optional sights, slewing devices or mechanisms to protect against thermal flash or lasers.

NOTE: Helmets described in 0A918.f.1 are controlled by 0A988. Helmets described in 0A918.f.2 are controlled by the U.S. Department of State, Office of Defense Trade Controls (See 22 CFR part 121, Category X).

0A980 Horses by sea.

LICENSE REQUIREMENTS

Reason for Control: SS

SS applies to entire entry. For licensing requirements (and possible License Exceptions), proceed directly to part 754 of the EAR. The Commerce Country Chart is not designed to determine licensing requirements for items controlled for SS reasons.

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

0A982 Saps; thumbcuffs, leg irons, shackles, and handcuffs; straight jackets, plastic handcuffs, police helmets and shields; and parts and accessories, n.e.s.

LICENSE REQUIREMENTS

Reason for Control: CC

Control(s)	*Country Chart*
CC applies to entire entry	CC Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

0A983 Specially designed implements of torture and thumbscrews; and parts and accessories, n.e.s.

LICENSE REQUIREMENTS

Reason for Control: CC

CC applies to entire entry. A license is required for ALL destinations, regardless of end-use. Accordingly, a column specific to this control does not appear on the Commerce Country Chart. (See part 742 of the EAR for additional information.)

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

0A984 Shotguns, barrel length 18 inches (45.72 cm) inches or over; buckshot shotgun shells; except equipment used exclusively to treat or tranquilize animals, and except arms designed solely for signal, flare, or saluting use; and parts, n.e.s.

LICENSE REQUIREMENTS

Reason for Control: CC, UN

Control(s)	*Country Chart*
CC applies to shotguns with a barrel length over 18 in. (45.72 cm) but less than 24 in. (60.96 cm) or buckshot shotgun shells controlled by this entry, regardless of end-user	CC Column 1
CC applies to shotguns with a barrel length over 24 in. (60.96 cm), regardless of end-user	CC Column 2
CC applies to shotguns with a barrel length over 24 in. (60.96 cm) if for sale or resale to police or law enforcement	CC Column 3
UN applies to entire entry	Rwanda

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: This entry does not control shotguns with a barrel length of less than 18 inches (45.72 cm). See 22 CFR part 121, Category I. These items are subject to the export licensing authority of the Department of State, Office of Defense Trade Controls.
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

0A985 Optical sighting devices for shotguns controlled by 0A984; discharge type arms (for example, stun guns, shock batons, electric cattle prods, immobilization guns and projectiles, etc.) except equipment used exclusively to treat or tranquilize animals, and except arms designed solely for signal, flare, or saluting use; and parts, n.e.s.

LICENSE REQUIREMENTS

Reason for Control: CC, UN

Control(s)	*Country Chart*
CC applies to entire entry	CC Column 1
UN applies to entire entry	Rwanda

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

0A986 Shotgun shells, except buckshot shotgun shells, and parts.

LICENSE REQUIREMENTS

Reason for Control: UN

UN applies to entire entry. A license is required for items controlled by this entry to Cuba, Libya, North Korea and Rwanda. The Commerce Country Chart is not designed to determine licensing requirements for this entry. See part 746 of the EAR for additional information.

NOTE: Exports from the U.S. and transhipments to Iran must be licensed by the Department of Treasury, Office of Foreign Assets Control. (See §746.7 of the EAR for additional information on this requirement.)

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

0A988 Conventional military steel helmets as described by 0A018.f.1; and machetes.

LICENSE REQUIREMENTS

Reason for Control: UN

UN applies to entire entry. A license is required for items controlled by this entry to Cuba, Libya, North Korea and Rwanda. The Commerce Country Chart is not designed to determine licensing requirements for this entry. See part 746 of the EAR for additional information.

NOTE: Exports from the U.S. and transhipments to Iran must be licensed by the Department of Treasury, Office of Foreign Assets Control. (See to §746.7 of the EAR for additional information on this requirement.)

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

B. TEST, INSPECTION AND PRODUCTION EQUIPMENT

0B001 Valves, specially designed or prepared for gaseous diffusion separation process, that are wholly made of or lined with aluminum, aluminum alloys, nickel, or alloy containing 60 percent by weight or more nickel, 40 mm (1.6 in.) or more in diameter, with bellows seals, and specially designed parts and components therefor.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: (1) This CCL entry controls only a subset of the items contained on the corresponding EU List number (e.g., 0B001.b). The items not included in this CCL entry are subject to the export licensing authority of the Nuclear Regulatory Commission (see 10 CFR part 110.) (2) Specially designed or prepared valves for gaseous diffusion separation process are also subject to the export licensing authority of the Nuclear Regulatory Commission. (See 10 CFR part 110.)
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

0B003 Plants for the production of uranium hexaflouride (UF_6) and specially designed or prepared equipment (including UF_6 purification equipment), and specially designed parts and accessories therefor.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value

Related Controls: This entry does not control nuclear plants (i.e., fuel fabrication facilities, enrichment facilities, reprocessing facilities, and heavy water production facilities). Nuclear plants are subject to the export licensing authority of the Nuclear Regulatory Commission. (See 10 CFR part 110.)
Related Definitions: N/A
Items: a. Plants for the production of UF_6;

b. Equipment and components, as follows, specially designed or prepared for UF_6 production:

b.1. Fluorination and hydrofluorination screw and fluid bed reactors and flame towers;

b.2. Distillation equipment for the purification of UF_6.

0B008 Reactor and power plant simulators and analytical models for reactor and power plant simulators, models or mock-ups.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: Nuclear equipment is also subject to the export licensing authority of the Nuclear Regulatory Commission. (See 10 CFR part 110.)
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

C. MATERIALS

0C006 Nickel powder and porous nickel metal.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Kilogram
Related Controls: Nickel powders which are specially prepared for the manufacture of gaseous diffusion barriers are subject to the export licensing authority of the Nuclear Regulatory Commission. (See 10 CFR part 110.)
Related Definitions: N/A
Items: a. Powder with a nickel purity content of 99.0% or greater and a mean particle size of less than 10 micrometers measured by the American Society for Testing and Materials (ASTM) B 330 standard, except filamentary nickel powders;

b. Porous nickel metal produced from materials controlled by 0C006.a except single porous nickel metal sheets not exceeding 1000 cm^2 per sheet.

NOTE: 0C006.b controls porous metal formed by compacting and sintering the material controlled by 0C006.a to form a metal material with fine pores interconnected throughout the structure.

D. SOFTWARE

0D001 "Software" specially designed or modified for the "development", "production" or "use" of items controlled by 0B001, 0B003, 0B008 or 0C006.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

E. TECHNOLOGY

0E001 "Technology" according to the General Technology Note for the "development", "production" or "use" of items controlled by 0B001, 0B003, 0B008 or 0C006.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A

Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

0E018 "Technology" for the "development", "production", or "use" of items controlled by 0A018.b through 0A018.e.

LICENSE REQUIREMENTS

Reason for Control: NS, AT, UN

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
AT applies to entire entry	AT Column 1
UN applies to entire entry	Rwanda

LICENSE EXCEPTIONS

CIV: N/A
TSR: Yes

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

0E984 "Technology" for the "development" or "production" of shotguns controlled by 0A984 and buckshot shotgun shells.

LICENSE REQUIREMENTS

Reason for Control: CC, UN

Control(s)	*Country Chart*
CC applies to ''technology'' for shotguns with a barrel length over 18 in. (45.72 cm) but less than 24 in. (60.96 cm) and shotgun shells, regardless of end-user	CC Column 1
CC applies to ''technology'' for shotguns with a barrel length over 24 in. (60.96 cm), regardless of end-user	CC Column 2
CC applies to ''technology'' for shotguns with a barrel length over 24 in. (60.96 cm) if for sale or resale to police or law enforcement	CC Column 3
UN applies to entire entry	Rwanda

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

EAR99 Items subject to the EAR that are not elsewhere specified in this CCL Category or in any other category in the CCL are designated by the number EAR99.

Category 1—Materials, Chemicals, ''Microorganisms,'' and Toxins

A. EQUIPMENT, ASSEMBLIES AND COMPONENTS

1A001 Components made from fluorinated compounds.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $5000
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Kilograms
Related Controls: N/A
Related Definitions: N/A
Items: a. Seals, gaskets, sealants or fuel bladders specially designed for aircraft or aerospace use made from more than 50% of any of the materials controlled by 1C009.b or .c;

b. Piezoelectric polymers and copolymers made from vinylidene fluoride:

b.1. In sheet or film form; and

b.2. With a thickness exceeding 200 micrometer;

c. Seals, gaskets, valve seats, bladders or diaphragms made from fluoroelastomers containing at least one vinylether monomer, specially designed for aircraft, aerospace or missile use.

1A002 "Composite" structures or laminates.

LICENSE REQUIREMENTS

Reason for Control: NS, MT, NP, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
MT applies to ''composite'' structures that are specially designed for missile applications (including specially designed subsystems and components)	MT Column 1
NP applies to 1A002.b	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $1500
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Kilograms
Related Controls: N/A
Related Definition: This entry does not control ''composite'' structures or laminates made from epoxy resin impregnated carbon ''fibrous or filamentary materials'' for the repair of aircraft structures of laminates,

provided that the size does not exceed one square meter (1 m^2).

Items: a. Having an organic ''matrix'' and made from materials controlled by 1C010.c, .d or .e; or

b. Having a metal or carbon ''matrix'' and made from:

b.1. Carbon ''fibrous and filamentary materials'' with:

b.1.a. A ''specific modulus'' exceeding 10.15×10^6 m; and

b.1.b. A ''specific tensile strength'' exceeding 17.7×10^4 m; or

b.2. Materials controlled by 1C010.c.

TECHNICAL NOTES: 1. Specific modulus: Young's modulus in pascals, equivalent to N/m^2 divided by specific weight in N/m^3, measured at a temperature of (296±2) K ((23±2) °C) and a relative humidity of (50±5)%.

2. Specific tensile strength: ultimate tensile strength in pascals, equivalent to N/m^2 divided by specific weight in N/m^3, measured at a temperature of (296±2) K ((23±2) °C) and a relative humidity of (50±5)%.

1A003 Manufactures of non-fluorinated polymeric substances controlled by 1C008.a, in film, sheet, tape or ribbon form.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $200
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Kilograms
Related Controls: N/A
Related Definitions: N/A
Items: a. With a thickness exceeding 0.254 mm; or

b. Coated or laminated with carbon, graphite, metals or magnetic substances.

1A102 Resaturated pyrolized carbon-carbon materials designed for systems controlled by 9A004.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $1500
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Kilograms
Related Controls: (1) See 9A110 for controls on ''composite'' structures or laminates usable in missile systems. (2) The corresponding EU number contains a reference to 9A104. Items controlled by the EU under 9A104 are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls (see 22 CFR part 121).
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

1A202 "Composite" structures, other than those controlled by 1A002, in the form of tubes with an inside diameter of between 75 mm and 400 mm made with "fibrous or filamentary materials" controlled by 1C010.a or .b or 1C210.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Kilograms
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

1A225 Platinized catalysts specially designed or prepared for promoting the hydrogen isotope exchange reaction between hydrogen and water for the recovery of tritium from heavy water or for the production of heavy water.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Kilograms
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

1A226 Specialized packings for use in separating heavy water from ordinary water and made of phosphor bronze mesh (chemically treated to improve wettability) and designed for use in vacuum distillation towers.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

1A227 High density (lead glass or other) radiation shielding windows greater than 0.09 m^2 on cold area and with a density greater than 3 g/cm^3 and a thickness of 100 mm or greater; and specially designed frames therefor.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: Nuclear equipment is also subject to the export licensing authority of the Nuclear Regulatory Commission. (See 10 CFR part 110.)
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

1A290 Depleted uranium (any uranium containing less than 0.711% of the isotope U–235) in shipments of more than 1,000 kilograms in the form of shielding contained in X-ray units, radiographic exposure or teletherapy devices, radioactive thermoelectric generators, or packaging for the transportation of radioactive materials.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Kilograms
Related Controls: (1) This entry does not control depleted uranium in fabricated forms for use in munitions. See 22 CFR part 121 for depleted uranium subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. (2) All forms of depleted uranium not specifically described in this entry, or in the above note, are subject to the export licensing authority of the Nuclear Regulatory Commission. (See 10 CFR part 110.)
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

1A984 Chemical agents, including tear gas formulation containing 1 percent or less of orthochlorobenzalmalononitrile (CS), or 1 percent or less of chloroacetophenone (CN), except in individual containers with a net weight of 20 grams or less; smoke bombs; non-irritant smoke flares, canisters, grenades and charges; other pyrotechnic articles having dual military and commercial use; and fingerprinting powders, dyes and inks.

LICENSE REQUIREMENTS

Reason for Control: CC

Control(s)	*Country Chart*
CC applies to entire entry	CC Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

1A988 Bulletproof and bullet resistant vests.

LICENSE REQUIREMENTS

Reason for Control: UN

UN applies to entire entry. A license is required for items controlled by this entry to Cuba, Libya, North Korea and Rwanda. The Commerce Country Chart is not designed to determine licensing requirements for this entry. See part 746 of the EAR for additional information.

NOTE: Exports from the U.S. and transhipments to Iran must be licensed by the Department of the Treasury, Office of Foreign Assets Control. (See §746.7 of the EAR for additional information on this requirement.)

LICENSE EXCEPTIONS

LVS: N/A

GBS: N/A

CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Number

Related Controls: Bulletproof and bullet resistant vests (body armor) are also subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. (See 22 CFR 121.1, Category X.)

Related Definitions: N/A

Items: The list of items controlled is contained in the ECCN heading.

B. TEST, INSPECTION AND PRODUCTION EQUIPMENT

1B001 Equipment for the "production" of fibers, prepregs, preforms or "composites" controlled by 1A002 or 1C010, and specially designed components and accessories therefor.

LICENSE REQUIREMENTS

Reason for Control: NS, MT, NP, AT

Control(s)	*Country chart*
NS applies to entire entry	NS Column 2
MT applies to entire entry EXCEPT 1B001.d.4 and .f	MT Column 1
NP applies to filament winding machines described in 1B001.a that are capable of winding cylindrical rotors having a diameter between 75 mm (3 in) and 400 mm (16 in) and lengths of 600 mm (24 in) or greater; AND coordinating and programming controls and precision mandrels for these filament winding machines	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A for 1B001.a; $5000 for all other items

GBS: N/A

CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value

Related Controls: N/A

Related Definitions: N/A

Items: a. Filament winding machines of which the motions for positioning, wrapping and winding fibers are coordinated and programmed in three or more axes, specially designed for the manufacture of ''composite'' structures or laminates from ''fibrous and filamentary materials'';

b. Tape-laying or tow-placement machines of which the motions for positioning and laying tape, tows or sheets can be coordinated and programmed in two or more axes, specially designed for the manufacture of ''composite'' airframe or ''missile'' structures;

c. Multi-directional, multidimensional weaving machines or interlacing machines, including adapters and modification kits, for weaving, interlacing or braiding fibers to manufacture ''composite'' structures, except textile machinery not modified for the above end-uses;

d. Equipment specially designed or adapted for the ''production'' of ''fibrous or filamentary materials''; as follows:

d.1. Equipment for converting polymeric fibers (such as polyacrylonitrile, rayon, pitch or polycarbosilane) into carbon fibers or silicon carbide fibers, including special equipment to strain the fiber during heating;

d.2. Equipment for the chemical vapor deposition of elements or compounds on heated filamentary substrates to manufacture silicon carbide fibers;

d.3. Equipment for the wet-spinning of refractory ceramics (such as aluminum oxide);

d.4. Equipment for converting aluminum containing precursor fibers into alumina fibers by heat treatment;

e. Equipment for producing prepregs controlled by 1C010.e by the hot melt method;

f. Non-destructive inspection equipment capable of inspecting defects three dimensionally, using ultrasonic or X-ray tomography and specially designed for ''composite'' materials;

1B002 Systems and components therefor specially designed for producing metal alloys, metal alloy powder or alloyed materials controlled by 1C002.a.2, 1C002.b, or 1C002.c.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $5000

GBS: N/A

CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value

Related Controls: N/A

Related Definitions: N/A

Items: The list of items controlled is contained in the ECCN heading.

1B003 Tools, dies, molds or fixtures, for "superplastic forming" or "diffusion bonding" titanium or aluminum or their alloys, specially designed for the manufacture of equipment described in this entry.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $5000
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number; components in $ value
Related Controls: N/A
Related Definitions: N/A
Items: a. Airframe or aerospace structures;
b. Aircraft or aerospace engines; or
c. Specially designed components for those structures or engines.

1B018 Equipment on the International Munitions List.

LICENSE REQUIREMENTS

Reason for Control: NS, MT, RS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
MT applies to equipment for the "production" of rocket propellants	MT Column 1
RS applies to 1B018.a	RS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $3000 for 1B018.a for countries WITHOUT an "X" in RS Column 2 on the Country Chart contained in Supplement No. 1 to part 738 of the EAR; $5000 for 1B018.b
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number; parts and accessories in $ value
Related Controls: N/A
Related Definitions: N/A
Items: a. Equipment for the "production" of military explosives and solid propellants.
a.1. Complete installations;
a.2. Specialized components (for example, dehydration presses; extrusion presses for the extrusion of small arms, cannon and rocket propellants; cutting machines for the sizing of extruded propellants; sweetie barrels (tumblers) 6 feet and over in diameter and having over 500 pounds product capacity; and continuous mixers for solid propellants); or
a.3. Nitrators, continuous types; and
a.4. Specially designed parts and accessories therefor.
b. Environmental chambers capable of pressures below (10^{-4}) Torr, and specially designed components therefor.

1B101 Equipment, other than that controlled by 1B001, for the production of structural composites and specially designed components and accessories thereof.

LICENSE REQUIREMENTS

Reason for Control: MT, NP, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
NP applies to 1B101.a only	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: Components and accessories controlled by this entry include moulds, mandrels, dies, fixtures and tooling for the preform processing, curing, casting, sintering or bonding of composite structures, laminates and manufactures thereof.
Items: a. Filament winding machines, of which the motions for positioning, wrapping and winding fibers can be coordinated and programmed in three or more axes, designed for the manufacture of "composite" structures or laminates from "fibrous or filamentary materials".
b. Tape-laying machines, of which the motions for positioning and laying tape or sheets can be coordinated and programmed in two or more axes, designed for the manufacture of "composite" airframe or "missile" structures.
c. Equipment designed or modified for the "production" of "fibrous or filamentary materials", as follows:
c.1. Equipment for converting polymeric fibers (such as polyacrylonitrile, rayon, or polycarbosilane) including special equipment to strain the fiber during heating;
c.2. Equipment for the chemical vapor deposition of elements or compounds on heated filament substrates; and
c.3. Equipment for the wet-spinning of refractory ceramics (such as aluminum oxide).
d. Equipment designed or modified for special fiber surface treatment or for producing prepregs and preforms, not controlled by 9A110.

NOTE: Equipment covered by 1B101.d includes but is not limited to rollers, tension stretchers, coating equipment, cutting equipment, and clicker dies.

1B115 Equipment for the "production", handling and acceptance testing of propellants or propellant constituents specified in 1C115.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number; components in $ value
Related Controls: (1) For other equipment for ''production'', handling, mixing, curing, casting, pressing, machining, extruding or acceptance testing of solid propellants or propellant constituents, including but not limited to: equipment for the ''production'' of atomized or spherical metallic powder in a controlled environment; and fluid energy mills for grinding or milling ammonium perchlorate, RDX, or HMX; (2) Equipment for ''production'', handling, or acceptance testing of liquid propellants or propellant constituents; and (3) Specially designed components for the items described in 1B115.a is subject to the export licensing authority of the Department of State, Office of Defense Trade Controls. (See 22 CFR part 121.)
Related Definitions: N/A
Items: a. Batch mixers and continuous mixers, as follows, capable of mixing solid propellants or propellant constituents under vacuum in the range from 0 kPa to 13.326 kPa, and with temperature control capability of the mixing chamber:

a.1. Batch mixers having:

a.1.a. A total volumetric capacity of 110 liters (30 gallons) or more; and

a.1.b. At least one mixing/kneading shaft mounted off center;

a.2. Continuous mixers having:

a.2.a. Two or more mixing/kneading shafts; and

a.2.b. Capability to open the mixing chamber.

1B116 Specially designed nozzles for producing pyrolitically derived materials formed on a mold, mandrel or other substrate from precursor gases that decompose in the 1573 K (1300 °C) to 3,173 K (2900 °C) temperature range at pressures of 130 Pa to 20 kPa.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $1500
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

1B201 Filament winding machines, other than those specified in 1B001 or 1B101, in which the motions for positioning, wrapping, and winding fibers are coordinated and programmed in two or more axes, specially designed to fabricate "composite" structures or laminates from "fibrous and filamentary materials" and capable of winding cylindrical rotors of diameters between 75 mm (3 in.) and 400 mm (16 in.) and lengths of 600 mm (24 in.) or greater; coordinating and programming controls therefor; and precision mandrels therefor.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

1B225 Electrolytic cells for fluorine production with a production capacity greater than 250 g of fluorine per hour.

LICENSE REQUIREMENTS

Reason for Control: NS, NP, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

1B226 Electromagnetic isotope separators designed for, or equipped with, single or multiple ion sources capable of providing a total ion beam current of 50 mA or greater.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: Isotope separators specially designed or prepared for separating uranium isotopes are subject to the export licensing authority of the Nuclear Regulatory Commission. (See 10 CFR part 110.)
Related Definitions: This entry controls; (a) separators capable of enriching stable isotopes; and, (b) seperators with the ion sources and collectors both in the magnetic field and those configurations in which they are external to the field.
Items: The list of items controlled is contained in the ECCN heading.

1B227 Ammonia synthesis converters or ammonia synthesis units in which the synthesis gas (nitrogen and hydrogen) is withdrawn from an ammonia/hydrogen high-pressure exchange column and the synthesized ammonia is returned to that column.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definition: N/A
Items: The list of items controlled is contained in the ECCN heading.

1B228 Hydrogen-cryogenic distillation columns having all of the following characteristics.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: Heavy water production equipment is also subject to the export licensing authority of the Nuclear Regulatory Commission. (See 10 CFR part 110.)
Related Definitions: N/A
Items: a. Designed to operate at internal temperatures of 35 K (−238 °C) or less;

b. Designed to operate at internal pressure of 0.5 to 5 Mpa (5 to 50 atmospheres);

c. Constructed of fine-grain stainless steels of the 300 series with low sulfur content or equivalent cryogenic and H_2-compatible materials; and

NOTE: Fine-grain stainless steels in this ECCN are defined to be fine-grain austenitic stainless steels with an ASTM (or equivalent standard) grain size number of 5 or greater.

d. With internal diameters of 1 m or greater and effective lengths of 5 m or greater.

1B229 Water-hydrogen sulfide exchange tray columns constructed from fine carbon steel with a diameter of 1.8 m (6 ft) or greater that can operate at a nominal pressure of 2 MPa (300 psi) or greater, and internal contactors therefor.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: (1) This entry does not control columns specially designed or prepared for the production of heavy water controlled on the NSG Trigger List (INFCIRC/254/part 2). See 10 CFR part 110 for heavy water production equipment subject to the export licensing authority of the Nuclear Regulatory Commission.
Related Definition: (1) 1B229 includes internal contactors of the columns are segmented trays with an effective assembled diameter of 1.8 m (6 ft.) or greater, are designed to facilitate countercurrent contacting and constructed of materials resistant to corrosion by hydrogen sulfide/water mixtures. These may be sieve trays, valve trays, bubble cap trays or turbogrid trays. (2) Fine carbon steel in this entry is defined to be steel with the austenitic ASTM (or equivalent standard) grain size number of 5 or greater. (3) Materials resistant to corrosion by hydrogen sulfide/water mixtures in this entry are defined to be stainless steels with a carbon content of 0.03% or less.
Items: The list of items controlled is contained in the ECCN heading.

1B230 Pumps circulating solutions of diluted or concentrated potassium amide catalyst in liquid ammonia (KNH_2/NH_3) having all of the following characteristics.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: Heavy water production equipment is also subject to the export licensing authority of the Nuclear Regulatory Commission. (See 10 CFR part 110.)
Related Definitions: N/A
Items: a. Airtight (i.e., hermetically sealed);

b. For concentrated potassium amide solutions (1% or greater), operating pressure of 1.5 to 60 MPa (15 to 600 atmospheres [atm]); or for dilute potassium amide solution (less than 1%), operating pressure of 20 to 60 MPa (200 to 600 atm); and

c. A capacity greater than 8.5 m^3/h (5 cubic feet per minute).

1B231 Tritium facilities, plants and equipment.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: This entry does not control tritium, tritium compounds, and mixtures containing tritium, or products or devices thereof. See 10 CFR part 110 for tritium subject to the export licensing authority of the Nuclear Regulatory Commission.
Related Definitions: N/A
Items: a. Facilities or plants for the production, recovery, extraction, concentration, or handling of tritium;

b. Equipment for tritium facilities or plants, as follows:

b.1. Hydrogen or helium refrigeration units capable of cooling to 23 K (−250 °C) or less, with heat removal capacity greater than 150 watts; or

b.2. Hydrogen isotope storage and purification systems using metal hydrides as the storage, or purification medium.

1B232 Turboexpanders or turboexpander-compressor sets designed for operation below 35K and a throughput of hydrogen gas of 1000 kg/hr or greater.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

C. MATERIALS

1C001 Materials specially designed for use as absorbers of electromagnetic waves, or intrinsically conductive polymers.

LICENSE REQUIREMENTS

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $5000
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Kilograms
Related Controls: N/A
Related Definitions: N/A
Items: a. Materials for absorbing frequencies exceeding 2×10^8 Hz but less than 3×10^{12} Hz, except materials as follows:

a.1. Hair type absorbers, constructed of natural or synthetic fibers, with non-magnetic loading to provide absorption;

a.2. Absorbers having no magnetic loss and whose incident surface is non-planar in shape, including pyramids, cones, wedges and convoluted surfaces;

a.3. Planar absorbers:

a.3.a. Made from:

a.3.a.1. Plastic foam materials (flexible or non-flexible) with carbon-loading, or organic materials, including binders, providing more than 5% echo compared with metal over a bandwidth exceeding ±15% of the center frequency of the incident energy, and not capable of withstanding temperatures exceeding 450 K (177 °C); or

a.3.a.2. Ceramic materials providing more than 20% echo compared with metal over a bandwidth exceeding ± 15% of the center frequency of the incident energy, and not capable of withstanding temperatures exceeding 800 K (527 °C);

TECHNICAL NOTE: Absorption test samples for 1C001.a.3.a should be a square at least 5 wavelengths of center frequency on a side and positioned in the far field of the radiating element.

a.3.b. Tensile strength less than $7\times10^6 N/m^2$; and

a.3.c. Compressive strength less than $14\times10^6 N/m^2$;

a.4. Planar absorbers made of sintered ferrite, with:

a.4.a. A specific gravity exceeding 4.4; and

a.4.b. A maximum operating temperature of 548 K (275 °C);

NOTE: Nothing in 1C001.a releases magnetic materials to provide absorption when contained in paint.

b. Materials for absorbing frequencies exceeding 1.5×10^{14} Hz but less than 3.7×10^{14} Hz and not transparent to visible light;

c. Intrinsically conductive polymeric materials with a bulk electrical conductivity exceeding 10,000 S/m (Siemens per meter) or a sheet (surface) resistivity of less than 100 ohms/square, based on any of the following polymers:

c.1. Polyaniline;

c.2. Polypyrrole;

c.3. Polythiophene;

c.4. Poly phenylene-vinylene;

c.5. Poly thienylene-vinylene;

TECHNICAL NOTE: Bulk electrical conductivity and sheet (surface) resistivity should be determined using ASTM D–257 or equivalents.

1C002 Metal alloys, metal alloy powder or alloyed materials.

LICENSE REQUIREMENTS

Reason for Control: NS, NP, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
NP applies to 1C002.a.2.c or a.2.d if they exceed the parameters stated in 1C202	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $3000
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Kilograms
Related Controls: N/A
Related Definition: This entry does not control metal alloys, metal alloy powder or alloyed materials for coating substrates.
Items: a. Metal alloys, as follows:

a.1. Nickel or titanium-based alloys in the form of aluminides, as follows, in crude or semi-fabricated forms:

a.1.a. Nickel aluminides containing 10 weight percent or more aluminum;

a.1.b. Titanium aluminides containing 12 weight percent or more aluminum;

a.2. Metal alloys, as follows, made from metal alloy powder or particulate material controlled by 1C002.b:

a.2.a. Nickel alloys with:

a.2.a.1. A stress-rupture life of 10,000 hours or longer at 923 K (650 °C) and at a stress of 550 MPa; or

a.2.a.2. A low cycle fatigue life of 10,000 cycles or more at 823 K (550 °C) at a maximum stress of 700 MPa;

a.2.b. Niobium alloys with:

a.2.b.1. A stress-rupture life of 10,000 hours or longer at 1,073 K (800 °C) and at a stress of 400 MPa; or

a.2.b.2. A low cycle fatigue life of 10,000 cycles or more at 973 K (700 °C) at a maximum stress of 700 MPa;

a.2.c. Titanium alloys with:

a.2.c.1. A stress-rupture life of 10,000 hours or longer at 723 K (450 °C) and at a stress of 200 MPa; or

a.2.c.2. A low cycle fatigue life of 10,000 cycles or more at 723 K (450 °C) at a maximum stress of 400 MPa;

a.2.d. Aluminum alloys with a tensile strength of:

a.2.d.1. 240 MPa or more at 473 K (200 °C); or

a.2.d.2. 415 MPa or more at 298 K (25 °C);

a.2.e. Magnesium alloys with a tensile strength of 345 MPa or more and a corrosion rate of less than 1 mm/year in 3% sodium chloride aqueous solution measured in accordance with ASTM standard G–31 or equivalents;

TECHNICAL NOTES: 1. The metal alloys in 1C002.a are those containing a higher percentage by weight of the stated metal than of any other element.

2. Stress-rupture life should be measured in accordance with ASTM standard E–139 or equivalents.

3. Low cycle fatigue life should be measured in accordance with ASTM Standard E–606 'Recommended Practice for Constant-Amplitude Low-Cycle Fatigue Testing' or equivalents. Testing should be axial with an average stress ratio equal to 1 and a stress-concentration factor (K_t) equal to 1. The average stress is defined as maximum stress minus minimum stress divided by maximum stress.

b. Metal alloy powder or particulate material for materials controlled by 1C002.a, as follows:

b.1. Made from any of the following composition systems:

TECHNICAL NOTE: X in the following equals one or more alloying elements.

b.1.a. Nickel alloys (Ni-Al-X, Ni-X-Al) qualified for turbine engine parts or components, i.e. with less than 3 non-metallic particles (introduced during the manufacturing process) larger than 100 micrometer in 10^9 alloy particles;

b.1.b. Niobium alloys (Nb-Al-X or Nb-X-Al, Nb-Si-X or Nb-X-Si, Nb-Ti-X or Nb-X-Ti);

b.1.c. Titanium alloys (Ti-Al-X or Ti-X-Al);

b.1.d. Aluminum alloys (Al-Mg-X or Al-X-Mg, Al-Zn-X or Al-X-Zn, Al-Fe-X or Al-X-Fe); or

b.1.e. Magnesium alloys (Mg-Al-X or Mg-X-Al); and

TECHNICAL NOTE: X equals one or more alloying elements.

b.2. Made in a controlled environment by any of the following processes:

b.2.a. ''Vacuum atomization'';

b.2.b. ''Gas atomization'';

b.2.c. ''Rotary atomization'';

b.2.d. ''Splat quenching'';

b.2.e. ''Melt spinning'' and ''comminution'';

b.2.f. ''Melt extraction'' and ''comminution''; or

b.2.g. ''Mechanical alloying'';

c. Alloyed materials, in the form of uncomminuted flakes, ribbons or thin rods produced in a controlled environment by ''splat quenching,'' ''melt spinning'' or ''melt extraction'', used in the manufacture of metal alloy powder or particulate material controlled by 1C002.b;

1C003 Magnetic metals, of all types and of whatever form, having any of the following characteristics.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $3000
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED:
Unit: Kilograms
Related Controls: N/A
Related Definitions: N/A
Items: a. Initial relative permeability 120,000 or more and thickness 0.05 mm or less;

TECHNICAL NOTE: Measurement of initial permeability must be performed on fully annealed materials.

b. Magnetostrictive alloys with:

b.1. A saturation magnetostriction of more than 5×10^{-4}; or

b.2. A magnetomechanical coupling factor (k) of more than 0.8; or

c. Amorphous alloy strips with:

c.1. A composition having a minimum of 75 weight percent of iron, cobalt or nickel; and

c.2. A saturation magnetic induction (B_s) of 1.6 T or more, and:

c.2.a. A strip thickness of 0.02 mm or less; or

c.2.b. An electrical resistivity of 2×10^{-4} ohmcm or more.

1C004 Uranium titanium alloys or tungsten alloys with a "matrix" based on iron, nickel or copper.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $3000
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Kilograms
Related Controls: N/A
Related Definitions: N/A
Items: a. A density exceeding 17.5 g/cm^3;

b. An elastic limit exceeding 1,250 MPa;

c. An ultimate tensile strength exceeding 1,270 MPa; and

d. An elongation exceeding 8%.

1C005 "Superconductive" "composite" conductors in lengths exceeding 100 m or with a mass exceeding 100 g.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS:

LVS: $1500
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Kilograms
Related Controls: N/A
Related Definitions: N/A
Items: a. Multifilamentary ''superconductive'' ''composite'' conductors containing one or more niobium-titanium filaments:

a.1. Embedded in a ''matrix'' other than a copper or copper based mixed ''matrix''; or

a.2. With a cross-section area less than 0.28×10^{-4} mm² (i.e., 6 micrometer in diameter for circular filaments);

b. ''Superconductive'' ''composite'' conductors consisting of one or more ''superconductive'' filaments other than niobium-titanium:

b.1. With a ''critical temperature'' at zero magnetic induction exceeding 9.85 K (−263.31 °C) but less than 24 K (−249.16 °C);

b.2. With a cross-section of less than 0.28×10^{-4} mm²; and

b.3. Which remain in the ''superconductive'' state at a temperature of 4.2 K (−268.96 °C) when exposed to a magnetic field corresponding to a magnetic induction of 12 T.

1C006 Fluids and lubricating materials.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $3000
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Barrels (55 U.S. gallons/ 209 liters)
Related Controls: N/A
Related Definitions: N/A
Items: a. Hydraulic fluids containing, as their principal ingredients, any of the following compounds or materials:

a.1. Synthetic hydrocarbon oils or silahydrocarbon oils with:

a.1.a. A flash point exceeding 477 K (204 °C);

a.1.b. A pour point at 239 K (−34 °C) or less;

a.1.c. A viscosity index of 75 or more; and

a.1.d. A thermal stability at 616 K (343 °C); or

NOTE: For the purpose of 1C006.a.1, silahydrocarbon oils contain exclusively silicon, hydrogen and carbon.

a.2. Chlorofluorocarbons with:

a.2.a. No flash point;

a.2.b. An autogenous ignition temperature exceeding 977 K (704 °C);

a.2.c. A pour point at 219 K (−54 °C) or less;

a.2.d. A viscosity index of 80 or more; and

a.2.e. A boiling point at 473 K (200 °C) or higher;

NOTE: For the purpose of 1C006.a.2, chlorofluorocarbons contain exclusively carbon, fluorine and chlorine.

b. Lubricating materials containing, as their principal ingredients, any of the following compounds or materials:

b.1. Phenylene or alkylphenylene ethers or thio-ethers, or their mixtures, containing more than two ether or thio-ether functions or mixtures thereof; or

b.2. Fluorinated silicone fluids with a kinematic viscosity of less than 5,000 mm²/s (5,000 centistokes) measured at 298 K (25 °C);

c. Damping or flotation fluids with a purity exceeding 99.8%, containing less than 25 particles of 200 micrometer or larger in size per 100 ml and made from at least 85% of any of the following compounds or materials:

c.1. Dibromotetrafluoroethane;

c.2. Polychlorotrifluoroethylene (oily and waxy modifications only); or

c.3. Polybromotrifluoroethylene;

TECHNICAL NOTE: For the purpose of 1C006:

a. Flash point is determined using the Cleveland Open Cup Method described in ASTM D–92 or equivalents.

b. Pour point is determined using the method described in ASTM D–97 or equivalents.

c. Viscosity index is determined using the method described in ASTM D–2270 or equivalents.

d. Thermal stability is determined by the following test procedure or equivalents: Twenty ml of the fluid under test is placed in a 46 ml type 317 stainless steel chamber containing one each of 12.5 mm (nominal) diameter balls of M–10 tool steel, 52100 steel and naval bronze (60% Cu, 39% Zn, 0.75% Sn). The chamber is purged with nitrogen, sealed at atmospheric pressure and the temperature raised to and maintained at 644±6 K (371±6 °C) for six hours. The specimen will be considered thermally stable if, on completion of the above procedure, all of the following conditions are met:

1. The loss in weight of each ball is less than 10 mg/mm² of ball surface;

2. The change in original viscosity as determined at 311 K (38 °C) is less than 25%; and

3. The total acid or base number is less than 0.40.

1e. Autogenous ignition temperature is determined using the method described in ASTM E–659 or equivalents.

1C007 Ceramic base materials, non-"composite" ceramic materials, ceramic "matrix" "composite" materials and precursor materials.

LICENSE REQUIREMENTS

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
MT applies to items described in 1C007.d (dielectric constant less than 6 at frequencies from 100Hz to 10,000 MH_Z) for use in missile radomes	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $5000, except N/A for 1C007.e
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Kilograms
Related Controls: N/A
Related Definitions: N/A
Items: a. Base materials of single or complex borides of titanium having total metallic impurities, excluding intentional additions, of less than 5,000 ppm, an average particle size equal to or less than 5 micrometer and no more than 10% of the particles larger than 10 micrometer;

b. Non-''composite'' ceramic materials in crude or semi-fabricated form, composed of borides of titanium with a density of 98% or more of the theoretical density, except abrasives;

c. Ceramic-ceramic ''composite'' materials with a glass or oxide-''matrix'' and reinforced with fibers from any of the following systems:

c.1. Si–N;

c.2. Si–C;

c.3. Si–Al–O–N; or

c.4. Si–O–N;

d. Ceramic-ceramic ''composite'' materials, with or without a continuous metallic phase, containing finely dispersed particles or phases of any fibrous or whisker-like material, where carbides or nitrides of silicon, zirconium or boron form the ''matrix'';

e. Precursor materials (i.e., special purpose polymeric or metallo-organic materials) for producing any phase or phases of the materials controlled by 1C007.c, as follows:

e.1. Polydiorganosilanes (for producing silicon carbide);

e.2. Polysilazanes (for producing silicon nitride); or

e.3. Polycarbosilazanes (for producing ceramics with silicon, carbon and nitrogen components).

1C008 Non-fluorinated polymeric substances.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $200
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Kilograms
Related Controls: N/A
Related Definitions: N/A
Items: a.1. Bismaleimides;

a.2. Aromatic polyamide-imides;

a.3. Aromatic polyimides;

a.4. Aromatic polyetherimides having a glass transition temperature (T_g) exceeding 503 K (230 °C) as measured by the wet method.

NOTE: 1C008.a does not control non-fusible compression molding powders or molded forms.

b. Thermoplastic liquid crystal copolymers having a heat distortion temperature exceeding 523 K (250 °C) measured according to ASTM D–648, method A, or equivalents, with a load of 1.82 N/mm² and composed of:

b.1. Either of the following:

b.1.a. Phenylene, biphenylene or naphthalene; or

b.1.b. Methyl, tertiary-butyl or phenyl substituted phenylene, biphenylene or naphthalene; and

b.2. Any of the following acids:

b.2.a. Terephthalic acid;

b.2.b. 6-hydroxy-2 naphthoic acid; or

b.2.c. 4-hydroxybenzoic acid;

c. Polyarylene ether ketones, as follows:

c.1. Polyether ether ketone (PEEK);

c.2. Polyether ketone ketone (PEKK);

c.3. Polyether ketone (PEK);

c.4. Polyether ketone ether ketone ketone (PEKEKK);

d. Polyarylene ketones;

e. Polyarylene sulphides, where the arylene group is biphenylene, triphenylene or combinations thereof;

f. Polybiphenylenethersulphone.

1C009 Unprocessed fluorinated compounds.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $5000
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Kilograms
Related Controls: N/A
Related Definitions: N/A
Items: a. Copolymers of vinylidene fluoride having 75% or more beta crystalline structure without stretching;

b. Fluorinated polyimides containing 30% or more of combined fluorine;

c. Fluorinated phosphazene elastomers containing 30% or more of combined fluorine.

1C010 "Fibrous and filamentary materials" that may be used in organic "matrix", metallic "matrix" or carbon "matrix" "composite" structures or laminates.

LICENSE REQUIREMENTS

Reason for Control: NS, NP, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
NP applies to 1C010.a, .b, .c, and e.1	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $1500, except for 1C010.a, .b, .c and e.1
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Kilograms
Related Controls: N/A
Related Definitions: N/A
Items: a. Organic ''fibrous and filamentary materials'' (except polyethylene) with:

a.1. A ''specific modulus'' exceeding 12.7×10^6m; and

a.2. A ''specific tensile strength'' exceeding 23.5×10^4m;

b. Carbon ''fibrous and filamentary materials'' with:

b.1. A ''specific modulus'' exceeding 12.7×10^6m; and

b.2. A ''specific tensile strength'' exceeding 23.5×10^4m;

TECHNICAL NOTE: Properties for materials described in 1C010.b should be determined using Suppliers of Advance Composite Materials Association (SACMA) recommended methods SRM 12 to 17, or equivalent tow tests, such as Japanese Industrial Standard JIS–R–7601, Paragraph 6.6.2., and based on lot average.

NOTE: 1C010.b does not control fabric made from ''fibrous or filamentary materials'' for the repair of aircraft structures or laminates, in which the size of individual sheets does not exceed 50 cm×90 cm.

c. Inorganic ''fibrous or filamentary materials'' with:

c.1. A ''specific modulus'' exceeding 2.54×106 m; and

c.2. A melting, decomposition or sublimation point exceeding 1,922 K (1,649 °C) in an inert environment; except

NOTE: 1C010.c does not control:
1. Discontinuous, multiphase, polycrystalline alumina fibers in chopped fiber or random mat form, containing 3 weight percent or more silica, with a ''specific modulus'' of less than 10×10^6 m;
2. Molybdenum and molybdenum alloy fibers;
3. Boron fibers;
4. Discontinuous ceramic fibers with a melting, decomposition or sublimation point lower than 2,043 K (1,770 °C) in an inert environment.

d. ''Fibrous or filamentary materials'':

d.1. Composed of any of the following:

d.1.a. Polyetherimides controlled by 1C008.a; or

d.1.b. Materials controlled by 1C008.b, .c, .d, .e, or .f; or

d.2. Composed of materials controlled by 1C010.d.1.a or .b and ''commingled'' with other fibers controlled by 1C010.a, b, or c;

e. Resin- or pitch-impregnated fibers (prepregs), metal or carbon-coated fibers (preforms) or ''carbon fiber preforms'', as follows:

e.1. Made from ''fibrous or filamentary materials'' controlled by 1C010.a, .b, or .c; or

e.2. Made from organic or carbon ''fibrous or filamentary materials'':

e.2.a. With a ''specific tensile strength'' exceeding 17.7×10^4m;

e.2.b. With a ''specific modulus'' exceeding 10.15×10^6m;

e.2.c. Not controlled by 1C010.a or .b; and

e.2.d. When impregnated with materials controlled by 1C008 or 1C009.b, or with phenolic or epoxy resins, having a glass transition temperature (T_g) exceeding 383 K (110 °C).

NOTE: 1C010.e does not control epoxy resin matrix impregnated carbon ''fibrous or filamentary materials'' (prepregs) for the repair of aircraft structures or laminates, in which the size of individual sheets of prepreg does not exceed 50 cm×90cm.

1C018 Materials on the International Munitions List.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $3000
GBS: Yes for items listed in Advisory Note to 1C018
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Kilograms
Related Controls: N/A
Related Definitions: N/A
Items: a. Ethyl and Methyl centralites.

b. NN-Diphenylurea (unsymmetrical diphenylurea).

c. Methyl-NN-diphenylurea (methyl unsymmetrical diphenylurea).

d. Ethyl-NN-diphenylurea (ethyl unsymmetrical diphenylurea).

e. Ethyl phenyl urethane.

f. Diphenyl urethane.

g. Diortho tolyl-urethane.

h. 2-Nitrodiphenylamine.

i. p-Nitromethylaniline.

j. 2,2' Dinitropropanol.

k. Bis(2,2' dinitropropyl) formal and acetal.

l. 3-Nitraza-1,5 pentane diisocyanate.

m. Guanidine nitrate.

n. Hydrogen peroxide in concentrations of 85%.

o. Charges specially designed for civilian applications, containing military explosives, except those items described in 1C992.

TECHNICAL NOTE: Military high explosives are solid, liquid or gaseous substances or mixtures of substances that, in their application as primary, booster, or main charges in warheads, demolition and other military applications, are required to detonate.

ADVISORY NOTE: Licenses are likely to be approved for export and reexport to satisfactory end-users in Country Group D:1 of certain explosive substances and mixtures in reasonable quantities for civilian or industrial purposes when made into cartridges or charges of an exclusively civilian or industrial nature, such as propellants for sporting purposes or shooting gallery practice; cartridges for riveting guns; and explosive charges for agricultural purposes, public works, mines, quarries or oil-well drilling. The following are the substances or mixtures to which this procedure applies:

a. Nitrate-based (40 percent or more) and provided they do not contain more than 40 percent nitroglycol/nitroglycerin or no more than 16 percent TNT;

b. Nitrocellulose with a nitrogen content of over 12.2 percent;

c. Nitroglycerin;

d. Single base nitrocellulose;

e. Sodium azide and other inorganic azides.

1C101 Materials and devices for reduced observables such as radar reflectivity, ultraviolet/infrared signatures and acoustic signatures other than those controlled by 1C001, usable in "missiles" and their subsystems.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Kilograms
Related Controls: N/A
Related Definitions: Materials controlled by this entry include: (a) structural materials and coatings specially designed for reduced radar reflectivity; (b) coatings, including paints, specially designed for reduced or tailored reflectivity or emissivity in the microwave, infrared or ultraviolet spectra. This entry does not control coatings when specially used for the thermal control of satellites.
Items: The list of items controlled is contained in the ECCN heading.

1C107 Graphite and ceramic materials.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $5000
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Kilograms
Related Controls: N/A
Related Definitions: N/A
Items: a. Fine grain recrystallized bulk graphites (with a bulk density of at least 1.72 g/cm^3 measured at 288 K (15 °C) and having a particle size of 100 micrometers or less), pyrolytic, or fibrous reinforced graphites usable for rocket nozzles and reentry vehicle nose tips; and

b. Ceramic ''composite'' materials (dielectric constant less than 6 at frequencies from 100 Hz to 10,000 MHz) for use in radomes, and bulk machinable silicon-carbide reinforced unfired ceramic, useable for nose tips.

1C115 Propellants and constituent chemicals for propellants.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Kilograms
Related Controls: The following materials, whether or not encapsulated in aluminum, beryllium, magnesium, or zirconium are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls: (See 22 CFR part 121, Category V): (a) Spherical aluminum powder with particles of uniform diameter 60×10^{-6} m (60 micrometers) or less and an aluminum content of 97 percent or greater; (b) Metal fuels in particle sizes less than 60×10^{-6}m (60 microns), whether spherical, atomized, spheroidal, flaked or ground, manufactured from material consisting of 99 percent or more of: Boron; magnesium; zirconium; alloys of boron, magnesium or zirconium; beryllium; or iron powder with average particle size of 3×10^{-6} m (3 microns) or less produced by hydrogen reduction of iron oxide.
Related Definitions: N/A
Items: a. Fuel substances:

a.1. Spherical aluminum powder, as follows:

a.1.a. Spherical aluminum powder with particles of uniform diameter less than 500×10^{-6} m (500 micrometers), but greater than 60×10^{-6} m (60 micrometers), and an aluminum content of 97 percent by weight or greater;

a.1.b. Spherical aluminum powder with particles of uniform diameter 60×10^{-6} m (60 micrometers) or less, and an aluminum content of 97 percent by weight or greater, but less than 99 percent;

a.2. Metal fuels containing beryllium, boron, magnesium, zirconium, or alloys of boron, magnesium, or zirconium, as follows:

a.2.a. Metal fuels in particle sizes less than 500×10^{-6} m (500 microns), but equal to or greater than 60×10^{-6} m (60 microns), whether spherical, atomized, spheroidal, flaked or ground, consisting of 97 percent by weight or more of beryllium, boron, magnesium, zirconium, and alloys of boron, magnesium, or zirconium;

a.2.b. Metal fuels in particle sizes less than 60×10^{-6} m (60 microns), whether spherical, atomized, spheroidal, flaked or ground, consisting of 97 percent by weight or more, but less than 99 percent, of beryllium, boron, magnesium, zirconium, and alloys of boron, magnesium, or zirconium;

a.3. Metal fuels in particle sizes less than 500×10^{-6} m (500 microns), whether spherical, atomized, spheroidal, flaked or ground, consisting of 97 percent by weight or more of alloys of beryllium.

a.4. Liquid oxidizer substances:

a.4.a. Dinitrogen trioxide;

a.4.b. Nitrogen dioxide/dinitrogen tetroxide;

a.4.c. Dinitrogen pentoxide;

b. Polymeric substances:

b.1. Carboxy-terminated polybutadiene (CTPB);

b.2. Commercial grade Hydroxy-terminated polybutadiene (HTPB);

NOTE: Military grade (i.e., Hydroxy-terminated polybutadiene (HTPB) with a hydroxyl functionality greater than or equal to 2.2 but less than or equal to 2.4, a hydroxyl value of less than 0.77 meq/g, and a viscosity at 30 °C of less than 47 poise) is controlled by the Office of Defense Trade Controls, U.S. Department of State (see Category V of the USML (22 CFR part 121)).

b.3. Polybutadiene-acrylic acid (PBAA);

b.4. Polybutadiene-acrylic acid-acrylonitrile (PBAN).

c. Other propellant additives and agents:

c.1. Burning rate modifiers as follows: Butacene;

c.2. Nitrate esters and nitrated plasticizers as follows:

c.2.a. Triethylene glycol dinitrate (TEGDN);

c.2.b. Trimethylolethane trinitrate (TMETN);

c.2.c. Diethylene glycol dinitrate (DEGDN);

c.3. Stabilizers, as follows: 2-nitrodiphenylamine.

1C116 Maraging steels (steels generally characterized by high nickel, very low carbon content and the use of substitutional elements or precipitates to produce age-hardening), other than those controlled by 1C216, having an Ultimate Tensile Strength of 1500 MPa or greater measured at 293 K (20 °C), in the form of sheet, plate, or tubing with a wall or plate thickness equal to or less than 5.0mm (0.2 inch).

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

1C117 Tungsten, molybdenum, and alloys of these metals in the form of uniform spherical or atomized particles of 500 micrometer diameter or less with a purity of 97% or higher for fabrication of rocket motor components; i.e., heat shields, nozzle substrates, nozzle throats, and thrust vector control surfaces.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Kilograms
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

1C202 Aluminum and titanium alloys in the form of tubes or cylindrical solid forms (including forgings) with an outside diameter of more than 75 mm (3 inches).

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls:
Related Definition: The phrase ''alloys capable of'' encompasses before and after heat treatment.
Items: a. Aluminum alloys capable of an ultimate tensile strength of 460 MPa ($.46\times10^9$ N/m^2) or more at 293 K (20 °C);

b. Titanium alloys capable of an ultimate tensile strength of 900 MPa (0.9×10^9 N/m^2) (130,500 lbs./in^2) or more at 293 K (20 °C).

1C210 "Fibrous and filamentary materials" not controlled by 1C010.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Kilograms
Related Controls: See 9A110 for fiber prepregs.
Related Definitions: For the purpose of this entry, the term ''fibrous or filamentary materials'' means continuous monofilaments, yarns, rovings, tows or tapes.

Defintions for other terms used in this entry:

Filament or Monofilament is the smallest increment of fiber, usually several μm in diameter.

Strand is a bundle of filaments (typically over 200) arranged approximately parallel.

Roving is a bundle (typically 12–120) of approximately parallel strands.

Yarn is a bundle of twisted strands.

Tow is a bundle of filaments, usually approximately parallel.

Tape is a material constructed of interlaced or unidirectional filaments, strands, rovings, tows or yarns, etc., usually preimpregnated with resin.

Specific modulus is the Young's modulus in N/m^2 divided by the specific weight in N/m^3, measured at a temperature of 23±2 °C and a relative humidity of 50±5 percent.

Specific tensile strength is the ultimate tensile strength in N/m^2 divided by specific weight in N/m^3, measured at a temperature of 23±2 °C and a relative humidity of 50±5 percent.

Items: a. Carbon and aramid ''fibrous and filamentary materials'' having:

a.1. A ''specific modulus'' of 12.7×10^6 m or greater; or

a.2. A ''specific tensile strength'' of 23.5×10^4 m or greater; or

NOTE: 1C210.a does not include aramid ''fibrous or filamentary materials'' having 0.25 percent or more by weight of an ester based fiber surface modifier.

b. Glass ''fibrous and filamentary materials'' having:

b.1. A ''specific modulus'' of 3.18×10^6 m or greater; and

b.2. A ''specific tensile strength'' of 7.62×10^4 m or greater; or

c. Thermoset resin impregnated continuous yarns, rovings, tows or tapes with a width no greater than 15 mm (prepregs), made from carbon or glass ''fibrous or filamentary materials'' described in 1C210.a or .b;

NOTE: The resin forms the matrix of the composite.

1C216 Maraging steel capable of an ultimate tensile strength of 2050 MPa (2.050×10^9 N/m^2) (300,000 lbs./in^2) or more at 293 K (20 °C), except forms in which no linear dimension exceeds 75 mm (3 inches).

LICENSE REQUIREMENTS

Reason for Control: NP, MT, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
MT applies to maraging steels controlled by this entry that also meet the specifications of 1C116	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definition: The phrase ''maraging steel capable of'' encompasses maraging steel before or after heat treatment.
Items: The list of items controlled is contained in the ECCN heading.

1C225 Boron and boron compounds, mixtures, and loaded materials in which the boron-10 isotope is more than 20% by weight of the total boron content.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Kilograms
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

1C226 Parts made of tungsten, tungsten carbide, or tungsten alloys (greater than 90% tungsten) having a mass greater than 20 kg and a hollow cylindrical symmetry (including cylinder segments) with an inside diameter greater than 100 mm (4 in.), but less than 300 mm (12 in.), except parts specially designed for use as weights or gamma-ray collimators.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Kilograms
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

1C227 Calcium (high purity) containing both less than 1,000 parts per million by weight of metallic impurities other than magnesium and less than 10 parts per million of boron.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Kilograms
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

1C228 Magnesium (high purity) containing both less than 200 parts per million by weight of metallic impurities other than calcium and less than 10 parts per million of boron.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Kilograms
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

1C229 High purity (99.99% or greater) bismuth with very low silver content (less than 10 parts per million).

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Kilograms
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

1C230 Beryllium.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Kilograms
Related Controls: N/A
Related Definitions: This entry does not control: (a) Metal windows for X-ray machines, or for bore-hole logging devices; (b) Oxide shapes in fabricated or semi-fabricated forms specially designed for electronic component parts or as substrates for electronic circuits; and, (c) Beryl (silicate of beryllium and aluminum) in the form of emeralds or aquamarines.
Items: a. Beryllium metal;

b. Alloys containing more than 50% beryllium by weight;

c. Beryllium compounds;

d. Manufactures of beryllium metal, alloys, or compounds described in 1C230.a, .b, or .c; or

e. Waste and scrap from beryllium metal, alloys, compounds, or manufactures thereof described in 1C230.a, .b, .c or .d.

1C231 Hafnium.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Kilograms
Related Controls: N/A
Related Definitions: N/A
Items: a. Hafnium metal;

b. Alloys and compounds of hafnium containing more than 60 percent hafnium by weight; or

c. Manufactures of hafnium metal, alloys, or compounds described in 1C231.a or .b.

1C232 Helium-3 or helium isotopically enriched in the helium-3 isotope, mixtures containing helium-3, and products or devices containing any of the foregoing, except; a product or device containing less than 1g of helium-3.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Liters
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

1C233 Lithium.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Kilograms
Related Controls: N/A
Related Definitions: N/A
Items: a. Lithium enriched in the 6 isotope (^{6}Li) to greater than 7.5 atom percent, alloys, compounds or mixtures containing lithium enriched in the 6 isotope, and products or devices containing any of the foregoing; except thermoluminescent dosimeters.

NOTE: The natural occurrence of the 6 isotope in lithium is 7.5 atom percent.

b. [Reserved]

1C234 Zirconium, with a hafnium content of less than 1 part hafnium to 500 parts zirconium by weight.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Kilograms
Related Controls: N/A
Related Definitions: Zirconium metal and alloys in the form of tubes or assemblies of tubes, specially designed or prepared for use in a reactor are subject to the export licensing authority of the Nuclear Regulatory Commission. (See 10 CFR part 110.)

This entry does not control zirconium in the form of foil or strip having a thickness not exceeding 0.10 mm (0.004 in.).

Items: a. Zirconium metal;

b. Alloys containing more than 50% zirconium by weight;

c. Compounds;

d. Manufactures of zirconium metal, alloys, or compounds described in 1C234.a, .b, or .c; or

e. Waste and scrap from zirconium metal, alloys, compounds, or manufactures thereof controlled by 1C234.a, .b, .c, or .d;

ADVISORY NOTE: (Not eligible for License Exception GBS) Licenses are likely to be approved for export and reexport to satisfactory end-users in Country Group D:1 of the following:

a. Finished parts made of zirconium metal or alloys, specially designed for an identified civil research or power reactor facility, provided that:

a.1. None of the parts contains fissile materials; and

a.2. The importing country has agreed to the application of the Safeguards of the International Atomic Energy Agency (IAEA) in connection with the nuclear reactor facility;

b. Contained zirconium metal, or parts made therefrom, in individual shipments not exceeding 100 kg, when intended for use in, or in support of, an identified civil research or power reactor facility, in connection with which it is contemplated that IAEA Safeguards would be applied.

N.B.: The provisions of this Advisory Note notwithstanding, current law prohibits approval to nuclear production or utilization facilities in the People's Republic of China.

1C236 Alpha-emitting radionuclides having an alpha half-life of 10 days or greater, but less than 200 years, including compounds and mixtures containing these radionuclides with a total alpha activity of 1 curie per kilogram (37 GBq) or greater; except devices containing less than 3.7 GBq (100 millicuries) of alpha activity per device.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Millicuries
Related Controls: Alpha emitting radionuclides are subject to the export licensing authority of the Nuclear Regulatory Commission. (See 10 CFR part 110.)
Related Definition: N/A
Items: The list of items controlled is contained in the ECCN heading.

1C237 Radium-226, radium-226 compounds, or mixtures containing radium-226, and products or devices containing any of the foregoing; except medical applicators, or a product or device containing not more than 0.37 GBq (10 millicuries) of radium-226 in any form.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definition: N/A
Items: The list of items controlled is contained in the ECCN heading.

1C238 Chlorine trifluoride (ClF_3).

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Kilograms
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

1C350 Chemicals, that may be used as precursors for toxic chemical agents.

LICENSE REQUIREMENTS

Reason for Control: CB, AT

Control(s)	*Country Chart*
CB applies to entire entry	CB Column 2
AT applies to entire entry	AT Column 1

LICENSE REQUIREMENT NOTES: 1. *Sample Shipments:* Certain sample shipments of chemicals controlled under ECCN 1C350 may be made without a license, as provided by the following:

a. Chemicals Not Eligible: The following chemicals are *not* eligible for sample shipments: 0-Ethyl-2-diisopropylaminoethyl methylphosphonite (QL) (C.A.S. #57856–11–8),

Ethylphosphonyl difluoride (C.A.S. #753–98–0), and Methylphosphonyl difluoride (C.A.S. #676–99–3).

b. Countries Not Eligible: The following countries are *not* eligible to receive sample shipments: Cuba, Iran, Libya, North Korea, Sudan, Syria.

c. Sample Shipments: A license is not required for sample shipments when the cumulative total of these shipments does not exceed a 55-gallon container or 200 kg of each chemical to any one consignee per calendar year. Multiple sample shipments, in any quantity, not exceeding the totals indicated in this paragraph may be exported without a license, in accordance with the provisions of this NOTE 1.

d. The exporter is required to submit a quarterly written report for shipments of samples made under this Note 1. The report must be on company letterhead stationery (titled ''Report of Sample Shipments of Chemical Precursors'' at the top of the first page) and identify the chemical(s), Chemical Abstract Service Registry (C.A.S.) number(s), quantity(ies), the ultimate consignee's name and address, and the date exported. The report must be sent to the U.S. Department of Commerce, Bureau of Export Administration, Room 2705, Washington, DC 20230, Attn: ''Report of Sample Shipments of Chemical Precursors''.

