DEPARTMENT OF COMMERCE

Bureau of Industry and Security

15 CFR Parts 740, 742, 743, 772 and 774

[Docket No. 050607153–5153–01]

RIN 0694–AD41

December 2004 Wassenaar Arrangement Plenary Agreement Implementation: Categories 1, 2, 3, 4, 5 Part I (Telecommunications), 6, 7, 8, and 9 of the Commerce Control List; Wassenaar Reporting Requirements; Definitions; and Certain New or Expanded Export Controls

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 certain entries controlled for national security reasons in Categories 1, 2, 3, 4, 5 Part I (telecommunications), 6, 7, 8, and 9, and Definitions to conform with changes in the Wassenaar Arrangement's List of Dual-Use Goods and Technologies 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). The Wassenaar Arrangement focuses on implementation of effective export controls on strategic items with the objective of improving regional and international security and stability.

The purpose of this final rule is to make the necessary changes to the CCL, definitions of terms used in the Export Administration Regulations (EAR), and Wassenaar reporting requirements to implement Wassenaar List revisions that were agreed upon in the December 2004 Wassenaar Arrangement Plenary Meeting. In addition, this rule adds Slovenia to the list of Wassenaar member countries in the EAR.

This rule also adds or expands unilateral U.S. controls on certain items consistent with the amendments made to implement the Wassenaar Arrangement's decisions.

DATES: *Effective Date:* This rule is effective July 15, 2005.

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: *scook@bis.doc.gov.*

For questions of a technical nature contact:

Category 1: Bob Teer 202–482–4749
Category 2: George Loh 202–482–3570
Category 3: Brian Baker 202–482–5534
Category 4 and 5 part 1: Joe Young 202–482–4197
Category 5 part 2: Norm La Croix 202–482–4439
Category 6: Chris Costanzo (night vision) 202–482–0718 or Wayne Hovis (lasers) 202–482–1837
Categories 7 and 8: Dan Squire 202–482–3710
Categories 8 and 9: Gene Christensen 202–482–2984

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). 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.

Addition of Slovenia

Slovenia was welcomed as a new Participating State to the Wassenaar Arrangement at the December 2004 Plenary Meeting. To reflect this change, this rule adds Slovenia to the list of Wassenaar Arrangement member Countries in Supplement No. 1 to part 743.

Expansion or New Export Controls

New or expanded antiterrorism (AT) controls imposed by this rule. This rule imposes a unilateral U.S. license requirement to export and reexport commodities (and related software and technology) controlled under ECCNs 6A001.a.2.a.3.b, 6A001.a.2.a.3.c, 6A001.a.2.a.6, 6A002.a.3.f, 6A003.b.4.b, 7A002.b for AT reasons to Cuba, Iran, Libya, North Korea, Sudan and Syria, in addition to the national security controls imposed to implement the Wassenaar Arrangement's decisions. There is a general policy of denial for applications to terrorism supporting countries, as set forth in part 742. In addition, certain of these countries are also subject to embargoes, as set forth in part 746. 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; license applications to these parties are reviewed under a general policy of denial.

New or expanded regional security (RS) controls imposed by this rule. This rule also imposes a unilateral U.S. license requirement to export and reexport commodities (and related technology) controlled under ECCNs 6A002.a.3.f and 6A003.b.4.b for RS reasons to all countries, except Canada, in addition to the national security controls imposed to implement the Wassenaar Arrangement's decisions. These destinations have an ''X'' indicated in RS column 1 on the Commerce Country Chart of Supplement No. 1 to part 738. Applications to export and reexport these commodities will be reviewed on a case-by-case basis to determine whether the export or reexport could contribute directly or indirectly to any country's military capabilities in a manner that would alter or destabilize a region's military balance contrary to the foreign policy interests of the United States. For designated terrorism-supporting countries, the applicable licensing policies are found in parts 742 and 746 of the EAR.

New or expanded United Nations (UN) controls imposed by this rule. This rule also imposes a license requirement to export and reexport commodities (and related technology) controlled under ECCN 6A002.a.3.f for UN reasons to Rwanda in addition to the national security controls imposed to implement the Wassenaar Arrangement's decisions. The U.S. Government has a general policy of denial for export or reexport of certain items, including 6A002.a.3, to Rwanda. However, proposed exports or reexports to the Government of Rwanda are reviewed on a case-by-case basis. The implementation of UN controls under 6A002.a.3.f, indirectly expands the UN controls under ECCNs 6A003.b.4, 6E001, and 6E002.

New or expanded NS Column 2 controls imposed by this rule. 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 ECCNs 6A001.a.2.a.3.b, 6A001.a.2.a.3.c, 6A001.a.2.a.6, 6A002.a.3.f, and 6A003.b.4.b to all

destinations that are not Country Group A:1 or cooperating countries (see Supplement No. 1 to part 740). These destinations have an ''X'' indicated in NS column 2 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 that would prove detrimental to the national security of the United States.

New or expanded NS Column 1 controls imposed by this rule. 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 ECCN 7A002.b to all destinations, except Canada. 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 that would prove detrimental to the national security of the United States.

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) is to approve 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 reexport of items to Country Group D:1 is to approve 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 revises a number of entries on the Commerce Control List (CCL) to conform with the December 2004 agreed revisions to the Wassenaar List of Dual-Use Goods and Technologies. This rule also revises language to provide a complete or more accurate description of controls. A description of the specific amendments to the CCL pursuant to the December 2004 Wassenaar Agreement is provided below. The ECCNs affected, as described below, are 1C008, 2B001, 2B005, 2B006, 2B201, 3A001, 3A001, 3A002, 3B001, 3B002, 3B991, 3B992, 4D001, 4E001, 5A001, 6A001, 6A002, 6A003, 6A006, 6A993, 6A996, 6E001, 6E002, 6E003, 6E991, 6E993, 7A002, 7A007, 8A002, and 9A001.

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

ECCN 1C008 is amended by:

(a) Deleting the phrase ''determined using the dry method described in ASTM D 3418'' from 1C008.a.4;

(b) Replacing the phrase ''ASTM D–648, method A'' with the phrase ''ISO 75–3 (2004)'' in 1C008.b;

(c) Adding the phrase ''having a glass transition temperature (T_g) exceeding 513 K (240 °C)'' to the end of 1C008.f; and

(d) Replacing the phrase ''ASTM D 3418 using the dry method'' with the phrase ''ISO 11357–2 (1999) or national equivalents'' in the technical note to 1C008.

The amendments in 1C008 were agreed to by the Wassenaar Arrangement for consistency and to avoid differing treatment of resins having the same applications and functional capabilities. The plastic resins that are controlled under 1C008.a.4 are extremely similar to those controlled under 1C008.f. The characteristics of these two types of resins allow them to be used interchangeably for the same end-uses. The resins under 1C008.a.4 are controlled differently than those under 1C008.f. This has created a marketing distortion which favors the resins controlled under 1C008.a.4. This rule clarifies the distinction in the control of these resins by including a glass transition temperature for items described in 1C008.f.

Category 2—Materials Processing

ECCN 2B001 is amended by:

(a) Removing the Note to 2B001.a regarding the contact lens turning machines exception and placing it under the NS Reason for Control; and

(b) Revising Note 2 to 2B001.c regarding what jig grinders are not controlled by ECCN 2B001.

Although the Wassenaar Arrangement agreed to not control under 2B001.c grinding machines that are ''designed specifically as jig grinders that do not have a z-axis or w-axis, with a positioning accuracy with 'all compensations available' less (better) than 3 μm according to ISO 230/2 (1997) or national equivalents,'' Technical Note 6 at the beginning of Category 2 Product Group B states that ''The positioning accuracy of 'numerically controlled' machine tools is to be determined and presented in accordance with ISO 230/2 (1988).'' Therefore, in Note 2 to 2B001.c BIS has replaced the ''3 μm'' with ''4 μm,'' which is the equivalent positioning accuracy under the 1988 standard.

The amendments to ECCN 2B001 were agreed to by the Wassenaar Arrangement because many of the latest generation jig grinders today utilize a Computer Numerical Controller (CNC) to control and coordinate 3 or more axes. The wording of the Note to 2B001.c could be interpreted to release 3- or more axes jig grinders with full CNC contouring control if a c- or an a-axis, as listed in 2B001.c Note 2, is added to their current capabilities. This was not the original intent of the Note. The revisions presented in this rule clarify that jig grinders with precise 3-dimensional contouring capability are controlled, because of their capacity to produce high-precision, complex military components. The revision limits the exclusion by placing accuracy parameters on the third linear axis (z or w).

ECCN 2B005 is amended by removing the term ''stored program controlled'' from paragraphs 2B005.a, .b, .c, .d, .e, .f, and .g. ECCN 2B006 is amended by removing the term ''stored program controlled'' from paragraph 2B006.a. This term is removed because most equipment is computer controlled now and the term no longer adds any value to the control.

ECCN 2B201 is amended by revising the list of items controlled by redesignating paragraphs (a) and (b) as paragraphs (b) and (c) and adding a new paragraph (a) that describes machine tools with ''positioning accuracies'' to mirror 1.B.2.a and the Note to 1.B.2.a from the Nuclear Suppliers Group INFCIRC/254/Rev. 5/Part 2 dated May 2003. This amendment is being added to conform with the Wassenaar Arrangement's exclusion note for turning machines specially designed for the production of contact lenses and capable of machining diameters greater than 35 mm in 2B001. Also, because of the structure of the numbering system for ECCNs in the CCL, an item (such as the item covered under ECCN 2B201) which is controlled for NP reasons but not NS reasons cannot remain in an NS-controlled ECCN where the second digit is a ''0'' (2B001), because ''0'' indicates that an item is controlled for NS reasons. The second digit differentiates individual CCL entries by identifying the type of controls associated with the items contained in the entry. (For example, zero indicates NS controls, one MT controls, two NP controls, etc.)

Category 3—Electronics

ECCN 3A001 is amended by:

(a) Revising paragraph 3A001.a.3.c for microprocessor microcircuits, microcomputer microcircuits, and microcontroller microcircuits by increasing the controlling number of data or instruction bus or serial communication ports from ''one'' to ''three,'' and increasing the direct

external interconnection between parallel microprocessor microcircuits from a transfer rate exceeding ''150 Mbyte/s'' to ''1000 Mbyte/s or greater.''

The Wassenaar Arrangement agreed to raise the threshold for the number of ports to three and the transfer rate to 1000 Mbyte/s in 3A001.a.3.c because these thresholds will not adversely affect national security, as the new thresholds fall just below what is currently being used in some military systems.

