

DEPARTMENT OF COMMERCE**Bureau of Industry and Security****15 CFR Parts 742, 743, 744, 772 and 774**

[Docket No. 070105004-7050-01]

RIN 0694 AD95

December 2006 Wassenaar Arrangement Plenary Agreement Implementation: Categories 1, 2, 3, 5 Part I, 6, 7, 8, and 9 of the Commerce Control List; Wassenaar Reporting Requirements; Definitions; and Statement of Understanding on Source Code**AGENCY:** Bureau of Industry and Security, Commerce.**ACTION:** Final rule.

SUMMARY: The Bureau of Industry and Security (BIS) maintains the Commerce Control List (CCL), which identifies items subject to Department of Commerce export controls. This final rule revises the Export Administration Regulations (EAR) to implement changes made to the Wassenaar Arrangement's List of Dual Use Goods and Technologies (Wassenaar List), and Statements of Understanding maintained and agreed to by governments participating in the Wassenaar Arrangement on Export Controls for Conventional Arms and Dual Use Goods and Technologies (Wassenaar Arrangement, or WA). The Wassenaar Arrangement advocates implementation of effective export controls on strategic items with the objective of improving regional and international security and stability. To harmonize with the changes to the Wassenaar List, this rule revises the EAR by amending certain entries that are controlled for national security reasons in Categories 1, 2, 3, 5 Part I (telecommunications), 6, 7, 8, and 9; and adding new entries to the Commerce Control List (CCL), amending EAR Definitions, as well as adding new definitions to the EAR, and adding a new Statement of Understanding on source code.

The purpose of this final rule is to make the necessary changes to the CCL, definitions of terms used in the EAR, and Wassenaar reporting requirements to implement Wassenaar List revisions that were agreed upon in the December 2006 Wassenaar Arrangement Plenary Meeting.

This rule also adds and expands unilateral U.S. export controls and national security export controls on certain items to make them consistent

with the amendments made to implement the Wassenaar Arrangement's decisions. In addition, this rule removes the remaining references to "Composite Theoretical Performance (CTP)" and "Millions of Theoretical Operations Per Second (MTOPS)" in the EAR, which is consistent with agreements made by the Wassenaar Arrangement with regard to microprocessors.

DATES: *Effective Date:* This rule is effective November 5, 2007.

FOR FURTHER INFORMATION CONTACT: For questions of a general nature contact Sharron Cook, Office of Exporter Services, Bureau of Industry and Security, U.S. Department of Commerce at (202) 482-2440 or E-Mail: scCook@bis.doc.gov.

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Comments regarding the collections of information associated with this rule, including suggestions for reducing the burden, should be sent to OMB Desk Officer, New Executive Office Building, Washington, DC 20503. Attention: David Rostker; and to the Office of Administration, Bureau of Industry and Security, Department of Commerce, 14th St. and Pennsylvania Avenue, NW., Room 6883, Washington, DC 20230.

SUPPLEMENTARY INFORMATION:**Background**

In July 1996, the United States and thirty-three other countries gave final approval to the establishment of a new multilateral export control arrangement, called the Wassenaar Arrangement on Export Controls for Conventional Arms and Dual Use Goods and Technologies (Wassenaar Arrangement or WA). The Wassenaar Arrangement contributes to regional and international security and stability by promoting transparency and greater responsibility in transfers of conventional arms and dual use goods and technologies, thus preventing destabilizing accumulations of such items. Participating states have committed to exchange information on exports of dual use goods and technologies to non-participating states for the purposes of enhancing transparency and assisting in

developing common understandings of the risks associated with the transfers of these items.

Expanded and New Export Controls

This rule imposes new controls and expands NS Column 1 controls. This rule imposes a license requirement under section 742.4(a) of the EAR for exports and reexports to all destinations, except Canada, of certain commodities (and related software and technology) described in ECCNs 1E002.g, 3E001, 7A001, 7A002.a and .c, 7A003.d, 7D001, 7D003, 7E001, 7E002, 7E004.a.7, 9D004.f and .g. These destinations have an "X" indicated in NS column 1 on the Commerce Country Chart of Supplement No. 1 to Part 738. The purpose of the controls is to ensure that these items do not make a contribution to the military potential of any other country or combination of countries that would prove detrimental to the national security of the United States. For designated terrorism supporting countries or embargoed countries, the applicable licensing policies are found in Parts 742 and 746 of the EAR, and Supplement No. 1 to Part 736 of the EAR for Syria.

This rule also imposes new controls and expands NS Column 2 controls. This rule imposes a license requirement under section 742.4(a) of the EAR for exports and reexports of commodities (and related software and technology) described in 1C005.a, 1C005.b.1, 1C005.b.2, 1C005.c, 1D003, 2B002.c, 2B002.d, 3A001.b.9, 3A001.e.4, 3A001.g, 3B001.f.2, 3B001.i, 3C005, 5A001.g, 6A008.a, 7A008, 8A002.a, 8A002.a.4 (components) to destinations that are not Country Group A:1 destinations, or that are not cooperating countries (see Supplement No. 1 to Part 740 of the EAR). These destinations have an "X" indicated in NS column 2 on the Commerce Country Chart of Supplement No. 1 to Part 738 of the EAR. The purpose of the controls is to ensure that these items do not make a contribution to the military potential of such destination countries that would prove detrimental to the national security of the United States. For designated terrorism supporting countries or embargoed countries, the applicable licensing policies are found in Parts 742 and 746 of the EAR, and Supplement No. 1 to Part 736 of the EAR for Syria.

The licensing policy for national security controlled items exported or reexported to any country except a country in Country Group D:1 (see Supplement No. 1 to Part 740 of the EAR) is to approve license applications unless there is a significant risk that the

items will be diverted to a country in Country Group D:1. The general policy for exports and reexports of items to Country Group D:1 is to approve license applications when BIS determines, on a case by case basis, that the items are for civilian use or would otherwise not make a significant contribution to the military potential of the country of destination that would prove detrimental to the national security of the United States.

This rule imposes new controls and expands antiterrorism (AT) controls. This rule imposes a unilateral U.S. license requirement to export and reexport commodities (and related software and technology) controlled under 1C005.a, 1C005.b.1, 1C005.b.2, 1C005.c, 1D003, 1E002.g, 2B002.d.2, 2B002.d.3, 3A001.b.9, 3A001.e.4, 3A001.g, 3B001.f.2, 3B001.i, 3C005, 3E001, 5A001.g, 6A008.a, 7A001, 7A002.a and .c, 7A003.d, 7A008, 7D001, 7D003.a and .b, 7E001, 7E002, 7E004.a.7, 8A002.a, 8A002.a.4 (components), and 9D004.f and .g for AT reasons to Cuba, Iran, North Korea, Sudan and Syria, in addition to the national security controls imposed to implement the Wassenaar Arrangement's decisions. These unilateral export controls are necessary because under Section 6(j) of the Export Administration Act of 1979 a license is required for items that could make a significant contribution to the military potential of such country or that could enhance the ability of such country to support acts of international terrorism. There is a general policy of denial for applications to terrorism supporting countries, as set forth in Part 742 of the EAR. In addition, certain of these countries are also subject to embargoes, as set forth in Part 746 of the EAR and Supplement No. 1 to Part 736 of the EAR for Syria. A license is also required for the export and reexport of these items to specially designated terrorists and foreign terrorist organizations, as set forth in Part 744 of the EAR; license applications to these parties are reviewed under a general policy of denial.

Revisions to the Commerce Control List

This rule revises a number of entries on the Commerce Control List (CCL) to implement the December 2006 agreed revisions to the Wassenaar List of Dual Use Goods and Technologies. This rule also revises language to provide a complete and more accurate description of controls. A description of the specific amendments to the CCL pursuant to the December 2006 Wassenaar Agreement is provided below. Newly added ECCNS, as described below, are as follows:

1D003, 3C005, and 7A008. The affected ECCNS, as described below, are 1A002, 1B001, 1C005, 1C008, 1C010, 1C998, 1E002, 2B001, 2B002, 3A001, 3A002, 3A991, 3B001, 3B991, 3C002, 3C992, 3E001, 3E002, 5A001, 5A991, 5E001, 6A002, 6A004, 6A005, 6A006, 6A008, 6A995, 6D003, 6E201, 7A001, 7A002, 7A003, 7A101, 7B003, 7D001, 7D003, 7E001, 7E002, 7E004, 8A002, 8C001, 9D004, 9E001, and 9E002.

Category 1 Materials, Chemicals, "Microorganisms," and Toxins

ECCN 1A002 (Composite structures or laminates) is amended by:

- a. Clarifying 1A002.a by adding 'consisting of' in front of the parameter and deleting 'made from';
- b. Clarifying 1A002.b by adding 'consisting of' to the front and replacing 'made from' with 'any of the following' to the end of the subparagraph;
- c. Clarifying the term 'aircraft' to read 'civil aircraft' in the Note to 1A002;
- d. Clarifying the size of fabric made from "fibrous or filamentary materials" not controlled for repair of civil aircraft structures from '1 m²' to '100 cm × 100 cm'.

Rationale: The previous material size limit impaired the ability of airlines to repair their airplanes successfully and in a timely manner. With each new commercial airplane design, the proportion of structure made from carbon materials is increasing.

ECCN 1A004 (Protective and detection equipment and components not specially designed for military use) is amended by revising the Related Controls paragraph in the List of Items Controlled section by redesignating note 2 as note 3 and adding a new note 2 to read "See ECCN 1D003 for "software" specially designed or modified to enable equipment to perform the functions of equipment controlled under section 1A004.c (Nuclear, biological and chemical (NBC) detection systems). See ECCN 1E002.g for control libraries (parametric technical databases) specially designed or modified to enable equipment to perform the functions of equipment controlled under 1A004.c (Nuclear, biological and chemical (NBC) detection systems)."

ECCN 1B001 (Equipment for the production of fibers) is amended by:

- a. Adding a note to the License Requirement section under the MT control that reads "Note: MT applies to equipment in 1B001.d that meets or exceeds the parameters of 1B101." to clarify the MT license requirement, as this requirement has been particularly confusing to the public; and
- b. Clarifying the text of 1B001.f., because attempts have been made to

export ultrasonic equipment without license due to interpretation that the 3-D and ultrasonic tomography parameters make an empty box. The control text therefore is clarified to ensure systems with critical capability are controlled for export.

ECCN 1C005 (superconductive composite conductors) is amended by:

- a. Removing the term 'multifilamentary' from 1C005.a.;
- b. Replacing the 'or' with an 'and' in 1C005.a.1.;
- c. Removing part of the parameter 'but less than 25 K (249.16°C)' from 1C005.b.1.;
- d. Replacing 1C005.b.2 which stated, "A cross-section area less than 0.28×10^{-4} mm²; and" to read "Remaining in the "superconductive" state at a temperature of 4.2 K (-268.96 °C) when exposed to a magnetic field oriented in any direction perpendicular to the longitudinal axis of conductor and corresponding to a magnetic induction of 12 T with critical current density exceeding 1750 A/mm² on overall cross-section of the conductor."
- e. Removing 1C005.b.3; and
- f. Adding 1C005.c and a new technical note, to read as follows "“Superconductive” “composite” conductors consisting of one or more “superconductive” filaments which remain “superconductive” above 115 K (-158.16 °C).

Technical Note: For the purpose of 1C005, filaments may be in wire, cylinder, film, tape or ribbon form.; and"

Rationale: These revisions are made to align controls with current technology.

ECCN 1C008 (Non-fluorinated polymeric substances) is amended by:

- a. Redesignating Note 1 as Note 2 and adding a new Note 1 to clarify the term polymeric substances;
- b. Revising the test method of determination of a heat distortion temperature in 1C008.b. from 'ISO 75-3 (2004)' to 'ISO 75-2 (2004), method A'; and
- c. Revising the load parameter in 1C008.b from '1.82 N/mm²' to '1.80 N/mm²';

Rationale: ISO75-3 (2004) specifies the method for determining the temperature of deflection under a load of high-strength thermosetting laminates and compression-molded long-fiber-reinforced plastics in which the fiber length is greater than 7.5 mm. The materials controlled under 1C008.b are thermoplastic liquid crystal copolymers, and therefore ISO75-3 (2004) is not an appropriate test method for 1C008.b. materials. In accordance with

ISO75-2 (2004), method A, '1.82 N/mm²' is replaced with '1.80 N/mm²'.

d. Delete 1C008.c, which are polyarylene ether ketones, including polyether ketone (PEKK), polyether ketone (PEK), and Polyether ketone ether ketone (PEKEKK).

Rationale: The patent for polyarylene ether ketones has expired and China and India are now manufacturing the commodity under different trade names. The manufacturing technology and the properties for all these products are very similar. Although polyarylene ether ketones is no longer controlled under ECCN 1C008 and related technology controlled under 1E001, there remains a license requirement under ECCNs 1C998 and 1E998 respectively.

ECCN 1C010 (fibrous or filamentary materials) is amended by:

a. Clarifying the term 'aircraft' to read 'civil aircraft' in the Notes to 1C010.b and 1C010.e;

b. Increasing the size of fabric made from "fibrous or filamentary materials" not controlled for repair of civil aircraft structures in the Notes to 1C010.b and 1C010.e from '50 cm × 90 cm' to '100 cm × 100 cm'; and

c. Adding the Celsius equivalent (2 °C) to 2K in the Technical Note that describes glass transition temperature.

Rationale: The previous material size limit impaired the ability of airlines to repair their airplanes successfully and in a timely manner. With each new commercial airplane design, the proportion of structure made from carbon materials is increasing.

ECCN 1C998 (Non-fluorinated polymeric substances) is amended by:

a. Redesignating 1C998.a to 1C998.a.1; and

b. Revising paragraph 1C998.a to add the polyarylene ether ketones deleted from 1C008.c.

Note: For equipment no longer controlled under ECCN 1C008 and related technology controlled under 1E001, there remains a license requirement under ECCNs 1C998 and 1E998 respectively, for exports and reexports to designated terrorism supporting countries, as set forth in Parts 742 and 746 of the EAR and as indicated in AT Column 1 of the Commerce Country Chart.

ECCN 1D003 is added to control "software" specially designed or modified to enable equipment to perform the functions of equipment controlled under section 1A004.c (Nuclear, biological and chemical (NBC) detection systems).

ECCN 1E001 is amended by revising the Related Controls paragraph in the List of Items Controlled section by redesignating notes 2 and 3 as notes 3 and 4, and adding a new note 2 to read "See ECCN 1E002.g for control libraries

(parametric technical databases) specially designed or modified to enable equipment to perform the functions of equipment controlled under 1A004.c (Nuclear, biological and chemical (NBC) detection systems)."

ECCN 1E002 is amended to add a new paragraph 1E002.g to control libraries (parametric technical databases) specially designed or modified to enable equipment to perform the functions of equipment controlled under 1A004.c (Nuclear, biological and chemical (NBC) detection systems).

Rationale: ECCNs 1D003 and 1E002 are revised because some non-controlled detection systems can be upgraded to become controlled nuclear, biological and chemical (NBC) detection systems by uploading software or the associated library of NBC related chemical fingerprints into the memory of the detector.

Category 2 Materials Processing

ECCN 2B001 (Machine tools) is amended by revising the Unit paragraph in the List of Items Controlled section to remove "parts and accessories", and adding additional parameters to the contact lens machine exception in Note to 2B001.a in order to prevent general purpose diamond turning machines from being exported as contact lens machines.

ECCN 2B002 (Numerically controlled machine tools using a magnetorheological finishing (MRF) process) is amended by:

a. Revising the heading to clarify the scope of controls from 'numerically controlled machine tools' to 'numerically controlled optical finishing machine tools'; and to revise the way the parameters are applied from "having any of the following" to 'having all of the following';

b. Adding a new definition for 'Electrorheological finishing (ERF)' to the Related Definitions paragraph in the List of Items Controlled section;

c. Removing the 'or' at the end of 2B002.a;

d. Adding new paragraphs 2B002.c to add a new parameter (Three or more axes which can be coordinated simultaneously for 'contouring control'); and

e. Adding a new paragraphs 2B002.d.1 through d.3 to list specific optical finishing processes (Magnetorheological finishing ('MRF'); Electrorheological finishing ('ERF'); and 'Energetic particle beam finishing').

Category 3 Electronics

ECCN 3A001 (Electronic components) is amended by:

a. Adding 3A001.b.9 to the License Exception LVS eligibility paragraph for \$3,000, and adding 3A001.b.9 and 3A001.g to the License Exception GBS eligibility paragraph;

b. Correcting 3A001.a.5.a.1 by adding the word "with" to be consistent with the Wassenaar Dual-Use List (A resolution of 8 bit or more, but less than 10 bit, with an output rate greater than 500 million words per second);

c. Revising the output rate for analog-to-digital converter integrated circuits in 3A001.a.5.a.3 from 'greater than 50 million words per second' to 'greater than 105 million words per second';

d. Revising the output rate for analog-to-digital converter integrated circuits in 3A001.a.5.a.4 from 'greater than 5 million words per second' to 'greater than 10 million words per second';

e. Revising the output rate for analog-to-digital converter integrated circuits in 3A001.a.5.a.5 from 'greater than 1 million words per second' to 'greater than 2.5 million words per second';

Rationale: These output rates are updated to keep pace with advances in analog-to-digital converter technology and growing commercial markets.

Note: For analog-to-digital converter integrated circuits no longer controlled under ECCN 3A001.a.5.a and related technology controlled under ECCN 3E001, there remains a license requirement under ECCNs 3A991.c and 3E991 respectively, as well as a software control under ECCN 3D991 for exports and reexports to designated terrorism supporting countries, as set forth in Parts 742 and 746 of the EAR and as indicated in AT Column 1 of the Commerce Country Chart.

f. 3A001.b.9 is amended by adding microwave power modules (MPM), consisting of, at least, a traveling wave tube, a microwave monolithic integrated circuit and an integrated electronic power conditioner having specified parameters;

Rationale: MPMs are added to 3A001.b.9 because they are used as an efficient, compact building block in electronic warfare, radar and communication systems. The military criticality of the MPM results from the operating frequency, power (peak and/or average), instantaneous bandwidth, and the speed at which the MPM turns-on and packaging attributes. The combination of these capabilities results in a large improvement in power density (power per unit volume) over comparable solid state power amplifiers, resulting in a wide range of military applications. These include synthetic aperture radar, wideband data links, satellite communications, towed decoys and electronic warfare. Commercial applications of MPMs include satellite communications, wireless

communications, high power RF sources for laboratory use, and rapid prototyping of microwave amplifiers for various applications.

g. 3A001.e.1 is amended by replacing the term “batteries” with the term “cells”;

h. 3A001.e.1.a and 3A001.e.1.b are amended by removing the phrase “and batteries”, replacing the term “rechargeable cells” with the term “secondary cells”, and changing the energy density parameter to “550 Wh/kg at 293K (20° C)”;

i. The technical note for 3A001.e.1 is replaced with 4 new technical notes that describe “energy density”, “cell”, “primary cell”, and “secondary cell”, as well as a note that explains that “3A001.e. does not control batteries, including single cell batteries;” and

j. 3A001.g is added to control solid-state pulsed power switching thyristor devices and thyristor modules.

ECCN 3A002 (General purpose electronic equipment) is amended by:

a. Revising the eligibility paragraphs for License Exceptions GBS and CIV to remove 3A002.d, because all signal generators that were eligible for these license exceptions are no longer controlled under ECCN 3A002, but are now controlled under ECCN 3A992.a;

b. Removing a comma between “Frequency synthesizer” and “electronic assemblies” in 3A002.b to harmonize with the Wassenaar Dual-Use List;

c. Adding a note after 3A002.b stating “The control status of signal analyzers, signal generators, network analyzers, and microwave test receivers as stand-alone instruments is determined by 3A002.c., 3A002.d., 3A002.e., and 3A002.f., respectively.”;

d. Revising 3A002.d (Frequency synthesized signal generators) by replacing the term “master frequency” with “master reference oscillator”;

e. Revising 3A002.d.3 (“frequency switching time”) by modifying the text and adding new subparagraphs 3A002.d.3.a through 3A002.d.3.e that specify various frequency switching time parameters;

f. Redesignating Note 1 (definition of ‘pulse duration’) as Note 2 and adding a new Note 1 following 3A002.d.4 to clarify the term ‘frequency synthesized signal generators’; and

g. Redesignating Technical Note 1 as Technical Note 2, and adding a new Technical Note 1 to explain that arbitrary waveform and function generators are normally specified by sample rate.