2. *Mixtures:* Mixtures controlled by this entry that contain certain concentrations of precursor and intermediate chemicals are subject to the following licensing requirements:

a. A license is required, regardless of the concentrations in the mixture, for the following chemicals: 0-Ethyl-2-diisopropylaminoethyl methylphosphonite (QL) (C.A.S.#57856–11–8), Ethylphosphonyl difluoride (C.A.S.#753–98–0) and Methylphosphonyl difluoride (C.A.S.#676–99–3);

b. A license is required when at least one of the following chemicals constitutes more than 10 percent of the weight of the mixture on a solvent free basis: Arsenic trichloride (C.A.S.#7784–34–1), Benzilic acid (C.A.S.#76–93–7), Diethyl ethylphosphonate (C.A.S.#78–38–6), Diethyl methylphosphonite (C.A.S.#15715–41–0), Diethyl-N,N-dimethylphosphoroamidate (C.A.S.#2404–03–7), N,N-Diisopropyl-beta-aminoethane thiol (C.A.S.#5842–07–9), N,N-Diisopropyl-2-aminoethyl chloride hydrochloride (C.A.S.#4261–68–1), N,N-Diisopropyl-beta-aminoethanol (C.A.S.#96–80–0), N,N-Diisopropyl-beta-aminoethyl chloride (C.A.S.#96–79–7), Dimethyl ethylphosphonate (C.A.S.#6163–75–3), Dimethyl methylphosphonate (C.A.S.#756–79–6), Ethylphosphonous dichloride [Ethylphosphinyl dichloride] (C.A.S.#1498–40–4), Ethylphosphonus difluoride [Ethylphosphinyl difluoride] (C.A.S.#430–78–4), Ethylphosphonyl dichloride (C.A.S.#1066–50–8), Methylphosphonous dichloride [Methylphosphinyl dicloride] (C.A.S.#676–83–5), Methylphosphonous difluoride [Methylphosphinyl difluoride] (C.A.S.#753–59–3), Methylphosphonyl dichloride (C.A.S.#676–97–1), Pinacolyl alcohol (C.A.S.#464–07–3), 3–Quinuclidinol (C.A.S.#1619–34–7), and Thiodiglycol (C.A.S.#111–48–8); (Related ECCN: 1C995)

c. A license is required when at least one of all other chemicals in the List of Items Controlled constitutes more than 25 percent of the weight of the mixture on a solvent free basis (related ECCN: 1C995); and

d. A license is not required under this entry for mixtures when the controlled chemical is a normal ingredient in consumer goods packaged for retail sale for personal use. Such consumer goods are controlled by ECCN EAR99.

e. Calculation of concentrations of AG-controlled chemicals.

1. Usual Commercial Purposes. In calculating the percentage of an AG controlled chemical in a mixture (solution), any other chemical must be excluded if it was not added for usual commercial purposes, but was added for the sole purpose of circumventing the Export Administration Regulations.

2. ''Solvent Free Basis Requirement.'' When calculating the percentage, by weight, of components in a chemical mixture, you must exclude from the calculation any component of the mixture that acts as a solvent.

3. Solvent—For purposes of this ECCN ''A substance capable of dissolving another substance to form a uniformly dispersed mixture (solution)''.

- Solvents are liquids at standard temperature and pressure (STP).
- In no instance is an AG controlled chemical considered a ''solvent''.
- All ingredients of mixtures are expressed in terms of weight.
- The solvent component of the mixture converts it into a solution.

3. *Compounds:* A license is not required under this entry for chemical compounds created with any chemicals identified in this ECCN 1C350, unless those compounds are also identified in this entry.

4. *Special Comprehensive License:* See part 752 of the EAR for eligibility.

TECHNICAL NOTES: 1. For purposes of this entry, a ''mixture'' is defined as a solid, liquid or gaseous product made up of two or more components that do not react together under normal storage conditions.

2. The scope of this control applicable to Hydrogen Fluoride (Item 25 in List of Items Controlled) includes its liquid, gaseous, and aqueous phases, and hydrates.

3. All *de minimis* exclusions of this entry extend to all mixtures including those that contain no solvents.

4. A Solvent is defined as a substance capable of dissolving another substance to form a uniformly

dispersed mixture (solution). For examples and clarification of the term ''solvent free'' basis, see Supplement No. 3 to part 774 of the EAR.

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Liters or kilograms, as appropriate
Related Controls: N/A
Related Definition: See part 770.2(k) of the EAR for synonyms for the chemicals listed in this entry.
Items: a. Precursor Chemicals, as follows:
a.1. (C.A.S. #1341–49–7) Ammonium hydrogen fluoride;
a.2. (C.A.S. #7784–34–1) Arsenic trichloride;
a.3. (C.A.S. #76–93–7) Benzilic acid;
a.4. (C.A.S. #107–07–3) 2-Chloroethanol;
a.5. (C.A.S. #78–38–6) Diethyl ethylphosphonate;
a.6. (C.A.S. #15715–41–0) Diethyl methylphosphonite;
a.7. (C.A.S. #2404–03–7) Diethyl-N,N-dimethylphosphoroamidate;
a.8. (C.A.S. #762–04–9) Diethyl phosphite;
a.9. (C.A.S. #100–37–8) N,N-Diethylethanolamine;
a.10. (C.A.S. #5842–07–9) N,N-Diisopropyl-.beta.-aminoethanethiol;
a.11. (C.A.S. #4261–68–1) N,N-Diisopropyl-.2.-aminoethyl chloride hydrochloride;
a.12. (C.A.S. #96–80–0) N,N-Diisopropyl-.beta.-aminoethanol;
a.13. (C.A.S. #96–79–7), N,N-Diisopropyl-.beta.-aminoethyl chloride;
a.14. (C.A.S. #108–18–9) Diisopropylamine;
a.15. (C.A.S. #6163–75–3) Dimethyl ethylphosphonate;
a.16. (C.A.S. #756–79–6) Dimethyl methylphosphonate;
a.17. (C.A.S. #868–85–9) Dimethyl phosphite (dimethyl hyrogen phosphite);
a.18. (C.A.S. #124–40–3) Dimethylamine;
a.19. (C.A.S. #506–59–2) Dimethylamine hydrochloride;
a.20. (C.A.S. #57856–11–8) 0-Ethyl-2-diisopropylaminoethyl methylphosphonite (QL);
a.21. (C.A.S. #1498–40–4) Ethylphosphonous dichloride [Ethylphosphinyl dichloride];/c
a.22. (C.A.S. #430–78–4) Ethylphosphonus difluoride [Ethylphosphinyl difluoride];
a.23. (C.A.S. #1066–50–8) Ethylphosphonyl dichloride;
a.24. (C.A.S. #753–98–0) Ethylphosphonyl difluoride;
a.25. (C.A.S. #7664–39–3) Hydrogen fluoride;
a.26. (C.A.S. #3554–74–3) 3-Hydroxyl-1-methylpiperidine;
a.27. (C.A.S. #76–89–1) Methyl benzilate;
a.28. (C.A.S. #676–83–5) Methylphosphonous dichloride [Methylphosphinyl dicloride];
a.29. (C.A.S. #753–59–3) Methylphosphonous difluoride [Methylphosphinyl difluoride];
a.30. (C.A.S. #676–97–1) Methylphosphonyl dichloride;
a.31. (C.A.S. #676–99–3) Methylphosphonyl difluoride;
a.32. (C.A.S. #10025–87–3) Phosphorus oxychloride;
a.33. (C.A.S. #10026–13–8) Phosphorus pentachloride;
a.34. (C.A.S. #1314–80–3) Phosphorus pentasulfide;
a.35. (C.A.S. #7719–12–2) Phosphorus trichloride;
a.36. (C.A.S. #75–97–8) Pinacolone;
a.37. (C.A.S. #464–07–3) Pinacolyl alcohol;
a.38. (C.A.S. #151–50–8) Potassium cyanide;
a.39. (C.A.S. #7789–23–3) Potassium fluoride;
a.40. (C.A.S. #7789–29–9) Potassium hydrogen fluoride;
a.41. (C.A.S. #1619–34–7) 3–Quinuclidinol;
a.42. (C.A.S. #3731–38–2) 3–Quinuclidinone;
a.43. (C.A.S. #1333–83–1) Sodium bifluoride;
a.44. (C.A.S. #143–33–9) Sodium cyanide;
a.45. (C.A.S. #7681–49–4) Sodium fluoride;
a.46. (C.A.S. #1313–82–2) Sodium sulfide;
a.47. (C.A.S. #10025–67–9) Sulfur monochloride;
a.48. (C.A.S. #10545–99–0) Sulfur dichloride;
a.49. (C.A.S. #111–48–8) Thiodiglycol;
a.50. (C.A.S. #7719–09–7) Thionyl chloride;
a.51. (C.A.S. #102–71–6) Triethanolamine;
a.52. (C.A.S. #637–39–8) Triethanolamine hydrochloride;
a.53. (C.A.S. #122–52–1) Triethyl phosphite; and
a.54. (C.A.S. #121–45–9) Trimethyl phosphite.
b. Reserved.

1C351 Human pathogens, zoonoses, and "toxins".

LICENSE REQUIREMENTS

Reason for Control: CB, AT

Control(s)	*Country Chart*
CB applies to entire entry	CB Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: All vaccines and ''immunotoxins'' are excluded from the scope of this entry. See ECCN 1C996.
Related Definition: (1) For the purposes of this entry ''immunotoxin'' is defined as an antibody-toxin conjugate intended to destroy specific target cells (e.g., tumor cells) that bear antigens homologous to the antibody. (2) For the purposes of this entry ''subunit'' is defined as a portion of the ''toxin''.
Items: a. Viruses, as follows:
a.1. Chikungunya virus
a.2. Congo-Crimean haemorrhagic fever virus;

a.3. Dengue fever virus;
a.4. Eastern equine encephalitis virus;
a.5. Ebola virus;
a.6. Hantaan virus;
a.7. Japanese encephalitis virus;
a.8. Junin virus;
a.9. Lassa fever virus
a.10. Lymphocytic choriomeningitis virus;
a.11. Machupo virus;
a.12. Marburg virus;
a.13. Monkey pox virus;
a.14. Rift Valley fever virus;
a.15. Tick-borne encephalitis virus (Russian Spring-Summer encephalitis virus);
a.16. Variola virus;
a.17. Venezuelan equine encephalitis virus;
a.18. Western equine encephalitis virus;
a.19. White pox; or
a.20. Yellow fever virus.
b. Rickettsiae, as follows:
b.1. Bartonella quintana (Rochalimea quintana, Rickettsia quintana);
b.2. Coxiella burnetii;
b.3. Rickettsia prowasecki; or
b.4. Rickettsia rickettsii.
c. Bacteria, as follows:
c.1. Bacillus anthracis;
c.2. Brucella abortus;
c.3. Brucella melitensis;
c.4. Brucella suis;
c.5. Burkholderia mallei (Pseudomonas mallei);
c.6. Burkholderia pseudomallei (Pseudomonas pseudomallei);
c.7. Chlamydia psittaci;
c.8. Clostridium botulinum;
c.9. Francisella tularensis;
c.10. Salmonella typhi;
c.11. Shigella dysenteriae;
c.12. Vibrio cholerae;
c.13. Yersinia pestis.
d. ''Toxins'', as follows: and subunits thereof:
d.1. Botulinum toxins;
d.2. Clostridium perfringens toxins;
d.3. Conotoxin;
d.4. Microcystin (cyanogenosin);
d.5. Ricin;
d.6. Saxitoxin;
d.7. Shiga toxin;
d.8. Staphylococcus aureus toxins;
d.9. Tetrodotoxin; or
d.10. Verotoxin.

1C352 Animal pathogens.

LICENSE REQUIREMENTS

Reason for Control: CB, AT

Control(s)	*Country chart*
CB applies to entire entry	CB Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: All vaccines are excluded from the scope of this entry. See ECCN 1C996.
Related Definition: N/A
Items: a. Viruses, as follows:
a.1. African swine fever virus;
a.2. Avian influenza virus that are;
a.2.a. Defined in EC Directive 92/40/EC as having high pathogenicity, as follows:
a.2.a.1. Type A viruses with an IVPI (intravenous pathogenicity index) in 6 week old chickens of greater than 1.2; or
a.2.a.2. Type A viruses H5 or H7 subtype for which nucleotide sequencing has demonstrated multiple basic amino acids at the cleavage site of haemegglutinin.
a.2.b. Reserved.
a.3. Bluetongue virus;
a.4. Foot and mouth disease virus;
a.5. Goat pox virus;
a.6. Herpes virus (Aujeszky's disease);
a.7. Hog cholera virus;
a.8. Lyssa virus;
a.9. Newcastle disease virus
a.10. Peste des petits ruminants virus;
a.11. Porcine enterovirus type 9;
a.12. Rinderpest virus;
a.13. Sheep pox virus;
a.14. Teschen disease virus;
a.15. Vesicular stomatitis virus; and
b. Bacteria, as follows:
b.1. Mycoplasma mycoides;
b.2. Reserved.

1C353 Genetically modified "microorganisms".

LICENSE REQUIREMENTS

Reason for Control: CB, AT

Control(s)	*Country Chart*
CB applies to entire entry	CB Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: All vacines are excluded from the scope of this entry. See ECCN 1C996.
Related Definition: N/A
Items: a. Genetically modified ''microorganisms'' or genetic elements that contain nucleic acid sequences associated with pathogenicity derived from organisms identified in ECCNs 1C351.a to .c, 1C352, or 1C354.
b. Genetically modified ''microorganisms'' or genetic elements that contain nucleic acid sequences coding for any of the ''toxins'', or their subunits, controlled by 1C351.,d

1C354 Plant pathogens.

LICENSE REQUIREMENTS

Reason for Control: CB, AT

Control(s)	*Country Chart*
CB applies to entire entry	CB Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: All vaccines are excluded from the scope of this entry. See ECCN 1C996.
Related Definitions: N/A
Items: a. Bacteria, as follows:
a.1. Xanthonomas albilineas;
a.2. Xanthonomas campestris pv. citri;
b. Fungi, as follows:
b.1. Colletotrichum coffeanum var. virulans;
b.2. Cochliobolus miyabeanus (Helminthosporium oryzae);
b.3. Microcyclus ulei (syn. Dothidella ulei);
b.4. Puccinia graminis (syn. Puccinia graminis f. sp. tritici);
b.5. Puccinia striiformis (syn. Puccinia glumarum); or
b.6. Pyricularia grisea/Pyricularia oryzae.

1C980 Inorganic chemicals listed in Supplement No. 1 to part 754 of the EAR that were produced or derived from the Naval Petroleum Reserves (NPR) or became available for export as a result of an exchange of any NPR produced or derived commodities.

LICENSE REQUIREMENTS

Reason for Control: SS

SS applies to entire entry. For licensing requirements (and possible License Exceptions) proceed directly to part 754 of the EAR. The Commerce Country Chart is not designed to determine licensing requirements for items controlled for SS reasons.

LIST OF ITEMS CONTROLLED

Unit: Barrels/Liters
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

1C981 Crude petroleum including reconstituted crude petroleum, tar sands & crude shale oil listed in Supplement No. 1 to part 754 of the EAR.

LICENSE REQUIREMENTS

Reason for Control: SS

SS applies to entire entry. For licensing requirements (and possible License Exceptions) proceed directly to part 754 of the EAR. The Commerce Country Chart is not designed to determine licensing requirements for items controlled for SS reasons.

LIST OF ITEMS CONTROLLED

Unit: Barrels/Liters
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

1C982 Other petroleum products listed in Supplement No. 1 to part 754 of the EAR that were produced or derived from the Naval Petroleum Reserves (NPR) or became available for export as a result of an exchange of any NPR produced or derived commodities.

LICENSE REQUIREMENTS

Reason for Control: SS

SS applies to entire entry. For licensing requirements (and possible License Exceptions) proceed directly to part 754 of the EAR. The Commerce Country Chart is not designed to determine licensing requirements for items controlled for SS reasons.

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

1C983 Natural gas liquids and other natural gas derivatives listed in Supplement No. 1 to part 754 of the EAR that were produced or derived from the Naval Petroleum Reserves (NPR) or became available for export as a result of an exchange of any NPR produced or derived commodities.

LICENSE REQUIREMENTS

Reason for Control: SS

SS applies to entire entry. For licensing requirements (and possible License Exceptions) proceed directly to part 754 of the EAR. The Commerce Country Chart is not designed to determine licensing requirements for items controlled for SS reasons.

LIST OF ITEMS CONTROLLED

Unit: Barrels/Liters
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

1C984 Manufactured gas and synthetic natural gas (except when commingled with natural gas and thus subject to export authorization from the Department of Energy) listed in Supplement No. 1 to part 754 of the EAR that were produced or derived from the Naval Petroleum Reserves (NPR) or became available for export as a result of an exchange of any NPR produced or derived commodities.

LICENSE REQUIREMENTS

Reason for Control: SS

SS applies to entire entry. For licensing requirements (and possible License Exceptions) proceed directly to part 754 of the EAR. The Commerce Country Chart is not designed to determine licensing requirements for items controlled for SS reasons.

LIST OF ITEMS CONTROLLED

Unit: Millions of cubic feet
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

1C988 Western red cedar (thuja plicata), logs and timber, and rough, dressed and worked lumber containing wane listed in Supplement No. 2 to part 754 of the EAR.

LICENSE REQUIREMENTS

Reason for Control: SS

SS applies to entire entry. For licensing requirements (and possible License Exceptions) proceed directly to part 754 of the EAR. The Commerce Country Chart is not designed to determine licensing requirements for items controlled for SS reasons.

LIST OF ITEMS CONTROLLED

Unit: Million board feet scribner
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

1C991 Vaccines containing items controlled by ECCNs 1C351, 1C352, 1C353 and 1C354, and immunotoxins.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Related Definitions: For the purposes of this entry ''immunotoxin'' is defined as an antibody-toxin conjugate intended to destroy specific target cells (e.g., tumor cells) that bear antigens homologous to the antibody.
Items: The list of items controlled is contained in the ECCN heading.

1C992 Oil well perforators.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Materials in number
Related Controls: N/A
Related Definitions: N/A
Items: 1a. Shaped charges specially designed for oil well operations, utilizing one charge functioning along a single axis, that upon detonation produce a hole, and:

a.1. Contain any formulation of RDX, PYX, PETN, HNS, or HMX; and

a.2. Have only a uniformly shaped conical liner with an included angle of 90 degrees or less; and

a.3. Have a total explosive mass of no more than 90 grams; and

a.4. Have a diameter not exceeding three inches.

1C993 Fibrous and filamentary materials, not controlled by 1C010 or 1C210, for use in "composite" structures and with a specific modulus of 3.18×10^6 m or greater and a specific tensile strength of 7.62×10^4 m or greater.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Kilograms
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

1C994 Fluorocarbon electronic cooling fluids.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Kilograms
Related Controls: N/A
Related Definitions: N/A
Items: Fluorocarbon electronic cooling fluids made from at least 85% of any of the following:

a. Monomeric or polymeric forms of perfluoropolyalkylether-friazines or perfluoroaliphatic-ethers;

b. Perfluoroalkylamines; or

c. Perfluorocycloalkanes or perfluoroalkanes with all of the following characteristics:

c.1. Density of 298K (25 °C) of 1.5 g/ml or more;

c.2. In a liquid state at 273K; (0 °C); and

c.3. Containing 60% or more by weight of fluorine.

1C995 Mixtures containing precursor and intermediate chemicals used in the "production" of chemical warfare agents that are not controlled by ECCN 1C350.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Kilograms
Related Controls: N/A
Related Definition: For calculation of *de minimis* quantities of controlled chemicals in mixtures, see ECCN 1C350 and [Supplement 3 to part 770].
Items: The list of items controlled is contained in the ECCN heading.

D. SOFTWARE

1D001 "Software" specially designed or modified for the "development", "production", or "use" of items controlled by 1B001 to 1B003.

LICENSE REQUIREMENTS

Reason for Control: NS, MT, NP, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
MT applies to ''software'' for the ''development'', ''production'', or ''use'' of items controlled by 1B001 for MT reasons	MT Column 1
NP applies to ''software'' for the ''development'', ''production'' or ''use'' of items controlled by 1B001 for NP reasons	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: Yes
TSR: Yes

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

1D002 "Software" for the "development" of organic matrix, metal matrix or carbon matrix laminates or "composites".

LICENSE REQUIREMENTS

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
MT applies to ''software'' specially designed or modified for the ''development'' of ''composites'' controlled by 1A, 1B or 1C entries for MT reasons	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: Yes
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

1D018 "Software" specially designed or modified for the "development", "production", or "use" of items controlled by 1B018.

LICENSE REQUIREMENTS

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
MT applies to ''software'' for the ''development'', ''production'', or ''use'' of items controlled by 1B018 for MT reasons	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

1D101 Other "software" not controlled by 1D001, 1D002, 1D103, and 1D018 specially designed for the "development", "production", or "use" of items controlled by 1A, 1B, and 1C for MT reasons.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

1D103 "Software" specially designed for analysis of reduced observables such as radar reflectivity, ultraviolet/infrared signatures and acoustic signatures.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

1D201 "Software" specially designed or modified for the "use" of items controlled by 1B101 or 1B201 for NP reasons.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

1D390 "Software" for process control that is specifically configured to control or initiate "production" of chemicals controlled by ECCN 1C350.

LICENSE REQUIREMENTS

Reason for Control: CB, AT

Control(s)	*Country Chart*
CB applies to entire entry	CB Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Items: The list of items controlled is contained in the ECCN heading.

1D993 "Software" specially designed for the "development", "production", or "use" of equipment or materials controlled by 1C210.b, 1C993, 1C994.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

E. TECHNOLOGY

1E001 "Technology" according to the General Technology Note for the "development" or "production" of items controlled by 1A001.b, 1A001.c, 1A002, 1A003, 1A102, 1B or 1C (except 1C980 to 1C984, 1C988 and 1C991 to 1C995).

LICENSE REQUIREMENTS

Reason for Control: NS, MT, NP, CB, AT

Control(s)	*Country Chart*
NS applies to ''technology'' for items controlled by 1A001.b and .c, 1A002, 1A003, 1B001 to 1B003, 1B018, 1B225, 1C001 to 1C010, 1C018, 1C230, 1C231, 1C233, or 1C234	NS Column 1
MT applies to ''technology'' for items controlled by 1A002, 1A102, 1B001, 1B018, 1B101, 1B115, 1B116, 1C001, 1C007, 1C101, 1C107, 1C115 to 1C117, or 1C216 for MT reasons	MT Column 1
NP applies to ''technology'' for items controlled by 1A002, 1B001, 1B101, 1B201, 1B225 to 1B232, 1C001, 1C010, 1C202, 1C210, 1C216, 1C225 to 1C234, 1C236 to 1C238 for NP reasons	NP Column 1
CB applies to ''technology'' for items controlled by 1C351, 1C352, 1C353, or 1C354	CB Column 1
CB applies to ''technology'' for materials controlled by 1C350	CB Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A

TSR: Yes

LIST OF ITEMS CONTROLLED

Unit: N/A

Related Controls: N/A

Related Definitions: The corresponding EU number captures controls related to 1C235. This EU entry is not contained on the CCL and is subject to the export licensing authority of the Nuclear Regulatory Commission (See 10 CFR part 110.)

Items: The list of items controlled is contained in the ECCN heading.

1E002 Other "technology".

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A

TSR: Yes

LIST OF ITEMS CONTROLLED

Unit: N/A

Related Controls: N/A

Related Definitions: N/A

Items: a. ''Technology'' for the ''development'' or ''production'' of polybenzothiazoles or polybenzoxazoles;

b. ''Technology'' for the ''development'' or ''production'' of fluoroelastomer compounds containing at least one vinylether monomer;

c. ''Technology'' for the design or ''production'' of the following base materials or non-''composite'' ceramic materials:

c.1. Base materials having all the following characteristics:

c.1.a. Any of the following compositions:

c.1.a.1. Single or complex oxides of zirconium and complex oxides of silicon or aluminium;

c.1.a.2. Single nitrides of boron (cubic crystalline forms);

c.1.a.3. Single or complex carbides of silicon or boron; or

c.1.a.4. Single or complex nitrides of silicon;

c.1.b. Total metallic impurities, excluding intentional additions, of less than:

c.1.b.1. 1,000 ppm for single oxides or carbides; or

c.1.b.2. 5,000 ppm for complex compounds or single nitrides; and

c.1.c.1. Average particle size equal to or less than 5 micrometer and no more than 10% of the particles larger than 10 micrometer; or

N.B.: For zirconia, these limits are 1 micrometer and 5 micrometer respectively;

c.1.c.2.a. Platelets with a length to thickness ratio exceeding 5;

c.1.c.2.b. Whiskers with a length to diameter ratio exceeding 10 for diameters less than 2 micrometer; and

c.1.c.2.c. Continuous or chopped fibers less than 10 micrometer in diameter.

c.2. Non-''composite'' ceramic materials, except abrasives, composed of the materials described in 1E002.c.1;

d. ''Technology'' for the ''production'' of aromatic polyamide fibers;

e. ''Technology'' for the installation, maintenance or repair of materials controlled by 1C001;

f. ''Technology'' for the repair of ''composite'' structures, laminates or materials controlled by 1A002, 1C007.c, or 1C007.d.

NOTE: 1E002.f does not control ''technology'' for the repair of ''civil aircraft'' structures using carbon ''fibrous or filamentary materials'' and epoxy resins, contained in aircraft manufacturers' manuals.

1E101 "Technology" according to the General Technology Note for the "use" of items controlled by 1A102, 1B001, 1B101, 1B115, 1B116, 1C001, 1C101, 1C107 or 1C115 to 1C117 for MT reasons.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

1E103 "Technology" (including processing conditions) and procedures for the regulation of temperature, pressures or atmosphere in autoclaves or hydroclaves when used for the "production" of "composites" or partially processed "composites".

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

1E104 "Technology" for producing pyrolytically derived materials formed on a mould, mandrel, or other substrate from precursor gases that decompose at 1,300 °C to 2,900 °C temperature range at pressures of 130 Pa (1 mm Hg) to 20 kPa (150 mm Hg).

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: This entry includes ''technology'' for the composition of precursor gasses, flow-rates and process control schedules and parameters.
Items: The list of items controlled is contained in the ECCN heading.

1E201 "Technology" according to the General Technology Note for the "use" of items controlled by 1A002, 1A202, 1A225 to 1A227, 1A290, 1B001.a, 1B101, 1B201, 1B225 to 1B232, 1C002.a.2.c or a.2.d, 1C010.b, 1C202, 1C210, 1C216, 1C225 to 1C239 or 1D201 for NP reasons.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

1E202 "Technology" according to the General Technology Note for the "development" or "production" of items controlled by 1A202 or 1A225 to 1A227, or 1A290.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

1E203 "Technology" according to the General Technology Note for the "development" of "software" controlled by 1D201.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A

TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

1E350 "Technology" for the "use" of chemicals controlled by 1C350 and for facilities designed or intended to produce chemicals controlled by 1C350.

LICENSE REQUIREMENTS

Reason for Control: CB, AT

Control(s)	*Country Chart*
CB applies to entire entry	CB Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: a. Overall plant design;

b. Design, specification, or procurement of equipment;

c. Supervision of construction, installation, or operation of complete plant or components thereof;

d. Training of personnel; and

e. Consultation on specific problems involving such facilities.

1E351 "Technology" for the "use" of microbiological materials controlled by 1C351, 1C352, 1C353, or 1C354.

LICENSE REQUIREMENTS

Reason for Control: CB, AT

Control(s)	*Country Chart*
CB applies to entire entry	CB Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

1E391 "Technology" for the disposal of chemicals or microbiological materials controlled by 1C350, 1C351, 1C352, 1C353, or 1C354.

LICENSE REQUIREMENTS

Reason for Control: CB, AT

Control(s)	*Country Chart*
CB applies to ''technology'' for the disposal of items controlled by 1C351, 1C352, 1C353, or 1C354	CB Column 1
CB applies to ''technology'' for the disposal of items controlled by 1C350	CB Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

1E994 "Technology" for the "development", "production", or "use" of fibrous and filamentary materials controlled by 1C993 or fluorocarbon electronic cooling fluids controlled by 1C994.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

EAR99 Items subject to the EAR that are not elsewhere specified in this CCL Category or in any other category in the CCL are designated by the number EAR99.

Category 2—Materials Processing

A. EQUIPMENT, ASSEMBLIES AND COMPONENTS

2A001 Ball bearings or solid roller bearings (except tapered roller bearings) having tolerances specified by the manufacturer in accordance with ABEC 7, ABEC 7P, or ABEC 7T or ISO Standard Class 4 or better (or equivalents) and having any of the following characteristics.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $3000
GBS: Yes
CIV: Yes

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: Quiet running bearings are subject to the export licensing authority of the Department of State, Office of Defense Trade Controls. (See 22 CFR part 121, Category VI.)
Related Definitions: (*1.*) This entry does not control balls with tolerance specified by the manufacturer in accordance with ISO 3290 as grade 5 or worse. (*2.*) (a) DN is the product of the bearing bore diameter in mm and the bearing rotational velocity in rpm. (b) Operating temperatures include those temperatures obtained when a gas turbine engine has stopped after operation. (*3.*) Annular Bearing Engineers Committee (ABEC)
Items: a. Rings, balls or rollers made from monel or beryllium;

b. Manufactured for use at operating temperatures above 573 K (300 °C) either by using special materials or by special heat treatment; or

c. With lubricating elements or component modifications that, according to the manufacturer's specifications, are specially designed to enable the bearings to operate at speeds exceeding 2.3 million DN.

2A002 Other ball bearings or solid roller bearings (except tapered roller bearings) having tolerances specified by the manufacturer in accordance with ABEC 9, ABEC 9P or ISO Standard Class 2 or better (or equivalents).

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $3000
GBS: Yes
CIV: Yes

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: (1) This entry does not control balls with tolerance specified by the manufacturer in accordance with ISO 3290 as grade 5 or worse. (2)(a) DN is the product of the bearing bore diameter in mm and the bearing rotational velocity in rpm. (b) Operating temperatures include those temperatures obtained when a gas turbine engine has stopped after operation. (3) Annular Bearing Engineers Committee (ABEC)
Items: The list of items controlled is contained in the ECCN heading.

2A003 Solid tapered roller bearings, having tolerances specified by the manufacturer in accordance with ANSI/AFBMA Class 00 (inch) or Class A (metric) or better (or equivalents) and having either of the following characteristics.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $3000
GBS: Yes
CIV: Yes

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: (1) This entry does not control balls with tolerance specified by the manufacturer in accordance with ISO 3290 as grade 5 or worse. (2)(a) DN is the product of the bearing bore diameter in mm and the bearing rotational velocity in rpm. (b) Operating temperatures include those temperatures obtained when a gas turbine engine has stopped after operation. (3) American National Standards Institute (ANSI); Anti-Friction Bearing Manufacturers Association (AFBMA)
Items: a. With lubricating elements or component modifications that, according to the manufacturer's specifications, are specially designed to enable the bearings to operate at speeds exceeding 2.3 million DN; or

b. Manufactured for use at operating temperatures below 219 K (−54 °C) or above 423 K (150 °C).

2A004 Gas-lubricated foil bearing manufactured for use at operating temperatures of 561 K (288 °C) or higher and a unit load capacity exceeding 1 MPa.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $3000
GBS: Yes

CIV: Yes

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: (a) DN is the product of the bearing bore diameter in mm and the bearing rotational velocity in rpm. (b) Operating temperatures include those temperatures obtained when a gas turbine engine has stopped after operation.
Items: The list of items controlled is contained in the ECCN heading.

2A005 Active magnetic bearing systems.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $3000
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: (a) DN is the product of the bearing bore diameter in mm and the bearing rotational velocity in rpm. (b) Operating temperatures include those temperatures obtained when a gas turbine engine has stopped after operation.
Items: The list of items controlled is contained in the ECCN heading.

2A006 Fabric-lined self-aligning or fabric-lined journal sliding bearings manufactured for use at operating temperatures below 219 K(−54 °C) or above 423 K (150 °C).

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $3000
GBS: Yes
CIV: Yes

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definition: (a) DN is the product of the bearing bore diameter in mm and the bearing rotational velocity in rpm. (b) Operating temperatures include those temperatures obtained when a gas turbine engine has stopped after operation.
Items: The list of items controlled is contained in the ECCN heading.

2A225 Crucibles made of materials resistant to liquid actinide metals.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: a. Crucibles with a volume between 150 ml and 8 liters, and made of or coated with any of the following materials having a purity of 98% or greater:

a.1. Calcium fluoride (CaF_2);

a.2. Calcium zirconate (metazirconate) ($CaZrO_3$);

a.3. Cerium sulfide (Ce_2S_3);

a.4. Erbium oxide (erbia) (Er_2O_3);

a.5. Hafnium oxide (hafnia) (HfO_2);

a.6. Magnesium oxide (MgO);

a.7. Nitrided niobium-titanium-tungsten alloy (approximately 50% Nb, 30% Ti, and 20% W);

a.8. Yttrium oxide (yttria) (Y_2O_3); or

a.9. Zirconium oxide (zirconia) (ZrO_2);

b. Crucibles with a volume between 50 ml and 2 liters, and made of or lined with tantalum, having a purity of 99.9% or greater;

c. Crucibles with a volume between 50 ml and 2 liters and made of or lined with tantalum (having a purity of 98% or greater) or coated with tantalum carbide, nitride, boride (or any combination of these).

2A226 Valves not controlled by 0B001 that are 5 mm (0.2 in.) or greater in nominal size, with a bellows seal, wholly made of or lined with aluminum, aluminum alloy, nickel, or alloy containing 60% or more nickel, either manually or automatically operated.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: Valves are also subject to the export licensing authority of the Nuclear Regulatory Commission. (See 10 CFR part 110.)
Related Definition: For valves with different inlet and outlet diameter, the nominal size parameter above refers to the smallest diameter.
Items: The list of items controlled is contained in the ECCN heading.

2A290 Generators and other equipment specially designed, prepared, or intended for use with nuclear plants.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: Nuclear equipment is also subject to the export licensing authority of the Nuclear Regulatory Commission. (See 10 CFR part 110.)
Related Definitions: N/A
Items: a. Generators, turbine-generator sets, steam turbines, heat exchangers, and heat exchanger type condensers designed or intended for use in a nuclear reactor;

b. Process control systems intended for use with the equipment controlled by 2A290.a.

2A291 Equipment related to nuclear material handling and processing and to nuclear reactors.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number; parts and accessories in $ value
Related Controls: Nuclear equipment is also subject to the export licensing authority of the Nuclear Regulatory Commission. (See 10 CFR part 110.)
Related Definitions: N/A
Items: a. Process control systems, except those controlled by 2A290.b, intended for use with nuclear reactors.

b. Casks that are specially designed for transportation of high-level radioactive material and that weigh more than 1,000 kg.

c. Commodities, parts and accessories specially designed or prepared for use with nuclear plants (e.g., snubbers, airlocks, reactor and fuel inspection equipment) except items licensed by the Nuclear Regulatory Commission, pursuant to 10 CFR part 110.

2A292 Piping, fittings and valves made of, or lined with, stainless steel, copper-nickel alloy or other alloy steel containing 10% or more nickel and/or chromium.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Pressure tubes, pipes, and fittings in kilograms; valves in number; parts and accessories in $ value
Related Controls: Piping, fittings, and valves are also subject to the export licensing authority of the Nuclear Regulatory Commission. (See 10 CFR part 110.)
Related Definitions: N/A
Items: a. Pressure tube, pipe, and fittings of 200 mm (8 inches) or more inside diameter, and suitable for operation at pressures of 3.4 MPa (500 psi) or greater;

b. Pipe valves having all of the following characteristics:

b.1. A pipe size connection of 8 inches or more inside diameter;

b.2. Rated at 1,500 psi or more;

c. Parts, n.e.s.

2A293 Pumps designed to move molten metals by electromagnetic forces.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number

Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

2A993 Explosive detection systems, consisting of an automated device, or combination of devices, with the ability to detect the presence of different types of explosives, in passenger checked baggage, without need for human skill, vigilance, or judgment.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

2A994 Portable electric generators and specially designed parts.

LICENSE REQUIREMENTS

Reason for Control: AT

AT applies to entire entry. A license is required for items controlled by this entry to Cuba, Iran, Libya, and North Korea. The Commerce Country Chart is not designed to determine licensing requirements for this entry. See part 746 of the EAR for additional information.

NOTE: Exports from the U.S. and transhipments to Iran must be licensed by the Department of Treasury, Office of Foreign Assets Control. (See §742.8 and §746.7 of the EAR for additional information on this requirement.)

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

B. TEST, INSPECTION AND PRODUCTION EQUIPMENT

NOTE FOR CATEGORY 2B: 2B001 to 2B009 do not control measuring interferometer systems, without closed or open loop feedback, containing a ''laser'' to measure slide movement errors of machine-tools, dimensional inspection machines or similar equipment.

2B001 "Numerical control" units, "motion control boards", specially designed for "numerical control" applications on machine tools, machine tools, and specially designed components therefore.

LICENSE REQUIREMENTS

Reason for Control: NS, NP, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
NP applies to entire entry	NP Column 1
Except as noted below: 2B001.a and .b unless controlled ''software'' in 2D001 or 2D002.b resides therein, 2B001.c.1.b.1 (turning machines only), c.1.b.2, c.1.b.3, c.1.b.4, c.1.b.5.b.2 (except bar machines (Swissturn), limited to machining only bar feed through, if maximum diameter is equal to or less than 42mm and there is no capability of mounting chucks. Machines may have drilling and/or milling capabilities for machining parts with diameters less than 42 mm), c.1.b.6, c.2. and c.4, turning machines with capacity ≤35 mm in diameter, milling machines with greater than 2 meters travel and worse than 30 micron accuracy, or crankshaft and camshaft grinding machines	
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: Yes, for items described in Advisory Note 1
CIV: Yes, for items described in Advisory Note 1

LIST OF ITEMS CONTROLLED

Unit: Equipment in number; parts and accessories in $ value
Related Controls: N/A
Related Definitions: N/A
Items:

TECHNICAL NOTES: 1. Secondary parallel contouring axes, e.g., the w-axis on horizontal boring mills or a secondary rotary axis the center line of which is parallel to the primary rotary axis, are not counted in the total number of contouring axes.

NOTE: Rotary axes need not rotate over 360°. A rotary axis can be driven by a linear device, e.g., a screw or a rack-and-pinion.

2. Axis nomenclature shall be in accordance with International Standard ISO 841, Numerical Control Machines—Axis and Motion Nomenclature.

a. ''Numerical control'' units for machine tools, as follows, and specially designed components therefor:

a.1. Having more than four interpolating axes that can be coordinated simultaneously for ''contouring control''; or

a.2. Having two, three or four interpolating axes that can be coordinated simultaneously for ''contouring control'' and:

a.2.a. Capable of ''real-time processing'' of data to modify, during the machining operation, tool path, feed rate and spindle data by either:

a.2.a.1. Automatic calculation and modification of part program data for machining in two or more axes by means of measuring cycles and access to source data; or

a.2.a.2. ''Adaptive control'' with more than one physical variable measured and processing by means of a computing model (strategy) to change one or more machining instructions to optimize the process; or

a.2.b. Capable of receiving directly (on-line) and processing computer-aided-design (CAD) data for internal preparation of machine instructions; or

a.2.c. Capable, without modification, according to the manufacturer's technical specifications, of accepting additional boards which would permit an increase above the control levels specified in 2B001, in the number of interpolating axes that can be coordinated simultaneously for ''contouring control'', even if they do not contain these additional boards;

NOTE: 2B001.a does not control ''numerical control'' units if:
a. Modified for and incorporated in uncontrolled machines; or
b. Specially designed for uncontrolled machines.

b. ''Motion control boards'' specially designed for machine tools and having any of the following characteristics:

b.1. Interpolation in more than four axes;

b.2. Capable of ''real time processing'' as described in 2B001.a.2.a; or

b.3. Capable of receiving and processing CAD data as described in 2B001.a.2.b;

c. Machine tools, as follows, for removing or cutting metals, ceramics or composites, that, according to the manufacturer's technical specifications, can be equipped with electronic devices for simultaneous ''contouring control'' in two or more axes:

c.1. Machine tools for turning, grinding, milling or any combination thereof that:

c.1.a. Have two or more axes that can be coordinated simultaneously for ''contouring control''; and

c.1.b. Have any of the following characteristics:

c.1.b.1. Two or more contouring rotary axes;

TECHNICAL NOTE: The c-axis on jig grinders used to maintain grinding wheels normal to the work surface is not considered a contouring rotary axis.

c.1.b.2. One or more contouring ''tilting spindles'';

NOTE: 2B001.c.1.b.2 applies to machine tools for grinding or milling only.

c.1.b.3. ''Camming'' (axial displacement) in one revolution of the spindle less (better) than 0.0006 mm total indicator reading (TIR);

NOTE: 2B001.c.1.b.3 applies to machine tools for turning only.

c.1.b.4. ''Run out'' (out-of-true running) in one revolution of the spindle less (better) than 0.0006 mm total indicator reading (TIR);

c.1.b.5. The ''positioning accuracies'', with all compensations available, are less (better) than:

c.1.b.5.a. 0.001° on any rotary axis; or

c.1.b.5.b.1. 0.004 mm along any linear axis (overall positioning) for grinding machines;

c.1.b.5.b.2. 0.006 mm along any linear axis (overall positioning) for turning or milling machines;

N.B.: 2B001.c.1.b.5 does not control milling or turning machine tools with a positioning accuracy along one axis, with all compensations available, equal to or greater (worse) than 0.005 mm.

TECHNICAL NOTE: The positioning accuracy of ''numerically controlled'' machine tools is to be determined and presented in accordance with ISO/DIS 230/2, paragraph 2.13, in conjunction with the requirements below:
a. Test conditions (paragraph 3):
1. For 12 hours before and during measurements, the machine tool and accuracy measuring equipment will be kept at the same ambient temperature. During the premeasurement time the slides of the machine will be continuously cycled in the same manner that the accuracy measurements will be taken;
2. The machine shall be equipped with any mechanical, electronic, or software compensation to be exported with the machine;
3. Accuracy of measuring equipment for the measurements shall be at least four times more accurate than the expected machine tool accuracy;
4. Power supply for slide drives shall be as follows:
a. Line voltage variation shall not exceed ±10% of nominal rated voltage;
b. Frequency variation shall not exceed ±2 Hz of normal frequency;
c. Lineouts or interrupted service are not permitted.
b. Test program (paragraph 4):
1. Feed rate (velocity of slides) during measurement shall be the rapid traverse rate;

NOTE: In the case of machine tools that generate optical quality surfaces, the feedrate shall be equal to or less than 50 mm per minute.

2. Measurements shall be made in an incremental manner from one limit of the axis travel to the other without returning to the starting position for each move to the target position;
3. Axes not being measured shall be retained at mid travel during test of an axis.
c. Presentation of test results (paragraph 2): The results of the measurement must include:
1. Positioning accuracy (A); and
2. The mean reversal error (B).

c.1.b.6.a A ''positioning accuracy'' less (better) than 0.007 mm; and

c.1.b.6.b. A slide motion from rest for all slides within 20% of a motion command input for inputs of less than 0.5 micrometer;

TECHNICAL NOTE: Minimum increment of motion test (slide motion from rest): The test is conducted only if the machine tool is equipped with a control unit the minimum increment of which is less (better) than 0.5 micrometer. Prepare the machine for testing in accordance with ISO 230.2 paragraphs 3.1, 3.2, 3.3. Conduct the test on each axis (slide) of the machine tool as follows:
1. Move the axis over at least 50% of the maximum travel in plus and minus directions twice at maximum feed rate, rapid traverse rate or jog control;
2. Wait at least 10 seconds;
3. With manual data input, input the minimum programmable increment of the control unit;
4. Measure the axis movement;
5. Clear the control unit with the servo null, reset or whatever clears any signal (voltage) in the servo loop;

6. Repeat steps 2 to 5 five times, twice in the same direction of the axis travel and three times in the opposite direction of travel for a total of six test points;

7. If the axis movement is between 80% and 120% of the minimum programmable input for four of the six test points, the machine is controlled. For rotary axes, the measurement is taken 200 mm from the center of rotation.

NOTE 1: 2B001.c.1 does not control cylindrical external, internal, and external-internal grinding machines having all of the following characteristics:

a. Not centerless (shoe-type) grinding machines;

b. Limited to cylindrical grinding;

c. A maximum workpiece capacity of 150 mm diameter or length;

d. Only two axes which can be coordinated simultaneously for ''contouring control''; and

e. No contouring c axis.

NOTE 2: 2B001.c.1 does not control machines designed specifically as jig grinders having both of the following characteristics:

a. Axes limited to x, y, c and a, where the c-axis is used to maintain the grinding wheel normal to the work surface and the a-axis is configured to grind barrel cams; and

b. A spindle ''run out'' not less (not better) than 0.0006 mm.

NOTE 3: 2B001.c.1 does not control tool or cutter grinding machines having all of the following characteristics:

a. Shipped as a complete system with ''software'' specially designed for the production of tools or cutters;

b. No more than two rotary axes that can be coordinated simultaneously for ''contouring control'';

c. ''Run out'' (out-of-true running) in one revolution of the spindle not less (not better) than 0.0006 mm total indicator reading (TIR); and

d. The ''positioning accuracies'', with all compensations available, are not less (not better) than:

1. 0.004 mm along any linear axis for overall positioning; or

2. 0.001° on any rotary axis.

c.2. Electrical discharge machines (EDM) of the wire feed type that have five or more axes that can be coordinated simultaneously for ''contouring control'';

c.3. Electrical discharge machines (EDM) of the non-wire type that have two or more rotary axes that can be coordinated simultaneously for ''contouring control'';

c.4. Machine tools for removing metals, ceramics or composites:

c.4.a. By means of:

c.4.a.1. Water or other liquid jets, including those employing abrasive additives;

c.4.a.2. Electron beam; or

c.4.a.3. ''Laser'' beam; and

c.4.b. Having two or more rotary axes that:

c.4.b.1. Can be coordinated simultaneously for ''contouring control''; and

c.4.b.2. Have a ''positioning accuracy'' of less (better) than 0.003 °C.

TECHNICAL NOTE: Machines capable of being simultaneously coordinated for contouring control in two or more rotary axes or one or more ''tilting spindles'', remain controlled regardless of the number of simultaneously coordinated contouring axes that can be controlled by the ''numerical control'' unit attached to the machine.

2B002 Non-"numerically controlled" machine tools for generating optical quality surfaces.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $3000
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number
Related Controls: N/A
Related Definitions: N/A
Items: a. Turning machines using a single point cutting tool and having all of the following characteristics:

a.1. Slide ''positioning accuracy'' less (better) than 0.0005 mm per 300 mm of travel;

a.2. Bidirectional slide positioning ''repeatability'' less (better) than 0.00025 mm per 300 mm of travel;

a.3. Spindle ''run out'' and ''camming'' less (better) than 0.0004 mm total indicator reading (TIR);

a.4. Angular deviation of the slide movement (yaw, pitch and roll) less (better) than 2 seconds of arc, TIR, over full travel; and

a.5. Slide perpendicularity less (better) than 0.001 mm per 300 mm of travel;

TECHNICAL NOTE: The bidirectional slide positioning ''repeatability'' (R) of an axis is the maximum value of the repeatability of positioning at any position along or around the axis determined using the procedure and under the conditions specified in part 2.11 of ISO 230/2: 1988.

b. Fly cutting machines having both of the following characteristics:

b.1. Spindle ''run out'' and ''camming'' less (better) than 0.004 mm TIR; and

b.2. Angular deviation of slide movement (yaw, pitch and roll) less (better) than 2 seconds of arc, TIR, over full travel.

2B003 "Numerically controlled" or manual machine tools specially designed for cutting, finishing, grinding or honing either of the following classes of bevel or parallel axis hardened (R_c = 40 or more) gears, and specially designed components, controls and accessories therefor.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $5000
GBS: Yes for 2B003.a
CIV: Yes for 2B003.a

LIST OF ITEMS CONTROLLED

Unit: Equipment in number; parts and accessories in $ value
Related Controls: N/A

Related Definitions: N/A
Items: a. Hardened bevel gears finished to a quality of better than American Gear Manufacturers Association (AGMA) 13 (equivalent to ISO 1328 class 4); or

b. Hardened spur, helical and double-helical gears with a pitch diameter exceeding 1,250 mm and a face width of 15% of pitch diameter or larger finished to a quality of AGMA 14 or better (equivalent to ISO 1328 class 3).

2B004 Hot "isostatic presses" and specially designed dies, molds, components, accessories and controls therefor.

LICENSE REQUIREMENTS

Reason for Control: NS, MT, NP, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
MT applies to entire entry	MT Column 1
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number; parts and accessories in $ value
Related Controls: N/A
Related Definitions: N/A
Items: a. Having a controlled thermal environment within the closed cavity and possessing a chamber cavity with an inside diameter of 406 mm or more; and

b. Having:

b.1. A maximum working pressure exceeding 207 MPa;

b.2. A controlled thermal environment exceeding 1,773 K (1,500 °C); or

b.3. A facility for hydrocarbon impregnation and removal of resultant gaseous degradation products.

TECHNICAL NOTE: The inside chamber dimension is that of the chamber in which both the working temperature and the working pressure are achieved and does not include fixtures. That dimension will be the smaller of either the inside diameter of the pressure chamber or the inside diameter of the insulated furnace chamber, depending on which of the two chambers is located inside the other.

2B005 Equipment specially designed for deposition, processing and in-process control of inorganic overlays, coatings and surface modification, for non-electronic substrates, by processes shown in the Table and associated Notes following 2E003.d, and specially designed automated handling, positioning, manipulation and control components therefor.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $1000
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: a. ''Stored program controlled'' chemical vapor deposition (CVD) production equipment with both of the following:

a.1. Process modified for one of the following:

a.1.a. Pulsating CVD;

a.1.b. Controlled nucleation thermal decomposition (CNTD); or

a.1.c. Plasma enhanced or plasma assisted CVD; and

a.2. Either of the following:

a.2.a. Incorporating high vacuum (equal to or less than 0.01 Pa) rotating seals; or

a.2.b. Incorporating *in situ* coating thickness control;

b. ''Stored program controlled'' ion implantation production equipment having beam currents of 5 mA or more;

c. ''Stored program controlled'' electron beam physical vapor deposition (EB–PVD) production equipment incorporating:

c.1. Power systems rated for over 80 kW;

c.2. A liquid pool level ''laser'' control system that regulates precisely the ingots feed rate; and

c.3. A computer controlled rate monitor operating on the principle of photo-luminescence of the ionized atoms in the evaporant stream to control the deposition rate of a coating containing two or more elements;

d. ''Stored program controlled'' plasma spraying production equipment having either of the following characteristics:

d.1. Operating at reduced pressure controlled atmosphere (equal to or less than 10 kPa measured above and within 300 mm of the gun nozzle exit) in a vacuum chamber capable of evacuation down to 0.01 Pa prior to the spraying process; or

d.2. Incorporating *in situ* coating thickness control;

e. ''Stored program controlled'' sputter deposition production equipment capable of current densities of 0.1 mA/mm^2 or higher at a deposition rate of 15 micrometer/hr or more;

f. ''Stored program controlled'' cathodic arc deposition production equipment incorporating a grid of electromagnets for steering control of the arc spot on the cathode;

g. ''Stored program controlled'' ion plating production equipment allowing for the *in situ* measurement of either:

g.1. Coating thickness on the substrate and rate control; or

g.2. Optical characteristics.

NOTE: 2B005.g does not control standard ion plating coating equipment for cutting or machining tools.

2B006 Dimensional inspection or measuring systems or equipment.

LICENSE REQUIREMENTS

Reason for Control: NS, NP, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
NP applies to 2B006.a, b and .c	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number
Related Controls: N/A
Related Definition: This entry does not control measuring interferometer systems, without closed or open loop feedback, containing a ''laser'' to measure slide movement errors of machine tools, dimensional inspection machines or similar equipment.
Items: a. Computer controlled, ''numerically controlled'' or ''stored program controlled'' dimensional inspection machines, having both of the following characteristics:

a.1. Two or more axes; and

a.2. A one dimensional length ''measurement uncertainty'' equal to or less (better) than (1.25+L/1,000) micrometer tested with a probe with an ''accuracy'' of less (better) than 0.2 micrometer (L is the measured length in mm);

b. Linear and angular displacement measuring instruments, as follows:

b.1. Linear measuring instruments having any of the following characteristics:

b.1.a. Non-contact type measuring systems with a ''resolution'' equal to or less (better) than 0.2 micrometer within a measuring range up to 0.2 mm;

b.1.b. Linear voltage differential transformer systems with both of the following characteristics:

b.1.b.1. ''Linearity'' equal to or less (better) than 0.1% within a measuring range up to 5 mm; and

b.1.b.2. Drift equal to or less (better) than 0.1% per day at a standard ambient test room temperature ±1 K; or

b.1.c. Measuring systems having both of the following characteristics:

b.1.c.1. Containing a ''laser''; and

b.1.c.2. Maintaining, for at least 12 hours, over a temperature range of ±1 K around a standard temperature and at a standard pressure:

b.1.c.2.a. A ''resolution'' over their full scale of 0.1 micrometer or less (better); and

b.1.c.2.b. A ''measurement uncertainty'' equal to or less (better) than (0.2+L/2,000) micrometer (L is the measured length in mm);

b.2. Angular measuring instruments having an ''angular position deviation'' equal to or less (better) than 0.00025°;

NOTE: 2B006.b.2 does not control optical instruments, such as autocollimators, using collimated light to detect angular displacement of a mirror.

c. Systems for simultaneous linear-angular inspection of hemishells, having both of the following characteristics:

c.1. ''Measurement uncertainty'' along any linear axis equal to or less (better) than 3.5 micrometer per 5 mm; and

c.2. ''Angular position deviation'' equal to or less (better) than 0.02°;

d. Equipment for measuring surface irregularities, by measuring optical scatter as a function of angle, with a sensitivity of 0.5 nm or less (better);

NOTES: 1. Machine tools that can be used as measuring machines are controlled if they meet or exceed the criteria specified for the machine tool function or the measuring machine function.

2. A machine described in 2B006 is controlled if it exceeds the control threshold anywhere within its operating range.

TECHNICAL NOTES: 1. The probe used in determining the ''measurement uncertainty'' of a dimensional inspection system shall be as described in VDI/VDE 2617 Parts 2, 3, and 4.

2. All measurement values in 2B006 represent permissible positive and negative deviations from the target value, i.e., not total band.

2B007 "Robots", and specially designed controllers and "end-effectors" therefor.

LICENSE REQUIREMENTS

Reason for Control: NS, NP, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
NP applies to 2B007.b and .c and to specially designed controllers and ''endeffectors'' therefor.	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $5000, except 2B007.b and .c
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: a. Capable in real time of full three-dimensional image processing or full three-dimensional scene analysis to generate or modify ''programs'' or to generate or modify numerical program data;

NOTE: The scene analysis limitation does not include approximation of the third dimension by viewing at a given angle, or limited grey scale interpretation for the perception of depth or texture for the approved tasks (2½ D).

b. Specially designed to comply with safety standards applicable to explosive munitions environments (i.e.) meeting electrical code ratings for high explosives); or

c. Specially designed or rated as radiation hardened to withstand greater than 5×10^4 grays(Silicon) (5×10^6 rad(Silicon)) without operational degradation.

2B008 Assemblies, units or inserts specially designed for machine tools, or for equipment controlled by 2B006 or 2B007.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definition: This entry does not control measuring interferometer systems, without closed or open loop feedback, containing a laser to measure slide movement errors of machine-tools, dimensional inspection machines or similar equipment.
Items: a. Spindle assemblies, consisting of spindles and bearings as a minimal assembly, with radial (''run out'') or axial (''camming'') axis motion in one revolution of the spindle less (better) than 0.0006 mm total indicator reading (TIR);

b. Linear position feedback units, e.g., inductive type devices, graduated scales, infrared systems or ''laser'' systems, having an overall ''accuracy'' less (better) than $(800 + (600 \times L \times 10^{-3}))$nm (L equals the effective length in mm);

c. Rotary position feedback units, e.g., inductive type devices, graduated scales, infrared systems or ''laser'' systems, having an ''accuracy'' less (better) than 0.00025°;

d. Slide way assemblies consisting of a minimal assembly of ways, bed and slide having all of the following characteristics:

d.1. A yaw, pitch or roll of less (better) than 2 seconds of arc TIR (reference: ISO/DIS 230/1) over full travel;

d.2. A horizontal straightness of less (better) than 2 micrometer per 300 mm length; and

d.3. A vertical straightness of less (better) than 2 micrometer per 300 mm length;

e. Single point diamond cutting tool inserts, having all of the following characteristics:

e.1. Flawless and chip-free cutting edge when magnified 400 times in any direction;

e.2. Cutting radius from 0.1 to 5 mm inclusive; and

e.3. Cutting radius out-of-roundness less (better) than 0.002 mm TIR.

2B009 Specially designed printed circuit boards with mounted components, or "compound rotary tables" or "tilting spindles", capable of upgrading, according to the manufacturer's specifications, "numerical control" units, machine tools or feed-back devices to or above the levels specified in ECCNs 2B001, 2B002, 2B003, 2B004, 2B005, 2B006, 2B007, or 2B008.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

2B018 Equipment on the International Munitions List.

LICENSE REQUIREMENTS

Reason for Control: NS, MT, RS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
MT applies to specialized machinery, equipment, and gear for producing rocket systems (including ballistic missile systems, space launch vehicles, and sounding rockets) and unmanned air vehicle systems (including cruise missile systems, target drones, and reconnaissance drones) usable in systems that are controlled for MT reasons including their propulsion systems and components, and pyrolytic deposition and densification equipment	MT Column 1
RS applies to entire entry	RS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $3000
GBS: Yes for Advisory Note in this entry to 2B018
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number; parts and accessories in § value

Related Controls: N/A
Related Definitions: N/A
Items: Specialized machinery, equipment, gear, and specially designed parts and accessories therefor, including but not limited to the following, that are specially designed for the examination, manufacture, testing, and checking of arms, appliances, machines, and implements of war:

a. Armor plate drilling machines, other than radial drilling machines;
b. Armor plate planing machines;
c. Armor plate quenching presses;
d. Centrifugal casting machines capable of casting tubes 6 feet (183 cm) or more in length, with a wall thickness of 2 inches (5 cm) and over;
e. Gun barrel rifling and broaching machines, and tools therefor;
f. Gun barrel rifling machines;
g. Gun barrel trepanning machines;
h. Gun boring and turning machines;
i. Gun honing machines of 6 feet (183 cm) stroke or more;
j. Gun jump screw lathes;
k. Gun rifling machines;
l. Gun straightening presses;
m. Induction hardening machines for tank turret rings and sprockets;
n. Jigs and fixtures and other metal-working implements or accessories of the kinds exclusively designed for use in the manufacture of firearms, ordnance, and other stores and appliances for land, sea, or aerial warfare;
o. Small arms chambering machines;
p. Small arms deep hole drilling machines and drills therefor;
q. Small arms rifling machines;
r. Small arms spill boring machines;
s. Tank turret bearing grinding machines.

ADVISORY NOTE: Licenses are likely to be approved, as administrative exceptions, for export and reexport to Country Group D:1 of equipment used to determine the safety data of explosives, as required by the International Convention on the Transport of Dangerous Goods (C.I.M.) articles 3 and 4 in Annex 1 RID, provided that such equipment will be used only by the railway authorities of current C.I.M. members, or by the Government-accredited testing facilities in those countries, for the testing of explosives to transport safety standards, of the following description:

a. Equipment for determining the ignition and deflagration temperatures;
b. Equipment for steel-shell tests;
c. Drophammers not exceeding 20 kg in weight for determining the sensitivity of explosives to shock;
d. Equipment for determining the friction sensitivity of explosives when exposed to charges not exceeding 36 kg in weight.

2B104 Equipment and process controls designed or modified for densification and pyrolysis of structural composite rocket nozzles and reentry vehicle nose tips.

LICENSE REQUIREMENTS

Reason for Control: MT, NP, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
NP applies to 2B104.a	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number
Related Controls: N/A
Related Definitions: N/A
Items: a. ''Isostatic presses'' other than those controlled by 2B004 having all of the following characteristics:

a.1. Capable of achieving a maximum working pressure of 10,000 psi (69 MPa) or greater;
a.2. Designed to achieve and maintain a controlled thermal environment of 873 K (600 °C) or greater; and
a.3. Possessing a chamber cavity with an inside diameter of 254 mm or greater;
b. Chemical vapor deposition furnaces designed or modified for the densification of carbon-carbon composites.

2B115 Flow forming machines, and specially designed components therefor.

LICENSE REQUIREMENTS

Reason for Control: MT, NP, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
NP applies to 2B115.a	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number; parts and accessories in $ value
Related Controls: N/A
Related Definition: This entry controls only spin-forming machines combining the functions of spin-forming and flow-forming.
Items: a. Flow-forming and spin-forming machines, and specially designed components therefor, that according to the manufacturer's technical specifications, can be equipped with ''numerical control'' units or a computer control; *and*

b. Having more than two axes that can be coordinated simultaneously for ''contouring control''.