The revision to 3A001.a.3.c will expand the availability of License Exception CIV for deemed exports of technology for the development or production of 3A001.a.3.c commodities, as described in 3E001.

(b) Revising the control parameter of conversion time to output word rate to reduce control interpretation ambiguities across various analog-to-digital (A–D) architectures. The conversion time parameter did not take into account latency or techniques used to perform conversions. Therefore, this rule revises paragraph 3A001.a.5.a for A–D converter integrated circuits by:

(b.1) Splitting 3A001.a.5.a.1 into two separate ranges of resolution with different controlling output parameters: ''A resolution of 8 bit or more, but less than 10 bit, with an output rate greater than 500 million words per second;'' and ''A resolution of 10 bit or more, but less than 12 bit, with an output rate greater than 200 million words per second;''

(b.2) Revising the controlling parameter in 3A001.a.5.a.3 for A–D converter integrated circuits with a resolution of 12 bit from ''with a total conversion time of less than 20 ns'' to ''with an output rate greater than 50 million words per second;''

(b.3) Revising the controlling parameter in 3A001.a.5.a.4 for A–D converter integrated circuits with a resolution of more than 12 bit but equal to or less than 14 bit from a ''total conversion time of less than 200 ns;'' to an ''output rate greater than 5 million words per second;''

(b.4) Revising the controlling parameter in 3A001.a.5.a.5 for A–D converter integrated circuits with a resolution of more than 14 bit from ''a total conversion time of less than 1 μs'' to an ''output rate greater than 1 million words per second.''

(c) Replacing the explanation for ''total conversion time'' in Technical Note 2 with explanations ''for number of bits in the output word'' and ''output rate'' in the new Technical Notes 2 through 4. This change was made pursuant to agreed definition clarifications made at the Plenary Meeting to be consistent with changes to the control parameters for Analog-Digital Converters.

The amendments to 3A001.a.5.a were agreed to by the Wassenaar Arrangement because the use of conversion time and sample rate metrics are not consistent across different Analog-Digital Converter (ADC) architectures. The revisions in this rule update the control parameter to account for changes on the architectures of ADCs—specifically pipelined converters and sigma delta converters—where conversion time and sampling rate are not appropriate indicators of a converter's capabilities.

ECCN 3A002 is amended by:

(a) Removing a comma in 3A002.b to conform to the Wassenaar Dual-use List; and

(b) Redesignating 3A002.c.2 as new paragraph 3A002.c.3 and revising 3A002.c.1 by splitting it into two paragraphs 3A002.c.1 and new 3A002.c.2:

(a.1) Paragraph 3A002.c.1 is revised by adding a new parameter ''having a 3 dB resolution bandwidth (RBW) exceeding 10 MHz'' for signal analyzers capable of analyzing any frequencies exceeding 31.8 GHz but not exceeding 37.5 GHz.

(a.2) New paragraph 3A002.c.2 controls signal analyzers capable of analyzing frequencies exceeding 43.5 GHz, which used to be controlled in 3A002.c.1.

The amendments to 3A002.c were agreed to by the Wassenaar Arrangement to revise the decontrol to certain signal analyzers by replacing the 31.8–37.5 GHz range frequency blackout that was agreed to in December 2002 with controls based on resolution bandwidth. This action is complementary to and consistent with the controls on signal generators agreed to by the Wassenaar Arrangement in December 2003.

ECCN 3B001 is amended by:

(a) Revising the dimensions parameter for anisotropic plasma dry etching equipment with cassette-to-cassette operation and load-locks from ''0.3 μm or less'' to 180 nm or less'' in 3B001.c.1.a;

(b) Revising the dimensions parameter for anisotropic plasma dry etching equipment specially designed for equipment controlled by 3B001.e from ''0.3 μm or less'' to ''180 nm or less'' in 3B001.c.2.a;

(c) Revising the wavelength parameter for lithography equipment from ''350 nm'' to ''245 nm'' in 3B001.f.1.a;

(d) Revising the minimum resolvable feature size for lithograph equipment from ''0.35 μm'' to ''180 nm'' in 3B001.f.1.b; and

(e) Revising the K factor of the MRF formula in the Technical Note from ''0.7'' to ''0.45.''

The Wassenaar Arrangement agreed to the revisions in 3B001 because consensus was reached regarding PE–CVD equipment controlled by 3B001.d.1, one of the thresholds, ''critical dimensions,'' was relaxed to 180 nm. ''Critical dimensions'' or ''feature size'' do not directly indicate the performance of PE–CVD equipment; however, they are related to the ''design rule'' of the semiconductor devices. In order to unify as much as possible in other provisions of 3B001, 180 nm was adopted in other relevant corresponding entries of the list for consistency. In order for the relaxation under 3B001.d.1 to be effective, revisions had to be made accordingly to 3B001.f.1.a (because the light source of KrF steppers are 248nm). In addition, the Technical Note to 3B001.f.1.b is revised because the level of K-factor has become lower based on the recent technological developments, *e.g.*, the K-factor of most current lithography equipment is less than 0.45.

Commodities no longer controlled under ECCN 3B001 continue to be controlled for antiterrorism reasons under ECCN 3B991.b.2.f 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 3B002 is amended by removing the term ''stored program controlled'' from the heading. This term is removed because most equipment is computer controlled now and the term no longer adds any value to the control. ECCN 3B002 is further amended by removing and reserving 3B002.b, including the Note and Technical Note. The Wassenaar Arrangement agreed to the removal of 3B002.b because although enhancing production efficiencies, semiconductor test equipment in 3B002 is not considered to be a choke point technology or a key enabler for semiconductor production. This type of testing equipment lowers manufacturing costs and increases output but does not otherwise provide semiconductor producers with the ability to create particular chips or technically advanced devices. Restricting test equipment also does not prevent the production of semiconductors targeted for military use. In addition, the most advanced semiconductor devices can be produced without requiring full speed testing on automatic test equipment. Moreover, test services have become readily available through international test

outsourcing companies. Semiconductors can be developed and manufactured in one country and then tested in other countries with no restrictions.

ECCN 3B991 is amended by adding the words ''*e.g.*, lithography'' to 3B991.b.2.f, to clarify that lithography equipment is controlled under that paragraph.

ECCN 3B992 is amended by:

(a) Organizing the notes after 3B992.b.4.b, and adding a note that 3B992.b.4.b does not control test equipment specially designed for testing memories; and

(b) Adding a technical note to define ''pattern rate.''

Commodities no longer controlled under ECCN 3B002 continue to be controlled for antiterrorism reasons under ECCN 3B992 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.

Category 4—Computers

ECCN 4A003 is amended by making an editorial correction, removing a reference to ''4A003.d'' in Note 1 to 4A003.c.

ECCN 4A994 is amended by making an editorial correction, clarifying the reference to ''4A994'' to read ''4A994.g and 4A994.k'' in Note 1 to 4A994.c.

ECCN 4D001 is amended by:

(a) Removing the License Requirement Note that provided a reference to Wassenaar reporting requirements for computer software under ECCN 4D001, because this rule removed this Wassenaar reporting requirement.

(b) Raising the CTP limit from ''33,000 MTOPS'' to ''190,000 MTOPS'' in the License Exception TSR eligibility paragraph under the License Exception section of ECCN 4D001.

(c) Raising the composite theoretical performance (CTP) control threshold for software for the production, development, or use of computers from ''28,000 MTOPS'' to ''75,000 MTOPS'' in 4D001.b.1.

ECCN 4E001 is amended by:

(a) Removing the License Requirement Note that provided a reference to Wassenaar reporting requirements for computer technology under ECCN 4E001, because this rule removed this Wassenaar reporting requirement.

(b) Raising the CTP limit from ''33,000 MTOPS'' to ''190,000 MTOPS'' in the License Exception TSR eligibility paragraph under the License Exception section of 4E001.

(c) Raising the composite theoretical performance (CTP) control threshold for technology for the production, development, or use of computers from ''28,000 MTOPS'' to ''75,000 MTOPS'' in 4E001.b.1.

The amendments to 4D001 and 4E001 were agreed to in the Wassenaar Arrangement because digital computers capable of either 75,000 or 190,000 MTOPS are becoming more common. The Wassenaar Arrangement recognized this with its decontrol of hardware to 190,000 MTOPS. Most of the multi-processor computer servers sold in this range are for commercial applications. It is for these reasons that the Wassenaar Arrangement removed computer technology and software from the Annex 2 (Very Sensitive List), raised the Annex 1 (Sensitive List) threshold from ''150,000 MTOPS'' to ''190,000 MTOPS,'' and raised the control threshold from ''33,000 MTOPS'' to ''75,000 MTOPS.'' Therefore, this rule revises to the CTP limit for License Exception TSR eligibility in ECCNs 4D001 and 4E001 accordingly.

BIS expects that the raising of the threshold for computer software and technology in 4D001 and 4E001, along with raising the eligibility limit for License Exceptions TSR and CTP will decrease the number of Category 4 license applications received by BIS by about 15 percent (*i.e.*, 150 applications) over the next 6 months.

Software and technology no longer controlled under ECCNs 4D001 and 4E001 continue to be controlled for antiterrorism reasons under ECCN 4D994 and 4E992, 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.

Category 5—Part I—Telecommunications

ECCN 5A001 is amended by:

(a) Raising the operating frequency for electronically steerable phased array antennae from ''31 GHz'' to ''31.8 GHz'' in paragraph 5A001.d.

In 2003, all frequency control units in Categories 3 and 5 were changed from 31 GHz to 31.8 GHz, except 5.A.1.d. This revision is a technical correction to implement a change that was inadvertently overlooked in 2003.

(b) Moving ECCN 7A007 to 5A001.e—direction finding equipment operating at frequencies above 30 MHz, and having other characteristics set forth in 5A001.e.1 through e.3, and specially designed components therefor.

This rule adds a note to the Related Controls paragraph in the List of Items Controlled section that states, ''Direction finding equipment defined in 5A001.e is subject to the export licensing authority of the Department of State, Directorate of Defense Trade Controls (22 CFR part 121).'' Direction finding equipment defined in 5A001.e is specifically excluded from eligibility for License Exceptions LVS, GBS, and CIV, because this equipment will remain under the jurisdiction of the Department of State, Directorate of Defense Trade Controls.