ECCN 3A991 (Electronic devices and components not controlled by 3A001) is amended by:

a. Revising 3A991.a.1 from “A composite theoretical performance (CTP) of 6,500 million theoretical operations per second (MTOPS) or more and an arithmetic logic unit with an access width of 32 bit or more” to read “A performance speed of 5 GFLOPS or more and an arithmetic logic unit with an access width of 32 bit or more” to harmonize with revisions to ECCN 3E002; and

b. Revising 3A991.j (batteries/cells) to harmonize with revisions to 3A001.e.1.

ECCN 3B001 (Equipment for the manufacturing of semiconductor devices or materials) is amended by:

a. Correcting the phrase “3B001.a.2 and a.3, or .f” to read “3B001.a.2, a.3, or .f” in the License Exception GBS eligibility paragraph in the License Exception section;

b. Redesignating 3B001.f.2 as 3B001.f.3;

c. Adding a new paragraph 3B001.f.2 to control imprint lithography equipment capable of producing features of 180 nm or less; and

d. Adding a new paragraph 3B001.i to control lithograph templates designed for integrated circuits controlled by 3A001.

Rationale: Imprint lithographic technology was added to the International Technology Roadmap for Semiconductor’s (ITRS’) 2003 edition. Imprint lithographic systems are currently being manufactured in the U.S., Austria, Sweden, and Germany, and have demonstrated the capability of producing features as small as 10nm. While these systems do not yet have the throughput and overlay accuracy necessary for use in major silicon integrated circuit production facilities, the technology is maturing, and is expected to be widely used at the 45nm technology node. They are currently being used in compound semiconductor manufacturing, and compound semiconductor devices have important military applications.

ECCN 3B991 (Equipment not controlled by 3B001 for the manufacture of electronic components and materials) is amended by adding ECCN 3C005 to the list of ECCNs referenced in 3B991.b.1.b in order to harmonize with the addition of this new ECCN.

ECCN 3C002 (Resist materials) is amended by revising the heading to conform to the Wassenaar Dual-Use List and the wavelength for positive resists designed for semiconductor lithography from ‘below 350 nm’ to ‘below 245 nm’ in order to match the wavelength threshold in ECCN 3B001.a (lithography equipment), which was changed in 2004.

ECCN 3C005 (Silicone carbide wafers) is added to the Commerce Control List to control silicon carbide (SiC) wafers having a resistivity of more than 10,000 ohm-cm, because it is emerging as the material of choice for high temperature devices, such as power switches, which are used in both military (e.g., military ships, vehicles, radar, communications, electromagnetic warfare and weapons systems) and commercial applications (e.g., communication systems, electric power, utilities industry, civil radar systems, cell phone base stations, and high definition television transmitters).

Note: ECCN 3C005 is controlled for NS:2 and AT:1 reasons. In addition, ECCN 3E001 controls for NS:1 and AT:1 reasons related technology for the development or production of silicon carbide (SiC) wafers classified as ECCN 3C005, and ECCN 3B991.b.1.b controls for AT:1 reasons related equipment specially designed for purifying or processing III/V and II/VI semiconductor materials controlled by ECCN 3C005.

ECCN 3C992 (positive resists) is amended by revising the heading to adjust the wavelength from ‘between 370 and 350 nm’ to ‘between 370 and 245 nm’ to harmonize with the revision to 3C002.

ECCN 3E001 is amended by:

a. Revising the NS control text in the License Requirements section to add the new ECCN 3C005;

b. Revising the Related Controls paragraph in the List of Items Controlled section to remove outdated note 2 and redesignating note 3 as note 2, because updated version of this note is already reflected in the Items paragraph of the List of Items Controlled section.

c. Redesignating Note 1 as Note 2 and Note 2 as Note 1 in the Items paragraph; and

d. Revising the citation in the technical note from ‘Note b’ to ‘Note 2’ in the Items paragraph.

ECCN 3E002 is amended by:

a. Revising the heading to remove references to ‘composite theoretical performance (CTP)’ and ‘million theoretical operations per second (MTOPS)’;

b. Revising License Exception CIV eligibility text from “Composite Theoretical Performance (CTP) less than or equal to 40,000 MTOPS (regardless of word length or access width)” to read “vector processor unit with operand length of 64-bit or less, 64-bit floating operations not exceeding 32 GFLOPS, or 16-bit or more floating-point operations not exceeding 32 GMACS” to conform to the revisions in 3A001 regarding microprocessors;

Note: The new parameter for measuring vector processor units is GMACS, which

equals billions of 16-bit fixed-point multiply-accumulate operations per second.

c. Adding subparagraphs 3E002.a, 3E002.b, and 3E002.c to specify new parameters for microprocessor technology controls related to the vector processor unit, floating-point vectors, and fixed-point multiply-accumulate results, including adding a technical note to describe "vector processing unit"

Rationale: These changes are made to remove the remaining references to "Composite Theoretical Performance (CTP)" and "Millions of Theoretical Operations Per Second (MTOPS)" in the EAR, which is consistent with agreements made by the Wassenaar Arrangement with regard to microprocessors. Information on How to Calculate "Composite Theoretical Performance" ("CTP") is removed from the end of Category 3, because CTP is no longer a parameter used to control any entry in the Commerce Control List.

Category 5 Part I Telecommunications

ECCN 5A001 (Telecommunications systems, equipment, and components) is amended by:

a. Revising the phrase 'telecommunication transmission equipment and systems' to read 'telecommunication systems and equipment' in 5A001.b, because 5A001.b controls transmission equipment, but also receivers, transmitters, and transceivers.

b. Revising the scope of parameters from 'any' to 'all' in 5A001.b.2 for radio equipment, because these features are more commonly found in radio equipment today as a result of technological advances;

c. Removing the parameter in 5A001.b.2.a 'incorporating adaptive techniques providing more than 15 dB suppression of an interfering signal';

Rationale: These revisions are made to 5A001 because the parameter is obsolete due to technological advances in Digital Signal Processing (DSP).

d. Adding 5A001.g to the NS:2 control paragraph in the License Requirements section; and

e. Adding a new paragraph 5A001.g to control specially designed Passive Coherent Location systems or equipment.

Rationale: Revisions are made to 5A001.g because passive location systems can be used in air defense networks to detect and track aircraft without being detected themselves and have the ability to detect aircraft designed to be stealthy. These systems can also be used for civil applications, such as analog FR radio, cellular phone

base stations and digital audio broadcast (DAB).

Note: Adding 5A001.g (specially designed Passive Coherent Location systems or equipment) to ECCN 5A001 consequently adds a license requirement for related development and production software in ECCN 5D001 and development, production, and use technology in ECCN 5E001, for the exports and reexports to all destinations, except Canada, under NS Column 1 of the Commerce Country Chart and for exports and reexports to designated terrorism supporting countries, as set forth in Parts 742 and 746 of the EAR and as indicated in AT Column 1 of the Commerce Country Chart.

ECCN 5A991 is amended by adding 5A991.b.7.d to maintain anti-terrorism controls on radio equipment operating in the 1.5 MHz to 87.5 MHz band and incorporating adaptive techniques providing more than 15 dB suppression of an interfering signal, which this rule removed from 5A001.b.2.a.

Note: Adding 5A991.b.7.d to ECCN 5A991 consequently maintains a license requirement for related development, production, and use software in ECCN 5D991, for the exports and reexports to designated terrorism supporting countries, as set forth in Parts 742 and 746 of the EAR and as indicated in AT Column 1 of the Commerce Country Chart. However, the Wassenaar Arrangement agreed to maintain national security controls for the related technology for this equipment in ECCN 5E001 by adding a new paragraph 5E001.c.4.c.

ECCN 5E001 is amended by adding a new paragraph 5E001.c.4.c to maintain national security and anti-terrorism controls on the technology for the development or production of certain shortwave radios employing adaptive interference suppression techniques, which this rule is removing from 5A001.b.2.a.

Category 6 Sensors

ECCN 6A002 (Optical Sensors) is amended by:

a. Revising the License Requirement section to add an exception note under the RS controls to exclude 6A002.a.3.d.a.2 and 6A002.a.3.e for lead selenide focal plane arrays, because these devices are not suitable for imaging applications, and no longer merit regional stability controls;

b. Revising the Unit paragraph in the List of Items Controlled section, to remove the term "accessories";

c. Revising the peak response in wavelength range in 6A002.a.3.d.1 from 'exceeding 1,200 nm but not exceeding 2,500 nm' to 'exceeding 1,200 nm but not exceeding 3,000 nm'; and

d. Revising the peak response in wavelength range for non-"space-qualified" linear (1-dimensional) "focal

plane arrays" in 6A002.a.3.e from 'exceeding 2,500 nm but not exceeding 30,000 nm' to 'exceeding 3,000 nm but not exceeding 30,000 nm'.

Rationale: The revisions to 6A002.a.3 are made to remove national security controls on focal plane arrays that are effectively non-usable in military applications, and to simplify the control text.

ECCN 6A004 (Optics) is amended by:

a. Revising the Unit paragraph in the List of Items Controlled section to remove the reference to cable;

b. Revising the Related Controls paragraph in the List of Items Controlled section to add a reference to ECCN 3B001 for optical mirrors or aspheric optical elements specially designed for lithography equipment; and by enumerating the notes in the Related Controls paragraph;

c. Moving the definition of 'aspheric optical element' from the technical note to the Related Definitions paragraph in the List of Items Controlled section; and

d. Adding single quotes around the term 'aspheric optical elements' in 6A004.e to indicate that the definition may be found in the Related Definitions paragraph of the List of Items Controlled section of the ECCN.

ECCN 6A005 (Lasers) is amended by:

a. Revising the NP controls in the License Requirements section to conform with the revisions in the ECCN 6A005 items paragraph and the revisions to ECCN 6A205;

b. Revising the License Requirements Notes to conform to the revisions related to nuclear controls and revisions in 6A005;

c. Revising the License Exception GBS and CIV eligibility paragraphs to conform to the revisions in the items paragraph and the license requirement note that outlines NP controls;

d. Revising the Note 6 in the Related Controls paragraph in the List of Items Controlled section to add "and "lasers" specifically designed, modified, or configured for military application are subject to the export licensing authority of the U.S. Department of State, Directorate of Defense Trade Controls";

e. Moving paragraph 1 in the Related Definitions paragraph in the List of Items Controlled section to Note 1 at the top of the items paragraph in the List of Items Controlled section, and removing paragraph 2 in the Related Definitions paragraph;

f. Adding a definition for 'Wall-plug efficiency' in the Related Definitions paragraph in the List of Items Controlled section;

g. Adding Notes 2 through 4 to the top of the items paragraph of the List of

Items Controlled section to clarify controls in ECCN 6A005;

- h. Moving 6A005.a.1 (Excimer lasers) to 6A005.d.4;
- i. Deleting 6A005.a.2 (Metal vapor lasers), as they are now controlled under 6A005.b, although they are not specifically cited as before;
- j. Moving 6A005.a.3 (Carbon monoxide (CO) lasers) to 6A005.d.2;
- k. Moving 6A005.a.4 (Carbon dioxide (CO₂) lasers) to 6A005.d.3;
- l. Moving 6A005.a.5 (Chemical lasers) to 6A005.d.5;
- m. Deleting 6A005.a.6 (Krypton ion or argon ion lasers), as pursuant to Note 5.a, Krypton lasers are no longer controlled, and Argon lasers are now controlled under 6A005.a, with the exception of Argon lasers below 50W, pursuant to the Note to 6A005.a.2;
- n. Moving 6A005.b (Semiconductor lasers) to 6A005.d.1;
- o. Moving 6A005.c.2 (non-tunable lasers) to 6A005.a and .b, with the exception of Neodymium glass lasers, and modifying the parameters;
- p. Moving 6A005.c.2.a (Neodymium glass lasers) to 6A005.d.6; and
- q. Moving 6A005.d (dye and other liquid lasers) to 6A005.c (tunable lasers), see Note to 6A005.c.

Rationale: The changes in ECCN 6A005 are made to move the laser controls from technology based categories to performance based criteria. The categories are restructured, where possible, to remove specific references to types of lasers and characterize the laser on the basis of wavelength, power, mode, energy, pulse length, mass, and efficiency.

ECCN 6A006 is amended by adding quotes around the term “compensation systems” in the heading and in 6A006.d, because it has become a defined term in Part 772.

ECCN 6A008 (Radar) is amended by:

- a. Adding a Note to explain that 6A008 does not control: secondary surveillance radar (SSR), car radar designed for collision prevention, displays or monitors used for air traffic control (ATC), and meteorological (weather) radar.

- b. Revising the parameters in 6A008.a to avoid overlapping controls between 6A008.a and 6A008.m.1.

ECCN 6A205 is amended by:

- a. Revising the heading to simplify it and place the referenced ECCNs in order;
- b. Removing the reference to “parts and accessories” in the unit paragraph of the List of Items Controlled section, because these are not controlled by this entry;
- c. Adding a reference to 6A005.a.2 for additional controls on argon ion lasers

and a reference to 6A005.b.6.b for additional neodymium-doped lasers in the Related Controls paragraph of the List of Items Controlled section;

- d. Revising 6A005.b.1 for “operating at wavelengths for tunable pulsed single-mode dye laser oscillators” from “Operating at wavelengths between 300 nm and 800 nm” to “Operating at wavelengths between 600 nm and 800 nm”;

- e. Removing 6A205.c (Tunable pulsed dye laser amplifiers and oscillators), because these paragraphs are entirely controlled by ECCN 6A005.c.1.b;

- f. Revising 6A205.f to maintain NP controls on Neodymium-doped (other than glass) lasers that are not controlled by ECCN 6A005.

Rationale: This change is made to split control of Neodymium-doped lasers between ECCN 6A005.b.6 and 6A205.f, with no intended overlap.

ECCN 6A995 is amended by:

- a. Revising 6A995.c, so that it controls “Ruby ‘lasers’ having an output energy exceeding 20 J per pulse”;

- b. Redesignating paragraph 6A995.d (Free electron lasers) as paragraph g., and adding three new paragraphs to maintain anti-terrorism (AT) controls for certain lasers no longer controlled by ECCN 6A005: 6A995.d (Non-“tunable” “pulsed lasers”), 6A995.e (Non-“tunable” continuous wave “(CW) lasers”), and 6A995.f (Non-“tunable” “lasers”).

ECCN 6D003 is amended by adding quotes around the term “compensation systems” in the in 6D003.f.1, because it has become a defined term in Part 772.

6E201 is amended by revising the heading to harmonize with revisions made to ECCNs 6A005 and 6A205, and adding the phrase “not controlled by 6E001 or 6E002”.

Category 7 Navigation and Avionics

ECCN 7A001 (Accelerometers) is amended by:

- a. Revising the heading from “Linear accelerometers designed for use in inertial navigation or guidance systems and having any of the following characteristics (see List of Items Controlled), and specially designed components therefor.” to read “Accelerometers as follows (see List of Items Controlled), and specially designed components therefor” in order to change the scope of control from including end-use and type to a strictly technical control, as set forth in the List of Items Controlled section;

- b. Revising the MT controls in the License Requirements section from “MT applies to entire entry” to “MT applies to commodities that meet or exceed the parameters of 7A101” to clarify items

controlled for MT reasons based on the Missile Technology Control Regime Annex;

- c. Differentiating between linear accelerometers designed to operate at high g values and linear accelerometers designed to operate at low g levels; and

- d. Moving the controls for angular and rotational accelerometers from the gyro controls in 7A002 to the accelerometer controls in 7A001.

Rationale: With the constant development of accelerometers, there are now products on the market which can be used for inertial navigation and guidance, but that were not necessarily designed for that purpose. Therefore, these changes are being made to 7A001 to control these new products.

ECCN 7A002 (Gyros or angular rate sensors) is amended by:

- a. Revising text in the heading from ‘and angular or rotational accelerometers’ to read ‘or angular rate sensors’;

Rationale: The heading is clarified to delete “angular or rotational accelerometers” because angular accelerometers do not measure angular rate. (These devices are more appropriately addressed in ECCN 7A001.) Also, the term angular rate sensor is added. With the emergence of new gyro technology, the term “angular rate sensor” is interchangeable with “gyro”.

- b. Revising the Missile Technology (MT) reason for control in the License Requirements section to read “MT applies to 7A002 items that meet or exceed the parameters of 7A102” because some items identified in 7A002.a and 7A002.b are national security controlled items and not MT controlled items;

- c. Adding a License Requirement Note to the License Requirements section to add the Missile Technology Control Regime’s definition for ‘stability’, which should only be used for the purposes of MT controls. (The Wassenaar Arrangement definition for ‘stability’ is found in Part 772);

- d. Revising the drift rate in from ‘less (better) than 0.1 degree per hour when specified to function at acceleration levels below 12 g’ to read ‘less (better) than 0.5 degree per hour when specified to function at linear acceleration levels up to and including 100.g’ combining paragraphs 7A002.a, 7A002.a.1 and 7A002.a.2;

- e. Adding double quotes around the term “angle random walk” in 7A002.b;

- f. Removing the technical note defining “angle random walk”, as the definition was moved to Part 772;

- g. Redesignating paragraph 7A002.c as paragraph 7A002.d; and

h. Adding a new paragraph 7A002.c to incorporate three critical parameters for controlling gyros.

Rationale: With new gyro technology, e.g. Fiber Optic Gyros (FOG) and MicroElectroMechanical System (MEMS) gyros, the current 7A002.a. and b. language does not adequately control gyros required for very short-term applications and having high rate range, such as those used in tactical missiles and smart munitions. The former 7A002.c addressed gyros with a high linear acceleration capability. The new paragraph 7A002.c includes three critical parameters: drift rate stability, input rate range and angle random walk (ARW). To be controlled, the gyro must meet the drift rate stability and either the input rate range or ARW parameter. The input rate range of 500 degrees per second and the ARW parameter of 0.2 degrees per square root hour were selected because they are consistent with tactical missile and howitzer requirements. The 40 degrees per hour drift rate stability was selected because it would control gyros used for guidance in very short mission tactical weapons and smart munitions, but would avoid the control of gyros used in automobiles. This revision will control the most critical gyros, while allowing wide commercial-use of these new gyro technologies.

ECCN 7A003 (Inertial systems) is amended by:

- a. Adding 7A003.d to control Inertial measurement equipment, including Inertial Measurement Units (IMU) and Inertial Reference Systems (IRS), which was added to clarify 7A003.c; and
- b. Replacing a reference in Note 2 that stated "civil authorities of a country in Country Group A:1" with "civil authorities of a Wassenaar Arrangement Participating State, see Supplement No. 1 to Part 743 for a list of these countries."

ECCN 7A008 is added to control underwater sonar navigation systems for NS:2 and AT:1 reasons, because underwater navigation systems pose significant military and terrorism concerns because of their potential use for coastal reconnaissance and infiltration.

ECCN 7A101 is amended by revising the Heading and the Items paragraph in the List of Items Controlled section to add a new paragraph 7A101.b for "continuous output accelerometers of any type, specified to function at acceleration levels greater than 100 g, and specially designed components therefor" and to expand the scope of the heading to include this new paragraph.

Rationale: These accelerometers were previously controlled under ECCN

7A001, but are no longer controlled under this ECCN because of the Wassenaar Arrangement's agreement to add the words "designed for use in inertial navigation or guidance systems." This revision was necessary in order to maintain the MT controls on these accelerometers as specified by 9.A.5 of the Missile Technology Control Regime Annex.

ECCN 7B003 is amended by revising the Related Controls paragraph in the List of Items Controlled section to clarify that 7B003 controls include fiber optic gyro coil winding machines.

ECCN 7D003 is amended by:

- a. Adding software controls for ECCN 7A008 in 7D003.a and .b;
- b. Replacing the term 'inertial data' with 'heading data' in 7D003.b; and
- c. Revising 7D003.b.1 by adding 'or sonar'.