2B116 Vibration test systems, equipment, and components therefor.

LICENSE REQUIREMENTS

Reason for Control: MT, NP, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $3,000
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: NOTE: The term ''digital control'' refers to equipment, the functions of which are, partly or entirely, automatically controlled by stored and digitally coded electrical signals.
Items: a. Vibration test systems employing feedback or closed loop techniques and incorporating a digital controller, capable of vibrating a system at 10 g RMS or more over the entire range 20 Hz to 2,000 Hz and imparting forces of 50 kN (11,250 lbs.), measured ''bare table'', or greater;

NOTE: NP controls in 2B116.a apply to electrodynamic vibration test systems, employing feedback or closed loop control techniques and incorporating a digital controller, capable of vibrating at 10 g RMS or more between 20 Hz and 2000 Hz and imparting forces of 50 kN (11,250 lbs.) measured ''bare table,'' or greater.

b. Digital controllers, combined with specially designed vibration test ''software'', with a real-time bandwidth greater than 5 kHz and designed for use with vibration test systems described in 2B116.a;

c. Vibration thrusters (shaker units), with or without associated amplifiers, capable of imparting a force of 50 kN (11,250 lbs.), measured ''bare table'', or greater, and usable in vibration test systems described in 2B116.a;

d. Test piece support structures and electronic units designed to combine multiple shaker units into a complete shaker system capable of providing an effective combined force of 50 kN, measured ''bare table'', or greater, and usable in vibration test systems described in 2B116.a.

2B204 "Isostatic presses," not controlled by 2B004 or 2B104, capable of achieving a maximum working pressure of 10,000 psi (69 MPa) or greater and having a chamber cavity with an inside diameter in excess of 152 mm (6 inches) and specially designed dies and moulds, and controls therefor.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number
Related Controls: N/A
Related Definition: N/A
Items: The list of items controlled is contained in the ECCN heading.

2B207 "Robots", and "end-effectors", other than those controlled by 2B007, specially designed to comply with safety standards applicable to handling explosives (i.e., meeting electrical code ratings for high explosives) and specially designed controllers therefor.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

2B215 Flow-forming and spin-forming machines other than those controlled by 2B115, and rotor-forming mandrels.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number; parts and accessories in $ value
Related Controls: N/A
Related Definition: This entry controls only spin-forming machines combining the functions of spin-forming and flow-forming.
Items: a. Having three or more rollers (active or guiding); and

a.1. According to the manufacturer's technical specifications, can be equipped with

''numerical control'' units or a computer control;

b. Rotor-forming mandrels designed to form cylindrical rotors of inside diameter between 75 mm (3 in.) and 400 mm (16 in.).

NOTE: This entry includes machines which have only a single roller designed to deform metal plus two auxiliary rollers which support the mandrel, but do not participate directly in the deformation process.

2B225 Remote manipulators that can be used to provide remote actions in radiochemical separation operations and hot cells.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definition: Remote manipulators provide translation of human operator actions to a remote operating arm and terminal fixture. They may be of a 'master/slave' type or operated by joystick or keypad.
Items: a. Having a capability of penetrating 0.6 m or more of hot cell wall (through-the-wall operation); or

b. Having a capability of bridging over the top of a hot cell wall with a thickness of 0.6 m or more (over-the-wall operation)

2B226 Vacuum and controlled environment (inert gas) induction) furnaces capable of operating above 1,123 K (850°C) and having induction coils 600 mm or less in diameter and designed for power inputs of 5 kW or more, and power supplies specially designed therefor with a specified power output of 5 kW or more.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definition: This entry does not control furnaces designed for semiconductor wafer manufacturing or processing.
Items: The list of items controlled is contained in the ECCN heading.

2B227 Vacuum and controlled atmosphere metallurgical melting and casting furnaces, and specially configured computer control and monitoring systems therefor.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definition: This entry does not control furnaces designed for semiconductor wafer manufacturing or processing.
Items: a. Arc remelt and casting furnaces with consumable electrode capacities between 1,000 cm^3 and 20,000 cm^3, and capable of operating with melting temperatures above 1,973 K (1,700 °C);

b. Electron beam melting and plasma atomization and melting furnaces with a power of 50 kW or greater and capable of operating with melting temperatures above 1,473 K (1,200 °C).

2B228 Rotor fabrication and assembly equipment and bellows-forming mandrels and dies.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definition: N/A
Items: a. Rotor assembly equipment (e.g., precision mandrels, clamps, and shrink fit machines) for assembly of gas centrifuge rotor tube sections, baffles, and end caps.

b. Rotor straightening equipment for alignment of gas centrifuge rotor tube sections to a common axis;

TECHNICAL NOTE: Normally such equipment will consist of precision measuring probes linked to a computer that subsequently controls the action of, for example, pneumatic rams used for aligning the rotor tube sections.

c. Bellows-forming mandrels and dies for producing single-convolution bellows (bellows made of high-strength aluminum alloys, maraging steel, or high-strength filamentary materials) that have all of the following dimensions:

c.1. 75 mm to 400 mm (3 in. to 6 in.) inside diameter;

c.2. 12.7 mm (0.5 in) or more in length; *and*

c.3. Single convolution depth more than 2 mm (0.08 in.).

2B229 Centrifugal balancing machines, fixed or portable, horizontal or vertical.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: a. Designed for balancing flexible rotors having a length of 600 mm (24 in.) or more and having all of the following characteristics:

a.1. A swing or journal diameter of 75 mm (3 in.) or more;

a.2. Mass capability for 0.9 kg (2 lb.) to 23 kg (50 lb.); and

a.3. Capable of balancing speed of more than 5,000 rpm;

b. Designed for balancing hollow cylindrical rotor components, and having all of the following characteristics:

b.1. A journal diameter of 75 mm (3 in.) or more;

b.2. Mass capability from 0.9 kg (2 lb.) to 23 kg (50 lb.);

b.3. Capable of balancing to a residual imbalance of 0.010 kg-mm/kg per plane or better; and

b.4. Belt drive type.

2B230 Pressure transducers which are capable of measuring absolute pressure at any point in the range 0 to 13 kPa, with pressure sensing elements made of or protected by nickel, nickel alloys with more than 60% nickel by weight, aluminum or aluminum alloys.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: (1) Pressure transducers are devices that convert pressure measurements into an electrical signal. (2) For the purposes of this entry, ''accuracy'' includes non-linearity, hysteresis and repeatability at ambient temperature.
Items: a. Transducers with a full scale of less than 13 kPa and an accuracy of better than ±1% of full scale;

b. Transducers with a full scale of 13 kPa or greater and an accuracy of better than ±130 Pa.

2B231 Vacuum pumps with an input throat size of 38 cm (15 in.) or greater with a pumping speed of 15,000 liters/second or greater and capable of producing an ultimate vacuum better than 10^4 Torr (1.33×10^{-4} mbar).

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: Vacuum pumps for gaseous diffusion separation process are subject to

the export licensing authority of the Nuclear Regulatory Commission. (See 10 CFR part 110.)

Related Definition: (1) The ultimate vacuum is determined at the input of the pump with the input of the pump blocked off. (2) The pumping speed is determined at the measurement point with nitrogen gas or air.

Items: The list of items controlled is contained in the ECCN heading.

2B232 Multistage light gas guns or other high-velocity gun systems (coil, electromagnetic, electrothermal, or other advanced systems) capable of accelerating projectiles to 2 km/s or greater and specialized components therefor.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

2B290 "Numerically controlled" machine tools not controlled by 2B001.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number; parts and accessories in § value
Related Controls: N/A
Related Definition: N/A
Items: a. Turning machines or combination turning/milling machines that are capable of machining diameters greater than 2.5 meters.

b. [Reserved]

2B350 Chemical manufacturing facilities and equipment.

LICENSE REQUIREMENTS

Reason for Control: CB, AT

Control(s)	*Country Chart*
CB applies to entire entry	CB Column 3
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number
Related Controls: The controls in this entry do not apply to equipment that is; a.) specially designed for use in civil applications (e.g., food processing, pulp and paper processing, or water purification); AND b.) inappropriate, by the nature of its design, for use in storing, processing, producing or conducting and controlling the flow of chemical weapons precursors controlled by 1C350.
Related Definition: For purposes of this entry the term ''chemical warfare agents'' are those agents subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. (See 22 CFR Part 121, Category XIV)
Items: a. Chemical processing equipment described in paragraph a.1 having any of the flow contact surfaces described in paragraph a.2:

a.1. Chemical processing equipment, as follows:

a.1.a. Reaction vessels or reactors, with or without agitators, with a total internal (geometric) volume greater than 0.1 m^3 (100 liters) and less than 20 m^3 (20,000 liters);

a.1.b Agitators for use in reaction vessels or reactors described in 2B350.a.1.a;

a.1.c. Storage tanks, containers or receivers with a total internal (geometric) volume greater than 0.1 m^3 (100 1);

a.1.d. Heat exchangers or condensers with a heat transfer surface area less than 20 m^2;

a.1.e. Distillation or absorption columns having a diameter greater than 0.1 m;

a.1.f. Multiple seal valves incorporating a leak detection port, bellows-seal valves, nonreturn (check) valves or diaphragm valves; or

a.1.g. Multi-walled piping incorporating a leak detection port;

a.2. Where all surfaces that come into direct contact with the chemical(s) being processed or contained are made from any of the following materials:

a.2.a. Nickel, or alloys with more than 40% nickel by weight;

a.2.b. Alloys with more than 25% nickel and 20% chromium by weight;

a.2.c. Fluoropolymers;

a.2.d. Glass or glass-lined (including vitrified or enamelled coating);

a.2.e. Graphite (for heat exchangers or condensers, distillation or absorption columns, or multi-walled piping only);

a.2.f. Tantalum or tantalum alloys;
a.2.g. Titanium or titanium alloys; or
a.2.h. Zirconium or zirconium alloys.

b. Remotely operated filling equipment in which all surfaces that come into direct contact with the chemical(s) being processed are made from any of the following materials:

b.1. Nickel, or alloys with more than 40% nickel by weight; or

b.2. Alloys with more than 25% nickel and 20% chromium by weight.

c. Multi-seal, canned drive, magnetic, bellows, or diaphragm pumps, with manufacturer's specified maximum flow-rate greater than 0.6m³/h, or vacuum pumps with the manufacturer's specified maximum flow-rate greater than 5 m³/h (under standard temperature (0 °C) and pressure (101.30 kPa) conditions) in which all surfaces that come into direct contact with the chemical(s) being processed are made from any of the following materials:

c.1. Nickel, or alloys with more than 40% nickel by weight;

c.2. Alloys with more than 25% nickel and 20% chromium by weight;

c.3. Fluoropolymers;

c.4. Glass or glass-lined (including vitrified or enamelled coating);

c.5. Graphite;

c.6. Tantalum or tantalum alloys;

c.7. Titanium or titanium alloys;

c.8. Zirconium or zirconium alloys;

c.9. Ceramics; or

c.10. Ferrosilicon.

d. Incinerators that are designed to destroy chemical warfare agents, or chemical weapons precursors controlled by ECCN 1C350, having specially designed waste supply systems, special handling facilities with an average combustion chamber temperature greater than 1000 °C in which all surfaces in the waste supply system that come into direct contact with the waste products are made from or lined with any of the following materials:

d.1. Nickel, or alloys with more than 40% nickel by weight;

d.2. Alloys with more than 25% nickel and 20% chromium by weight; or

d.3. Ceramics.

2B351 Toxic gas monitoring system; and dedicated detectors therefor.

LICENSE REQUIREMENTS

Reason for Control: CB, AT

Control(s)	*Country Chart*
CB applies to entire entry	CB Column 3
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number
Related Controls: N/A
Related Definitions: N/A
Items: a. Designed for continuous operation and usable for detecting chemical warfare agents controlled on the U.S. Munitions List (See 22 CFR part 121) or chemical weapons precursors controlled by ECCN 1C350, or detecting organic compounds containing phosphorus, sulphur, fluorine, or chlorine, or their compounds, at a concentration less than 0.3 mg/m³; and

b. Designed for the detection of chemical compounds having a cholinesterase-inhibiting activity.

2B352 Biological equipment.

LICENSE REQUIREMENTS

Reason for Control: CB, AT

Control(s)	*Country Chart*
CB applies to entire entry	CB Column 3
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number
Related Controls: N/A
Related Definitions: N/A
Items: a. Complete containment facilities at P3 or P4 containment level;

TECHNICAL NOTE: P3 or P4 (BL3, BL4, L3, L4) containment levels are as specified in the WHO Laboratory Biosafety Manual (Geneva, 1983).

b. Fermenters capable of cultivation of pathogenic micro-organisms, viruses or for toxin production, without the propagation of aerosols, having a capacity equal to or greater than 100 liters.

TECHNICAL NOTE: Fermenters include bioreactors, chemostats, and continuous-flow systems.

c. Centrifugal separators capable of the continuous separation of pathogenic microorganisms, without the propagation of aerosols, and having all of the following characteristics:

c.1. A flow rate greater than 100 liters per hour;

c.2. Components of polished stainless steel or titanium;

c.3. Double or multiple sealing joints within the stream containment area;

c.4. Capable of *in situ* stream sterilization in a closed state.

TECHNICAL NOTE: Centifugal separators include decanters.

d. Cross-flow filtration equipment capable of continuous separation of pathogenic microorganisms, viruses, toxins, and cell cultures without the propagation of aerosols, having all of the following characteristics:

d.1. Equal to or greater than 5 square meters;

d.2. Capable of *in situ* sterilization.

e. Steam sterilizable freeze-drying equipment with a condenser capacity greater than 50 kgs. but less than 1,000 kgs. of ice in 24 hours.

f. Equipment that incorporates or is contained in P3 or P4 containment housing, as follows:

f.1. Independently ventilated protective full or half suits; and

f.2. Class III biological safety cabinets or isolators with similar performance standards;

NOTE: In this entry, isolators include flexible isolators, dry boxes, anaerobic chambers and glove boxes.

g. Chambers designed for aerosol challenge testing with microorganisms, viruses, or toxins and having a capacity of 1 m^3 or greater.

2B985 Equipment specially designed for manufacturing shotgun shells; and ammunition hand-loading equipment for both cartridges and shotgun shells.

LICENSE REQUIREMENTS

Reason for Control: UN

UN applies to entire entry. A license is required for items controlled by this entry to Cuba, Libya, North Korea and Rwanda. The Commerce Country Chart is not designed to determine licensing requirements for this entry. See part 746 of the EAR for additional information.

NOTE: Exports from the U.S. and transhipments to Iran must be licensed by the Department of Treasury, Office of Foreign Assets Control. (See to §746.7 of the EAR for additional information on this requirement.)

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

2B991 Numerical control units for machine tools and "numerically controlled" machine tools, n.e.s

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number
Related Controls: N/A
Related Definitions: N/A
Items: a. ''Numerical control'' units for machine tools:

a.1. Having four interpolating axes that can be coordinated simultaneously for ''contouring control''; or

a.2. Having two or more axes that can be coordinated simultaneously for ''contouring control'' and a minimum programmable increment better (less) than 0.001 mm;

b. ''Numerically controlled'' machine tools that, according to the manufacturer's technical specifications, can be equipped with electronic devices for simultaneous ''contouring control'' in two or more axes and that have both of the following characteristics:

b.1. Two or more axes that can be coordinated simultaneously for contouring control; and

b.2. ''Positioning accuracies'', with all compensations available:

b.2.a. Better than 0.020 mm, but no better than 0.004 mm along any linear axis (overall positioning) for grinding machines;

b.2.b. Better than 0.020 mm, but no better than 0.006 mm along any linear axis (overall positioning) for milling machines; or

b.2.c. Better than 0.020 mm, but no better than 0.010 mm along any linear axis (overall positioning) for turning machines.

2B992 Manual dimensional inspection machines with two or more axes, and measurement uncertainty equal to or less (better) than (3 + L/300) micrometer in any axes (L measured length in mm).

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED:
Unit: Equipment in number
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

2B993 Gearmaking and/or finishing machinery not controlled by 2B003 capable of producing gears to a quality level of better than AGMA 11.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED:
Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

2B994 "Robots" not controlled by 2B007 or 2B207 that are capable of employing feedback information in real-time processing from one or more sensors to generate or modify "programs" or to generate or modify numerical program data.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

C. MATERIALS [RESERVED]

D. SOFTWARE

2D001 "Software" specially designed or modified for the "development", "production" or "use" of equipment controlled by 2A001 to 2A007 or 2B001 to 2B009.

LICENSE REQUIREMENTS

Reason for Control: NS, MT, NP, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
MT applies to ''software'' for equipment controlled by 2B004	MT Column 1
NP applies to ''software'' for equipment controlled by 2B001, 2B004, 2B006, 2B007 for NP reasons	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: Yes

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

2D002 Specific "software."

LICENSE REQUIREMENTS

Reason for Control: NS, NP, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
NP applies to 2D002.b	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: Yes

LIST OF ITEMS CONTROLLED

Unit: § value
Related Controls: N/A
Related Definitions: N/A
Items: a. ''Software'' to provide ''adaptive control'' and having both of the following characteristics:

a.1. For ''flexible manufacturing units'' (FMUs) which consist at least of equipment described in b.1 and b.2 of the definition of ''flexible manufacturing unit'' contained in part 772 of the EAR; and

a.2. Capable of generating or modifying, in ''real time processing'', programs or data by using the signals obtained simultaneously by means of at least two detection techniques, such as:

a.2.a. Machine vision (optical ranging);

a.2.b. Infrared imaging;

a.2.c. Acoustical imaging (acoustical ranging);

a.2.d. Tactile measurement;

a.2.e. Inertial positioning;

a.2.f. Force measurement;

a.2.g. Torque measurement;

NOTE: 2D002.a does not control ''software'' which only provides rescheduling of functionally identical equipment within ''flexible manufacturing units'' using pre-stored part programs and a pre-stored strategy for the distribution of the part programs.

b. ''Software'' for electronic devices other than those described in 2B001.a or b, which provides the ''numerical control'' capability of the equipment controlled by 2B001.

2D018 "Software" for the "development", "production" or "use" of equipment controlled by 2B018.

LICENSE REQUIREMENTS

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1

Control(s)	*Country Chart*
MT applies to ''software'' for equipment controlled by 2B018 for MT reasons	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: Yes

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

2D101 "Software" for the "development", "production", or "use" of items controlled by 2B104, 2B115 or 2B116.

LICENSE REQUIREMENTS

Reason for Control: MT, NP, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

2D201 "Software" specially designed for the "development", "production" or "use" of items controlled by 2B204, 2B207, 2B215, 2B227 or 2B229.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

2D290 "Software" specially designed or modified for the "development", "production" or "use" of items controlled by 2A290, 2A291 or 2B290.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to ''software'' for equipment controlled by 2A291 or 2B290	NP Column 1
NP applies to ''software'' for equipment controlled by 2A290	NP Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

2D992 "Software" specially designed for the "development" or "production" of equipment controlled by 2B992.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

2D993 "Software" specially designed for the "development", "production", or "use" of equipment controlled by 2B991, 2B993, or 2B994.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

2D994 "Software" specially designed for the "development" or "production" of portable electric generators controlled by 2A994.

LICENSE REQUIREMENTS

Reason for Control: AT

AT applies to entire entry. A license is required for items controlled by this entry to Cuba, Iran, Libya, and North Korea. The Commerce Country Chart is not designed to determine licensing requirements for this entry. See part 746 of the EAR for additional information.

NOTE: Exports from the U.S. and transhipments to Iran must be licensed by the Department of Treasury, Office of Foreign Assets Control. (See §742.8 and §746.7 for additional information on this requirement.)

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

E. TECHNOLOGY

2E001 "Technology" according to the General Technology Note for the "development" of items controlled by 2A (except 2A993 and 2A994) or 2B (except 2B018, 2B991 to 2B994) 2D (except 2D018, 2D992 to 2D994)

LICENSE REQUIREMENTS

Reason for Control: NS, MT, NP, CB, AT

Control(s)	*Country Chart*
NS applies to ''technology'' for items controlled by 2A001 to 2A006, 2B001 to 2B009, 2D001 or 2D002	NS Column 1
MT applies to ''technology'' for items controlled by 2B004, 2B018 or 2B116, 2D001 or 2D101 for MT reasons	MT Column 1
NP applies to ''technology'' for items controlled by 2A292, 2A293, 2B001, 2B004, 2B006, 2B007, 2B104, 2B215, 2B225, 2B226, 2B228, 2B229, 2B231, 2B290, 2D001, 2D002 or 2D201 for NP reasons	NP Column 1
NP applies to ''technology'' for equipment controlled by 2A290	NP Column 2
CB applies to ''technology'' for equipment controlled by 2B350 to 2B352	CB Column 3
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: Yes

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

2E002 "Technology" according to the General Technology Note for the "production" of items controlled by 2A (except 2A993 and 2A994) or 2B (except 2B018, 2B991 to 2B994).

LICENSE REQUIREMENTS

Reason for Control: NS, MT, NP, CB, AT

Control(s)	*Country Chart*
NS applies to ''technology'' for equipment controlled by 2A001 to 2A006, 2B001 to 2B009	NS Column 1
MT applies to ''technology'' for equipment controlled by 2B004, 2B018, and 2B116 for MT reasons	MT Column 1
NP applies to ''technology'' for equipment controlled by 2A292, 2A293, 2B001, 2B004, 2B006, 2B007, 2B104, 2B215, 2B225, 2B226, 2B228, 2B229, 2B231, 2B290 NP reasons	NP Column 1
NP applies to ''technology'' for equipment controlled by 2A290	NP Column 2
CB applies to ''technology'' for equipment controlled by 2B350 to 2b352	CB Column 3
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: Yes

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

2E003 Other "technology".

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
NP applies to ''technology'' controlled by 2E003.a.1 or a.3.	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: Yes, except 2E003.a.1, a.3, .b, and .d

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: a. ''Technology'':

a.1 For the ''development'' of interactive graphics as an integrated part in ''numerical control'' units for preparation or modification of part programs;

a.2 For the ''development'' of generators of machine tool instructions (e.g., part programs) from design data residing inside ''numerical control'' units;

a.3 For the ''development'' of integration ''software'' for incorporation of expert systems for advanced decision support of shop floor operations into ''numerical control'' units;

b. ''Technology'' for metal-working manufacturing processes, as follows:

b.1. ''Technology'' for the design of tools, dies or fixtures specially designed for the following processes:

b.1.a. ''Superplastic forming'';

b.1.b. ''Diffusion bonding'';

b.1.c. ''Direct-acting hydraulic pressing'';

b.2. ''Technology'' consisting of process methods or parameters as listed below used to control:

b.2.a. ''Superplastic forming'' of aluminium alloys, titanium alloys or ''superalloys'':

b.2.a.1. Surface preparation;

b.2.a.2. Strain rate;

b.2.a.3. Temperature;

b.2.a.4. Pressure;

b.2.b. ''Diffusion bonding'' of ''superalloys'' or titanium alloys:

b.2.b.1. Surface preparation;

b.2.b.2. Temperature;

b.2.b.3. Pressure;

b.2.c. ''Direct-acting hydraulic pressing'' of aluminium alloys or titanium alloys:

b.2.c.1. Pressure;

b.2.c.2. Cycle time;

b.2.d. ''Hot isostatic densification'' of titanium alloys, aluminium alloys or ''superalloys'':

b.2.d.1. Temperature;

b.2.d.2. Pressure;

b.2.d.3. Cycle time;

c. ''Technology'' for the ''development'' or ''production'' of hydraulic stretch-forming machines and dies therefor, for the manufacture of airframe structures;

d. ''Technology'' for:

d.1 The application of inorganic overlay coatings or inorganic surface modification coatings, specified in column 3 of the following Table;

d.2 To non-electronic substrates, specified in column 2 of the following Table;

d.3 By processes specified in column 1 of the following Table and defined in the Technical Note;

CATEGORY 2E—MATERIALS PROCESSING TABLE; DEPOSITION TECHNIQUES

1. Coating Process (1)	*2. Substrate*	*3. Resultant Coating*
A. Chemical Vapor Deposition (CDV)	''Superalloys''	Aluminides for internal passages
	Ceramics and Low-expansion glasses (14)	Silicides Carbides Dielectric layers (15)
	Carbon-carbon, Ceramic, and Metal matrix composites.	Silicides Carbides Refractory metals Mixtures thereof (4) Dielectric layers (15) Aluminides Alloyed aluminides (2)
	Cemented tungsten carbide (16), Silicon carbide	Carbides Tungsten Mixtures thereof (4) Dielectric layers (15)
	Molybdenum and Molybdenum alloys	Dielectric layers (15)
	Beryllium and Beryllium alloys	Dielectric layers (15)
	Sensor window materials (9)	Dielectric layers (15)
B. Thermal-Evaporation Physical Vapor Deposition (TE–PVD)		
1. Physical Vapor Deposition (PVD): Electron-Beam (EB–PVB).	''Superalloys''	Alloyed silicides Alloyed aluminides (2) MCrAlx (5) Modified zirconia (12) Silicides Aluminides Mixtures thereof (4)
	Ceramics and Low-expansion glasses (14)	Dielectric layers (15)
	Corrosion resistant steel (7)	MCrAlx (5) Modified zirconia (12) Mixtures thereof (4)
	Carbon-carbon, Ceramic and Metal matrix composites.	Silicides Carbides Refractory metals Mixtures thereof (4) Dielectric layers (15)

CATEGORY 2E—MATERIALS PROCESSING TABLE; DEPOSITION TECHNIQUES—Continued

1. Coating Process (1)	2. Substrate	3. Resultant Coating
	Cemented tungsten carbide (16), Silicon carbide	Carbides Tungsten Mixtures thereof (4) Dielectric layers (15)
	Molybdenum and Molybdenum alloys	Dielectric layers (15)
	Beryllium and Beryllium alloys	Dielectric layers (15) Borides
	Sensor window materials (9)	Dielectric layers (15)
	Titanium alloys (13)	Borides Nitrides
2. Ion assisted resistive heating Physical Vapor Deposition (Ion Plating).	Ceramics and Low-expansion glasses (14)	Dielectric layers (15)
	Carbon-carbon, Ceramic and Metal matrix composites.	Dielectric layers (15)
	Cemented tungsten carbide (16), Silicon carbide	Dielectric layers (15)
	Molybdenum and Molybdenum alloys	Dielectric layers (15)
	Beryllium and Beryllium alloys	Dielectric layers (15)
	Sensor window materials (9)	Dielectric layers (15)
3. Physical Vapor Deposition: ''laser'' evaporation.	Ceramics and Low-expansion glasses (14)	Silicides Dielectric layers (15)
	Carbon-carbon, Ceramic and Metal matrix composites.	Dielectric layers (15)
	Cemented tungsten carbide (16), Silicon carbide	Dielectric layers (15)
	Molybdenum and Molybdenum alloys	Dielectric layers (15)
	Beryllium and Beryllium alloys	Dielectric layers (15)
	Sensor window materials (9)	Dielectric layers (15)
4. Physical Vapor Deposition: cathodic arc discharge.	''Superalloys''	Alloyed silicides Alloyed aluminides (2) MCrAlx (5)
	Polymers (11) and Organic matrix composites	Borides Carbides Nitrides
C. Pack cementation (see A above for out-of-pack cementation) (10)	Carbon-carbon, Ceramic and Metal matrix composites.	Silicides Carbides Mixtures thereof (4)
	Titanium alloys (13)	Silicides Aluminides Alloyed aluminides (2)
	Refractory metals and alloys (8).	
D. Plasma spraying	Superalloys	MCrAlx (5) Modified zirconia (12) Mixtures thereof (4) Abradable Nickel-Graphite Abradable Ni-Cr-Al- Bentonite Abradable Al-Si-Polyester Alloyed aluminides (2)
	Aluminum alloys (6)	MCrAlx (5) Modified zirconia (12) Silicides Mixtures thereof (4)
	Refractory metals and alloys (8)	Aluminides Silicides Carbides
	Corrosion resistant steel (7)	Modified zirconia (12) Mixtures thereof (4)
	Titanium alloys (13)	Carbides Aluminides Silicides Alloyed aluminides (2) Abradable Nickel-Graphite Abradable Ni-Cr-Al- Bentonite Abradable Al-Si-Polyester

CATEGORY 2E—MATERIALS PROCESSING TABLE; DEPOSITION TECHNIQUES—Continued

1. Coating Process (1)	*2. Substrate*	*3. Resultant Coating*
E. Slurry Deposition	Refractory metals and alloys (8)	Fused silicides
		Fused aluminides except for resistance heating elements
	Carbon-carbon, Ceramic and Metal matrix composites.	Silicides
		Carbides
		Mixtures thereof (4)
F. Sputter Deposition	''Superalloys''	Alloyed silicides
		Alloyed aluminides (2)
		Noble metal modified aluminides (3)
		MCrAlx (5)
		Modified zirconia (12)
		Platinum
		Mixtures thereof (4)
	Ceramics and Low-expansion glasses (14)	Silicides
		Platinum
		Mixtures thereof (4)
		Dielectric layers (15)
	Titanium alloys (13)	Borides
		Nitrides
		Oxides
		Silicides
		Aluminides
		Alloyed aluminides (2)
		Carbides
	Carbon-carbon, Ceramic and Metal matrix composites.	Silicides
		Carbides
		Refractory metals
		Mixtures thereof (4)
		Dielectric layers (15)
	Cemented tungsten carbide (16), Silicon carbide	Carbides
		Tungsten
		Mixtures thereof (4)
		Dielectric layers (15)
	Molybdenum and Molybdenum alloys	Dielectric layers (15)
	Beryllium and Beryllium alloys	Borides
		Dielectric layers (15)
	Sensor window materials (9)	Dielectric layers (15)
	Refractory metals and alloys (8)	Aluminides
		Silicides
		Oxides
		Carbides
G. Ion Implantation	High temperature bearing steels	Additions of Chromium, Tantalum, or Niobium (Columbium)
	Titanium alloys (15)	Borides
		Nitrides
	Beryllium and Beryllium alloys	Borides
	Cemented tungsten carbide (16)	Carbides
		Nitrides

NOTES TO TABLE ON DEPOSITION TECHNIQUES

1. The term ''coating process'' includes coating repair and refurbishing as well as original coating.

2. The term ''alloyed aluminide'' coating includes single or multiple-step coatings in which an element or elements are deposited prior to or during application of the aluminide coating, even if these elements are deposited by another coating process. It does not, however, include the multiple use of single-step pack cementation processes to achieve alloyed aluminides.

3. The term 'noble metal modified aluminide' coating includes multiple-step coatings in which the noble metal or noble metals are laid down by some other coating process prior to application of the aluminide coating.

4. Mixtures consist of infiltrated material, graded compositions, co-deposits and multilayer deposits and are obtained by one or more of the coating processes specified in the Table.

5. MCrAlX refers to a coating alloy where M equals cobalt, iron, nickel or combinations thereof and X equals hafnium, yttrium, silicon, tantalum in any amount or other intentional additions over 0.01 weight percent

in various proportions and combinations, except:

a. CoCrAlY coatings which contain less than 22 weight percent of chromium, less than 7 weight percent of aluminium and less than 2 weight percent of yttrium;

b. CoCrAlY coatings which contain 22 to 24 weight percent of chromium, 10 to 12 weight percent of aluminium and 0.5 to 0.7 weight percent of yttrium; or

c. NiCrAlY coatings which contain 21 to 23 weight percent of chromium, 10 to 12 weight percent of aluminium and 0.9 to 1.1 weight percent of yttrium.

6. The term ''aluminium alloys'' refers to alloys having an ultimate tensile strength of 190 MPa or more measured at 293 K (20 °C).

7. The term 'corrosion resistant steel' refers to AISI (American Iron and Steel Institute) 300 series or equivalent standard steels.

8. Refractory metals consist of the following metals and their alloys: niobium (columbium), molybdenum, tungsten and tantalum.

9. Sensor window materials, as follows: alumina, silicon, germanium, zinc sulphide, zinc selenide, gallium arsenide and the following metal halides: potassium iodide, potassium fluoride, or sensor window materials of more than 40 mm diameter for thallium bromide and thallium chlorobromide.

10. ''Technology'' for single-step pack cementation of solid airfoils is not controlled by this Category.

11. Polymers, as follows: polyimide, polyester, polysulfide, polycarbonates and polyurethanes.

12. Modified zirconia refers to additions of other metal oxides, e.g., calcia, magnesia, yttria, hafnia, rare earth oxides, etc., to zirconia in order to stabilize certain crystallographic phases and phase compositions. Thermal barrier coatings made of zirconia, modified with calcia or magnesia by mixing or fusion, are not controlled.

13. Titanium alloys refers to aerospace alloys having an ultimate tensile strength of 900 MPa or more measured at 293 K (20 °C).

14. Low-expansion glasses refers to glasses which have a coefficient of thermal expansion of 1×10^{-7} K^{-1} or less measured at 293 K (20 °C).

15. Dielectric layers are coatings constructed of multi-layers of insulator materials in which the interference properties of a design composed of materials of various refractive indices are used to reflect, transmit or absorb various wavelength bands. Dielectric layers refers to more than four dielectric layers or dielectric/metal composite layers.

16. Cemented tungsten carbide does not include cutting and forming tool materials consisting of tungsten carbide/(cobalt, nickel), titanium carbide/(cobalt, nickel), chromium carbide/nickel-chromium and chromium arbide/nickel.

TECHNICAL NOTE TO TABLE ON DEPOSITION TECHNIQUES

Processes specified in Column 1 of the Table are defined as follows:

a. Chemical Vapor Deposition (CVD) is an overlay coating or surface modification coating process wherein a metal, alloy, composite, dielectric or ceramic is deposited upon a heated substrate. Gaseous reactants are decomposed or combined in the vicinity of a substrate resulting in the deposition of the desired elemental, alloy or compound material on the substrate. Energy for this decomposition or chemical reaction process may be provided by the heat of the substrate, a glow discharge plasma, or ''laser'' irradiation.

NOTE 1: CVD includes the following processes: directed gas flow out-of-pack deposition, pulsating CVD, controlled nucleation thermal decomposition (CNTD), plasma enhanced or plasma assisted CVD processes.

NOTE 2: Pack denotes a substrate immersed in a powder mixture.

NOTE 3: The gaseous reactants used in the out-of-pack process are produced using the same basic reactions and parameters as the pack cementation process, except that the substrate to be coated is not in contact with the powder mixture.

b. Thermal Evaporation-Physical Vapor Deposition (TE–PVD) is an overlay coating process conducted in a vacuum with a pressure less than 0.1 Pa wherein a source of thermal energy is used to vaporize the coating material. This process results in the condensation, or deposition, of the evaporated species onto appropriately positioned substrates. The addition of gases to the vacuum chamber during the coating process to synthesize compound coatings is an ordinary modification of the process. The use of ion or electron beams, or plasma, to activate or assist the coating's deposition is also a common modification in this technique. The use of monitors to provide in-process measurement of optical characteristics and thickness of coatings can be a feature of these processes. Specific TE-PVD processes are as follows:

1. Electron Beam PVD uses an electron beam to heat and evaporate the material which forms the coating;

2. Resistive Heating PVD employs electrically resistive heating sources capable of producing a controlled and uniform flux of evaporated coating species;

3. ''Laser'' Evaporation uses either pulsed or continuous wave ''laser'' beams to heat the material which forms the coating;

4. Cathodic Arc Deposition employs a consumable cathode of the material which forms the coating and has an arc discharge established on the surface by a momentary contact of a ground trigger. Controlled motion of arcing erodes the cathode surface creating a highly ionized plasma. The anode can be either a cone attached to the periphery of the cathode, through an insulator, or the chamber. Substrate biasing is used for non line-of-sight deposition.

NOTE: This definition does not include random cathodic arc deposition with non-biased substrates.

c. Ion Plating is a special modification of a general TE–PVD process in which a plasma or an ion source is used to ionize the species to be deposited, and a negative bias is applied to the substrate in order to facilitate the extraction of the species to be deposited from the plasma. The introduction of reactive species, evaporation of solids within the process chamber, and the use of monitors to provide in-process measurement of optical characteristics and thicknesses of coatings are ordinary modifications of the process.

d. Pack Cementation is a surface modification coating or overlay coating process wherein a substrate is immersed in a powder mixture (a pack), that consists of:

1. The metallic powders that are to be deposited (usually aluminum, chromium, silicon or combinations thereof);

2. An activator (normally a halide salt); and

3. An inert powder, most frequently alumina. The substrate and powder mixture is contained within a retort which is heated to between 1,030 K (757 °C) to 1,375 K (1,102 °C) for sufficient time to deposit the coating.

e. Plasma Spraying is an overlay coating process wherein a gun (spray torch) which produces and controls a plasma accepts powder or wire coating materials, melts them and propels them towards a substrate, whereon an integrally bonded coating is formed. Plasma spraying constitutes either low pressure plasma spraying or high velocity plasma spraying carried out underwater.

NOTE 1: Low pressure means less than ambient atmospheric pressure.

NOTE 2: High velocity refers to nozzle-exit gas velocity exceeding 750 m/s calculated at 293 K (20 °C) at 0.1 MPa.

f. Slurry Deposition is a surface modification coating or overlay coating process wherein a metallic or ceramic powder with an organic binder is suspended in a liquid and is applied to a substrate by either spraying, dipping or painting, subsequent air or oven drying, and heat treatment to obtain the desired coating.

g. Sputter Deposition is an overlay coating process based on a momentum transfer phenomenon, wherein positive ions are accelerated by an electric field towards the surface of a target (coating material). The kinetic energy of the impacting ions is sufficient to cause target surface atoms to be released and deposited on an appropriately positioned substrate.

NOTE 1: The Table refers only to triode, magnetron or reactive sputter deposition which is used to increase adhesion of the coating and rate of deposition and to radio frequency (RF) augmented sputter deposition used to permit vaporization of non-metallic coating materials.

NOTE 2: Low-energy ion beams (less than 5 keV) can be used to activate the deposition.

h. Ion Implantation is a surface modification coating process in which the element to be alloyed is ionized, accelerated through a potential gradient and implanted into the surface region of the substrate. This includes processes in which ion implantation is performed simultaneously with electron beam physical vapor deposition or sputter deposition.

ACCOMPANYING TECHNICAL INFORMATION TO TABLE ON DEPOSITION TECHNIQUES

1. ''Technology'' for pretreatments of the substrates listed in the Table, as follows:

a. Chemical stripping and cleaning bath cycle parameters, as follows:

1. Bath composition;

a. For the removal of old or defective coating corrosion product or foreign deposits;

b. For preparation of virgin substrates;

2. Time in bath;

3. Temperature of bath;

4. Number and sequences of wash cycles;

b. Visual and macroscopic criteria for acceptance of the cleaned part;

c. Heat treatment cycle parameters, as follows:

1. Atmosphere parameters, as follows:

a. Composition of the atmosphere;

b. Pressure of the atmosphere;

2. Temperature for heat treatment;

3. Time of heat treatment;

d. Substrate surface preparation parameters, as follows:

1. Grit blasting parameters, as follows:

a. Grit composition;

b. Grit size and shape;

c. Grit velocity;

2. Time and sequence of cleaning cycle after grit blast;

3. Surface finish parameters;

e. Masking technique parameters, as follows:

1. Material of mask;

2. Location of mask;

2. ''Technology'' for in situ quality assurance techniques for evaluation of the coating processes listed in the Table, as follows:

a. Atmosphere parameters, as follows:

1. Composition of the atmosphere;

2. Pressure of the atmosphere;

b. Time parameters;

c. Temperature parameters;

d. Thickness parameters;

e. Index of refraction parameters;

3. ''Technology'' for post deposition treatments of the coated substrates listed in the Table, as follows:

a. Shot peening parameters, as follows:

1. Shot composition;

2. Shot size;

3. Shot velocity;

b. Post shot peening cleaning parameters;

c. Heat treatment cycle parameters, as follows:

1. Atmosphere parameters, as follows:

a. Composition of the atmosphere;

b. Pressure of the atmosphere;

2. Time-temperature cycles;

d. Post heat treatment visual and macroscopic criteria for acceptance of the coated substrates;

4. ''Technology'' for quality assurance techniques for the evaluation of the coated substrates listed in the Table, as follows:

a. Statistical sampling criteria;

b. Microscopic criteria for:

1. Magnification;

2. Coating thickness uniformity;

3. Coating integrity;

4. Coating composition;

5. Coating and substrates bonding;

6. Microstructural uniformity.

c. Criteria for optical properties assessment:

1. Reflectance;

2. Transmission;

3. Absorption;

4. Scatter;

5. ''Technology'' and parameters related to specific coating and surface modification processes listed in the Table, as follows:

a. For Chemical Vapor Deposition:

1. Coating source composition and formulation;

2. Carrier gas composition;

3. Substrate temperature;

4. Time-temperature-pressure cycles;

5. Gas control and part manipulation;

b. For Thermal Evaporation—Physical Vapor Deposition:

1. Ingot or coating material source composition;

2. Substrate temperature;

3. Reactive gas composition;

4. Ingot feed rate or material vaporization rate;

5. Time-temperature-pressure cycles;

6. Beam and part manipulation;

7. ''Laser'' parameters, as follows:

a. Wave length;

b. Power density;

c. Pulse length;

d. Repetition ratio;

e. Source;

f. Substrate orientation;

c. For Pack Cementation:

1. Pack composition and formulation;

2. Carrier gas composition;

3. Time-temperature-pressure cycles;

d. For Plasma Spraying:

1. Powder composition, preparation and size distributions;

2. Feed gas composition and parameters;

3. Substrate temperature;

4. Gun power parameters;

5. Spray distance;

6. Spray angle;

7. Cover gas composition, pressure and flow rates;

8. Gun control and part manipulation;

e. For Sputter Deposition:

1. Target composition and fabrication;

2. Geometrical positioning of part and target;

3. Reactive gas composition;

4. Electrical bias;

5. Time-temperature-pressure cycles;

6. Triode power;

7. Part manipulation;

f. For Ion Implantation:

1. Beam control and part manipulation;

2. Ion source design details;

3. Control techniques for ion beam and deposition rate parameters;

4. Time-temperature-pressure cycles.

g. For Ion Plating:

1. Beam control and part manipulation;

2. Ion source design details;

3. Control techniques for ion beam and deposition rate parameters;

4. Time-temperature-pressure cycles;

5. Coating material feed rate and vaporization rate;

6. Substrate temperature;

7. Substrate bias parameters.

2E018 "Technology" for the "use" of equipment controlled by 2B018.

LICENSE REQUIREMENTS

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
MT applies to ''technology'' for equipment controlled by 2B018 for MT reasons	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A

TSR: Yes

LIST OF ITEMS CONTROLLED

Unit: N/A

Related Controls: N/A

Related Definitions: N/A

Items: The list of items controlled is contained in the ECCN heading.

2E101 "Technology" according to the General Technology Note for the "use" of items or "software" controlled by 2B004, 2B104, 2B115, 2B116 or 2D101.

LICENSE REQUIREMENTS

Reason for Control: MT, NP, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
NP applies to 2B004 and 2B104.a	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A

TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A

Related Controls: N/A

Related Definitions: N/A

Items: The list of items controlled is contained in the ECCN heading.

2E201 "Technology" according to the General Technology Note for the "use" of items or "software" controlled by 2A225, 2A226, 2B001, 2B006, 2B007, 2B204, 2B207, 2B215, 2B225 to 2B232 or 2D201 for NP reasons.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

2E290 "Technology" according to the General Technology Note for the "use" of items controlled by 2A290, 2A291, 2A292, 2A293, 2A294, 29295 and 2B290.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to ''technology'' for equipment controlled by 2A291 to 2A295 or 2B290	NP Column 1
NP applies to ''technology'' for equipment controlled by 2A290	NP Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

2E301 "Technology" for "use" of items controlled by 2B350, 2B351 and 2B352.

LICENSE REQUIREMENTS

Reason for Control: CB, AT

Control(s)	*Country Chart*
CB applies to entire entry	CB Column 3
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: The lists of items controlled are contained in the ECCN headings.

2E993 "Technology" for the "use" of equipment controlled by 2B991, 2B992, 2B993, or 2B994.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

2E994 "Technology" for the "use" of portable electric generators controlled by 2A994.

LICENSE REQUIREMENTS

Reason for Control: AT

AT applies to entire entry. A license is required for items controlled by this entry to Cuba, Iran, Libya, and North Korea. The Commerce Country Chart is not designed to determine licensing requirements for this entry. See part 746 of the EAR for additional information.

NOTE: Exports from the U.S. and transshipments to Iran must be licensed by the Department of Treasury, Office of Foreign Assets Control. (See §742.8 and §746.7 of the EAR for additional information on this requirement.)

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

EAR99 Items subject to the EAR that are not elsewhere specified in this CCL Category or in any other category in the CCL are designated by the number EAR99.

ADVISORY NOTES FOR CATEGORY 2

ADVISORY NOTE 1: Licenses are likely to be approved, as administrative exceptions, to satisfactory end-users in the People's Republic of China of machine tools for milling controlled by 2B001.c.1 to civil end-users other

than nuclear and aerospace, provided that they are not controlled by 2B001.c.1.b.1, c.1.b.4, c.1.b.5, or c.1.b.6.

ADVISORY NOTE 2: Licenses are likely to be approved, as administrative exceptions, to satisfactory end-users in Country Group D:1 of equipment controlled by 2B006.b.1 to civil end-users not engaged in aerospace or nuclear activities.

Category 3—Electronics Design, Development and Production

A. EQUIPMENT, ASSEMBLIES AND COMPONENTS

NOTE 1: The control status of equipment, devices and components described in Category 3A, other than those described in 3A001.a.3 to a.10, or 3A001.a.12, that are specially designed for or that have the same functional characteristics as other equipment are determined by the control status of the other equipment.

NOTE 2: The control status of integrated circuits described in 3A001.a.3 to a.9 or 3A001.a.12 that are unalterably programmed or designed for a specific function for other equipment is determined by the control status of the other equipment.

N.B.: When the manufacturer or applicant cannot determine the control status of the other equipment, the control status of the integrated circuits is determined in 3A001.a.3 to a.9 or 3A001.a.12. If the integrated circuit is a silicon-based ''microcomputer microcircuit'' or a microcontroller microcircuit described in 3A001.a.3 having an operand (data) word length of 8 bits or less, the control status of the integrated circuit is determined in 3A001.a.3.

3A001 Electronic devices and components.

LICENSE REQUIREMENTS

Reason for Control: NS, MT, NP, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
MT applies to 3A001.a.1.a	MT Column 1
NP applies to 3A001.e.5	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $1500: 3A001.c; $3000: 3A001.b.1, b.2, b.3, .d, .e and .f; $5000: 3A001.a, and .b.4 to b.7

GBS: Yes, except 3A001.a.1, b.1, b.3 to b.7, c to f

CIV: Yes, except 3A001.a.1, a.2, a.5, a.6, a.9, a.10, and a.12, .b, .c, .d, .e, and .f

LIST OF ITEMS CONTROLLED

Unit: Number

Related Controls: N/A

Related Definitions: N/A

Items: a. General purpose integrated circuits, as follows:

NOTES: 1. The control status of wafers (finished or unfinished), in which the function has been determined, is to be evaluated against the parameters of 3A001.a.

2. Integrated circuits include the following types:
''Monolithic integrated circuits'';
''Hybrid integrated circuits'';
''Multichip integrated circuits'';
''Film type integrated circuits'', including silicon-on-sapphire integrated circuits;
''Optical integrated circuits''.

a.1. Integrated circuits, designed or rated as radiation hardened to withstand either of the following:

a.1.a. A total dose of 5×10^5 Rads (Si), or higher; or

a.1.b. A dose rate upset of 5×10^8 Rads (Si)/s or higher;

a.2. Integrated circuits described in 3A00l.a.3 to a.10 or 3A00l.a.12, as follow:

a.2.a. Rated for operation at an ambient temperature above 398 K (+125 °C);

a.2.b. Rated for operation at an ambient temperature below 218 K (−55 °C); or

a.2.c. Rated for operation over the entire ambient temperature range from 218 K (−55 °C) to 398 K (+125 °C);

NOTE: 3A00l.a.2 does not apply to integrated circuits for civil automobile or railway train applications.

a.3. ''Microprocessor microcircuits'', ''microcomputer microcircuits'' and microcontroller microcircuits, having any of the following:

NOTE: 3A00l.a.3 includes digital signal processors, digital array processors and digital coprocessors.

a.3.a An arithmetic logic unit with an access width of 32 bit or more and a ''composite theoretical performance'' (''CTP'') of 80 million theoretical operations per second (Mtops) or more;

a.3.b. Manufactured from a compound semiconductor and operating a clock frequency exceeding 40 MHz; or

a.3.c. More than one data or instruction bus or serial communication port for external interconnection in a parallel processor with a transfer rate exceeding 2.5 Mbyte/s;

a.4. Electrically erasable programmable read-only memories (EEPROMs), static random-access memories (SRAMs), and storage integrated circuits manufactured from a compound semiconductor, as follows:

a.4.a. Electrically erasable programmable read-only memories (EEPROMs) with a storage capacity:

a.4.a.1. Exceeding 16 Mbit per package for flash memory types; or

a.4.a.2. Exceeding either of the following limits for all other EEPROM types:

a.4.a.2.a. 4 Mbit per package; or

a.4.a.2.b. 1 Mbit per package and having a maximum access time of less than 80 ns;

a.4.b. Static random-access memories (SRAMs) with a storage capacity:

a.4.b.1. Exceeding 4 Mbit per package; or

b.4.b.2. Exceeding 1 Mbit per package and having a maximum access time of less than 20 ns;

a.4.c. Storage integrated circuits manufactured from a compound semiconductor;

a.5. Analog-to-digital and digital-to-analog converter integrated circuits, as follows:

a.5.a. Analog-to-digital converters having any of the following:

a.5.a.1. A resolution of 8 bits or more, but less than 12 bits, with a total conversion time to maximum resolution of less than 10 ns;

a.5.a.2. A resolution of 12 bits with a total conversion time to maximum resolution of less than 200 ns; or

a.5.a.3. A resolution of more than 12 bits with a total conversion time to maximum resolution of less than 2 microseconds;

a.5.b. Digital-to-analog converters with a resolution of 12 bits or more, and a ''settling time'' of less than 10 ns;

a.6. Electro-optical or ''optical integrated circuits'' for ''signal processing'' having all of the following:

a.6.a. One or more internal ''laser'' diodes;

a.6.b. One or more internal light detecting elements; and

a.6.c. Optical waveguides;

a.7. Field programmable gate arrays having either of the following:

a.7.a. An equivalent usable gate count of more than 30,000 (2 input gates); or

a.7.b. A typical ''basic gate propagation delay time'' of less than 0.4 ns;

a.8. Field programmable logic arrays having either of the following:

a.8.a. An equivalent usable gate count of more than 30,000 (2 input gates); or

b. A toggle frequency exceeding 133 MHz;

a.9. Neural network integrated circuits;

a.10. Custom integrated circuits for which either the function is unknown, or the control status of the equipment in which the integrated circuits will be used is unknown to the manufacturer, having any of the following:

a.10.a. More than 144 terminals;

a.10.b. A typical ''basic gate propagation delay time'' of less than 0.4 ns; or

a.10.c. An operating frequency exceeding 3 GHz;

a.11. Digital integrated circuits, other than those described in 3A001.a.3 to a.l0 or 3A001.a.12, based upon any compound semiconductor and having either of the following:

a.11.a. An equivalent gate count of more than 300 (2 input gates); or

a.11.b. A toggle frequency exceeding 1.2 GHz;

a.12. Fast Fourier Transform (FFT) processors having any of the following characteristics:

a.12.a. A rated execution time for a 1,024 point complex FFT of less than 1 ms;

a.12.b. A rated execution time for an N-point complex FFT of other than 1,024 points of less than $N \log_2 N/10{,}240$ ms, where N is the number of points; or

a.12.c. A butterfly throughput of more than 5.12 MHz;

b. Microwave or millimeter wave devices:

b.1. Electronic vacuum tubes and cathodes, as follows:

(Frequency agile magnetron tubes are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. See 22 CFR part 121, Category XI.)

NOTE: 3A001.b.1 does not control tubes designed or rated to operate in the Standard Civil Telecommunications Bands at frequencies not exceeding 31 GHz.

b.1.a. Traveling wave tubes, pulsed or continuous wave, as follows:

b.1.a.1 Operating at frequencies higher than 31 GHz;

b.1.a.2. Having a cathode heater element with a turn on time to rated RF power of less than 3 seconds;

b.1.a.3. Coupled cavity tubes, or derivatives thereof, with an ''instantaneous bandwidth'' of more than 7% or a peak power exceeding 2.5 kW;

b.1.a.4. Helix tubes, or derivatives thereof, with any of the following characteristics:

b.1.a.4.a. An ''instantaneous bandwidth'' of more than one octave, and average power (expressed in kW) times frequency (expressed in GHz) of more than 0.5;

b.1.a.4.b. An ''instantaneous bandwidth'' of one octave or less, and average power (expressed in kW) times frequency (expressed in GHz) of more than 1; or

b.1.a.4.c. ''Space qualified'';

b.1.b. Crossed-field amplifier tubes with a gain of more than 17 dB;

b.1.c. Impregnated cathodes for electronic tubes, with either of the following:

b.1.c.1. Having a turn on time to rated emission of less than 3 seconds; or

b.1.c.2. Producing a continuous emission current density at rated operating conditions exceeding 5 A/cm^2;

b.2. Microwave integrated circuits or modules containing ''monolithic integrated circuits'' operating at frequencies exceeding 3 GHz;

NOTE: 3A001.b.2 does not control circuits or modules for equipment designed or rated to operate in the Standard Civil Telecommunications Bands at frequencies not exceeding 31 GHz.

b.3. Microwave transistors rated for operation at frequencies exceeding 31 GHz;

b.4. Microwave solid state amplifiers, as follows:

b.4.a. Operating at frequencies exceeding 10.5 GHz and having an ''instantaneous bandwidth'' of more than half an octave; or

b.4.b. Operating at frequencies exceeding 31 GHz;

b.5. Electronically or magnetically tunable band-pass or band-stop filters having more than 5 tunable resonators capable of tuning across a 1.5:1 frequency band (f_{max}/f_{min}) in less than 10 microseconds with either:

b.5.a. A band-pass bandwidth of more than 0.5 % of center frequency; or

b.5.b. A band-stop bandwidth of less than 0.5 percent of center frequency;

b.6. Microwave assemblies capable of operating at frequencies exceeding 31 GHz;

b.7. Mixers and converters designed to extend the frequency range of equipment described in 3A002.c, 3A002.e or 3A002.f beyond the control limits stated therein;

c. Acoustic wave devices, as follows, and specially designed components therefor:

c.1. Surface acoustic wave and surface skimming (shallow bulk) acoustic wave devices (i.e., ''signal processing'' devices employing elastic waves in materials), having any of the following:

c.1.a. A carrier frequency exceeding 2.5 GHz;

c.1.b. A carrier frequency 2.5 GHz or less, and:

c.1.b.1. A frequency side-lobe rejection exceeding 55 dB;

c.1.b.2. A product of the maximum delay time and the bandwidth (time in microseconds and bandwidth in MHz) of more than 100; or

c.1.b.3. A dispersive delay of more than 10 microseconds; or

c.1.c. A carrier frequency exceeding 1 GHz and a bandwidth of 250 MHz or more;

c.2. Bulk (volume) acoustic wave devices (i.e., ''signal processing'' devices employing elastic waves) that permit the direct processing of signals at frequencies exceeding 1 GHz;

c.3. Acoustic-optic ''signal processing'' devices employing interaction between acoustic waves (bulk wave or surface wave) and light waves that permit the direct processing of signals or images, including spectral analysis, correlation or convolution;

d. Electronic devices or circuits containing components, manufactured from ''superconductive'' materials specially designed for operation at temperatures below the ''critical temperature'' of at least one of the ''superconductive'' constituents, with any of the following:

d.1. Electromagnetic amplification:

d.1.a. At frequencies equal to or less than 31 GHz with a noise figure of less than 0.5 dB; or

d.1.b. At frequencies exceeding 31 GHz;

d.2. Current switching for digital circuits using ''superconductive'' gates with a product of delay time per gate (in seconds) and power dissipation per gate (in watts) of less than 10^{-14} J; or

d.3. Frequency selection at all frequencies using resonant circuits with Q-values exceeding 10,000;

e. High energy devices, as follows:

e.1. Batteries, as follows:

NOTE: 3A001.e.1 does not control batteries with volumes equal to or less than 27 cm^3 (e.g., standard C-cells or R 14 batteries).

e.1.a. Primary cells and batteries having an energy density exceeding 480 Wh/kg and rated for operation in the temperature range from below 243 K (−30 °C) to above 343 K (70 °C);

e.1.b. Rechargeable cells and batteries having an energy density exceeding 150 Wh/kg after 75 charge/discharge cycles at a discharge current equal to C/5 hours (C being the nominal capacity in ampere hours) when operating in the temperature range from below 253 K (−20 °C) to above 333 K (60 °C);

TECHNICAL NOTE: Energy density is obtained by multiplying the average power in watts (average voltage in volts times average current in amperes) by the duration of the discharge in hours to 75% of the open circuit voltage divided by the total mass of the cell (or battery) in kg.

e.1.c. ''Space qualified'' and radiation hardened photovoltaic arrays with a specific power exceeding 160 W/m^2 at an operating temperature of 301 K (28 °C) under a tungsten illumination of 1 kW/m^2 at 2,800 K (2,527 °C);

e.2. High energy storage capacitors, as follows:

e.2.a. Capacitors with a repetition rate of less than 10 Hz (single shot capacitors) having all of the following:

e.2.a.1. A voltage rating equal, to or more than 5 kV;

e.2.a.2. An energy density equal to or more than 250 J/kg; and

e.2.a.3. A total energy equal to or more than 25 kJ;

e.2.b. Capacitors with a repetition rate of 10 Hz or more (repetition rated capacitors) having all of the following:

e.2.b.1. A voltage rating equal to or more than 5 kv;

e.2.b.2. An energy density equal to or more than 50 J/kg;

e.2.b.3. A total energy equal to or more than 100 J; and

e.2.b.4. A charge/discharge cycle life equal to or more than 10,000;

e.3. ''Superconductive'' electromagnets or solenoids specially designed to be fully charged or discharged in less than one second, having all of the following:

e.3.a. Energy delivered during the discharge exceeding 10 kJ in the first second;

e.3.b. Inner diameter of the current carrying windings of more than 250 mm; and

e.3.c. Rated for a magnetic induction of more than 8 T or ''overall current density'' in the winding of more than 300 A/mm^2;

NOTE: 3A001.e.3. does not control ''superconductive'' electromagnets or solenoids specially designed for Magnetic Resonance Imaging (MRI) medical equipment.

e.4. Circuits or systems for electromagnetic energy storage, containing components manufactured from ''superconductive'' materials specially designed for operation at temperatures below the ''critical temperature of at least one of their ''superconductive'' constituents, having all of the following:

e.4.a. Resonant operating frequencies exceeding 1 MHz;

e.4.b. A stored energy density of 1 MJ/m^3 or more; and

3.4.c. A discharge time of less than 1 ms; e.5. Flash discharge type X-ray systems, and tubes therefor, having all of the following:

e.5.a. A peak power exceeding 500 MW;

e.5.b. An output voltage exceeding 500 kV; and

e.5.c. A pulse width of less than 0.2 microsecond;

f. Rotary input type shaft absolute position encoders having either of the following:

f.1. A resolution of better than 1 part in 265,000 (18 bit resolution) of full scale; or

f.2. An accuracy better than ±2.5 seconds of arc.