ECCN 7A007 is moved to 5A001.e to ensure that direction-finding equipment for navigation is not confused with direction-finding equipment for surveillance. Direction finding equipment defined in 5A001.e is subject to the export licensing authority of the Department of State, Directorate of Defense Trade Controls (22 CFR part 121), because radio surveillance equipment and systems capable of finding the line-of-bearing (LOB) to a radio transmitter are used in tactical applications for locating and targeting hostile emitters. Historically, direction finding equipment for surveillance equipment has been controlled under International Munitions List (IML) Category 11. However, the International Telecommunications Union Spectrum Monitoring Handbook recommends that civil spectrum authorities employ radio-surveillance direction finding systems (DF) capable of finding the LOB to emitters with signals with a duration of less than 10 milliseconds. Systems which meet and exceed this threshold are marketed for this purpose, indicating that surveillance equipment and systems for locating non-cooperating emitters may be becoming more dual-use in nature, even though it is still of tactical interest.

Category 6—Sensors

ECCN 6A001 is amended by:

(a) Redesignating paragraphs 6A001.a.2.a.2 through 6A001.a.2.a.5, to 6A001.a.2.a.3 through 6A001.a.2.a.6;

This rule revises License Exception LVS eligibility to harmonize with the redesignation of these paragraphs.

(b) Revising 6A001.a.2.a.1 to separate the characteristics for hydrophones into two paragraphs 6A001.a.2.a.1 and a new paragraph 6A001.a.2.a.2;

(c) Redesignating paragraph 6A001.a.2.a.3.b as 6A001.a.2.a.3.c and revising the control language from ''Flexible piezoelectric *ceramic materials*'' to ''Flexible piezoelectric *composites*'' in the newly designated 6A001.a.2.a.3 (used to be 6A001.a.2.a.2);

(d) Adding a new paragraph 6A001.a.2.a.3.b to control ''Piezoelectric polymer films other than polyvinylidene-fluoride (PVDF) and its

co-polymers {P(VDF–TrFE) and P(VDF–TFE)};'' and

(e) Adding two new Technical Notes to 6A001.a.2.a to define ''Piezoelectric polymer film'' and ''Flexible piezoelectric composite.''

The Wassenaar Arrangement agreed to the revisions in ECCN 6A001 because the original intention was not to include all kinds of semi-rigid assemblies of discrete sensor elements, but only sensitive sensor elements constituting a flexible assembly and thereby making an array easy to handle.

ECCN 6A002 is amended by:

(a) Adding an N.B. to 6A002.a to state that 6A002.a includes ''focal plane arrays'' based on microbolometer material (see 6A002.a.3.f), and that silicon-based ''focal plane arrays'' are only specified under 6A002.a.3.f;

(b) Adding a Note Bene to 6A002.a.3 to read as follows: ''**N.B.** Silicon and other material based 'microbolometer' non ''space-qualified'' ''focal plane arrays'' are only specified in 6A002.a.3.f.''

(c) Removing paragraph (a) from Note 2 to 6A002.a.3 and redesignating the other paragraphs accordingly. Paragraph (a) of Note 2 to 6A002.a.3 stated that 6A002.a.3 does not control silicon ''focal plane arrays'';

(d) Adding a Note Bene to 6A002.a.3.c to read ''**N.B.** Silicon and other material based 'microbolometer' non-''space-qualified'' ''focal plane arrays'' are only specified in 6A002.a.3.f.''

(e) Adding paragraph 6A002.a.3.f to control non-''space-qualified'' non-linear (2-dimensional) infrared ''focal plane arrays'' based on microbolometer material having individual elements with an unfiltered response in the wavelength range equal to or exceeding 8,000 nm but not exceeding 14,000 nm; and

(f) Adding a technical note for 6A002.a.3.f to define ''microbolometer'' as a thermal imaging detector that, as a result of a temperature change in the detector caused by the absorption of infrared radiation, is used to generate any usable signal.

(g) Adding a technical note for 6A002.a.3.f that specifies that microbolometers having any response between 8,000 nm and 14,000 nm are controlled.

The amendments to ECCNs 6A002 and 6A003 (and indirectly 6E001 and 6E002) were agreed to by the Wassenaar Arrangement because, while silicon infrared focal plane arrays (SIIRFPAs) are used in cameras and other systems for civilian fire fighting, commercial collision avoidance (*e.g.* automotive, aircraft, maritime), predictive/preventative maintenance, and medical imaging applications, they also have the potential to be used in strategic military applications including surveillance systems, vehicle systems, soldier systems, rifle sights, and unmanned vehicle systems.

The focal plane array industry is changing rapidly and needs to be monitored. The amendments to ECCNs 6A002 and 6A003 are subject to a Validity Note. Control of these items is valid until December 5, 2007. Renewal of controls will require unanimous consent by all Wassenaar Arrangement Participating States. Applying a validity note on these items requires Participating States to reassess the need for controlling these items based on technological developments and strategic applications.

By interagency agreement, there are no devices that are no longer controlled under ECCN 6A002 as a result of these amendments that merit application of antiterrorism controls. Therefore, this rule does not amend ECCN 6A992.

ECCN 6A003 is amended by:

(a) Adding paragraph 6A003.b.4.a to clarify that imaging cameras incorporating ''focal plane arrays'' controlled by 6A002.a.3.a to 6A002.a.3.e are controlled by 6A003.b.4.a;

(b) Adding paragraph 6A003.b.4.b to add a control for imaging cameras incorporating 6A002.a.3.f—non-''space-qualified'' non-linear (2-dimensional) infrared ''focal plane arrays'' based on microbolometer material having individual elements with an unfiltered response in the wavelength range equal to or exceeding 8,000 nm but not exceeding 14,000 nm;

(c) Renumbering the existing note as Note 2 and adding Note 1 to 6A003.b.4 to read '''Imaging cameras' described in 6A003.b.4 include ''focal plane arrays'' combined with sufficient signal processing electronics, beyond the read out integrated circuit, to enable as a minimum the output of an analogue or digital signal once power is supplied.'';

(d) Adding Note 3 to 6A003.b.4.b to explain what is not controlled under 6A003.b.4.b. The new note explains that ECCN 6A003.b.4.b does not control the following items:

(a) Imaging cameras having a maximum frame rate equal to or less than 9 Hz; or

(b) Imaging cameras having a minimum horizontal or vertical Instantaneous-Field-of-View (IFOV) of at least 10 mrad/pixel (milliradians/pixel), incorporating a fixed focal-length lens that is not designed to be removed, not incorporating a direct view display, having no facility to obtain a viewable image or designed for a single kind of application and designed not to be user modified; or

(c) Imaging cameras that are specially designed for installation into certain civilian passenger land vehicles, and that incorporate a tamper-proof mechanism.

A note to this entry states that detailed information about items must be provided, upon request, to the Bureau of Industry and Security in order to ascertain compliance with the conditions described in Note 3.b.4. and Note 3.c. in this Note to 6A003.b.4.b. The intent of this note is to require exporters in Wassenaar Arrangement countries to provide detailed technical data, if requested by their governments, to assist in making licensing decisions. Such a procedure is common practice in the United States, and this note imposes no additional burden on U.S. exporters.

Certain commodities no longer controlled under ECCN 6A003, as well as certain items not previously listed on the Commerce Control List, are controlled for antiterrorism reasons under new ECCN 6A993 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 (see discussion of 6A993 below).

The revisions to ECCNs 6A002 and 6A003 affect U.S. exporters of imaging cameras and non-space qualified silicon infrared focal plane arrays (SIIRFPAs), original equipment manufacturers who use non-space qualified SIIRFPAs in their products, and distributors of these products and technologies. Based on discussions with industry, BIS expects that the imposition of license requirements on systems that contain these non-space qualified SIIRFPAs and related software and technology will increase the number of Category 6 license applications received by BIS by more than 40 percent (*i.e.*, 800 to 1000 applications) over the next 6 months.

ECCN 6A006 is amended by:

(a) Splitting 6A006.a (Magnetometers) into three separate paragraphs: 6A006.a.1 to control those using superconductive (SQUID) technology, 6A006.a.2 those using optically pumped or nuclear precession (proton/Overhauser) technology, and 6A006.a.3 to control those using fluxgate technology;

(b) Adding the following two characteristics for 6A006.a.1 (magnetometers using superconductive (SQUID) technology):

(1) 6A006.a.1.a, which are those that have SQUID systems designed for stationary operation with certain characteristics; and

(2) 6A006.a.1.b, which are those that have SQUID systems designed for in-motion operation with certain characteristics;

Note that this rule removes License Exception LVS eligibility for ''magnetometers'' and subsystems defined in 6A006.a.1, because magnetometers and subsystems with these characteristics are utilized in military applications and 6A006.a.1 is the old 6A006.h, which is listed on the Wassenaar Arrangement's Sensitive List (Annex 1).

(c) Revising the noise level (sensitivity) for magnetometers and subsystems defined using optically pumped or nuclear precession (proton/Overhauser) technology, in 6A002.a.2, from ''lower (better) than 0.05 nT rms per square root Hz'' to ''lower (better) than 20 pT(rms) per square root Hz;

Note also that this rule removes License Exception LVS eligibility for ''magnetometers'' and subsystems defined in 6A006.a.2 using optically pumped or nuclear precession (proton/Overhauser) having a ''noise level'' (sensitivity) lower (better) than 2 pT rms per square root Hz, because magnetometers and subsystems with these characteristics are utilized in military applications and are therefore listed on the Wassenaar Arrangement's Sensitive List (Annex 1).

(d) Revising the noise level (sensitivity) for magnetometers and subsystems using fluxgate technology, in 6A006.a.3, from ''lower (better) than 0.05 nT rms per square root Hz'' to ''lower (better) than 10 pT (rms) per square root Hz at a frequency of 1 Hz;''

(e) Redesignating 6A006.b (induction coil magnetometers) and 6A006.c (fiber optic magnetometers) as 6A006.a.4 and 6A006.a.5;

(f) Redesignating 6A006.d (Magnetic gradiometers), 6A006.e (Fiber optic intrinsic magnetic gradiometers), 6A006.f (Intrinsic magnetic gradiometers other than fiber optic), and 6A006.g (magnetic compensation systems) as 6A006.b.1, 6A006.b.2, 6A006.b.3, and 6A006.c respectively; and

(g) Removing 6A006.h (Superconductive electromagnetic sensors).

The Wassenaar Arrangement agreed to the revisions in 6A006 because it makes no difference what technology is used to perform a measurement, only the sensitivity, therefore the specific technologies were dropped from the control.