Rationale: The revisions to 7D003.a address software that improves navigation performance of equipment controlled by ECCN 7A008. The revisions to 7D003.b address source code for a hybrid underwater navigation system that combines a heading source (inertial or non-inertial, such as a fluxgate compass) with Doppler sonar to provide positioning data to the level specified in ECCN 7A008.

ECCNs 7D001, 7E001, and 7E002 are amended to revise the License Requirement section to include ECCN 7A008 in the NS:1 control and to exclude ECCN 7A008 from the MT:1 control.

Rationale: This revision necessary in order to add NS:1 controls for the related technology and software for the new ECCN 7A008, but to exclude it from MT:1 controls, as equipment controlled by ECCN 7A008 does not appear on the MTCR Annex.

ECCN 7E004 is amended by adding 7E004.a.7 to control development and production technology for Data Based Referenced Navigation (DBRN) systems designed to navigate underwater using sonar or gravity databases that provide a positioning accuracy equal to or less (better) than 0.4 nautical miles.

Rationale: The addition of ECCN 7A008 and 7E004.a.7 addresses two new commercial capabilities under the title of Underwater Sonar Navigation Systems: (1) underwater sonar navigation systems and (2) technology for underwater Data Based Referenced Navigation (DBRN) (e.g. sonar imaging). These capabilities pose significant military and terrorism concerns because of their potential use for coastal reconnaissance and infiltration. These systems are also used for commercial surveying applications. The Munitions List ML11 controls navigation and

guidance systems specially designed for military use, but ML11 does not control underwater sonar navigation systems designed for commercial use.

Category 8 Marine

ECCN 8A002 (Systems, equipment and components for submersible vehicles) is amended by:

- a. Adding 'and components' to the heading;
- b. Revising the unit paragraph to add 'systems' and 'components in \$ value';
- c. Adding 'and components' to 8A002.a;
- d. Adding a new paragraph 8A002.a.4 to control 'Components manufactured from material specified in ECCN 8C001.' and adding a technical note to explain that this control includes components in any stage of manufacture, i.e., not in final form.

Rationale: The completed foam blocks, which are components manufactured from material specified in ECCN 8C001, are ready to use, and therefore it is sensible to control these 'components,' as well as the raw material that is already controlled, thus blocking a current loophole in the control text.

ECCN 8C001 (Syntactic foam designed for underwater use) is amended to add a reference to 8A002.a.4 in the Related Control paragraph of the List of Items Controlled section.

Category 9 Propulsion Systems, Space Vehicles and Related Equipment

Category 9 is amended by revising the title of Category 9 to read "Aerospace and Propulsion," because this Category contains a significant amount of aerospace items.

ECCN 9D004 is amended by:

- a. Revising the License Requirement section to exclude the newly added paragraphs 9D004.f and .g;
- b. Adding a new paragraph 9D004.f to control software specially designed to design the internal cooling passages of aero gas turbine engine blades, vanes, and tip shrouds; and
- c. Adding a new paragraph 9D004.g to control software having all of the following characteristics: Being specially designed to predict aero thermal, aeromechanical and combustion conditions in gas turbine engines; and having theoretical modeling predictions of the aero thermal, aeromechanical and combustion conditions, which have been validated with actual turbine engine (experimental or production) performance data.

Rationale: ECCN 9D004 is amended because this type of software is used in

highly advanced research domains and is not part of the “off the shelf” market. Rather, it is developed, and daily improved, by aircraft engine manufacturers. The software is used in the setting of new engines, and the quality is crucial for improving the performances of aircraft engines.

ECCN 9E001 is amended by revising the heading and the national security controls to correct the citation 9A001.c to read 9A001.b.

ECCN 9E002 is amended by revising the heading to correct the citation 9A001.c to read 9A001.b.

Part 742 “Control Policy—CCL Based Controls”

This rule amends section 742.19 by revising paragraph (b)(1)(xix) from stating “Microprocessors with a CTP of 550 or above” to read “Microprocessors with a processing speed of 0.5 GFLOPS or above” In addition, this rule amends Supplement No. 2 “Anti-terrorism Controls: Iran, North Korea, Syria and Sudan Contract Sanctity Dates and Related Policies” by revising paragraph (26)(ii) from stating “With a CTP of 550 MTOPS or above” to read “With a processing speed of 0.5 GFLOPS or above.”

Retiring Composite Theoretical Performance/Millions of Theoretical Operations Per Second (CTP/MTOPS) Metric

The CTP/MTOPS metric was used in measuring computer and microprocessor performance. The usefulness of the CTP/MTOPS metric in defining computer and microprocessor performance has been overtaken by advances in technology. The U.S. Government, in a final rule published in April 2006 (71 FR 20876), replaced the CTP/MTOPS metric with the APP/WT metric for measuring computer performance. The CTP/MTOPS reference was retained in certain parts of the EAR for measuring microprocessor performance because it was still used by the Wassenaar Arrangement (WA) in defining the control level for microprocessor technology. In the WA 2006 list review, the WA revised its microprocessor technology control and discontinued all uses of the CTP/MTOPS metric in the WA List of Dual-use Goods and Technologies. The U.S. Government is also discontinuing all uses of CTP/MTOPS in the EAR with this implementation of the results of the WA 2006 list review.

Deviating From Parallel Control Parameters by Not Using Adjusted Peak Performance/Weighted TeraFLOPS (APP/WT) Metric (Used To Measure Computer Performance) To Measure Microprocessor Performance

With the use of the APP/WT metric for measuring computer performance, there is the temptation, following tradition, to use the APP/WT metric to measure microprocessor performance. However, the GFLOPS metric (billions of 64-bit floating-point operations per second) is preferable to the APP/WT metric because:

(a) The GFLOPS value is published by the manufacturer in its product literature.

(b) The additional complexities introduced by the APP/WT metric are unnecessary because there is a direct linear relationship between the proposed GFLOPS metric and the APP/WT metric (1 GFLOPS = 0.001*0.3 WT = 0.0003 WT).

(c) The translation from GFLOPS to WT provides no additional value.

(d) In the 1990s, the Wassenaar Arrangement (WA) controlled microprocessors with a wide range of operand lengths (8-bit, 16-bit, 32-bit, 64-bit). Today, the WA is only interested in processors with 32- and 64-bit operands. GFLOPS standardizes the measurement on 64-bit floating-point multiply and add. In short, technology has moved forward.

(e) A large part of the CTP formula deals with computer architecture and the rules of aggregation that have absolutely no meaning for microprocessors. Exporters have expressed concern about the need to deal with a complex formula when all they really need is a small part of the CTP formula to calculate the speed of a microprocessor, i.e., GFLOPS.

Section 743.1 “Wassenaar Arrangement”

Section 743.1 is amended by:

- Inserting “6A001” before “a.2.d” for clarification in paragraph (c)(1)(vi);
- Adding ECCN 6A006.a.1 to paragraph (c)(1)(vi);
- Adding clarification notes in parentheses after: 6A002.c, 6A003.b.3, and 6A003.b.4 in paragraph (c)(1)(vi);
- Replacing the text in the parentheses after 6A006.d in paragraph (c)(1)(vi) with the reference “certain items only; see Note to this paragraph”; and
- Revising the Notes to paragraph (c)(1)(vi) to add another type of focal plane array excluded from reporting under 6A002.a.3, namely, microbolometer focal plane arrays

having less than 8,000 elements. Also, adding a new Note 2 to describe which items in 6A006.d are subject to the Wassenaar special reporting requirement.

Rationale: All of the revisions to 743.1(c)(1)(vi) are made to conform to the Wassenaar Sensitive List and will also affect Wassenaar reporting requirements for ECCNS 6E001 and 6E002.

Section 744.17 “Restrictions on certain exports and reexports of general purpose microprocessors for ‘military end-uses’ and to ‘military end-users’” is amended by revising the parameter in the first sentence of paragraph (a) that stated “a composite theoretical performance” (“CTP”) of 6,500 million theoretical operations per second (MTOPS)” to read “a processing speed of 5 GFLOPS”.

Definitions in Part 772

Section 772.1 is amended by:

a. Removing the terms “Composite theoretical performance (CTP)” and “CTP”;

b. Revising the definition of the terms “Drift rate” and “Peak power”; and

c. Adding in alphabetical order the definitions for “Angle random walk”, “Average Output Power”, “Compensation Systems”, “CW Laser”, “Pulsed Laser”, and “Repeatability”.

Supplement No. 3 to Part 774—Statements of Understanding

This rule adds a Statement of Understanding (SOU) addressing source code. The SOU explains that source code may be controlled in either a software or technology entry. The rationale for adding this SOU was to allow flexibility to control source code in either a software or a technology entry, where the definitions for “software” and “technology” didn’t seem to allow for such flexibility. This SOU only applies to national security controlled items, as no such SOU has been agreed to in other multinational regimes. However, this does not preclude other regimes or BIS from controlling source code in whatever manner is best suited for the situation. For the purposes of applying this SOU to source code subject to the EAR, source code should be considered “software,” unless otherwise stated.

Although the Export Administration Act expired on August 20, 2001, the President, through Executive Order 13222 of August 17, 2001, 3 CFR, 2001 Comp., p. 783 (2002), as extended by the Notice of August 15, 2007, 72 FR 46137 (August 16, 2007), has continued the Export Administration Regulations in

effect under the International Emergency Economic Powers Act.

Saving Clause

Shipments of items removed from license exception eligibility or eligibility for export without a license as a result of this regulatory action that were on dock for loading, on lighter, laden aboard an exporting carrier, or en route aboard a carrier to a port of export, on November 5, 2007, pursuant to actual orders for export to a foreign destination, may proceed to that destination under the previous license exception eligibility or without a license so long as they have been exported from the United States before December 5, 2007. Any such items not actually exported before midnight, on December 5, 2007, require a license in accordance with this regulation.

Rulemaking Requirements

1. This final rule has been determined to be not significant for purposes of Executive Order 12866.

2. Notwithstanding any other provision of law, no person is required to respond to, nor shall any person be subject to a penalty for failure to comply with a collection of information subject to the requirements of the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 *et seq.*) (PRA), unless that collection of information displays a currently valid Office of Management and Budget (OMB) Control Number. This rule involves two collections of information subject to the PRA. One of the collections has been approved by OMB under control number 0694 0088, "Multi Purpose Application," and carries a burden hour estimate of 58 minutes for a manual or electronic submission. The other of the collections has been approved by OMB under control number 0694 0106, "Reporting and Recordkeeping Requirements under the Wassenaar Arrangement," and carries a burden hour estimate of 21 minutes for a manual or electronic submission. Send comments regarding these burden estimates or any other aspect of these collections of information, including suggestions for reducing the burden, to OMB Desk Officer, New Executive Office Building, Washington, DC 20503; and to the Office of Administration, Bureau of Industry and Security, Department of Commerce, 14th and Pennsylvania Avenue, NW., Room 6622, Washington, DC 20230.

3. This rule does not contain policies with Federalism implications as that term is defined under Executive Order 13132.

4. The provisions of the Administrative Procedure Act (5 U.S.C. 553) requiring notice of proposed rulemaking, the opportunity for public participation, and a delay in effective date, are inapplicable because this regulation involves a military and foreign affairs function of the United States (5 U.S.C. 553(a)(1)). Further, no other law requires that a notice of proposed rulemaking and an opportunity for public comment be given for this final rule. Because a notice of proposed rulemaking and an opportunity for public comment are not required to be given for this rule under the Administrative Procedure Act or by any other law, the analytical requirements of the Regulatory Flexibility Act (5 U.S.C. 601 *et seq.*) are not applicable. Therefore, this regulation is issued in final form. Although there is no formal comment period, public comments on this regulation are welcome on a continuing basis. Comments should be submitted to Sharron Cook, Office of Exporter Services, Bureau of Industry and Security, Department of Commerce, P.O. Box 273, Washington, DC 20044.

List of Subjects

15 CFR Part 742

Exports, Terrorism.

15 CFR Part 743

Administrative practice and procedure, Reporting and recordkeeping requirements.

15 CFR Part 744

Exports, Reporting and recordkeeping requirements, Terrorism.

15 CFR Part 772

Exports.

15 CFR Part 774

Exports, Reporting and recordkeeping requirements.

■ Accordingly, parts 742, 743, 744, 772 and 774 of the Export Administration Regulations (15 CFR parts 730 799) are amended as follows:

PART 742—[AMENDED]

■ 1. The authority citation for part 742 continues to read as follows:

Authority: 50 U.S.C. app. 2401 *et seq.*; 50 U.S.C. 1701 *et seq.*; 22 U.S.C. 3201 *et seq.*; 42 U.S.C. 2139a; Sec. 901–911, Pub. L. 106–387; Sec. 221, Pub. L. 107–56; Sec 1503, Pub.L. 108–11, 117 Stat. 559; E.O. 12058, 43 FR 20947, 3 CFR, 1978 Comp., p. 179; E.O. 12851, 58 FR 33181, 3 CFR, 1993 Comp., p. 608; E.O. 12938, 59 FR 59099, 3 CFR, 1994 Comp., p. 950; E.O. 13026, 61 FR 58767, 3 CFR, 1996 Comp., p. 228; E.O. 13222, 66 FR 44025, 3 CFR, 2001 Comp., p. 783;

Presidential Determination 2003–23 of May 7, 2003, 68 FR 26459, May 16, 2003; Notice of August 3, 2006, 71 FR 44551 (August 7, 2006); Notice of October 27, 2006, 71 FR 64109 (October 31, 2006); Notice of August 15, 2007, 72 FR 46137 (August 16, 2007).

■ 2. Section 742.19 is amended by revising paragraph (b)(1)(ix) to read "Microprocessors with a processing speed of 0.5 GFLOPS or above."

■ 3. Supplement No. 2 to Part 742 is amended by revising paragraph (c)(26)(ii) introductory text to read as follows:

Supplement No. 2 to Part 742—Anti-Terrorism Controls: Iran, North Korea, Syria and Sudan Contract Sanctity Dates and Related Policies

* * * * *
(c) * * *
(26) * * *
(ii) With a processing speed of 0.5 GFLOPS or above."
* * * * *

PART 743—[AMENDED]

■ 4. The authority citation for part 743 continues to read as follows:

Authority: 50 U.S.C. app. 2401 *et seq.*; Pub.L. 106–508; 50 U.S.C. 1701 *et seq.*; Notice of August 3, 2006, 71 FR 44551 (August 7, 2006); Notice of August 15, 2007, 72 FR 46137 (August 16, 2007).

■ 5. Section 743.1 is amended by revising paragraph (c)(1)(vi), revising the Note to this paragraph, as follows:

§ 743.1 Wassenaar Arrangement.

* * * * *
(c) * * *
(1) * * *
(vi) *Category 6:* 6A001.a.1.b (changing 10 kHz to 5 kHz and adding the text "or a sound pressure level exceeding 224 dB (reference 1 μPa at 1 m) for equipment with an operating frequency in the band from 5kHz to 10 kHz inclusive" to the existing text in 6A001.a.1.b.1), and 6A001.a.2.d; 6A002.a.1.a, 6A002.a.1.b, 6A002.a.2.a (changing 350 uA/Im to 700 uA/Im in 6A002.a.2.a.3.a), 6A002.a.3, 6A002.b, 6A002.c (incorporating 6A002.a.2.a or 6A002.a.3 having characteristics described in this paragraph), 6A002.e; 6A003.b.3 (incorporating 6A002.a.2.a having characteristics described in this paragraph), 6A003.b.4 (incorporating 6A002.a.3 having characteristics described in this paragraph); 6A004.c and d; 6A006.a.1, 6A006.a.2 (having a "noise level" (sensitivity) lower (better) than 2pT rms per square root Hz), 6A006.d (certain items only; see Note to this paragraph); 6A008.d, .h, and .k; 6D001 (for 6A004.c and .d and 6A008.d, .h, and .k); 6E001 (for

equipment and software listed in this paragraph); and 6E002 (for equipment listed in this paragraph);

Notes to paragraph (c)(1)(vi):

Note 1: Reports for 6A002.a.3 exclude the following "focal plane arrays":

- a. Platinum Silicide having less than 10,000 elements;
- b. Iridium Silicide;
- c. Indium Antimonide or Lead Selenide having less than 256 elements;
- d. Indium Arsenide;
- e. Lead Sulphide;
- f. Indium Gallium Arsenide;
- g. Mercury Cadmium Telluride, as follows:
 - 1. 'Scanning Arrays' having any of the following:
 - a. 30 elements or less; or
 - b. Incorporating time delay-and-integration within the element and having 2 elements or less;
 - 2. 'Staring Arrays' less than 256 elements;

Technical Notes:

'Scanning Arrays' are defined as "focal plane arrays" designed for use with a scanning optical system that images a scene in a sequential manner to produce an image.

'Staring Arrays' are defined as "focal plane arrays" unfortunately designed for use with a non-scanning optical system that images a scene.

- h. Gallium Arsenide or Gallium Aluminum Arsenide quantum well having less than 256 elements; and
- i. Microbolometer having less than 8,000 elements.

Note 2: Reports for 6A006.d, are for "compensation systems" for the following:

- a. Magnetic sensors controlled in 6A006.a.2. using optically pumped or nuclear precession (proton/Overhauser) "technology" that will permit these sensors to realize a "noise level" (sensitivity) lower (better) than 2 pT rms per square root Hz.
- b. Underwater electric field sensors controlled in 6A006.b.
- c. Magnetic gradiometers controlled in 6A006.c. that will permit these sensors to realize a "noise level" (sensitivity) lower (better) than 3 pT/m rms per square root Hz.

* * * * *

PART 744—[AMENDED]

■ 6. The authority citation for part 744 continues to read as follows:

Authority: 50 U.S.C. app. 2401 *et seq.*; 50 U.S.C. 1701 *et seq.*; 22 U.S.C. 3201 *et seq.*; 42 U.S.C. 2139a; Sec. 901–911, Pub. L. 106–387; Sec. 221, Pub. L. 107–56; E.O. 12058, 43 FR 20947, 3 CFR, 1978 Comp., p. 179; E.O. 12851, 58 FR 33181, 3 CFR, 1993 Comp., p. 608; E.O. 12938, 59 FR 59099, 3 CFR, 1994 Comp., p. 950; E.O. 12947, 60 FR 5079, 3 CFR, 1995 Comp., p. 356; E.O. 13026, 61 FR 58767, 3 CFR, 1996 Comp., p. 228; E.O. 13099, 63 FR 45167, 3 CFR, 1998 Comp., p. 208; E.O. 13222, 66 FR 44025, 3 CFR, 2001 Comp., p. 783; E.O. 13224, 66 FR 49079, 3 CFR, 2001 Comp., p. 786; Notice of August

3, 2006, 71 FR 44551 (August 7, 2006); Notice of October 27, 2006, 71 FR 64109 (October 31, 2006); Notice of August 15, 2007, 72 FR 46137 (August 16, 2007).

■ 7. Section 744.17 is amended by revising paragraph (a) to read as follows:

§ 744.17 Restrictions on Certain Exports and Reexports of General Purpose Microprocessors for 'Military End-uses' and to 'Military End-users.'

(a) *General prohibition.* In addition to the license requirements for anti-terrorism reasons set forth in Part 42 of the EAR, you may not export or reexport commodities described in ECCN 3A991.a.1 on the CCL ("microprocessor microcircuits", "microcomputer microcircuits", and microcontroller microcircuits having a processing speed of 5 GFLOPS or more and an arithmetic logic unit with an access width of 32 bit or more), without a license if, at the time of the export or reexport, you know, have reason to know, or are informed by BIS that the item will be or is intended to be used for a 'military end-use,' as defined in paragraph (d) of this section, in Country Group D:1 (see Supplement No. 1 to Part 740 of the EAR); or by a 'military end-user,' as defined in paragraph (e) of this section, in Country Group D:1. This license requirement does not apply to exports or reexports of items for the official use by personnel and agencies of the U.S. Government or agencies of a cooperating government. See § 740.11(b)(3) of the EAR for definitions of "agency of the U.S. Government" and "agency of a cooperating government".