3A002 General purpose electronic equipment.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $3000: 3A002.a, .e, .f, .g; $5000: 3A002.b to d, and 3A002.h

GBS: Yes for 3A002.a.1. 3A002.h and a.2, .b, d.2, as described in Advisory Note 1 to Category 3

CIV: Yes for 3A002.h, and a.1, a.2, .b, d.2, as described in Advisory Note 1 to Category 3

LIST OF ITEMS CONTROLLED

Unit: Number

Related Controls: N/A

Related Definitions: N/A

Items: a. Recording equipment, as follows, and specially designed test tape therefor:

a.1. Analog instrumentation magnetic tape recorders, including those permitting the recording of digital signals (e.g., using a high density digital recording (HDDR) module), having any of the following:

a.1.a. A bandwidth exceeding 4 MHz per electronic channel or track;

a.1.b. A bandwidth exceeding 2 MHz per electronic channel or track and having more than 42 tracks; or

a.1.c. A time displacement (base) error, measured in accordance with applicable Inter Range Instrumentation Group (IRIG) or Electronic Industries Association (EIA) documents, of less than ±0.1 microsecond;

a.2. Digital video magnetic tape recorders having a maximum digital interface transfer rate exceeding 180 Mbit/s, except those specially designed for television recording using a signal format as standardized or recommended by the International Radio Consultative Committee (CCIR) or the International Technical Commission (IEC) for civil television applications;

a.3. Digital instrumentation magnetic tape data recorders employing helical scan techniques or fixed head techniques, having either of the following characteristics:

a.3.a. A maximum digital interface transfer rate exceeding 175 Mbits/s; or

a.3. b. ''Space qualified'';

NOTE: 3A002.a.3 does not control analog magnetic tape recorders equipped with HDDR conversion electronics and configured to record only digital data.

a.4. Equipment, with a maximum digital interface transfer rate exceeding 175 Mbit/s, designed to convert digital video magnetic tape recorders for use as digital instrumentation data recorders;

a.5. Waveform digitizers and transient recorders with both of the following characteristics:

a.5.a. Digitizing rates equal to or more than 200 million samples per second and a resolution of 10 bits or more; and

a.5.b. A continuous throughput of 2 Gbits/s or more;

TECHNICAL NOTE: For those instruments with a parallel bus architecture, the continuous throughput rates the highest word rate multiplied by the number of bits in a word. Continuous throughput is the fastest data rate the instrument can output to mass storage without the loss of any information while sustaining the sampling rate and analog-to-digital conversion.

b. ''Frequency synthesizer'' ''electronic assemblies'' having a ''frequency switching time'' from one selected frequency to another of less than 1 ms;

c. ''Signal analyzers'', as follows:

c.1. Capable of analyzing frequencies exceeding 31 GHz;

c.2. ''Dynamic signal analyzers'' with a ''real-time bandwidth'' exceeding 25.6 kHz, except those using only constant percentage bandwidth filters (also known as octave or fractional octave filters);

d. Frequency synthesized signal generators producing output frequencies, the accuracy and short term and long term stability of which are controlled, derived from or disciplined by the internal master frequency, and having any of the following:

d.1. A maximum synthesized frequency exceeding 31 GHz;

d.2. A ''frequency switching time'' from one selected frequency to another of less than 1 ms; or

d.3. A single sideband (SSB) phase noise better than $-(126+20\log_{10}F-20\log_{10}f)$ in dBc/Hz, where F is the off-set from the operating frequency in Hz and f is the operating frequency in MHz;

NOTE: 3A002.d does not control equipment in which the output frequency is either produced by the addition or subtraction of two or more crystal oscillator frequencies, or by an addition or subtraction followed by a multiplication of the result.

e. Network analyzers with a maximum operating frequency exceeding 31 GHz;

NOTE: 3A002.e does not control ''swept frequency network analyzers'' with a maximum operating frequency not exceeding 40 GHz and that do not contain a data bus for remote control interfacing.

f. Microwave test receivers with both of the following:

f.1. A maximum operating frequency exceeding 31 GHz; and

f.2. Capable of measuring amplitude and phase simultaneously;

g. Atomic frequency standards having either of the following characteristics:

g.1. Long term stability (aging) less (better) than 1×10^{-11}/month; or

g.2. ''Space qualified'';

NOTE: 3A002.g.1 does not control non-''space qualified'' rubidium standards.

h. Emulators for microcircuits controlled by 3A001.a.3 or 3A001.a.9.

NOTE: 3A002.h does not control emulators designed for a ''family'' that contains at least one device not controlled by 3A001.a.3 or 3A001.a.9.

3A101 Electronic equipment, devices and components, other than those specified in 3A001.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $5,000
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Number
Related Controls: The corresponding EU list number controls analog-to-digital converters, usable in ''missiles'', designed to meet military specifications for ruggedized equipment in 1A101.a. These items are not controlled by this CCL entry. These items are subject to the export licensing authority of the U.S. Departement of State, Office of Defense Trade Controls (See 22 CFR 121.16, Item 14—Category II).
Related Definitions: N/A
Items: a. [Reserved]

b. Accelerators capable of delivering electromagnetic radiation produced by bremsstrahlung from accelerated electrons of 2Mev or greater, and systems containing those accelerators, excluding that equipment specially designed for medical purposes.

3A201 Electronic components, other than those specified in 3A001.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Number
Related Controls:
Related Definition: This entry does not control magnets that are specially designed for and exported as parts of medical nuclear magnetic resonance (NMR) imaging systems. Such parts may be exported in separate shipments from different sources, provided that the related export control documents clearly specify that the parts are for medical NMR imaging systems that are being exported.
Items: a. Capacitors with the following characteristics:

a.1. Voltage rating greater than 1.4 kV, energy storage greater than 10J, capacitance greater than 500 nF and series inductance less than 50 nH; or

a.2. Voltage rating greater than 750 V, capacitance greater than 250 nF and series inductance less than 10 nH;

b. Superconducting solenoidal electromagnets with all of the following characteristics:

b.1. Capable of creating magnetic fields of more than 2 teslas (20 kilogauss);

b.2. With an L/D ratio (length divided by inner diameter) greater than 2;

b.3. With an inner diameter of more than 300 mm; *and*

b.4. With a magnetic field uniform to better than 1% over the central 50% of the inner volume;

c. Flash X-ray generators or pulsed electron accelerators with peak energy of 500 keV or greater, as follows; except: Accelerators that are component parts of devices designed for purposes other than electron beam or X-ray radiation (electron microscopy, for example) and those designed for medical purposes:

c.1. Having an accelerator peak electron energy of 500 keV or greater but less than 25 MeV and with a figure of merit (K) of 0.25 or greater, where K is defined as: $K=1.7\times10^{3}V^{2.65}Q$, where V is the peak electron energy in million electron volts and Q is the total accelerated charge in coulombs if the accelerator beam pulse duration is less than or equal to 1 microsecond; if the accelerator beam pulse duration is greater than 1 microsecond, Q is the maximum accelerated charge in 1 microsecond [Q equals the integral of i with respect to t, over the lesser of 1 microsecond or the time duration of the beam pulse (Q=[integral] idt), where i is beam current in amperes and t is time in seconds]; or

c.2. Having an accelerator peak electron energy of 25 MeV or greater and a peak power greater than 50 MW. [Peak power=(peak potential in volts)×(peak beam current in amperes)].

TECHNICAL NOTES: a. Time duration of the beam pulse - In machines, based on microwave accelerating cavities, the time duration of the beam pulse is the lesser of 1 microsecond or the duration of the bunched beam packet resulting from one microwave modulator pulse.

b. Peak beam current—In machines based on microwave accelerating cavities, the peak beam current is the average current in the time duration of a bunched beam packet.

3A202 Oscilloscopes and transient recorders other than those controlled by 3A002.a.5, and specially designed components therefor.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Number
Related Controls: N/A
Related Definitions: Specially designed components specified in this item are the following, for analog oscilloscopes:
1. Plug-in units;
2. External amplifiers;
3. pre-amplifiers;
4. Sampling devices;
5. Cathode ray tubes.
Items: a. Non-modular analog oscilloscopes having a bandwidth of 1 GHz or greater;

TECHNICAL NOTE: ''Bandwidth'' is defined as the band of frequencies over which the deflection on the cathode ray tube does not fall below 70.7% of that at the maximum point measured with a constant input voltage to the oscilloscope amplifier.

b. Modular analog oscilloscope systems having either of the following characteristics:

b.1. A mainframe with a bandwidth of 1 GHz or greater; or

b.2. Plug-in modules with an individual bandwidth of 4 GHz or greater;

c. Analog sampling oscilloscopes for the analysis of recurring phenomena with an effective bandwidth greater than 4 GHz;

d. Digital oscilloscopes and transient recorders using analog-to-digital conversion techniques, capable of storing transients by sequentially sampling one-shot input signals at successive intervals of less than 1 ns (greater than 1 giga-sample per second), digitizing to 8 bits or greater resolution, and storing 256 or more samples.

3A225 Frequency changers (also known as converters or inverters) or generators, having all of the following characteristics.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Number
Related Controls: Frequency changers (also known as converters or inverters) especially designed or prepared to supply motor stators and having the characteristics described in 3A225.b and .d, together with a total harmonic distortion of less than 2 percent and an efficiency of greater than 80 percent are subject to the export licensing authority of the Nuclear Regulatory Commission. (See 10 CFR part 110.)
Related Definition: Motor stators are especially designed or prepared ring-shaped stators for high-speed multiphase AC hysteresis (or reluctance) motors for synchronous operation within a vacuum in the frequency range of 600 Hz to 2,000 Hz, and a power range of 50 VA to 1,000 VA. The stators consist of multiphase windings on a laminated low-loss iron core comprising thin layers typically to 2.0 mm (.008 in) thick or less.
Items: a. A multisphase output capable of providing power of 40 W or more;

b. Capable of operating in the frequency range between 600 and 2,000 Hz;

c. Total harmonic distortion below 10%; and

d. Frequency control better than 0.1%.

3A226 Direct current high-power supplies capable of continuously producing, over a time period of 8 hours, 100 V or greater with a current output of 500 A or greater and with a current or voltage regulation better than 0.1%.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

3A227 High-voltage direct current power supplies capable of continuously producing, over a time period of 8 hours, 20,000 V or greater with a current output of 1 A or greater and with a current or voltage regulation better than 0.1%.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

3A228 Switching devices.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Number
Related Controls: N/A
Related Definitions: N/A
Items: a. Cold-cathode tubes (including gas krytron tubes and vacuum sprytron tubes), whether gas filled or not, operating similarly to a spark gap, containing three or more electrodes, and having all of the following characteristics:

a.1. Anode peak voltage rating of 2,500 V or more;

a.2. Anode peak current rating of 100 A or more; and

a.3. Anode delay time of 10 microseconds or less;

b. Triggered spark-gaps having an anode delay time of 15 microseconds or less and rated for a peak current of 500 A or more;

c. Modules or assemblies with a fast switching function having all of the following characteristics:

c.1. Anode peak voltage rating greater than 2,000 V;

c.2. Anode peak current rating of 500 A or more; and

c.3. Turn-on time of 1 microseconds or less.

3A229 Firing sets and equivalent high-current pulse generators (for detonators controlled by 3A232).

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Number
Related Controls: N/A
Related Definitions: N/A
Items: a. Explosive detonator firing sets designed to drive multiple detonators of the type controlled by ECCN 3A232;

b. Modular electrical pulse generators (pulsers) designed for portable, mobile, or ruggedized use (including xenon flash-lamp drivers) having all the following characteristics:

b.1. Capable of delivering their energy in less than 15 microseconds;

b.2. Having an output greater than 100 A; and

b.3. Having a ''rise time'' of less than 10 microseconds into loads of less than 40 ohms.

TECHNICAL NOTE: ''Rise time'' is defined as the time interval from 10% to 90% current amplitude when driving a resistive load.

b.4. Enclosed in a dust-tight enclosure;

b.5. No dimension greater than 254 mm (10 in.);

b.6. Weight less than 25 kg (55 lb.); and

b.7. Specified for use over an extended temperature range (223 K [−50 °C] to 373 K [100 °C]) or specified as suitable for aerospace use.

3A230 High-speed pulse generators with output voltages greater than 6 volts into a less than 55 ohm resistive load, and with pulse transition times less than 500 picoseconds (defined as the time interval between 10% and 90% voltage amplitude).

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Number
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

3A231 Neutron generator systems, including tubes, designed for operation without an external vacuum system, and utilizing electrostatic acceleration to induce a tritium-deuterium nuclear reaction.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Number, parts and accessories in $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

3A232 Detonators and multipoint initiation systems (exploding bridge wire, slapper, etc.).

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Number
Related Controls: N/A
Related Definition: Detonators using only primary explosives, such as lead azide, are not controlled by this entry.
Items: a. Electrically driven explosive detonators, as follows:

a.1. Exploding bridge (EB);

a.2. Exploding bridge wire (EBW);

a.3. Slapper;

a.4. Exploding foil initiators (EFI)

b. Arrangements using single or multiple detonators designed to nearly simultaneously initiate an expolsive surface (over greater than 5,000 mm^2) from a single firing signal (with an initiation timing spread over the surface of less than 2.5 microseconds).

TECHNICAL NOTE: The detonators controlled by 3A232 utilize a small electrical conductor (bridge, bridgewire, or foil) that explosively vaporizes when a fast, high-current electrical pulse is passed through it. In nonslapper types, the exploding conductor starts a chemical detonation in a contacting high-explosive material such as PETN (pentaerythritoltetranitrate). In slapper detonators, the explosive vaporization of the electrical conductor drives a flyer or slapper across a gap, and the impact of the slapper on an explosive starts a chemical detonation. The slapper in some designs is driven by magnetic force. The term exploding foil detonator may refer to either an EB or a slapper-type detonator. Also, the word initiator is sometimes used in place of the word detonator.

3A233 Mass spectrometers capable of measuring ions of 230 atomic mass units or greater and having a resolution of better than 2 parts in 230, and ion sources therefor.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Number
Related Controls: Specially designed or prepared magnetic or quadruple mass spectrometers that have the following characteristics and are capable of taking on-line samples of feed, product, or tails from UF_6 gas streams are subject to the export licensing authority of the Nuclear Regulatory Commission. (See 10 CFR part 110.): (a) Unit resolution for mass greater than 320; (b) Ion sources that are constructed of or lined with nichrome or that are monel or nickel-plated; (c) Electron bombardment ionization sources; (d) Having a collector system suitable for isotopic analysis.
Related Definitions: N/A
Items: a. Inductively coupled plasma mass spectrometers (ICP/MS);

b. Glow discharge mass spectrometers (GDMS);

c. Thermal ionization mass spectrometers (TIMS);

d. Electron bombardment mass spectrometers that have a source chamber constructed from, or lined with or plated with materials resistent to UF_6;

e. Molecular beam mass spectrometers that:

e.1. Have a source chamber constructed from, or lined with or plated with stainless steel or molybdenum and have a cold trap

capable of cooling to 193 K (−80 °C) or less; or

e.2. Have a source chamber constructed from, or lined with or plated with materials resistant to UF_6; or

f. Mass spectrometers equipped with a microfluorination ion source designed for use with actinides or actinide fluorides.

3A980 Voice print identification and analysis equipment and parts, n.e.s.

LICENSE REQUIREMENTS

Reason for Control: CC

Control(s)	*Country Chart*
CC applies to entire entry	CC Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

3A981 Polygraphs (except biomedical recorders designed for use in medical facilities for monitoring biological and neurophysical responses); fingerprint analyzers, cameras and equipment, n.e.s.; automated fingerprint and identification retrieval systems, n.e.s.; psychological stress analysis equipment; electronic monitoring restraint devices; and specially designed parts and accessories, n.e.s.

LICENSE REQUIREMENTS

Reason for Control: CC

Control(s)	*Country Chart*
CC applies to entire entry	CC Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

3A992 Electronic devices and components not controlled by 3A001.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number
Related Controls: N/A
Related Definitions: N/A
Items: a. ''Microprocessor microcircuits'', ''microcomputer microcircuits'', and microcontroller microcircuits having a clock frequency exceeding 25 MHz;

b. Storage integrated circuits not controlled by 3A001, as follows:

b.1. Electrical erasable programmable read-only memories (EEPROMs) with a storage capacity;

b.1.a. Exceeding 1 Mbit per package; or

b.1.b. Exceeding 256 kbit per package and a maximum access time of less than 80 ns;

b.2. Static random access memories (SRAMs) with a storage capacity:

b.2.a. Exceeding 1 Mbit per package; or

b.2.b. Exceeding 256 kbit per package and a maximum access time of less than 25 ns;

c. Field programmable logic arrays not controlled by 3A001 having either of the following:

c.1. An equivalent gate count of more than 5,000 (2 input gates); or

c.2. A toggle frequency exceeding 100 MHz;

d. Travelling wave tubes, pulsed or continuous wave, not controlled by 3A001, as follows:

d.1. Coupled cavity tubes, or derivatives thereof;

d.2. Helix tubes, or derivatives thereof, with any of the following:

d.a.1. An ''instantaneous bandwidth'' of half an octave or more; and

d.a.2. The product of the rated average output power (expressed in kW) and the maximum operating frequency (expressed in GHz) of more than 0.2;

d.2.b.1 An ''instantaneous bandwidth'' of less than half an octave; and

d.2.b.2. The product of the rated average output power (expressed in kW) and the maximum operating frequency (expressed in GHz) of more than 0.4;

e. Flexible waveguides designed for use at frequencies exceeding 40 GHz;

f. Surface acoustic wave and surface skimming (shallow bulk) acoustic wave devices (i.e., ''signal processing'' devices employing elastic waves in materials), not controlled by 3A001, having either of the following:

f.1. A carrier frequency exceeding 1 GHz; or

f.2. A carrier frequency of 1 GHz or less, and

f.2.a. A frequency side-lobe rejection exceeding 55 dB;

f.2.b. A product of the maximum delay time and bandwidth (time in microseconds and bandwidth in MHz) of more than 100; or

f.2.c. A dispersive delay of more than 10 microseconds.

g. Batteries not controlled by 3A001, as follows:

NOTE: 3A992.g does not control batteries with volumes equal to or less than 26 cm^3 (e.g., standard C-cells or UM–2 batteries).

g.1. Primary cells and batteries having an energy density exceeding 350 Wh/kg and rated for operation in the temperature range from below 243 K (−30 °C) to above 343 K (70 °C);

g.2. Rechargeable cells and batteries having an energy density exceeding 150 Wh/kg after 75 charge/discharge cycles at a discharge current equal to C/5 hours (C being the nominal capacity in ampere hours) when operating in the temperature range from below 253 K (−20 °C) to above 333 K (60 °C);

TECHNICAL NOTE: Energy density is obtained by multiplying the average power in watts (average voltage in volts times average current in amperes) by the duration of the discharge in hours to 75 percent of the open circuit voltage divided by the total mass of the cell (or battery) in kg.

g.3. ''Space qualified'' or radiation hardened photovoltaic arrays with a specific power exceeding 160 W/m^2 at an operating temperature of 301 K (28 °C) under a tungsten illumination of 1 kW/m^2 at 2,800 K (2,527 °C);

h. ''Superconductive'' electromagnets or solenoids specially designed to be fully charged or discharged in less than one minute, not controlled by 3A001, having all of the following:

NOTE: 3A992.h does not control ''superconductive'' electromagnets or solenoids designed for Magnetic Resonance Imaging (MRI) medical equipment.

h.1. Maximum energy delivered during the discharge divided by the duration of the discharge of more than 500 kJ per minute;

h.2. Inner diameter of the current carrying windings of more than 250 mm; and

h.3. Rated for a magnetic induction of more than 8T or ''overall current density'' in the winding of more than 300 A/mm^2.

3A993 Electronic test equipment in Category 3A n.e.s.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $1000 for Syria only
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

3A994 General purpose electronic equipment not controlled by 3A002.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number
Related Controls: N/A
Related Definitions: N/A
Items: a. Digital instrumentation magnetic tape data recorders not controlled by 3A002 having any of the following characteristics;

a.1. A maximum digital interface transfer rate exceeding 60 Mbit/s and employing helical scan techniques;

a.2. A maximum digital interface transfer rate exceeding 120 Mbit/s and employing fixed head techniques; or

a.3. ''Space qualified'';

b. Equipment, not controlled by 3A002, with a maximum digital interface transfer rate exceeding 60 Mbit/s, designed to convert digital video magnetic tape recorders for use as digital instrumentation data recorders;

c. Hydrogen/hydrogen-isotope thyratrons of ceramic-metal construction and rate for a peak current of 500A or more.

B. TEST, INSPECTION AND PRODUCTION EQUIPMENT

3B001 ''Stored program controlled'' equipment for epitaxial growth.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $500
GBS: Yes, except 3B001 .b and .c
CIV: Yes for equipment controlled by 3B001.a as described in Advisory Note 1.d

LIST OF ITEMS CONTROLLED

Unit: Number
Related Controls: N/A
Related Definitions: N/A
Items: a. Capable of producing a layer thickness uniform to less than ±2.5% across a distance of 75 mm or more;

b. Metal organic chemical vapour deposition (MOCVD) reactors specially designed for

compound semiconductor crystal growth by the chemical reaction between materials controlled by 3C003 or 3C004;

c. Molecular beam epitaxial growth equipment using gas sources.

3B002 "Stored program controlled" equipment designed for ion implanation, having the following characteristics.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $500
GBS: Yes
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Number
Related Controls: N/A
Related Definitions: N/A
Items: a. An accelerating voltage exceeding 200 keV;

b. Specially designed and optimized to operate at accelerating voltages of less than 10 keV;

c. Direct write capability; or

d. Capable of high energy oxygen implant into a heated semiconductor material ''substrate''.

3B003 "Stored program controlled" anisotropic plasma dry etching equipment.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $500
GBS: Yes
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Number
Related Controls: N/A
Related Definitions: N/A
Items: a. With cassette-to-cassette operation and load-locks, and having either of the following:

a.1. Magnetic confinement; or

a.1. Electron cyclotron resonance (ECR);

b. Specially designed for equipment controlled by 3B005 and having either of the following:

b.1. Magnetic confinement; or

b.2. Electron cyclotron resonance (ECR).

3B004 "Stored program controlled" plasma enchanced CVD equipment.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $500
GBS: Yes
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Number
Related Controls: N/A
Related Definitions: N/A
Items: a. With cassette-to-cassette operation and load-locks, and having either of the following:

a.1. Magnetic confinement; or

a.2. Electron cyclotron resonance (ECR);

b. Specially designed for equipment controlled by 3B005 and having either of the following:

b.1. Magnetic confinement; or

b.2. Electron cyclotron resonance (ECR);

3B005 "Stored program controlled" automatic loading multi-chamber central wafer handling systems, having interfaces for wafer input and output, to which more than two pieces of semiconductor processing equipment are to be connected, to form an integrated system in a vacuum environment for sequential multiple wafer processing.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $500
GBS: Yes, except when connected with equipment controlled by 3B001.b and .c or 3B006
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Number
Related Controls: N/A
Related Definitions: This entry does not control automatic robotic wafer handling systems not designed to operate in a vacuum environment.
Items: The list of items controlled is contained in the ECCN heading.

3B006 "Stored program controlled" lithography equipment.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $500
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Number
Related Controls: N/A
Related Definitions: N/A
Items: a. Align and expose step and repeat equipment for wafer processing using photo-optical or X-ray methods, having either of the following:

a.1. A light source wavelength shorter than 400 nm;

a.2. Capable of producing a pattern with a minimum resolvable feature size of 0.7 micrometers or less when calculated by the following formula:

$$\text{MRF} = \frac{(\text{wavelength in micrometer}) \times (\text{K factor})}{\text{numerical aperture}}$$

where:

MRF is the minimum resolvable feature size; the K factor = 0.7; and wavlength is the exposure light source wavelength;

b. Equipment specially designed for mask making or semiconductor device processing using deflected focussed electron beam, ion beam or ''laser'' beam, with any of the following:

b.1. A spot size smaller than 0.2 micrometer;

b.2. Capable of producing a pattern with a feature size of less than 1 micrometer; or

b.3. An overlay accuracy of better than ±0.20 micrometer (3 sigma).

3B007 Masks or reticles.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $500
GBS: Yes
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Number
Related Controls: N/A
Related Definitions: N/A
Items: a. For integrated circuits controlled by 3A001;

b. Multi-layer masks with a phase shift layer.

3B008 "Stored program controlled" test equipment, specially designed for testing semiconductor devices and unencapsulated dice.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $500
GBS: Yes
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Number
Related Controls: N/A
Related Definitions: N/A
Items: a. For testing S-parameters of transistor devices at frequencies exceeding 31 GHz;

b. For testing integrated circuits, capable of performing functional (truth table) testing at a pattern rate of more than 40 MHz;

NOTE: 3B008.b does not control test equipment specially designed for testing:
1. ''Electronic assemblies'' or a class of ''electronic assemblies'' for home or entertainment applications;
2. Non-controlled electronic components, ''electronic assemblies'' or integrated circuits.

c. For testing microwave integrated circuits at frequencies exceeding 3 GHz;

NOTE: 3B008.c does not control test equipment specially designed for testing microwave integrated circuits operating solely in the Standard Civil Telecommunication Bands at frequencies not exceeding 31 GHz.

d. Electron beam systems designed for operation at or below 3 keV, or ''laser'' beam systems, for the non-contactive probing of powered-up semiconductor devices, with both of the following:

d.1. Stroboscopic capability with either beam-blanking or detector strobing; and

d.2. An electron spectrometer for voltage measurement with a resolution of less than 0.5 V.

NOTE: 3B008.d does not control scanning electron microscopes, except when specially designed and instrumented for the non-contactive probing of powered-up semiconductor devices.

3B991 Equipment not controlled by 3B001 for the manufacture or testing of electronic components and materials, and specially designed components and accessories therefor.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number
Related Controls: N/A
Related Definitions: N/A
Items: a. Equipment specially designed for the manufacture or testing of electron tubes, optical elements and specially designed components therefor controlled by 3A001;

b. Equipment specially designed for the manufacture or testing of semiconductor devices, integrated circuits and ''assemblies'', as follows, and systems incorporating or having the characteristics of such equipment:

NOTE: 3B991.b also controls equipment used or modified for use in the manufacture or testing of other devices, such as imaging devices, electro-optical devices, acoustic-wave devices.

b.1. Equipment for the processing of materials for the manufacture of devices and components as specified in the heading of 3B991.b, as follows:

NOTE: 3B991 does not control quartz furnace tubes, furnace liners, paddles, boats (except specially designed caged boats), bubblers, cassettes or crucibles specially designed for the processing equipment controlled by 3B991.b.1.

b.1.a. Equipment for producing polycrystalline silicon and materials controlled by 3C001;

b.1.b. Equipment specially designed for purifying or processing III/V and II/VI semiconductor materials controlled by 3C001, 3C002, 3C003, or 3C004, except crystal pullers, for which see 3B991.b.1.c below;

b.1.c. Crystal pullers and furnaces, as follows:

NOTE: 3B991.b.1.c does not control diffusion and oxidation furnaces.

b.1.c.1. Annealing or recrystallizing equipment other than constant temperature furnaces employing high rates of energy transfer capable of processing wafers at a rate exceeding 0.005 m^2 per minute;

b.1.c.2. ''Stored programme controlled'' crystal pullers having any of the following characteristics:

b.1.c.2.a. Rechargeable without replacing the crucible container;

b.1.c.2.b. Capable of operation at pressures above 2.5 x 105 Pa; or

b.1.c.2.c. Capable of pulling crystals of a diameter exceeding 100 mm;

b.1.d. ''Stored program controlled'' equipment for epitaxial growth having any of the following characteristics:

b.1.d.1. Capable of producing a layer thickness uniformity across the wafer of equal to or better than +3.5%;

b.1.d.2. Rotation of individual wafers during processing; or

b.1.e. Molecular beam epitaxial growth equipment;

b.1.f. ''Magnetically enhanced'' ''sputtering'' equipment with specially designed integral load locks capable of transferring wafers in an isolated vacuum environment;

b.1.g. Equipment specially designed for ion implantation, ion-enhanced or photo-enhanced diffusion, having any of the following characteristics:

b.1.g.1. Patterning capability;

b.1.g.2. Accelerating voltage for more than 200 keV; or

b.1.g.3. Capable of high energy oxygen implant into a heated ''substrate'';

b.1.h. ''Stored program controlled'' equipment for the selective removal (etching) by means of anisotropic dry methods (e.g., plasma), as follows:

b.1.h.1. Batch types having either of the following:

b.1.h.1.a. End-point detection, other than optical emission spectroscopy types; or

b.1.h.1.b. Reactor operational (etching) pressure of 26.66 Pa or less;

b.1.h.2. Single wafer types having any of the following:

b.1.h.2.a. End-point detection, other than optical emission spectroscopy types;

b.1.h.2.b. Reactor operational (etching) pressure of 26.66 Pa or less; or

b.1.h.2.c. Cassette-to-cassette and load locks wafer handling;

NOTES: 1. ''Batch types'' refers to machines not specially designed for production processing of single wafers. Such machines can process two or more wafers simultaneously with common process parameters, e.g., RF power, temperature, etch gas species, flow rates.

2. ''Single wafer types'' refers to machines specially designed for production processing of single wafers. These machines may use automatic wafer handling techniques to load a single wafer into the equipment for processing. The definition includes equipment that can load and process several wafers but where the etching parameters, e.g., RF power or end point, can be independently determined for each individual wafer.

b.1.i. ''Chemical vapor deposition'' (CVD) equipment, e.g., plasma-enhanced CVD (PECVD) or photo-enhanced CVD, for semiconductor device manufacturing, having either of the following capabilities, for deposition of oxides, nitrides, metals or polysilicon:

b.1.i.1. ''Chemical vapor deposition'' equipment operating below 105 Pa; or

b.1.i.2. PECVD equipment operating either below 60 Pa (450 millitorr) or having automatic cassette-to-cassette and load lock wafer handling;

NOTE: 3B991.b.1.i does not control low pressure ''chemical vapor deposition'' (LPCVD) systems or reactive ''sputtering'' equipment.

b.1.j. Electron beam systems specially designed or modified for mask making or semiconductor device processing having any of the following characteristics:

b.1.j.1. Electrostatic beam deflection;

b.1.j.2. Shaped, non-Gaussian beam profile;

b.1.j.3. Digital-to-analog conversion rate exceeding 3 MHz;

b.1.j.4. Digital-to-analog conversion accuracy exceeding 12 bit; or

b.1.j.5. Target-to-beam position feedback control precision of 1 micrometer or finer;

NOTE: 3B991.b.1.j does not control electron beam deposition systems or general purpose scanning electron microscopes.

b.1.k. Surface finishing equipment for the processing of semiconductor wafers as follows:

b.1.k.1. Specially designed equipment for backside processing of wafers thinner than 100 micrometer and the subsequent separation thereof; or

b.1.k.2. Specially designed equipment for achieving a surface roughness of the active surface of a processed wafer with a two-sigma value of 2 micrometer or less, total indicator reading (TIR);

NOTE: 3B991.b.1.k does not control single-side lapping and polishing equipment for wafer surface finishing.

b.1.l. Interconnection equipment which includes common single or multiple vacuum chambers specially designed to permit the integration of any equipment controlled by 3B991 into a complete system;

b.1.m. ''Stored program controlled'' equipment using ''lasers'' for the repair or trimming of ''monolithic integrated circuits'' with either of the following characteristics:

b.1.m.1. Positioning accuracy less than ±1 micrometer; or

b.1.m.2. Spot size (kerf width) less than 3 micrometer.

b.2. Masks, mask ''substrates'', mask-making equipment and image transfer equipment for the manufacture of devices and components as specified in the heading of 3B991, as follows:

NOTE: The term ''masks'' refers to those used in electron beam lithography, X-ray lithography, and ultraviolet lithography, as well as the usual ultraviolet and visible photo-lithography.

b.2.a. Finished masks, reticles and designs therefor, except:

b.2.a.1. Finished masks or reticles for the production of unembargoed integrated circuits; or

b.2.a.2. Masks or reticles, having both of the following characteristics:

b.2.a.2.a. Their design is based on geometries of 2.5 micrometer or more; and

b.2.a.2.b. The design does not include special features to alter the intended use by means of production equipment or ''software'';

b.2.b. Mask ''substrates'' as follows:

b.2.b.1. Hard surface (e.g., chromium, silicon, molybdenum) coated ''substrates'' (e.g., glass, quartz, sapphire) for the preparation of masks having dimensions exceeding 125 mm×125 mm; or

b.2.b.2. ''Substrates'' specially designed for X-ray masks;

b.2.c. Equipment, other than general purpose computers, specially designed for computer aided design (CAD) of semiconductor devices or integrated circuits;

b.2.d. Equipment or machines, as follows, for mask or reticle fabrication:

b.2.d.1. Photo-optical step and repeat cameras capable of producing arrays larger than 100 mm×100 mm, or capable of producing a single exposure larger than 6 mm×6 mm in the image (i.e., focal) plane, or capable of producing line widths of less than 2.5 micrometer in the photoresist on the ''substrate'';

b.2.d.2. Mask or reticle fabrication equipment using ion or ''laser'' beam lithography capable of producing line widths of less than 2.5 micrometer; or

b.2.d.3. Equipment or holders for altering masks or reticles or adding pellicles to remove defects;

NOTE: 3B991.b.2.d.1 and b.2.d.2 do not control mask fabrication equipment using photo-optical methods which was either commercially available before the 1st January, 1980, or has a performance no better than such equipment.

b.2.e. ''Stored program controlled'' equipment for the inspection of masks, reticles or pellicles with:

b.2.e.1. A resolution of 0.25 micrometer or finer; and

b.2.e.2. A precision of 0.75 micrometer or finer over a distance in one or two coordinates of 63.5 mm or more;

NOTE: 3B991.b.2.e does not control general purpose scanning electron microscopes except when specially designed and instrumented for automatic pattern inspection.

b.2.f. Align and expose equipment for wafer production using photo-optical methods, including both projection image transfer equipment and step and repeat equipment, capable of performing any of the following functions:

NOTE: 3B991.b.2.f does not control photo-optical contact and proximity mask align and expose equipment or contact image transfer equipment.

b.2.f.1. Production of a pattern size of less than 2.5 micrometer;

b.2.f.2. Alignment with a precision finer than ±0.25 micrometer (3 sigma); or

b.2.f.3. Machine-to-machine overlay no better than +0.3 micrometer;

b.2.g. Electron beam, ion beam or X-ray equipment for projection image transfer capable of producing patterns less than 2.5 micrometer;

NOTE: For focussed, deflected-beam systems (direct write systems), see 3B91.b.1.j or b.10.

b.2.h. Equipment using ''lasers'' for direct write on wafers capable of producing patterns less than 2.5 micrometer.

b.3. ''Stored program controlled'' inspection equipment for the automatic detection of defects, errors or contaminants of 0.6 micrometer or less in or on processed wafers, ''substrates'', other than printed circuit boards or chips, using optical image acquisition techniques for pattern comparison;

NOTE: 3B991.b.3 does not control general purpose scanning electron microscopes, except when specially designed and instrumented for automatic pattern inspection.

b.4. Specially designed ''stored program controlled'' measuring and analysis equipment, as follows:

b.4.a. Specially designed for the measurement of oxygen or carbon content in semiconductor materials;

b.4.b. Equipment for line width measurement with a resolution of 1 micrometer or finer;

b.4.c. Specially designed flatness measurement instruments capable of measuring deviations from flatness of 10 micrometer or less with a resolution of 1 micrometer or finer.

b.5. Equipment for the assembly of integrated circuits, as follows:

b.5.a. ''Stored program controlled'' die bonders having all of the following characteristics:

b.5.a.1. Specially designed for ''hybrid integrated circuits'';

b.5.a.2. X–Y stage positioning travel exceeding 37.5×37.5 mm; and

b.5.a.3. Placement accuracy in the X–Y plane of finer than + 10 micrometer;

b.5.b. ''Stored program controlled'' equipment for producing multiple bonds in a single operation (e.g., beam lead bonders, chip carrier bonders, tape bonders);

b.5.c. Semi-automatic or automatic hot cap sealers, in which the cap is heated locally to a higher temperature than the body of the package, specially designed for ceramic microcircuit packages controlled by 3A001 and that have a throughput equal to or more than one package per minute.

NOTE: 3B991.b.5. does not control general purpose resistance type spot welders.

b.6. ''Stored program controlled'' wafer probing equipment having any of the following characteristics:

b.6.a. Positioning accuracy finer than 3.5 micrometer;

b.6.b. Capable of testing devices having more than 68 terminals; or

b.6.c. Capable of testing at a frequency exceeding 1 GHz;

b.7. Test equipment as follows:

b.7.a. ''Stored program controlled'' equipment specially designed for testing discrete semiconductor devices and unencapsulated dice, capable of testing at frequencies exceeding 18 GHz;

TECHNICAL NOTE: Discrete semiconductor devices include photocells and solar cells.

b.7.b. ''Stored program controlled'' equipment specially designed for testing integrated circuits and ''assemblies'' thereof, capable of functional testing:

b.7.b.1. At a pattern rate exceeding 20 MHz; or

b.7.b.2. At a pattern rate exceeding 10 MHz but not exceeding 20 MHz and capable of testing packages of more than 68 terminals;

NOTE: 3B991.b.7.b. does not control equipment specially designed for testing integrated circuits not controlled by 3A001 or 3A991.

NOTES: 1. 3B991.b.7.b does not control test equipment specially designed for testing ''assemblies'' or a class of ''assemblies'' for home and entertainment applications.

2. 3B991.b.7.b does not control test equipment specially designed for testing electronic components, ''assemblies'' and integrated circuits not controlled by 3A001 or 3A991 provided such test equipment does not incorporate computing facilities with ''user accessible programmability''.

b.7.c. Equipment specially designed for determining the performance of focal-plane arrays at wavelengths of more than 1,200 nm, using ''stored program controlled'' measurements or computer aided evaluation and having any of the following characteristics:

b.7.c.1. Using scanning light spot diameters of less than 0.12 mm;

b.7.c.2. Designed for measuring photosensitive performance parameters and for evaluating frequency response, modulation transfer function, uniformity of responsivity or noise; or

b.7.c.3. Designed for evaluating arrays capable of creating images with more than 32 x 32 line elements;

b.8. Filters for clean rooms capable of providing an air environment of 10 or less particles of 0.3 micrometer or smaller per 0.02832 m 3 and filter materials therefor;

b.9. Electron beam test systems, capable of operating at or below 3,000 eV, for non-contactive probing of powered-up semiconductor devices having any of the following:

b.9.a. Stroboscopic capability with either beam blanking or detector strobing;

b.9.b. An electron spectrometer for voltage measurements with a resolution of less than 0.5 V; or

b.9.c. Electrical tests fixtures for performance analysis of integrated circuits;

NOTE: 3B991.b.9 does not control scanning electron microscopes, except when specially designed and instrumented for non-contactive probing of a powered-up semiconductor device.

b.10. ''Stored program controlled'' multifunctional focused ion beam systems specially designed for manufacturing, repairing, physical layout analysis and testing of

masks or semiconductor devices and having either of the following characteristics:

b.10.a. Target-to-beam position feedback control precision of 1 micrometer or finer; or

b.10.b. Digital-to-analog conversion accuracy exceeding 12 bit;

b.11. Particle measuring systems employing ''lasers'' designed for measuring particle size and concentration in air having both of the following characteristics:

b.11.a. Capable of measuring particle sizes of 0.2 micrometer or less at a flow rate of 0.02832 m3 per minute or more; and

b.11.b. Capable of characterizing Class 10 clean air or better.

C. MATERIALS

3C001 Hetero-epitaxial materials consisting of a "substrate" with stacked epitaxially grown multiple layers.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $3,000
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: a. Silicon;

b. Germanium; or

c. III/V compounds of gallium or indium.

TECHNICAL NOTE: III/V compounds are polycrystalline or binary or complex monocrystalline products consisting of elements of groups IIIA and VA of Mendeleyev's periodic classification table (gallium arsenide, gallium-aluminium arsenide, indium phosphide, etc.).

3C002 Resist materials, and "substrates" coated with controlled resists.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $3000
GBS: Yes for 3C002.a as described in Advisory Note 1.e
CIV: Yes for 3C002.a as described in Advisory Note 1.e

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: a. Positive resists for semiconductor lithography specially adjusted (optimized) for use at wavelengths below 370 nm;

b. All resists, for use with electron beams or ion beams, with a sensitivity of 0.01 microcoulomb/mm2 or better;

c. All resists, for use with X-rays, with a sensitivity of 2.5 mJ/mm2 or better;

d. All resists optimized for surface imaging technologies, including silyated resists.

TECHNICAL NOTE: Silyation techniques are defined as processes incorporating oxidation of the resist surface to enhance performance for both wet and dry developing.

3C003 Organo-inorganic compounds.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $3,000
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definition: This entry controls only compounds whose metallic, partly metallic or non-metallic element is directly linked to carbon in the organic part of the molecule.
Items: a. Organo-metallic compounds of aluminum, gallium or indium having a purity (metal basis) better than 99.999%; or

b. Organo-arsenic, organo-antimony and organo-phosphorus compounds having a purity (inorganic element basis) better than 99.999% percent.

3C004 Hydrides of phosphorus, arsenic or antimony, having a purity better than 99.999%, even diluted in inert gases or hydrogen.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $3000
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definition: This entry does not control hydrides containing less than 20% molar or more of inert gases or hydrogen.

Items: The list of items controlled is contained in the ECCN heading.

D. SOFTWARE

3D001 "Software" specially designed for the "development" or "production" of equipment controlled by 3A001.a.1.a, 3A001.b to 3A001.f, 3A002, 3A101 or 3B (except 3B991).

LICENSE REQUIREMENTS

Reason for Control: NS, MT, NP, AT

Control(s)	*Country Chart*
NS applies to ''software'' for equipment controlled by 3A001.b to 3A001.f, 3A002, and 3B001 to 3B008 ..	NS Column 1
MT applies to ''software'' for equipment controlled by 3A001.a.1.a or 3A101	MT Column 1
NP applies to ''software'' for equipment controlled by 3A001.e.5	NP Column 1
At applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: Yes, except 3A001.e.5

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

3D002 "Software" specially designed for the "use" of "stored program controlled" items controlled by 3B (except 3B991).

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: Yes

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

3D003 Computer-aided-design (CAD) "software" for semiconductor device or integrated circuits, having any of the following.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: Yes

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: (a) This entry does not control ''software'' specially designed for schematic entry, logic simulation, placing and routing, layout verification or pattern generation tape. (b) Libraries, design attributes or associated data for the design of semiconductor devices or integrated circuits are considered as ''technology''.
Items: a. Design rules or circuit verification rules;

b. Simulation of the physically laid out circuits; or

c. Lithographic processing simulators for design.

TECHNICAL NOTE: A lithographic processing simulator is a ''software'' package used in the design phase to define the sequence of lithographic, etching and deposition steps for translating masking patterns into specific topographical patterns in conductors, dielectrics or semiconductor material.

3D101 "Software" specially designed for the "use" of items controlled by 3A101.b.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A Items: The list of items controlled is contained in the ECCN heading.

3D980 "Software" specially designed for the "development", "production", or "use" of items controlled by 3A980 and 3A981.

LICENSE REQUIREMENTS

Reason for Control: CC

Control(s)	*Country Chart*
CC applies to entire entry	CC Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A

TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

3D994 "Software" specially designed for the "development", "production", or "use" of electronic devices or components controlled by 3A992, electronic test equipment controlled by 3A993, general purpose electronic equipment controlled by 3A994, or manufacturing and test equipment controlled by 3B991.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

E. TECHNOLOGY

3E001 "Technology" according to the General Technology Note for the "development" or "production" of items controlled by 3A (except 3A980, 3A981, and 3A992 to 3A994), 3B (except 3B991) or 3C.

LICENSE REQUIREMENTS

Reason for Control: NS, MT, NP, AT

Control(s)	*Country Chart*
NS applies to ''technology'' for items controlled by 3A001, 3A002, 3B001 to 3B008 or 3C001 to 3C004	NS Column 1
MT applies to ''technology'' for equipment controlled by 3A001 or 3A101 for MT reasons	MT Column 1
NP applies to ''technology'' for equipment controlled by 3A001, 3A201, 3A202, 3A225 to 3A233 for NP reasons	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: Yes, except 3A001.a.1.a and e.5

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definition: This entry does not control ''technology'' for the ''development'' or ''production'' of: (a) Microwave transistors operating at frequencies below 31 GHz; (b) Integrated circuits controlled by 3A001.a.3 to a.12, having both of the following characteristics using ''technology'' of one micrometer or more, AND not incorporating multi-layer structures. This does not preclude the export and reexport of multilayer ''technology'' for devices incorporating a maximum of two metal layers and two polysilicon layers.
Items: The list of items controlled is contained in the ECCN heading.

3E002 Other "technology" for the "development" or "production" of items described in this entry.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: Yes

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: a. Vacuum microelectronic devices;

b. Hetero-structure semiconductor devices such as high electron mobility transistors (HEMT), hetero-bipolar transistors (HBT), quantum well or super lattice devices;

c. ''Superconductive'' electronic devices;

d. ''Substrates'' of films of diamond for electronic components.

3E101 "Technology" according to the General Technology Note for the "use" of equipment controlled by 3A001.a.1.a or 3A101.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

3E201 "Technology" according to the General Technology Note for the "use" of items controlled by 3A001.e.2, e.3, and e.5, 3A201, 3A202, 3A225 to 3A233.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

3E980 "Technology" specially designed for "development", "production", or "use" of items controlled by 3A980 and 3A981.

LICENSE REQUIREMENTS

Reason for Control: CC

Control(s)	*Country Chart*
CC applies to entire entry	CC Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

3E994 "Technology" for the "development", "production", or "use" of electronic devices or components controlled by 3A992, electronic test equipment controlled by 3A993, general purpose electronic equipment controlled by 3A994, or manufacturing and test equipment controlled by 3B991.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

EAR99 Items subject to the EAR that are not elsewhere specified in this CCL Category or in any other category in the CCL are designated by the number EAR99.

ADVISORY NOTES FOR CATEGORY 3

ADVISORY NOTE 1: Licenses are likely to be approved, as administrative exceptions, for exports to satisfactory end-users in the People's Republic of China of:

a. Analog instrumentation magnetic tape recorders controlled by 3A002.a.1, provided that all of the following conditions are met:

1. Bandwidths do not exceed:

a. 4 MHz per track and have up to 28 tracks; or

b. 2 MHz per track and have up to 42 tracks;

2. Tape speed does not exceed 6.1 m/s;

3. They are not designed for underwater use;

4. They are not ruggedized for military use; and

5. Recording density does not exceed 653.2 magnetic flux sine waves per mm;

b. Video magnetic tape recorders specially designed for civil television recording;

c. Instrument ''frequency synthesizers'' or synthesized signal generators controlled by 3A002.b or 3A002.d.2, and specially designed components or accessories therefor, having:

1. A synthesized output frequency of 2.6 GHz or less; and

2. A ''frequency switching time'' of 0.3 ms or more;

d. Epitaxial reactors controlled by 3B001.a, except those also controlled by 3B001.b or 3B001.c;

e. Positive resists not optimized for photolithography at a wavelength of less than 365 nm, provided that they are not controlled by 3C002.b to 3C002.d.

ADVISORY NOTE 2: Licenses are likely to be approved, as administrative exceptions, for exports to satisfactory end-users in Country Group D:1 of items controlled by 3A001.a.4.a or a.4.b.

ADVISORY NOTE 3: Licenses are likely to be approved for exports and reexports to satisfactory end-uses in Country Group D:1 of items controlled by 3A231, including tubes, provided that they are for civil use.

N.B.: The provisions of this Advisory Note notwithstanding, current law prohibits approval to nuclear production or utilization facilities in the People's Republic of China.

Category 4—Computers

NOTE 1: Computers, related equipment or ''software'' performing telecommunications

or ''local area network'' functions must also be evaluated against the performance characteristics in Category 5 (Part I. Telecommunications).

N.B. 1: Control units that directly interconnect the buses or channels of central processing units, ''main storage'' or disk controllers, are not regarded as telecommunications equipment described in Category 5 (Part I. Telecommunications).

N.B. 2: For the control status of ''software'' that provides routing or switching of ''datagram'' or ''fast select'' packets (i.e., packet by packet route selection) or for ''software'' specially designed for packet switching, see Category 5 (Part I. Telecommunications).

NOTE 2: Computers, related equipment or ''software'' performing cryptographic, cryptanalytic, certifiable multi-level security or certifiable user isolation functions, or that limit electronmagnetic compatibility (EMC), must also be evaluated against the performance characteristics in Category 5 (Part II. ''Information Security'').

A. EQUIPMENT, ASSEMBLIES AND COMPONENTS

4A001 Electronic computers and related equipment, and "electronic assemblies" and specially designed components therefor.

LICENSE REQUIREMENTS

Reason for Control: NS, MT, AT, NP, XP

Control(s)	*Country chart*
NS applies to entire entry	NS Column 2
MT applies to 4A001.a	MT Column 1
AT applies to entire entry	AT Column 1

NP applies to electronic computers with a CTP greater than 2,000 Mtops, unless a License Exception is available. See §742.3(b) of the EAR for information on applicable licensing review policies.

XP applies to electronic computers with a CTP greater than 2,000 Mtops, unless a License Exception is available. XP controls vary according to destination and end-user and end-use. See §742.12 of the EAR for additional information.

See §742.12 of the EAR for additional information.

LICENSE EXCEPTIONS

LVS: $5,000 for 4A001.a; N/A for 4A001.b
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number; parts and accessories in $ value
Related Controls: Equipment designed or rated for transient ionizing radiation is subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. (See 22 CFR part 121, Category XI.)
Related Definitions: N/A
Items: a. Specially designed to have either of the following characteristics:

a.1. Rated for operation at an ambient temperature below 228 K (−45 °C) or above 358 K (85 °C);

NOTE: The temperature limits in 4A001.a.1. do not apply to computers specially designed for civil automobile and railway train applications.

a.2. Radiation-hardened to exceed any of the following specifications:

a.2.a. Total Dose: 5×10^5 Rads (Si);

a.2.b. Dose Rate Upset: 5×10^8 Rads (Si)/sec;

a.2.c. Single Event Upse: 1×10^{-7} Error/bit/day; or

b. Having characteristics or performing functions exceeding the limits in Category 5 (Part II. ''Information Security'').

4A002 "Hybrid computers", and "electronic assemblies" and specially designed components therefor.

LICENSE REQUIREMENTS

Reason for Control: NS, MT, AT, NP, XP

Control(s)	*Country chart*
NS applies to entire entry	NS Column 2
MT applies to hybrid computers combined with specially designed ''software'', for modeling, simulation, or design integration of complete rocket systems and unmanned air vehicle systems that are usable in systems controlled for MT reasons	MT Column 1
AT applies to entire entry	AT Column 1

NP applies to hybrid computers with a CTP greater than 2,000 Mtops, unless a License Exception is available. See §742.3(b) of the EAR for information on applicable licensing review policies.

XP applies to hybrid computers with a CTP greater than 2,000 Mtops, unless a License Exception is available. XP controls vary according to destination and end-user and end-use. See §742.12 of the EAR for additional information.

LICENSE EXCEPTIONS

LVS: $,5,000
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number; parts and accessories in $ value
Related Controls: N/A
Related Definitions: N/A
Items: a. Containing ''digital computers'' controlled by 4A003;

b. Containing analog-to-digital converters having both of the following characteristics:

b.1. 32 channels or more; and

b.2. A resolution of 14 bits (plus sign bit) or more with a conversion rate of 200,000 conversions/s or more.

4A003 "Digital computers", "electronic assemblies", and related equipment therefor, and specially designed components therefor.

Reason for Control: NS, MT, CC. AT, NP, XP

Control(s)	*Country chart*
NS applies to 4A003.b and .c	NS Column 1
NS applies to 4A003.a, d, .e, .f, and .g	NS Column 2
MT applies to digital computers used as ancillary equipment for test facilities and equipment that are controlled by 9B005 or 9B006 ...	MT Column 1
CC applies to digital computers for computerized fingerprint equipment	CC Column 1
AT applies to entire entry (refer to 4A994 for controls on computers with a CTP ≥ 6 but ≤ to 260 Mtops)	AT Column 1

NP applies to digital computers with a CTP greater than 2,000 Mtops, unless a License Exception is available. See §742.3(b) of the EAR for information on applicable licensing review policies.

XP applies to digital computers with a CTP greater than 2,000 Mtops, unless a License Exception is available. XP controls vary according to destination and end-user and end-use. See §742.12 of the EAR for additional information.

NOTE: For all destinations, except Cuba, Iran, Iraq, Libya, N.Korea, Sudan, and Syria, no license is required (NLR) for computers with a CTP between 260 and 2,000 Mtops., and for assemblies described in 4A003.c that are not capable of exceeding a CTP of 2,000 Mtops in aggregation. Computers controlled in this entry for MT reasons are not eligible for NLR.

LICENSE EXCEPTIONS

LVS: $5000

GBS: Yes, for 4A003.d, .e, .f, and .g and specially designed components therefor, exported separately or as part of a system

CTP: Yes, for computers controlled by 4A003.a, .b and .c, to the exclusion of other technical parameters, with the exception of parameters specified as controlled for Missile Technology (MT) concerns or 4A003.e (equipment performing analog-to-digital conversions exceeding the limits of 3A001.a.5.a). See §740.7 of the EAR.

CIV: Yes, for 4A003.d (having a 3–D vector rate less than 10 M vectors/sec), .e, .f and .g

LIST OF ITEMS CONTROLLED

Unit: Equipment in number; parts and accessories in $ value

Related Controls: N/A

Related Definitions: N/A

Items:

NOTE 1: 4A003 includes vector processors, array processors, digital signal processors, logic processors, and equipment for ''image enhancement'' or ''signal processing''.

NOTE 2: The control status of the ''digital computers'' or related equipment described in 4A003 is governed by the control status of other equipment or systems provided:

a. The ''digital computers'' or related equipment are essential for the operation of the other equipment or systems;

b. The ''digital computers'' or related equipment are not a ''principal element'' of the other equipment or systems; and

N.B. 1: The control status of ''signal processing'' or ''image enhancement'' equipment specially designed for other equipment with functions limited to those required for the other equipment is determined by the control status of the other equipment even if it exceeds the ''principal element'' criterion.

N.B. 2: For the control status of ''digital computers'' or related equipment for telecommunications equipment, see the telecommunications entries in Category 5.

c. The ''technology'' for the ''digital computers'' and related equipment is governed by 4E.

a. Designed or modified for ''fault tolerance'';

NOTE: For the purposes of 4A003.a, ''digital computers'' and related equipment are not considered to be designed or modified for ''fault tolerance'', if they use:

1. Error detection or correction algorithms in ''main storage'';

2. The interconnection of two ''digital computers'' so that, if the active central processing unit fails, an idling but mirroring central processing unit can continue the system's functioning;

3. The interconnection of two central processing units by data channels or by use of shared storage to permit one central processing unit to perform other work until the second central processing unit fails, at which time the first central processing unit takes over in order to continue the system's functioning; or

4. The synchronization of two central processing units by ''software'' so that one central processing unit recognizes when the other central processing unit fails and recovers tasks from the failing unit.

b. ''Digital computers'' having a ''Composite Theoretical Performance'' (''CTP'') exceeding 260 million composite theoretical operations per second (Mtops);

c. ''Electronic assemblies'' specially designed or modified to be capable of enhancing performance by aggregation of ''computing elements'', so that the ''CTP'' of the aggregation exceeds the limit in 4A003.b.

NOTE 1: 4A003.c applies only to ''electronic assemblies'' and programmable interconnections not exceeding the limits in 4A003.b, when shipped as unintegrated ''electronic assemblies''. It does not apply to ''electronic assemblies'' inherently limited by nature of their design for use as related equipment controlled by 4A003.d to 4A003.f.

NOTE 2: 4A003.c does not control ''electronic assemblies'' specially designed for a product or family of products whose maximum configuration does not exceed the limits of 4A003.b.

d. Graphics accelerators or graphics coprocessors exceeding a ''3–D Vector Rate'' of 1,600,000;

e. Equipment performing analog-to-digital conversions exceeding the limits in 3A001.a.5;

f. Equipment containing ''terminal interface equipment'' exceeding the limits in 5A001.b.3;

NOTE: For the purposes of 4A003.f, ''terminal interface equipment'' includes ''local area network'' interfaces, modems and other communications interfaces. ''Local area network'' interfaces are evaluated as ''network access controllers''.

g. Equipment, specially designed to provide for the external interconnection of ''digital computers'' or associated equipment,

that allows communications at data rates exceeding 80 Mbytes/s.

NOTE: 4A003.g does not control internal interconnection equipment (e.g., backplanes, buses) or passive interconnection equipment.

4A004 Computers, and specially designed related equipment, "electronic assemblies" and components therefor.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $5,000
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number; parts and accessories in $ value
Related Controls: N/A
Related Definitions: N/A
Items: a. ''Systolic array computers'';
b. ''Neural computers''; and
c. ''Optical computers''.

4A101 Analog computers, "digital computers", or digital differential analyzers, other than those controlled by 4A001.a.1, designed or modified for use in missiles, having either of the following characteristics.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number
Related Controls: N/A
Related Definitions: N/A
Items: a. Rated for continuous operation at temperatures from below −45 °C to above +55 °C; or

b. Designed as ruggedized or ''radiation hardened''.

4A980 Computers for fingerprint equipment, n.e.s.

LICENSE REQUIREMENTS

Reason for Control: CC

Control(s)	*Country Chart*
CC applies to entire entry	CC Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

4A994 Computers, "electronic assemblies", and related equipment not controlled by 4A001, 4A002, or 4A003, and specially designed components therefor.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number; parts and accessories in $ value
Related Controls: N/A
Related Definitions: N/A
Items: a. Electronic computers and related equipment, and ''electronic assemblies'' and specially designed components therefor, rated for operation at an ambient temperature above 343 K (70 °C);

b. ''Digital computers'' having a ''composite theoretical performance'' (''CTP'') equal to or greater than 6 million theoretical operations per second (Mtops);

c. ''Assemblies'' not controlled by 4A003 that are specially designed or modified to enhance performance by aggregation of ''computing elements'' (''CEs''), as follows:

c.1. Designed to be capable of aggregation in configurations of 16 or more ''computing elements'' (''CEs''); or

c.2. Having a sum of maximum data rates on all channels available for connection to associated processors exceeding 40 million Bytes/s;

NOTE 1: 4A994.c applies only to ''electronic assemblies'' and programmable interconnections with a ''CTP'' not exceeding the limits in 4A994.b, when shipped as unintegrated ''electronic assemblies''. It does not apply to ''electronic assemblies'' inherently limited by nature of their design for use as related equipment controlled by 4A994.

NOTE 2: 4A994.c does not control any ''electronic assembly'' specially designed for a product or family of products whose maximum configuration does not exceed the limits of 4A994.b.

d. Disk drives and solid state storage equipment:

d.1. Magnetic, erasable optical or magneto-optical disk drives with a ''maximum bit transfer rate'' exceeding 25 million bit/s;

d.2. Solid state storage equipment, other than ''main storage'' (also known as solid state disks or RAM disks), with a ''maximum bit transfer rate'' exceeding 36 million bit/s;

e. Input/output control units designed for use with equipment controlled by 4A994.d;

f. Equipment for ''signal processing'' or ''image enhancement'', not controlled by 4A003, having a ''composite theoretical performance'' (''CTP'') exceeding 8.5 million theoretical operations per second (Mtops);

g. Graphics accelerators or graphics coprocessors, not controlled by 4A003, that exceeds a ''3–D vector rate'' of 400,000 or, if supported by 2–D vectors only, a ''2–D vector rate'' of 600,000;

NOTE 1: The provisions of 4A994.g do not apply to work stations designed for and limited to:
a. Graphic arts (e.g., printing, publishing); and
b. The display of two-dimensional vectors.

h. Color displays or monitors having more than 120 resolvable elements per cm in the direction of the maximum pixel density;

NOTE 1: 4A994.h does not control displays or monitors not specially designed for electronic computers.

NOTE 2: Displays specially designed for air traffic control (ATC) systems are treated as specially designed components for ATC systems under Category 6.

i. Equipment containing ''terminal interface equipment'' exceeding the limits in 5A991.

NOTE: For the purposes of 4A994.i, ''terminal interface equipment'' includes ''local area network'' interfaces, modems and other communications interfaces. ''Local area network'' interfaces are evaluated as ''network access controllers''.

B. Test, Inspection and Production Equipment

4B994 Equipment for the "development" and "production" of magnetic and optical storage equipment.

License Requirements

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

License Exceptions

LVS: N/A
GBS: N/A
CIV: N/A

List of Items Controlled

Unit: $ value
Related Controls: N/A
Related Definition: This entry does not control general-purpose sputtering equipment.
Items: a. Equipment specially designed for the application of magnetic coating to controlled non-flexible (rigid) magnetic or magneto-optical media;

b. ''Stored program controlled'' equipment specially designed for monitoring, grading, exercising or testing controlled rigid magnetic media;

c. Equipment specially designed for the ''production'' or alignment of heads or head/disk assemblies for controlled rigid magnetic and magneto-optical storage, and electromechanical or optical components therefor.

C. Materials

4C994 Materials specially formulated for and required for the fabrication of head/disk assemblies for controlled magnetic and magneto-optical hard disk drives.

License Requirements

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

License Exceptions

LVS: N/A
GBS: N/A
CIV: N/A

List of Items Controlled

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

D. Software

4D001 "Software" specially designed or modified for the "development", "production" or "use" of equipment controlled by 4A001 to 4A004, 4A101, or "software" controlled by 4D001 to 4D003.

License Requirements

Reason for Control: NS, MT, CC, AT, NP, XP.

Control(s)	*Country chart*
NS applies to ''software'' for equipment controlled by 4A001 to 4A004, 4D001 to 4D003	NS Column 1
MT applies to ''software'' for equipment controlled by 4A001 to 4A003 or 4A101 for MT reasons	MT Column 1
CC applies to ''software'' for equipment controlled by 4A003 for CC reasons	CC Column 1
AT applies to entire entry	AT Column 1

NP applies to ''software'' for computers with a CTP greater than 2,000 Mtops, unless a License Exception is available. See §742.3(b) of the EAR for information on applicable licensing review policies.