Commodities no longer controlled under ECCN 6A006, and related technology no longer controlled under 6E001, continue to be controlled for antiterrorism reasons under ECCNs 6A996 and 6E991, 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 6A993 is added to EAR to control for antiterrorism (AT) reasons imaging cameras no longer controlled under 6A003.b.4.b (*see* Note 3 to 6A003.b.4.b). ECCN 6A993 also captures certain cameras that previously were not controlled on the CCL such as cameras incorporating microbolometers made from amorphous silicon or thermopiles that fall below the control thresholds for 6A003. The effect of adding this entry is to require a license to export or reexport certain low performance thermal imaging cameras to those countries determined by the Department of State to have provided support for international terrorism.

ECCN 6A996 is amended by revising the entry to include not only magnetometers, but also superconductive electromagnetic sensors formerly controlled for NS reasons in 6A006.h.

ECCNs 6E001 and 6E002 are amended by:

(a) Removing License Exception TSR eligibility for exports or reexports of 6A001.a.1.b.1 (Object detection or location systems) to destinations outside of Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Luxembourg, the Netherlands, Portugal, Spain, Sweden, or the United Kingdom, because 6A001.a.1.b.1 is listed on the Wassenaar Arrangement's Annex 2 (Very Sensitive List).

(b) Replacing 6A001.a.2.a.3 with 6A001.a.2.a.4, and adding 6A001.a.2.a.6 to the list of ineligible commodities under License Exception TSR, because of the redesignation of paragraphs in 6A001.a.2.a and because these paragraphs are listed on the Wassenaar Arrangement's Annex 2 (Very Sensitive List).

ECCN 6E003 is amended by removing ECCN 6E003.f (Technology required for the development or production of non-triaxial fluxgate magnetometers or non-triaxial fluxgate magnetometer systems), to conform with a similar change on the Wassenaar Arrangement list. Technology no longer controlled under ECCN 6E003 continues to be controlled for antiterrorism reasons under ECCN 6E993 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 6E991 is amended by making an editorial correction to the heading, *i.e.*, revising the phrase ''or use equipment'' to read ''or use *of* equipment.''

ECCN 6E993 is amended by:

(a) Revising the ''heading'' to include the phrase ''as follows (*see* List of Items Controlled)'' to clarify that 6E993 only controls the technology in the List of Items Controlled;

(b) Adding a new paragraph 6E993.c to control technology for the development or production of cameras controlled by 6A993, *i.e.*, those cameras decontrolled by Note 3 to 6A003.b.4.b; and

(c) Adding a new paragraph 6E993.d (formally 6E003.f) to control technology required for the development or production of non-triaxial fluxgate magnetometers or non-triaxial fluxgate magnetometer systems.

Because technology entries generally directly correspond to commodity entries, the shift of commodities from NS-controlled entries to AT-controlled entries (*e.g.*, 6A003 to 6A993) necessitates a corresponding shift in technology controls (*e.g.*, 6E003 to 6E993).

Category 7—Navigation and Avionics

ECCN 7A002 (Gyros, and angular or rotational accelerometers) is amended by:

(a) Revising the time frame in which drift rate stability is measured from ''over a period of three months'' to ''over a period of one month'' in 7A002.a;

(b) Revising the linear acceleration level from ''below 10 g'' to ''below 12 g'' in 7A002.a.1;

(c) Revising the linear acceleration level from ''from 10 g to 100 g'' to ''from 12 g to 100 g'' in 7A002.a.2;

(d) Redesignating 7A002.b as 7A002.c; and

(e) Adding a new control parameter in new paragraph 7A002.b (angle random walk in degree per square root hour), including a Note describing that 7A002.b does not control spinning mass gyros, and a Technical Note defining ''angle random walk''. This rule also revises the MT control in the License Requirements section to exempt the newly added 7A002.b from MT controls, as this is not a control parameter for gyros on the Missile Technology Control Regime Annex.

The amendments to 7A002.a and the addition of 7A002.b were agreed to by the Wassenaar Arrangement, because 7A002.a only addressed gyroscopes with long-term stability, mainly used for spacecraft, vessels and submersibles. The current control did not adequately address gyroscopes with short-term

stability that are used for aircraft, land vehicles, rockets and tactical missiles. This rule revises 7A002.a and adds new parameters in 7A002.b to address highly accurate gyroscopes necessary to meet the existing inertial system's parameters in 7A003.a. and 7A003.c.1.

ECCN 7A007 is removed and the direction finding equipment is now controlled under ECCN 5A001.e. This amendment is explained in the description of amendments to Category 5 in paragraph (b) above.

Category 8—Marine

ECCN 8A002 is amended by removing the term ''stored program controlled'' from 8A002.h, 8A002.i.2, and the Note following 8A002.i.2. This term is removed because most equipment is computer controlled now and the term no longer adds any value to the control.

Category 9—Propulsion Systems, Space Vehicles and Related Equipment

ECCN 9A001 is amended by:

(a) Revising the heading to make it more general, so that the parameter in the heading could be placed in a new paragraph 9A001.a;

(b) Moving old 9A001.a. and 9A001.b to the new Note to 9A001.a; and

(c) Redesignating 9A001.c (aero gas turbine engines that are designed to power an aircraft designed to cruise at Mach 1 or higher for more than 30 minutes) as 9A001.b.

The Wassenaar Arrangement agreed to the revisions in ECCN 9A001 because it was unclear whether the certification referred to in 9A001 had to be done by aviation authorities in a Wassenaar Participating State or whether the certification could be done by aviation authorities in any country, including rogue countries who could evade the Wassenaar controls by issuing civil certification for aircraft that would never be considered acceptable by a Wassenaar Participating State.

Section 740.7—License Exception Computers (CTP)

This rule raises the Composite Theoretical Performance (CTP) eligibility limit from 75,000 MTOPS to 190,000 MTOPS for deemed exports of computer technology and source code to foreign nationals of Computer Tier 3 destinations, because doing so will assist the computer industry in the area of research and development to advance computer technology, and because it will not adversely affect the national security of the United States. Certain deemed exports to Computer Tier 3 foreign nationals are subject to a Foreign National Review requirement.

Digital computers capable of either 75,000 or 190,000 MTOPS are becoming more common. The Wassenaar Arrangement (WA) recognized this with its decontrol of hardware to 190,000 MTOPS. Most of the multi-processor computer servers sold in this range are for commercial applications. It is for these reasons that WA removed computer technology and software from the Annex 2 (Very Sensitive List), raised the Annex 1 (Sensitive List) threshold from ''150,000 MTOPS'' to ''190,000 MTOPS,'' and raised the control threshold under ECCNs 4D001 and 4E001 from ''33,000 MTOPS'' to ''75,000 MTOPS.''

Generally, Wassenaar Arrangement countries do not have in-country transfer controls (deemed export controls), with the exception of classified material. A deemed export is any release of technology or source code subject to the EAR to a foreign national within the United States. Such release is deemed to be an export to the home country or countries of the foreign national. The deemed export rule does not apply to persons lawfully admitted for permanent residence in the United States and does not apply to persons who are protected individuals under the Immigration and Naturalization Act (8 U.S.C. 1324b(a)(3)). Deemed export license applications for foreign nationals with dual citizenship should be based on the most recently obtained country citizenship. Applications for foreign nationals with temporary or permanent residence status of a third country (*i.e.,* non-U.S. and a temporary or permanent residence status other than a foreign national's country of origin) should be based on the foreign national's country of citizenship.

Because the United States is one of the only Wassenaar Arrangement member countries to implement deemed export controls, U.S. industry has been required to obtain license authorization for these deemed exports when other Wassenaar Arrangement member countries have not imposed such controls on their industries. Expanding the availability of a License Exception for deemed exports of computer technology and source code provides relief from licensing burdens for U.S. industry and levels the playing field in global competition. BIS agrees with the analysis of WA and has decided that the expansion of license exception availability under the technology parameters set forth above will not have an adverse impact on the U.S. national security, and will assist in strengthening the U.S. national security through advancements in computer technology.

Section 740.11 and Supplement No. 1 to Part 740.11—License Exception GOV

The Wassenaar Arrangement agreed to remove computer technology and software from the Annex 2 (Very Sensitive List) for reasons stated in a note under Category 4 above. Therefore, this rule removes the restrictions for computer software classified under ECCN 4D001 and computer technology under ECCN 4E001 under License Exception GOV for: (1) The official use of any agency of a cooperating government within the territory of any cooperating government; (2) the official use of a diplomatic or consular mission of a cooperating government located in any country in Country Group B (*see* Supplement No. 1 to part 740); and (3) the official international safeguard use of the International Atomic Energy Agency (IAEA) and the European Atomic Energy Community (Euratom). However, the access of computer restriction by nationals of countries in Country Group E:1 will be retained in a new paragraph 740.11(a)(4).

In addition, this rule removes computers from the list of items excluded from eligibility under License Exception GOV to the Organization for Prohibition of Chemical Weapons (OPCW). However, the access of computer restriction by nationals of countries in Country Group E:1 will be retained in a new paragraph 740.11(c)(4).

1. Section 740.11 is amended by removing and reserving paragraphs (a)(2)(ii), (a)(2)(iii), and (a)(2)(vi)(A). In addition, the Note to 740.11(a)(2)(iii) is removed.

2. Supplement No. 1 to 740.11 is amended by removing and reserving paragraphs (a)(1)(vi)(A), (a)(1)(vii)(B), (b)(1)(vi)(A), and (b)(1)(vii)(B).

Because of the redesignation of the paragraphs in 6A001.a.2, concerning hydrophones, the following corresponding revisions were made to section 740.11 and Supplement No. 1 to section 740.11 to ensure that all cross-references are accurate:

1. Section 740.11 is amended by revising paragraph (a)(2), and

2. Supplement No. 1 to 740.11 is amended by revising paragraphs (a)(1), (a)(1)(vii)(D), (a)(1)(vii)(E), (b)(1), (b)(1)(vii)(D), and (b)(1)(vii)(E).

Section 742.12 ''High Performance Computers''

Section 742.12 is amended by revising the phrase ''greater than 75,000 MTOPS.'' to read ''greater than 190,000 MTOPS.'' in paragraph (a)(3), to harmonize the CTP value in this paragraph with the Wassenaar reporting requirement in 743.1(c)(2).