* * * * *

PART 772—[AMENDED]

■ 8. The authority citation for part 772 continues to read as follows:

Authority: 50 U.S.C. app. 2401 *et seq.*; 50 U.S.C. 1701 *et seq.*; E.O. 13222, 66 FR 44025, 3 CFR, 2001 Comp., p. 783; Notice of August 3, 2006, 71 FR 44551 (August 7, 2006); Notice of August 15, 2007, 72 FR 46137 (August 16, 2007).

- 9. Section 772.1 is amended by:
 - a. Removing the definitions of the terms "Composite theoretical performance" and "CTP";
 - b. Revising the definition of the terms "Drift rate" and "Peak power", as set forth below;
 - c. Adding in alphabetical order the definitions for "Angle random walk", "Average Output Power", "Compensation systems", "CW Laser", "Pulsed Laser", and "Repeatability" to read as follows:

§ 772.1 Definitions of Terms as Used in the Export Administration Regulations (EAR).

* * * * *

"Angle random walk". (Cat 7) The angular error buildup with time that is due to white noise in angular rate. (IEEE STD 528–2001)

* * * * *

"Average Output Power". (Cat 6) The average output power is the total "laser" output energy in joules divided by the "laser duration" in seconds.

* * * * *

"Compensation systems". (Cat 6) Consist of the primary scalar sensor, one or more reference sensors (e.g., vector magnetometers) together with software that permit reduction of rigid body rotation noise of the platform.

* * * * *

"CW Laser". (Cat 6) A CW (Continuous Wave) laser is defined as a laser that produces a nominally constant output energy for greater than 0.25 seconds.

* * * * *

"Drift rate". (gyro) (Cat 7)—The component of gyro output that is functionally independent of input rotation. It is expressed as an angular rate. (IEEE STD 528–2001)

* * * * *

"Peak power". (Cat 6)—The highest level of power attained in the "laser duration".

Note: "Laser Duration" is the time over which a "laser" emits "laser" radiation, which for "pulsed lasers" corresponds to the time over which a single pulse or series of consecutive pulses is emitted.

* * * * *

"Pulsed Laser". (Cat 6)—A pulsed "laser" is defined as having a "pulse duration" that is less than or equal to 0.25 seconds.

* * * * *

"Repeatability". (Cat 7)—The closeness of agreement among repeated measurements of the same variable under the same operating conditions when changes in conditions or non-operating periods occur between measurements. (Reference: IEEE STD 528–2001 (one sigma standard deviation))

PART 774—[AMENDED]

■ 10. The authority citation for part 774 continues to read as follows:

Authority: 50 U.S.C. app. 2401 *et seq.*; 50 U.S.C. 1701 *et seq.*; 10 U.S.C. 7420; 10 U.S.C. 7430(e); 22 U.S.C. 287c, 22 U.S.C. 3201 *et seq.*, 22 U.S.C. 6004; 30 U.S.C. 185(s), 185(u); 42 U.S.C. 2139a; 42 U.S.C. 6212; 43 U.S.C. 1354; 46 U.S.C. app. 466c; 50 U.S.C. app. 5; Sec. 901–911, Pub. L. 106–387; Sec. 221, Pub. L. 107–56; E.O. 13026, 61 FR 58767, 3 CFR, 1996 Comp., p. 228; E.O. 13222, 66 FR 44025, 3 CFR, 2001 Comp., p. 783; Notice of August 3, 2006, 71 FR 44551 (August 7, 2006); Notice

of August 15, 2007, 72 FR 46137 (August 16, 2007).

**Supplement No. 1 to Part 774—
Commerce Control List [Amended]**

■ 11. In Supplement No. 1 to Part 774 (the Commerce Control List), Category 1 Materials, Chemicals, Microorganisms, and Toxins, Export Control Classification Number (ECCN) 1A002 is amended by revising the “items” paragraph in the List of Items Controlled section, to read as follows:

1A002 “Composite” structures or laminates, having any of the following (see List of Items Controlled).

* * * * *

List of Items Controlled

Unit: * * *

Related Controls: * * *

Related Definitions: * * *

Items:

a. Consisting of an organic “matrix” and materials controlled by 1C010.c 1C010.d, or 1C010.e or

Note: 1A002.a does not control finished or semifinished items specially designed for purely civilian applications as follows:

- a. Sporting goods;
- b. Automotive industry;
- c. Machine tool industry; and
- d. Medical applications.

b. Consisting of a metal or carbon “matrix” and any of the following:

b.1. Carbon “fibrous or 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.

Note: 1A002.b does not control finished or semifinished items specially designed for purely civilian applications as follows:

- a. Sporting goods;
- b. Automotive industry;
- c. Machine tool industry; and
- d. Medical applications.

Technical Notes:

1. Specific modulus: Young’s modulus in pascals, equivalent to N/m², divided by specific weight in N/m³, measured at a temperature of (296 ± 2) K ((23 ± 2) °C) and a relative humidity of $(50 \pm 5)\%$.

2. Specific tensile strength: ultimate tensile strength in pascals, equivalent to N/m² divided by specific weight in N/m³, measured at a temperature of (296 ± 2) K ((23 ± 2) °C) and a relative humidity of $(50 \pm 5)\%$.

Note: 1A002 does not control composite structures or laminates made from epoxy resin impregnated carbon “fibrous or filamentary materials” for the repair of “civil aircraft” structures of laminates, provided that the size does not exceed 100 cm × 100 cm.

■ 12. In Supplement No. 1 to Part 774 (the Commerce Control List), Category 1 Materials, Chemicals, Microorganisms, and Toxins, Export Control Classification Number (ECCN) 1A004 is amended by revising the “Related Controls” paragraph in the List of Items Controlled section, to read as follows:

1A004 Protective and detection equipment and components not specially designed for military use as follows (see List of Items Controlled).

* * * * *

List of Items Controlled

Unit: * * *

Related Controls: (1) See ECCNs 1A995, 2B351, and 2B352. (2) See ECCN 1D003 for “software” specially designed or modified to enable equipment to perform the functions of equipment controlled under section 1A004.c (Nuclear, biological and chemical (NBC)

detection systems). (3) See ECCN 1E002.g for control libraries (parametric technical databases) specially designed or modified to enable equipment to perform the functions of equipment controlled under 1A004.c (Nuclear, biological and chemical (NBC) detection systems).(4) Chemical and biological protective and detection equipment specifically designed, developed, modified, configured, or adapted for military applications is subject to the export licensing jurisdiction of the Department of State, Directorate of Defense Trade Controls (see 22 CFR part 121, category XIV(f)), as is commercial equipment that incorporates components or parts controlled under that category unless those components or parts are: (1) Integral to the device; (2) inseparable from the device; and (3) incapable of replacement without compromising the effectiveness of the device, in which case the equipment is subject to the export licensing jurisdiction of the Department of Commerce under ECCN 1A004.

Related Definitions: * * *

Items: * * *

■ 13. In Supplement No. 1 to Part 774 (the Commerce Control List), Category 1 Materials, Chemicals, Microorganisms, and Toxins, Export Control Classification Number (ECCN) 1B001 is amended by revising the “heading,” the License Requirement section, and paragraph (f) in the “items” paragraph of the List of Items Controlled section, to read as follows:

1B001 Equipment for the production of fibers, prepreps, preforms or “composites” controlled by 1A002 or 1C010, as follows (see List of Items Controlled), 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.
NOTE: MT applies to equipment in 1B001.d that meet or exceed the parameters of 1B101.	
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.

* * * * *

List of Items Controlled

Unit: * * *

Related Controls: * * *

Related Definitions: * * *

Items:

f. Non-destructive inspection equipment specially designed for “composite” materials, as follows:

f.1. X-ray tomography systems for three dimensional defect inspection;

f.2. Numerically controlled ultrasonic testing machines of which the motions for

positioning transmitters and/or receivers are simultaneously coordinated and programmed in four or more axes to follow the three dimensional contours of the component under inspection.

■ 14. In Supplement No. 1 to Part 774 (the Commerce Control List), Category 1 Materials, Chemicals, Microorganisms, and Toxins, Export Control Classification Number (ECCN) 1C005 is amended by revising the List of Items Controlled section, to read as follows:

1C005 “Superconductive” “composite” conductors in lengths exceeding 100 m or

with a mass exceeding 100 g, as follows (see List of Items Controlled).

* * * * *

List of Items Controlled

Unit: Kilograms

Related Controls: N/A

Related Definitions: N/A

Items:

a. “Superconductive” “composite” conductors containing one or more niobium-titanium filaments, having all of the following:

a.1. Embedded in a “matrix” other than a copper or copper-based mixed “matrix”; and

a.2. Having a cross-section area less than $0.28 \times 10^{-4} \text{ mm}^2$ (6 μm in diameter for circular filaments);

b. "Superconductive" "composite" conductors consisting of one or more "superconductive" filaments other than niobium-titanium, having all of the following:

b.1. A "critical temperature" at zero magnetic induction exceeding 9.85 K (-263.31 °C); and

b.2. Remaining in the "superconductive" state at a temperature of 4.2 K (-268.96 °C) when exposed to a magnetic field oriented in any direction perpendicular to the longitudinal axis of conductor and corresponding to a magnetic induction of 12 T with critical current density exceeding 1750 A/mm² on overall cross-section of the conductor.

c. "Superconductive" "composite" conductors consisting of one or more "superconductive" filaments which remain "superconductive" above 115 K (-158.16 °C).

Technical Note: For the purpose of 1C005, filaments may be in wire, cylinder, film, tape or ribbon form.

■ 15. In Supplement No. 1 to Part 774 (the Commerce Control List), Category 1 Materials, Chemicals, Microorganisms, and Toxins, Export Control Classification Number (ECCN) 1C008 is amended by revising the "items" paragraph in the List of Items Controlled section, to read as follows:

1C008 Non fluorinated polymeric substances, as follows (see List of Items Controlled).

* * * * *

List of Items Controlled

Unit: * * *

Related Controls: * * *

Related Definitions: * * *

Items:

a. Non-fluorinated polymeric substances, as follows:

a.1. Bismaleimides;

a.2. Aromatic polyamide-imides;

a.3. Aromatic polyimides;

a.4. Aromatic polyetherimides having a glass transition temperature (T_g) exceeding 513K (240 °C).

Notes:

1. 1C008.a controls the substances in liquid or solid form, including resin, powder, pellet, film, sheet, tape, or ribbon.

2. 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 ISO 75-2 (2004), method A, or national equivalents, with a load of 1.80 N/mm² and composed of:

b.1. Any 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. [RESERVED]

d. Polyarylene ketones;

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

f. Polybiphenylenethersulphone having a glass transition temperature (T_g) exceeding 513 K (240 °C).

Technical Note: The glass transition temperature (T_g) for 1C008 materials is determined using the method described in ISO 11357-2 (1999) or national equivalents.

■ 16. In Supplement No. 1 to Part 774 (the Commerce Control List), Category 1 Materials, Chemicals, Microorganisms, and Toxins, Export Control Classification Number (ECCN) 1C010, the "items" paragraph in the List of Items Controlled section is amended by:

■ a. Revising the Note for 1C010.b that follows the technical note following paragraph b.2. to read as set forth below; and

■ b. Revising the Notes and Technical Note following paragraph e.2.d., to read as follows:

1C010 "Fibrous or filamentary materials" which may be used in organic "matrix", metallic "matrix" or carbon "matrix" "composite" structures or laminates, as follows (see List of Items Controlled).

* * * * *

List of Items Controlled

Unit: * * *

Related Controls: * * *

Related Definitions: * * *

Items:

* * * * *

b. * * *

b.2. * * *

Technical Note: * * *

Note: 1C010.b does not control fabric made from "fibrous or filamentary materials" for the repair of "civil aircraft" structures or laminates, in which the size of individual sheets does not exceed 100 cm x 100 cm.

* * * * *

e. * * *

e.2. * * *

e.2.d. * * *

Notes: 1C010.e does not control:

1. Epoxy resin "matrix" impregnated carbon "fibrous or filamentary materials" (prepregs) for the repair of "civil aircraft" structures or laminates, in which the size of individual sheets of prepreg does not exceed 100 cm x 100 cm;

2. Prepregs when impregnated with phenolic or epoxy resins having a glass transition temperature (T_g) less than 433 K (160 °C) and a cure temperature lower than the glass transition temperature.

Technical Note: The glass transition temperature (T_g) for 1C010.e materials is determined using the method described in ASTM D 3418 using the dry method. The glass transition temperature for phenolic and epoxy resins is determined using the method described in ASTM D 4065 at a frequency of 1 Hz and a heating rate of 2 K (2 °C) per minute using the dry method.

■ 17. In Supplement No. 1 to Part 774 (the Commerce Control List), Category 1 Materials, Chemicals, Microorganisms, and Toxins, Export Control Classification Number (ECCN) 1C998 is amended by revising the "items" paragraph in the List of Items Controlled section, to read as follows:

1C998 Non fluorinated polymeric substances, not controlled by 1C008, as follows (see List of Items Controlled).

* * * * *

List of Items Controlled

Unit: * * *

Related Controls: * * *

Related Definitions: * * *

Items:

a. Polyarylene ether ketones, as follows:

a.1 Polyether ether ketone (PEEK);

a.2. Polyether ketone ketone (PEKK);

a.3. Polyether ketone (PEK);

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

b. [RESERVED].

■ 18. In Supplement No. 1 to Part 774 (the Commerce Control List), Category 1 Materials, Chemicals, Microorganisms, and Toxins is amended by adding Export Control Classification Number (ECCN) 1D003, to read as follows:

1D003 "Software" specially designed or modified to enable equipment to perform the functions of equipment controlled under 1A004.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

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.

■ 19. In Supplement No. 1 to Part 774 (the Commerce Control List), Category 1 Materials, Chemicals, Microorganisms, and Toxins, Export Control Classification Number (ECCN) 1E001 is amended by revising the “Related Controls” paragraph in the List of Items Controlled section, to read as follows:

1E001 “Technology” according to the General Technology Note for the “development” or “production” of items

controlled by 1A001.b, 1A001.c, 1A002, 1A003, 1A004, 1A005, 1A101, 1B (except 1B999), or 1C (except 1C355, 1C980 to 1C984, 1C988, 1C990, 1C991, 1C992, 1C995 to 1C999).
* * * * *

List of Items Controlled

Unit: * * *
Related Controls: (1) Also see ECCNs 1E101, 1E201, and 1E202. (2) See ECCN 1E002.g for control libraries (parametric technical databases) specially designed or modified to enable equipment to perform the functions of equipment controlled under 1A004.c (Nuclear, biological and chemical (NBC) detection systems). (3) “Technology” for lithium isotope separation (see related ECCN 1B233) and “technology” for items described in ECCN 1C012 are subject to the export licensing authority of the Nuclear Regulatory Commission (see 10 CFR part 110). (4) “Technology” for items described in ECCN 1A102 is subject to the export

licensing authority of the U.S. Department of State, Directorate of Defense Trade Controls (see 22 CFR part 121).
Related Definitions: * * *
Items: * * *

■ 20. In Supplement No. 1 to Part 774 (the Commerce Control List), Category 1 Materials, Chemicals, Microorganisms, and Toxins, Export Control Classification Number (ECCN) 1E002 is amended by:

- a. Revising the License Requirements section to read as set forth below; and
- b. Add a new paragraph g to the items paragraph in the List of Items Controlled section, to read as follows:

1E002 Other “technology”, as follows (see List of Items Controlled).

License Requirements

Reason for Control: NS, MT, AT

Control(s)	Country chart
NS applies to entire entry, except 1E002.g	NS Column 1.
NS applies to 1E002.g	NS Column 2.
MT applies to 1E002.e	MT Column 1.
AT applies to entire entry	AT Column 1.

License Requirement Notes: See § 743.1 of the EAR for reporting requirements for exports under License Exceptions.

* * * * *

List of Items Controlled

* * * * *

Items:

g. Libraries (parametric technical databases) specially designed or modified to enable equipment to perform the functions of equipment controlled under 1A004.c.

Technical Note: For the purpose of 1E002.g, the term ‘library’ (parametric technical database) means a collection of technical information, reference to which may enhance the performance of relevant equipment or systems.

* * * * *

■ 21. Supplement No. 1 to Part 774 (the Commerce Control List), Category 2 Materials Processing, Export Control Classification Number (ECCN) 2B001 is amended by revising the Unit paragraph in the List of Items Controlled section and the Note following paragraph 2B001.a.2 in the Items paragraph of the List of Items Controlled section to read as follows:

2B001 Machine tools and any combination thereof, for removing (or cutting) metals, ceramics or “composites”, which, according to the manufacturer’s technical specifications, can be equipped with electronic devices for “numerical control”; and specially designed components (see List of Items Controlled).

* * * * *

List of Items Controlled

Unit: Equipment in number; components in \$ value

* * * * *

Items:

* * * * *

- a. * * *
- a.2. * * *

Note: 2B001.a does not control turning machines specially designed for the production of contact lenses, having all of the following characteristics:

- 1. Machine controller limited to using ophthalmic based software for part programming data input; and
- 2. No vacuum chucking.

* * * * *

■ 22 . Supplement No. 1 to Part 774 (the Commerce Control List), Category 2 Materials Processing, Export Control Classification Number (ECCN) 2B002 is amended by revising the heading and the List of Items Controlled section to read as follows:

2B002 Numerically controlled optical finishing machine tools equipped to produce non-spherical optical surfaces, having all of the following characteristics (See List of Items Controlled).

* * * * *

List of Items Controlled

Unit: Equipment in number
Related Controls: See also 2B001.
Related Definitions: For the purposes of 2B002, ‘MRF’ is a material removal process using an abrasive magnetic fluid whose viscosity is controlled by a magnetic field. ‘ERF’ is removal process using an abrasive

fluid whose viscosity is controlled by an electric field. ‘Energetic particle beam finishing’ uses Reactive Atom Plasmas (RAP) or ion-beams to selectively remove material.

- Items:
 - a. Finishing the form to less (better) than 1.0 μm;
 - b. Finishing to a roughness less (better) than 100 nm rms;
 - c. Three or more axes which can be coordinated simultaneously for “contouring control”; and
 - d. Using any of the following processes;
 - d.1. Magnetorheological finishing (‘MRF’);
 - d.2. Electrorheological finishing (‘ERF’); or
 - d.3. ‘Energetic particle beam finishing’.

■ 23 . In Supplement No. 1 to Part 774 (the Commerce Control List), Category 3 Electronics, Export Control Classification Number (ECCN) 3A001 is amended revising the License Exceptions section and “items” paragraph in the List of Items Controlled section, to read as follows:

3A001 Electronic components, as follows (see List of Items Controlled).

* * * * *

License Exceptions

LVS: N/A for MT or NP
Yes for:
\$1500: 3A001.c
\$3000: 3A001.b.1, b.2, b.3, b.9, .d, .e, .f, and g
\$5000: 3A001.a (except a.1.a and a.5.a when controlled for MT), and .b.4 to b.7
GBS: Yes for 3A001.a.1.b, a.2 to a.12 (except .a.5.a when controlled for MT), b.2, b.8 (except for TWAS exceeding 18 GHz), b.9., and g
CIV: Yes for 3A001.a.3, a.4, a.7, and a.11

List of Items Controlled

Unit: * * *

Related Controls: * * *

Related Definitions: * * *

Items:

a. General purpose integrated circuits, as follows:

Note 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.