XP applies to ''software'' for computers with a CTP greater than 2,000 Mtops, unless a License Exception is available. See §742.12

of the EAR for information on applicable licensing review policies.

LICENSE EXCEPTIONS

CIV: Yes, (see Advisory Notes 2 and 3 to Category 4)

TSR: Yes, except for computers requiring a license.

LIST OF ITEMS CONTROLLED

Unit: $ value

Related Controls: N/A

Related Definitions: N/A

Items: The list of items controlled is contained in the ECCN heading.

4D002 "Software" specially designed or modified to support "technology" controlled by 4E001 or 4E002.

LICENSE REQUIREMENTS

Reason for Control: NS, MT, AT, NP, XP.

Control(s)	*Country chart*
NS applies to entire entry	NS Column 1
MT applies to ''software'' for equipment controlled by 4A001 to 4A003 or 4A101 for MT reasons	MT Column 1
AT applies to entire entry	AT Column 1

NP applies to ''software'' for computers with a CTP greater than 2,000 Mtops, unless a License Exception is available. See §742.3(b) of the EAR for information on applicable licensing review policies.

XP applies to ''software'' for computers with a CTP greater than 2,000 Mtops, unless a License Exception is available. See §742.12 of the EAR for information on applicable licensing review policies.

LICENSE EXCEPTIONS

CIV: N/A

TSR: Yes, except ''software'' specifically designed or modified to support ''technology'' for computers requiring a license.

LIST OF ITEMS CONTROLLED

Unit: $ value

Related Controls: N/A

Related Definitions: N/A

Items: The list of items controlled is contained in the ECCN heading.

4D003 Specific "software", as described in this entry.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A

TSR: Yes, except 4D003.c

LIST OF ITEMS CONTROLLED

Unit: $ value

Related Controls: N/A

Related Definitions: N/A

Items: a. Operating system ''software'', ''software'' ''development'' tools and compilers specially designed for ''multi-data-stream processing'' equipment, in ''source code'';

b. ''Expert systems'' or ''software'' for ''expert system'' inference engines providing both:

b.1. Time dependent rules; and

b.2. Primitives to handle the time characteristics of the rules and the facts;

c. ''Software'' having characteristics or performing functions exceeding the limits in the ''information security'' entries in Category 5;

d. Operating systems specially designed for ''real time processing'' equipment that guarantees a ''global interrupt latency time'' of less than 20 microseconds.

4D980 "Software" specially designed for the "development", "production", or "use" of items controlled by 4A980.

LICENSE REQUIREMENTS

Reason for Control: CC

Control(s)	*Country Chart*
CC applies to entire entry	CC Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A

TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value

Related Controls: N/A

Related Definitions: N/A

Items: The list of items controlled is contained in the ECCN heading.

4D993 "Program" proof and validation "software", "software" allowing the automatic generation of "source codes", and operating systems not controlled by 4D003 that are specially designed for real time processing equipment.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A

TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value

Related Controls: N/A

Related Definitions: N/A
Items: a. ''Program'' proof and validation ''software'' using mathematical and analytical techniques and designed or modified for ''programs'' having more than 500,000 ''source code'' instructions;

b. ''Software'' allowing the automatic generation of ''source codes'' from data acquired on line from external sensors described in the Commerce Control List;

c. Operating systems not controlled by 4D003 that are specially designed for ''real time processing'' equipment that guarantees a ''global interrupt latency time'' of less than 30 microseconds.

4D994 "Software" specially designed or modified for the "development", "production", or "use" of equipment controlled by 4A994, 4B994 and materials controlled by 4C994.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

E. TECHNOLOGY

4E001 "Technology" according to the General Technology Note, for the "development", "production" or "use" of equipment controlled by 4A001 to 4A004, 4A101 or "software" controlled by 4D (except 4A980, 4A993 or 4A994).

LICENSE REQUIREMENTS

Reason for Control: NS, MT, CC, AT, NP, XP.

Control(s)	*Country chart*
NS applies to ''technology'' for equipment controlled by 4A001 to 4A004, 4D001 to 4D003	NS Column 1
MT applies to ''technology'' for equipment controlled by 4A001 to 4A003, 4A101 4D001 or 4D002 for MT reasons	MT Column 1
CC applies to ''technology'' for equipment controlled by 4A003 for CC reasons	CC Column 1
AT applies to entire entry	AT Column 1

NP applies to ''technology'' for computers with a CTP greater than 2,000 Mtops, unless a License Exception is available. See §742.3(b) of the EAR for information on applicable licensing review policies.

XP applies to ''technology'' for computers with a CTP greater than 2,000 Mtops, unless a License Exception is available. See §742.12 of the EAR for information on applicable licensing review policies.

LICENSE EXCEPTIONS

CIV: N/A
TSR: Yes, except ''technology'' for computers with a CTP > 2,000 Mtops.

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

4E002 Other "technology".

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: Yes

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: a. ''Technology'' for the ''development'' or ''production'' of equipment designed for ''multi-data-stream processing'' where the ''CTP'' exceeds 120 Mtops;

b. ''Technology'' ''required'' for the ''development'' or ''production'' of magnetic hard disk drives with a Maximum Bit Transfer Rate (''MBTR'') exceeding 47 Mbits/s.

4E980 "Technology" for the "development", "production", or "use" of items controlled by 4A980.

LICENSE REQUIREMENTS

Reason for Control: CC

Control(s)	*Country Chart*
CC applies to entire entry	CC Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

4E992 "Technology" for the "development", "production", or "use" of equipment controlled by 4A994 and 4B994, materials controlled by 4C994, or "software" controlled by 4D992, 4D993, or 4D994.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

4E993 "Technology" for the "development" or "production" of graphics accelerators or equipment designed for "multi-data-stream processing" and "technology" "required" for the "development" or "production" of magnetic hard disk drives.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: a. ''Technology'' for the ''development'' or ''production'' of graphics accelerators not controlled by 4A003.d or 4A994.g;

b. ''Technology'', not controlled by 4E002.a, for the ''development'' or ''production'' of equipment designed for ''multi-data-stream processing'';

c. ''Technology'', not controlled by 4E002.b, ''required'' for the ''development'' or ''production'' of magnetic hard disk drives with a ''maximum bit transfer rate'' (''MBTR'') exceeding 11 Mbit/s.

EAR99 Items subject to the EAR that are not elsewhere specified in this CCL Category or in any other category in the CCL are designated by the number EAR99.

ADVISORY NOTES FOR CATEGORY 4

ADVISORY NOTE 1: Licenses are likely to be approved, as administrative exceptions, for exports and reexports to satisfactory end-users in Romania of the items controlled by Category 4 for national security reasons, except:

a. Computers controlled by 4A001 or 4A002;

b. ''Digital computers'' controlled by 4A003.b having a ''composite theoretical performance (''CPT'') exceeding 100 million theoretical operations per second (Mtops);

c. Computers controlled by 4A004, and specially related equipment, ''electronic assemblies'' and components therefor;

d. ''Software'' specially designed and ''technology'' ''required'' for the equipment described in this Advisory Note 1 .a, .b, or .c that are controlled by 4D or 4E.

ADVISORY NOTE 2: Licenses are likely to be approved, as administrative exceptions, for export and reexport to satisfactory end-users in the People's Republic of China of ''digital computers'', specially designed components and related equipment therefor, controlled by 4A003.b, .d, .e, .f, or ''software'' controlled by 4D001, provided that:

a. They will be operated by civil end-users for civil applications;

b. They are exported or reexported as complete systems or enhancements to previously exported systems up to the limits in this Advisory Note 2.d;

c. They have been primarily designed and used for non-strategic applications;

d. The ''CTP'' of the ''digital computers'' does not exceed 20 Mtops;

e. Equipment containing ''terminal interface equipment'' does not exceed:

1. The limits of Advisory Note 3 to Category 5, Section I (Telecommunications);

2. The limits of 5A002.c.2; or

3. A ''digital transfer rate'' of 100 Mbits/s on the common media for ''network access controllers'' and related equipment controlled by 5A002.c.3; and

f. Any controlled ''software'' is the minimum required for the ''use'' of the approved ''digital computers'' and related equipment.

ADVISORY NOTE 3: Licenses are likely to be approved, as administrative exceptions, for exports and reexports to satisfactory end-users in Country Group D:1 of ''digital computers'', ''electronic assemblies'' or related equipment controlled by 4A003, or specially designed components therefor, and ''software'' controlled by 4D001, provided that:

a. They will be operated by civil end-users for civil applications;

b. They have been primarily designed and used for non-strategic applications;

c. They do not exceed any of the following limits:

1. The ''CTP'' of the ''digital computers'' does not exceed 1,000 Mtops;

2. The ''3–D vector rate'' does not exceed 3 million;

3. The total data transfer rate of equipment controlled by 4A003.g does not exceed 400 MB/second;

d. When exported as enhancements, the enhanced ''digital computer'' does not exceed the limit in this Advisory Note 3.c;

e. Exports of items covered by this Advisory Note 3 shall be subject to the following restrictions:

1. The equipment will be used primarily for the specific non-strategic application for which the export or reexport has been approved; and

2. The equipment will not be used for the design, ''development'', or ''production'' of items controlled for national security reasons; and

3. The exporter or reexporter shall report promptly any evidence of the removal or diversion of the equipment from authorized purposes related to the specific license;

f. For systems where the ''CTP'' exceeds 520 Mtops, the following conditions apply:

1. The licensee or the designated representative of the licensee, who must be from a country other than that listed in Country Group D:1, must have the right of access to all the equipment and may carry out inspections;

2. The licensee, upon the request of the BXA, must carry out inspections to establish that all the equipment and systems exported or reexported under the provisions of this Advisory Note:

a. Are being used for the intended civil purposes; and

b. Are still located at the installation sites. The licensee shall report the findings from the inspection to the BXA (at P.O. Box 273, Washington, D.C. 20044) within one month after completing the inspection.

ADVISORY NOTE 4: Licenses are likely to be approved, as administrative exceptions, for exports and reexports to satisfactory end-users in Country Group D:1 of equipment controlled by 4A003.g, provided that it is exported or reexported for ''use'' in interconnecting peripheral equipment to ''digital computers'' not controlled by 4A003.b.

Information on How to Calculate ''Composite Theoretical Performance'' (''CTP''):

TECHNICAL NOTE: ''Composite Theoretical Performance'' (CTP).

ABBREVIATIONS USED IN THIS TECHNICAL NOTE

CE ''computing element'' (typically an arithmetic logical unit)
FP floating point
XP fixed point
t execution time
XOR exclusive OR
CPU central processing unit
TP theoretical performance (of a single CE)
CTP ''composite theoretical performance'' (multiple CEs)
R effective calculating rate
WL word length
L word length adjustment
* multiply

Execution time 't' is expressed in microseconds, TP and ''CTP'' are expressed in Mtops (millions of theoretical operations per second) and WL is expressed in bits.

OUTLINE OF ''CTP'' CALCULATION METHOD

''CTP'' is a measure of computational performance given in millions of theoretical operations per second (Mtops). In calculating the ''Composite Theoretical Performance'' (''CTP'') of an aggregation of ''Computing Elements'' (''CEs''), the following three steps are required:

1. Calculate the effective calculating rate (R) for each ''computing element'' (''CE'');

2. Apply the word length adjustment (L) to the effective calculating rate (R), resulting in a Theoretical Performance (TP) for each ''computing element'' (''CE'');

3. If there is more than one ''computing element'' (''CE''), combine the Theoretical Performances (TPs), resulting in a ''Composite Theoretical Performance'' (''CTP'') for the aggregation. Details for these steps are given in the following section.

NOTE 1: For aggregations of multiple ''computing elements'' (''CEs'') that have both shared and unshared memory subsystems, the calculation of ''CTP'' is completed hierarchically, in two steps: first, aggregate the group of ''computing elements'' (''CEs'') sharing memory, second calculate the ''CTP'' of the groups using the calculation method for multiple ''computing elements'' (''CEs'') not sharing memory.

NOTE 2: ''Computing elements'' (''CEs'') that are limited to input/output and peripheral functions (e.g., disk drive, communication and video display controllers) are not aggregated into the ''CTP'' calculation.

The following table shows the method of calculating the ''Effective Calculating Rate'' (R) for each ''Computing Element'' (''CE''):

Step 1: *The effective calculating rate R.* For Computing Elements (CEs) Implementing: Effective calculating Rate, R

NOTE: Every ''CE'' must be evaluated independently

$$\text{XP only } \left(R_{xp}\right)$$

$$\frac{1}{3*\left(t_{xp\,add}\right)}$$

If no add is implemented use:

$$\frac{1}{\left(t_{xp\,mult}\right)}$$

If neither add nor multiply is implemented use the fastest available arithmetic operation as follows:

$$\frac{1}{\left(3\times t_{xp}\right)}$$

See Notes X and Y.

$$\text{FP only}\left(R_{fp}\right)$$

$$\text{Max}\frac{1}{t_{fp\,add}}, \frac{1}{t_{fp\,mult}}$$

See Notes X and Y.

Both FP and XP (R).

Calculate both R_{xp}, R_{fp}.

For simple logic processors not implementing any of the specified arithmetic operations.

$$\frac{1}{3 \times t_{log}}$$

Where t_{log} is the execute time of the XOR, or for logic hardware not implementing the XOR, the fastest simple logic operation.

See Notes X and Z.

For special logic processors not using any of the specified arithmetic or logic operations. R = R^t x WL/64

Where R is the number of results per second, WL is the number of bits upon which the logic operation occurs, and 64 is a factor to normalize to a 64 bit operation.

NOTE W: For a pipelined ''CE'' capable of executing up to one arithmetic or logic operation every clock cycle after the pipeline is full, a pipelined rate can be established. The effective calculating rate (R) for such a ''CE'' is the faster of the pipelined rate or non-pipelined execution rate.

NOTE X: For a ''CE'' that performs multiple operations of a specific type in a single cycle (e.g., two additions per cycle or two identical logic operations per cycle), the execution time t is given by:

$$t = \frac{\text{cycle time}}{\text{the number of arithmetic operations per machine cycle}}$$

''Computing elements'' (''CEs'') that perform different types of arithmetic or logic operations in a single machine cycle are to be treated as multiple separate ''computing elements'' (''CEs'') performing simultaneously (e.g., a ''CE'' performing an addition and a multiplication in one cycle is to be treated as two ''CEs'', the first performing an addition in one cycle and the second performing a multiplication in one cycle).

If a single ''Computing element'' (''CE'') has both scalar function and vector function, use the shorter execution time value.

NOTE Y: For the ''CE'' that does not implement FP add or FP multiply, but that performs FP divide:

$$R_{tp} = \frac{1}{t_{fp\,divide}};$$

If the ''CE'' implements FP reciprocal, but not FP add, FP multiply or FP divide, then:

$$R_{fp} = \frac{1}{t_{fp\,reciprocal}}.$$

If the divide is not implemented, the fp reciprocal should be used.

If none of the specified instructions is implemented, the effective floating point (FP) rate is 0.

NOTE Z: In simple logic operations, a single instruction performs a single logic manipulation of no more than two operands of given lengths. In complex logic operations, a single instruction performs multiple logic manipulations to produce one or more results from two or more operands.

Rates should be calculated for all supported operand lengths considering both pipelined operations (if supported), and non-pipelined operations, using the fastest executing instruction for each operand length based on:

1. Pipelined or register-to-register operations. Exclude extraordinarily short execution times generated for operations on a predetermined operand or operands (for example, multiplication by 0 or 1). If no register-to-register operations are implemented, continue with (2).
2. The faster of register-to-memory or memory-to-register operations; if these also do not exist, then continue with (3).
3. Memory-to-memory.

In each case above, use the shortest execution time certified by the manufacturer.

Step 2: *TP for each supported operand length WL:*

Adjust the effective rate R (or R^t) by the word length adjustment L as follows:

$$TP = R \times L, \text{ where } L = \left(1_3 + WL/96\right).$$

NOTE: The word length WL used in these calculations is the operand length in bits. (If an operation uses operands of different lengths, select the largest word length.)

The combination of a mantissa ALU and an exponent ALU of a floating point processor or unit is considered to be one ''computing Element'' (''CE'') with a Word Length (WL) equal to the number of bits in the data representation (typically 32 or 64) for purposes of the ''Composite Theoretical Performance'' (''CTP'') calculations.

This adjustment is not applied to specialized logic processors that do not use XOR instructions. In this case TP = R.

Select the maximum resulting value of TP for:

Each XP-only ''CE'' (R_{xp});

Each FP-only ''CE'' (R_{fp});

Each combined FP and XP ''CE'' (R);

Each simple logic processor not implementing any of the specified arithmetic operations; and

Each special logic processor not using any of the specified arithmetic or logic operations.

Step 3: *''CTP'' for aggregations of ''CEs'', including CPU's:*

For a CPU with a single ''CE'', ''CTP'' = TP (for CEs performing both fixed and floating point operations, TP = max (TP_{fp}, TP_{xp})).

''CTP'' for aggregations of multiple ''CEs'' operating simultaneously is calculated as follows:

NOTE 1: For aggregations that do not allow all of the ''CEs'' to run simultaneously, the possible combination of ''CEs'' that provides the largest ''CTP'' should be used. The TP of each contributing ''CE'' is to be calculated at its maximum value theoretically possible before the ''CTP'' of the combination is derived.

N.B.: To determine the possible combinations of simultaneously operating ''CEs'', generate an instruction sequence that initiates operations in multiple ''CEs'', beginning with the slowest ''CE'' (the one needing the largest number of cycles to complete its operation) and ending with the fastest ''CE''. At each cycle of the sequence, the combination of ''CEs'' that are in operation during that cycle is a possible combination. The instruction sequence must take into account all hardware and/or architectural constraints on overlapping operations.

NOTE 2: A single integrated circuit chip or board assembly may contain multiple ''CEs''.

NOTE 3: Simultaneous operations are assumed to exist when the computer manufacturer claims concurrent, parallel or simultaneous operation or execution in a manual or brochure for the computer.

NOTE 4: ''CTP'' values are not to be aggregated for ''CE''-combinations (inter)connected by ''Local Area Networks'', Wide Area Networks, Input/Output shared connections/devices, I/O controllers and any communication interconnection implemented by ''software''.

NOTE 5: ''CTP'' values must be aggregated for multiple ''CEs'' specially designed to enhance performance by aggregation, operating simultaneously and sharing memory,— or multiple memory/''CE''—combinations operating simultaneously utilizing specially designed hardware. This aggregation does not apply to ''electronic assemblies'' controlled by 4A003.c.

''CTP'' = $TP_1 + C_2 * TP_2 + . . . + C_n * TP_n$, where the TPs are ordered by value, with TP_1, being the highest, TP_2 being the second highest, . . . and TP_n being the lowest. C_i is a coefficient determined by the strength of the interconnection between ''CEs'', as follows:

For multiple ''CEs'' operating simultaneously and sharing memory:

$$C_2 = C_3 = C_4 = K = C_n = 0.75.$$

NOTE 1: When the ''CTP'' calculated by the above method does not exceed 194 Mtops, the following formula may be used to calculate C_i:

$$C_i = \frac{0.75}{m^{0.5}(i = 2, K\ n)}$$

where m = the number of ''CEs'' or groups of ''CEs'' sharing access.

Provided:

1. The TP_i of each ''CE'' or group of ''CEs'' does not exceed 30 Mtops;

2. The ''CEs'' or groups of ''CEs'' share access to main memory (excluding cache memory) over a single channel; and

3. Only one ''CE'' or group of ''CEs'' can have use of the channel at any given time.

N.B.: This does not apply to items controlled under Category 3.

NOTE 2: ''CEs'' share memory if they access a common segment of solid state memory. This memory may include cache memory, main memory, or other internal memory. Peripheral memory devices such as disk drives, tape drives, or RAM disks are not included.

For multiple ''CEs'' or groups of ''CEs'' not sharing memory, interconnected by one or more data channels:

C_i=0.75*k_i (i=2, . . ., 32) (see NOTE on k_i factor)

=0.60*k_i (i=33, . . ., 64)

=0.45*k_i (i=65, . . ., 256)

=0.30*k_i (i>256)

The value of C_i is based on the number of ''CEs'', not the number of nodes.

where k_i=min (S_i/K_r, 1), and

K_r=normalizing factor of 20 MByte/s.

S_i=sum of the maximum data rates (in units of MBytes/s) for all data channels connected to the i_{th} ''CE'' or group of ''CEs'' sharing memory.

When calculating a C_i for a group of ''CEs'', the number of the first ''CE'' in a group determines the proper limit for C_i. For example, in an aggregation of groups consisting of 3 ''CEs'' each, the 22nd group will contain $''CE''_{64}$, $''CE''_{65}$ and $''CE''_{66}$. The proper limit for C_i for this group is 0.60.

Aggregation (of ''CEs'' or groups of ''CEs'') should be from the fastest-to-slowest; i.e.:

$TP_1 \geq TP_2 \geq TP_3$; and in the case of $TP_i = TP_{i+1}$, from the largest to smallest, i.e.:

$C_i \geq C_{i+1}$

NOTE: The k_i factor is not to be applied to ''CEs'' to 2 to 12 if the TP i / of the ''CE'' or group of ''CEs'' is more than 50 Mtops; i.e., C_i for ''CEs'' 2 to 12 is 0.75.

Category 5—Telecommunications and Information Security

NOTICE: Category 5 entries are divided into two sections. (I) Telecommunications and (II) Information Security.

I. TELECOMMUNICATIONS

NOTES: 1. The control status of components, ''lasers'', test and ''production'' equipment, materials and ''software'' therefor that are specially designed for telecommunications equipment or systems is defined in the telecommunications entries in this Category.

2. ''Digital computers'', related equipment or ''software'', when essential for the operation and support of telecommunications equipment described by the telecommunications equipment in this Category, are regarded as specially designed components, provided they are the standard models customarily supplied by the manufacturer. This includes operation, administration, maintenance, engineering or billing computer systems.

A. EQUIPMENT, ASSEMBLIES AND COMPONENTS

5A001 Any type of telecommunications equipment having any of the following characteristics, functions or features:

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to 5A001.a.	NS Column 1
NS applies to 5A001.b., c., d., .e, or .f	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A for 5A001.a;
$5000 for 5A001.b, .c, .d, and .f;
$3000 for 5A001.e
GBS: Yes, except 5A001.a, b.8, and b.9
CIV: Yes, except 5A001.a, b.8, and b.9

LIST OF ITEMS CONTROLLED

Unit: Equipment in number; parts and accessories in $ value
Related Controls: N/A
Related Definitions: N/A
Items: a. Any type of telecommunications equipment having any of the following characteristics, functions or features:

a.1. Specially designed to withstand transitory electronic effects or electromagnetic pulse arising from a nuclear explosion;

a.2. Specially hardened to withstand gamma, neutron or ion radiation;

a.3. Specially designed to operate outside the temperature range from 218 K (−55 °C) to 397 K (124 °C).

NOTE: 5A001.a.3 applies only to electronic equipment.

NOTE: 5A001.a.2 and a.3 do not apply to equipment on board satellites.

b. Telecommunication transmission equipment or systems and specially designed components and accessories therefor, having any of the characteristics, functions or features:

NOTE: Telecommunication transmission equipment:
a. Categorized as follows, or combinations thereof:
1. Radio equipment (e.g., transmitters, receivers and transceivers);
2. Line terminating equipment;
3. Intermediate amplifier equipment;
4. Repeater equipment;
5. Regenerator equipment;
6. Translation encoders (transcoders);
7. Multiplex equipment (statistical multiplex included);
8. Modulators/demodulators (modems);
9. Transmultiplex equipment (see CCITT Rec. G.7Ol);
10. ''Stored program controlled'' digital crossconnection equipment;
11. ''Gateways'' and bridges;
12. ''Media access units''; and
b. Designed for use in single or multi-channel communication via:
1. Wire (line);
2. Coaxial cable;
3. Optical fiber cable;
4. Electromagnetic radiation; or
5. Underwater acoustic wave propagation.

b.1. Employing digital techniques, including digital processing of analog signals, and designed to operate at a ''digital transfer rate'' at the highest multiplex level exceeding 45 Mbit/s or a ''total digital transfer rate'' exceeding 90 Mbit/s.

NOTE: 5A001.b.1. does not control equipment specially designed to be integrated and operated in any satellite system for civil use.

b.2. Being ''stored program controlled'' digital cross connect equipment with a ''digital transfer rate'' exceeding 8.5 Mbit/s per port.

b.3. Being equipment containing:

b.3.a. Modems using the ''bandwidth of one voice channel'' with a ''data signalling rate'' exceeding 28,800 bits/s;

b.3.b. ''Communication channel controllers'' with a digital output having a ''data signalling rate'' exceeding 2.1 Mbit/s per channel; or

b.3.c. ''Network access controllers'' and their related common medium having a ''digital transfer rate'' exceeding 156 Mbit/s;

NOTE: If any non-controlled equipment contains a ''network access controller'', it cannot have any type of telecommunications interface except those described in, but not controlled by, 5A001.b.3.

b.4 Employing a ''laser'' and having any of the following characteristics:

b.4.a. Having a transmission wavelength exceeding 1,000 nm;

b.4.b. Employing analog techniques and having a bandwidth exceeding 45 MHz;

b.4.c. Employing coherent optical transmission or coherent optical detection techniques (also called optical heterodyne or homodyne techniques);

b.4.d. Employing wavelength division multiplexing techniques; or

b.4.e. Performing ''optical amplification''.

b.5. Radio equipment operating at input or output frequencies exceeding:

b.5.a. 31 GHz for satellite-earth station applications; or

b.5.b. 26.5 GHz for other applications;

NOTE: 5A001.b.5.b. does not control equipment for civil use when conforming with an International

Telecommunicatios Union (ITU) allocated band between 26.5 GHz and 31 GHz.

b.6. Being radio equipment:

b.6.a. Employing quadrature-amplitude-modulation (QAM) techniques above level 4 if the ''total digital transfer rate'' exceeds 8.5 Mbit/s;

b.6.b. Employing quadrature-amplitude-modulation (QAM) techniques above level 16 if the ''total digital transfer rate'' is equal to or less than 8.5 Mbit/s; or

b.6.c. Employing other digital modulation techniques and having a ''spectral efficiency'' greater than 3 bit/sec/Hz;

NOTE 1: 5A001.b.6 does not control equipment specially designed to be integrated and operated in any satellite system for civil use.

NOTE 2: 5A001.b.6. does not control radio relay equipment for operation in an ITU allocated band:

a.1. Not exceeding 960 MHz; or

a.2. With a ''total digital transfer rate'' not exceeding 8.5 Mbit/s; and

b. Having a ''spectral efficiency'' not exceeding 4 bit/sec/Hz.

b.7 Being radio equipment operating in the 1.5 to 87.5 MHz band and having either of the following characteristics:

b.7.a.1. Automatically predicting and selecting frequencies and ''total digital transfer rates'' per channel to optimize the transmission; and

b.7.a.2. Incorporating a linear power amplifier configuration having a capability to support multiple signals simultaneously at an output power of 1 kW or more in the 1.5 to 30 Mhz frequency range or 250 W or more in the 30 to 87.5 MHz frequency range, over an ''instantaneous bandwidth'' of one octave or more and with an output harmonic and distortion content of better than −80 dB; or

b.7.b. Incorporating adaptive techniques providing more than 15 dB suppression of an interfering signal.

b.8. Being radio equipment employing ''spread spectrum'' or ''frequency agility'' (frequency hopping) techniques having any of the following characteristics:

b.8.a. User programmable spreading codes; or

b.8.b. A total transmitted bandwidth that is 100 or more times the bandwidth of any one information channel and in excess of 50 kHz.

b.9. Being digitally controlled radio receivers having more than 1,000 channels, that:

b.9.a. Search or scan automatically a part of the electromagnetic spectrum;

b.9.b. Identify the received signals or the type of transmitter; and

b.9.c. Have a ''frequency switching time'' of less than 1 ms;

b.10. Providing functions of digital ''signal processing'' as follows:

b.10.a. Voice coding at rates less than 2,400 bit/s;

b.10.b. Employing circuitry that incorporates ''user-accessible programmability'' of digital ''signal processing'' circuits exceeding the limits of 4A003.b;

b.11. Being underwater communications systems having any of the following characteristics:

b.11.a. An acoustic carrier frequency outside the range of 20 to 60 kHz;

b.11.b. Using an electromagnetic carrier frequency below 30 kHz; or

b.11.c. Using electronic beam steering techniques.

c. ''Stored program controlled'' switching equipment and related signalling systems having any of the following characteristics, functions or features; and specially designed components and accessories therefor:

NOTE: Statistical multiplexers with digital input and digital output that provide switching are treated as ''stored program controlled'' switches.

c.1. ''Common channel signalling'',

NOTE: Signalling systems in which the signalling channel is carried in and refers to no more than 32 multiplexed channels forming a trunk line of no more than 2.1 Mbit/s, and in which the signalling information is carried in a fixed, time division multiplexed channel without the use of labelled messages, are not considered to be ''common channel signalling'' systems.

c.2. Containing ''Integrated Services Digital Network'' (ISDN) functions and having either of the following:

c.2.a. Switch-terminal (e.g., subscriber line) interfaces with a ''digital transfer rate'' at the highest multiplex level exceeding 192,000 bit/s, including the associated signalling channel (e.g., 2B+D); or

c.2.b. The capability that a signalling message received by a switch on a given channel that is related to a communication on another channel may be passed through to another switch.

NOTE: 5A001.c.2. does not preclude:

a. The evaluation and appropriate actions taken by the receiving switch.

b. Unrelated user message traffic on a D channel of ISDN.

c.3. Multi-level priority and pre-emption for circuit switching;

NOTE: 5A001.c.3. does not control single-level call preemption.

c.4. ''Dynamic adaptive routing'';

c.5. Routing or switching of ''datagram'' packets;

c.6. Routing or switching of ''fast select'' packets;

NOTE: The restrictions in 5A001.c.5. and c.6. do not apply to networks restricted to using only ''network access controllers'' or to ''network access controllers'' themselves.

c.7. Designed for automatic hand-off of cellular radio calls to other cellular switches or automatic connection to a centralized subscriber data base common to more than one switch;

c.8. Being packet switches, circuit switches and routers with ports or lines exceeding either:

c.8.a. A ''data signalling rate'' of 64,000 bit/s per channel for a ''communications channel controller''; or

NOTE: 5A001.c.8.a. does not preclude the multiplexing over a composite link of communications channels not controlled by 5A001.b.1.

c.8.b. A ''digital transfer rate'' of 33 Mbit/s for a ''network access controller'' and related common media.

c.9. ''Optical switching'';

c.10. Employing ''Asynchronous Transfer Mode'' (ATM) techniques;

c.11. Containing ''stored program controlled'' digital crossconnect equipment with ''digital transfer rate'' exceeding 8.5 Mbit/s per port;

d. Centralized network control having both of the following characteristics:

d.1. Receives data from the nodes; and

d.2. Processes these data in order to provide control of traffic not requiring operator decisions, and thereby performing ''dynamic adaptive routing'';

NOTE: 5A001.d. does not preclude control of traffic as a function of predictable statistical traffic conditions.

e. Optical fiber communication cables, optical fibers and accessories therefor, as follows:

e.1. Optical fiber or cable of more than 50 m in length having either of the following characteristics:

e.1.a. Designed for single mode operation; or

e.1.b. For optical fibers, specified by the manufacturer as being capable of withstanding a Proof Test tensile stress of 2×10^9 N/m^2 or more;

TECHNICAL NOTE: Proof Test: On-line or off-line production screen testing that dynamically applies a prescribed tensile stress over a 0.5 to 3 m length of fiber at a running rate of 2 to 5 m/s while passing between capstans approximately 150 mm in diameter. The ambient temperature is a nominal 293 K (20 °C) and relative humidity of 40%.

N.B.: Equivalent national standards may be used for executing the Proof Test.

e.2. Optical fiber cables and accessories designed for underwater use (for fiber-optic hull penetrators or connectors, see 8A002.c);

f. Phased array antennae, operating above 10.5 GHz, containing active elements and distributed components, and designed to permit electronic control of beam shaping and pointing, except for landing systems with instruments meeting International Civil Aviation Organization (ICAO) standards (microwave landing systems (MLS)).

5A101 Telemetering and telecontrol equipment usable for "missiles".

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Number
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

5A980 Communications intercepting devices; and parts and accessories therefor.

LICENSE REQUIREMENTS

Reason for Control:

Controls on equipment described in this entry are maintained in accordance with the Omnibus Crime Control and Safe Streets Act of 1968 (Pub. L. 90–351). A license is required for ALL destinations, regardless of end-use. Accordingly, a column specific to this control does not appear on the Commerce Country Chart. (See §742.13 of the EAR for additional information on the scope of this control.)

NOTE: These items are subject to the United Nations Security Council arms embargo against Rwanda described in §746.8 of the EAR.

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

5A990 Any type of telecommunications equipment, not controlled by 5A001.a, specially designed to operate outside the temperature range from 219 K (−54 °C) to 397 K (124 °C).

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

5A991 Transmission equipment, not controlled by 5A001.b.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: a. Modems using the ''bandwidth of one voice channel'' with a ''data signalling rate'' exceeding 9,600 bits per second;

b. ''Communication channel controllers'' with a digital output having a ''data signalling rate'' exceeding 64,000 bit/s per channel; or

c. ''Network access controller'' and their related common medium having a ''digital transfer rate'' exceeding 33 Mbit/s.

5A992 Mobile communications equipment, n.e.s., and assemblies and components therefor.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

5A993 Radio relay communications equipment designed for use at frequencies equal to or exceeding 19.7 GHz and assemblies and components therefor, n.e.s.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

5A994 "Data (message) switching" equipment or systems designed for "packet-mode operation" and assemblies and components therefor, n.e.s.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definition: Data (message) switching is defined as the technique for: (a) Accepting data groups (including messages, packets, or other digital or telegraphic information groups transmitted as a composite whole); (b) Storing (buffering) data groups as necessary; (c) Processing part of all the data groups, as necessary, for the purpose of: (1) Control (routing, priority, formatting, code conversion, error control, retransmission or journaling); (2) Transmission; or (3) Multiplexing; and (d) Retransmitting (processed) data groups when transmission or receiving facilities are available.
Items: The list of items controlled is contained in the ECCN heading.

B. TEST, INSPECTION AND PRODUCTION EQUIPMENT

5B001 Equipment, and specially designed components and accessories therefor.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $5000
GBS: Yes
CIV: Yes

LIST OF ITEMS CONTROLLED

Unit: Equipment in number; parts and accessories in $ value
Related Controls: N/A
Related Definition: This entry does not control optical fibers and ''optical fiber

preform'' characterization equipment not using semiconductor ''lasers''.

Items: a. Equipment and specially designed components and accessories therefor, specially designed for:

a.1. ''Development'' of equipment, materials, functions, or features controlled by 5A001, 5B001, 5C001, 5D001 or 5E001, including measuring or test equipment;

a.2. ''Production'' of equipment, materials, functions, or features controlled by 5A001, 5B001, 5C001, 5D001 or 5E001, including measuring, test or repair equipment;

a.3. ''Use'' of equipment, materials, functions, or features exceeding any of the least stringent control criteria applicable in 5A001, 5B001, 5C001, 5D001 or 5E001, including measuring, repair or test equipment.

b. Other equipment as follows:

b.1. Bit error rate (BER) test equipment designed or modified to test the equipment controlled by 5A001.b.1.;

b.2. Data communication protocol analyzers, testers and simulators for functions controlled by 5A001;

b.3. Stand alone ''stored program controlled'' radio transmission media simulators/channel estimators specially designed for testing equipment controlled by 5A001.b.5.

5B994 Telecommunications test equipment, n.e.s.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $1,000 for Syria; N/A to Iran
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

C. MATERIALS

5C001 Preforms of glass or of any other material optimized for the manufacture of optical fibers controlled by 5A001.e.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $3000
GBS: Yes
CIV: Yes

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

D. SOFTWARE

5D001: Telecommunications "Software".

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: Yes
TSR: Yes

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items:

a. ''Software'' specially designed or modified for the ''development'', ''production'' or ''use'' of equipment or materials controlled by 5A001, 5B001, or 5C001.

b. ''Software'' specially designed or modified to support ''technology'' controlled by 5E001.

c. Specific ''software'' as follows:

c.1. ''Generic software'', other than in machine-executable form, specially designed or modified for the ''use'' of ''stored program controlled'' digital switching equipment or systems;

c.2. ''Software'', other than in machine-executable form, specially designed or modified for the ''use'' of digital cellular radio equipment or systems;

c.3. ''Software'' specially designed or modified to provide characteristics, functions or features of equipment controlled by 5A001 or 5B001;

c.4. ''Software'' that provides capability of recovering ''source code'' of telecommunications ''software'' controlled by this Category.

c.5. ''Software'' specially designed for the ''development'' or ''production'' of ''software'' controlled by 5D001;

5D101 "Software" designed or modified for the "development", "production" or "use" of items controlled by 5A101.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

5D990 "Software" specially designed or modified for the "development", "production", or "use" of equipment controlled by 5A990 and 5A991.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 2

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

5D991 "Software" specially designed or modified for the "development", "production", or "use" of telecommunications test equipment controlled by 5B994.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

5D992 "Software" specially designed or modified for the "development", "production" or "use" of mobile communications equipment controlled by 5A992.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

5D993 "Software" specially designed or modified for the "development", "production" or "use" of radio relay communication equipment controlled by 5A993.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

5D994 "Software" specially designed or modified for the "development", "production" or "use" of data (message) switching equipment controlled by 5A994.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

E. TECHNOLOGY

5E001 Telecommunications "technology".

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: Yes

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: a. ''Technology'' according to the General Technology Note for the ''development'', ''production'' or ''use'' (excluding operation) of equipment, systems, materials or ''software'' controlled by 5A001, 5B001, 5C001, or 5D001.

b. Specific technologies, as follows:

b.1. ''Required'' technology for the ''development'' or ''production'' of telecommunications equipment specially designed to be used on board satellites.

b.2. ''Technology'' for the ''development'' or ''use'' of laser communication techniques with the capability of automatically acquiring and tracking signals and maintaining communications through exoatmosphere or sub-surface (water) media;

b.3. ''Technology'' for the processing and application of coatings to optical fiber specially designed to make it suitable for underwater use;

b.4. ''Technology'' for the ''development'' or ''production'' of equipment employing ''Synchronous Digital Hierarchy'' (SDH) or ''Synchronous Optical Network'' (SONET) techniques;

b.5. ''Technology'' for the ''development'' or ''production'' of ''switch fabric'' exceeding 64,000 bits per second per information channel other than for digital cross connect integrated in the switch;

b.6. ''Technology'' for the ''development'' or ''production'' of centralized network control;

b.7. ''Technology'' for the ''development'' or ''production'' of digital cellular radio systems;

b.8. ''Technology'' for the ''development'' or ''production'' of ''Integrated Services Digital Network'' (ISDN).

b.9. ''Technology'' for the ''development'' of QAM techniques, for radio equipment, above level 4.

5E101 "Technology" according to the General Technology Note for the "development", "production" or "use" of equipment controlled by 5A101 or "software" controlled by 5D101.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

5E990 Technology for the "development", "production" or "use" of equipment controlled by 5A990 or 5A991 or "software" controlled by 5D990.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

5E991 "Technology" for the "development", "production", or "use" of telecommunications test equipment controlled by 5B994, or "software" controlled by 5D991.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

5E992 "Technology" for the "development", "production", or "use" of mobile communications equipment controlled by 5A992 or "software" controlled by 5D992.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

5E993 "Technology" for the "development", "production", or "use" of radio relay communication equipment controlled by 5A993, or "software" controlled by 5D993.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

5E994 "Technology" for the "development", "production" or "use" of data (message) switching equipment controlled by 5A994, or "software" controlled by 5D994.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

EAR99 Items subject to the EAR that are not elsewhere specified in this CCL Category or in any other category in the CCL are designated by the number EAR99.

ADVISORY NOTES FOR TELECOMMUNICATIONS

ADVISORY NOTE 1: Licenses are likely to be approved, as administrative exceptions, for exports and reexports to satisfactory end-users in Estonia, Latvia and Lithuania of equipment or systems controlled by 5A001.b, .c, .d, .e, and .f, and test equipment, ''software'' and ''use'' technology therefor, provided that:

a. The equipment or systems:

1. Are designed for and will be used for specific civil applications; and

2. Will be operated in the importing country by a civil end-user who has furnished to the supplier a Statement by Ultimate Consignee and Purchaser (Form BXA–711), or a statement on company letterhead described in §748.11(e) of the EAR certifying that the equipment or systems will used only for the specific end-use;

b. The information to accompany each application will include:

1. End-use assurances provided by the importer and backed by the importing country;

2. Acceptance of on-site inspection of the equipment or system by the licensee or the designated representative of the licensee from a country other than that listed in Country Group D:1;

3. A full description of the equipment or systems to be provided; and

4. The end-use information clearly stated including the installation site and intended application.

ADVISORY NOTE 2: Licenses are likely to be approved, as administrative exceptions, for exports and reexports to satisfactory end-users in the People's Republic of China of the following communications, measuring or test equipment:

a. ''Telecommunications transmission equipment'' controlled by 5A001.b.1, b.2, b.4 provided that:

1. It is intended for general commercial traffic in a civil communication system;

2. It is designed for operation at a ''digital transfer rate'' at the highest multiplex level of 140 Mbit/s or less and at a ''total digital transfer rate'' of 168 Mbit/s or less;

N.B.: An additional 2 Mbit/s for operation, maintenance and service communications may be added to the ''total digital transfer rate'' of 168 Mbit/s.

3. For equipment controlled by 5A001.b.4, the transmission wavelength must not exceed 1,370 nm and optical fiber must be used as the communication medium;

4. It is to be installed under the supervision of the seller in a permanent circuit; and

5. It is to be operated by the civilian authorities of the importing country;

b. Measuring or test equipment controlled by 5B001.a.3, 5B001.b.1, 5B001.b.2, that is necessary for the ''use'' (i.e., installation, operation and maintenance) of equipment exported under the conditions of this Advisory Note, provided that:

1. It is designed for ''use'' with communication transmission equipment operating at a ''digital transfer rate'' of 140 Mbit/s or less, and at a ''total digital transfer rate'' of 168 Mbit/s or less; and

2. It will be supplied in the minimum quantity required for the transmission equipment eligible for administrative exception treatment.

N.B. 1: Where possible, built-in test equipment (BITE) will be provided for installation or maintenance of transmission equipment eligible for administrative exception treatment under this Advisory Note rather than individual test equipment.

N.B. 2: The license application must include the locations of the connection points, types of equipment being connected and transmission rates.

ADVISORY NOTE 3: Licenses are likely to be approved, as administrative exceptions, for exports and reexports to satisfactory end-users in the People's Republic of China of ''network access controllers'' controlled by 5A001.b.3.c, when exported under the conditions of Advisory Note 2 to Category 4, with a ''digital transfer rate'' not exceeding 100 Mbits/s.

ADVISORY NOTE 4: Licenses are likely to be approved, as administrative exceptions, for exports and reexports to satisfactory end-users in the People's Republic of China of the following, provided that the associated multiplex equipment is designed for operation at a ''digital transfer rate'' at the highest multiplex level of 140 Mbit/s or less:

a. Digital microwave radio relay equipment controlled by 5A001.b.1 or 5B001.b.6, for fixed civil installations, operating at fixed frequencies not exceeding 23.6 GHz, with a ''total digital transfer rate'' not exceeding 168 Mbit/s;

b. Ground communication radio equipment for use with temporarily fixed services operated by civil authorities and designed to be used at fixed frequencies not exceeding 23.6 GHz;

c. Radio transmission media simulators/channel estimators controlled by 5B001.b.3, designed for testing equipment described in this Advisory Note 4.a or .b.

ADVISORY NOTE 5: Licenses are likely to be approved, as administrative exceptions, for exports and reexports to satisfactory end-users in the People's Republic of China of equipment controlled by 5A001.c.1 or ''software'' for ''common channel signalling'' controlled by 5D001.a or 5D001.c.3, provided that:

a. The ''common channel signalling'' is restricted to quasi-associated or associated mode of operation according to CCITT Red Book, Volume X, fascicle X.1;

b. No functions, other than those described in the following recommendations in the Red Book of CCITT: Q.701 to Q.709, Q.721 to Q.725, Q.791 and Q.795, are included;

N.B.: Only functions described in paragraph 2 of Q.795 are to be included. These Q.795 functions may not provide centralized network control having all of the following characteristics:

a. Is based on a network management protocol; and

b. Does both of the following:

1. Receives data from the nodes; and

2. Processes these data in order to:

a. Control traffic; and

b. Directionalize paths;

c. No form of ''Integrated Services Digital Network'' (ISDN) is provided;

d. Equipment or ''software'' is restricted to that necessary for the operation within a city or, for ''Private Automatic Branch Exchanges'', within a radius of 100 km;

N.B. 1: Where a recognized city contains more than one subordinate entity or city, the larger unified boundary prevails. In no case is the boundary larger than that of Beijing.

N.B. 2: A suburban entity that does not belong to a city, but is located within a circle with a diameter of 50 km and with a city in the middle, can be considered as part of a city.

e. No means are provided that will allow ''common channel signalling'' via analog transmission links;

f. All the applicable conditions enumerated in this Advisory Note 5.a to .e are accomplished by:

1. Omission or physical removal of equipment or coding;

2. Over-writing with non-functioning statements; or

3. Reasonably non-reversible modifications.

ADVISORY NOTE 6: Licenses are likely to be approved, as administrative exceptions, for export to satisfactory end-users in the People's Republic of China of equipment controlled by 5B001.a.2, as follows:

a. Optical fiber or ''optical fiber preform'' characterization equipment using semiconductor ''laser'' with a wavelength not exceeding 1,370 nm;

b. Equipment for the manufacture of silica-based ''optical fiber preforms'', optical fibers or cables.

ADVISORY NOTE 7: Licenses are likely to be approved, as administrative exceptions, for exports and reexports to satisfactory end-users in the People's Republic of China of test and inspection equipment and specially designed components and accessories therefor controlled by 5B001.a or 5B001.b and ''software'' and technology for such equipment, components and accessories, for the repair of telecommunications equipment, provided that:

a. Such equipment, components, accessories, ''software'' and technology:

1. Are specially designed for repair;

2. Are to be used to repair controlled equipment authorized for export or equipment that is not controlled for national security reasons;

3. Are shipped in reasonable quantities necessary for the types and quantities of exported equipment being serviced;

4. Do not provide local production facilities;

5. Do not provide for testing of individual electronic components; and

6. Do not include ''software'' in ''source code'' controlled by 5D001.c.1;

b. The repair does not upgrade the equipment or ''software'';

c. All the records of repair activity are kept by a representative of the supplier located in a country other than that listed in Country Group D:1; and

d. The information to accompany each license application shall include:

1. A complete list of equipment to be provided; and

2. A clear identification of the users and their activities.

N.B.: Nothing in this Advisory Note 7 shall be construed as overriding controls in other ECCNs contained in the Commerce Control List.

ADVISORY NOTE 8: Licenses are likely to be approved, as administrative exceptions, for export to satisfactory end-users in the People's Republic of China of ''optical fiber preforms'' controlled by 5C001, specially designed for the manufacture of silica-based optical fibers, provided they are specially designed to produce non-militarized silica-based optical fibers that are optimized to operate at a wavelength not exceeding 1,370 nm.

ADVISORY NOTE 9: Licenses are likely to be approved, as administrative exceptions, for exports and reexports to the People's Republic of China of minimum quantities of semiconductor ''lasers'' designed and intended for use with a civil fiber optic communication system that would be either not controlled for national security reasons or eligible for administrative exceptions treatment under Advisory Note 2 (Notes for Telecommunications), having an output wavelength not exceeding 1,370 nm and a CW power output not exceeding 100 mW.

ADVISORY NOTE 10: Licenses are likely to be approved, as administrative exceptions, for exports and reexports to satisfactory end-users in Albania, Bulgaria, the People's Republic of China, Mongolia, Romania or Vietnam of telecommunication equipment for optical fibers controlled by 5A001.b.4.a, provided that the transmission wavelength does not exceed 1,370 nm.

ADVISORY NOTE 11: Licenses are likely to be approved, as administrative exceptions, for exports and reexports to satisfactory end-users in Albania, Bulgaria, the People's Republic of China, Mongolia, Romania or Vietnam of cables or fibers controlled by 5A001.e, provided that:

a. Quantities are normal for the envisaged end-use; and

b. They are for a specified civil end-use.

ADVISORY NOTE 12: Licenses are likely to be approved, as administrative exceptions, for exports and reexports to satisfactory end-users in Albania, Bulgaria, the People's Republic of China, Mongolia, Romania or Vietnam of optical fiber test equipment controlled by 5B001.a.3 using a transmission wavelength not exceeding 1,370 nm.

ADVISORY NOTE 13: Licenses are likely to be approved, as administrative exceptions, for exports and reexports to satisfactory end-users in Country Group D:1 of digital radio equipment or systems controlled by 5A001.b.1 or 5A001.b.6, provided that:

a. The equipment or system is intended for general commercial international traffic in an international civil telecommunication system, one end of which is in a country listed in Country Group A:1;

b. It is to be installed in a permanent circuit under the supervision of the licensee;

c. No means are to be provided for the transmission of traffic between points in a single country listed in Country Group D:1 other than Romania;

d. The ''digital transfer rate'' at the highest multiplex level does not exceed 156 Mbit/s;

e. The equipment does not employ either of the following:

1. Quadrature Amplitude Modulation (QAM) techniques above level 64; or

2. Other digital modulation techniques with a ''spectral efficiency'' exceeding 6 bit/s/Hz;

f. The equipment is not controlled by 5A001.b.4 or b.7 or by the ''Information Security'' entries in Category 5;

g. Spare parts shall remain under the control of the licensee or the licensee's designated representative;

NOTE: The supervision of the spare parts by the licensee may be effected by stock inventory procedures and does not require the permanent on-site presence of a representative of the licensee.

h. The licensee or the licensee's designated representative who shall be from a country other than that listed in Country Group D:1, shall have the right of access to all the equipment;

i. There will be no transfer of technology controlled for national security reasons;

j. Supervision of systems installation, operation and maintenance shall be performed by the licensee or the licensee's designated representative, who shall be from a country other than that listed in Country Group D:1, using only personnel from countries other than those listed in Country Group D:1;

N.B. 1: Supervision of maintenance includes preventive maintenance at periodic intervals and intervention for major functions.

N.B. 2: This does not mean that only nationals from the exporting country should install the system.

k. Upon request, the licensee shall carry out an inspection to establish that:

1. The system is being used for the intended civil purpose; and

2. All the equipment exported under the provisions of this Advisory Note is being used for the stated purpose and is still located at the installation sites. The licensee shall report the findings from the inspection

to the BXA within one month after completing the inspection.

ADVISORY NOTE 14: Licenses are likely to be approved, as administrative exceptions, for exports and reexports to satisfactory end-users in Country Groups D:1 of fiber optic telecommunication transmission system or equipment controlled by 5A001.b.1 and 5A001.b.4.a, fiber optic cables controlled by 5A001.e, or coaxial cable telecommunications transmission systems controlled by 5A001.b.1, and the test equipment, specially designed components, accessories, ''software'' and technology, necessary for the ''use'' thereof, provided that:

a. They are intended for international telecommunications links dedicated to international civil traffic between the following locations:

1.a. *From the following countries:* Austria, Belgium, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Netherlands, Norway, Poland, Portugal, the Slovak Republic, Spain, Sweden, Switzerland, Turkey, or the United Kingdom;

b. *To the following cities as listed by country:* Albania (Tirana), Armenia (Yerevan), Azerbaijan (Baku), Bulgaria (Sophia, Varna), Belarus (Minsk), Georgia (Tbilissi), Kazakhstan (Alma-Ata), Kyrgyzstan (Bishkek), Moldova (Chisinau), Romania (Bucharest, Constanza), Russia (Moscow, Novorossiisk, Rostov-on-Don, St. Petersburg, Volgograd), Tajikistan (Dushanbe), Turkmenistan (Ashgabat), Ukraine (Kiev, Odessa, Sebastopol), Uzbekistan (Tashkent) or:

2.a. *From the following countries:* Australia, Canada, Hong Kong, Japan, New Zealand, South Korea, or the United States;

b. *To the following cities as listed by country:* People's Republic of China (Shanghai, Guangzhou), Russia (Khabarovsk, Nakhodka, Vladivostok, Yuzhno-Sadhalinsk), Vietnam (Hanoi, Ho Chi Minh City);

N.B.: No traffic shall be carried between points in countries listed in Country Group D:1, except in Estonia, Latvia, and Lithuania.

b. [Reserved]

c. They are designed to operate at a ''digital transfer rate'' at the highest multiplex level of 623 Mbit/s or less;

d. The ''laser'' transmission wavelength does not exceed 1,590 nm;

e. The equipment, if employing synchronous transmission techniques, must conform to one of the approved SONET or SDH standards or recommendations (i.e. ANSI or CCITT);

f. Supervision of systems installation and maintenance of controlled transmission equipment must be performed by the licensee or the licensee's designated representative, who must be from a country other than that listed in Country Group D:1. Any portion of the installation of controlled transmission equipment which would require the transfer of controlled technology must be performed by the licensee or the licensee's designated representative using only personnel from countries other than those listed in Country Group D:1;

N.B. 1: Supervision of maintenance includes preventive maintenance at periodic intervals and intervention for major malfunctions.

N.B. 2: This is not meant to require that only nationals from the exporting country should install the system.

g. Controlled test equipment and controlled spare parts must remain under the supervision of the licensee or the licensee's designated representative, who shall be from a country other than that listed in Country Group D:1;

N.B.: The supervision of the test equipment and spare parts by the licensee may be effected by stock inventory procedures and does not require the permanent on-site presence of a representative of the licensee.

h. The licensee or the licensee's designated representative who shall be from a country other than that listed in Country Group D:1, must have the right of access to all the equipment;

i. Upon request of the government of the exporting country, the licensee must carry out an inspection to establish that:

1. The system is being used for the intended civil purpose; and

2. All the equipment exported under the provisions of this Advisory Note is being used for the stated end purpose and is still located at the installation sites. The licensee shall report the findings from the inspection to the BXA (at P.O. Box 273, Washington D.C. 20044) within one month after completing the inspection.

j. The license application must include a system plan containing equipment quantities and approximate locations for the proposed system. After final installation, unless already provided, the applicant must provide to its licensing authorities the final location of the installed equipment to the greatest degree of precision available and a map of the final cable route.

ADVISORY NOTE 15: Licenses are likely to be approved, as administrative exceptions, for exports and reexports to satisfactory end-users in Country Group D:1 of fiber optic telecommunication transmission systems or equipment controlled by 5A001.b.1 and 5A001.b.4.a, digital radio equipment or systems controlled by 5A001.b.1 and 5A001.b.6.a, coaxial cable telecommunications transmission equipment or systems controlled by 5A001.b.1, or fiber optic cables controlled by 5A001.e and the test equipment, specially designed components, accessories, ''software'' and technology, necessary for the ''use thereof, provided that:

a. They are intended for:

1. Intra-city or inter-city links within Albania, Armenia, Azerbaijan, Bulgaria, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Mongolia, Romania, Russia, Tajikistan, Turkmenistan, Ukraine, Uzbekistan, or Vietnam.

N.B.: Intra-city links provide service within a local service area which must not extend beyond a circle with a diameter of 50 km and with the city in the middle.

2. Inter-city links between cities in Albania, Armenia, Azerbaijan, Bulgaria, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Mongolia, Romania, Russia, Tajikistan, Turkmenistan, Ukraine, or Uzbekistan;

b. They are designed to operate at a ''digital transfer rate'' at the highest multiplex level of 156 Mbit/s or less;

c. The ''laser'' transmission wavelength does not exceed 1,590 nm;

d. The radio transmission system does not employ Quadrature Amplitude Modulation (QAM) techniques above level 16;

e. The equipment or systems are designed and intended to be used for fixed civil applications directly connected to the civilian network;

f. The equipment, if employing synchronous transmission techniques, must conform to one of the approved SONET or SDH standards or recommendations (i.e., ANSI or CCITT);

g. Supervision of systems installation and of maintenance of controlled transmission equipment must be performed by the licensee or the licensee's designated representative, who must be from a country other than that listed in Country Group D:1. Any portion of the installation of controlled transmission equipment which would require the transfer of controlled technology must be performed by the licensee or the licensee's designated representative using only personnel from countries other than those listed in Country Group D:1;

N.B. 1: Supervision of maintenance includes preventive maintenance at period intervals and intervention for major malfunctions.

N.B. 2: This is not meant to require that only nationals from the exporting country should install the system.

h. Controlled test equipment and controlled spare parts must remain under the supervision of the Country Group A:1 member country licensee;

N.B.: The supervision of the test equipment and spare parts by the licensee may be effected by stock inventory procedures and does not require the permanent on-site presence of a representative of the licensee.

i. The Country Group A:1 country licensee or his designated representative, who must be from a country other than that listed in Country Group D:1, must have the right of access to all the equipment;

j. Upon request of the government of the exporting country, the licensee must carry out an inspection to establish that:

1. The system is being used for the intended civil purpose; and

2. All the equipment exported under the provisions of this Advisory Note is being used for the stated end purpose and is still located at the installation sites. The licensee shall report the findings from the inspection to the Bureau of Export Administration within one month after completing the inspection.

k. The license application must include a system plan containing equipment quantities and approximate locations for the proposed system. After final installation, unless already provided, the applicant must provide to its licensing authorities the final location of the installed equipment to the greatest degree of precision available and a map of the final cable route.

ADVISORY NOTE 16: Licenses are likely to be approved, as administrative exceptions, for exports and reexports to satisfactory end-users in Country Group D:1 of systems or equipment controlled by 5A001.c.1 or 5A001.c.2, or ''software'' for ''common channel signalling'' controlled by 5D001.a or 5D001.c.3, and test equipment, specially designed components, accessories and technology necessary for the ''use'' thereof, provided that:

a. They are intended for fiber optic, radio, or coaxial cable international telecommunication links fulfilling the provisions of Advisory Note l4.a and b.;

b. The ''common channel signalling'' (CCS) is restricted to associated mode of operation. Signalling channels and all related traffic channels must be carried on the same transmission system. Only international traffic between the locations listed in Advisory Note l4.a is permitted (i.e. calls originating in a country listed in Country Group D:1 will not be rerouted to any country listed in Country Group D:1;

c. No general service of ''Integrated Service Digital Network'' (ISDN) is provided by the country listed in Country Group D:1 gateway switch, except:

1. The ISDN user part (ISP) may be used on the international signalling link;

2. ISDN service may be provided for specified subscribers on the Country Group D:1 countries gateway switch;

d. Supervision of systems installation and of maintenance of controlled equipment and ''software'' must be performed by the licensee or the licensee's designated representative, who must be from a country other than that listed in Country Group D:1. Any portion of the installation of controlled equipment and ''software'' that would require the transfer of controlled technology must be performed by the licensee or the licensee's designated representative using only personnel from countries other than those listed in Country Group D:1;

N.B. 1: Supervision of maintenance includes preventive maintenance at periodic intervals and intervention for major malfunctions.

N.B. 2: This is not meant to require that only nationals from the exporting country should install the system.

e. Controlled test equipment and controlled spare parts must remain under the supervision of the Country Group A:1 country licensee;

N.B: The supervision of the test equipment and spare parts by the licensee may be effected by stock inventory procedures and does not require the permanent on-site presence of a representative of the licensee.

f. All ''common channel signalling'' equipment including spares, is operational in such a form that any removal from or manipulation on the end in a country listed in Country Group D:1 is immediately recognized (e.g. through remote maintenance and monitoring procedures) by the operator (i.e., an operator from one of the countries listed in Advisory Note l4.a.1.a or a.2.a);

g. The licensee or operator (i.e., an operator from one of the countries listed in Advisory Note l4.a.1.a or a.2.a) takes immediate action to ensure that non-operational equipment is repaired or replaced within a week of the failure;

h. The Country Group A:1 country licensee or the designated representative of the licensee, who must be from a country other than that listed in Country Group D:1, must have the right of access to all the equipment;

i. Nationals from countries listed in Country Group D:1 are not given tools or training allowing them to modify the approved configuration or divert equipment or ''software'' to non-approved uses;

j. Upon request of the government of the exporting country, the licensee or operator (i.e., an operator from one of the countries listed in Advisory Note l4.a.1.a or a.2.a) must carry out an inspection to establish that:

1. The system is being used for the intended civil purpose; and

2. All the equipment exported under the provisions of this Advisory Note is being used for the stated end purpose and is still located at the installation sites. The licensee shall report the findings from the inspection to the BXA (at P.O. Box 273, Washington, D.C. 20044) within one month after completing the inspection.

k. The operator (i.e., an operator from one of the countries listed in Advisory Note l4.a.1.a or a.2.a) informs the exporting government immediately of any sign of misuse or diversion of ''common channel signalling'' hardware or ''software'' on the other end of the international link, or of any failure of the operator at the other end (i.e, the operator from one of the countries) listed in Advisory Note l4.a.l.b or a.2.b) to allow the operator to comply with the terms of the license;

l. Contractual agreements between the licensee and the operators on both ends of the link require that the operator at the other end of the international link (i.e., the operator from one of the countries listed in Advisory Note l4.a.1.b or a.2.b) complies fully with all the conditions stipulated in the license and that, in the event of failure by the latter to comply, the operator who is from one of the countries listed in Advisory Note l4.a.l.a or a.2.a will inform the authorities of such country and the government of the exporting country.