Section 743.1 ''Wassenaar Arrangement''

Section 743.1 is amended by revising the phrase ''having a CTP exceeding 75,000 MTOPS.'' to read ''having a CTP exceeding 190,000 MTOPS.'' in paragraph (c)(2), because the Wassenaar Arrangement agreed to raise the threshold to 190,000 MTOPS in the Sensitive List (Annex 1).

Definitions in Part 772

''Allocated by the ITU'' has been amended by revising which ITU Radio Regulations should be consulted for the allocation of frequency bands, from ''edition 1998'' to ''current edition of the'' ITU Radio Regulations.

''Stored program controlled'' was removed from the Wassenaar Arrangement's definitions because most equipment is computer controlled now and the term no longer adds any value to the control, therefore the term has been removed from many paragraphs in the CCL. However, BIS will retain this definition in part 772, because the term is still used in some ECCNs controlled for anti-terrorism reasons, *e.g.*, ECCNs 3B991, 4B994, and 5A991, and to remove the term from these entries would allow the rare instance of manually controlled equipment to be used in nefarious ways.

Although the Export Administration Act expired on August 20, 2001, Executive Order 13222 of August 17, 2001 (3 CFR, 2001 Comp., p. 783 (2002)), as extended by the Notice of August 6, 2004, 69 FR 48763 (August 10, 2004) continues the 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 August 15, 2005, 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 September 13, 2005. Any such items not actually exported before midnight, on September 13, 2005, require a license in accordance with this regulation.

Rulemaking Requirements

1. This final rule has been determined to be not significant for purposes of E.O. 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 6883, Washington, DC 20230.

3. This rule does not contain policies with Federalism implications as that term is defined under E.O. 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 740

Administrative practice and procedure, Exports, Reporting and recordkeeping requirements.

15 CFR Part 742

Exports, Terrorism.

15 CFR Part 743

Administrative practice and procedure, Reporting and recordkeeping requirements.

15 CFR Part 772

Exports.

15 CFR Part 774

Exports, Reporting and recordkeeping requirements.

■ Accordingly, parts 740, 742, 743, 772 and 774 of the Export Administration Regulations (15 CFR parts 730–799) are amended as follows:

PART 740—[AMENDED]

■ 1. The authority citation for part 740 continues to read as follows:

Authority: 50 U.S.C. app. 2401 *et seq.*; 50 U.S.C. 1701 *et seq.*; Sec. 901–911, Pub. L. 106–387; 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 6, 2004, 69 FR 48763 (August 10, 2004).

§ 740.7 [Amended]

■ 2. Section 740.7 is amended by revising the phrase ''with a CTP less than or equal to 75,000 MTOPS are eligible for deemed exports under License Exception CTP to foreign nationals of Tier 3 destinations'' to read ''with a CTP less than or equal to 190,000 MTOPS are eligible for deemed exports under License Exception CTP to foreign nationals of Tier 3 destinations'' in paragraph (d)(3).

■ 3. Section 740.11 is amended by:

■ (a) Revising paragraph (a)(2) introductory text as set forth below;

■ (b) Removing and reserving paragraphs (a)(2)(ii), (a)(2)(iii), (a)(2)(vi)(A), and (c)(2)(i);

■ (c) Removing the Note to 740.11(a)(2)(iii); and

■ (d) Adding two new paragraphs (a)(4) and (c)(4) to read as follows:

§ 740.11 Governments, international organizations, and international inspections under the Chemical Weapons Convention (GOV).

* * * * *

(a) * * *

(2) The following items controlled for national security (NS) reasons under

Export Control Classification Numbers (ECCNs) identified on the Commerce Control List may not be exported or reexported under this License Exception to destinations other than Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden, and the United Kingdom: 1C001, 5A001.b.5, 6A001.a.1.b.1 object detection and location systems having a sound pressure level exceeding 210 dB (reference 1 μPa at 1 m) for equipment with an operating frequency in the band from 30 Hz to 2 kHz inclusive, 6A001.a.2.a.1, 6A001.a.2.a.2, 6A001.a.2.a.3, 6A001.a.2.a.5, 6A001.a.2.a.6, 6A001.a.2.b, 6A001.a.2.e, 6A002.a.1.c, 6A008.l.3, 6B008, 8A001.b, 8A001.d, 8A002.o.3.b; and

* * * * *

(4) *Restrictions.* Nationals of countries in Country Group E:1 may not physically or computationally access computers that have been enhanced by ''electronic assemblies'', which have been exported or reexported under License Exception GOV and have been used to enhance such computers by aggregation of ''computing elements'' so that the CTP of the aggregation exceeds the CTP parameter set forth in ECCN 4A003.b. of the Commerce Control List in Supplement No. 1 to part 774 of the EAR, without prior authorization from the Bureau of Industry and Security.

* * * * *

(c) * * *

(4) *Restrictions.* Nationals of countries in Country Group E:1 may not physically or computationally access computers that have been enhanced by ''electronic assemblies'', which have been exported or reexported under License Exception GOV and have been used to enhance such computers by aggregation of ''computing elements'' so that the CTP of the aggregation exceeds the CTP parameter set forth in ECCN 4A003.b. of the Commerce Control List in Supplement No. 1 to part 774 of the EAR, without prior authorization from the Bureau of Industry and Security.

■ 4. Supplement No. 1 to 740.11 is amended by:

■ a. Removing and reserving paragraphs (a)(1)(vi)(A), (a)(1)(vii)(B), (b)(1)(vi)(A), and (b)(1)(vii)(B); and

■ b. Revising paragraphs (a)(1) introductory text, (a)(1)(vii)(D), (a)(1)(vii)(E)(b)(1) introductory text, (b)(1)(vii)(D), and (b)(1)(vii)(E), to read as follows:

Supplement No. 1 to § 740.11—Additional Restrictions on Use of License Exception Gov

(a) * * *

(1) Items identified on the Commerce Control List as controlled for national security (NS) reasons under Export Control Classification Numbers (ECCNs) as follows for export or reexport to destinations other than Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden, or the United Kingdom: 1C001, 5A001.b.5, 6A001.a.1.b.1 object detection and location systems having a sound pressure level exceeding 210 dB (reference 1 μPa at 1 m) for equipment with an operating frequency in the band from 30 Hz to 2 kHz inclusive, 6A001.a.2.a.1, 6A001.a.2.a.2, 6A001.a.2.a.3, 6A001.a.2.a.5, 6A001.a.2.a.6, 6A001.a.2.b, 6A001.a.2.e, 6A002.a.1.c, 6A008.1.3, 6B008, 8A001.b, 8A001.d, 8A002.o.3.b; and

* * * * *

(vii) * * *

(D) Controlled by 6E001 for the ''development'' of equipment or ''software'' in 6A001.a.1.b.1, 6A001.a.2.a.1, 6A001.a.2.a.2, 6A001.a.2.a.3, 6A001.a.2.a.5, 6A001.a.2.a.6, 6A001.a.2.b, 6A001.a.2.c, 6A001.a.2.e, 6A001.a.2.f, 6A002.a.1.c, 6A008.1.3, or 6B008, as described in paragraph (a)(1) of this Supplement; and

(E) Controlled by 6E002 for the ''production'' of equipment controlled by 6A001.a.1.b.1, 6A001.a.2.a.1, 6A001.a.2.a.2, 6A001.a.2.a.3, 6A001.a.2.a.5, 6A001.a.2.a.6, 6A001.a.2.b, 6A001.a.2.c, 6A001.a.2.e, 6A001.a.2.f, 6A002.a.1.c, 6A008.1.3, or 6B008, as described in paragraph (a)(1) of this Supplement; and

* * * * *

(b) * * *

(1) Items identified on the Commerce Control List as controlled for national security (NS) reasons under Export Control Classification Numbers (ECCNs) as follows for export or reexport to destinations other than Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden, or the United Kingdom: 1C001, 5A001.b.5, 6A001.a.1.b.1 object detection and location systems having a sound pressure level exceeding 210 dB (reference 1 μPa at 1 m) for equipment with an operating frequency in the band from 30 Hz to 2 kHz inclusive, 6A001.a.2.a.1, 6A001.a.2.a.2, 6A001.a.2.a.3, 6A001.a.2.a.5, 6A001.a.2.a.6, 6A001.a.2.b, 6A001.a.2.e, 6A002.a.1.c, 6A008.1.3, 6B008, 8A001.b, 8A001.d, 8A002.o.3.b; and

* * * * *

(vii) * * *

(D) Controlled by 6E001 for the ''development'' of equipment or ''software'' in 6A001.a.1.b.1, 6A001.a.2.a.1, 6A001.a.2.a.2, 6A001.a.2.a.3, 6A001.a.2.a.5, 6A001.a.2.a.6, 6A001.a.2.b, 6A001.a.2.c, 6A001.a.2.e, 6A001.a.2.f, 6A002.a.1.c, 6A008.1.3, or 6B008, as described in paragraph (a)(1) of this supplement; and

(E) Controlled by 6E002 for the ''production'' of equipment controlled by 6A001.a.1.b.1, 6A001.a.2.a.1, 6A001.a.2.a.2, 6A001.a.2.a.3, 6A001.a.2.a.5, 6A001.a.2.a.6, 6A001.a.2.b, 6A001.a.2.c, 6A001.a.2.e, 6A001.a.2.f, 6A002.a.1.c, 6A008.l.3, or 6B008, as described in paragraph (a)(1) of this Supplement; and

* * * * *

PART 742—[AMENDED]

■ 5. The authority citation for part 742 is revised to read as follows:

Authority: 50 U.S.C. app. 2401 *et seq.*; 50 U.S.C. 1701 *et seq.*; 18 U.S.C. 2510 *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, 3 CFR, 2003 Comp., p. 320; Notice of August 6, 2004, 69 FR 48763, 3 CFR, 2004 Comp., p. 284; Notice of November 4, 2004, 69 FR 64637, 3 CFR, 2004 Comp., p. 303.

§ 742.12 [Amended]

■ 6. Section 742.12 is amended by revising the phrase ''greater than 75,000 MTOPS.'' to read ''greater than 190,000 MTOPS.'' in paragraph (a)(3).

PART 743—[AMENDED]

■ 7. The authority citation for part 743 is revised to read as follows:

Authority: 50 U.S.C. app. 2401 *et seq.;* Pub. L. 106–508; 50 U.S.C. 1701 *et seq.;* E.O. 13206, 66 FR 18397, 3 CFR, 2001 Comp., p. 763.