Note 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 any of the following:

a.1.a. A total dose of 5×10^3 Gy (Si), or higher;

a.1.b. A dose rate upset of 5×10^6 Gy (Si)/s, or higher; or

a.1.c. A fluence (integrated flux) of neutrons (1 MeV equivalent) of 5×10^{13} n/cm² or higher on silicon, or its equivalent for other materials;

Note: 3A001.a.1.c does not apply to Metal Insulator Semiconductors (MIS).

a.2. “Microprocessor microcircuits”, “microcomputer microcircuits”, microcontroller microcircuits, storage integrated circuits manufactured from a compound semiconductor, analog-to-digital converters, digital-to-analog converters, electro-optical or “optical integrated circuits” designed for “signal processing”, field programmable logic devices, neural network integrated circuits, custom integrated circuits for which either the function is unknown or the control status of the equipment in which the integrated circuit will be used is unknown, Fast Fourier Transform (FFT) processors, electrical erasable programmable read-only memories (EEPROMs), flash memories or static random-access memories (SRAMs), having any of the following:

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: 3A001.a.2 does not apply to integrated circuits for civil automobile or railway train applications.

a.3. “Microprocessor microcircuits”, “micro-computer microcircuits” and microcontroller microcircuits, manufactured from a compound semiconductor and operating at a clock frequency exceeding 40 MHz;

Note: 3A001.a.3 includes digital signal processors, digital array processors and digital coprocessors.

a.4. 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 bit or more, but less than 10 bit, with an output rate greater than 500 million words per second;

a.5.a.2. A resolution of 10 bit or more, but less than 12 bit, with an output rate greater than 200 million words per second;

a.5.a.3. A resolution of 12 bit with an output rate greater than 105 million words per second;

a.5.a.4. A resolution of more than 12 bit but equal to or less than 14 bit with an output rate greater than 10 million words per second; or

a.5.a.5. A resolution of more than 14 bit with an output rate greater than 2.5 million words per second.

a.5.b. Digital-to-analog converters with a resolution of 12 bit or more, and a “settling time” of less than 10 ns;

Technical Notes:

1. A resolution of n bit corresponds to a quantization of 2n levels.

2. The number of bits in the output word is equal to the resolution of the analogue-to-digital converter.

3. The output rate is the maximum output rate of the converter, regardless of architecture or oversampling. Vendors may also refer to the output rate as sampling rate, conversion rate or throughput rate. It is often specified in megahertz (MHz) or mega samples per second (MSPS).

4. For the purpose of measuring output rate, one output word per second is equivalent to one Hertz or one sample per second.

a.6. Electro-optical and “optical integrated circuits” designed for “signal processing” having all of the following:

a.6.a. One or more than one internal “laser” diode;

a.6.b. One or more than one internal light detecting element; and

a.6.c. Optical waveguides;

a.7. Field programmable logic devices having any of the following:

a.7.a. An equivalent usable gate count of more than 30,000 (2 input gates);

a.7.b. A typical “basic gate propagation delay time” of less than 0.1 ns; or

a.7.c. A toggle frequency exceeding 133 MHz;

Note: 3A001.a.7 includes: Simple Programmable Logic Devices (SPLDs), Complex Programmable Logic Devices (CPLDs), Field Programmable Gate Arrays (FPGAs), Field Programmable Logic Arrays (FPLAs), and Field Programmable Interconnects (FPICs).

N.B.: Field programmable logic devices are also known as field programmable gate or field programmable logic arrays.

a.8. [RESERVED]

a.9. Neural network integrated circuits;

a.10. Custom integrated circuits for which 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 1,000 terminals;

a.10.b. A typical “basic gate propagation delay time” of less than 0.1 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 3A001.a.10 and 3A001.a.12, based upon any compound semiconductor and having any of the following:

a.11.a. An equivalent gate count of more than 3,000 (2 input gates); or

a.11.b. A toggle frequency exceeding 1.2 GHz;

a.12. Fast Fourier Transform (FFT) processors having a rated execution time for an N-point complex FFT of less than $(N \log_2 N)/20,480$ ms, where N is the number of points;

Technical Note: When N is equal to 1,024 points, the formula in 3A001.a.12 gives an execution time of 500 μ s.

b. Microwave or millimeter wave components, as follows:

b.1. Electronic vacuum tubes and cathodes, as follows:

Note 1: 3A001.b.1 does not control tubes designed or rated for operation in any frequency band which meets all of the following characteristics:

(a) Does not exceed 31.8 GHz; and

(b) Is “allocated by the ITU” for radio-communications services, but not for radio-determination.

Note 2: 3A001.b.1 does not control non-“space-qualified” tubes which meet all the following characteristics:

(a) An average output power equal to or less than 50 W; and

(b) Designed or rated for operation in any frequency band which meets all of the following characteristics:

(1) Exceeds 31.8 GHz but does not exceed 43.5 GHz; and

(2) Is “allocated by the ITU” for radio-communications services, but not for radio-determination.

b.1.a. Traveling wave tubes, pulsed or continuous wave, as follows:

b.1.a.1. Operating at frequencies exceeding 31.8 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 a “fractional 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. Being “space qualified”;

b.1.b. Crossed-field amplifier tubes with a gain of more than 17 dB;

b.1.c. Impregnated cathodes designed for electronic tubes producing a continuous emission current density at rated operating conditions exceeding 5 A/cm²;

b.2. Microwave monolithic integrated circuits (MMIC) power amplifiers having any of the following:

b.2.a. Rated for operation at frequencies exceeding 3.2 GHz up to and including 6 GHz and with an average output power greater than 4W (36 dBm) with a "fractional bandwidth" greater than 15%;

b.2.b. Rated for operation at frequencies exceeding 6 GHz up to and including 16 GHz and with an average output power greater than 1W (30 dBm) with a "fractional bandwidth" greater than 10%;

b.2.c. Rated for operation at frequencies exceeding 16 GHz up to and including 31.8 GHz and with an average output power greater than 0.8W (29 dBm) with a "fractional bandwidth" greater than 10%;

b.2.d. Rated for operation at frequencies exceeding 31.8 GHz up to and including 37.5 GHz;

b.2.e. Rated for operation at frequencies exceeding 37.5 GHz up to and including 43.5 GHz and with an average output power greater than 0.25W (24 dBm) with a "fractional bandwidth" greater than 10%; or

b.2.f. Rated for operation at frequencies exceeding 43.5 GHz.

Note 1: 3A001.b.2 does not control broadcast satellite equipment designed or rated to operate in the frequency range of 40.5 to 42.5 GHz.

Note 2: The control status of the MMIC whose rated operating frequency includes frequencies listed in more than one frequency range, as defined by 3A001.b.2.a through 3A001.b.2.f, is determined by the lowest average output power control threshold.

Note 3: Notes 1 and 2 following the Category 3 heading for A. Systems, Equipment, and Components mean that 3A001.b.2. does not control MMICs if they are specially designed for other applications, e.g., telecommunications, radar, automobiles.

b.3. Discrete microwave transistors having any of the following:

b.3.a. Rated for operation at frequencies exceeding 3.2 GHz up to and including 6 GHz and having an average output power greater than 60W (47.8 dBm);

b.3.b. Rated for operation at frequencies exceeding 6 GHz up to and including 31.8 GHz and having an average output power greater than 20W (43 dBm);

b.3.c. Rated for operation at frequencies exceeding 31.8 GHz up to and including 37.5 GHz and having an average output power greater than 0.5W (27 dBm);

b.3.d. Rated for operation at frequencies exceeding 37.5 GHz up to and including 43.5 GHz and having an average output power greater than 1W (30 dBm); or

b.3.e. Rated for operation at frequencies exceeding 43.5 GHz.

Note: The control status of a transistor whose rated operating frequency includes frequencies listed in more than one frequency range, as defined by 3A001.b.3.a through 3A001.b.3.e, is determined by the lowest average output power control threshold.

b.4. Microwave solid state amplifiers and microwave assemblies/modules containing microwave amplifiers having any of the following:

b.4.a. Rated for operation at frequencies exceeding 3.2 GHz up to and including 6

GHz and with an average output power greater than 60W (47.8 dBm) with a "fractional bandwidth" greater than 15%;

b.4.b. Rated for operation at frequencies exceeding 6 GHz up to and including 31.8 GHz and with an average output power greater than 15W (42 dBm) with a "fractional bandwidth" greater than 10%;

b.4.c. Rated for operation at frequencies exceeding 31.8 GHz up to and including 37.5 GHz;

b.4.d. Rated for operation at frequencies exceeding 37.5 GHz up to and including 43.5 GHz and with an average output power greater than 1W (30 dBm) with a "fractional bandwidth" greater than 10%;

b.4.e. Rated for operation at frequencies exceeding 43.5 GHz; or

b.4.f. Rated for operation at frequencies above 3.2 GHz and all of the following:

b.4.f.1. An average output power (in watts), P, greater than 150 divided by the maximum operating frequency (in GHz) squared [$P > 150 \text{ W} \cdot \text{GHz}^2 / f_{\text{GHz}}^2$];

b.4.f.2. A fractional bandwidth of 5% or greater; and

b.4.f.3. Any two sides perpendicular to one another with length d (in cm) equal to or less than 15 divided by the lowest operating frequency in GHz [$d \leq 15 \text{ cm} \cdot \text{GHz} / f_{\text{GHz}}$].

Technical Note: 3.2 GHz should be used as the lowest operating frequency (f_{GHz}) in the formula in 3A001.b.4.f.3., for amplifiers that have a rated operation range extending downward to 3.2 GHz and below [$d \leq 15 \text{ cm} \cdot \text{GHz} / 3.2 f_{\text{GHz}}$].

N.B.: MMIC power amplifiers should be evaluated against the criteria in 3A001.b.2.

Note 1: 3A001.b.4. does not control broadcast satellite equipment designed or rated to operate in the frequency range of 40.5 to 42.5 GHz.

Note 2: The control status of an item whose rated operating frequency includes frequencies listed in more than one frequency range, as defined by 3A001.b.4.a through 3A001.b.4.e, is determined by the lowest average output power control threshold.

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 ($f_{\text{max}}/f_{\text{min}}$) in less than 10 μs having any of the following:

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% of center frequency;

b.6. [RESERVED]

b.7. Mixers and converters designed to extend the frequency range of equipment described in 3A002.c, 3A002.e or 3A002.f beyond the limits stated therein;

b.8. Microwave power amplifiers containing tubes controlled by 3A001.b and having all of the following:

b.8.a. Operating frequencies above 3 GHz;

b.8.b. An average output power density exceeding 80 W/kg; and

b.8.c. A volume of less than 400 cm^3 ;

Note: 3A001.b.8 does not control equipment designed or rated for operation in any frequency band which is "allocated by the ITU" for radio-communications services, but not for radio-determination.

b.9. Microwave power modules (MPM), consisting of, at least, a traveling wave tube, a microwave monolithic integrated circuit and an integrated electronic power conditioner, having all of the following characteristics:

b.9.a. A turn-on time from off to fully operational in less than 10 seconds;

b.9.b. A volume less than the maximum rated power in Watts multiplied by 10 cm^3/W ; and

b.9.c. An "instantaneous bandwidth" greater than 1 octave ($f_{\text{max}} > 2f_{\text{min}}$) and any of the following:

b.9.c.1. For frequencies equal to or less than 18 GHz, an RF output power greater than 100 W; or

b.9.c.2. Having a frequency greater than 18 GHz.

Technical Notes:

1. To calculate the control volume in 3A001.b.9.b., the following example is provided: for a maximum rated power of 20 W, the volume would be: $20 \text{ W} \times 10 \text{ cm}^3/\text{W} = 200 \text{ cm}^3$.

2. The turn-on time in 3A001.b.9.a. refers to the time from fully-off to fully operational; i.e., it includes the warm-up time of the MPM.

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 exceeding 1 GHz, but not exceeding 2.5 GHz, and having any of the following:

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 μs and bandwidth in MHz) of more than 100;

c.1.b.3. A bandwidth greater than 250 MHz; or

c.1.b.4. A dispersive delay of more than 10 μs ; or

c.1.c. A carrier frequency of 1 GHz or less, having any of the following:

c.1.c.1. A product of the maximum delay time and the bandwidth (time in μs and bandwidth in MHz) of more than 100;

c.1.c.2. A dispersive delay of more than 10 μs ; or

c.1.c.3. A frequency side-lobe rejection exceeding 55 dB and a bandwidth greater than 50 MHz;

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 and 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. 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.2. Frequency selection at all frequencies using resonant circuits with Q-values exceeding 10,000;

e. High energy devices, as follows:

e.1. Cells and photovoltaic arrays, as follows:

e.1.a. Primary cells having an energy density exceeding 550 Wh/kg at 293 K (20 °C); e.1.b. Secondary cells having an energy density exceeding 250 Wh/kg at 293 K (20 °C);

Technical Notes:

1. For the purpose of 3A001.e.1., energy density (Wh/kg) is calculated from the nominal voltage multiplied by the nominal capacity in ampere-hours divided by the mass in kilograms. If the nominal capacity is not stated, energy density is calculated from the nominal voltage squared then multiplied by the discharge duration in hours divided by the discharge load in Ohms and the mass in kilograms.

2. For the purpose of 3A001.e.1., a 'cell' is defined as an electrochemical device, which has positive and negative electrodes, and electrolyte, and is a source of electrical energy. It is the basic building block of a battery.

3. For the purpose of 3A001.e.1.a., a 'primary cell' is a 'cell' that is not designed to be charged by any other source.

4. For the purpose of 3A001.e.1.b., a 'secondary cell' is a 'cell' that is designed to be charged by an external electrical source.

Note: 3A001.e. does not control batteries, including single cell batteries.

e.1.c. "Space qualified" and radiation hardened photovoltaic arrays with a specific power exceeding 160 W/m² at an operating temperature of 301 K (28 °C) under a tungsten illumination of 1 kW/m² 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 and solenoids specially designed to be fully charged or discharged in less than one second, having all of the following:

Note: 3A001.e.3 does not control "superconductive" electromagnets or solenoids specially designed for Magnetic Resonance Imaging (MRI) medical equipment.

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/mm²;

f. Rotary input type shaft absolute position encoders having any 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.

g. Solid-state pulsed power switching thyristor devices and thyristor modules using either electrically, optically, or electron radiation controlled switch methods, having any of the following:

1. A maximum turn-on current rate of rise (di/dt) greater than 30,000 A/μs and off-state voltage greater than 1,100 V; or

2. A maximum turn-on current rate of rise (di/dt) greater than 2,000 A/μs and all of the following:

a. An off-state peak voltage equal to or greater than 3,000 V; and

b. A peak (surge) current equal to or greater than 3,000 A.

Note 1: 3A001.g. includes:

— Silicon Controlled Rectifiers (SCRs)
— Electrical Triggering Thyristors (ETTs)
— Light Triggering Thyristors (LTTs)
— Integrated Gate Commutated Thyristors (IGCTs)
— Gate Turn-off Thyristors (GTOs)
— MOS Controlled Thyristors (MCTs)
— Solidtrons

Note 2: 3A001.g. does not control thyristor devices and thyristor modules incorporated into equipment designed for civil railway or "civil aircraft" applications.

Technical Note: For the purposes of 3A001.g., a 'thyristor module' contains one or more thyristor devices.

■ 24. In Supplement No. 1 to Part 774 (the Commerce Control List), Category 3 Electronics, Export Control Classification Number (ECCN) 3A002 is amended revising the License Exception section and the List of Items Controlled section, to read as follows:

3A002 General purpose electronic equipment, as follows (see List of Items Controlled).

* * * * *

License Exceptions

LVS: * * *

GBS: Yes for 3A002.a.1.; and 3A002.b (synthesized output frequency of 2.6 GHz or less and a "frequency switching time" of 0.3 ms or more).

CIV: Yes for 3A002.a.1 (provided all of the following conditions are met: (1) Bandwidths do not exceed: 4 MHz per track and have up to 28 tracks or 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; and 3A002.b (synthesized output frequency of 2.6 GHz or less; and a "frequency switching time" of 0.3 ms or more).

List of Items Controlled

Unit: Number

Related Controls: "Space qualified" atomic frequency standards defined in 3A002.g.2 are subject to the export licensing authority of the Department of State, Directorate of Defense Trade Controls (22 CFR part 121). See also 3A292 and 3A992.

Related Definitions: Constant percentage bandwidth filters are also known as octave or fractional octave filters.

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 IRIG or EIA documents, of less than ±0.1 μs;

Note: Analog magnetic tape recorders specially designed for civilian video purposes are not considered to be instrumentation tape recorders.

a.2. Digital video magnetic tape recorders having a maximum digital interface transfer rate exceeding 360 Mbit/s;

Note: 3A002.a.2 does not control digital video magnetic tape recorders specially designed for television recording using a signal format, which may include a compressed signal format, standardized or recommended by the ITU, the IEC, the SMPTE, the EBU, the ETSI, or the IEEE for civil television applications.

a.3. Digital instrumentation magnetic tape data recorders employing helical scan techniques or fixed head techniques, having any of the following:

a.3.a. A maximum digital interface transfer rate exceeding 175 Mbit/s; or

a.3.b. Being "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, having 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 having all of the following:

N.B.: See also 3A292.

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 Gbit/s or more;

Technical Note: For those instruments with a parallel bus architecture, the continuous

throughput rate is 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.

a.6. Digital instrumentation data recorders, using magnetic disk storage technique, having all of the following:

a.6.a. Digitizing rate equal to or more than 100 million samples per second and a resolution of 8 bits or more; and

a.6.b. A continuous throughput of 1 Gbit/s or more;

b. "Frequency synthesizer" "electronic assemblies" having a "frequency switching time" from one selected frequency to another of less than 1 ms;

Note: The control status of signal analyzers, signal generators, network analyzers, and microwave test receivers as stand-alone instruments is determined by 3A002.c., 3A002.d., 3A002.e., and 3A002.f., respectively.

c. Radio frequency "signal analyzers", as follows:

c.1. "Signal analyzers" capable of analyzing any frequencies exceeding 31.8 GHz but not exceeding 37.5 GHz and having a 3 dB resolution bandwidth (RBW) exceeding 10 MHz;

c.2. "Signal analyzers" capable of analyzing frequencies exceeding 43.5 GHz;

c.3. "Dynamic signal analyzers" having a "real-time bandwidth" exceeding 500 kHz;

Note: 3A002.c.3 does not control those "dynamic signal analyzers" 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 reference oscillator, and having any of the following:

d.1. A maximum synthesized frequency exceeding 31.8 GHz, but not exceeding 43.5 GHz and rated to generate a pulse duration of less than 100 ns;

d.2. A maximum synthesized frequency exceeding 43.5 GHz;

d.3. A "frequency switching time" from one selected frequency to another as specified by any of the following:

d.3.a. Less than 10 ns;

d.3.b. Less than 100 μs for any frequency change exceeding 1.6 GHz within the synthesized frequency range exceeding 3.2 GHz but not exceeding 10.6 GHz;

d.3.c. Less than 250 μs for any frequency change exceeding 550 MHz within the synthesized frequency range exceeding 10.6 GHz but not exceeding 31.8 GHz;

d.3.d. Less than 500 μs for any frequency change exceeding 550 MHz within the synthesized frequency range exceeding 31.8 GHz but not exceeding 43.5 GHz; or

d.3.e. Less than 1 ms within the synthesized frequency range exceeding 43.5 GHz; or

d.4. 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 1: For the purpose of 3A002.d., the term frequency synthesized signal generators includes arbitrary waveform and function generators.

Note 2: 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.

Technical Notes: 1. Arbitrary waveform and function generators are normally specified by sample rate (e.g., GSample/s), which is converted to the RF domain by the Nyquist factor of two. Thus, a 1 GSample/s arbitrary waveform has a direct output capability of 500 MHz. Or, when oversampling is used, the maximum direct output capability is proportionately lower.

2. For the purposes of 3A002.d.1., 'pulse duration' is defined as the time interval between the leading edge of the pulse achieving 90% of the peak and the trailing edge of the pulse achieving 10% of the peak.

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 43.5 GHz;

f. Microwave test receivers having all of the following:

f.1. A maximum operating frequency exceeding 43.5 GHz; and

f.2. Being capable of measuring amplitude and phase simultaneously;

g. Atomic frequency standards having any of the following:

g.1. Long-term stability (aging) less (better) than 1×10^{-11} /month; or

g.2. Being "space qualified".

Note: 3A002.g.1 does not control non-"space qualified" rubidium standards.

■ 25. In Supplement No. 1 to Part 774 (the Commerce Control List), Category 3 Electronics, Export Control Classification Number (ECCN) 3A991 is amended by revising paragraphs a.1. and j in the "items" paragraph of the List of Items Controlled section, as set forth below, to read as follows:

3A991 Electronic devices and components not controlled by 3A001.

* * * * *

List of Items Controlled

* * * * *

Items:

a. * * *

a.1. A performance speed of 5 GFLOPS or more and an arithmetic logic unit with an access width of 32 bit or more;

* * * * *

j. Cells as follows:

j.1. Primary cells having an energy density of 550 Wh/kg or less at 293 K (20°C);

j.2. Secondary cells having an energy density of 250 Wh/kg or less at 293 K (20°C).