ADVISORY NOTE 17: Licenses are likely to be approved, as administrative exceptions, for exports and reexports to satisfactory end-users in Country Group D:1 of equipment controlled by 5A001.c.4, 5A001.c.5 or 5A001.c.6, ''software'' controlled by 5D001.c.3 that provides features described in 5A001.c.4, 5A001.c.5, or 5A001.c.6, specially designed components and accessories therefor, and test equipment, ''software'' and technology necessary for the ''use'' thereof, provided that:

a. The equipment or ''software'' will be used for a specified civil end-use by a civil end-user only;

b. The equipment or ''software'' does not perform circuit switching or circuit switching functions;

c. Supervision of systems installation and of maintenance of controlled equipment or ''software'' must be performed by the licensee or the licensee's designated representative, who must be from a country other than that listed in Country Group D:1. Any portion of the installation of controlled equipment or ''software'' that would require the transfer of controlled technology must be performed by the licensee or the licensee's designated representative using only personnel from countries other than those listed in Country Group D:1.

N.B. 1: Supervision of maintenance includes preventative maintenance at periodic intervals and intervention for major malfunctions.

N.B. 2: This is not meant to require that only exporting country should install the system.

N.B. 3: This does not apply if the equipment or ''software'' is designed for installation by the user without further substantial support by the supplier.

d. The Country Group A:1 country licensee or the designated representative of the licensee, who must be from a country other than that listed in Country Group D:1, must have the right of access to all the equipment and may carry out inspections;

e. Upon request of the government of the exporting country, the licensee must carry out an inspection to establish that:

1. The system is being used for the intended civil purpose; and

2. All the equipment exported under the provisions of this Advisory Note is being used for the stated end purpose and is still located at the installation site. The licensee shall report the findings from the inspection to the BXA (at P.O. Box 273, Washington,

D.C. 20044) within one month after completing the inspection.

ADVISORY NOTE 18: Licenses are likely to be approved, as administrative exceptions, for exports and reexports to satisfactory end-users in Country Group D:1 of ''software'' controlled by 5D001.c.1, and related technology, ''software'' tools and test equipment necessary for the ''development'', ''production'' or ''use'' thereof, provided that:

a. The ''software'', technology, ''software'' tools and test equipment will be limited to those necessary for problem analysis and reporting or for local adaptation of the switching equipment such as for subscriber terminal interface, network interface, billing, administration or similar adaptations for local civilian telecommunications requirements, by a civil end-user;

b. No ''software'' or technology ''required'' for the ''development'', ''production'' or ''use'' of functions, features or equipment controlled by the telecommunications entries in 5A, 5B or 5E of Subcategory I to Category 5 shall be included;

NOTE: This Advisory Note does not release from control the ''software'' in ''source code'' comprising that ''software'' that controls the management and execution of programs, commonly referred to as the operating system.

c. Such ''software'', technology, ''software'' tools or test equipment do not provide the capability to decompile, disassemble or perform similar activities to ''software'' in ''object code'' or similar format and thereby reverse-engineer controlled characteristics, functions or features;

d. The licensee or the licensee's designated representative, who shall be from a country other than that listed in Country Group D:1, shall have the right of access to the site of, and computing equipment being used to perform, such adaptations so as to have access to:

1. The ''software'', technology, ''software'' tools and test equipment referred to in this Advisory Note; and

2. All ''software'' developed or derived from the ''software'' technology, ''software'' tools and test equipment licensed under this Advisory Note;

e. Upon request of the BXA, the licensee must carry out an inspection to establish that:

1. The ''software'', technology, ''software'' tools and test equipment referred to in this Advisory Note are being used for the intended civil purpose; and

2. All the ''software'', technology, ''software'' tools and test equipment exported under the provisions of this Advisory Note are being used for the stated end purpose and are still located at the installation sites. The licensee shall report the findings from the inspection to the Bureau of Export Administration within one month after completing the inspection.

ADVISORY NOTE 19: Licenses are likely to be approved, as Administrative exceptions, for exports and reexports to satisfactory end-users in Country Group D:1 of components, parts and materials, controlled for national security reasons by entries on the Commerce Control List, necessary for the ''production'' of telecommunication equipment or systems, provided that:

a. The ''production'' equipment and technology for the equipment concerned has been previously legally exported;

b. The quantity of components, parts and materials exported is normal for the stated end-use;

c. Authorization under this Advisory Note will cover a program of supplies up to two calendar years for the ''production'' by the same licensee of equipment authorized under this Advisory Note 19.a;

d. No technology or ''software'' ''required'' for ''development'', ''production'' or ''use'' shall be included;

e. The components, parts and materials exported will not be permitted to exceed the performance threshold or features of the equipment previously authorized;

f. The contract includes explicit conditions to ensure that:

1. The equipment manufactured with the exported components, parts and materials is not exported or reexported, either directly or indirectly, to another country listed in Country Group D:1;

2. The supplier or licensor may appoint a representative who is entitled to verify that the ''production'' technology and ''production'' equipment or systems serve their intended use;

3. Any modification of the capabilities or functions of the equipment produced must be approved by the supplier or licensor;

4. The supplier's or licensor's personnel have right of access to all the facilities directly involved in the production of the equipment or systems;

5. The equipment or systems produced will be for civil end-use only.

ADVISORY NOTE 20: Licenses are likely to be approved, as administrative exceptions, for exports and reexports to Albania, Armenia, Azerbaijan, Bulgaria, Belarus, Estonia, Georgia, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Moldova, Mongolia, the People's Republic of China, Romania, Russia, Tajikistan, Turkmenistan, Ukraine, Uzbekistan, and Vietnam of telecommunications equipment or systems controlled by 5A001.b.1, 5A001.b.7, 5A001.c, 5A001.d or 5A001.e, measuring, test or repair equipment controlled by 5B001.a.3 or 5B001.b, and specially designed components and accessories, ''software'' and technology necessary for the ''use'' thereof, provided that:

a. Optical fiber telecommunication transmission equipment or systems:

1. Are designed to operate at a ''digital transfer rate'' of 623 Mbit/s or less at the highest multiplex level; and

2. Are designed to operate on a ''laser'' transmission wavelength not exceeding 1,590 nm.

b. Digital radio equipment or systems:

1. Are designed to operate at a ''digital transfer rate'' of 623 Mbit/s or less at the highest multiplex level;

2. Do not employ QAM techniques exceeding level 512 or other digital modulation techniques having a ''spectral efficiency'' exceeding 9 bit/s/Hz;

c. ''CCS'':

1. Is limited to the associated mode of operation;

2. Signalling and related speech/data channels are limited to two signalling points and must not be routed via different transmission media or different routes;

N.B.: A single route consists of one or more consecutive serial connection links that may use different transmission media.

3. Message Transfer Part (MTP) level 3 signalling routes are limited to two signalling points;

N.B.: MTP Level 3 is found in Q.704 and related recommendations of the IT–T Q series for ''CCS''.

4. For point-to-point inter-city ''CCS'' connectivity between two signalling points, where permitted by this Advisory Note 20.c.1, c.2, or c.3, the Originating Point Codes (OPC) and Destination Point Codes (DPC) for all signalling messages over such signalling links cannot be reinstalled or changed following the vendor's initial software installation without prior authorization, being available in object code only; all compilation mechanisms and administrative tools that allow for modification of the Point Codes are removed following installation;

d. The equipment or systems are designed and intended to be used for fixed civil applications directly connected to a civilian network;

e. The equipment or systems, if employing synchronous transmission techniques, conform to one of the ANSI or IT–T approved standards or recommendations for ''SONET'' or ''SDH'';

f. Measuring, test or repair equipment controlled by 5B001.a.3 or 5B001.b and controlled spare parts remain under the supervision of the licensee or the licensee's designated representative;

g. The licensee or the licensee's designated representative have the right of access to all the equipment or systems and may carry out inspections;

h. Upon the request of the BXA, the licensee must carry out inspections to establish that:

1. All the equipment or systems exported under the provisions of this Advisory Note are being used for the intended civil purpose; and

2. Are still located at the installation sites. The licensee shall report the findings from the inspection to the BXA (at P.O. Box 273, Washington DC 20044) within one month after completing the inspection;

i. Supervision of systems installation and maintenance of controlled transmission equipment is performed by the licensee or the licensee's designated representative. Any portion of the installation of controlled transmission equipment that would require the transfer of controlled technology is performed by the licensee or the licensee's designated representative;

N.B. 1: Supervision of maintenance includes prevention maintenance at periodic intervals and intervention for major malfunctions.

j. License applications to export systems or equipment for ''common channel signalling'' identify the intended system routes and locations of signalling points.

II. Information Security

NOTE: The control status of ''information security'' equipment, ''software'', systems, application specific ''electronic assemblies'', modules, integrated circuits, components, or functions is defined in the ''information security'' entries in this Category even if they are components or ''electronic assemblies'' of other equipment.

NOTE: ''Information security'' equipment, ''software'', systems, application specific ''assemblies'', modules, integrated circuits, components, technology or functions that are excepted from control, not controlled, or eligible for licensing under an Advisory Note are under the licensing jurisdiction of the Department of Commerce. In addition, antivirus software controlled under 5D002.c is also under the licensing jurisdiction of the Department of Commerce. For all other items, exporters requesting a license from the Bureau of Export Administration must provide a statement from the Department of State, Office of Defense Trade Controls, verifying that the equipment intended for export is under the licensing jurisdiction of the Department of Commerce.

A. Equipment, Assemblies and Components

5A002 Systems, Equipment, Application Specific "Electronic Assemblies", Modules or Integrated Circuits for "Information Security", and Specially Designed Components Therefor

License Requirements

Reason for Control: NS, AT, EI

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
AT applies to entire entry	AT Column 1

EI applies only to encryption items transferred from the U.S. Munitions List to the Commerce Control List consistent with E.O. 13026 of November 15, 1996 (61 FR 58767) and

pursuant to the Presidential Memorandum of that date. Refer to §742.15.

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: a. Designed or modified to use ''cryptography'' employing digital techniques to ensure ''information security'';

b. Designed or modified to perform cryptanalytic functions;

c. Designed or modified to use ''cryptography'' employing analog techniques to ensure ''information security'';

NOTE: 5A002.c does not control the following:
1. Equipment using ''fixed'' band scrambling not exceeding 8 bands and in which the transpositions change not more frequently than once every second;
2. Equipment using ''fixed'' band scrambling exceeding 8 bands and in which the transpositions change not more frequently than once every ten seconds;
3. Equipment using ''fixed'' frequency inversion and in which the transpositions change not more frequently than once every second;
4. Facsimile equipment;
5. Restricted audience broadcast equipment; and
6. Civil television equipment;

d. Designed or modified to suppress the compromising emanations of information-bearing signals;

NOTE: 5A002.d does not control equipment specially designed to suppress emanations for reasons of health and safety.

e. Designed or modified to use cryptographic techniques to generate the spreading code for ''spread spectrum'' or hopping code for ''frequency agility'' systems;

f. Designed or modified to provide certified or certifiable ''multilevel security'' or user isolation at a level exceeding Class B2 of the Trusted Computer System Evaluation Criteria (TCSEC) or equivalent;

g. Communications cable systems designed or modified using mechanical, electrical or electronic means to detect surreptitious intrusion.

NOTE: 5A002 does not control:
a. ''Personalized smart cards'' or specially designed components therefor, with any of the following characteristics:
1. Not capable of message traffic encryption or encryption of user-supplied data or related key management functions therefor; or
2. When restricted for use in equipment or systems excluded from control under the note to 5A002.c, or under paragraphs b through h of this note.
b. Equipment containing ''fixed'' data compression or coding techniques;
c. Receiving equipment for radio broadcast, pay television or similar restricted audience television of the consumer type, without digital encryption and where digital decryption is limited to the video, audio or management functions;
d. Portable or mobile radiotelephones for civil use (e.g., for use with commercial civil cellular radiocommunications systems) that are not capable of end-to-end encryption;
e. Decryption functions specially designed to allow the execution of copy-protected ''software'', provided the decryption functions are not user-accessible;
f. Access control equipment, such as automatic teller machines, self-service statement printers or point of sale terminals, that protects password or personal identification numbers (PIN) or similar data to prevent unauthorized access to facilities but does not allow for encryption of files or text, except as directly related to the password or PIN protection;
g. Data authentication equipment that calculates a Message Authentication Code (MAC) or similar result to ensure no alteration of text has taken place, or to authenticate users, but does not allow for encryption of data, text or other media other than that needed for the authentication;
h. Cryptographic equipment specially designed and limited for use in machines for banking or money transactions, such as automatic teller machines, self-service statement printers or point of sale terminals.

5A995: "Information security" equipment, n.e.s.; (e.g., cryptographic, cryptoanalytic, and cryptologic equipment, n.e.s.), and components therefor.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 2

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value

The list of items controlled is contained in the ECCN heading.

B. TEST, INSPECTION AND PRODUCTION EQUIPMENT

5B002 Information Security—test, inspection and "production" equipment.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value

a. Equipment specially designed for:

a.1. The ''development'' of equipment or functions controlled by 5A002, 5B002, 5D002 or 5E002, including measuring or test equipment;

a.2. The ''production'' of equipment or functions controlled by 5A002, 5B002, 5D002,

or 5E002, including measuring, test, repair or production equipment;

b. Measuring equipment specially designed to evaluate and validate the ''information security'' functions controlled by 5A002 or 5D002.

C. MATERIALS [RESERVED]

D. SOFTWARE

5D002 Information Security "Software"

LICENSE REQUIREMENTS

Reason for Control: NS, AT, EI

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
AT applies to entire entry	AT Column 1

EI controls apply to encryption software transferred from the U.S. Munitions List to the Commerce Control List consistent with E.O. 13026 of November 15, 1996 (61 FR 58767) and pursuant to the Presidential Memorandum of that date. Refer to §742.15 of the EAR.

NOTE: Encryption software is controlled because of its functional capacity, and not because of any informational value of such software; such software is not accorded the same treatment under the EAR as other ''software''; and for export licensing purposes encryption software is treated under the EAR in the same manner as a commodity included in ECCN 5A002. License Exceptions for commodities are not applicable.

NOTE: Encryption software controlled for EI reasons under this entry remains subject to the EAR even when made publicly available in accordance with part 734 of the EAR, and it is not eligible for the General Software Note (''mass market'' treatment under License Exception TSU for mass market software). After a one-time BXA review, certain encryption software may be released from EI controls and made eligible for the General Software Note treatment as well as other provisions of the EAR applicable to software. Refer to §742.15(b)(1) of the EAR, and Supplement No. 6 to part 742.

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: 5D002.a controls ''software'' designed or modified to use ''cryptography'' employing digital or analog techniques to ensure ''information security''.
Items: a. ''Software'' specially designed or modified for the ''development'', ''production'' or ''use'' of equipment or ''software'' controlled by 5A002, 5B002 or 5D002.

b. ''Software'' specially designed or modified to support ''technology'' controlled by 5E002.

c. Specific ''software'' as follows:

c.1. ''Software'' having the characteristics, or performing or simulating the functions of the equipment controlled by 5A002 or 5B002;

c.2. ''Software'' to certify ''software'' controlled by 5D002.c.1;

c.3. ''Software'' designed or modified to protect against malicious computer damage, e.g., viruses;

NOTE: 5D002 does not control:
a. ''Software required'' for the ''use'' of equipment excluded from control under the Note to 5A002;
b. ''Software'' providing any of the functions of equipment excluded from control under the Note to 5A002.

5D995 "Software", n.e.s., specially designed or modified for the "development", "production", or use of information security or cryptologic equipment (e.g., equipment controlled by 5A995).

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 2

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value

The list of items controlled is contained in the ECCN heading.

E. TECHNOLOGY

5E002 "Technology" according to the General Technology Note for the "development", "production" or use of equipment controlled by 5A002 or 5B002 or "software" controlled by 5D002

LICENSE REQUIREMENTS

Reason for Control: NS, AT, EI

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
AT applies to entire entry	AT Column 1

EI controls applies only to encryption technology transferred from the U.S. Munitions List consistent with E.O. 13026 of November 15, 1996 (61 FR 58767) and pursuant to the Presidential Memorandum of that date. Refer to §742.15 of the EAR.

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A

Items: The list of items controlled is contained in the ECCN heading.

5E995 "Technology", n.e.s., for the "development", "production", or "use" of "information security" or cryptologic equipment (e.g., equipment controlled by 5A995), or software controlled by 5D995.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 2

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A

The list of items controlled is contained in the ECCN heading.

EAR99 Items subject to the EAR that are not elsewhere specified in this CCL Category or in any other category in the CCL are designated by the number EAR99.

ADVISORY NOTES FOR ''INFORMATION SECURITY''

ADVISORY NOTE 1: Licenses are likely to be approved, as administrative exceptions, for exports and reexports to satisfactory end-users in Country Group D:1 of the following cryptographic equipment, provided that the equipment is intended for civil use:

a. Access control equipment, such as automatic teller machines, self-service statement printers or point of sale terminals, that protects password or personal identification numbers (PIN) or similar data to prevent unauthorized access to facilities, but does not allow for encryption of files or text, except as directly related to the password of PIN protection;

b. Data authentication equipment that calculates a Message Authentication Code (MAC) or similar result to ensure no alteration of text has taken place, or to authenticate users, but does not allow for encryption of data, text or other media other than that needed for the authentication;

c. Cryptographic equipment specially designed, developed or modified for use in machines for banking or money transactions, such as automatic teller machines, self-service statement printers, point of sale terminals or equipment for the encryption of interbanking transactions, and intended for use only in such applications.

ADVISORY NOTE 2: (Eligible for TSR). Licenses are likely to be approved, as administrative exceptions, for exports and reexports to satisfactory end-users in Country Group D:1 of the following cryptographic ''software'':

a. ''Software'' required for the ''use'' of equipment eligible for administrative exceptions treatment under Advisory Note 1 (Notes for ''Information Security'').

b. ''Software'' providing any of the functions of equipment eligible for administrative exceptions treatment under Advisory Note 1 (Notes for ''Information Security'').

Category 6—Sensors

A. EQUIPMENT, ASSEMBLIES AND COMPONENTS

6A001 Acoustics.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $3000
GBS: Yes for 6A001.a.1.b.4 and 6A001.b
CIV: Yes for 6A001.a.1.b.4 and 6A001.b

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: a. Marine acoustic systems, equipment and specially designed components therefor, as follows:

a.1. Active (transmitting or transmitting-and-receiving) systems, equipment or specially designed components therefor, as follows:

NOTE: 6A001.a.1 does not control:
a.1.a Depth sounders operating vertically below the apparatus, not including a scanning function exceeding ±10°, and limited to measuring the depth of water, the distance of submerged or buried objects or fish finding.
a.1.b. Acoustic beacons, as follows:
a.1.b.1. Acoustic emergency beacons; or
a.1.b.2. Pingers specially designed for relocating or returning to an underwater position.

a.1.a. Wide-swath bathymetric survey systems for sea bed topographic mapping:

a.1.a.1. Designed:

a.1.a.1.a. To take measurements at an angle exceeding 10° from the vertical; and

a.1.a.1.b. To measure depths exceeding 600 m below the water surface; and

a.1.a.2. Designed:

a.1.a.2.a. To incorporate multiple beams any of which is less than 2°; or

a.1.a.2.b. To provide data accuracies of better than 0.5% of water depth across the swath averaged over the individual measurements within the swath;

a.1.b. Object detection or location systems having any of the following:

a.1.b.1. A transmitting frequency below 10 kHz;

a.1.b.2. Sound pressure level exceeding 224 dB (reference 1 micropascal at 1 m) for equipment with an operating frequency in the band from 10 kHz to 24 kHz inclusive;

a.1.b.3. Sound pressure level exceeding 235 dB (reference 1 micropascal at 1 m) for equipment with an operating frequency in the band between 24 kHz and 30 kHz;

a.1.b.4. Forming beams of less than 1° on any axis and having an operating frequency of less than 100 kHz;

a.1.b.5. Designed to withstand pressure during normal operation at depths exceeding 1,000 m and having transducers:

a.1.b.5.a. Dynamically compensated for pressure; or

a.1.b.5.b. Incorporating other than lead zirconate titanate as the transduction element; or

a.1.b.6. Designed to operate with an unambiguous display range exceeding 5,120 m;

a.1.c. Acoustic projectors, including transducers, incorporating piezoelectric, magnetostrictive, electrostrictive, electrodynamic or hydraulic elements operating individually or in a designed combination, having any of the following characteristics:

NOTE 1: The control status of acoustic projectors, including transducers, specially designed for other equipment is determined by the control status of the other equipment.

NOTE 2: 6A001.a.1.c does not control electronic sources that direct the sound vertically only, or mechanical (e.g., air gun or vapor-shock gun) or chemical (e.g., explosive) sources.

a.1.c.1. An instantaneous radiated acoustic power density exceeding 0.01 mW/mm ^{2}/Hz for devices operating at frequencies below 10 kHz;

a.1.c.2. A continuously radiated acoustic power density exceeding 0.001 mW/mm ^{2}/Hz for devices operating at frequencies below 10 kHz;

a.1.c.3. Designed to withstand pressure during normal operation at depths exceeding 1,000 m; or

a.1.c.4. Side-lobe suppression exceeding 22 dB.

TECHNICAL NOTE: Acoustic power density is obtained by dividing the output acoustic power by the product of the area of the radiating surface and the frequency of operation.

a.1.d. Acoustic systems, equipment and specially designed components for determining the position of surface vessels or underwater vehicles designed:

a.1.d.1. To operate at a range exceeding 1,000 m with a positioning accuracy of less than 10 m rms (root mean square) when measured at a range of 1,000 m; or

a.1.d.2. To withstand pressure at depths exceeding 1,000 m;

NOTE: 6A001.a.1.d.1 includes equipment using coherent ''signal processing'' between two or more beacons and the hydrophone unit carried by the surface vessel or underwater vehicle, or capable of automatically correcting speed-of-sound propagation errors for calculation of a point.

a.2. Passive (receiving, whether or not related in normal application to separate active equipment) systems, equipment or specially designed components therefor, as follows:

a.2.a. Hydrophones (transducers) with any of the following characteristics:

a.2.a.1. Incorporating continuous flexible sensors or assemblies of discrete sensor elements with either a diameter or length less than 20 mm and with a separation between elements of less than 20 mm;

a.2.a.2. Having any of the following sensing elements:

a.2.a.2.a. Optical fibers;

a.2.a.2.b. Piezoelectric polymers; or

a.2.a.2.c. Flexible piezoelectric ceramic materials;

a.2.a.3. Hydrophone sensitivity better than—180 dB at any depth with no acceleration compensation;

a.2.a.4. When designed to operate at depths not exceeding 35 m, hydrophone sensitivity better than—186 dB with acceleration compensation;

a.2.a.5. When designed for normal operation at depths exceeding 35 m hydrophone sensitivity better than—192 dB with acceleration compensation;

a.2.a.6. When designed for normal operation at depths exceeding 100 m hydrophone sensitivity better than—204 dB; or

a.2.a.7. Designed for operation at depths exceeding 1,000 m;

TECHNICAL NOTE: Hydrophone sensitivity is defined as twenty times the logarithm to the base 10 of the ratio of rms output voltage to a 1 V rms reference, when the hydrophone sensor, without a preamplifier, is placed in a plane wave acoustic field with an rms pressure of 1 micropascal. For example, a hydrophone of −160 dB (reference 1 V per micropascal) would yield an output voltage of 10^{-8} V in such a field, while one of −180 dB sensitivity would yield only 10^{-9} V output. Thus, −160 dB is better than −180 dB.

a.2.b. Towed acoustic hydrophone arrays with any of the following:

a.2.b.1. Hydrophone group spacing of less than 12.5 m;

a.2.b.2. Hydrophone group spacing of 12.5 m to less than 25 m and designed or able to be modified to operate at depths exceeding 35 m; or

TECHNICAL NOTE: ''Able to be modified'' in 6A001.a.2.b.2 means having provisions to allow a change of the wiring or interconnections to alter hydrophone group spacing or operating depth limits. These provisions are: spare wiring exceeding 10% of the number of wires, hydrophone group spacing adjustment blocks or internal depth limiting devices that are adjustable or that control more than one hydrophone group.

a.2.b.3. Hydrophone group spacing of 25 m or more and designed to operate at depths exceeding 100 m;

a.2.b.4. Heading sensors controlled by 6A001a.2.d;

a.2.b.5. Non-metallic strength members or longitudinally reinforced array hoses;

a.2.b.6. An assembled array of less than 40 mm in diameter;

a.2.b.7. Multiplexed hydrophone group signals; or

a.2.b.8. Hydrophone characteristics specified in 6A001.a.2.a;

a.2.c. Processing equipment specially designed for towed acoustic hydrophone arrays with either of the following:

a.2.c.1. A Fast Fourier or other transform of 1,024 or more complex points in less than 20 ms with no ''user-accessible programmability''; or

a.2.c.2. Time or frequency domain processing and correlation, including spectral analysis, digital filtering and beamforming using Fast Fourier or other transforms or processes with ''user accessible programmability'';

a.2.d. Heading sensors having an accuracy of better than ±0.5°; and

a.2.d.1. Designed to be incorporated within the array hosing and to operate at depths exceeding 35 m or having an adjustable or removable depth sensing device in order to operate at depths exceeding 35 m; or

a.2.d.2. Designed to be mounted external to the array hosing and having a sensor unit capable of operating with 360o roll at depths exceeding 35 m;

b. Terrestrial geophones capable of conversion for use in marine systems, equipment or specially designed components controlled by 6A001.a.2.a;

c. Correlation-velocity sonar log equipment designed to measure the horizontal speed of the equipment carrier relative to the sea bed at distances between the carrier and the sea bed exceeding 500 m.

6A002 Optical sensors.

LICENSE REQUIREMENTS

Reason for Control: NS, MT, CC, RS, AT, UN

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
MT applies to optical detectors in 6A002.a.1, a.3, and a.4 that are specially designed or rated as electromagnetic (including ''lasers'') and ionizedparticle radiation resistant.	MT Column 1
RS applies to 6A002.a.1, a.2, a.3 and .c	RS Column 1
CC applies to police-model infrared viewers in 6A002.c	CC Column 1
AT applies to entire entry	AT Column 1
UN applies to 6A002.a.1, a.2 a.3 and c	Rwanda

LICENSE EXCEPTIONS

LVS: $3000, *except* N/A for 6A002.a.1, a.2, a.3, and c

GBS: Yes, for 6A002.a.4

CIV: Yes, for 6A002.a.4

LIST OF ITEMS CONTROLLED

Unit: parts and accessories in $ value

Related Controls: N/A

Related Definitions: Image intensifiers defined in 6A002.a.2 and focal plane arrays defined in 6A002.a.3 specially designed, modified, or configured for military use and not part of civil equipment are subject to the export licensing authority of U.S. Department of State, Office of Defense Trade Controls. (See 22 CFR part 121)

Items: a. Optical detectors, as follows:

NOTE: 6A002.a does not control germanium or silicon photodevices.

a.1. ''Space-qualified'' solid-state detectors having any of the following:

a.1.a.1. A peak response in the wavelength range exceeding 10 nm but not exceeding 300nm; and

a.1.a.2. A response of less than 0.1% relative to the peak response at a wavelength exceeding 400 nm;

a.1.b.1. A peak response in the wavelength range exceeding 900 nm but not exceeding 1,200 nm; and

a.1.b.2. A response ''time constant'' of 95 ns or less; or

a.1.c. A peak response in the wavelength range exceeding 1,200 nm but not exceeding 30,000 nm;

a.2. Image intensifier tubes and specially designed components therefor, as follows:

a.2.a. Image intensifier tubes having all the following:

a.2.a.1. A peak response in wavelength range exceeding 400 nm, but not exceeding 1,050 nm;

a.2.a.2. A microchannel plate for electron image amplification with a hole pitch (center-to-center spacing) of less than 25 micrometers; and

a.2.a.3.a. An S–20, S–25 or multialkali photocathode; or

a.2.a.3.b. A GaAs or GaInAs photocathode;

a.2.b. Specially designed components as follows:

a.2.b.1. Fiber optic image inverters;

a.2.b.2. Microchannel plates having both of the following characteristics:

a.2.b.2.a. 15,000 or more hollow tubes per plate; and

a.2.b.2.b. Hole pitch (center-to-center spacing) of less than 25 micrometers; or

a.2.b.3. GaAs or GaInAs photocathodes;

a.3. Non-''space-qualified'' ''focal plane arrays'', having any of the following:

TECHNICAL NOTE: Linear or two-dimensional multi-element detector arrays are referred to as ''focal plane arrays''.

a.3.a.1. Individual elements with a peak response within the wavelength range exceeding 900 nm, but not exceeding 1,050 nm; and

a.3.a.2. A response ''time constant'' of less than 0.5 ns;

a.3.b.1. Individual elements with a peak response in the wavelength range exceeding 1,050 nm, but not exceeding 1,200 nm; and

a.3.b.2. A response ''time constant'' of 95 ns or less; or

a.3.c. Individual elements with a peak response in the wavelength range exceeding 1,200 nm, but not exceeding 30,000 nm;

NOTE 1: 6A002.a.3 includes photoconductive arrays and photovoltaic arrays.

NOTE 2: 6A002.a.3 does not control silicon ''focal plane arrays'', multi-element (not to exceed 16 elements) encapsulated photoconductive cells or pyroelectric detectors using any of the following:

a. Lead sulphide;
b. Triglycine sulphate and variants;
c. Lead-lanthanum-zirconium titanate and variants;
d. Lithium tantalate;
e. Polyvinylidene fluoride and variants;
f. Strontium barium niobate and variants; or
g. Lead selenide.

a.4. Non-''space-qualified'' single-element or non-focal-plane multi-element semiconductor photodiodes or phototransistors having both of the following:

a.4.a. A peak response at a wavelength exceeding 1,200 nm, but not exceeding 30,000 nm; and

a.4.b. A response ''time constant'' of 0.5 ns or less;

b. ''Multispectral Imaging Sensors'' designed for remote sensing applications, having either of the following characteristics:

b.1. An Instantaneous-Field-Of-View (IFOV) of less than 200 microradians; or

b.2. Specified for operation in the wavelength range exceeding 400 nm, but not exceeding 30,000 nm; and

b.2.a. Providing output imaging data in digital format; and

b.2.b.1. ''Space-qualified''; or

b.2.b.2. Designed for airborne operation and using other than silicon detectors;

c. Direct view imaging equipment operating in the visible or infrared spectrum, incorporating either of the following:

c.1. Image intensifier tubes controlled by 6A002.a.2 or

c.2. ''Focal plane arrays'' controlled by 6A002.a.3;

TECHNICAL NOTE: Direct view refers to imaging equipment operating in the visible or infrared spectrum, that presents a visual image to a human observer without converting the image into an electronic signal for television display, and that cannot record or store the image photographically, electronically, or by any other means.

NOTE: 6A002.c does not control the following equipment incorporating other than GaAs or GaInAs photocathodes:

a. Industrial or civilian intrusion alarm, traffic or industrial movement control or counting systems;
b. Medical equipment;
c. Industrial equipment used for inspection, sorting or analysis of the properties of materials;
d. Flame detectors for industrial furnaces;
e. Equipment specially designed for laboratory use.

d. Special support components for optical sensors, as follows:

d.1. ''Space-qualified'' cryocoolers;

d.2. Non-''space-qualified'' cryocoolers, with a cooling source temperature below 218 K (−55 °C), as follows:

d.2.a. Closed cycle with a specified Mean-Time-To-Failure (MTTF), or Mean-Time-Between-Failures (MTBF), exceeding 2,500 hours;

d.2.b. Joule-Thomson (JT) self-regulating minicoolers with bore (outside) diameters of less than 8 mm;

d.3. Optical sensing fibers:

d.3.a. Specially fabricated either compositionally or structurally, or modified by coating, to be acoustically, thermally, inertially, electromagnetically or nuclear radiation sensitive; or

d.3.b. Modified structurally to have a ''beat length'' of less than 50 mm (high birefringence).

6A003 Cameras.

LICENSE REQUIREMENTS

Reason for Control: NS, NP, RS, AT, UN

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
NP applies to items controlled in paragraphs 6A003.a.2, a.3 and a.4	NP Column 1
RS applies to items controlled in 6A003.b.3 and b.4	RS Column 1
AT applies to entire entry	AT Column 1
UN applies to items controlled in 6A003.b.3 and b.4	Rwanda

LICENSE EXCEPTIONS

LVS: $1500, except N/A for 6A003.a.2 through a.5, b.1, b.3 and b.4

GBS: Yes for 6A003.a.1 and a.2 (see Advisory Note 3 to Category 6)

CIV: Yes for 6A003.a.1 and a.2 (see Advisory Note 3 to Category 6)

LIST OF ITEMS CONTROLLED

Unit: Number

Related Controls: Reference ECCNs 8A002.d and .e for cameras specially designed for underwater use.

Related Definitions: N/A

Items: a. Instrumentation cameras, as follows:

a.1. High-speed cinema recording cameras using any film format from 8 mm to 16 mm inclusive, in which the film is continuously advanced throughout the recording period, and that are capable of recording at framing rates exceeding 13,150 frames per second;

NOTE: 6A003.a.1 does not control cinema recording cameras for normal civil purposes.

a.2. Mechanical high speed cameras, in which the film does not move, capable of recording at rates exceeding 1,000,000 frames per second for the full framing height of 35 mm film, or at proportionately higher rates for lesser frame heights, or at proportionately lower rates for greater frame heights;

a.3. Mechanical or electronic streak cameras with writing speeds exceeding 10 mm/microsecond;

a.4. Electronic framing cameras having a speed exceeding 1,000,000 frames per second;

a.5. Electronic cameras having:

a.5.a. An electronic shutter speed (gating capability) of less than 1 microsecond per full frame; and

a.5.b. A read out time allowing a framing rate of more than 125 full frames per second;

b. Imaging cameras, as follows:

NOTE: 6A003.b does not control television or video cameras specially designed for television broadcasting.

b.1. Video cameras incorporating solid state sensors, having any of the following:

b.1.a. More than 4×10^6 ''active pixels'' per solid state array for monochrome (black and white) cameras;

b.1.b. More than 4×10^6 ''active pixels'' per solid state array for color cameras incorporating three solid state arrays; or

b.1.c. More than 12×10^6 ''active pixels'' for solid state array color cameras incorporating one solid state array;

b.2. Scanning cameras and scanning camera systems:

b.2.a. Incorporating linear detector arrays with more than 8,192 elements per array; and

b.2.b. Having mechanical scanning in one direction;

b.3. Incorporating image intensifiers controlled by 6A002.a.2.a;

b.4. Incorporating focal plane arrays controlled by 6A002.a.3.

6A004 Optics.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $3000

GBS: Yes for 6A004.a.1, a.2, a.4, b, d.1.a, e.2, e.4 and .f (See Advisory Note 4.1 to Category 6)

CIV: Yes for 6A004.f and items in Advisory Note 4.1 to Category 6

LIST OF ITEMS CONTROLLED

Unit: Equipment in number; cable in meters/feet; components in $ value

Related Controls: N/A

Related Definitions: N/A

Items: a. Optical mirrors (reflectors), as follows:

a.1. ''Deformable mirrors'' with either continuous or multi-element surfaces, and specially designed components therefor, capable of dynamically repositioning portions of the surface of the mirror at rates exceeding 100 Hz;

a.2. Lightweight monolithic mirrors with an average ''equivalent density'' of less than 30 kg/m^2, and a total weight exceeding 10 kg;

a.3. Lightweight ''composite'' or foam mirror structures with an average ''equivalent density'' of less than 30 kg/m^2, and a total weight exceeding 2 kg;

a.4. Beam steering mirrors more than 100 mm in diameter or length of major axis that maintain a flatness of lambda/2 or better (lambda is equal to 663nm) with a control bandwidth exceeding 100 Hz;

b. Optical components made from zinc selenide (ZnSe) or zinc sulphide (ZnS) with transmission in the wavelength range exceeding 3,000 nm but not exceeding 25,000 nm and either of the following:

b.1. Exceeding 100 cm^3 in volume; or

b.2. Exceeding 80 mm in diameter or length of major axis and 20 mm in thickness (depth);

c. ''Space-qualified'' components for optical systems, as follows:

c.1. Lightweighted to less than 20% ''equivalent density'' compared with a solid blank of the same aperture and thickness;

c.2. Substrates, substrates with surface coatings (single-layer or multi-layer, metallic or dielectric, conducting, semiconducting or insulating) or with protective films;

c.3. Elements or assemblies of mirrors designed to be assembled in space into an optical system with a collecting aperture equivalent to or larger than a single optic 1 meter in diameter;

c.4. Manufactured from ''composite'' materials having a coefficient of linear thermal expansion equal to or less than 5×10^{-6} in any coordinate direction;

d. Optical filters, as follows:

d.1. For wavelengths longer than 250 nm, comprised of multi-layer optical coatings and having either of the following:

d.1.a. Bandwidths equal to or less than 1 nm Full Width Half Intensity (FWHI) and peak transmission of 90% or more; or

d.1.b. Bandwidths equal to or less than 0.1 nm FWHI and peak transmission of 50% or more;

NOTE: 6A004.d.1 does not control optical filters with fixed air gaps or Lyot-type filters.

d.2. For wavelengths longer than 250 nm, and having all of the following:

d.2.a. Tunable over a spectral range of 500 nm or more;

d.2.b. Instantaneous optical bandpass of 1.25 nm or less;

d.2.c. Wavelength resettable within 0.1 ms to an accuracy of 1 nm or better within the tunable spectral range; and

d.2.d. A single peak transmission of 91% or more;

d.3. Optical opacity switches (filters) with a field of view of 30° or wider and a response time equal to or less than 1 ns;

e. Optical control equipment, as follows:

e.1. Specially designed to maintain the surface figure or orientation of the ''space-qualified'' components controlled by 6A004.c.1 or c.3;

e.2. Having steering, tracking, stabilization or resonator alignment bandwidths equal to or more than 100 Hz and an accuracy of 10 microradians or less;

e.3. Gimbals having a maximum slew exceeding 5°, a bandwidth equal to or more than 100 Hz and either of the following:

e.3.a.1. Exceeding 0.15 m but not exceeding 1 m in diameter or major axis length;

e.3.a.2. Capable of angular accelerations exceeding 2 radians/s^2; and

e.3.a.3. Having angular pointing errors equal to or less than 200 microradians; or

e.3.b.1. Exceeding 1 m in diameter or major axis length;

e.3.b.2. Capable of angular accelerations exceeding 0.5 radians/s^2; and

e.3.b.3. Having angular pointing errors equal to or less than 200 microradians;

e.4. Specially designed to maintain the alignment of phased array or phased segment mirror systems consisting of mirrors with a segment diameter or major axis length of 1 m or more;

f. ''Fluoride fiber'' cable, or optical fibers therefor, having an attenuation of less than 4 dB/km in the wavelength range exceeding 1,000 nm but not exceeding 3,000 nm.

6A005 Lasers, components and optical equipment.

LICENSE REQUIREMENTS

Reason for Control: NS, NP, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
NP applies to 6A005.a.1.c, a.2.a (with an output power > 40W), a.4.c, a.6, (argon ion lasers only), c.1.b (with an output power > 30W), c.2.c.2.a (with an output power > 40W), c.2.c.2.b (with an output power > 40W), c.2.d.2.b (with an output power > 40W), and d.2.c	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $3000 for all other items; N/A for NP items

GBS: Yes, for items in Advisory Notes 5.1, 5.2 and 5.3 to Category 6

CIV: Yes, except for 6A005.c.2.a, .d (except d.2.c), .e and for items in Advisory Notes 5.1, 5.2 and 5.3 to Category 6

LIST OF ITEMS CONTROLLED

Unit: Equipment in number; parts and accessories in $ value

Related Controls: Shared aperture optical elements, capable of operating in super-high power laser applications are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. (See 22 CFR part 121, Category XII.)

Related Definitions: 1. Pulsed ''lasers'' include those that run in a continuous wave (CW) mode with pulses superimposed. 2. Pulse-excited ''lasers'' include those that run in a continuously excited mode with pulse excitation superimposed. 3. The control status of Raman ''lasers'' is determined by the parameters of the pumping source ''lasers''. The pumping source ''lasers'' can be any of the ''lasers'' described below.

Items: a. Gas ''lasers'', as follows:

a.1. Excimer ''lasers'' having any of the following:

a.1.a. An output wavelength not exceeding 150 nm and:

a.1.a.1. An output energy exceeding 50 mJ per pulse; *or*

a.1.a.2. An average or CW output power exceeding 1 W;

a.1.b. An output wavelength exceeding 150 nm but not exceeding 190 nm and:

a.1.b.1. An output energy exceeding 1.5 J per pulse; or

a.1.b.2. An average or CW output power exceeding 120 W;

a.1.c. An output wavelength exceeding 190 nm but not exceeding 360 nm and:

a.1.c.1. An output energy exceeding 10 J per pulse; or

a.1.c.2. An average or CW output power exceeding 500 W; or

a.1.d. An output wavelength exceeding 360 nm and:

a.1.d.1. An output energy exceeding 1.5 J per pulse; or

a.1.d.2. An average or CW output power exceeding 30 W;

a.2. Metal vapour ''lasers'', as follows:

a.2.a. Copper (Cu) ''lasers'' with an average or CW output power exceeding 20 W;

a.2.b. Gold (Au) ''lasers'' with an average or CW output power exceeding 5 W;

a.2.c. Sodium (Na) ''lasers'' with an output power exceeding 5 W;

a.2.d. Barium (Ba) ''lasers'' with an average or CW output power exceeding 2 W;

a.3. Carbon monoxide (CO) ''lasers'' having either:

a.3.a. An output energy exceeding 2 J per pulse and a pulsed ''peak power'' exceeding 5 kW; or

a.3.b. An average or CW output power exceeding 5 kW;

a.4. Carbon dioxide (CO_2) ''lasers'' having any of the following:

a.4.a. A CW output power exceeding 10 kW;

a.4.b. A pulsed output with a ''pulse duration'' exceeding 10 microseconds and:

a.4.b.1. An average output power exceeding 10 kW; or

a.4.b.2. A pulsed ''peak power'' exceeding 100 kW; or

a.4.c. A pulsed output with a ''pulse duration'' equal to or less than 10 microseconds and:

a.4.c.1. A pulse energy exceeding 5 J per pulse and ''peak power'' exceeding 2.5 kW; or

a.4.c.2. An average output power exceeding 2.5 kW;

a.5. ''Chemical lasers'', as follows:

a.5.a. Hydrogen Fluoride (HF) ''lasers'';

a.5.b. Deuterium Fluoride (DF) ''lasers'';

a.5.c. ''Transfer lasers'':

a.5.c.1. Oxygen Iodine (O_2–I) ''lasers'';

a.5.c.2. Deuterium Fluoride-Carbon dioxide (DF-CO_2) ''lasers'';

a.6. Gas discharge and ion ''lasers'', i.e., krypton ion or argon ion ''lasers'', as follows:

a.6.a. An output energy exceeding 1.5 J per pulse and a pulsed ''peak power'' exceeding 50 W; or

a.6.b. An average or CW output power exceeding 50 W; or

a.7. Other gas ''lasers'', except nitrogen ''lasers'', having any of the following:

a.7.a. An output wavelength not exceeding 150 nm and:

a.7.a.1. An output energy exceeding 50 mJ per pulse and a pulsed ''peak power'' exceeding 1 W; or

a.7.a.2. An average or CW output power exceeding 1 W;

a.7.b. An output wavelength exceeding 150 nm but not exceeding 800 nm and:

a.7.b.1. An output energy exceeding 1.5 J per pulse and a pulsed ''peak power'' exceeding 30 W; or

a.7.b.2. An average or CW output power exceeding 30 W;

a.7.c. An output wavelength exceeding 800 nm but not exceeding 1,400 nm and:

a.7.c.1. An output energy exceeding 0.25 J per pulse and a pulsed ''peak power'' exceeding 10 W; or

a.7.c.2. An average or CW output power exceeding 10 W; or

a.7.d. An output wavelength exceeding 1,400 nm and an average or CW output power exceeding 1 W;

b. Semiconductor ''lasers'', as follows:

TECHNICAL NOTE: Semiconductor ''lasers'' are commonly called ''laser'' diodes.

NOTE: The control status of semiconductor ''lasers'' specially designed for other equipment is determined by the control status of the other equipment.

b.1. Individual, single-transverse mode semiconductor ''lasers'' having:

b.1.a. An average output power exceeding 100 mW; or

b.1.b. A wavelength exceeding 1,050 nm;

b.2. Individual, multiple-transverse mode semiconductor ''lasers'', or arrays of individual semiconductor ''lasers'', having:

b.2.a. An output energy exceeding 500 microjoules per pulse and a pulsed ''peak power'' exceeding 10 W;

b.2.b. An average or CW output power exceeding 10 W; or

b.2.c. A wavelength exceeding 1,050 nm;

c. Solid state ''lasers'', as follows:

c.1. ''Tunable'' ''lasers'' having any of the following:

NOTE: 6A005.c.1. includes titanium-sapphire ($Ti: Al_2O_3$), thulium-YAG (Tm: YAG), thulium-YSGG (Tm: YSGG), alexandrite ($Cr: BeAl_2O_4$) and color center ''lasers''.

c.1.a. An output wavelength less than 600 nm and:

c.1.a.1. An output energy exceeding 50 mJ per pulse and a pulsed ''peak power'' exceeding 1 W; or

c.1.a.2. An average or CW output power exceeding 1 W;

c.1.b. An output wavelength of 600 nm or more but not exceeding 1,400 nm and:

c.1.b.1. An output energy exceeding 1 J per pulse and a pulsed ''peak power'' exceeding 20 W; or

c.1.b.2. An average or CW output power exceeding 20 W; or

c.1.c. An output wavelength exceeding 1,400 nm and:

c.1.c.1. An output energy exceeding 50 mJ per pulse and a pulsed ''peak power'' exceeding 1 W; or

c.1.c.2.An average or CW output power exceeding 1 W;

c.2. Non-''tunable'' ''lasers'', as follows:

NOTE: 6A005.c.2. includes atomic transition solid state ''lasers''.

c.2.a. Ruby ''lasers'' having an output energy exceeding 20 J per pulse;

c.2.b. Neodymium glass ''lasers'', as follows:

c.2.b.1. ''Q-switched lasers'' having:

c.2.b.1.a. An output energy exceeding 20 J but not exceeding 50 J per pulse and an average output power exceeding 10 W; or

c.2.b.1.b. An output energy exceeding 50 J per pulse;

c.2.b.2. Non-''Q-switched lasers'' having:

c.2.b.2.a. An output energy exceeding 50 J but not exceeding 100 J per pulse and an average output power exceeding 20 W; or

c.2.b.2.b. An output energy exceeding 100 J per pulse;

c.2.c. Neodymium-doped (other than glass) ''lasers'', as follows, with an output wavelength exceeding 1,000 nm but not exceeding 1,100 nm:

NOTE: For Neodymium-doped (other than glass) ''lasers'' having an output wavelength not exceeding 1,000 nm or exceeding 1,100 nm, see 6A005.c.2.d.

c.2.c.1. Pulse excited, mode-locked, ''Q-switched lasers'' with a ''pulse duration'' of less than 1 ns and:

c.2.c.1.a. A ''peak power'' exceeding 5 GW;

c.2.c.1.b. An average output power exceeding 10 W; or

c.2.c.1.c. A pulsed energy exceeding 0.1 J;

c.2.c.2. Pulse-excited, ''Q-switched lasers'', with a pulse duration equal to or more than 1 ns, and:

c.2.c.2.a. A single-transverse mode output with:

c.2.c.2.a.1. A ''peak power'' exceeding 100 MW;

c.2.c.2.a.2. An average output power exceeding 20 W; or

c.2.c.2.a.3. A pulsed energy exceeding 2 J; or

c.2.c.2.b. A multiple-transverse mode output with:

c.2.c.2.b.1. A ''peak power'' exceeding 200 MW;

c.2.c.2.b.2. An average output power exceeding 50 W; or

c.2.c.2.b.3. A pulsed energy exceeding 2 J;

c.2.c.3. Pulse-excited, non-''Q-switched lasers'', having:
c.2.c.3.a. A single-transverse mode output with:
c.2.c.3.a.1. A ''peak power'' exceeding 500 kW; or
c.2.c.3.a.2. An average output power exceeding 150 W; or
c.2.c.3.b. A multiple-transverse mode output with:
c.2.c.3.b.1. A ''peak power'' exceeding 1 MW; or
c.2.c.3.b.2. An average power exceeding 500 W;
c.2.c.4. Continuously excited ''lasers'' having:
c.2.c.4.a. A single-transverse mode output with:
c.2.c.4.a.1. A ''peak power'' exceeding 500 kW; or
c.2.c.4.a.2. An average or CW output power exceeding 150 W; or
c.2.c.4.b. A multiple-transverse mode output with:
c.2.c.4.b.1. A ''peak power'' exceeding 1 MW; or
c.2.c.4.b.2. An average or CW output power exceeding 500 W;
c.2.d. Other non-''tunable'' ''lasers'', having any of the following:
c.2.d.1. A wavelength less than 150 nm and:
c.2.d.1.a. An output energy exceeding 50 mJ per pulse and a pulsed ''peak power'' exceeding 1 W; or
c.2.d.1.b. An average or CW output power exceeding 1 W;
c.2.d.2. A wavelength of 150 nm or more but not exceeding 800 nm and:
c.2.d.2.a. An output energy exceeding 1.5 J per pulse and a pulsed ''peak power'' exceeding 30 W; or
c.2.d.2.b. An average or CW output power exceeding 30 W;
c.2.d.3. A wavelength exceeding 800 nm but not exceeding 1,400 nm, as follows:
c.2.d.3.a. ''Q-switched lasers'' with:
c.2.d.3.a.1. An output energy exceeding 0.5 J per pulse and a pulsed ''peak power'' exceeding 50 W; or
c.2.d.3.a.2. An average output power exceeding:
c.2.d.3.a.2.a. 10 W for single-mode ''lasers'';
c.2.d.3.a.2.b. 30 W for multimode ''lasers'';
c.2.d.3.b. Non-''Q-switched lasers'' with:
c.2.d.3.b.1. An output energy exceeding 2 J per pulse and a pulsed ''peak power'' exceeding 50 W; or
c.2.d.3.b.2. An average or CW output power exceeding 50 W; or
c.2.d.4. A wavelength exceeding 1,400 nm and:
c.2.d.4.a. An output energy exceeding 100 mJ per pulse and a pulsed ''peak power'' exceeding 1 W; or
c.2.d.4.b. An average or CW output power exceeding 1 W;
d. Dye and other liquid ''lasers'', having any of the following:
d.1. A wavelength less than 150 nm and:
d.1.a. An output energy exceeding 50 mJ per pulse and a pulsed ''peak power'' exceeding 1 W; or
d.1.b. An average or CW output power exceeding 1 W;
d.2. A wavelength of 150 nm or more but not exceeding 800 nm and:
d.2.a. An output energy exceeding 1.5 J per pulse and a pulsed ''peak power'' exceeding 20 W;
d.2.b. An average or CW output power exceeding 20 W; or
d.2.c. A pulsed single longitudinal mode oscillator with an average output power exceeding 1 W and a repetition rate exceeding 1 kHz if the ''pulse duration'' is less than 100 ns;
d.3. A wavelength exceeding 800 nm but not exceeding 1,400 nm and:
d.3.a. An output energy exceeding 0.5 J per pulse and a pulsed ''peak power'' exceeding 10 W; or
d.3.b. An average or CW output power exceeding 10 W; or
d.4. A wavelength exceeding 1,400 nm and:
d.4.a. An output energy exceeding 100 mJ per pulse and a pulsed ''peak power'' exceeding 1 W; or
d.4.b. An average or CW output power exceeding 1 W;
e. Free electron ''lasers'';
f. Components, as follows:
f.1. Mirrors cooled either by active cooling or by heat pipe cooling;

TECHNICAL NOTE: Active cooling is a cooling technique for optical components using flowing fluids within the subsurface (nominally less than 1 mm below the optical surface) of the optical component to remove heat from the optic.

f.2. Optical mirrors or transmissive or partially transmissive optical or electro-optical components specially designed for use with controlled ''lasers'';
g. Optical equipment, as follows:
g.1. Dynamic wavefront (phase) measuring equipment capable of mapping at least 50 positions on a beam wavefront with:
g.1.a. Frame rates equal to or more than 100 Hz and phase discrimination of at least 5% of the beam's wavelength; or
g.1.b. Frame rates equal to or more than 1,000 Hz and phase discrimination of at least 20% of the beam's wavelength;
g.2. ''Laser'' diagnostic equipment capable of measuring ''Super-High Power Laser'' (SHPL) system angular beam steering errors of equal to or less than 10 microradians;
g.3. Optical equipment, assemblies or components specially designed for a phased-array SHPL system for coherent beam combination to an accuracy of Lambda/10 at the designed wavelength, or 0.1 micrometer, whichever is the smaller;
g.4. Projection telescopes specially designed for use with SHPL systems.

6A006 "Magnetometers", "magnetic gradiometers", "intrinsic magnetic gradiometers" and compensation systems and specially designed components.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $1500
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: § value
Related Controls: N/A
Related Definition: This entry does not control instruments specially designed for biomagnetic measurements for medical diagnostics, unless they incorporate unembedded sensors controlled by 6A006.h.
Items: a. ''Magnetometers'' using ''superconductive'', optically pumped or nuclear precession (proton/Overhauser) technology having a ''noise level'' (sensitivity) lower (better) than 0.05 nT rms per square root Hz;

b. Induction coil ''magnetometers'' having a ''noise level'' (sensitivity) lower (better) than:

b.1. 0.05 nT rms per square root Hz at frequencies of less than 1 Hz;

b.2. 1×10^{-3} nT rms per square root Hz at frequencies of 1 Hz or more but not exceeding 10 Hz; or

b.3. 1×10^{-4} nT rms per square root Hz at frequencies exceeding 10 Hz;

c. Fiber optic ''magnetometers'' having a ''noise level'' (sensitivity) lower (better) than 1 nT rms per square root Hz;

d. ''Magnetic gradiometers'' using multiple ''magnetometers'' controlled by 6A006.a, .b or .c;

e. Fiber optic ''intrinsic magnetic gradiometers'' having a magnetic gradient field ''noise level'' (sensitivity) lower (better) than 0.3 nT/m rms per square root Hz;

f. ''Intrinsic magnetic gradiometers'', using technology other than fiber-optic technology, having a magnetic gradient field ''noise level'' (sensitivity) lower (better) than 0.015 nT/m rms per square root Hz;

g. Magnetic compensation systems for magnetic sensors designed for operation on mobile platforms;

h. ''Superconductive'' electromagnetic sensors, containing components manufactured from ''superconductive'' materials, as follows:

h.1. Designed for operation at temperatures below the ''critical temperature'' of at least one of their ''superconductive'' constituents (including Josephson effect devices or ''superconductive'' quantum interference devices (SQUIDS));

h.2. Designed for sensing electromagnetic field variations at frequencies of 1 KHz or less, and:

h.3. Having any of the following characteristics:

h.3.a. Incorporating thin-film SQUIDS with a minimum feature size of less than 2 micrometers and with associated input and output coupling circuits;

h.3.b. Designed to operate with a magnetic field slew rate exceeding 1×10^{6} magnetic flux quanta per second;

h.3.c. Designed to function without magnetic shielding in the earth's ambient magnetic field; or

h.3.d. Having a temperature coefficient less (smaller) than 0.1 magnetic flux quantum/K;

6A007 Gravity meters (gravimeters) and gravity gradiometers.

LICENSE REQUIREMENTS

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
MT applies to 6A07.b and c when the accuracies in 6A07.b.1 and b.2 are met or exceeded	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $3000
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definition: N/A
Items: a. Gravity meters for ground use having a static accuracy of less (better) than 10 microgal;

NOTE: 6A007.a does not control ground gravity meters of the quartz element (Worden) type.

b. Gravity meters for mobile platforms for ground, marine, submersible, space or airborne use having:

b.1. A static accuracy of less (better) than 0.7 milligal; and

b.2. An in-service (operational) accuracy of less (better) than 0.7 milligal with a time-to-steady-state registration of less than 2 minutes under any combination of attendant corrective compensations and motional influences;

c. Gravity gradiometers.

6A008 Radar systems, equipment and assemblies and specially designed components therefor.

LICENSE REQUIREMENTS

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
MT applies to items that are designed for airborne applications and that are usable in systems controlled for MT reasons.	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $5000
GBS: Yes, for 6A008.b, .c, and l.1 only
CIV: Yes, for 6A008.b, .c, and l.1 only

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definition: This entry does not control: 1.) Secondary surveillance radar (SSR); 2.) Car radar designed for collision prevention; 3.) Displays or monitors used for Air Traffic Control (ATC) having no more than 12 resolvable elements per mm; 4.) Meteorological (weather) radar.
Items: a. Operating at frequencies from 40 GHz to 230 GHz and having an average output power exceeding 100mW;

b. Having a tunable bandwidth exceeding ±6.25% of the center operating frequency;

TECHNICAL NOTE: The center operating frequency equals one half of the sum of the highest plus the lowest specified operating frequencies.

c. Capable of operating simultaneously on more than two carrier frequencies;

d. Capable of operating in synthetic aperture (SAR), inverse synthetic aperture (ISAR) or sidelooking airborne (SLAR) radar mode;

e. Incorporating ''electronically steerable phased array antennae'';

f. Capable of heightfinding non-cooperative targets;

NOTE: 6A008.f does not control precision approach radar equipment (PAR) conforming to ICAO standards;

g. Designed specially for airborne (balloon or airframe mounted) operation and having Doppler signal processing for the detection of moving targets;

h. Employing processing of radar signals using:

h.1. ''Radar spread spectrum'' techniques; or

h.2. ''Radar frequency agility'' techniques;

i. Providing ground-based operation with a maximum ''instrumented range'' exceeding 185 km;

NOTE: 6A008.i does not control:
a. Fishing ground surveillance radar;
b. Ground radar equipment specially designed for enroute air traffic control and ''software'' specially designed for ''use'' thereof, provided:
1. It has a maximum ''instrumented range'' of 500 km or less
2. It is configured so that radar target data can be transmitted only one way from the radar site to one or more civil ATC centers;
3. It contains no provisions for remote control of the radar scan rate from the enroute ATC center; and
4. It is to be permanently installed;

N.B.: The ''use'' ''software'' must be limited to ''object code'' and the minimum amount of ''source code'' necessary for installation, operation or maintenance.

j. ''Laser'' radar or Light Detection and Ranging (LIDAR) equipment, having either of the following:

j.1. ''Space-qualified''; or

j.2. Employing coherent heterodyne or homodyne detection techniques and having an angular resolution of less (better) than 20 microradians;

NOTE: 6A008.j does not control LIDAR equipment specially designed for surveying or for meteorological observation.

k. Having signal processing sub-systems using ''pulse compression'' with:

k.1. A ''pulse compression'' ratio exceeding 150; or

k.2. A pulse width of less than 200 ns;

l. Having data processing sub-systems with:

l.1. ''Automatic target tracking'' providing, at any antenna rotation, the predicted target position beyond the time of the next antenna beam passage;

NOTE: 6A008.l.1 does not control conflict alert capability in air traffic control systems, or marine or harbor radar.

l.2. Calculation of target velocity from primary radar having non-periodic (variable) scanning rates;

l.3. Processing for automatic pattern recognition (feature extraction) and comparison with target characteristic data bases (waveforms or imagery) to identify or classify targets; or

l.4. Superposition and correlation, or fusion, of target data from two or more ''geographically dispersed'' and ''interconnected radar'' sensors to enhance and discriminate targets.

NOTE: 6A008.l.4 does not control systems, equipment and assemblies used for marine traffic control.

6A018 Magnetic, pressure, and acoustic underwater detection devices specially designed for military purposes and controls and components therefor.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $5000
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number; components in $ value
Related Controls: N/A
Related Definition: N/A

Items: The list of items controlled is contained in the ECCN heading.

6A102 Radiation hardened detectors, other than those specified in 6A002, for use in protecting against nuclear effects (e.g., electromagnetic pulse (EMP), X-rays, combined blast and thermal effects) and usable for "missiles", designed or rated to withstand radiation levels which meet or exceed a total irradiation dose of 5 X 10^5 rads (Si).

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $3000
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Components in number
Related Controls: N/A
Related Definition: In 6A102, a detector is defined as a mechanical, electrical, optical or chemical device that automatically identifies and records, or registers a stimulus such as an environmental change in pressure or temperature, an electrical or electromagnetic signal or radiation from a radioactive material.
Items: The list of items controlled is contained in the ECCN heading.