§ 743.1 [Amended]

■ 8. Section 743.1 is amended by revising the phrase ''having a CTP exceeding 75,000 MTOPS.'' to read ''having a CTP exceeding 190,000 MTOPS.'' in paragraph (c)(2).

Supplement No. 1 to Part 743 [Amended]

■ 9. Supplement No. 1 to part 743 is amended by adding ''Slovenia'' in alphabetical order after ''Slovakia'' and before ''South Korea''.

PART 772—[AMENDED]

■ 10. The authority citation for part 772 is revised 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 6, 2004, 69 FR 48763, 3 CFR, 2004 Comp., p. 284.

■ 11. Section 772.1 is amended by revising the definition of ''Allocated by the ITU'', to read as follows.

§ 772.1 Definitions of terms as used in the Export Administration Regulations (EAR).

* * * * *

Allocated by the ITU. (Cat 3 and Cat 5 part 1)—The allocation of frequency bands according to the current edition of the ITU Radio Regulations for primary, permitted and secondary services.

N.B. Additional and alternative allocations are not included.

* * * * *

PART 774—[AMENDED]

■ 12. The authority citation for part 774 is revised 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); 18 U.S.C. 2510 *et seq.*; 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 6, 2004, 69 FR 48763, 3 CFR, 2004 Comp., p. 284.

Supplement No. 1 to Part 774 [Amended]

■ 13. 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).

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

b. Thermoplastic liquid crystal copolymers having a heat distortion temperature exceeding 523 K (250 °C) measured according to ISO 75–3 (2004), or national equivalents, with a load of 1.82 N/mm ^{2} 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. Polyarylene ether ketones, as follows:
c.1. Polyether ether ketone (PEEK)
c.2. Polyether ketone ketone (PEKK);
c.3. Polyether ketone (PEK);
c.4. Polyether ketone ether ketone ketone (PEKEKK);
d. Polyarylene ketones;
e. Polyarylene sulphides, where the arylene group is biphenylene, triphenylene or combinations thereof;
f. Polybiphenylenethersulphone 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.

■ 14. In Supplement No. 1 to part 774 (the Commerce Control List), Category 2—Materials Processing, Product Group B ''Test, Inspection and Production Equipment'', following ECCN 2A999, the ''Technical Notes for 2B001 to 2B009'' are revised to read as follows:

Category 2—Material Processing

B. Test, Inspection and Production Equipment

Technical Notes for 2B001 to 2B009:

1. Secondary parallel contouring axes, (*e.g.*, the w-axis on horizontal boring mills or a secondary rotary axis the center line of which is parallel to the primary rotary axis) are not counted in the total number of contouring axes. Rotary axes need not rotate over 360°. A rotary axis can be driven by a linear device (*e.g.*, a screw or a rack-and-pinion).

2. The number of axes which can be co-ordinated simultaneously for ''contouring control'' is the number of axes along or around which, during processing of the workpiece, simultaneous and interrelated motions are performed between the workpiece and a tool. This does not include any additional axes along or around which other relative motions within the machine are performed, such as:

2.a. Wheel-dressing systems in grinding machines;

2.b. Parallel rotary axes designed for mounting of separate workpieces;

2.c. Co-linear rotary axes designed for manipulating the same workpiece by holding it in a chuck from different ends.

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

4. A ''tilting spindle'' is counted as a rotary axis.

5. Guaranteed ''positioning accuracy'' levels instead of individual test protocols may be used for each machine tool model using the agreed ISO test procedure.

6. The positioning accuracy of ''numerically controlled'' machine tools is to be determined and presented in accordance with ISO 230/2 (1988).

■ 15. In 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 License Requirements section, and the ''items'' paragraph in 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).

License Requirements

Reason for Control: NS, NP, AT.

Control(s)	Country chart
NS applies to entire entry	NS Column 2.
NP applies to 2B001.a, .b, .c, and .d, EXCEPT: (1) turning machines under 2B001.a with a capacity equal to or less than 35 mm diameter; (2) bar machines (Swissturn), limited to machining only bar feed through, if maximum bar diameter is equal to or less than 42 mm and there is no capability of mounting chucks. (Machines may have drilling and/or milling capabilities for machining parts with diameters less than 42 mm); or (3) milling machines under 2B001.b. with x-axis travel greater than two meters and overall ''positioning accuracy'' on the x-axis more (worse) than 0.030 mm.	NP Column 1.
AT applies to entire entry	AT Column 1.

* * * * *

List of Items Controlled

Unit: * * *
Related Controls: * * *
Related Definitions: * * *
Items:

Note 1: 2B001 does not control special purpose machine tools limited to the manufacture of gears. For such machines, see 2B003.

Note 2: 2B001 does not control special purpose machine tools limited to the manufacture of any of the following parts:

a. Crank shafts or cam shafts;
b. Tools or cutters;
c. Extruder worms;

d. Engraved or faceted jewelry parts.

Note 3: A machine tool having at least two of the three turning, milling or grinding capabilities (*e.g.*, a turning machine with milling capability), must be evaluated against each applicable entry 2.B001.a., b. or c.

a. Machine tools for turning, having all of the following characteristics:

a.1. Positioning accuracy with ''all compensations available'' of less (better) than 6 μm along any linear axis; *and*

a.2. Two or more axes which can be coordinated simultaneously for ''contouring control'';

Note: 2B001.a does not control turning machines specially designed for the production of contact lenses.

b. Machine tools for milling, having any of the following characteristics:

b.1. Having all of the following:

b.1.a. Positioning accuracy with ''all compensations available'' of less (better) than 6 μm along any linear axis; *and*

b.1.b. Three linear axes plus one rotary axis which can be coordinated simultaneously for ''contouring control'';

b.2. Five or more axes which can be coordinated simultaneously for ''contouring control'';

b.3. A positioning accuracy for jig boring machines, with ''all compensations available'', of less (better) than 4 μm along any linear axis; *or*

b.4. Fly cutting machines, having all of the following characteristics:

b.4.a. Spindle ''run-out'' and ''camming'' less (better) than 0.0004 mm TIR; *and*

b.4.b. Angular deviation of slide movement (yaw, pitch and roll) less (better) than 2 seconds of arc, TIR, over 300 mm of travel.

c. Machine tools for grinding, having any of the following characteristics:

c.1. Having all of the following:

c.1.a. Positioning accuracy with ''all compensations available'' of less (better) than 4 μm along any linear axis; *and*

c.1.b. Three or more axes which can be coordinated simultaneously for ''contouring control''; *or*

c.2. Five or more axes which can be coordinated simultaneously for ''contouring control'';

Notes: 2B001.c does not control grinding machines, as follows:

1. Cylindrical external, internal, and external-internal grinding machines having all the following characteristics:

a. Limited to cylindrical grinding; and

b. Limited to a maximum workpiece capacity of 150 mm outside diameter or length.

2. Machines designed specifically as jig grinders that do not have a z-axis or a w-axis, with a positioning accuracy with ''all compensations available'' less (better) than 4 μm.

3. Surface grinders.

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

e. Machine tools for removing metals, ceramics or ''composites'' having all of the following characteristics:

e.1. Removing material by means of any of the following:

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

e.1.b. Electron beam; *or*

e.1.c. ''Laser'' beam; *and*

e.2. Having two or more rotary axes which:

e.2.a. Can be coordinated simultaneously for ''contouring control''; *and*

e.2.b. Have a positioning accuracy of less (better) than 0.003°;

f. Deep-hole-drilling machines and turning machines modified for deep-hole-drilling, having a maximum depth-of-bore capability exceeding 5,000 mm and specially designed components therefor.

■ 16. In Supplement No. 1 to part 774 (the Commerce Control List), Category 2—Materials Processing, Export Control Classification Number (ECCN) 2B005 is amended by revising the ''items'' paragraph in the List of Items Controlled section to read as follows:

2B005 Equipment specially designed for the deposition, processing and in-process control of inorganic overlays, coatings and surface modifications, as follows, for non-electronic substrates, by processes shown in the Table and associated Notes following 2E003.f, and specially designed automated handling, positioning, manipulation and control components therefor.

* * * * *

List of Items Controlled

Unit: * * *

Related Controls: * * *

Related Definitions: * * *

Items:

a. Chemical vapor deposition (CVD) production equipment having all of the following:

a.1. Process modified for one of the following:

a.1.a. Pulsating CVD;

a.1.b. Controlled nucleation thermal deposition (CNTD); *or*

a.1.c. Plasma enhanced or plasma assisted CVD; *and*

a.2. Any of the following:

a.2.a. Incorporating high vacuum (equal to or less than 0.01 Pa) rotating seals; *or*

a.2.b. Incorporating *in situ* coating thickness control;

b. Ion implantation production equipment having beam currents of 5 mA or more;

c. Electron beam physical vapor (EB–PVD) production equipment incorporating power systems rated for over 80 kW, having any of the following:

c.1. A liquid pool level ''laser'' control system which regulates precisely the ingots feed rate; *or*

c.2. A computer controlled rate monitor operating on the principle of photo-luminescence of the ionized atoms in the evaporant stream to control the deposition rate of a coating containing two or more elements;

d. Plasma spraying production equipment having any of the following characteristics:

d.1. Operating at reduced pressure controlled atmosphere (equal or less than 10 kPa measured above and within 300 mm of the gun nozzle exit) in a vacuum chamber capable of evacuation down to 0.01 Pa prior to the spraying process; *or*

d.2. Incorporating *in situ* coating thickness control;

e. Sputter deposition production equipment capable of current densities of 0.1 mA/mm^2 or higher at a deposition rate 15 μm/h or more;

f. Cathodic arc deposition equipment incorporating a grid of electromagnets for steering control of the arc spot on the cathode;

g. Ion plating production equipment allowing for the *in situ* measurement of any of the following:

g.1. Coating thickness on the substrate and rate control; *or*

g.2. Optical characteristics.

■ 17. In Supplement No. 1 to part 774 (the Commerce Control List), Category 2—Materials Processing, Export Control Classification Number (ECCN) 2B006 is amended by revising the ''items'' paragraph in the List of Items Controlled section to read as follows:

2B006 Dimensional inspection or measuring systems and equipment, as follows (see List of Items Controlled).