Note: 3A991.j. does not control batteries, including single cell batteries.

Technical Notes:

1. For the purpose of 3A991.j energy density (Wh/kg) is calculated from the nominal voltage multiplied by the nominal capacity in ampere-hours divided by the mass in kilograms. If the nominal capacity is not stated, energy density is calculated from the nominal voltage squared then multiplied by the discharge duration in hours divided by the discharge load in Ohms and the mass in kilograms.

2. For the purpose of 3A991.j, a 'cell' is defined as an electrochemical device, which has positive and negative electrodes, and electrolyte, and is a source of electrical energy. It is the basic building block of a battery.

3. For the purpose of 3A991.j.1, a 'primary cell' is a 'cell' that is not designed to be charged by any other source.

4. For the purpose of 3A991.j.2., a 'secondary cell' is a 'cell' that is designed to be charged by an external electrical source.

* * * * *

■ 26. In Supplement No. 1 to Part 774 (the Commerce Control List), Category 3 Electronics, Export Control Classification Number (ECCN) 3B001 is amended by:

■ a. Revising the GBS paragraph in the License Exception section as set forth below; and

■ b. Revising paragraph f in the "items" paragraph of the List of Items Controlled section, as set forth below; and

■ c. Adding a new paragraph i in the "items" paragraph of the List of Items Controlled section, to read as follows:

3B001 Equipment for the manufacturing of semiconductor devices or materials, as follows (see List of Items Controlled), and specially designed components and accessories therefor.

* * * * *

License Exceptions

LVS: * * *

GBS: Yes, except 3B001.a.2 (metal organic chemical vapor deposition reactors), a.3 (molecular beam epitaxial growth equipment using gas sources), e (automatic loading multi-chamber central wafer handling systems only if connected to equipment controlled by 3B001.a.2, a.3, or .f), and .f (lithography equipment).

CIV: * * *

List of Items Controlled

* * * * *

Items:

* * * * *

f. Lithography equipment, as follows:

f.1. Align and expose step and repeat (direct step on wafer) or step and scan (scanner) equipment for wafer processing using photo-optical or X-ray methods, having any of the following:

f.1.a. A light source wavelength shorter than 245 nm; or

f.1.b. Capable of producing a pattern with a minimum resolvable feature size of 180 nm or less;

Technical Note: The minimum resolvable feature size is calculated by the following formula:

$$MRF = \frac{(\text{an exposure light source wavelength in nm}) \times (\text{K factor})}{\text{numerical aperture}}$$

Where the K factor = 0.45

MRF = minimum resolvable feature size.

f.2 Imprint lithography equipment capable of production features of 180 nm or less.

Note: 3B001.f.2 includes:

- Micro contact printing tools
- Hot embossing tools
- Nano-imprint lithography tools
- Step and flash imprint lithography (S-FIL) tools

f.3. Equipment specially designed for mask making or semiconductor device processing using deflected focused electron beam, ion beam or “laser” beam, having any of the following:

- f.3.a. A spot size smaller than 0.2 μm;
- f.3.b. Being capable of producing a pattern with a feature size of less than 1 μm; or
- f.3.c. An overlay accuracy of better than ± 0.20 μm (3 sigma);

* * * * *

i. Imprint lithography templates designed for integrated circuits by 3A001.

* * * * *

■ 27. In Supplement No. 1 to Part 774 (the Commerce Control List), Category 3 Electronics, Export Control Classification Number (ECCN) 3B991 is

amended revising paragraph b.1.b in the Items paragraph of the List of Items Controlled section, to read as follows:

3B991 Equipment not controlled by 3B001 for the manufacture of electronic components and materials, and specially designed components and accessories therefor.

* * * * *

List of Items Controlled

* * * * *

Items:

* * * * *

b. * * *

b.1. * * *

b.1.b. Equipment specially designed for purifying or processing III/V and II/VI semiconductor materials controlled by 3C001, 3C002, 3C003, 3C004, or 3C005 except crystal pullers, for which see 3B991.b.1.c below;

* * * * *

■ 28. In Supplement No. 1 to Part 774 (the Commerce Control List), Category 3 Electronics, Export Control Classification Number (ECCN) 3C002 is amended revising the Heading and

paragraph a in the Items paragraph of the List of Items Controlled section, to read as follows:

3C002 Resist materials, as follows (see List of Items Controlled), and “substrates” coated with controlled resists.

* * * * *

List of Items Controlled

* * * * *

Items:

a. Positive resists designed for semiconductor lithography specially adjusted (optimized) for use at wavelengths below 245 nm;

* * * * *

■ 29. In Supplement No. 1 to Part 774 (the Commerce Control List), Category 3 Electronics, Export Control Classification Number (ECCN) 3C005 is added after ECCN 3C004, to read as follows:

3C005 Silicon carbide (SiC) wafers having a resistivity of more than 10,000 ohm-cm.

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: See ECCN 3E001 for related development and production technology, and ECCN 3B991.b.1.b for related production equipment.

Related Definition: N/A

Items:

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

■ 30. In Supplement No. 1 to Part 774 (the Commerce Control List), Category 3 Electronics, Export Control Classification Number (ECCN) 3C992 is amended by revising the “heading”, to read as follows:

3C992 Positive resists designed for semiconductor lithography specially adjusted (optimized) for use at wavelengths between 370 and 245 nm.

* * * * *

■ 31. In Supplement No. 1 to Part 774 (the Commerce Control List), Category 3 Electronics, Export Control

Classification Number (ECCN) 3E001 is amended revising the License Requirements section and the related controls and items paragraphs in the List of Items Controlled section, to read as follows:

3E001 “Technology” according to the General Technology Note for the “development” or “production” of equipment or materials controlled by 3A (except 3A292, 3A980, 3A981, 3A991 or 3A992), 3B (except 3B991 or 3B992) or 3C (except 3C992).

License Requirements

Reason for Control: NS, MT, NP, AT

Control(s)	Country chart
NS applies to “technology” for items controlled by 3A001, 3A002, 3B001, 3B002, or 3C001 to 3C005	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, or 3A225 to 3A233 for NP reasons	NP Column 1.
AT applies to entire entry	AT Column 1.

License Requirement Note: See § 743.1 of the EAR for reporting requirements for exports under License Exceptions.

* * * * *

List of Items Controlled

Unit: * * *

Related Controls: (1.) See also 3E101 and 3E201. (2.) "Technology" according to the General Technology Note for the "development" or "production" of the following commodities is under the export licensing authority of the Department of State, Directorate of Defense Trade Controls (22 CFR part 121): (a) When operating at frequencies higher than 31 GHz and "space qualified": helix tubes (traveling wave tubes (TWT)) defined in 3A001.b.1.a.4.c; microwave solid state amplifiers defined in 3A001.b.4.b; microwave "assemblies" defined in 3A001.b.6; or traveling wave tube amplifiers (TWTAs) defined in 3A001.b.8; (b) "Space qualified" and radiation hardened photovoltaic arrays defined in 3A001.e.1.c (i.e., not having silicon cells or single, dual or triple junction solar cells that have gallium arsenide as one of the junctions), and spacecraft/satellite solar concentrators and batteries; and (c) "Space qualified" atomic frequency standards defined in 3A002.g.2.

Related Definition: * * *

Items:

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

Note 1: 3E001 does not control "technology" for the "production" of equipment or components controlled by 3A003.

Note 2: 3E001 does not control "technology" for the "development" or "production" of integrated circuits controlled by 3A001.a.3 to a.12, having all of the following:

- (a) Using "technology" of 0.5 µm or more; and
- (b) Not incorporating multi-layer structures.

Technical Note: The term multi-layer structures in Note 2 of 3E001 does not include devices incorporating a maximum of three metal layers and three polysilicon layers.

■ 32. In Supplement No. 1 to Part 774 (the Commerce Control List), Category 3 Electronics, Export Control Classification Number (ECCN) 3E002 is

amended by revising the "Heading" and the License Requirements section, the License Exceptions section, and the "items" paragraph in the List of Items Controlled section, to read as follows:

3E002 "Technology" according to the General Technology Note other than that controlled in 3E001 for the "development" or "production" of a "microprocessor microcircuit", "micro-computer microcircuit" and microcontroller microcircuit core, having an arithmetic logic unit with an access width of 32 bits or more and any of the following features or characteristics (see List of Items Controlled).

* * * * *

License Exceptions

CIV: Yes, for deemed exports, as described in § 734.2(b)(2)(ii) of the EAR, of "technology" for the "development" or "production" of general purpose microprocessors with a vector processor unit with operand length of 64-bit or less, 64-bit floating operations not exceeding 32 GFLOPS, or 16-bit or more floating-point operations not exceeding 32 GMACS (billions of 16-bit fixed-point multiply-accumulate operations per second). Deemed exports under License Exception CIV are subject to a Foreign National Review (FNR) requirement, see § 740.5 of the EAR for more information about the FNR. License Exception CIV does not apply to ECCN 3E002 technology also required for the development or production of items controlled under ECCNs beginning with 3A, 3B, or 3C, or to ECCN 3E002 technology also controlled under ECCN 3E003.

TSR: Yes

List of Items Controlled

Unit: * * *

Related Controls: * * *

Related Definitions: * * *

Items:

a. A vector processor unit designed to perform more than two calculations on floating-point vectors (one dimensional arrays of 32-bit or larger numbers) simultaneously;

Technical Note: A vector processing unit is a processor element with built-in instructions that perform multiple calculations on floating-point vectors (one-dimensional arrays of 32-bit or larger numbers)

simultaneously, having at least one vector arithmetic logic unit.

b. Designed to perform more than two 64-bit or larger floating-point operation results per cycle; or

c. Designed to perform more than four 16-bit fixed-point multiply-accumulate results per cycle (e.g., digital manipulation of analog information that has been previously converted into digital form, also known as digital signal processing).

Note: 3E002.c does not control technology for multimedia extensions.

Notes:

1. 3E002 does not control "technology" for the "development" or "production" of microprocessor cores, having all of the following:

- a. Using "technology" at or above 0.130 µm; and
 - b. Incorporating multi-layer structures with five or fewer metal layers.
2. 3E002 includes "technology" for digital signal processors and digital array processors.

■ 33. In Supplement No. 1 to Part 774 (the Commerce Control List), Category 3 Electronics is amended by removing the section entitled "Information on How to Calculate "composite Theoretical Performance ("CTP")" that follows EAR99.

■ 34. In Supplement No. 1 to Part 774 (the Commerce Control List), Category 5 Telecommunications and "Information Security", Part I Telecommunications, Export Control Classification Number (ECCN) 5A001 is amended by

- a. Revising the License Requirements section, to read as set forth below;
- b. Revising the introductory text to paragraph b in the "items" paragraph of the List of Items Controlled section, as set forth below; and
- c. Revising paragraphs b.2 and g in the "items" paragraph of the List of Items Controlled section, to read as follows:

5A001 Telecommunications systems, equipment, and components, as follows (see List of Items Controlled).

License Requirements

Reason for Control: NS, AT

Control(s)	Country chart
NS applies to 5A001.a, and .e	NS Column 1.
NS applies to 5A001.b, .c, .d, .f, .g	NS Column 2.
AT applies to entire entry	AT Column 1.

License Requirement Notes: See § 743.1 of the EAR for reporting requirements for exports under License Exceptions.

* * * * *

List of Items Controlled

* * * * *

Items:

* * * * *

b. Telecommunication systems and equipment, and specially designed components and accessories therefor, having any of the following characteristics, functions or features:

b.1 * * *

b.2. Being radio equipment operating in the 1.5 MHz to 87.5 MHz band and having all of the following characteristics:

b.2.a. Automatically predicting and selecting frequencies and "total digital transfer rates" per channel to optimize the transmission; and

b.2.b. 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 frequency range of 1.5 MHz or more but less than 30 MHz, or 250 W or more in the

frequency range of 30 MHz or more but not exceeding 87.5 MHz, over an "instantaneous bandwidth" of one octave or more and with an output harmonic and distortion content of better than -80 dB;

* * * * *

g. Passive Coherent Location systems or equipment specially designed for detecting and tracking moving objects by measuring reflections of ambient radio frequency emissions, supplied by non-radar transmitters.

Technical Note: Non-radar transmitters may include commercial radio, television or cellular telecommunications base stations.

Note: 5A001.g. does not control:

- a. Radio-astronomical equipment;
- b. Systems or equipment that require any radio transmission from the target.

* * * * *

■ 35. In Supplement No. 1 to Part 774 (the Commerce Control List), Category 5 Telecommunications and "Information Security", Part 1 Telecommunications, Export Control Classification Number (ECCN) 5A991 is amended by revising paragraph b.7. in the "items" paragraph of the List of Items Controlled section, to read as follows:

5A991 Telecommunication equipment, not controlled by 5A001.

* * * * *

List of Items Controlled

* * * * *

Items:

* * * * *

b. * * *
b.7. Being radio equipment employing any of the following:

b.7.a. Quadrature-amplitude-modulation (QAM) techniques above level 4 if the "total digital transfer rate" exceeds 8.5 Mbit/s;

b.7.b. QAM techniques above level 16 if the "total digital transfer rate" is equal to or less than 8.5 Mbit/s;

b.7.c. Other digital modulation techniques and having a "spectral efficiency" exceeding 3 bit/s/Hz; or

b.7.d. Operating in the 1.5 MHz to 87.5 MHz band and incorporating adaptive techniques providing more than 15 dB suppression of an interfering signal.

Notes: 1. 5A991.b.7 does not control equipment specially designed to be integrated and operated in any satellite system for civil use.

2. 5A991.b.7 does not control radio relay equipment for operation in an ITU allocated band:

- a. Having any of the following:
 - 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/s/Hz.

* * * * *

■ 36. In Supplement No. 1 to Part 774 (the Commerce Control List), Category 5 Telecommunications and "Information Security", Part 2 Information Security, Export Control Classification Number

(ECCN) 5E001 is amended by adding a new paragraph c.4.c in the Items paragraph of the List of Items Controlled section, to read as follows:

5E001 "Technology", (see List of Items Controlled).

* * * * *

List of Items Controlled

* * * * *

Items:

* * * * *

c. * * *

c.4. * * *

Note: * * *

c.4.c. Operating in the 1.5 MHz to 87.5 MHz band and incorporating adaptive techniques providing more than 15 dB suppression of an interfering signal; or

* * * * *

■ 37. In Supplement No. 1 to Part 774 (the Commerce Control List), Category 6 Sensors, Export Control Classification Number (ECCN) 6A002 is amended by revising the License Requirements section, the Unit paragraph in the List of Items Controlled section, and paragraphs a.3.d.1 and a.3.e in the Items paragraph of the List of Items Controlled section, to read as follows:

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, or .e that are specially designed or modified to protect "missiles" against nuclear effects (e.g., Electromagnetic Pulse (EMP), X-rays, combined blast and thermal effects), and usable for "missiles".	MT Column 1.
RS applies to 6A002.a.1, a.2, a.3 (except a.3.d.2.a and a.3.e for lead selenide based focal plane arrays (FPAs)), .c, and .e	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	Iraq, North Korea, and Rwanda.

License Requirement Notes: See § 743.1 of the EAR for reporting requirements for exports under License Exceptions.

* * * * *

List of Items Controlled

Unit: Equipment in number; components in \$ value

* * * * *

Items:

- a. * * *
- a.3. * * *
- a.3.d. * * *
- a.3.d.1. Individual elements with a peak response in the wavelength range exceeding 1,200 nm but not exceeding 3,000 nm; and

a.3.e. Non-"space-qualified" linear (1-dimensional) "focal plane arrays", having individual elements with a peak response in

the wavelength range exceeding 3,000 nm but not exceeding 30,000 nm.

* * * * *

■ 38. In Supplement No. 1 to Part 774 (the Commerce Control List), Category 6 Sensors, Export Control Classification Number (ECCN) 6A004 is amended by:

■ a. Revising the Units, Related Controls and Related Definition paragraphs in the List of Items Controlled section, as set forth below;

■ b. Adding single quotes around the term "Aspheric optical elements" in paragraph e in the Items paragraph of the List of Items Controlled section;

■ c. Removing and reserving Technical Note 1 that appears after paragraph e.3 in the Items paragraph of the List of Items Controlled section; and

■ d. Removing the Note Bene that reads "N.B.: For aspheric optical elements specially designed for lithographic equipment, see 3B001.", which appears at the end of the Items paragraph in the List of Items Controlled section.

6A004 Optics.

* * * * *

List of Items Controlled

Unit: Equipment in number; components in \$ value.

Related Controls: (1) For optical mirrors or "aspheric optical elements" specially designed for lithography equipment, see ECCN 3B001. (2) "Space qualified" components for optical systems defined in 6A004.c and optical control equipment defined in 6A004.d.1 are subject to the export licensing authority of the Department of

State, Directorate of Defense Trade Controls (22 CFR part 121). (3) See also 6A994.

Related Definitions: An "aspheric optical element" is any element used in an optical system whose imaging surface or surfaces are designed to depart from the shape of an ideal sphere.

* * * * *

■ 39. In Supplement No. 1 to Part 774 (the Commerce Control List), Category 6 Sensors, Export Control Classification Number (ECCN) 6A005 is revised, to read as follows:

6A005 "Lasers" (other than those described in 0B001.g.5 or .h.6), components

and optical equipment, as follows (see List of Items Controlled).

License Requirements

Reason for Control: NS, NP, AT

Control(s)	Country chart
NS applies to entire entry	NS Column 2.
NP applies to "lasers" controlled by 6A005.a.2, a.4, b.2.b, b.3.a, b.4.b, b.6.b., c.1.b, c.2.b, d.3.c, and d.4.c, as described in the following License Requirements Note.	NP Column 1.
AT applies to entire entry	AT Column 1.

License Requirements Note: NP controls apply to the following "lasers" controlled by 6A005:

(a) Pulsed excimer "lasers" controlled by 6A005.d.4.c having all of the following characteristics:

(1) Operating at wavelengths between 240 and 360 nm;

(2) A repetition rate > 250 Hz; and

(3) An average output power > 500 W;

(b) Copper vapor "lasers" controlled by 6A005.b.4.b having all of the following characteristics:

(1) Operating at wavelengths between 500 and 600 nm; and

(2) An average output power ≥ 40 W;

(c) Pulsed carbon dioxide "lasers"

controlled by 6A005.d.3.c (except industrial CO₂ lasers used in applications such as cutting and welding), having all of the following characteristics:

(1) Operating at wavelengths between 9,000 and 11,000 nm;

(2) A repetition rate > 250 Hz;

(3) An average output power > 2.5kW; and

(4) A pulse width < 200ns;

(d) Argon ion "lasers" controlled by 6A005.a.2 having all of the following characteristics:

(1) Operating at wavelengths between 400 and 515 nm; and

(2) An average output power ≥ 50 W;

(e) Alexandrite "lasers" controlled by 6A005.c.2.b having all of the following characteristics:

(1) Operating at wavelengths between 720 and 800 nm;

(2) A bandwidth ≤ 0.005 nm;

(3) A repetition rate > 125 Hz; and

(4) Average output power > 30 W;

(f) Pulse-excited, Q-switched neodymium-doped (other than glass) "lasers" controlled by 6A005.b.6.b having all of the following characteristics:

(1) An output wavelength exceeding 1,000 nm, but not exceeding 1,100 nm;

(2) A pulse duration equal to or more than 1 ns; and

(3) A single-transverse mode output having an average power exceeding 40 W or a multiple-transverse mode output having an average power exceeding 50 W;

(g) Neodymium-doped (other than glass) "lasers" controlled by 6A005.b.2, b.3, or b.4, having all of the following characteristics:

(1) Incorporating frequency doubling for output wavelength between 500 and 550 nm; and

(2) Average output power > 40 W;

(h) Tunable pulsed single-mode dye laser oscillators controlled by 6A005.c.1.b and 6A005.c.2.b having all of the following characteristics:

(1) Operating at wavelengths between 300 nm and 800 nm;

(2) An average output power greater than 1 W;

(3) A repetition rate greater than 1 kHz; and

(4) Pulse width less than 100 ns;

(i) Tunable pulsed dye laser amplifiers and oscillators controlled by 6A005.c.1.b and 6A005.c.2.b having all of the following characteristics:

(1) Operating at wavelengths between 300 nm and 800 nm;

(2) An average output power greater than 30 W;

(3) A repetition rate greater than 1 kHz; and

(4) Pulse width less than 100 ns;

Note: NP controls do not apply to single mode oscillators.