6A107 Specially designed components for gravity meters and gravity gradiometers specified in 6A007.b. and c.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $3000
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

6A108 Radar systems and tracking systems, other than those controlled by 6A008.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $5000
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: This entry does not control airborne civil weather radar conforming to international standards for civil weather radars provided that they do not incorporate any of the following: (a) Phased array antennas; (b) Frequency agility; (c) Spread spectrum; or (d) Signal processing specially designed for the tracking of vehicles.

Laser radar systems are defined as those that embody specialized transmission, scanning, receiving and signal processing techniques for utilization of lasers for echo ranging, direction finding and discrimination of targets by location, radial speed and body reflection characteristics.

a. Radar and laser radar systems designed or modified for use in systems controlled by 9A004 (as provided in the Commerce Control List) and 9A104.

b. Precision tracking systems usable for ''missiles'', as follows:

b.1. Tracking systems that use a code translator in conjunction with either surface or airborne references or navigation satellite systems to provide real-time measurements of in-flight position and velocity;

b.2. Range instrumentation radars including associated optical/infrared trackers with all of the following capabilities:

b.2.a. Angular resolution better than 3 milliradians (0.5 mils);

b.2.b. Range of 30 km or greater, with a range resolution better than 10 meters rms; and

b.2.c. Velocity resolution better than 3 meters per second.

6A202 Photomultiplier tubes with a photocathode area of greater than 20cm^2 having an anode pulse rise time of less than 1 ns.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A

CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Number
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

6A203 Cameras and components not controlled by ECCN 6A003.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment and components in number; parts and accessories in $ value
Related Controls: N/A
Related Definitions: N/A
Items: a. Mechanical rotating mirror cameras, as follows; and specially designed components therefor:

a.1 Framing cameras with recording rates greater than 225,000 frames per second;

a.2. Streak cameras with writing speeds greater than 0.5 mm per microsecond;

TECHNICAL NOTE: Components of such cameras include their synchronizing electronics units and rotor assemblies consisting of turbines, mirrors and bearings.

b. Electronic streak and framing cameras and tubes, as follows:

b.1. Electronic streak cameras capable of 50 ns or less time resolution and streak tubes therefor;

b.2. Electronic (or electrically shuttered) framing cameras capable of 50 ns or less frame exposure time;

b.3. Framing tubes and solid state imaging devices for use with cameras described in 6A203.b.2, as follows:

b.3.a. Proximity focused image intensifier tubes having a photocathode deposited on a transparent conductive coating to decrease photocathode sheet resistance;

b.3.b. Gated silicon intensifier target (SIT) vidicon tubes, where a fast system allows gating the photoelectrons from the photocathode before they impinge on the SIT plate;

b.3.c. Kerr or pockel cell electro-optical shuttering; or

b.3.d. Other framing tubes and solid-state imaging devices having a fast-image gating time of less than 50 ns specially designed for cameras controlled by 6A203.b.2;

c. Radiation-hardended television cameras, or lenses therefor, specially designed or rated as radiation-hardened to withstand greater than 5×10^4 grays (Silicon) (5×10^6 rad (Silicon)) without operational degradation.

6A205 Lasers, other than those specified in 6A005.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number; parts and accessories in $ value
Related Controls: N/A
Related Definitions: N/A
Items: a. Argon ion lasers with greater than 40 W average output power operating at wavelengths between 400 nm and 515 nm;

b. Tunable pulsed single-mode dye oscillators capable of an average power output of greater than 1 W, a repetition rate greater than 1 kHz, a pulse less than 100 ns, and a wavelength between 300 nm and 800 nm;

c. Tunable pulsed dye laser amplifiers and oscillators with an average power output of greater than 30 W, a repetition rate greater than 1 kHz, a pulse width less than 100 ns, and a wavelength between 300 nm and 800 nm; *except:* Single mode oscillators;

d. Pulsed carbon dioxide lasers with a repetition rate greater than 250 Hz, an average power output of greater than 500 W, and a pulse of less than 200 ns operating at wavelengths between 9,000 nm and 11,000 nm;

NOTE: This specification is not intended to control the higher power (typically 1 to 5kW) industrial CO_2 lasers used in applications such as cutting and welding, as those latter lasers are either continuous wave or are pulsed with a pulse width more than 200 ns.

e. Para-hydrogen Raman shifters designed to operate at 16 micrometer output wavelength and at a repetition rate greater than 250 Hz.

6A225 Velocity interferometers for measuring velocities in excess of 1 km per second during time intervals less than 10 microseconds (e.g. VISAR's, Doppler laser interferometers, DLI's, etc.).

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number; parts and accessories in $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

6A226 Pressure sensors.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number; parts and accessories in $ value
Related Controls: N/A
Related Definitions: N/A
Items: a. Manganin gauges for pressures greater than 100 kilobars; or
b. Quartz pressure transducers for pressures greater than 100 kilobars.

6A990 Airborne radar equipment, n.e.s., and specially designed components therefor.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

6A992 Gravity meters (gravimeters) for ground use, n.e.s.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: a. Having a static accuracy of less (better) than 100 microgal; or
b. Being of the quartz element (Worden) type.

6A993 "Magnetometers", n.e.s., having a "noise level" (sensitivity) lower (better) than 1.0 nT rms per square root Hz.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

6A994 Marine or terrestrial acoustic equipment, n.e.s., capable of detecting or locating underwater objects or features or positioning surface vessels or underwater vehicles; and specially designed components, n.e.s.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 2

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

B. TEST, INSPECTION AND PRODUCTION EQUIPMENT

6B004 Optics.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $5000
GBS: Yes for Advisory Note 4.2 to Category 6
CIV: Yes for Advisory Note 4.2 to Category 6

LIST OF ITEMS CONTROLLED

Unit: Number
Related Controls: N/A
Related Definition: This entry does not control microscopes.

a. Equipment for measuring absolute reflectance to an accuracy of ±0.1% of the reflectance value;

b. Equipment other than optical surface scattering measurement equipment, having an unobscured aperture of more than 10 cm, specially designed for the non-contact optical measurement of a non-planar optical surface figure (profile) to an ''accuracy'' of 2 nm or less (better) against the required profile.

6B005 Specially designed or modified equipment, including tools, dies, fixtures or gauges, and other specially designed components and accessories therefor.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $5000
GBS: Yes
CIV: Yes

LIST OF ITEMS CONTROLLED

Unit: Equipment in number; parts and accessories in $ value
Related Controls: N/A
Related Definitions: N/A
Items: a. For the manufacture or inspection of:

a.1. Free electron ''laser'' magnet wigglers;

a.2. Free electron ''laser'' photo injectors;

b. For the adjustment, to required tolerances, of the longitudinal magnetic field of free electron ''lasers''.

6B007 Equipment to produce, align and calibrate land-based gravity meters with a static accuracy of better than 0.1 milligal.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $5000
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Number
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

6B008 Pulse radar cross-section measurement systems having transmit pulse widths of 100 ns or less and specially designed components therefor.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $5000
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Number
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

6B108 Systems specially designed for radar cross section measurement usable for "missiles" and their subsystems.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $3000
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Number
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

C. MATERIALS

6C002 Optical sensors.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $3000
GBS: Yes for 6C002.c
CIV: Yes for 6C002.c

LIST OF ITEMS CONTROLLED

Unit: Number
Related Controls: N/A
Related Definitions: N/A
Items: a. Elemental tellurium (Te) of purity levels equal to or more than 99.9995%;

b. Single crystals of cadmium telluride (CdTe) cadmium zinc telluride (CdZnTe) or mercury cadmium tellurium (HgCdTe) of any purity level, including epitaxial wafers thereof;

TECHNICAL NOTE: Purity verified in accordance with ASTM F574–83 standard or equivalents.

c. ''Optical fiber preforms'' specially designed for the manufacture of high birefringence fibers controlled by 6A002.d.3.

6C004 Optics.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $1500
GBS: Yes for 6C004.h and 6C004.a, e.2, and .f as described in Advisory Note 4.1 to Category 6
CIV: Yes for 6C004.h and 6C004.a, e.2, and .f as described in Advisory Note 4.1 to Category 6

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: a. Zinc selenide (ZnSe) and zinc sulphide (ZnS) ''substrate blanks'' produced by the chemical vapor deposition process:

a.1. Larger than 100 cm^3 in volume; or

a.2. Larger than 80 mm in diameter with a thickness equal to or more than 20 mm;

b. Boules of the following electro-optic materials:

b.1. Potassium titanyl arsenate (KTA);

b.2. Silver gallium selenide ($AgGaSe_2$);

b.3. Thallium arsenic selenide (Tl_3AsSe_3, also known as TAS);

c. Non-linear optical materials having:

c.1. Third order susceptibility (chi 3) equal to or less than 1 W/m^2; and

c.2. A response time of less than 1 ms;

d. ''Substrate blanks'' of silicon carbide or beryllium beryllium (Be/Be) deposited materials exceeding 300 mm in diameter or major axis length;

e. Low optical absorption materials, as follows:

e.1. Bulk fluoride compounds containing ingredients with a purity of 99.999% or better; or

NOTE: 6C004.e.1 controls fluorides of zirconium or aluminium and variants.

e.2. Bulk fluoride glass made from compounds controlled by 6C004.e.1;

f. Glass, including fused silica, phosphate glass, fluorophosphate glass, zirconium fluoride (ZrF_4) and hafnium fluoride (HfF_4) with:

f.1. A hydroxil ion (OH-) concentration of less than 5 ppm;

f.2. Integrated metallic purity levels of less than 1 ppm; and

f.3. High homogeneity (index of refraction variance) less than 5×10^{-6};

g. Synthetically produced diamond material with an absorption of less than 10^{-5} cm^{-1} for wavelengths exceeding 200 nm, but not exceeding 14,000 nm;

h. ''Optical fiber preforms'' made from bulk fluoride compounds containing ingredients with a purity of 99.999% or better, specially designed for the manufacture of ''fluoride fibers'' controlled by 6A004.f.

6C005 Synthetic crystalline ''laser'' host material in unfinished form.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $1500
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Kilograms
Related Controls: N/A
Related Definitions: N/A
Items: a. Titanium doped sapphire;

b. Alexandrite.

D. SOFTWARE

6D001 ''Software'' specially designed for the ''development'' or ''production'' of equipment controlled by 6A002, 6A003, 6A004, 6A005, 6A007, 6A008, 6A102, 6A108, 6B008 or 6B108.

LICENSE REQUIREMENTS

Reason for Control: NS, MT, NP, RS, AT, UN

Control(s)	*Country Chart*
NS applies to ''software'' for equipment controlled by 6A004, 6A005, 6A008 or 6B008	NS Column 1

Control(s)	*Country Chart*
MT applies to ''software'' for equipment controlled by 6A002, 6A003, 6A007, 6A008 (that is designed for airborne applications and that are usable in systems controlled for MT reasons), 6A102, 6A108 or 6B108 for MT reasons	MT Column 1
NP applies to ''software'' for equipment controlled by 6A005 for NP reasons	NP Column 1
RS applies to ''software'' for equipment controlled by 6A002 or 6A003 for RS reasons	RS Column 1
AT applies to entire entry	AT Column 1
UN applies to ''software'' for equipment controlled by 6A002 or 6A003 for UN reasons	Rwanda

LICENSE EXCEPTIONS

CIV: N/A
TSR: Yes

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

6D002 "Software" specially designed for the "use" of equipment controlled by 6A002.b, 6A008, or 6B008.

LICENSE REQUIREMENTS

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
MT applies to ''software'' for equipment controlled by 6A008 that is designed for airborne applications and that are usable in systems controlled for MT reasons	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
CIV: N/A
TSR: Yes

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

6D003 Other "software."

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
CIV: Yes for 6D003.d.1
TSR: Yes

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: a. Acoustics:

a.1. ''Software'' specially designed for acoustic beam forming for the ''real-time processing'' of acoustic data for passive reception using towed hydrophone arrays;

a.2. ''Source code'' for the ''real-time processing'' of acoustic data for passive reception using towed hydrophone arrays;

b. Magnetometers:

b.1. ''Software'' specially designed for magnetic compensation systems for magnetic sensors designed to operate on mobile platforms;

b.2. ''Software'' specially designed for magnetic anomaly detection on mobile platforms;

c. Gravimeters: ''Software'' specially designed to correct motional influences of gravity meters or gravity gradiometers;

d. Radar:

d.1. Air Traffic Control ''software'' application ''programs'' hosted on general purpose computers located at Air Traffic Control centers and capable of any of the following:

d.1.a. Processing and displaying more than 150 simultaneous ''system tracks'';

d.1.b. Accepting radar target data from more than four primary radars; or

d.1.c. Automatically handing over primary radar target data (if not correlated with secondary surveillance radar (SSR) data) from the host ATC center to another ATC center;

d.2. ''Software'' for the design or ''production'' of radomes that:

d.2.a. Are specially designed to protect the ''electronically steerable phased array antennae'' controlled by 6A008.e; and

d.2.b. Limit the average side-lobe level increase by less than 13 dB for frequencies equal to or higher than 2 GHz.

6D102 "Software" specially designed for the "use" of equipment controlled by 6A002, 6A003, 6A007, 6A102, 6A108 or 6B108.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A

Items: The list of items controlled is contained in the ECCN heading.

6D103 "Software" that processes post-flight recorded data obtained from systems controlled by 6A108.b, enabling determination of vehicle position throughout its flight path.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value

The list of items controlled is contained in the ECCN heading.

6D990 "Software" specially designed for the "development", "production", or "use" of equipment controlled by 6A990, 6A992 or 6A993.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

6D994 "Software" specially designed for the "development", "production", or "use" of equipment controlled by 6A994.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 2

LICENSE EXCEPTIONS

LVS: N/A
CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

E. TECHNOLOGY

6E001 "Technology" according to the General Technology Note for the "development" of equipment, materials or "software" controlled by 6A (except 6A018 6A990, 6A992 to 6A994), 6B, 6C, or 6D (except 6D990 or 6D994).

LICENSE REQUIREMENTS

Reason for Control: NS, MT, NP, RS, CC, AT, UN

Control(s)	*Country Chart*
NS applies to "technology" for items controlled by 6A001 to 6A008, 6B004 to 6B008, 6C002 to 6C005, or 6D001 to 6D003	NS Column 1
MT applies to "technology" for items controlled by 6A002, 6A007, 6A008, 6A102, 6A107, 6A108, 6B108, 6D001, 6D002, 6D102 or 6D103 for MT reasons	MT Column 1
NP applies to "technology" for equipment controlled by 6A003, 6A005, 6A202, 6A203, 6A205, 6A225 or 6A226 for NP reasons	NP Column 2
RS applies to "technology" for equipment controlled by 6A002 or 6A003 for RS reasons	RS Column 1
CC applies to "technology" for equipment controlled by 6A002 for CC reasons	CC Column 1
AT applies to entire entry	AT Column 1
UN applies to "technology" for equipment controlled by 6A002 or 6A003 for UN reasons	Rwanda

LICENSE EXCEPTIONS

CIV: N/A
TSR: Yes

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

6E002 "Technology" according to the General Technology Note for the "production" of equipment or materials controlled by 6A (except 6A018, 6A990, 6A992 to 6A994), 6B, or 6C.

LICENSE REQUIREMENTS

Reason for Control: NS, MT, NP, RS, AT, CC, UN

Control(s)	*Country Chart*
NS applies to "technology" for equipment controlled by 6A001 to 6A008, 6B004 to 6B008, or 6C002 to 6C005	NS Column 1

Control(s)	*Country Chart*
MT applies to ''technology'' for equipment controlled by 6A002, 6A007, 6A008, 6A102, 6A107, 6A108, or 6B108 for MT reasons	MT Column 1
NP applies to ''technology'' for equipment controlled by 6A003, 6A005, 6A202, 6A203, 6A205, 6A225 or 6A226 for NP reasons	NP Column 1
RS applies to ''technology'' for equipment controlled by 6A002 or 6A003 for RS reasons	RS Column 1
CC applies to ''technology'' for equipment controlled by 6A002 for CC reasons	CC Column 1
AT applies to entire entry	AT Column 1
UN applies to ''technology'' for equipment controlled by 6A002 or 6A003 for UN reasons	Rwanda

LICENSE EXCEPTIONS

CIV: N/A
TSR: Yes

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

6E003 Other "technology".

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: Yes

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: a. Optics.

a.1. Optical surface coating and treatment ''technology'' required to achieve uniformity of 99.5% or better for optical coatings 500 mm or more in diameter or major axis length and with a total loss (absorption and scatter) of less than 5×10^{-3};

a.2. Optical fabrication technologies, as follows:

a.2.a. For serially producing optical components at a rate exceeding 10 m^2 of surface area per year on any single spindle and with:

a.2.a.1. An area exceeding 1 m^2; and

a.2.a.2. A surface figure exceeding lambda/10 rms at the designed wavelength;

a.2.b. Single point diamond turning techniques producing surface finish accuracies of better than 10 nm rms on non-planar surfaces exceeding 0.5 m^2;

NOTE: See also ECCN 2E003.d in Category 2, Materials Processing.

b. Lasers.

b.1. ''Technology'' for optical filters with a bandwidth equal to or less than 10 nm, a field of view (FOV) exceeding 40° and a resolution exceeding 0.75 line pairs per milliradian;

b.2. ''Technology'' ''required'' for the ''development'', ''production'' or ''use'' of specially designed diagnostic instruments or targets in test facilities for Super High Power Lasers (SHPL) testing or testing or evaluation of materials irradiated by SHPL beams;

c. Magnetometers. ''Technology'' ''required'' for the ''development'' or ''production'' of fluxgate ''magnetometers'' or fluxgate ''magnetometer'' systems having a noise level:

c.1. Less than 0.05 nT rms per root Hz at frequencies of less than 1 Hz; or

c.2. 1×10^{-3} nT rms per square root Hz at frequencies of 1 Hz or more.

6E101 "Technology" according to the General Technology Note for the "use" of equipment or "software" controlled in 6A002.a.1, a.3 and a.4, 6A007.b. and .c, 6A008, 6A102, 6A107, 6A108, 6B108, 6D001, 6D002, 6D102 or 6D103 for MT reasons.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

6E201 "Technology" for the "use" of equipment controlled by 6A003, 6A005, 6A202, 6A203, 6A205, 6A225 or 6A226 for NP reasons.

LICENSE REQUIREMENTS

Reason for Control: NP, AT

Control(s)	*Country Chart*
NP applies to entire entry	NP Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

6E990 "Technology" for the "development", "production" or "use" equipment controlled by 6A990, 6A992, or 6A993.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

6E994 "Technology" for the "development", "production", or "use" of equipment controlled by 6A994.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 2

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

EAR99 Items subject to the EAR that are not elsewhere specified in this CCL Category or in any other category in the CCL are designated by the number EAR99.

ADVISORY NOTES FOR CATEGORY 6

Acoustics

ADVISORY NOTE 1: Licenses are likely to be approved, as administrative exceptions, for export and reexport to satisfactory end-users in Country Group D:1 of equipment controlled by 6A001.a.1.b.4 for use in civil research or civil exploration work.

Optical Sensors

ADVISORY NOTE 2.1: Licenses are likely to be approved, as administrative exceptions, for export and reexport to satisfactory end-users in the People's Republic of China of image intensifier tubes incorporating microchannel-plates, not specially designed for cameras controlled by 6A003.

N.B.: Advisory Note 2.1 does not apply to tubes incorporating a gallium arsenide (or similar semiconductor) photocathode.

ADVISORY NOTE 2.2: Licenses are likely to be approved, as administrative exceptions, for export and reexport to satisfactory end-users in Country Group D:1 of reasonable quantities of non-ruggedized image intensifier tubes controlled by 6A002.a.2.a.3.a for bona fide medical use.

Cameras

ADVISORY NOTE 3: Licenses are likely to be approved, as administrative exceptions, for export and reexport to satisfactory end-users in Country Group D:1 of mechanical framing cameras controlled by 6A003.a.2 designed for civil purposes (i.e., non-nuclear use) with a framing speed of not more than 2 million frames per second.

Optics

ADVISORY NOTE 4.1: Licenses are likely to be approved, as administrative exceptions, for export and reexport to satisfactory end-users in Country Group D:1 of the following items for installation and use at ground-based bona fide academic or civilian astronomical research sites or in international air- or space-based bona fide academic or civilian astronomical research projects. For the end-use stated in this Advisory Note, the following limits apply:

a. One optical mirror controlled by 6A004.a.1;

b. Three optical mirrors controlled by 6A004.a.2;

c. Three optical mirrors controlled by 6A004.a.4;

d. Three optical mirrors controlled by 6A004.b;

e. Ten optical filters controlled by 6A004.d.1.a;

f. One piece of optical control equipment controlled by 6A004.e.2 for each operational mirror;

g. Four pieces of optical control equipment controlled by 6A004.e.4;

h. Three ''substrate blanks'' controlled by 6C004.a;

i. A reasonable quantity of the bulk fluoride glass controlled by 6C004.e.2;

j. A reasonable quantity of the materials controlled by 6C004.f.

N.B.: The quantity limitations listed in Advisory Note 4.1 refer to specific projects.

ADVISORY NOTE 4.2: Licenses are likely to be approved, as administrative exceptions, for export and reexport to satisfactory end-users in Country Group D:1 of equipment controlled by 6B004.b for stated bona fide civil end-uses.

Lasers

ADVISORY NOTE 5.1: Licenses are likely to be approved, as administrative exceptions,

for export and reexport to satisfactory end-users in the People's Republic of China of:

a. ''Tunable'' pulsed flowing-dye ''lasers'' having all of the following, and specially designed components therefor:

1. An output wavelength less than 800 nm;

2. A ''pulse duration'' not exceeding 100 ns; and

3. A peak output power not exceeding 15 MW;

b. CO_2 or CO/CO_2 ''lasers'' having an output wavelength in the range from 9,000 to 11,000 nm and having a pulsed output not exceeding 2 J per pulse and a maximum rated average single or multimode output power not exceeding 5 kW; or

c. CO ''lasers'' having a CW maximum rated single or multimode output power not exceeding 10 kW.

ADVISORY NOTE 5.2: Licenses are likely to be approved, as administrative exceptions, for export and reexport to satisfactory end-users in Country Group D:1 of ''lasers'', for civil applications, as follows:

a. Neodymium-doped (other than glass), pulse-excited, ''Q-switched lasers'' controlled by 6A005.c.2.c.2.b having:

1. A pulse duration equal to or more than 1 ns; and

2. A multiple-transverse mode output with a ''peak power'' not exceeding 400 MW;

b. Neodymium-doped (other than glass) ''lasers'' controlled by 6A005.c.2.c.3.b or 6A005.c.2.c.4.b:

1. Having:

a. An output wavelength exceeding 1,000 nm, but not exceeding 1,100 nm; and

b. An average or CW output power not exceeding 2 kW; and

2. Being:

a. Pulse-excited, non-''Q-switched'' multiple-transverse mode; or

b. Continuously excited, multiple-transverse mode;

c. CO_2 ''lasers'' controlled by 6A005.a.4:

1. Being in CW multiple-transverse mode; and

2. Having a CW output power not exceeding 15 kW.

d. CO ''lasers'' having a CW maximum rated single or multimode output power not exceeding 10 kW.

ADVISORY NOTE 5.3: Licenses are likely to be approved, as administrative exceptions, for export and reexport to satisfactory end-users in Country Group D:1 of optical equipment controlled by 6A005.g when intended for use with ''lasers'' that are not controlled or controlled ''lasers'' that have been approved for export and reexport.

Radar

ADVISORY NOTE 6: Licenses are likely to be approved, as administrative exceptions, for export and reexport to satisfactory end-users in Country Group D:1 of Air Traffic Control (ATC) ''software'' application ''programs'' controlled by 6D03.d.1, provided that:

a. The number of ''system tracks'' does not exceed 700;

b. The number of primary radar inputs does not exceed 32; and

c. The ''software'' is further limited to ''object code'' and the minimum amount of ''source code'' necessary for installation, operation or maintenance.

Category 7—Navigation and Avionics

A. EQUIPMENT, ASSEMBLIES, AND COMPONENTS

7A001 Accelerometers designed for use in inertial navigation or guidance systems and having any of the following characteristics, and specially designed components therefor.

LICENSE REQUIREMENTS

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
MT applies to entire entry except accelerometers that are specially designed and developed as Measurement While Drilling (MWD) sensors for use in downhole well service applications	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $5000
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: a. A ''bias'' ''stability'' of less (better) than 130 micro g with respect to a fixed calibration value over a period of one year;

b. A ''scale factor'' ''stability'' of less (better) than 130 ppm with respect to a fixed calibration value over a period of one year; or

c. Specified to function at linear acceleration levels exceeding 100 g.

7A002 Gyros having any of the following characteristics, and specially designed components therefor.

LICENSE REQUIREMENTS

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $5000
GBS: N/A

CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: a. A ''drift rate'' ''stability'', when measured in a 1 g environment over a period of three months and with respect to a fixed calibration value, of:

a.1. Less (better) than 0.1° per hour when specified to function at linear acceleration levels below 10 g; or

a.2. Less (better) than 0.5° per hour when specified to function at linear acceleration levels from 10 g to 100 g inclusive; or

b. Specified to function at linear acceleration levels above 100 g.

7A003 Inertial navigation systems (gimballed and strapdown) and inertial equipment for attitude, guidance or control, having any of the following characteristics, and specially designed components therefor.

LICENSE REQUIREMENTS

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $5000
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: Inertial navigation systems and inertial equipment, and specially designed components therefor specifically designed, modified or configured for military use are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. (See 22 CFR part 121, Category VIII.)
Related Definitions: N/A
Items: a. For ''aircraft'':

a.1. Navigation error (free inertial) of 0.8 nautical mile per hour (50% Circular Error Probable (CEP)) or less (better) subsequent to normal alignment;

a.2. Not certified for use on ''civil aircraft'' by ''civil aviation authorities''; or

a.3. Specified to function at linear acceleration levels exceeding 10 g.

b. [Reserved]

7A004 Gyro-astro compasses, and other devices that derive position or orientation by means of automatically tracking celestial bodies or satellites, with an azimuth accuracy of equal to or less (better) than 5 seconds of arc; and specially designed components therefor.

LICENSE REQUIREMENTS

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to entire entry except specially designed components	NS Column 2
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $5000
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit:$ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

7A006 Airborne altimeters operating at frequencies other than 4.2 to 4.4 GHz inclusive, having either of the following characteristics, and specially designed components therefor.

LICENSE REQUIREMENTS

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to entire entry except specially designed components	NS Column 2
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $5000
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: See Category 8 of the Commerce Control List for controls on automatic pilots for underwater vehicles, and Category 6 for controls on radar. Inertial navigation equipment for ships and submersibles is subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. (See 22 CFR part 121, Category VIII, paragraph (e).)
Related Definitions: N/A
Items: a. ''Power management''; or

b. Using phase shift key modulation.

7A101 Accelerometers, other than those specified in entry 7A001, with a threshold of 0.05 g or less, or a linearity error within 0.25% of full scale output, or both, that are designed for use in inertial navigation systems or in guidance systems of all types and specially designed components therefor.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry except accelerometers that are specially designed and developed as Measurement While Drilling (MWD) sensors for use in downhole well service applications.	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $5000
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definition: 7A101 does not specify accelerometers which are specially designed and developed as MWD (Measurement While Drilling) sensors for use in downhole well service operations.
Items: The list of items is included in the entry heading.

7A102 All types of gyros, other than those specified in 7A002, usable in "missiles", with a rated "drift rate" "stability" of less than 0.5° (1 sigma or rms) per hour in a 1 g environment and specially designed components therefor.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $5000
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: § value
Related Controls: N/A
Related Definitions: (1) Drift rate is defined as the time rate of output deviation from the desired output. It consists of random and systematic components and is expressed as an equivalent angular displacement per unit time with respect to inertial space. (2) Stability is defined as standard deviation (1 sigma) of the variation of a particular parameter from its calibrated value measured under stable temperature conditions. This can be expressed as a function of time.
Items: The list of items controlled is contained in the ECCN heading.

7A103 Instrumentation, navigation equipment and systems, other than those specified in 7A003, and specially designed components therefor.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $5000
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: (1) Items controlled in 7A103.b in the corresponding EU list number are not controlled in this CCL entry. Those items are subject to the export licensing jurisdiction of the U.S. Department of State, Office of Defense Trade Controls (See 22 CFR part 121, Category VIII.e) (2) Inertial navigation systems and inertial equipment, and specially designed components therefor specifically designed, modified or configured for military use are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. (See 22 CFR part 121, Category VIII.)
Related Definitions: N/A
Items: a. Inertial or other equipment using accelerometers or gyros specified in 7A001, 7A002, 7A101 or 7A102 and systems incorporating such equipment.
b. [Reserved]

7A104 Gyro-astro compasses and other devices, other than those specified in 7A004, that derive position or orientation by means of automatically tracking celestial bodies or satellites and specially designed components therefor.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $5000
GBS: N/A

CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

7A106 Avionics equipment and components usable in missile systems.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: Altimeters for missile systems controlled in the corresponding EU list number are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. (See 22 CFR part 121, Category VIII, paragraph (e).)
Related Definitions: N/A
Items: a. Terrain contour mapping equipment;
b. Scene mapping and correlation (both digital and analog) equipment;
c. Doppler navigation radar equipment;
d. Imaging sensor equipment (active).

7A115 Airborne passive sensors for determining bearing to specific electromagnetic sources (direction finding equipment) or terrain characteristics.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: Airborne passive sensors designed or modified for use in missile systems controlled in the corresponding EU list number is subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. (See 22 CFR part 121.)
Related Definitions: N/A
Items: a. Scene mapping and correlation (both digital and analog) equipment;
b. Passive interferometer equipment; and,
c. Imaging sensor equipment (passive).

7A994 Other navigation direction finding equipment, airborne communication equipment, all aircraft, inertial navigation systems not controlled under 7A003 or 7A103, and other avionic equipment, including parts and components, n.e.s.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: Global Positioning Satellite receivers having the following characteristics are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls (22 CFR part 121, Category XV): (a) Designed for encryption or decryption (e.g., Y-code) or GPS precise positioning service (PPS) signal; (b) Designed for producing navigation results above 60,000 feet altitude and at 1,000 knots velocity or greater; (c) Specifically designed or modified for use with a null-steering antenna or including a null-steering antenna designed to reduce or avoid jamming signals; or (d) Designed or modified for use with unmanned air vehicle systems capable of delivering at least a 500 kg payload to a range of at least 300 km. (GPS receivers designed or modified for use with military unmanned air vehicle systems with less capability are considered to be specially designed, modified or configured for military use are controlled by 22 CFR part 121, Category XV, paragraph (c).
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

B. TEST, INSPECTION AND PRODUCTION EQUIPMENT

7B001 Test, calibration or alignment equipment specially designed for equipment controlled by 7A, except equipment for Maintenance Level I or Maintenance Level II.

LICENSE REQUIREMENTS

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $3000
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definition: (1) Maintenance Level I: The failure of an inertial navigation unit is detected on the aircraft by indications from the Control and Display Unit (CDU) or by the status message from the corresponding sub-system. By following the manufacturer's manual, the cause of the failure may be localized at the level of the malfunctioning line replaceable unit (LRU). The operator then removes the LRU and replaces it with a spare.

(2) Maintenance Level II: The defective LRU is sent to the maintenance workshop (the manufacturer's or that of the operator responsible for level II maintenance). At the maintenance workshop, the malfunctioning LRU is tested by various appropriate means to verify and localize the defective shop replaceable assembly (SRA) module responsible for the failure. This SRA is removed and replaced by an operative spare. The defective SRA (or possibly the complete LRU) is then shipped to the manufacturer. Maintenance Level II does not include the removal of controlled accelerometers or gyro sensors from the SRA.

Items: The list of items controlled is contained in the ECCN heading.

7B002 Equipment specially designed to characterize mirrors for ring "laser" gyros.

LICENSE REQUIREMENTS

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $3000
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: a. Scatterometers having a measurement accuracy of 10 ppm or less (better); or

b. Profilometers having a measurement accuracy of 0.5 nm (5 angstrom) or less (better).

7B003 Equipment specially designed for the "production" of equipment controlled by 7A, and specially designed components therefor.

LICENSE REQUIREMENTS

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $3000
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: a. Gyro tuning test stations;
b. Gyro dynamic balance stations;
c. Gyro run-in/motor test stations;
d. Gyro evacuation and fill stations;
e. Centrifuge fixtures for gyro bearings;
f. Accelerometer axis align stations.

7B101 Equipment specially designed for the "production" of equipment controlled by 7A, and specially designed components therefor.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $3000
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: a. Inertial Measurement Unit (IMU Module) tester;
b. IMU platform tester;
c. IMU stable element handling fixture;
d. IMU platform balance fixture;
e. Accelerometer test station.

7B102 Reflectometers specially designed to characterize mirrors, for "laser" gyros, having a measurement accuracy of 50 ppm or less (better).

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $3000
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

7B994 Other equipment for the test, inspection, or "production" of navigation and avionics equipment.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

C. MATERIALS [RESERVED]

D. SOFTWARE

7D001 "Software" specially designed or modified for the "development" or "production" of equipment controlled by 7A (except 7A994) or 7B (except 7B994).

LICENSE REQUIREMENTS

Reason for Control: NS, MT, RS, AT

Control(s)	*Country Chart*
NS applies to ''software'' for equipment controlled by 7A001 to 7A004, 7A006, 7B001, 7B002 or 7B003	NS Column 1
MT applies to entire entry	MT Column 1
RS applies to ''software'' for inertial navigation systems inertial equipment, and specially designed components therefor, for ''civil aircraft''	RS Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: (1) The corresponding EU List number controls ''software'' relating to entries that do not appear on the CCL (e.g., 7A003.b, 7A005, 7A103.b, 7A105, 7A116, 7A117, 7B103). The ''software'' related to these entries is subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. (See 22 CFR part 121.) (2) ''Software'' for inertial navigation systems and inertial equipment, and specially designed components therefor, not for use on civil aircraft are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. (See 22 CFR part 121, Category VIII, paragraph (e).)
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

7D002 "Source code" for the "use" of any inertial navigation equipment or Attitude Heading Reference Systems (AHRS) (except gimballed AHRS) including inertial equipment not controlled by 7A003 or 7A004.

LICENSE REQUIREMENTS

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definition: AHRS generally differ from inertial navigation systems (INS) in that an AHRS provides altitude heading information and normally does not provide the acceleration, velocity and position information associated with INS.
Items: The list of items controlled is contained in the ECCN heading.

7D003 Other "software".

LICENSE REQUIREMENTS

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A

Related Definitions: N/A

Items: a. ''Software'' specially designed or modified to improve the operational performance or reduce the navigational error of systems to the levels specified in 7A003 or 7A004;

b. ''Source code'' for hybrid integrated systems that improves the operational performance or reduces the navigational error of systems to the level specified in 7A003 by continuously combining inertial data with any of the following navigation data:

b.1. Doppler radar velocity;

b.2. Global Positioning Satellite (GPS) references or;

b.3. Terrain data base;

c. ''Source code'' for integrated avionics or mission systems that combine sensor data and employ knowledge-based expert systems;

d. ''Source code'' for the ''development'' of:

d.1. Digital flight management systems for flight path optimization;

d.2. Integrated propulsion and flight control systems;

d.3. Fly-by-wire or fly-by-light control systems;

d.4. Fault-tolerant or self-reconfiguring ''active flight control systems'';

d.5. Airborne automatic direction finding equipment;

d.6. Air data systems based on surface static data;

d.7. Raster-type head-up displays or three dimensional displays.

7D101 "Software" specially designed for the "use" of equipment controlled by 7A001 to 7A004, 7A006, 7A101 to 7A104, 7A106, 7A115, 7B001, 7B002, 7B003, 7B101, or 7B102.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A

TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value

Related Controls: (1) The corresponding EU List number controls ''software'' relating to entries that do not appear on the CCL (e.g., 7A003.b, 7A005, 7A103.b, 7A105, 7A116, 7A117, or 7B103). The ''software'' related to these entries is subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. (See 22 CFR part 121.) (2) ''Software'' for inertial navigation systems and inertial equipment, and specially designed components therefor, not designed for use on civil aircraft by civil aviation authorities of a country listed in Country Group A:1 is subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. (See 22 CFR part 121, Category VIII.)

Related Definitions: N/A

Items: The list of items controlled is contained in the ECCN heading.

7D102 Integration "software" for the equipment controlled by 7A003 or 7A103.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS:

CIV: N/A

TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value

Related Controls: (1) The corresponding EU List number controls ''software'' relating to entries that do not appear on the CCL (e.g., 7A003.b or 7A103.b). The ''software'' related to these entries is subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. (See 22 CFR part 121.)

Related Definitions: N/A

Items: The list of items controlled is contained in the ECCN heading.

7D994 "Software", n.e.s., for the "development", "production", or "use" of navigation, airborne communication and other avionics.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A

TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value

Related Controls: N/A

Related Definitions: N/A

Items: The list of items controlled is contained in the ECCN heading.

E. TECHNOLOGY

7E001 "Technology" according to the General Technology Note for the "development" of equipment or "software" controlled by 7A (except 7A994), 7B (except 7B994), or 7D (except 7D994).

LICENSE REQUIREMENTS

Reason for Control: MT, NS, RS, AT

Control(s)	*Country Chart*
NS applies to ''technology for items controlled by 7A001 to 7A004, 7A006, 7B001 to 7B003, 7D001 to 7D003	NS Column 1
MT applies to entire entry	MT Column 1
RS applies to ''technology'' for inertial navigation systems, inertial equipment and specially designed components therefor, for civil aircraft	RS Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: The corresponding EU List number controls ''technology'' relating to entries that do not appear on the CCL (e.g., 7A003.b, 7A005, 7A103.b, 7A105, 7A116, 7A117, 7B103). The software related to these entries is subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Control (see 22 CFR part 121).
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

7E002 "Technology" according to the General Technology Note for the "production" of equipment controlled by 7A (except 7A994) or 7B (except 7B994).

LICENSE REQUIREMENTS

Reason for Control: NS, MT, RS, AT

Control(s)	*Country Chart*
NS applies to ''technology'' for equipment controlled by 7A001 to 7A004, 7A006 or 7B001 to 7B003	NS Column 1
MT applies to entire entry	MT Column 1
RS applies to ''technology'' for inertial navigation systems, inertial equipment and specially designed components therefor, for civil aircraft	RS Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: The corresponding EU List number controls ''technology'' relating to entries that do not appear on the CCL (e.g., 7A003.b, 7A005, 7A103.b, 7A105, 7A116, 7A117, 7B103). The software related to these entries is subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls (see 22 CFR part 121).
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

7E003 "Technology" according to the General Technology Note for the repair, refurbishing or overhaul of equipment controlled by 7A001 to 7A004, except for maintenance "technology" directly associated with calibration, removal or replacement of damaged or unserviceable line replaceable units (LRU) and shop replaceable units (SRA) of a "civil aircraft" as described in Maintenance Level I or Maintenance Level II.

LICENSE REQUIREMENTS

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definition: Refer to the Related Definitions for 7B001
Items: The list of items controlled is contained in the ECCN heading.

7E004 Other "technology."

LICENSE REQUIREMENTS

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls:
N/A
Related Definitions: N/A
Items: a. ''Technology'' for the ''development'' or ''production'' of:

a.1. Airborne automatic direction finding equipment operating at frequencies exceeding 5 MHz;

a.2. Air data systems based on surface static data only, i.e., that dispense with conventional air data probes;

a.3. Raster-type head-up displays or three dimensional displays for ''aircraft'';

a.4. Inertial navigation systems or gyro-astro compasses containing accelerometers or gyros controlled by 7A001 or 7A002;

b. ''Development'' ''technology'', as follows, for ''active flight control systems'' (including fly-by-wire or fly-by-light);

b.1. Configuration design for interconnecting multiple microelectronic processing elements (on-board computers) to achieve ''real time processing'' for control law implementation;

b.2. Control law compensation for sensor location or dynamic airframe loads, i.e., compensation for sensor vibration environment or for variation of sensor location from the center of gravity;

b.3. Electronic management of data redundancy or systems redundancy for fault detection, fault tolerance, fault isolation or reconfiguration;

NOTE: 7E004.b.3 does not control ''technology'' for the design of physical redundancy.

b.4. Flight controls that permit inflight reconfiguration of force and moment controls for real time autonomous air vehicle control;

b.5. Integration of digital flight control, navigation and propulsion control data into a digital flight management system for flight path optimization, except ''development'' ''technology'' for aircraft flight instrument systems integrated solely for VOR, DME, ILS or MLS navigation or approaches;

b.6. Full authority digital flight control or multi sensor mission management systems incorporating knowledge-based expert systems;

NOTE: (For ''technology'' for Full Authority Digital Engine Control (FADEC), see 9E003.a.10)

c. ''Technology'' for the ''development'' of helicopter systems, as follows:

c.1. Multi-axis fly-by-wire or fly-by-light controllers that combine the functions of at least two of the following into one controlling element:

c.1.a. Collective controls;

c.1.b. Cyclic controls;

c.1.c. Yaw controls;

c.2. ''Circulation-controlled anti-torque or circulation-controlled directional control systems'';

c.3. Rotor blades incorporating ''variable geometry airfoils'' for use in systems using individual blade control.

7E101 "Technology" according to the General Technology Note for the "use" of equipment or "software" specified in 7A001 to 7A004, 7A006, 7A101 to 7A104, 7A106, 7A115, 7B002, 7B003, 7B101, 7B102, 7D101 or 7D102 for MT reasons.

LICENSE REQUIREMENTS

Reason for Control: MT, RS, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
RS applies to ''development'' or ''production'' of inertial navigation systems, inertial equipment and specially designed components therefor, for civil aircraft. ..	RS Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A

TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A

Related Controls: (1) The corresponding EU List number controls ''technology'' relating to entries that do not appear on the CCL (e.g., 7A003.b, 7A005, 7A103.b, 7A105, 7A116, 7A117, 7B103). The software related to these entries is subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. (See 22 CFR part 121.) 2.)

''Technology'' for inertial navigation systems and inertial equipment, and specially designed components therefor, not for use on civil aircraft are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. (See 22 CFR part 121, Category VIII.)

Related Definitions: N/A

Items: The list of items controlled is contained in the ECCN heading.

97E102 "Technology" for protection of avionics and electrical subsystems against electromagnetic pulse (EMP) and electromagnetic interference (EMI) hazards from external sources.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A

TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A

Related Controls: N/A

Related Definitions: N/A
Items: a. Design ''technology'' for shielding systems;
b. Design ''technology'' for the configuration of hardened electrical circuits and subsystems;
c. Design ''technology'' for the determination of hardening criteria of paragraph a and b above.

7E994 "Technology", n.e.s., for the "development", "production", or "use" of navigation, airborne communication, and other avionics equipment.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

EAR99 Items subject to the EAR that are not elsewhere specified in this CCL Category or in any other category in the CCL are designated by the number EAR99.

Category 8—Marine

A. EQUIPMENT, ASSEMBLIES AND COMPONENTS

8A001 Submersible vehicles or surface vessels.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $5000
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number; parts and accessories in § value
Related Controls: See other Categories, as appropriate, within the Commerce Control List for controls of equipment for submersible vehicles (e.g., for the control status of marine gas turbine engines, see Category 9).
Related Definitions: N/A
Items: a. Manned, tethered submersible vehicles designed to operate at depths exceeding 1,000 m;
b. Manned, untethered submersible vehicles:
b.1. Designed to ''operate autonomously'' and having a lifting capacity of:
b.1.a. 10% or more of their weight in air; and
b.1.b. 15 kN or more;
b.2. Designed to operate at depths exceeding 1,000 m; or
b.2.a. Designed to carry a crew of 4 or more;
b.2.b. Designed to ''operate autonomously'' for 10 hours or more;
b.2.c. Having a ''range'' of 25 nautical miles or more; and
b.2.d. Having a length of 21 m or less;
c. Unmanned, tethered submersible vehicles designed to operate at depths exceeding 1,000 m:
c.1. Designed for self-propelled maneuver using propulsion motors or thrusters controlled by 8A002.a.2; or
c.2. Having a fiber optic data link;
d. Unmanned, untethered submersible vehicles:
d.1. Designed for deciding a course relative to any geographical reference without real-time human assistance;
d.2. Having an acoustic data or command link; or
d.3. Having a fiber optic data or command link exceeding 1,000 m;
e. Ocean salvage systems with a lifting capacity exceeding 5 MN for salvaging objects from depths exceeding 250 m and having either of the following:
e.1. Dynamic positioning systems capable of position keeping within 20 m of a given point provided by the navigation system; or
e.2. Seafloor navigation and navigation integration systems for depths exceeding 1,000 m with positioning accuracies to within 10 m of a predetermined point;
f. Surface-effect vehicles (fully skirted variety) with a maximum design speed, fully loaded, exceeding 30 knots in a significant wave height of 1.25 m (Sea State 3) or more, a cushion pressure exceeding 3,830 Pa, and a light-ship-to-full-load displacement ratio of less than 0.70;
g. Surface-effect vehicles (rigid sidewalls) with a maximum design speed, fully loaded, exceeding 40 knots in a significant wave height of 3.25 m (Sea State 5) or more;
h. Hydrofoil vessels with active systems for automatically controlling foil systems, with a maximum design speed, fully loaded, of 40 knots or more in a significant wave height of 3.25 m (Sea State 5) or more;
i. Small waterplane area vessels with:
i.1. A full load displacement exceeding 500 tons with a maximum design speed, fully loaded, exceeding 35 knots in a significant

wave height of 3.25 m (Sea State 5) or more; or

i.2. A full load displacement exceeding 1,500 tons with a maximum design speed, fully loaded, exceeding 25 knots in a significant wave height of 4 m (Sea State 6) or more.

TECHNICAL NOTE: A small waterplane area vessel is defined by the following formula: waterplane area at an operational design draft less than 2×(displaced volume at the operational design draft)$^{2/3}$.

8A002 Systems or equipment.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $5000

GBS: Yes for 8A002.i.2 as described in Advisory Note to Category 8 and 8A002.e.2

CIV: Yes for 8A002.i.2 as described in Advisory Note to Category 8 and 8A002.e.2

LIST OF ITEMS CONTROLLED

Unit: Equipment in number

Related Controls: See other Categories, as appropriate, within the Commerce Control List for controls of equipment for submersible vehicles (e.g., for underwater communications systems, see Category 5).

Related Definitions: N/A

Items: a. Systems or equipment, specially designed or modified for submersible vehicles, designed to operate at depths exceeding 1,000 m, as follows:

a.1. Pressure housings or pressure hulls with a maximum inside chamber diameter exceeding 1.5 m;

a.2. Direct current propulsion motors or thrusters;

a.3. Umbilical cables, and connectors therefor, using optical fiber and having synthetic strength members;

b. Systems specially designed or modified for the automated control of the motion of equipment for submersible vehicles controlled by 8A001 using navigation data and having closed loop servo-controls to:

b.1. Enable a vehicle to move within 10 m of a predetermined point in the water column;

b.2. Maintain the position of the vehicle within 10 m of a predetermined point in the water column; or

b.3. Maintain the position of the vehicle within 10 m while following a cable on or under the seabed;

c. Fiber optic hull penetrators or connectors;

d. Underwater vision systems, as follows:

d.1.a. Television systems (comprising camera, lights, monitoring and signal transmission equipment) having a limiting resolution when measured in air of more than 500 lines and specially designed or modified for remote operation with a submersible vehicle; or

d.1.b. Underwater television cameras having a limiting resolution when measured in air of more than 700 lines;

TECHNICAL NOTE: Limiting resolution in television is a measure of horizontal resolution usually expressed in terms of the maximum number of lines per picture height discriminated on a test chart, using IEEE Standard 208/1960 or any equivalent standard.

d.2. Systems, specially designed or modified for remote operation with an underwater vehicle, employing techniques to minimize the effects of back scatter, including range-gated illuminators or ''laser'' systems;

d.3. Low light level television cameras specially designed or modified for underwater use containing:

d.3.a. Image intensifier tubes controlled by 6A002.a.2.a; and

d.3.b. More than 150,000 ''active pixels'' per solid state area array;

e. Photographic still cameras specially designed or modified for underwater use, having a film format of 35 mm or larger, and:

e.1. Annotating the film with data provided by a source external to the camera;

e.2. Having autofocussing or remote focussing specially designed for underwater use;

e.3. Having automatic back focal distance correction; or

e.4. Having automatic compensation control specially designed to permit an underwater camera housing to be usable at depths exceeding 1,000 m;

f. Electronic imaging systems, specially designed or modified for underwater use, capable of storing digitally more than 50 exposed images;

g. Light systems, as follows, specially designed or modified for underwater use:

g.1. Stroboscopic light systems capable of a light output energy of more than 300 J per flash;

g.2. Argon arc light systems specially designed for use below 1,000 m;

h. ''Robots'' specially designed for underwater use, controlled by using a dedicated stored program computer, and:

h.1. Having systems that control the ''robot'' using information from sensors that measure force or torque applied to an external object, distance to an external object, or tactile sense between the ''robot'' and an external object; or

h.2. Capable of exerting a force of 250 N or more or a torque of 250 Nm or more and using titanium based alloys or ''fibrous and filamentary'' ''composite'' materials in their structural members;

i. Remotely controlled articulated manipulators specially designed or modified for use with submersible vehicles and having either of the following characteristics:

i.1. Having systems that control the manipulator using the information from sensors

that measure the torque or force applied to an external object, or tactile sense between the manipulator and an external object; or

i.2. Controlled by proportional master-slave techniques or by using a dedicated stored program computer, and having 5 degrees of freedom of movement or greater;

NOTE: Only functions having proportional control using positional feedback or by using a dedicated stored program computer are counted when determining the number of degrees of freedom of movement.

j. Air-independent power systems, as follows, specially designed for underwater use:

j.1. Brayton, Stirling or Rankine cycle engine air independent power systems having any of the following:

j.1.a. Chemical scrubber or absorber systems specially designed to remove carbon dioxide, carbon monoxide and particulates from recirculated engine exhaust;

j.1.b. Systems specially designed to use a monoatomic gas;

j.1.c. Devices or enclosures specially designed for underwater noise reduction in frequencies below 10 kHz, or special mounting devices for shock mitigation; or

j.1.d. Systems specially designed:

j.1.d.1. To pressurize the products of reaction or for fuel reformation;

j.1.d.2. To store the products of the reaction; and

j.1.d.3. To discharge the products of the reaction against a pressure of 100 kPa or more;

j.2. Diesel cycle engine air independent systems, having all of the following:

j.2.a. Chemical scrubber or absorber systems specially designed to remove carbon dioxide, carbon monoxide and particulates from recirculated engine exhaust;

j.2.b. Systems specially designed to use a monoatomic gas;

j.2.c. Devices or enclosures specially designed for underwater noise reduction in frequencies below 10 kHz or special mounting devices for shock mitigation; and

j.2.d. Specially designed exhaust systems that do not exhaust continuously the products of combustion;

j.3. Fuel cell air independent power systems with an output exceeding 2 kW having either of the following:

j.3.a. Devices or enclosures specially designed for underwater noise reduction in frequencies below 10 kHz or special mounting devices for shock mitigation; or

j.3.b. Systems specially designed:

j.3.b.1. To pressurize the products of reaction or for fuel reformation;

j.3.b.2. To store the products of the reaction; and

j.3.b.3. To discharge the products of the reaction against a pressure of 100 kPa or more;

k. Skirts, seals and fingers, as follows:

k.1. Designed for cushion pressures of 3,830 Pa or more, operating in a significant wave height of 1.25 m (Sea State 3) or more and specially designed for surface effect vehicles (fully skirted variety) controlled by 8A001.f;

k.2. Designed for cushion pressures of 6,224 Pa or more, operating in a significant wave height of 3.25 m (Sea State 5) or more and specially designed for surface effect vehicles (rigid sidewalls) controlled by 8A001.g;

l. Lift fans rated at more than 400 kW specially designed for surface effect vehicles controlled by 8A001.f or 8A001.g;

m. Fully submerged subcavitating or supercavitating hydrofoils specially designed for vessels controlled by 8A001.h;

n. Active systems specially designed or modified to control automatically the sea-induced motion of vehicles or vessels controlled by 8A001.f, .g, .h or .i;

o.1. Water-screw propeller or power transmission systems, as follows, specially designed for surface effect vehicles (fully skirted or rigid sidewall variety), hydrofoils or small waterplane area vessels controlled by 8A001.f, .g, .h or .i:

o.1.a. Supercavitating, super-ventilated, partially-submerged or surface piercing propellers rated at more than 7.5 MW;

o.1.b. Contrarotating propeller systems rated at more than 15 MW;

o.1.c. Systems employing pre-swirl or post-swirl techniques for smoothing the flow into a propeller;

o.1.d. Light-weight, high capacity (K factor exceeding 300) reduction gearing;

o.1.e. Power transmission shaft systems, incorporating ''composite'' material components, capable of transmitting more than 1 MW;

o.2. Water-screw propeller, power generation or transmission systems for use on vessels.

o.2.a. Controllable-pitch propellers and hub assemblies rated at more than 30 MW;

o.2.b. Internally liquid-cooled electric propulsion engines with a power output exceeding 2.5 MW;

o.2.c. ''Superconductive'' propulsion engines, or permanent magnet electric propulsion engines, with a power output exceeding 0.1 MW;

o.2.d. Power transmission shaft systems, incorporating ''composite'' material components, capable of transmitting more than 2 MW;

o.2.e. Ventilated or base-ventilated propeller systems rated at more than 2.5 MW;

o.3. Noise reduction systems for use on vessels of 1,000 tons displacement or more, as follows:

o.3.a. Noise reduction systems that attenuate at frequencies below 500 Hz and consist of compound acoustic mounts for the acoustic isolation of diesel engines, diesel generator sets, gas turbines, gas turbine generator sets, propulsion motors or propulsion reduction gears, specially designed for sound or vibration isolation, having an intermediate mass

exceeding 30% of the equipment to be mounted;

o.3.b. Active noise reduction or cancellation systems, or magnetic bearings, specially designed for power transmission systems, and incorporating electronic control systems capable of actively reducing equipment vibration by the generation of anti-noise or anti-vibration signals directly to the source;

p. Pumpjet propulsion systems with a power output exceeding 2.5 MW using divergent nozzle and flow conditioning vane techniques to improve propulsive efficiency or reduce propulsion-generated underwater-radiated noise.

8A018 Items on the International Munitions List.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country chart*
NS applies to entire entry	NS Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $5000
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: a. Closed and semi-closed circuit (rebreathing) apparatus for diving and underwater swimming, and specially designed components for use in the conversion of open-circuit apparatus to military use;

b. Naval equipment, as follows:

b.1. Diesel engines of 1,500 hp and over with rotary speed of 700 rpm or over specially designed for submarines;

b.2. Electric motors specially designed for submarines, i.e., over 1,000 hp, quick reversing type, liquid cooled, and totally enclosed;

b.3. Nonmagnetic diesel engines, 50 hp and over, specially designed for military purposes. (An engine shall be presumed to be specially designed for military purposes if it has nonmagnetic parts other than crankcase, block, head, pistons, covers, end plates, valve facings, gaskets, and fuel, lubrication and other supply lines, or its nonmagnetic content exceeds 75 percent of total weight.);

b.4. Marine boilers designed to have any of the following characteristics:

b.4.a. Heat release rate (at maximum rating) equal to or in excess of 190,000 BTU per hour per cubic foot of furnace volume; or

b.4.b. Ratio of steam generated in pounds per hour (at maximum rating) to the dry weight of the boiler in pounds equal to or in excess of 0.83;

b.5. Submarine and torpedo nets; and

b.6. Components, parts, accessories, and attachments for the above.

8A992 Other underwater camera equipment, n.e.s., other submersible systems, n.e.s.; and specially designed parts therefor.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

8A993 Self-contained underwater breathing apparatus (scuba gear) and related equipment.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 2

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: a. Self-contained underwater breathing apparatus (scuba gear);

b. Pressure regulators, air cylinders, hoses, valves and backpacks for the apparatus described in paragraph 8A993.a;

c. Life jackets, inflation cartridges, compasses, wetsuits, masks, fins, weight belts, and dive computers;

d. Underwater lights and propulsion equipment;

e. Air compressors and filtration systems specially designed for filling air cylinders; and

f. Other self-contained underwater breathing apparatus (scuba gear) and related equipment, n.e.s.

8A994 Boats, n.e.s., including inflatable boats, marine engines (both inboard and outboard) and submarine engines, n.e.s; and specially designed parts therefor, n.e.s.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 2

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

B. TEST, INSPECTION AND PRODUCTION EQUIPMENT

8B001 Water tunnels, having a background noise of less than 100 dB (reference 1 microPascal, 1 Hz) in the frequency range from 0 to 500 Hz, designed for measuring acoustic fields generated by a hydro-flow around propulsion system models.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $3000
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

C. MATERIALS

8C001: Syntactic foam for underwater use.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definition: Syntactic foam consists of hollow spheres of plastic or glass embedded in a resin matrix.
Items: a. Designed for marine depths exceeding 1,000 m; and
b. With a density less than 561 kg/m^3.

D. SOFTWARE

8D001 "Software" specially designed or modified for the "development", "production" or "use" of equipment or materials controlled by 8A (except 8A018, 8A992 to 8A994), 8B, or 8C.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: Yes

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

8D002 Specific "software" specially designed or modified for the "development", "production", repair, overhaul or refurbishing (re-machining) of propellers specially designed for underwater noise reduction.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: Yes

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

8D992 "Software" specially designed or modified for the "development", "production" or "use" of equipment controlled by 8A992.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

8D993 "Software" specially designed or modified for the "development", "production" or "use" of equipment controlled by 8A993 and 8A994.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 2

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

E. TECHNOLOGY

8E001 "Technology" according to the General Technology Note for the "development" or "production" of equipment or materials controlled by 8A (except 8A018, 8A992 to 8A994), 8B, or 8C.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country chart*
NS applies to entire entry	NS Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: Yes

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

8E002 Other technology.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country chart*
NS applies to entire entry	NS Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: Yes

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: a. ''Technology'' for the ''development'', ''production'', repair, overhaul or refurbishing (re-machining) of propellers specially designed for underwater noise reduction;

b. ''Technology'' for the overhaul or refurbishing of equipment controlled by 8A001, 8A002.b, .j, .o, or .p.

8E992 "Technology" for the "development", "production" or "use" of equipment controlled by 8A992.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

8E993 "Technology" for the "development", "production" or "use" of items controlled by 8A993 and 8A994.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 2

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

EAR99 Items subject to the EAR that are not elsewhere specified in this CCL Category or in any other category in the CCL are designated by the number EAR99.

ADVISORY NOTES FOR CATEGORY 8

ADVISORY NOTE: Licenses are likely to be approved, as administrative exceptions, for export and reexport to satisfactory end-users in Country Group D:1 of manipulators, for civil end-uses (e.g., underwater oil, gas or mining operations), that are controlled by 8A002.i.2 and have 5 degrees of freedom of movement.

Category 9—Propulsion Systems Space Vehicles and Related Equipment

A. EQUIPMENT, ASSEMBLIES AND COMPONENTS

9A001 Aero gas turbine engines incorporating any of the technologies controlled by 9E003.a and described in this entry.

LICENSE REQUIREMENTS

Reason for Control: NS, MT, AT

Control(s)	*Country chart*
NS applies to entire entry	NS Column 2
MT applies to only to those engines that meet the characteristics listed in 9A101	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $5000
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number; parts and accessories in $ value
Related Controls: N/A
Related Definitions: N/A
Items: a. Not certified for the specific ''civil aircraft'' for which they are intended;

NOTE: For the purpose of the ''civil aircraft'' certification process, a limited number of civil certified engines, assemblies or components may be authorized for export and reexport to Country Group D:1. This limited number is defined as the minimum required (up to 16, including spares) for civil certification.

b. Not certified for civil use by the civil aviation authorities in a country listed in Country Group A:1;

c. Designed to cruise at speeds exceeding Mach 1.2 for more than thirty minutes;

9A002 Marine gas turbine engines with an ISO standard continuous power rating of 24,245 kW or more and a specific fuel consumption of less than 0.219 kg/kWh at any point in the power range from 35 to 100%, and specially designed assemblies and components therefor.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $5000
GBS: Yes, only as described in Advisory Note 1 to Category 9
CIV: Yes, only as described in Advisory Note 1 to Category 9

LIST OF ITEMS CONTROLLED

Unit: Number
Related Controls: N/A
Related Definition: The term marine gas turbine engines includes those industrial, or aero-derivative, gas turbine engines adapted for marine propulsion or shipboard power generation.
Items: The list of items controlled is contained in the ECCN heading.

9A003 Specially designed assemblies and components, incorporating any of the technologies controlled by 9E003.a, for gas turbine engine propulsion systems.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $5000
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Number
Related Controls:
Related Definition: This entry does not control multiple domed combusters operating at average burner outlet temperatures equal to or less than 1,813 K (1,540 °C).
Items: a. Assemblies and components specially designed for those gas turbine engine propulsion systems controlled by 9A001; or

b. Whose design or production origins are either countries listed in Country Group D:1 or unknown to the manufacturer;

9A004 "Spacecraft", (not including their payloads) and specially designed components therefor that are not subject to the authority of the Department of State. (See notes.)