List of Items Controlled

Unit: * * *

Related Controls: * * *

Related Definitions: * * *

Items:

a. Computer controlled or ''numerically controlled'' co-ordinate measuring machines (CMM), having a three dimensional length (volumetric) maximum permissible error of indication (MPE_E) at any point within the operating range of the machine (*i.e.*, within the length of axes) equal to or less (better) than (1.7 + L/1,000) μm (L is the measured length in mm) tested according to ISO 10360–2 (2001);

b. Linear and angular displacement measuring instruments, as follows:

b.1. Linear displacement measuring instruments having any of the following:

Technical Note: For the purpose of 2B006.b.1 ''linear displacement'' means the change of distance between the measuring probe and the measured object.

b.1.a. Non-contact type measuring systems with a ''resolution'' equal to or less (better) than 0.2 μm within a measuring range up to 0.2 mm;

b.1.b. Linear voltage differential transformer systems having all of the following characteristics:

b.1.b.1. ''Linearity'' equal to or less (better) than 0.1% within a measuring range up to 5 mm; *and*

b.1.b.2. Drift equal to or less (better) than 0.1% per day at a standard ambient test room temperature ±1 K; *or*

b.1.c. Measuring systems having all of the following:

b.1.c.1. Containing a ''laser''; *and*

b.1.c.2. Maintaining, for at least 12 hours, over a temperature range of ±1 K around a standard temperature and at a standard pressure, all of the following:

b.1.c.2.a. A ''resolution'' over their full scale of 0.1 μm or less (better); *and*

b.1.c.2.b. A ''measurement uncertainty'' equal to or less (better) than (0.2 + L/2,000) μm (L is the measured length in mm);

Note: 2B006.b.1 does not control measuring interferometer systems, without closed or open loop feedback, containing a ''laser'' to measure slide movement errors of machine-tools, dimensional inspection machines or similar equipment.

b.2. Angular displacement measuring instruments having an ''angular position deviation'' equal to or less (better) than 0.00025°;

Note: 2B006.b.2 does not control optical instruments, such as autocollimators, using collimated light (*e.g.*, laser light) to detect angular displacement of a mirror.

c. Equipment for measuring surface irregularities, by measuring optical scatter as a function of angle, with a sensitivity of 0.5 nm or less (better).

■ 18. In Supplement No. 1 to part 774 (the Commerce Control List), Category 2—Materials Processing, Export Control Classification Number (ECCN) 2B201 is amended by revising the ''items'' paragraph in the List of Items Controlled section to read as follows:

2B201 Machine tools, other than those controlled by 2B001, for removing or cutting metals, ceramics or ''composites'', which, according to manufacturer's technical specifications, can be equipped with electronic devices for simultaneous ''contouring control'' in two or more axes.

* * * * *

List of Items Controlled

Unit: * * *
Related Controls: * * *
Related Definitions: * * *
Items:

a. Machine tools for turning, that have ''positioning accuracies'' with all compensations available better (less) than 6 µm according to ISO 230/2 (1988) along any linear axis (overall positioning) for machines capable of machining diameters greater than 35 mm;

Note: Item 2B201.a. does not control bar machines (Swissturn), limited to machining only bar feed thru, if maximum bar diameter is equal to or less than 42 mm and there is no capability of mounting chucks. Machines may have drilling and/or milling capabilities for machining parts with diameters less than 42 mm.

b. Machine tools for milling, having any of the following characteristics:

b.1. Positioning accuracies with ''all compensations available'' equal to or less (better) than 6 µm along any linear axis (overall positioning); *or*

b.2. Two or more contouring rotary axes.

Note: 2B201.b does not control milling machines having the following characteristics:

a. X-axis travel greater than 2 m; and

b. Overall positioning accuracy on the x-axis more (worse) than 30 µm.

c. Machine tools for grinding, having any of the following characteristics:

c.1. Positioning accuracies with ''all compensations available'' equal to or less (better) than 4 µm along any linear axis (overall positioning); *or*

c.2. Two or more contouring rotary axes.

Note: 2B201.c does not control the following grinding machines:

a. Cylindrical external, internal, and external-internal grinding machines having all of the following characteristics:

1. Limited to cylindrical grinding;

2. A maximum workpiece outside diameter or length of 150 mm;

3. Not more than two axes that can be coordinated simultaneously for ''contouring control''; and

4. No contouring c-axis.

b. Jig grinders with axes limited to x, y, c and a where c axis is used to maintain the grinding wheel normal to the work surface, and the a axis is configured to grind barrel cams;

c. Tool or cutter grinding machines with ''software'' specially designed for the production of tools or cutters; or

d. Crankshaft or camshaft grinding machines.

■ 19. In Supplement No. 1 to part 774 (the Commerce Control List), Category 3—Electronics, Export Control Classification Number (ECCN) 3A001 is amended by revising the ''items'' paragraphs in the List of Items Controlled section, to read as follows:

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

* * * * *

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/cm^2 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 in 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, having any of the following characteristics:

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

a.3.a. [RESERVED]

a.3.b. Manufactured from a compound semiconductor and operating at a clock frequency exceeding 40 MHz; *or*

a.3.c. More than three data or instruction bus or serial communication ports, each providing direct external interconnection between parallel ''microprocessor microcircuits'' with a transfer rate of 1000 Mbyte/s or greater;

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, 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 50 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 5 million words per second; *or*

a.5.a.5. A resolution of more than 14 bit with an output rate greater than 1 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 2^n 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 log2 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 μs.

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/cm^2;

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 operating frequency spans more than one frequency range, as defined by 3A001.b.2., 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. 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 an item whose operating frequency spans more than one frequency range, as defined by 3A001.b.3, 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 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 [$P > 150\ W^{*}GHz^2 / f_{GHz}^2$];

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 [$d \leq 15\ cm^{*}GHz / f_{GHz}$].

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 operating frequency spans more than one frequency range, as defined by 3A001.b.4, 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_{max}/f_{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.

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. Batteries and photovoltaic arrays, as follows:

Note: 3A001.e.1 does not control batteries with volumes equal to or less than 27 cm^3 (*e.g.,* standard C-cells or R14 batteries).

e.1.a. Primary cells and batteries having an energy density exceeding 480 Wh/kg and rated for operation in the temperature range from below 243 K (−30 °C) to above 343 K (70 °C);

e.1.b. Rechargeable cells and batteries having an energy density exceeding 150 Wh/kg after 75 charge/discharge cycles at a discharge current equal to C/5 hours (C being the nominal capacity in ampere hours) when operating in the temperature range from below 253 K (−20 °C) to above 333 K (60 °C);

Technical Note: Energy density is obtained by multiplying the average power in watts (average voltage in volts times average current in amperes) by the duration of the discharge in hours to 75% of the open circuit voltage divided by the total mass of the cell (or battery) in kg.

e.1.c. ''Space qualified'' and radiation hardened photovoltaic arrays with a specific power exceeding 160 W/m^2 at an operating temperature of 301 K (28 °C) under a tungsten illumination of 1 kW/m^2 at 2,800 K (2,527 °C);

e.2. High energy storage capacitors, as follows:

e.2.a. Capacitors with a repetition rate of less than 10 Hz (single shot capacitors) having all of the following:

e.2.a.1. A voltage rating equal to or more than 5 kV;

e.2.a.2. An energy density equal to or more than 250 J/kg; *and*

e.2.a.3. A total energy equal to or more than 25 kJ;

e.2.b. Capacitors with a repetition rate of 10 Hz or more (repetition rated capacitors) having all of the following:

e.2.b.1. A voltage rating equal to or more than 5 kV;

e.2.b.2. An energy density equal to or more than 50 J/kg;

e.2.b.3. A total energy equal to or more than 100 J; *and*

e.2.b.4. A charge/discharge cycle life equal to or more than 10,000;

e.3. ''Superconductive'' electromagnets 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/mm^2;

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.

■ 20. In Supplement No. 1 to part 774 (the Commerce Control List), Category 3—Electronics, Export Control Classification Number (ECCN) 3A002 is amended by revising the ''items'' paragraphs in the List of Items Controlled section, to read as follows:

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

* * * * *

List of Items Controlled

Unit: * * *

Related Controls: * * *

Related Definitions: * * *

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;

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 frequency, 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 of less than 1 ms; *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;

Technical Note: For the purposes of 3A002.d.1., '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.

■ 21. In Supplement No. 1 to part 774 (the Commerce Control List), Category 3—Electronics, Export Control Classification Number (ECCN) 3B001 is amended revising the ''items'' paragraph in 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.

* * * * *

List of Items Controlled

Unit: * * *

Related Controls: * * *

Related Definitions: * * *

Items:

a. Equipment designed for epitaxial growth, as follows:

a.1. Equipment capable of producing any of the following:

a.1.a. A silicon layer with a thickness uniform to less than ''2.5% across a distance of 200 mm or more; *or*

a.1.b. A layer of any material other than silicon with a thickness uniform to less than ±2.5% across a distance of 75 mm or more;

a.2. Metal organic chemical vapor deposition (MOCVD) reactors specially designed for compound semiconductor crystal growth by the chemical reaction between materials controlled by 3C003 or 3C004;

a.3. Molecular beam epitaxial growth equipment using gas or solid sources;

b. Equipment designed for ion implantation, having any of the following:

b.1. A beam energy (accelerating voltage) exceeding 1MeV;

b.2. Being specially designed and optimized to operate at a beam energy (accelerating voltage of less than 2 keV;

b.3. Direct write capability; *or*

b.4. A beam energy of 65 keV or more and a beam current of 45 mA or more for high energy oxygen implant into a heated semiconductor material ''substrate'';

c. Anisotropic plasma dry etching equipment, as follows:

c.1. Equipment with cassette-to-cassette operation and load-locks, and having any of the following:

c.1.a. Designed or optimized to produce critical dimensions of 180 nm or less with ±5% 3 sigma precision; *or*

c.1.b. Designed for generating less than 0.04 particles/cm² with a measurable particle size greater than 0.1 μm in diameter;

c.2. Equipment specially designed for equipment controlled by 3B001.e. and having any of the following:

c.2.a. Designed or optimized to produce critical dimensions of 180 nm or less with ±5% 3 sigma precision; *or*

c.2.b. Designed for generating less than 0.04 particles/cm² with a measurable particle size greater than 0.1 μm in diameter;

d. Plasma enhanced CVD equipment, as follows:

d.1. Equipment with cassette-to-cassette operation and load-locks, and designed according to the manufacturer's specifications or optimized for use in the production of semiconductor devices with critical dimensions of 180 nm or less;

d.2. Equipment specially designed for equipment controlled by 3B001.e. and designed according to the manufacturer's specifications or optimized for use in the production of semiconductor devices with critical dimensions of 180 nm or less;

e. Automatic loading multi-chamber central wafer handling systems, having all of the following:

e.1. Interfaces for wafer input and output, to which more than two pieces of semiconductor processing equipment are to be connected; *and*

e.2. Designed to form an integrated system in a vacuum environment for sequential multiple wafer processing;

Note: 3B001.e. does not control automatic robotic wafer handling systems not designed to operate in a vacuum environment.