License Exceptions

LVS: N/A for NP items \$3000 for all other items

GBS: Yes, except 6A005.a.2, a.4, b.2.b, b.3.a, b.4.b, b.6.b, c.1.b, c.2.b, d.3.c, and d.4.c, which meets the parameters for NP controls set forth in the License Requirements Note.

CIV: Yes, except 6A005.a.2, a.4, b.3.a, b.2.b, b.3.a, b.4.b, b.6.b, c.1.b, c.2.b, d.3.c, and d.4.c, which meets the parameters for NP controls set forth in the License Requirements Note.

List of Items Controlled

Unit: Equipment in number; components and accessories in \$ value

Related Controls: (1) See ECCN 6D001 for "software" for items controlled under this entry. (2) See ECCNs 6E001 ("development"), 6E002 ("production"), and 6E201 ("use") for technology for items controlled under this entry. (3) Also see ECCNs 6A205 and 6A995. (4) See ECCN 3B001 for excimer "lasers" specially designed for lithography equipment. (5) "Lasers" specially designed or prepared for use in isotope separation are subject to the export licensing authority of the Nuclear Regulatory Commission (see 10 CFR part 110). (6) Shared aperture optical elements, capable of operating in "super-high power laser" applications, and "lasers" specifically designed, modified, or configured for military application are subject to the export licensing authority of

the U.S. Department of State, Directorate of Defense Trade Controls (see 22 CFR part 121).

Related Definitions: "Wall-plug efficiency" is defined as the ratio of laser output power (or "average output power") to total electrical input power required to operate the "laser", including the power supply/conditioning and thermal conditioning/heat exchanger.

Items:

Notes:

1. Pulsed "lasers" include those that run in a continuous wave (CW) mode with pulses superimposed.

2. Eximer, semiconductor, chemical, CO, CO₂, and non-repetitive pulsed Nd:glass "lasers" are only specified in 6A005.d.

3. 6A005 includes fiber "lasers".

4. The control status of "lasers" incorporating frequency conversion (i.e., wavelength change) by means other than one "laser" pumping another "laser" is determined by applying the control parameters for both the output of the source "laser" and the frequency-converted optical output.

5. 6A005 does not control the following "lasers":

a. Ruby with output energy below 20 J;

b. Nitrogen;

c. Krypton.

a. Non-"tunable" continuous wave ("CW") lasers", having any of the following:

a.1. An output wavelength less than 150 nm with an output power exceeding 1W;

a.2. An output wavelength of 150 nm or more but not exceeding 520 nm and having an output power exceeding 30 W;

Note: 6A005.a.2 does not control Argon "lasers" having an output power equal to or less than 50 W.

a.3. An output wavelength exceeding 520 nm but not exceeding 540 nm and having any of the following:

a.3.a. A single transverse mode output having an output power exceeding 50 W; or

a.3.b. A multiple transverse mode output having an output power exceeding 150 W;

a.4. An output wavelength exceeding 540 nm but not exceeding 800 nm and having an output power exceeding 30 W;

a.5. An output wavelength exceeding 800 nm but not exceeding 975 nm and having any of the following:

a.5.a. A single transverse mode output having an output power exceeding 50 W; or

a.5.b. A multiple transverse mode output having an output power exceeding 80 W;

a.6. An output wavelength exceeding 975 nm but not exceeding 1,150 nm and having any of the following:

- a.6.a. A single transverse mode output having any of the following:
 - a.6.a.1. A "wall-plug efficiency" exceeding 12% and an output power exceeding 100 W; or
 - a.6.a.2. An output power exceeding 150 W; or
- a.6.b. A multiple transverse mode output having any of the following:
 - a.6.b.1. A "wall-plug efficiency" exceeding 18% and an output power exceeding 500 W; or
 - a.6.b.2. An output power exceeding 2 kW;

Note: 6A005.a.6.b does not control multiple transverse mode, industrial "lasers" with output power exceeding 2 kW and not exceeding 6 kW with a total mass greater than 1,200 kg. For the purpose of this note, total mass includes all components required to operate the "laser", e.g., "laser", power supply, heat exchanger, but excludes external optics for beam conditioning and/or delivery.

a.7. An output wavelength exceeding 1,150 nm but not exceeding 1,555 nm and having any of the following:

- a.7.a. A single transverse mode having an output power exceeding 50 W; or
- a.7.b. A multiple transverse mode having an output power exceeding 80 W; or
- a.8. An output wavelength exceeding 1,555 nm and having an output power exceeding 1 W.

b. Non-"tunable" "pulsed lasers", having any of the following:

- b.1. An output wavelength less than 150 nm and having any of the following:
 - b.1.a. An output energy exceeding 50 mJ per pulse and a "peak power" exceeding 1 W; or
 - b.1.b. An "average output power" exceeding 1 W;
 - b.2. An output wavelength of 150 nm or more but not exceeding 520 nm and having any of the following:
 - b.2.a. An output energy exceeding 1.5 J per pulse and a "peak power" exceeding 30 W; or
 - b.2.b. An "average output power" exceeding 30 W;

Note: 6A005.b.2.b does not control Argon "lasers" having an "average output power" equal to or less than 50 W.

b.3. An output wavelength exceeding 520 nm, but not exceeding 540 nm and having any of the following:

- b.3.a. A single transverse mode output having any of the following:
 - b.3.a.1. An output energy exceeding 1.5 J per pulse and a "peak power" exceeding 50 W; or
 - b.3.a.2. An "average output power" exceeding 50 W; or
 - b.3.b. A multiple transverse mode output having any of the following:
 - b.3.b.1. An output energy exceeding 1.5 J per pulse and a "peak power" exceeding 150 W; or
 - b.3.b.2. An "average output power" exceeding 150 W;
 - b.4. An output wavelength exceeding 540 nm but not exceeding 800 nm and having any of the following:

b.4.a. An output energy exceeding 1.5 J per pulse and a "peak power" exceeding 30 W; or

- b.4.b. An "average output power" exceeding 30 W;
- b.5. An output wavelength exceeding 800 nm but not exceeding 975 nm and having any of the following:
 - b.5.a. A "pulse duration" not exceeding 1 μ s and having any of the following:
 - b.5.a.1. An output energy exceeding 0.5 J per pulse and a "peak power" exceeding 50 W;
 - b.5.a.2. A single transverse mode output having an "average output power" exceeding 20 W; or
 - b.5.a.3. A multiple transverse mode output having an "average output power" exceeding 50 W; or
 - b.5.b. A "pulse duration" exceeding 1 μ s and having any of the following:
 - b.5.b.1. An output energy exceeding 2 J per pulse and a "peak power" exceeding 50 W;
 - b.5.b.2. A single transverse mode output having an "average output power" exceeding 50 W; or
 - b.5.b.3. A multiple transverse mode output having an "average output power" exceeding 80 W.
- b.6. An output wavelength exceeding 975 nm but not exceeding 1,150 nm and having any of the following:
 - b.6.a. A "pulse duration" of less than 1 μ s and having any of the following:
 - b.6.a.1. An output "peak power" exceeding 5 GW per pulse;
 - b.6.a.2. An "average output power" exceeding 10 W; or
 - b.6.a.3. An output energy exceeding 0.1 J per pulse;
 - b.6.b. A "pulse duration" exceeding 1 ns but not exceeding 1 μ s, and having any of the following:
 - b.6.b.1. A single transverse mode output having any of the following:
 - b.6.b.1.a. A "peak power" exceeding 100 MW;
 - b.6.b.1.b. An "average output power" exceeding 20 W limited by design to a maximum pulse repetition frequency less than or equal to 1 kHz;
 - b.6.b.1.c. A "wall-plug efficiency" exceeding 12% and an "average output power" exceeding 100 W and capable of operating at a pulse repetition frequency greater than 1 kHz;
 - b.6.b.1.d. An "average output power" exceeding 150 W and capable of operating at a pulse repetition frequency greater than 1 kHz; or
 - b.6.b.1.e. An output energy exceeding 2 J per pulse;
 - b.6.b.2. A multiple transverse mode output having any of the following:
 - b.6.b.2.a. A "peak power" exceeding 400 MW;
 - b.6.b.2.b. A "wall-plug efficiency" exceeding 18% and an "average output power" exceeding 500 W;
 - b.6.b.2.c. An "average output power" exceeding 2 kW; or
 - b.6.b.2.d. An output energy exceeding 4 J per pulse; or
 - b.6.c. A "pulse duration" exceeding 1 μ s and having any of the following:
 - b.6.c.1. A single transverse mode output having any of the following:

b.6.c.1.a. A "peak power" exceeding 500 kW;

- b.6.c.1.b. A "wall-plug efficiency" exceeding 12% and an "average output power" exceeding 100 W; or
- b.6.c.1.c. An "average output power" exceeding 150 W; or
- b.6.c.2. A multiple transverse mode output having any of the following:
 - b.6.c.2.a. A "peak power" exceeding 1 MW;
 - b.6.c.2.b. A "wall-plug efficiency" exceeding 18% and an "average output power" exceeding 500 W; or
 - b.6.c.2.c. An "average output power" exceeding 2 kW;
- b.7. An output wavelength exceeding 1,150 nm but not exceeding 1,555 nm and having any of the following:
 - b.7.a. A "pulse duration" not exceeding 1 μ s and having any of the following:
 - b.7.a.1. An output energy exceeding 0.5 J per pulse and a "peak power" exceeding 50 W;
 - b.7.a.2. A single transverse mode output having an "average output power" exceeding 20 W; or
 - b.7.a.3. A multiple transverse mode output having an "average output power" exceeding 50 W; or
 - b.7.b. A "pulse duration" exceeding 1 μ s and having any of the following:
 - b.7.b.1. An output energy exceeding 2 J per pulse and a "peak power" exceeding 50 W;
 - b.7.b.2. A single transverse mode output having an "average output power" exceeding 50 W; or
 - b.7.b.3. A multiple transverse mode output having an "average output power" exceeding 80 W; or
 - b.8. An output wavelength exceeding 1,555 nm and having any of the following:
 - b.8.a. An output energy exceeding 100 mJ per pulse and a "peak power" exceeding 1 W; or
 - b.8.b. An "average output power" exceeding 1 W;
- c. "Tunable" lasers, having any of the following:

Note: 6A005.c includes titanium-sapphire (Ti: Al₂O₃), thulium-YAG (Tm: YAG), thulium-YSGG (Tm:YSGG), alexandrite (Cr:BeAl₂O₄), color center "lasers", dye "lasers", and liquid "lasers".

 - c.1. An output wavelength less than 600 nm and having any of the following:
 - c.1.a. An output energy exceeding 50 mJ per pulse and a "peak power" exceeding 1 W; or
 - c.1.b. An average or CW output power exceeding 1 W;
 - c.2. An output wavelength of 600 nm or more but not exceeding 1,400 nm and having any of the following:
 - c.2.a. An output energy exceeding 1 J per pulse and a "peak power" exceeding 20 W; or
 - c.2.b. An average or CW output power exceeding 20 W; or
 - c.3. An output wavelength exceeding 1,400 nm and having any of the following:
 - c.3.a. An output energy exceeding 50 mJ per pulse and a "peak power" exceeding 1 W; or
 - c.3.b. An average or CW output power exceeding 1 W;

d. Other "lasers", not controlled in 6A005.a., 6A005.b., or 6A005.c., as follows:
 d.1. Semiconductor "lasers", as follows:

Notes:

1. 6A005.d.1 includes semiconductor "lasers" having optical output connectors (e.g., fiber optic pigtails).

2. The control status of semiconductor "lasers" specially designed for other equipment is determined by the control status of the other equipment.

d.1.a. Individual single-transverse mode semiconductor "lasers", having any of the following:

d.1.a.1. A wavelength equal to or less than 1,510 nm and having an average or CW output power exceeding 1.5 W; or

d.1.a.2. A wavelength greater than 1,510 nm, and having an average or CW output power exceeding 500 mW;

d.1.b. Individual, multiple-transverse mode semiconductor "lasers", having any of the following:

d.1.b.1. A wavelength of less than 1,400 nm and having an average or CW output power exceeding 10W;

d.1.b.2. A wavelength equal to or greater than 1,400 nm and less than 1,900 nm, and having an average or CW output power exceeding 2.5 W; or

d.1.b.3. A wavelength equal to or greater than 1,900 nm and having an average or CW output power exceeding 1 W.

d.1.c. Individual semiconductor "laser" arrays, having any of the following:

d.1.c.1. A wavelength of less than 1,400 nm and having an average or CW output power exceeding 80 W;

d.1.c.2. A wavelength equal to or greater than 1,400 nm and less than 1,900 nm and having an average or CW output power exceeding 25 W; or

d.1.c.3. A wavelength equal to or greater than 1,900 nm and having an average or CW output power exceeding 10 W.

d.1.d. Array stacks of semiconductor "lasers" containing at least one array that is controlled under 6A005.d.1.c.

Technical Notes:

1. Semiconductor "lasers" are commonly called "laser" diodes.

2. An "array" consists of multiple semiconductor "laser" emitters fabricated as a single chip so that the centers of the emitted light beams are on parallel paths.

3. An "array stack" is fabricated by stacking, or otherwise assembling, "arrays" so that the centers of the emitted light beams are on parallel paths.

d.2. Carbon monoxide (CO) "lasers" having any of the following:

d.2.a. An output energy exceeding 2 J per pulse and a "peak power" exceeding 5 kW; or

d.2.b. An average or CW output power exceeding 5 kW;

d.3. Carbon dioxide (CO₂) "lasers" having any of the following:

d.3.a. A CW output power exceeding 15 kW;

d.3.b. A pulsed output having a "pulse duration" exceeding 10 μs and having any of the following:

d.3.b.1. An "average output power" exceeding 10 kW; or

d.3.b.2. A "peak power" exceeding 100 kW; or

d.3.c. A pulsed output having a "pulse duration" equal to or less than 10 μs and having any of the following:

d.3.c.1. A pulse energy exceeding 5 J per pulse; or

d.3.c.2. An "average output power" exceeding 2.5 kW;

d.4. Excimer "lasers", having any of the following:

d.4.a. An output wavelength not exceeding 150 nm and having any of the following:

d.4.a.1. An output energy exceeding 50 mJ per pulse; or

d.4.a.2. An "average output power" exceeding 1 W;

d.4.b. An output wavelength exceeding 150 nm but not exceeding 190 nm and having any of the following:

d.4.b.1. An output energy exceeding 1.5 J per pulse; or

d.4.b.2. An "average output power" exceeding 120 W;

d.4.c. An output wavelength exceeding 190 nm but not exceeding 360 nm and having any of the following:

d.4.c.1. An output energy exceeding 10 J per pulse; or

d.4.c.2. An "average output power" exceeding 500 W; or

d.4.d. An output wavelength exceeding 360 nm and having any of the following:

d.4.d.1. An output energy exceeding 1.5 J per pulse; or

d.4.d.2. An "average output power" exceeding 30 W;

Note: For excimer "lasers" specially designed for lithography equipment, see 3B001.

d.5. "Chemical lasers", as follows:

d.5.a. Hydrogen Fluoride (HF) "lasers";

d.5.b. Deuterium Fluoride (DF) "lasers";

d.5.c. "Transfer lasers", as follows:

d.5.c.1. Oxygen Iodine (O₂-I) "lasers";

d.5.c.2. Deuterium Fluoride-Carbon

dioxide (DF-CO₂) "lasers";

d.6. "Non-repetitive pulsed" Neodymium (Nd) glass "lasers", having any of the following:

d.6.a. A "pulse duration" not exceeding 1 μs and an output energy exceeding 50 J per pulse; or

d.6.b. A "pulse duration" exceeding 1 μs and an output energy exceeding 100 J per pulse;

Note: "Non-repetitive pulsed" refers to "lasers" that produce either a single output pulse or that have a time interval between pulses exceeding one minute.

e. Components, as follows:

e.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.

e.2. Optical mirrors or transmissive or partially transmissive optical or electro-optical components specially designed for use with controlled "lasers";

f. Optical equipment, as follows:

N.B.: For shared aperture optical elements, capable of operating in "Super-High Power Laser" ("SHPL") applications, see the U.S. Munitions List (22 CFR part 121).

f.1. Dynamic wavefront (phase) measuring equipment capable of mapping at least 50 positions on a beam wavefront having any the following:

f.1.a. Frame rates equal to or more than 100 Hz and phase discrimination of at least 5% of the beam's wavelength; or

f.1.b. Frame rates equal to or more than 1,000 Hz and phase discrimination of at least 20% of the beam's wavelength;

f.2. "Laser" diagnostic equipment capable of measuring "SHPL" system angular beam steering errors of equal to or less than 10 μrad;

f.3. Optical equipment and 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 μm, whichever is the smaller;

f.4. Projection telescopes specially designed for use with "SHPL" systems.

■ 40. In Supplement No. 1 to part 774 (the Commerce Control List), Category 6 Sensors, Export Control Classification Number (ECCN) 6A006 is amended by adding quotes around the term "Compensation systems" as it appears in the Heading and in paragraph d in the Items paragraph of the List of Items Controlled section.

■ 41. In Supplement No. 1 to Part 774 (the Commerce Control List), Category 6 Sensors, Export Control Classification Number (ECCN) 6A008 is amended by adding a note to the beginning of the Items paragraph of the List of Items Controlled section, and revising paragraph a in the Items paragraph of the List of Items Controlled section, to read as follows:

6A008 Radar systems, equipment and assemblies having any of the following characteristics (see List of Items Controlled), and specially designed components therefor.

* * * * *

List of Items Controlled

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Items:

Note: 6A008 does not control:
 a. Secondary surveillance radar (SSR);
 b. Civil Automotive Radar;
 c. Displays or monitors used for air traffic control (ATC) having no more than 12 resolvable elements per mm;
 d. Meteorological (weather) radar.

a. Operating at frequencies from 40 GHz to 230 GHz and having any of the following:

a.1. An "average output power" exceeding 100 mW; or

a.2. Locating accuracy of 1 m or less (better) in range and 0.2 degree or less (better) in azimuth;

* * * * *

■ 42. In Supplement No. 1 to Part 774 (the Commerce Control List), Category 6 Sensors, Export Control Classification Number (ECCN) 6A205 is amended by:

■ a. Revising the heading;

■ b. Revising the Units paragraph in the List of Items Controlled section, as set forth below;

■ c. Revising the “Related Controls” paragraph of the List of Items Controlled section; as set forth below and

■ d. Revising the Items paragraph of the List of Items Controlled section, to read as follows:

6A205 “Lasers”, “laser” amplifiers and oscillators, other than those controlled by 0B001.g.5, 0B001.h.6, or 6A005, as follows (see List of Items Controlled).

* * * * *

List of Items Controlled

Unit: Equipment in number

Related Controls: (1) See ECCNs 6E001 (“development”), 6E002 (“production”), and 6E201 (“use”) for technology for items controlled under this entry. (2) Also see ECCNs 6A005 and 6A995. (3) See ECCN 6A005.a.2 for additional controls on argon ion lasers; See ECCN 6A005.b.6.b for additional controls on neodymium-doped lasers. (4) “Lasers” specially designed or prepared for use in isotope separation are subject to the export licensing authority of the Nuclear Regulatory Commission (see 10 CFR part 110).

Related Definitions: * * *

Items:

a. Argon ion “lasers” having both of the following characteristics:

a.1. Operating at wavelengths between 400 nm and 515 nm; and

a.2. An average output power greater than 40 W;

b. Tunable pulsed single-mode dye laser oscillators having all of the following characteristics:

b.1. Operating at wavelengths between 600 nm and 800 nm;

b.2. Having an average output greater than 1 W;

b.3. A repetition rate greater than 1 kHz; and

b.4. Pulse width less than 100 ns;

c. [RESERVED]

d. Pulsed carbon dioxide “lasers” having all of the following characteristics:

d.1. Operating at wavelengths between 9,000 nm and 11,000 nm;

d.2. A repetition rate greater than 250 Hz;

d.3. An average output power greater than 500 W; and

d.4. Pulse width of less 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.;

f. Neodymium-doped (other than glass) lasers with an output wavelength between 1000 and 1100 nm having either of the following:

f.1. Pulse-excited and Q-switched with a pulse duration equal to or greater than 1 ns, and having either of the following:

f.1.a. A single-transverse mode output with an average output power greater than 40 W; or

f.1.b. A multiple-transverse mode output with an average output power greater than 50 W; or

f.2. Incorporating frequency doubling to give an output wavelength between 500 and 550 nm with an average output power of greater than 40 W.