LICENSE REQUIREMENTS

Reason for Control: NS, AT, SI.

Control(s)	*Country chart*
NS applies to entire entry	NS Column 1
AT applies to entire entry	AT Column 1

SI applies to commercial communications satellites controlled by 9A004.a. See §742.14 of the EAR for additional information.

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number; systems, components, parts and accessories in $ value.

Related Controls: (1) The corresponding EU list number controls space launch vehicles (not including their payloads) and other ''spacecraft'' (not identified in this CCL entry). These items are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls (See 22 CFR part 121, Category XV). For the control status of products contained in ''spacecraft'' payloads, see the appropriate categories of the U.S. Munitions List (USML). (2) For the control status of items contained in ''spacecraft'' payloads subject to the EAR, see the appropriate entries on the CCL.

Related Definition: Transferring registration or operational control to any foreign person of any commercial communications satellite controlled by this entry must be authorized on a license issued by the Bureau of Export Administration. This requirement applies whether the commercial communications satellite is physically located in the United States or abroad.

Items: a. Commercial communication satellites;

TECHNICAL NOTE: Commercial communications satellites are subject to Commerce licensing jurisdiction even if they include the individual munitions list systems, components, or parts identified in Category XV(f) of the USML. In all other cases, these systems, components, or parts remain on the USML, except that non-embedded, solid propellant orbit transfer engines (''kick motors'') are subject to Commerce licensing jurisdiction (and not controlled under the USML) when they are to be utilized for the specific commercial communications satellite launch, provided the solid propellant ''kick motor'' being utilized is not specifically designed or modified for military use or capable of being restarted after achievement of mission orbit (such orbit transfer engines are always controlled under Category IV of the USML). Technical data (as defined in §120.21 of the International Traffic in Arms Regulations (ITAR)) and defense services (as defined in §120.8 of the ITAR) related to the systems, components, or parts referred to in Category XV(f) of the USML are always controlled under the USML, even when the satellite itself is licensed by the Department of Commerce.

NOTE: Military communications satellites or multi-mission satellites, including commercial communications satellites having additional non-communication mission(s) or payload(s) are under the jurisdiction of the Department of State.

b. [Reserved]

c. Other ''spacecraft'' not subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls under 22 CFR part 121, Category XV.

NOTES: 1. ECCN 9A004.c includes the international space station being developed, launched and operated under the supervision of the U.S. National Aeronautics and Space Administration. Exporters requesting a license from the Department of Commerce for spacecraft other than the international space station or a commercial communications satellite specified in 9A004 must provide a statement from the Department of State, Office of Defense Trade Controls, verifying that the item intended for export is under the licensing jurisdiction of the Department of Commerce.

2. All other spacecraft, including all other satellites not controlled under 9A004 and components, parts, accessories, attachments, associated equipment, and ground support equipment therefor are subject to the export licensing authority of the Department of State.

3. Items on Category XV(f) of the USML that are included in a commercial communications satellite to be exported under a Commerce license must be specifically listed on the Commerce license application. Such items when not included in a specific commercial communications satellite are under the jurisdiction of the Department of State.

4. Technical data provided to the launch provider (form, fit, function, mass, electrical, mechanical, dynamic/environmental, telemetry, safety, facility, launch pad access, and launch parameters) for commercial communications satellites that describe the interfaces for mating of the satellite to the launch vehicle and parameters for launch (e.g. orbit, timing) of the satellite, are under Commerce jurisdiction. Other technical data and all defense services and technical assistance for satellite and/or launch vehicles, including compatibility, integration, or processing data are controlled and subject to licensing by the Department of State, in accordance with 22 CFR parts 120 through 130. Approval for such technical assistance will require a Technical Assistance Agreement (TAA) and may require U.S. Government oversight.

5. Once a satellite is launched, items remaining unlaunched are required to be returned immediately to the United States. If the satellite launch is canceled or unduly delayed, the satellite and all support equipment must be returned immediately to the United States.

6. Detailed design, development, production, or manufacturing data for all spacecraft, including satellites, regardless of which agency has jurisdiction over the export, and all systems components, parts, accessories, attachments, and associated equipment (including ground support equipment) specifically designed or modified for articles under Category XV on the United States Munitions List (including software source code and operating algorithms) are subject to licensing by the Department of State. This does not include that level of technical data (including marketing data) necessary and reasonable for a purchaser to have assurance that a U.S.-built item intended to operate in space has been designed, manufactured and tested in conformance with specified contract requirements (e.g., operational performance, reliability, lifetime, product quality, or delivery expectations) as well as data necessary for normal in-orbit satellite operations, to evaluate in-orbit anomalies, and to operate and maintain associated ground station equipment (except encryption hardware).

9A018 Equipment on the International Munitions List.

LICENSE REQUIREMENTS

Reason for Control: NS, RS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
RS applies to 9A018.a and b	RS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $1500
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number; parts and accessories in $ value

Related Controls: (a) Parachute systems designed for use in dropping military equipment, braking military aircraft, slowing spacecraft descent, or retarding weapons delivery; AND (b)Instrument flight trainers for combat simulation are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. (See 22 CFR part 121, Category VIII.)

Related Definition: This entry controls parachute systems designed for use in dropping personnel only.

Items: a. Military trainer aircraft bearing ''T'' designations:

a.1. Using reciprocating engines; or

a.2. Turbo prop engines with less than 600 horse power (h.p.);

a.3. T–37 model jet trainer aircraft; and

a.4. Specially designed component parts.

b. Vehicles specially designed or modified for military purposes. (See part 770 of the EAR, Interpretation 8)

c. Pressure refuelers, pressure refueling equipment, and equipment specially designed to facilitate operations in confined areas; and ground equipment, n.e.s, developed specially for military aircraft and helicopters, and specially designed parts and accessories, n.e.s.;

d. Pressurized breathing equipment specially designed for use in military aircraft and helicopters;

e. Military parachutes and complete canopies, harnesses, and platforms and electronic release mechanisms therefor, except such types as are in normal sporting use;

f. Military instrument flight trainers, except for combat simulation; and components, parts, attachments and accessories specially designed for such equipment.

9A101 Lightweight turbojet and turbofan engines (including turbocompound engines) usable in "missiles", other than those specified in 9A001, having both the following characteristics.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $5000
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number; parts and accessories in § value

Related Controls: (1) Items controlled in 9A101.b in the corresponding EU List number are not controlled in this CCL entry. Those items are subject to the export licensing jurisdiction of the U.S. Department of State, Office of Defense Trade Controls (See 22 CFR part 121, Category IV, paragraph (h) and Category VIII). (2) Engines designed or modified for missiles (except engines for non-military unmanned air vehicles [UAVs] or remotely piloted vehicles [RPVs]), regardless of thrust or specific fuel consumption, are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. (See 22 CFR part 121, Category VIII.)

Related Definitions: N/A

Items: a. Maximum thrust value greater than 1000 N (achieved un-installed) excluding civil certified engines with a maximum thrust value greater than 8,890 N (achieved un-installed); *and*

b. [Reserved]

c. Specific fuel consumption of 0.13kg/N/hr or less (at sea level static and standard conditions).

9A106 Systems or components, other than those controlled by 9A006, usable in "missiles," as follows, specially designed for liquid rocket propulsion systems.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $1000
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment and components in number; parts and accessories in $ value

Related Controls: Items controlled in 9A106.a, .b, and .c in the corresponding EU List number are not controlled in this CCL entry. Those items are subject to the export licensing jurisdiction of the U.S. Department of State, Office of Defense Trade Controls (See 22 CFR part 121, Category IV, paragraphs (f) and (h).)

Related Definitions: Only the following servo valves and pumps are controlled by this entry: (1) Servo valves designed for flow rates of 24 liters per minute or greater, at an absolute pressure of 7 MPa (1,000 psi) or greater, have an actuator response time of less than 100 ms; (2) Pumps, for liquid propellants, with shaft speeds equal to or greater than 8,000 rpm or with discharge pressures equal to or greater than 7 MPa (1,000 psi).

Items: a–c. [Reserved]

d. Liquid or slurry propellant (including oxidizers) control systems designed or modified to operate in vibration environments of

more than 10 g RMS between 20 Hz and 2,000 Hz, and specially designed components therefor.

9A110 Composite structures, laminates, and manufactures thereof, and resin impregnated fiber prepregs and metal coated fiber preforms, therefor, made either with organic matrix or metal matrix utilizing fibrous or filamentary reinforcements having a specific tensile strength greater than 7.62×10^4 m (3×10^6 inches) and a specific modulus greater than 3.18×10^6 m (1.25×10^8 inches).

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $1500
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Kilograms
Related Controls: The corresponding EU List number includes references to items that are not contained on the CCL (e.g., 9A005, 9A007, 9A010, 9A104, 9A105, 9A106.a, .b, and .c, 9A107, 9A108, 9A116 to 9A119). These items are not cross-referenced in the CCL since they are subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls (see 22 CFR part 121) and do not appear on the CCL.
Related Definition: The only resin impregnated fiber prepregs specified in entry 9A110 are those using resins with a glass transition temperature (T_g), after cure, exceeding 418 K (145 °C) as determined by ASTM D4065 or national equivalents.
Items: The list of items controlled is contained in the ECCN heading.

9A115 Launch support equipment designed or modified for systems controlled by 9A004 or 9A104.

LICENSE REQUIREMENTS

Reason for Control: MT, UN, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
UN applies to entire entry	Rwanda
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number; parts and accessories in $ value
Related Controls: (1) Items controlled in 9A115.a in the corresponding EU List number are not controlled in this CCL entry. Those items are subject to the export licensing jurisdiction of the U.S. Department of State, Office of Defense Trade Controls (see 22 CFR part 121, Category VIII, paragraph (e)). (2) This entry contains references to EU list numbers that are not contained on the CCL.
Related Definitions: N/A
Items: a. [Reserved]

b. Vehicles for transport, handling, control, activation or launching.

9A190 Non-military unmanned air vehicle systems (UAVs) and remotely piloted vehicles (RPVs) that are capable of a maximum range of at least 300 kilometers (km), regardless of payload.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $5000
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number; parts and accessories in $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

9A980 Nonmilitary mobile crime science laboratories; and parts and accessories, n.e.s.

LICENSE REQUIREMENTS

Reason for Control: CC

Control(s)	*Country Chart*
CC applies to entire entry	CC Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

9A990 Diesel engines, n.e.s., for trucks, tractors, and automotive applications of continuous brake horsepower of 400 BHP (298 kW) or greater (performance based on SAE J1349 standard conditions of 100 kPa and 25°); pressurized aircraft breathing equipment, n.e.s.; and specially designed parts therefor, n.e.s.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 2

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

9A991 "Aircraft" and certain gas turbine engines, n.e.s.

LICENSE REQUIREMENTS

Reason for Control: AT, UN

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1
UN applies to 9A991.a	Rwanda

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Number
Related Controls: N/A
Related Definitions: N/A
Items: a. Military aircraft, demilitarized (not specifically equipped or modified for military operation), as follows:

a.1. Cargo, ''C–45 through C–118'' inclusive, and ''C–121,''

a.2. Trainers, bearing a ''T'' designation and using piston engines,

a.3. Utility, bearing a ''U'' designation and using piston engines,

a.4. Liaison, bearing an ''L'' designation, and

a.5. Observation, bearing an ''O'' designation and using piston engines;

b. Other nonmilitary aircraft; and

NOTE: Specify make and model of aircraft and type of avionic equipment on aircraft.

c. Aero gas turbine engines not controlled by 9A001 or 9A101, and specially designed parts therefor.

NOTE: 9A991.c does not control aero gas turbine engines that are destined for use in civil ''aircraft'' and that have been in use in bona fide civil ''aircraft'' for more than eight years. (See 9A994.)

9A992 Off highway wheel tractors of carriage capacity 9mt (20,000 lbs) or more; and parts and accessories, n.e.s.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number; parts and accessories in § value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

9A993 On-Highway tractors, with single or tandem rear axles rated for 9mt per axel (20,000 lbs.) or greater and specially designed parts.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number; parts and accessories in $ value
Related Controls: N/A
Related Definition: This entry controls highway tractors only. It does not control solid chassis vehicles such as dump trucks, construction equipment, or panel/van type trucks.
Items: The list of items controlled is contained in the ECCN heading.

9A994 Aircraft parts and components, n.e.s.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A

CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

B. TEST, INSPECTION AND PRODUCTION EQUIPMENT

9B001 Specially designed equipment, tooling or fixtures, as follows, for manufacturing or measuring gas turbine blades, vanes or tip shroud castings.

LICENSE REQUIREMENTS

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $5000
GBS: Yes, for 9B001.a, .b, .f and .h
CIV: Yes, for 9B001.a, .b, .f and .h

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: a. Automated equipment using non-mechanical methods for measuring airfoil wall thickness;

b. Tooling, fixtures or measuring equipment for the ''laser'', water jet or ECM/EDM hole drilling processes controlled by 9E003.c;

c. Directional solidification or single crystal casting equipment;

d. Ceramic cores or shells;

e. Ceramic core manufacturing equipment or tools;

f. Ceramic core leaching equipment;

g. Ceramic shell wax pattern preparation equipment;

h. Ceramic shell burn out or firing equipment.

9B002 On-line (real time) control systems, instrumentation (including sensors) or automated data acquisition and processing equipment, specially designed for the development of gas turbine engines, assemblies or components incorporating technologies controlled by 9E003.a.

LICENSE REQUIREMENTS

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $3000
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

9B003 Equipment specially designed for the production or test of gas turbine brush seals designed to operate at tip speeds exceeding 335 m/s, and specially designed parts or accessories.

LICENSE REQUIREMENTS

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $5000
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

9B004 Tools, dies or fixtures for the solid state joining of gas turbine "superalloy" or titanium components.

LICENSE REQUIREMENTS

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $3000
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Number
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

9B005 On-line (real-time) control systems, instrumentation (including sensors) or automated data acquisition and processing equipment, specially designed for use with wind tunnels or devices.

LICENSE REQUIREMENTS

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 2
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $5000
GBS: N/A
CIV: Yes

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: a. Wind tunnels designed for speeds of Mach 1.2 or more, except those specially designed for educational purposes and having a test section size (measured laterally) of less than 250 mm;

TECHNICAL NOTE: Test section size in 9B005.a means: the diameter of the circle, or the side of the square, or the longest side of the rectangle at the largest test section location.

b. Devices for simulating flow-environments at speeds exceeding Mach 5, including hot-shot tunnels, plasma arc tunnels, shock tubes, shock tunnels, gas tunnels and light gas guns;

c. Wind tunnels or devices, other than two-dimensional sections, capable of simulating Reynolds number flows exceeding 25 x 106.

9B006 Specially designed acoustic vibration test equipment capable of producing sound pressure levels of 160 dB or more, (reference to 20 micropascals) with a rated output of 4 kW or more at a test cell temperature exceeding 1273 K (1000 °C), and specially designed transducers, strain gauges, accelerometers, thermocouples or quartz heaters therefor.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS:
LVS: $3000
GBS: Yes
CIV: Yes

LIST OF ITEMS CONTROLLED

Unit: Number
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

9B007 Equipment specially designed for inspecting the integrity of rocket motors using non-destructive test (NDT) techniques other than planar X-ray or basic physical or chemical analysis.

LICENSE REQUIREMENTS

Reason for Control: NS, MT, AT

Control(s)	*Country chart*
NS applies to entire entry	NS Column 2
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Number
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

9B008 Transducers specially designed for the direct measurement of the wall skin friction of the test flow with a stagnation temperature exceeding 833 K (560 °C).

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country chart*
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $5000
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Number
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

9B009 Tooling specially designed for producing turbine engine powder metallurgy rotor components capable of operating at stress levels of 60% of ultimate tensile strength (UTS) or more and metal temperatures of 873 K (600 °C) or more.

LICENSE REQUIREMENTS

Reason for Control: NS, AT

Control(s)	*Country chart*
NS applies to entire entry	NS Column 2

Control(s)	*Country chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $5000
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: Equipment in number; parts and accessories in $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

9B105 Wind tunnels for speeds of Mach 0.9 or more usable for "missiles" and their subsystems.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $5000
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

9B106 Environmental chambers and anechoic chambers.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $3000
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: a. Environmental chambers capable of simulating the following flight conditions:

a.1. Vibration environments of 10 g rms or greater between 20 Hz and 2,000 Hz and imparting forces of 50 kN or greater; and

a.2. Altitudes of 15,000 m or greater; or

a.3. Temperature of at least 223 K (−50 °C) to 398 K (+ 125 °C)

b. Anechoic chambers capable of simulating the following flight conditions:

b.1. Acoustic environments at an overall sound pressure level of 140 dB or greater (referenced to 20 microPa) or with a rated power output of 4 kW or greater; and

b.2. Altitudes of 15,000 m or greater; or

b.3. Temperature of at least 223 K (−50 °C) to 398 K (+125 °C).

9B115 Specially designed "production equipment" for the systems, subsystems, and components controlled by 9A004 to 9A009, 9A011, 9A101, 9A104 to 9A109, 9A111, 9A116 to 9A119.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $5000
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: This entry contains references to EU list numbers that are not contained on the CCL. Though the items controlled by 9A004 to 9A009, 9A011, 9A101, 9A104 to 9A109, 9A111, 9A116 to 9A119 are not subject to the export licensing authority of BXA, the "production equipment" related to these items are controlled in this entry on the CCL.
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

9B116 Specially designed "production facilities" for the systems, sub-systems, and components controlled by 9A004 to 9A009, 9A011, 9A101, 9A104 to 9A109, 9A111, 9A116 to 9A119.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $5000
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: This entry contains references to EU list numbers that are not contained on the CCL. Though the items controlled by 9A004 to 9A009, 9A011, 9A101, 9A104 to 9A109, 9A111, 9A116 to 9A119 are

not subject to the export licensing authority of BXA, the ''production facilities'' related to these items are controlled in this entry on the CCL.
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

9B117 Test benches and test stands for solid or liquid propellant rockets or rocket motors, having either of the following characteristics.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: $5000
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: a. The capacity to handle more than 90 kN (20,000 lbs.) of thrust; *or*
b. Capable of simultaneously measuring the three axial thrust components.

9B994 Vibration test equipment and specially designed parts and components, n.e.s.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

LVS: N/A
GBS: N/A
CIV: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

C. MATERIALS [RESERVED]

D. ''SOFTWARE''

9D001 "Software" "required" for the "development" of equipment or "technology" controlled by 9A (except 9A018, 9A990 to 9A994), 9B (except 9B994) or 9E003.

LICENSE REQUIREMENTS

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to ''software'' for items controlled by 9A001 to 9A003, 9B001 to 9B009, 9E003	NS Column 1
MT applies to ''software'' for equipment controlled by 9A001, 9A101, 9A106, 9A110, 9A115, 9A190, 9B001 to 9B005, 9B007, 9B105, 9B106, 9B115 to 9B117 for for MT reasons	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: (1) The corresponding EU List number controls ''software'' relating to entries that do not appear on the CCL (e.g., 9A004 to 9A011, 9A104, 9A105, 9A107 to 9A109, 9A111, 9A116 to 9A119). The ''software'' related to these entries is subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. (See 22 CFR part 121.) (2) ''Software'' ''required'' for the ''development'' of equipment controlled by 9A004 is subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. (See 22 CFR part 121, Category XV.)
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

9D002 "Software" "required" for the "production" of equipment controlled by 9A (except 9A018, 9A990 to 9A994) or 9B (except 9B994).

LICENSE REQUIREMENTS

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to ''software'' for equipment controlled by 9A001 to 9A003 or 9B001 to 9B009	NS Column 1
MT applies to ''software'' for equipment controlled by 9A001, 9A101, 9A106, 9A110, 9A115, 9A190, 9B001 to 9B005, 9B007, 9B105, 9B106, 9B115 to 9B117 for for MT reasons	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: (1) The corresponding EU List number controls ''software'' relating to entries that do not appear on the CCL (e.g., 9A005 to 9A011, 9A104, 9A105, 9A107 to 9A109, 9A111, 9A116 to 9A119). The ''software'' related to these entries is subject to the export licensing authority of the U.S.

Department of State, Office of Defense Trade Controls. (See 22 CFR part 121.) (2) ''Software'' ''required'' for the ''production'' of equipment controlled by 9A004 is subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. (See 22 CFR part 121, Category XV.)

Related Definitions: N/A

Items: The list of items controlled is contained in the ECCN heading.

9D003 "Software" "required" for the "use" of full authority digital electronic engine controls (FADEC) for propulsion systems controlled by 9A (except 9A018, 9A990 to 9A994) or 9B (except 9B994).

LICENSE REQUIREMENTS

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to ''software'' for ''use'' of FADEC for equipment controlled by 9A001 to 9A003	NS Column 1
MT applies to ''software'' required for the ''use'' of FADEC for gas turbine aero engines controlled by 9A101, 9A106, 9A110, or 9A115	MT Column 1
AT applies to entire entry	AT Column 1

Unit: $ value

Related Controls: (1) The corresponding EU List number controls ''software'' relating to entries that do not appear on the CCL (e.g., 9A005 to 9A011, 9A105, 9A107 to 9A109, 9A111, 9A116 to 9A119). The ''software'' related to these entries is subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls (see 22 CFR part 121). (2) ''Software'' ''required'' for ''use'' of FADEC for equipment controlled by 9A004 is subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. (See 22 CFR part 121, Category XV.)

Related Definitions: N/A

Items: a. ''Software'' in digital electronic controls for propulsion systems, aerospace test facilities or air breathing aero-engine test facilities;

b. Fault-tolerant ''software'' used in FADEC systems for propulsion systems and associated test facilities.

9D004 Other "software".

LICENSE REQUIREMENTS

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A

TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value

Related Controls: N/A

Related Definitions: N/A

Items: a. ''Software'' specially designed for vibration test equipment using real time digital controls with individual exciters (thrusters) with a maximum thrust exceeding 50 kN;

b. 2D or 3D viscous ''software'' validated with wind tunnel or flight test data ''required'' for detailed engine flow modelling;

c. ''Software'' ''required'' for the ''development'' or ''production'' of real time full authority electronic test facilities for engines or components controlled by 9A;

d. ''Software'' for testing aero gas turbine engines, assemblies or components, specially designed to collect, reduce and analyze data in real time, and capable of feedback control, including the dynamic adjustment of test articles or test conditions, as the test is in progress;

e. ''Software'' specially designed to control directional solidification or single crystal casting;

f. ''Software'' in ''source code,'' ''object code'' or machine code ''required'' for the ''use'' of active compensating systems for rotor blade tip clearance control.

NOTE: 9D004.f does not control ''software'' embedded in uncontrolled equipment or ''required'' for maintenance activities associated with the calibration or repair or updates to the active compensating clearance control system.

9D101 "Software" specially designed for the "use" of items specified in 9A101, 9A106, 9A110, 9A115, 9A190, 9B105, 9B106, 9B116 or 9B117.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A

TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value

Related Controls: N/A

Related Definitions: N/A

Items: The list of items controlled is contained in the ECCN heading.

9D018 "Software" for the "use" of equipment controlled by 9A018.

LICENSE REQUIREMENTS

Reason for Control: NS, RS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
RS applies to 9A018.a and .b	RS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: Yes for Australia, Japan, New Zealand, and NATO only

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

9D990 "Software", n.e.s., for the "development" or "production" of diesel engines and pressurized aircraft breathing equipment controlled by 9A990.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 2

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

9D991 "Software", n.e.s., for the "development" or "production" of aircraft and aero gas turbine engines controlled by 9A991 or aircraft parts and components controlled by 9A994.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

9D993 "Software" for the "production" or "development" of off-highway wheel tractors controlled by 9A992 or on-highway tractors controlled by 9A993.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

9D994 "Software" for the "development", "production", or "use" of equipment controlled by 9B994.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: $ value
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

E. TECHNOLOGY

9E001 "Technology" according to the General Technology Note for the "development" of equipment or "software" controlled by 9A001.c, 9B (except 9B994), or 9D (except 9D018, 9D990 to 9D994).

LICENSE REQUIREMENTS

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to ''technology'' for items controlled by 9A001.c, 9B001 to 9B009, 9D001 to 9D004	NS Column 1
MT applies to ''technology'' for items controlled by 9B001 to 9B005, 9B007, 9B105, 9B106, 9B115 to 9B117, 9D001 to 9D004 for MT reasons	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: (1) The corresponding EU List number controls ''software'' relating to entries that do not appear on the CCL (e.g., 9D103). The ''software'' related to these entries is subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls

(see 22 CFR part 121). (2) ''Technology'' required for the ''development'' of equipment controlled by 9A004 is subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls. (See 22 CFR part 121, Category XV.)

Related Definitions: N/A

Items: The list of items controlled is contained in the ECCN heading.

9E002 "Technology" according to the General Technology Note for the "production" of equipment controlled by 9A001.c or 9B (except 9B994).

LICENSE REQUIREMENTS

Reason for Control: NS, MT, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
MT applies to ''technology'' for equipment controlled by 9B001 to 9B005, 9B007, 9B105, 9B106, 9B115 to 9B117 for MT reasons	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A

TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A

Related Controls: See 1E002.f for controls on ''technology'' for the repair of controlled structures, laminates or materials.

Related Definition: Development or production ''technology'' controlled by 9E for gas turbine engines remains controlled when used as ''use'' ''technology'' for repair, rebuild and overhaul. Excluded from control are: technology, drawings or documentation for maintenance activities directly associated with calibration, removal or replacement of damaged or unserviceable line replaceable units, including replacement of whole engines or engine modules.

Items: The list of items controlled is contained in the ECCN heading.

9E003 Other "technology".

LICENSE REQUIREMENTS

Reason for Control: NS, AT, SI.

Control(s)	*Country chart*
NS applies to entire entry	NS Column 1
AT applies to entire entry	AT Column 1

SI applies to 9E003. a.1. through a.12 and f. See §742.14 of the EAR for additional information.

LICENSE EXCEPTIONS

CIV: N/A

TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A.

Related Controls: (1) The corresponding EU List number does not control technology controlled under 9E003.f. (2) Hot section technology specifically designed, modified, or equipped for military uses or purposes, or developed principally with U.S. Department of Defense funding, is subject to the jurisdiction of the Department of State. (3) Technology is subject to the EAR when actually applied to a commercial aircraft engine program. Exporters may seek to establish commercial application either on a case-by-case basis through submission of documentation demonstrating application to a commercial program in requesting an export license from Commerce in respect to a specific export or, in the case of use for broad categories of aircraft, engines, or components, a commodity jurisdiction determination from State.

Items: a. ''Technology'' ''required'' for the ''development'', ''production'' or overhaul of the following commercial aircraft engines, components or systems:

a.1. Gas turbine blades, vanes or tip shrouds made from directionally solidified (DS) or single crystal (CS) alloys having (in the 001 Miller Index Direction) a stress-rupture life exceeding 400 hours at 1,273 K (1,000 °C) at a stress of 200 MPa, based on the average property values;

a.2. Multiple domed combustors operating at average burner outlet temperatures exceeding 1,643 K (1370 °C), or combustors incorporating thermally decoupled combustion liners, non-metallic liners or non-metallic shells;

a.3. Components manufactured from organic ''composite'' materials designed to operate above 588 K (315 °C), or from metal ''matrix'' ''composite'', ceramic ''matrix'', intermetallic or intermetallic reinforced materials controlled by 1A002 or 1C007;

a.4. Uncooled turbine blades, vanes, tip-shrouds or other components designed to operate at gas path temperatures of 1,323 K (1,050 °C) or more;

a.5. Cooled turbine blades, vanes or tip-shrouds, other than those described in 9E003.a.1, exposed to gas path temperatures of 1,643 K (1,370 °C) or more;

a.6. Airfoil-to-disk blade combinations using solid state joining;

a.7. Gas turbine engine components using ''diffusion bonding'' ''technology'' controlled by 2E003.b;

a.8. Damage tolerant gas turbine engine rotating components using powder metallurgy materials controlled by 1C002.b;

a.9. Full authority digital electronic engine controls (FADEC) for gas turbine and combined cycle engines and their related diagnostic components, sensors and specially designed components;

a.10. Adjustable flow path geometry and associated control systems for:

a.10.a. Gas generator turbines;

a.10.b. Fan or power turbines;

a.10.c. Propelling nozzles;

NOTE 1: Adjustable flow path geometry and associated control systems do not include inlet guide vanes, variable pitch fans, variable stators or bleed valves for compressors.

NOTE 2: 9E003.a.10 does not control ''development'' or ''production'' ''technology'' for adjustable flow path geometry for reverse thrust.

a.11. Rotor blade tip clearance control systems employing active compensating casing ''technology'' limited to a design and development data base;

a.12. Gas bearings for gas turbine engine rotor assemblies;

a.13. Wide chord hollow fan blades without part-span support;

NOTE: Also see 9E003.f.

b. ''Technology'' ''required'' for the ''development'' or ''production'' of:

b.1. Wind tunnel aero-models equipped with non-intrusive sensors capable of transmitting data from the sensors to the data acquisition system;

b.2. ''Composite'' propeller blades or propfans capable of absorbing more than 2,000 kW at flight speeds exceeding Mach 0.55;

c. ''Technology'' ''required'' for the ''development'' or ''production'' of gas turbine engine components using ''laser'', water jet or ECM/EDM hole drilling processes to produce holes with:

c.1.a. Depths more than four times their diameter;

c.1.b. Diameters less than 0.76 mm; and

c.1.c. Incidence angles equal to or less than 25°; or

c.2.a. Depths more than five times their diameter;

c.2.b. Diameters less than 0.4 mm; and

c.2.c. Incidence angles of more than 25°;

TECHNICAL NOTE: For the purposes of 9E003.c, incidence angle is measured from a plane tangential to the airfoil surface at the point where the hole axis enters the airfoil surface.

d. ''Technology'' ''required'' for the ''development'' or ''production'' of helicopter power transfer systems or tilt rotor or tilt wing ''aircraft'' power transfer systems:

d.1. Capable of loss-of-lubrication operation for 30 minutes or more; or

d.2. Having an input power-to-weight ratio equal to or more than 8.87 kW/kg.

e.1 ''Technology'' for the ''development'' or ''production'' of reciprocating diesel engine ground vehicle propulsion systems having all of the following:

e.1.a. A box volume of 1.2 m^3 or less;

e.1.b. An overall power output of more than 750 kW based on 80/1269/EEC, ISO 2534 or national equivalents; and

e.1.c. A power density of more than 700 kW/m^3 of box volume;

TECHNICAL NOTE: Box volume: the product of three perpendicular dimensions measured in the following way:

Length: The length of the crankshaft from front flange to flywheel face;

Width: The widest of the following:

a. The outside dimension from valve cover to valve cover;

b. The dimensions of the outside edges of the cylinder heads; or

c. The diameter of the flywheel housing;

Height: The largest of the following:

a. The dimension of the crankshaft center-line to the top plane of the valve cover (or cylinder head) plus twice the stroke; or

b. The diameter of the flywheel housing.

e.2. ''Technology'' ''required'' for the ''production'' of specially designed components, as follows, for ''high output diesel engines'':

e.2.a. ''Technology'' ''required'' for the ''production'' of engine systems having all of the following components employing ceramics materials controlled by 1C007:

e.2.a.1. Cylinder liners;

e.2.a.2. Pistons;

e.2.a.3. Cylinder heads; and

e.2.a.4. One or more other components (including exhaust ports, turbocharger, valve guides, valve assemblies or insulated fuel injectors);

e.2.b. ''Technology'' ''required'' for the ''production'' of turbocharger systems, with single-stage compressors having all of the following:

e.2.b.1. Operating at pressure ratios of 4:1 or higher;

e.2.b.2. A mass flow in the range from 30 to 130 kg per minute; and

e.2.b.3. Variable flow area capability within the compressor or turbine sections;

e.2.c. ''Technology'' ''required'' for the ''production'' of fuel injection systems with a specially designed multifuel (e.g., diesel or jet fuel) capability covering a viscosity range from diesel fuel (2.5 cSt at 310.8 K (37.8° C)) down to gasoline fuel (0.5 cSt at 310.8 K (37.8° C)), having both of the following:

e.2.c.1. Injection amount in excess of 230 mm^3 per injection per cylinder;

e.2.c.2. Specially designed electronic control features for switching governor characteristics automatically depending on fuel property to provide the same torque characteristics by using the appropriate sensors;

e.3. ''Technology'' ''required'' for the ''development'' or ''production'' of ''high output diesel engines'' for solid, gas phase or liquid film (or combinations thereof) cylinder wall lubrication, permitting operation to temperatures exceeding 723 K (450° C), measured on the cylinder wall at the top limit of travel of the top ring of the piston.

f. Technology not otherwise controlled in 9E003.a.1. through a.12 and currently used in the ''development'', ''production'' or overhaul of hot section parts and components of civil derivatives of military engines controlled on the U.S. Munitions List.

9E018 "Technology" for the "development", "production", or "use" of equipment controlled by 9A018.

LICENSE REQUIREMENTS

Reason for Control: NS, RS, AT

Control(s)	*Country Chart*
NS applies to entire entry	NS Column 1
RS applies to 9A018.a and .b	RS Column 2
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A

TSR: Yes for Australia, Japan, New Zealand, and NATO only

LIST OF ITEMS CONTROLLED

Unit: N/A

Related Controls: N/A

Related Definitions: N/A

Items: The list of items controlled is contained in the ECCN heading.

9E101 "Technology" according to the General Technology Note for the "development" or "production" of equipment controlled by 9A101, 9A106, 9A110, or 9A115.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A

TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A

Related Controls: The corresponding EU List number controls ''software'' relating to entries that do not appear on the CCL (e.g., 9A104, 9A105, 9A107 to 9A109, 9A111, 9A116 to 9A119). The ''software'' related to these entries is subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls (see 22 CFR part 121).

Related Definitions: N/A

Items: The list of items controlled is contained in the ECCN heading.

9E102 "Technology" according to the General Technology Note for the "use" of goods specified in 9A101, 9A106, 9A110, 9B105, 9B106, 9B115, 9B116, 9B117, or 9D101.

LICENSE REQUIREMENTS

Reason for Control: MT, AT

Control(s)	*Country Chart*
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A

TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A

Related Controls: The corresponding EU List number controls ''software'' relating to entries that do not appear on the CCL (e.g., 9A004 to 9A011, 9A104, 9A105, 9A107 to 9A109, 9A111, 9A116 to 9A119, or 9D103). The ''software'' related to these entries is subject to the export licensing authority of the U.S. Department of State, Office of Defense Trade Controls (see 22 CFR part 121).

Related Definitions: N/A

Items: The list of items controlled is contained in the ECCN heading.

9E990 "Technology", n.e.s., for the "development", "production", or "use" of diesel engines and pressurized aircraft breathing equipment controlled by 9A990.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 2

LICENSE EXCEPTIONS

CIV: N/A

TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A

Related Controls: N/A

Related Definitions: N/A

Items: The list of items controlled is contained in the ECCN heading.

9E991 "Technology", n.e.s., for the "development", "production", or "use" of aircraft and aero gas turbine engines controlled by 9A991 or aircraft parts and components controlled by 9A994.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A

TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A

Related Controls: N/A

Related Definitions: N/A

Items: The list of items controlled is contained in the ECCN heading.

9E993 "Technology" for the "development", "production", or "use" of off-highway wheel tractors controlled by 9A992 or on-highway tractors controlled by 9A993.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

9E994 "Technology" for "development", "production", or "use" of vibration test equipment controlled by 9B994.

LICENSE REQUIREMENTS

Reason for Control: AT

Control(s)	*Country Chart*
AT applies to entire entry	AT Column 1

LICENSE EXCEPTIONS

CIV: N/A
TSR: N/A

LIST OF ITEMS CONTROLLED

Unit: N/A
Related Controls: N/A
Related Definitions: N/A
Items: The list of items controlled is contained in the ECCN heading.

EAR99 Items subject to the EAR that are not elsewhere specified in this CCL Category or in any other category in the CCL are designated by the number EAR99.

ADVISORY NOTES FOR CATEGORY 9

ADVISORY NOTE 1: Licenses are likely to be approved, as administrative exceptions, for export and reexport to satisfactory end-users in Country Group D:1 of marine gas turbine engines controlled by 9A002, for installation in civil marine vessels for civil end-use, provided that their specific fuel consumption exceeds 0.23 kg/kW–hr. and their continuous ISO rating is less than 20,000 kW.

[61 FR 12937, Mar. 25, 1996]

EDITORIAL NOTE: For additional FEDERAL REGISTER citations to Supplement No. 1 to part 774, see the List of CFR Sections Affected in the Finding Aids section of this volume.

SUPPLEMENT NO. 2 TO PART 774—GENERAL TECHNOLOGY AND SOFTWARE NOTES

1. *General Technology Note.* The export of ''technology'' that is ''required'' for the ''development'', ''production'', or ''use'' of items on the Commerce Control List is controlled according to the provisions in each Category.

''Technology'' ''required'' for the ''development'', ''production'', or ''use'' of a controlled product remains controlled even when applicable to a product controlled at a lower level.

License Exception OTS is available for ''technology'' that is the minimum necessary for the installation, operation, maintenance (checking), and repair of those products that are eligible for License Exceptions or that are exported under a license.

N.B.: This does not allow release under a License Exception of the repair ''technology'' controlled by 1E002.e, 1E002.f, 7E003, or 8E002.a.

N.B.: The 'minimum necessary' excludes ''development'' or ''production'' technology and permits ''use'' technology only to the extent ''required'' to ensure safe and efficient use of the product. Individual ECCNs may further restrict export of ''minimum necessary'' information.

II. *General Software Note.* License Exception TSU (''mass market'' software) is available to all destinations, except Cuba, Iran, Iraq, Libya, North Korea, Sudan, and Syria, for release of software that is generally available to the public by being:

a. Sold from stock at retail selling points, without restriction, by means of:

1. Over the counter transactions;
2. Mail order transactions; or
3. Telephone call transactions; and

b. Designed for installation by the user without further substantial support by the supplier.

NOTE: License Exception TSU for mass market software does not apply to encryption software controlled for EI reasons under ECCN 5D002. Encryption software may become eligible after a one-time BXA review according to the provision of §742.15(b)(1) of the EAR.

[61 FR 12937, Mar. 25, 1996, as amended at 61 FR 65467, Dec. 13, 1996; 61 FR 68587, Dec. 30, 1996]

SUPPLEMENT NO. 3 TO PART 774

CROSS-REFERENCE

Old ECCN	New ECCN
Sorted by ''OLD'' ECCN CAT 0	
0A18	0A018
0A80	0A980
0A82	0A982
0A82	0A983
0A84	0A984
0A84	0A985
0A86	0A986
0A88	0A988
0A95	§746.4(b)(2)(i)
0A96	EAR99
0A98	§734.3(b)(2)
0E18	0E018
0E84	0E984
0E96	EAR99
1B16	0B003
1C19.b	0C006
1D01	0D001

Old ECCN	New ECCN
1E19	0E001
2A19.c	0B001
2A50.b	0B008
2D19	0D001
2D50	0D001
2E19	0E001
2E50	0E001

CAT 1

***	1D103
***	1E202
***	1E203
1A01	1A001
1A02	1A002
1A03	1A003
1A22.b	1A102
1A27	1C116
1A45	1A226
1A46	1C202
1A47	1C216
1A48	1A290
1A50	1C226
1A84	1A984
1A88	1A988
1A96	EAR99
1B01	1B001
1B02	1B002
1B03	1B003
1B17	1B225
1B18	1B018
1B21	1B101
1B28	1B115
1B30.a	1B116
1B41	1B201
1B42	1B226
1B52	1B229
1B53	1B228
1B54	1B227
1B55	1B232
1B58	1B231
1B59	1B230
1B96	EAR99
1C01	1C001
1C02	1C002
1C03	1C003
1C05	1C005
1C06	1C006
1C07	1C007
1C08	1C008
1C09	1C009
1C10	1C010
1C18	1C018
1C19.a	1C234
1C19.c	1C233
1C19.d	1C230
1C19.e	1A225
1C19.f	1C231
1C21	1C101
1C22	1C117
1C27	1C107
1C31	1C115
1C49	1A225
1C50	1C210
1C50.c	1A202
1C51	1C229
1C52	1C227
1C53	1C228
1C54	1C236
1C55	1C232
1C56	1C238
1C57	1C225
1C58	1C237
1C60	1C350
1C61.a (partial), .b.c (partial), .f	1C351
1C61.a (partial), .c (partial)	1C352
1C61.c.15,c.16, .d	1C354
1C61.e	1C353
1C80	1C980
1C81	1C981
1C82	1C982
1C83	1C983
1C84	1C984
1C88	1C988
1C91	1C991
1C92	1C992
1C93	1C993
1C94	1C994
1C95	1C995
1C96	EAR99
1CO4	1C004
1D01	1D018
1D01	1D001
1D02	1D002
1D23	1D101
1D41	1D201
1D60	1D390
1D93	1D993
1D94	1D993
1D96	EAR99
1E02	1E002
1E23	1E001
1E23	1E101
1E24	1E103
1E25	1E104
1E40	1E201
1E41	1E201
1E60	1E001
1E60	1E350
1E60	1E391
1E61	1E001
1E61	1E351
1E61	1E391
1E94	1E994
1E96	EAR99
2A50.c	1A227

CAT 2

***	2A993
***	2B207
1A44	2A225
1B30.b	2B104
1B50.a	2B226
1B50.b	2B227
1B51	2B230
1B70.a through .d	2B350
1B70.e	2B351
1B71	2B352
1D50	2D201
1E41	2E201
1E70	2E301
2A01	2A001
2A02	2A002
2A03	2A003
2A04	2A004
2A05	2A005
2A06	2A006
2A48	2A226
2A49	2A290
2A50.b.d.f	2A291
2A50.e	2B225
2A51	2A292
2A52	2B231
2A53	2A293
2A94	2A994

Old ECCN	New ECCN
2A96	EAR96
2B01	2B001
2B02	2B002
2B03	2B003
2B04	2B004
2B05	2B005
2B06	2B006
2B07	2B007
2B08	2B008
2B09	2B009
2B18	2B018
2B24	2B104
2B41	2B290
2B44	2B204
2B50	2B115
2B50	2B215
2B51	2B228
2B53	2B229
2B85	2B985
2B91	2B991
2B92	2B992
2B93	2B993
2B94	2B994
2B96	EAR99
2D01	2D001
2D02	2D002
2D18	2D018
2D24	2D101
2D41	2D290
2D49	2D290
2D50	2D290
2D92	2D994
2D93	2D992
2D94	2D993
2D96	EAR99
2E01	2E001
2E02	2E002
2E03	2E003
2E18	2E018
2E20	2E201
2E24	2E001
2E24	2E002
2E24	2E101
2E40	2E201
2E40	2E290
2E41	2E001
2E41	2E002
2E41	2E201
2E41	2E290
2E44	2E001
2E44	2E002
2E44	2E201
2E44	2E290
2E48	2E001
2E48	2E002
2E48	2E201
2E49	2E001
2E49	2E002
2E49	2E290
2E50	2E001
2E50	2E002
2E50	2E201
2E50	2E290
2E51	2E001
2E51	2E002
2E51	2E201
2E51	2E290
2E52	2E001
2E52	2E002
2E52	2E201
2E53	2E001
2E53	2E002
2E53	2E201
2E53	2E290
2E93	2E994
2E94	2E993
2E96	EAR99
3A48	2B232
9B26.a	2B116

CAT 3

2A19.b	3A231
3A01	3A001
3A02	3A002
3A22	3A101
3A41	3A201.a
3A42	3A201.b
3A43	3A228
3A44	3A230
3A46	3A229
3A49	3A232
3A50	3A225
3A51	3A233
3A52	3A202
3A53	3A227
3A54	3A226
3A55	3A201.c
3A80	3A980
3A81	3A981
3A92	3A992
3A93	3A993
3A94	3A994
3A96	EAR99
3B01.a	3B001
3B01.b	3B002
3B01.c	3B003
3B01.d	3B004
3B01.e	3B005
3B01.f	3B006
3B01.g	3B007
3B01.h	3B008
3B91	3B991
3B96	EAR99
3C01	3C001
3C02	3C002
3C03	3C003
3C04	3C004
3C96	EAR99
3D02	3D002
3D03	3D003
3D21	3D001
3D22	3D001
3D22	3D101
3D80	3D980
3D94	3D994
3D96	EAR99
3E02	3E002
3E22	3E001
3E22	3E101
3E40	3E001
3E40	3E201
3E41	3E201
3E80	3E980
3E94	3E994
3E96	EAR99

CAT 4

4A01	4A001
4A02	4A002
4A03	4A003
4A04	4A004
4A21	4A101
4A80	4A980
4A94	4A994

Old ECCN	New ECCN
4A96	EAR99
4B94	4B994
4B96	EAR99
4C94	4C994
4C96	EAR99
4D01	4D001
4D02	4D002
4D03	4D003
4D21	4D190
4D80	4D980
4D92	4D994
4D93	4D993
4D94	4D994
4D96	EAR99
4E01	4E001
4E02	4E002
4E80	4E980
4E92	4E994
4E93	4E993
4E94	4E994
4E96	EAR99

CAT 5

2A19.a	Deleted
5A01	5A001.a
5A02	5A001.b
5A03	5A001.c
5A04	5A001.d
5A05	5A001.e
5A06	5A001.f
5A11	5A002
5A20	5A101
5A80	5A980
5A90	5A990
5A91	5A991
5A92	5A992
5A93	5A993
5A94	5A994
5A95	5A995
5A96	EAR99
5B01	5B001.a
5B02	5B001.b
5B11	5B002.a.1
5B12	5B002.a.2
5B13	5B002.b
5B94	5B994
5B96	EAR99
5C01	5C001
5C96	EAR99
5D01	5D001.a
5D02	5D001.b
5D03	5D001.c
5D11	5D002.a
5D12	5D002.b
5D13	5D002.c
5D20	5D101
5D20	5D190
5D90	5D990
5D91	5D991
5D92	5D992
5D93	5D993
5D94	5D994
5D95	5D995
5D96	EAR99
5E01	5E001.a
5E02	5E001.b
5E11	5E002
5E20	5E101
5E90	5E990
5E91	5E991
5E92	5E992
5E93	5E993
5E94	5E994
5E95	5E995
5E96	EAR99

CAT 6

2A44.a	6A225
2A44.b.c	6A226
6A01	6A001
6A02	6A002
6A03	6A003
6A04	6A004
6A05	6A005
6A06	6A006
6A07	6A007
6A07	6A107
6A08	6A008
6A18	6A018
6A22	6A102
6A28	6A108
6A29	6A108
6A30	6B108
6A43	6A203
6A44	6A202
6A50	6A205
6A90	6A990
6A92	6A992
6A93	6A993
6A94	6A994
6A96	EAR99
6B04	6B004
6B05	6B005
6B07	6B007
6B08	6B008
6B96	EAR99
6C02	6C002
6C04	6C004
6C05	6C005
6C96	EAR99
6D01	6D001
6D02	6D002
6D03	6D003
6D21	6D001
6D22	6D102
6D29	6D103
6D90	6D990
6D92	6D990
6D93	6D990
6D94	6D994
6D96	EAR99
6E01	6E001
6E02	6E002
6E03	6E003
6E21	6E001
6E22	6E002
6E23	6E101
6E40	6E201
6E41	6E001
6E41	6E002
6E41	6E201
6E94	6E994
6E96	EAR99

CAT 7

* * *	7D102
7A01	7A001
7A02	7A002
7A03	7A003
7A04	7A004
7A06	7A006
7A21	7A101

Old ECCN	New ECCN
7A22	7A102
7A23	7A103
7A24	7A104
7A26	7A106
7A27	7A115
7A94	7A994
7B01	7B001
7B02	7B002
7B03	7B003
7B22.a	7B102
7B22.b through .f	7B101
7B94	7B994
7D01	7D001
7D02	7D002
7D03	7D003
7D24	7D001
7D24	7D101
7D94	7D994
7E01	7E001
7E02	7E002
7E03	7E003
7E04	7E004
7E21	7E001
7E21	7E002
7E21	7E101
7E22	7E102
7E94	7E994
CAT 8	
8A01	8A001
8A02	8A002
8A18	8A018
8A92	8A992
8A93	8A993
8A94	8A994
8A96	EAR99
8B01	8B001
8B96	EAR99
8C01	8C001
8C96	EAR99
8D01	8D001
8D02	8D002
8D92	8D992
8D93	8D993
8D96	EAR99
8E01	8E001
8E02	8E002
8E92	8E992
8E93	8E993
8E96	EAR99
CAT 9	
1A22.a	9A110
9A01	9A001
9A02	9A002
9A03	9A003
9A04	9A004
9A18	9A018
9A21	9A101
9A22	9A115
9A23	9A106
9A24	9A190
9A80	9A980
9A90	9A990
9A91	9A991
9A92	9A992
9A93	9A993
9A94	9A994
9A96	EAR99
9B01	9B001
9B02	9B002
9B03	9B003
9B04	9B004
9B05	9B005
9B06	9B006
9B07	9B007
9B08	9B008
9B09	9B009
9B21	9B115
9B21	9B116
9B25	9B105
9B26.b	9B106
9B27	9B117
9B94	9B994
9B96	EAR99
9D01	9D001
9D02	9D002
9D03	9D003
9D04	9D004
9D18	9D018
9D24	9D001
9D24	9D002
9D24	9D101
9D90	9D990
9D91	9D991
9D93	9D993
9D94	9D994
9D96	EAR99
9E01	9E001
9E02	9E002
9E03	9E003
9E18	9E018
9E21	9E101
9E21	9E102
9E90	9E990
9E91	9E991
9E93	9E993
9E94	9E994
9E96	EAR99

Sorted by ''NEW'' ECCN

CAT 0

0A18	0A018
0A80	0A980
0A82	0A982
0A82	0A983
0A84	0A984
0A84	0A985
0A86	0A986
0A88	0A988
2A19.c	0B001
1B16	0B003
2A50.b	0B008
1C19.b	0C006
1D01	0D001
2D19	0D001
2D50	0D001
1E19	0E001
2E19	0E001
2E50	0E001
0E18	0E018
0E84	0E984
0A98	§ 734.3(b)(2)
0A95	§ 746.4(b)(2)(i)
0A96	EAR99
0E96	EAR99
CAT 1	
1A01	1A001
1A02	1A002

Old ECCN	New ECCN
1A03	1A003
1A22.b	1A102
1C50.c	1A202
1C19.e	1A225
1C49	1A225
1A45	1A226
2A50.c	1A227
1A48	1A290
1A84	1A984
1A88	1A988
1B01	1B001
1B02	1B002
1B03	1B003
1B18	1B018
1B21	1B101
1B28	1B115
1B30.a	1B116
1B41	1B201
1B17	1B225
1B42	1B226
1B54	1B227
1B53	1B228
1B52	1B229
1B59	1B230
1B58	1B231
1B55	1B232
1C01	1C001
1C02	1C002
1C03	1C003
1CO4	1C004
1C05	1C005
1C06	1C006
1C07	1C007
1C08	1C008
1C09	1C009
1C10	1C010
1C18	1C018
1C21	1C101
1C27	1C107
1C31	1C115
1A27	1C116
1C22	1C117
1A46	1C202
1C50	1C210
1A47	1C216
1C57	1C225
1A50	1C226
1C52	1C227
1C53	1C228
1C51	1C229
1C19.d	1C230
1C19.f	1C231
1C55	1C232
1C19.c	1C233
1C19.a	1C234
1C54	1C236
1C58	1C237
1C56	1C238
1C60	1C350
1C61.a (partial), .b.c (partial), .f	1C351
1C61.a (partial), .c (partial)	1C352
1C61.e	1C353
1C61.c.15, c.16, .d	1C354
1C80	1C980
1C81	1C981
1C82	1C982
1C83	1C983
1C84	1C984
1C88	1C988
1C91	1C991
1C92	1C992
1C93	1C993
1C94	1C994
1C95	1C995

Old ECCN	New ECCN
1D01	1D001
1D02	1D002
1D01	1D018
1D23	1D101
* * *	1D103
1D41	1D201
1D60	1D390
1D93	1D993
1D94	1D993
1E23	1E001
1E60	1E001
1E61	1E001
1E02	1E002
1E23	1E101
1E24	1E103
1E25	1E104
1E40	1E201
1E41	1E201
* * *	1E202
* * *	1E203
1E60	1E350
1E61	1E351
1E60	1E391
1E61	1E391
1E94	1E994
1A96	EAR99
1B96	EAR99
1C96	EAR99
1D96	EAR99
1E96	EAR99

CAT 2

2A01	2A001
2A02	2A002
2A03	2A003
2A04	2A004
2A05	2A005
2A06	2A006
1A44	2A225
2A48	2A226
2A49	2A290
2A50.b.d.f	2A291
2A51	2A292
2A53	2A293
* * *	2A993
2A94	2A994
2B01	2B001
2B02	2B002
2B03	2B003
2B04	2B004
2B05	2B005
2B06	2B006
2B07	2B007
2B08	2B008
2B09	2B009
2B18	2B018
1B30.b	2B104
2B24	2B104
2B50	2B115
9B26.a	2B116
2B44	2B204
* * *	2B207
2B50	2B215
2A50.e	2B225
1B50.a	2B226
1B50.b	2B227
2B51	2B228
2B53	2B229
1B51	2B230
2A52	2B231
3A48	2B232
2B41	2B290

Old ECCN	New ECCN
1B70.a through .d	2B350
1B70.e	2B351
1B71	2B352
2B85	2B985
2B91	2B991
2B92	2B992
2B93	2B993
2B94	2B994
2D01	2D001
2D02	2D002
2D18	2D018
2D24	2D101
1D50	2D201
2D41	2D290
2D49	2D290
2D50	2D290
2D93	2D992
2D94	2D993
2D92	2D994
2E01	2E001
2E24	2E001
2E41	2E001
2E44	2E001
2E48	2E001
2E49	2E001
2E50	2E001
2E51	2E001
2E52	2E001
2E53	2E001
2E02	2E002
2E24	2E002
2E41	2E002
2E44	2E002
2E48	2E002
2E49	2E002
2E50	2E002
2E51	2E002
2E52	2E002
2E53	2E002
2E03	2E003
2E18	2E018
2E24	2E101
1E41	2E201
2E20	2E201
2E40	2E201
2E41	2E201
2E44	2E201
2E48	2E201
2E50	2E201
2E51	2E201
2E52	2E201
2E53	2E201
2E40	2E290
2E41	2E290
2E44	2E290
2E49	2E290
2E50	2E290
2E51	2E290
2E53	2E290
1E70	2E301
2E94	2E993
2E93	2E994
2A96	EAR96
2B96	EAR99
2D96	EAR99
2E96	EAR99

CAT 3

3A01	3A001
3A02	3A002
3A22	3A101
3A41	3A201.a
3A42	3A201.b
3A55	3A201.c
3A52	3A202
3A50	3A225
3A54	3A226
3A53	3A227
3A43	3A228
3A46	3A229
3A44	3A230
2A19.b	3A231
3A49	3A232
3A51	3A233
3A80	3A980
3A81	3A981
3A92	3A992
3A93	3A993
3A94	3A994
3B01.a	3B001
3B01.b	3B002
3B01.c	3B003
3B01.d	3B004
3B01.e	3B005
3B01.f	3B006
3B01.g	3B007
3B01.h	3B008
3B91	3B991
3C01	3C001
3C02	3C002
3C03	3C003
3C04	3C004
3D21	3D001
3D22	3D001
3D02	3D002
3D03	3D003
3D22	3D101
3D80	3D980
3D94	3D994
3E22	3E001
3E40	3E001
3E02	3E002
3E22	3E101
3E40	3E201
3E41	3E201
3E80	3E980
3E94	3E994
3A96	EAR99
3B96	EAR99
3C96	EAR99
3D96	EAR99
3E96	EAR99

CAT 4

4A01	4A001
4A02	4A002
4A03	4A003
4A04	4A004
4A21	4A101
4A80	4A980
4A94	4A994
4B94	4B994
4C94	4C994
4D01	4D001
4D02	4D002
4D03	4D003
4D21	4D190
4D80	4D980
4D93	4D993
4D92	4D994
4D94	4D994
4E01	4E001
4E02	4E002
4E80	4E980

Old ECCN	New ECCN
4E93	4E993
4E92	4E994
4E94	4E994
4A96	EAR99
4B96	EAR99
4C96	EAR99
4D96	EAR99
4E96	EAR99

CAT 5

5A01	5A001.a
5A02	5A001.b
5A03	5A001.c
5A04	5A001.d
5A05	5A001.e
5A06	5A001.f
5A11	5A002
5A20	5A101
5A80	5A980
5A90	5A990
5A91	5A991
5A92	5A992
5A93	5A993
5A94	5A994
5A95	5A995
5B01	5B001.a
5B02	5B001.b
5B11	5B002.a.1
5B12	5B002.a.2
5B13	5B002.b
5B94	5B994
5C01	5C001
5D01	5D001.a
5D02	5D001.b
5D03	5D001.c
5D11	5D002.a
5D12	5D002.b
5D13	5D002.c
5D20	5D101
5D20	5D190
5D90	5D990
5D91	5D991
5D92	5D992
5D93	5D993
5D94	5D994
5D95	5D995
5E01	5E001.a
5E02	5E001.b
5E11	5E002
5E20	5E101
5E90	5E990
5E91	5E991
5E92	5E992
5E93	5E993
5E94	5E994
5E95	5E995
2A19.a	Deleted
5A96	EAR99
5B96	EAR99
5C96	EAR99
5D96	EAR99
5E96	EAR99

CAT 6

6A01	6A001
6A02	6A002
6A03	6A003
6A04	6A004
6A05	6A005
6A06	6A006
6A07	6A007
6A08	6A008
6A18	6A018
6A22	6A102
6A07	6A107
6A28	6A108
6A29	6A108
6A44	6A202
6A43	6A203
6A50	6A205
2A44.a	6A225
2A44.b.c	6A226
6A90	6A990
6A92	6A992
6A93	6A993
6A94	6A994
6B04	6B004
6B05	6B005
6B07	6B007
6B08	6B008
6A30	6B108
6C02	6C002
6C04	6C004
6C05	6C005
6D01	6D001
6D21	6D001
6D02	6D002
6D03	6D003
6D22	6D102
6D29	6D103
6D90	6D990
6D92	6D990
6D93	6D990
6D94	6D994
6E01	6E001
6E21	6E001
6E41	6E001
6E02	6E002
6E22	6E002
6E41	6E002
6E03	6E003
6E23	6E101
6E40	6E201
6E41	6E201
6E94	6E994
6A96	EAR99
6B96	EAR99
6C96	EAR99
6D96	EAR99
6E96	EAR99

CAT 7

7A01	7A001
7A02	7A002
7A03	7A003
7A04	7A004
7A06	7A006
7A21	7A101
7A22	7A102
7A23	7A103
7A24	7A104
7A26	7A106
7A27	7A115
7A94	7A994
7B01	7B001
7B02	7B002
7B03	7B003
7B22.b through .f	7B101
7B22.a	7B102
7B94	7B994
7D01	7D001
7D24	7D001

Old ECCN	New ECCN
7D02	7D002
7D03	7D003
7D24	7D101
***	7D102
7D94	7D994
7E01	7E001
7E21	7E001
7E02	7E002
7E21	7E002
7E03	7E003
7E04	7E004
7E21	7E101
7E22	7E102
7E94	7E994
CAT 8	
8A01	8A001
8A02	8A002
8A18	8A018
8A92	8A992
8A93	8A993
8A94	8A994
8B01	8B001
8C01	8C001
8D01	8D001
8D02	8D002
8D92	8D992
8D93	8D993
8E01	8E001
8E02	8E002
8E92	8E992
8E93	8E993
8A96	EAR99
8B96	EAR99
8C96	EAR99
8D96	EAR99
8E96	EAR99
CAT 9	
9A01	9A001
9A02	9A002
9A03	9A003
9A04	9A004
9A18	9A018
9A21	9A101
9A23	9A106
1A22.a	9A110
9A22	9A115
9A24	9A190
9A80	9A980
9A90	9A990
9A91	9A991
9A92	9A992
9A93	9A993
9A94	9A994
9B01	9B001
9B02	9B002
9B03	9B003
9B04	9B004
9B05	9B005
9B06	9B006
9B07	9B007
9B08	9B008
9B09	9B009
9B25	9B105
9B26.b	9B106
9B21	9B115
9B21	9B116
9B27	9B117
9B94	9B994
9D01	9D001
9D24	9D001
9D02	9D002
9D24	9D002
9D03	9D003
9D04	9D004
9D18	9D018
9D24	9D101
9D90	9D990
9D91	9D991
9D93	9D993
9D94	9D994
9E01	9E001
9E02	9E002
9E03	9E003
9E18	9E018
9E21	9E101
9E21	9E102
9E90	9E990
9E91	9E991
9E93	9E993
9E94	9E994
9A96	EAR99
9B96	EAR99
9D96	EAR99
9E96	EAR99

Parts 775–779 [Reserved]