■ 43. In Supplement No. 1 to Part 774 (the Commerce Control List), Category 6 Sensors, Export Control Classification Number (ECCN) 6A995 is amended by:

■ a. Revising the “heading” and paragraph c;

■ b. Redesignating paragraphs d and g from the items paragraph of the List of Items Controlled section; and

■ c. Adding three new paragraphs d, e, and f to the Items paragraph of the List of Items Controlled section, to read as follows:

6A995 “Lasers”, not controlled by 0B001.g.5, 0B001.h.6, 6A005 or 6A205.

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List of Items Controlled

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Items:

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c. Ruby “lasers” having an output energy exceeding 20 J per pulse;

d. Non-“tunable” “pulsed lasers” having an output wavelength exceeding 975 nm but not exceeding 1,150 nm and having any of the following:

d.1. A “pulse duration” equal to or exceeding 1 ns but not exceeding 1 μs, and having any of the following:

d.1.a. A single transverse mode output and having any of the following:

d.1.a.1. A “wall-plug efficiency” exceeding 12% and an “average output power” exceeding 10 W and capable of operating at a pulse repetition frequency greater than 1 kHz; or

d.1.a.2.1. An “average output power” exceeding 20 W; or

d.1.b. A multiple transverse mode output and having any of the following:

d.1.b.1. A “wall-plug efficiency” exceeding 18% and an “average output power” exceeding 30 W;

d.1.b.2. A “peak power” exceeding 200 MW; or

d.1.b.3. An “average output power” exceeding 50 W; or

d.2. A “pulse duration” exceeding 1 μs and having any of the following:

d.2.a. A single transverse mode output and having any of the following:

d.2.a.1. A “wall-plug efficiency” exceeding 12% and an “average output power” exceeding 10 W and capable of operating at a pulse repetition frequency greater than 1 kHz; or

d.2.a.2. An “average output power” exceeding 20 W; or

d.2.b. A multiple transverse mode output and having any of the following:

d.2.b.1. A “wall-plug efficiency” exceeding 18% and an “average output power” exceeding 30 W; or

d.2.b.2. An “average output power” exceeding 500 W;

e. Non-“tunable” continuous wave (“CW”) lasers”, having an output wavelength exceeding 975 nm but not exceeding 1,150 nm and having any of the following:

e.1. A single transverse mode output and having any of the following:

e.1.a. A “wall-plug efficiency” exceeding 12% and an “average output power” exceeding 10 W and capable of operating at a pulse repetition frequency greater than 1 kHz; or

e.1.b. An “average output power” exceeding 500 W; or

e.2. A multiple transverse mode output and having any of the following:

e.2.a. A “wall-plug efficiency” exceeding 18% and an “average output power” exceeding 30 W; or

e.2.b. An “average output power” exceeding 500 W;

Note: 6A995.e.1.b does not control multiple transverse mode, industrial “lasers” with output power less than or equal to 2kW with a total mass greater than 1,200kg. For the purpose of this note, total mass includes all components required to operate the “laser”, e.g., “laser”, power supply, heat exchanger, but excludes external optics for beam conditioning and/or delivery.

f. Non-“tunable” “lasers”, having a wavelength exceeding 1,400 nm, but not exceeding 1555 nm and having any of the following:

f.1. An output energy exceeding 100 mJ per pulse and a pulsed “peak power” exceeding 1 W; or

f.2. An average or CW output power exceeding 1 W.

* * * * *

■ 44. In Supplement No. 1 to Part 774 (the Commerce Control List), Category 6 Sensors, Export Control Classification Number (ECCN) 6D003 is amended by adding quotes around the term “compensation systems” in the in paragraph f.1 in the Items paragraph of the List of Items Controlled section.

■ 45. In Supplement No. 1 to Part 774 (the Commerce Control List), Category 6 Sensors, Export Control Classification Number (ECCN) 6E201 is amended by revising the heading to read as follows:

6E201 “Technology”, not controlled by 6E001 or 6E002, according to the General Technology Note for the “use” of equipment controlled by 6A003.a.2, 6A003.a.3, 6A003.a.4; 6A005.a.2, 6A005.a.4, 6A005.b.2.b, 6A005.b.3.a, 6A005.b.4.b, 6A005.b.6.b, 6A005.c.1.b, 6A005.c.2.b, 6A005.d.3.c, or 6A005.d.4.c (as described in the license requirement note to 6A005); 6A202, 6A203, 6A205, 6A225 or 6A226.

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■ 46. In Supplement No. 1 to Part 774 (the Commerce Control List), Category 7 Navigation and Avionics, Export Control Classification Number (ECCN) 7A001 is amended by revising the heading, and the License Requirements and List of Items Controlled sections, to read as follows:

7A001 Accelerometers as follows (see List of Items Controlled), and specially designed components therefor.

License Requirements

Reason for Control: NS, MT, AT

Control(s)	Country chart
NS applies to entire entry	NS Column 1.
MT applies to commodities that meet or exceed the parameters of 7A101	MT Column 1.
AT applies to entire entry	AT Column 1.

* * * * *

List of Items Controlled

Unit: \$ value
Related Controls: See also 7A101 and 7A994. For angular or rotational accelerometers, see 7A001.b. MT controls do not apply to accelerometers that are specially designed and developed as Measurement While Drilling (MWD) sensors for use in downhole well service applications.

Related Definitions: N/A

Items:

a. Linear accelerometers having any of the following:

a.1. Specified to function at linear acceleration levels less than or equal to 15 g, and having any of the following:

a.1.a. A "bias" "stability" of less (better) than 130 micro g with respect to a fixed

calibration value over a period of one year; or

a.1.b. A "scale factor" "stability" of less (better) than 130 ppm with respect to a fixed calibration value over a period of one year;

a.2. Specified to function at linear acceleration levels exceeding 15 g, and having all of the following:

a.2.a. A "bias" "repeatability" of less (better) than 5,000 micro g over a period of one year; and

a.2.b. A "scale factor" "repeatability" of less (better) than 2,500 ppm over a period of one year; or

a.3. Designed for use in inertial navigation or guidance systems and specified to function at linear acceleration levels exceeding 100 g.

b. Angular or rotational accelerometers specified to function at linear acceleration levels exceeding 100 g.

■ 47. In Supplement No. 1 to Part 774 (the Commerce Control List), Category 7 Navigation and Avionics, Export Control Classification Number (ECCN) 7A002 is amended by revising the heading and the License Requirements and List of Items Controlled sections to read as follows:

7A002 Gyros or angular rate sensors, having any of the following characteristics (see List of Items Controlled), and specially designed components therefor.

License Requirements

Reason for Control: NS, MT, AT

Control(s)	Country chart
NS applies to entire entry	NS Column 1.
MT applies to commodities that meet or exceed the parameters of 7A102	MT Column 1.
AT applies to entire entry	AT Column 1.

License Requirement Note: For the purpose of MT controls only, the term 'stability' is defined as a measure of the ability of a specific mechanism or performance coefficient to remain invariant when continuously exposed to a fixed operating condition. (This definition does not refer to dynamic or servo stability.) (IEEE STD 528-2001 paragraph 2.247)

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List of Items Controlled

Unit: \$ value

Related Controls: See also 7A102 and 7A994. For angular or rotational accelerometers, see 7A001.b.

Related Definitions: N/A

Items:

a. A "drift rate" "stability", when measured in a 1 g environment over a period of one month, and with respect to a fixed calibration value, of less (better) than 0.5

degree per hour when specified to function at linear acceleration levels up to and including 100 g;

b. An "angle random walk" of less (better) than or equal to 0.0035 degree per square root hour; or

Note: 7A002.b does not control spinning mass gyros (spinning mass gyros are gyros which use a continually rotating mass to sense angular motion).

c. A rate range greater than or equal to 500 degrees per second and having any of the following:

c.1. A "drift rate" "stability", when measured in a 1 g environment over a period of three minutes, and with respect to a fixed calibration value of less (better) than 40 degrees per hour; or

c.2. An "angle random walk" of less (better) than or equal to 0.2 degree per square root hour; or

d. Specified to function at linear acceleration levels exceeding 100 g.

■ 48. In Supplement No. 1 to Part 774 (the Commerce Control List), Category 7 Navigation and Avionics, Export Control Classification Number (ECCN) 7A003 is amended by:

■ a. Revising the License Requirements section, as set forth below;

■ b. Adding paragraph (d) in the Items paragraph of the List of Items Controlled section, as set forth below; and

■ c. Revising Note 2 in the Items paragraph of the List of Items Controlled section, to read as follows:

7A003 Inertial Systems and specially designed components therefor.

License Requirements

Reason for Control: NS, MT, AT

Control(s)	Country chart
NS applies to entire entry	NS Column 1.
MT applies to commodities that meet or exceed the parameters of 7A103	MT Column 1.
AT applies to entire entry	AT Column 1.

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List of Items Controlled

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Items:

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d. Inertial measurement equipment including Inertial Measurement Units (IMU) and Inertial Reference Systems (IRS),

incorporating accelerometers or gyros controlled by 7A001 or 7A002, and specially designed components therefor.

Note 1: * * *

Note 2: 7A003 does not control inertial navigation systems that are certified for use on "civil aircraft" by civil authorities of a Wassenaar Arrangement Participating State, see Supplement No. 1 to Part 743 for a list of these countries.

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■ 49. In Supplement No. 1 to Part 774 (the Commerce Control List), Category 7 Navigation and Avionics is amended by adding Export Control Classification Number (ECCN) 7A008 to read as follows:

7A008 Underwater sonar navigation systems, using Doppler velocity or

correlation velocity logs integrated with a heading source, having a positioning accuracy of equal to or less (better) than 3% of distance traveled Circular Error Probable (CEP), and specially designed components therefore.

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

CIV: N/A
TSR: N/A

List of Items Controlled

Unit: \$ value

Related Controls: 7A008 does not control systems specially designed for installation on surface vessels or systems requiring acoustic beacons or buoys to provide positioning data. See 6A001.a for acoustic systems, and 6A001.b for correlation-velocity sonar log equipment. See 8A002 for other marine systems.

Related Definitions: N/A

Items:

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

■ 50. In Supplement No. 1 to Part 774 (the Commerce Control List), Category 7 Navigation and Avionics, Export Control Classification Number (ECCN) 7A101 is amended by revising the Heading and the Items paragraph of the List of Items Controlled section, to read as follows:

7A101 Accelerometers, other than those controlled by 7A001 (see List of Items Controlled), and specially designed components therefore.

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List of Items Controlled

Unit: * * *

Related Controls: * * *

Related Definitions: * * *

Items:

a. Linear accelerometers designed for use in inertial navigation systems or in guidance systems of all types, usable in "missiles" having all of the following characteristics, and specially designed components therefore:

1. 'Scale factor' "repeatability" less (better) than 1250 ppm; and
2. 'Bias' "repeatability" less (better) than 1250 micro g.

Note: The measurement of 'bias' and 'scale factor' refers to one sigma standard deviation with respect to a fixed calibration over a period of one year.

b. Continuous output accelerometers of any type, specified to function at acceleration levels greater than 100 g, and specially designed components therefor.

■ 51. In Supplement No. 1 to Part 774 (the Commerce Control List), Category 7 Navigation and Avionics, Export Control Classification Number (ECCN) 7B003 is amended by revising the Related Controls paragraph in the List of Items Controlled section, to read as follows:

7B003 Equipment specially designed for the "production" of equipment controlled by 7A (except 7A994).

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List of Items Controlled

Unit: * * *

Related Controls: (1) See also 7B103, (this entry is subject to the licensing authority of the U.S. Department of State, Directorate of Defense Trade Controls (see 22 CFR part 121)) and 7B994. (2) This entry includes: Inertial Measurement Unit (IMU module) tester; IMU platform tester; IMU stable element handling fixture; IMU platform balance fixture; gyro tuning test station; gyro dynamic balance station; gyro run-in/motor test station; gyro evacuation and fill station; centrifuge fixtures for gyro bearings; accelerometer axis align stations; accelerometer test station; and fiber optic gyro coil winding machines.

Related Definitions: * * *

Items: * * *

■ 52. In Supplement No. 1 to Part 774 (the Commerce Control List), Category 7 Navigation and Avionics, Export Control Classification Number (ECCN) 7D001 is amended by revising the License Requirements section, to read as follows:

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, 7A008, 7B001, 7B002 or 7B003	NS Column 1.
MT applies to entire entry except 7A008	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.

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■ 53. In Supplement No. 1 to Part 774 (the Commerce Control List), Category 7 Navigation and Avionics, Export Control Classification Number (ECCN)

7D003 is amended by revising the License Requirements section, and revising paragraphs a and b in the Items paragraph of the List of Items Controlled section, to read as follows:

7D003 Other "software", as follows (see List of Items Controlled).

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, except software for 7A008	MT Column 1.
AT applies to entire entry	AT Column 1.

* * * * *
List of Items Controlled
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Items:
 a. "Software" specially designed or modified to improve the operational performance or reduce the navigational error of systems to the levels controlled by 7A003, 7A004 or 7A008;
 b. "Source code" for hybrid integrated systems that improves the operational performance or reduces the navigational error

of systems to the level controlled by 7A003 or 7A008 by continuously combining heading data with any of the following:
 b.1. Doppler radar or sonar velocity data;
 b.2. Global navigation satellite systems (i.e., GPS or GLONASS) reference data; or
 b.3. Data from 'Data-Based Referenced Navigation' ('DBRN') systems;
 * * * * *
 ■ 54. In Supplement No. 1 to Part 774 (the Commerce Control List), Category 7 Navigation and Avionics, Export

Control Classification Number (ECCN) 7E001 is amended by revising the License Requirements section, to read as follows:
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: NS, MT, RS, AT

Control(s)	Country chart
NS applies to "technology" for items controlled by 7A001 to 7A004, 7A006, 7A008, 7B001 to 7B003, 7D001 to 7D003	NS Column 1.
MT applies to entire entry except 7A008	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.

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 ■ 55. In Supplement No. 1 to Part 774 (the Commerce Control List), Category 7 Navigation and Avionics, Export Control Classification Number (ECCN)

7E002 is amended by revising the License Requirements section, to read as follows:
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, 7A008 or 7B001 to 7B003	NS Column 1.
MT applies to entire entry, except 7A008	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.

■ 56. In Supplement No. 1 to Part 774 (the Commerce Control List), Category 7 Navigation and Avionics, Export Control Classification Number (ECCN) 7E004 is amended by revising the

License Requirements section, and adding a new paragraph adding a.7 in the Items paragraph of the List of Items Controlled sections, to read as follows:

7E004 Other "technology", as follows (see List of Items Controlled).
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, except 7E004.a.7	MT Column 1.
AT applies to entire entry	AT Column 1.

* * * * *
List of Items Controlled
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Items:
 a. * * *
 * * * * *
 a.7. "DBRN" systems designed to navigate underwater using sonar or gravity databases that provide a positioning accuracy equal to or less (better) than 0.4 nautical miles.
 * * * * *

■ b. Revising the "unit" paragraph of the List of Items Controlled section, as set forth below; and
 ■ c. Revising paragraph a in the Items paragraph of the List of Items Controlled section, to read as follows:
8A002 Systems, equipment and components, as follows (see List of Items Controlled).
 * * * * *

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;
 a.4. Components manufactured from material specified in ECCN 8C001.
Technical Note: The object of this control should not be defeated by the export of syntactic foam controlled by 8C001 when an intermediate stage of manufacture has been performed and it is not yet in its final component form.
 * * * * *

■ 57. In Supplement No. 1 to Part 774 (the Commerce Control List), Category 8 Marine, Export Control Classification Number (ECCN) 8A002 is amended by:
 ■ a. Revising the "heading", as set forth below;

List of Items Controlled
Unit: Systems and equipment in number, components in \$ value
Related Controls: * * *
Related Definitions: * * *
Items:
 a. Systems, equipment and components, specially designed or modified for

■ 58. In Supplement No. 1 to Part 774 (the Commerce Control List), Category 8 Marine, Export Control Classification Number (ECCN) 8C001 is amended by revising the ‘Related Controls’ paragraph in the List of Items Controlled section, to read as follows:

8C001 Syntactic foam designed for underwater use, having all of the following (see List of Items Controlled).

* * * * *

List of Items Controlled

Unit: * * *

Related Controls: See also 8A002.a.4.
Related Definition: * * *
Items: * * *

■ 59. In Supplement No. 1 to Part 774 (the Commerce Control List), Category 9 Propulsion Systems, Space Vehicles and Related Equipment is amended by revising the title of Category 9, to read as follows:

Category 9—Aerospace and Propulsion

* * * * *

■ 60. In Supplement No. 1 to Part 774 (the Commerce Control List), Category 9 Aerospace and Propulsion, Export Control Classification Number 9D004 is amended by revising the License Requirements section, and adding two new paragraphs f and g to the Items paragraph of the List of Items Controlled section, to read as follows:

9D004 Other “software”, as follows (see List of Items Controlled).

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, except 9D004.g and .f	MT Column 1.
AT applies to entire entry	AT Column 1.

* * * * *

List of Items Controlled

* * * * *

Items:

* * * * *

f. “Software” specially designed to design the internal cooling passages of aero gas turbine engine blades, vanes and tip shrouds;

g. “Software” having all of the following characteristics:

g.1. Being specially designed to predict aero thermal, aeromechanical and

combustion conditions in aero gas turbine engines; and

g.2. Having theoretical modeling predictions of the aero thermal, aeromechanical and combustion conditions which have been validated with actual turbine engine (experimental or production) performance data.

* * * * *

■ 61. In Supplement No. 1 to Part 774 (the Commerce Control List), Category 9 Aerospace and Propulsion, Export

Control Classification Number 9E001 is amended by revising the Heading and the License Requirements section, to read as follows:

9E001 “Technology” according to the General Technology Note for the “development” of equipment or “software” controlled by 9A001.b, 9A004 to 9A012, 9B (except 9B990 or 9B991), or 9D (except 9D990 or 9D991).

License Requirements

Reason for Control: NS, MT, AT

Control(s)	Country chart
NS applies to “technology” for items controlled by 9A001.b., 9A012, 9B001 to 9B010, 9D001 to 9D004 for NS reasons	NS Column 1.
MT applies to “technology” for items controlled by 9B001, 9B002, 9B003, 9B004, 9B005, 9B007, 9B105, 9B106, 9B116, 9B117, 9D001, 9D002, 9D003, and 9D004 for MT reasons.	MT Column 1.
AT applies to entire entry	AT Column 1.

License Requirement Notes: See § 743.1 of the EAR for reporting requirements for exports under License Exceptions.

* * * * *

■ 62. In Supplement No. 1 to Part 774 (the Commerce Control List), Category 9 Aerospace and Propulsion, Export Control Classification Number 9E002 is amended by revising the Heading, to read as follows:

9E002 “Technology” according to the General Technology Note for the “production” of equipment controlled by

9A001.b, 9A004 to 9A011 or 9B (except 9B990 or 9B991).

* * * * *

■ 63. Supplement No. 3 to Part 774 (the Commerce Control List) is amended to add a new Statement of Understanding after the existing Statement of Understanding—Medical equipment, to read as follows:

Supplement No. 3 to Part 774—Statements of Understanding

* * * * *

Statement of Understanding—Source Code

For the purpose of national security controlled items, “source code” items are controlled either by “software” or by “software” and “technology” controls, except when such “source code” items are explicitly decontrolled.

Dated: October 23, 2007.

Christopher A. Padilla,
Assistant Secretary for Export Administration.

[FR Doc. E7–21247 Filed 11–2–07; 8:45 am]

BILLING CODE 3510–33–P