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 =

$$\frac{(\text{an exposure light source wavelength in } \mu m) \times (\text{K factor})}{\text{numerical aperture}}$$

where the K factor = 0.45
MRF = minimum resolvable feature size.

f.2. 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.2.a. A spot size smaller than 0.2 μm;

f.2.b. Being capable of producing a pattern with a feature size of less than 1 μm; *or*

f.2.c. An overlay accuracy of better than ±0.20 μm (3 sigma);

g. Masks and reticles designed for integrated circuits controlled by 3A001;

h. Multi-layer masks with a phase shift layer.

Note: 3B001.h. does not control multi-layer masks with a phase shift layer designed for the fabrication of memory devices not controlled by 3A001.

■ 22. In Supplement No. 1 to part 774 (the Commerce Control List), Category 3—Electronics, Export Control Classification Number (ECCN) 3B002 is amended revising the heading and the ''items'' paragraph in the List of Items Controlled section, to read as follows:

3B002 Test equipment, specially designed for testing finished or unfinished semiconductor devices, as follows (see List of Items Controlled), and specially designed components and accessories therefor.

* * * * *

List of Items Controlled

Unit: * * *
Related Controls: * * *
Related Definitions: * * *
Items:

a. For testing S-parameters of transistor devices at frequencies exceeding 31.8 GHz;

b. [RESERVED]

c. For testing microwave integrated circuits controlled by 3A001.b.2.

■ 23. In Supplement No. 1 to part 774 (the Commerce Control List), Category 3—Electronics, Export Control Classification Number (ECCN) 3B991 is amended, revising the ''items'' paragraph in 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

Unit: * * *
Related Controls: * * *
Related Definitions: * * *
Items:

a. Equipment specially designed for the manufacture of electron tubes, optical elements and specially designed components therefor controlled by 3A001 or 3A991;

b. Equipment specially designed for the manufacture of semiconductor devices, integrated circuits and ''electronic assemblies'', as follows, and systems incorporating or having the characteristics of such equipment:

Note: 3B991.b also controls equipment used or modified for use in the manufacture of other devices, such as imaging devices, electro-optical devices, acoustic-wave devices.

b.1. Equipment for the processing of materials for the manufacture of devices and components as specified in the heading of 3B991.b, as follows:

Note: 3B991 does not control quartz furnace tubes, furnace liners, paddles, boats (except specially designed caged boats), bubblers, cassettes or crucibles specially designed for the processing equipment controlled by 3B991.b.1.

b.1.a. Equipment for producing polycrystalline silicon and materials controlled by 3C001;

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

b.1.c. Crystal pullers and furnaces, as follows:

Note: 3B991.b.1.c does not control diffusion and oxidation furnaces.

b.1.c.1. Annealing or recrystallizing equipment other than constant temperature furnaces employing high rates of energy transfer capable of processing wafers at a rate exceeding 0.005 m^2 per minute;

b.1.c.2. ''Stored program controlled'' crystal pullers having any of the following characteristics:

b.1.c.2.a. Rechargeable without replacing the crucible container;

b.1.c.2.b. Capable of operation at pressures above 2.5×10^5 Pa; *or*

b.1.c.2.c. Capable of pulling crystals of a diameter exceeding 100 mm;

b.1.d. ''Stored program controlled'' equipment for epitaxial growth having any of the following characteristics:

b.1.d.1. Capable of producing a layer thickness uniformity across the wafer of equal to or better than ±3.5%; *or*

b.1.d.2. Rotation of individual wafers during processing;

b.1.e. Molecular beam epitaxial growth equipment;

b.1.f. Magnetically enhanced ''sputtering'' equipment with specially designed integral load locks capable of transferring wafers in an isolated vacuum environment;

b.1.g. Equipment specially designed for ion implantation, ion-enhanced or photo-enhanced diffusion, having any of the following characteristics:

b.1.g.1. Patterning capability;

b.1.g.2. Beam energy (accelerating voltage) exceeding 200 keV;

b.1.g.3. Optimized to operate at a beam energy (accelerating voltage) of less than 10 keV; *or*

b.1.g.4. Capable of high energy oxygen implant into a heated ''substrate'';

b.1.h. ''Stored program controlled'' equipment for the selective removal (etching) by means of anisotropic dry methods (*e.g.*, plasma), as follows:

b.1.h.1. Batch types having either of the following:

b.1.h.1.a. End-point detection, other than optical emission spectroscopy types; *or*

b.1.h.1.b. Reactor operational (etching) pressure of 26.66 Pa or less;

b.1.h.2. Single wafer types having any of the following:

b.1.h.2.a. End-point detection, other than optical emission spectroscopy types;

b.1.h.2.b. Reactor operational (etching) pressure of 26.66 Pa or less; *or*

b.1.h.2.c. Cassette-to-cassette and load locks wafer handling;

Notes: 1. ''Batch types'' refers to machines not specially designed for production processing of single wafers. Such machines can process two or more wafers simultaneously with common process parameters, *e.g.*, RF power, temperature, etch gas species, flow rates.

2. ''Single wafer types'' refers to machines specially designed for production processing of single wafers. These machines may use automatic wafer handling techniques to load a single wafer into the equipment for processing. The definition includes equipment that can load and process several wafers but where the etching parameters, *e.g.*, RF power or end point, can be independently determined for each individual wafer.

b.1.i. ''Chemical vapor deposition'' (CVD) equipment, *e.g.*, plasma-enhanced CVD (PECVD) or photo-enhanced CVD, for semiconductor device manufacturing, having either of the following capabilities, for deposition of oxides, nitrides, metals or polysilicon:

b.1.i.1. ''Chemical vapor deposition'' equipment operating below 10^5 Pa; *or*

b.1.i.2. PECVD equipment operating either below 60 Pa (450 millitorr) or having automatic cassette-to-cassette and load lock wafer handling;

Note: 3B991.b.1.i does not control low pressure ''chemical vapor deposition'' (LPCVD) systems or reactive ''sputtering'' equipment.

b.1.j. Electron beam systems specially designed or modified for mask making or semiconductor device processing having any of the following characteristics:

b.1.j.1. Electrostatic beam deflection;

b.1.j.2. Shaped, non-Gaussian beam profile;

b.1.j.3. Digital-to-analog conversion rate exceeding 3 MHz;

b.1.j.4. Digital-to-analog conversion accuracy exceeding 12 bit; *or*

b.1.j.5. Target-to-beam position feedback control precision of 1 micrometer or finer;

Note: 3B991.b.1.j does not control electron beam deposition systems or general purpose scanning electron microscopes.

b.1.k. Surface finishing equipment for the processing of semiconductor wafers as follows:

b.1.k.1. Specially designed equipment for backside processing of wafers thinner than 100 micrometer and the subsequent separation thereof; *or*

b.1.k.2. Specially designed equipment for achieving a surface roughness of the active surface of a processed wafer with a two-sigma value of 2 micrometer or less, total indicator reading (TIR);

Note: 3B991.b.1.k does not control single-side lapping and polishing equipment for wafer surface finishing.

b.1.l. Interconnection equipment which includes common single or multiple vacuum chambers specially designed to permit the integration of any equipment controlled by 3B991 into a complete system;

b.1.m. ''Stored program controlled'' equipment using ''lasers'' for the repair or trimming of ''monolithic integrated circuits'' with either of the following characteristics:

b.1.m.1. Positioning accuracy less than ±1 micrometer; *or*

b.1.m.2. Spot size (kerf width) less than 3 micrometer.

b.2. Masks, mask ''substrates'', mask-making equipment and image transfer equipment for the manufacture of devices and components as specified in the heading of 3B991, as follows:

Note: The term ''masks'' refers to those used in electron beam lithography, X-ray lithography, and ultraviolet lithography, as well as the usual ultraviolet and visible photo-lithography.

b.2.a. Finished masks, reticles and designs therefor, except:

b.2.a.1. Finished masks or reticles for the production of unembargoed integrated circuits; *or*

b.2.a.2. Masks or reticles, having both of the following characteristics:

b.2.a.2.a. Their design is based on geometries of 2.5 micrometer or more; *and*

b.2.a.2.b. The design does not include special features to alter the intended use by means of production equipment or ''software'';

b.2.b. Mask ''substrates'' as follows:

b.2.b.1. Hard surface (*e.g.*, chromium, silicon, molybdenum) coated ''substrates'' (*e.g.*, glass, quartz, sapphire) for the preparation of masks having dimensions exceeding 125 mm × 125 mm; *or*

b.2.b.2. ''Substrates'' specially designed for X-ray masks;

b.2.c. Equipment, other than general purpose computers, specially designed for computer aided design (CAD) of semiconductor devices or integrated circuits;

b.2.d. Equipment or machines, as follows, for mask or reticle fabrication:

b.2.d.1. Photo-optical step and repeat cameras capable of producing arrays larger than 100 mm x 100 mm, or capable of producing a single exposure larger than 6 mm x 6 mm in the image (*i.e.*, focal) plane, or capable of producing line widths of less than 2.5 micrometer in the photoresist on the ''substrate'';

b.2.d.2. Mask or reticle fabrication equipment using ion or ''laser'' beam lithography capable of producing line widths of less than 2.5 micrometer; *or*

b.2.d.3. Equipment or holders for altering masks or reticles or adding pellicles to remove defects;

Note: 3B991.b.2.d.1 and b.2.d.2 do not control mask fabrication equipment using photo-optical methods which was either commercially available before the 1st January, 1980, or has a performance no better than such equipment.

b.2.e. ''Stored program controlled'' equipment for the inspection of masks, reticles or pellicles with:

b.2.e.1. A resolution of 0.25 micrometer or finer; *and*

b.2.e.2. A precision of 0.75 micrometer or finer over a distance in one or two coordinates of 63.5 mm or more;

Note: 3B991.b.2.e does not control general purpose scanning electron microscopes except when specially designed and instrumented for automatic pattern inspection.

b.2.f. Align and expose equipment for wafer production using photo-optical or X-ray methods, *e.g.*, lithography equipment, including both projection image transfer equipment and step and repeat (direct step on wafer) or step and scan (scanner) equipment, capable of performing any of the following functions:

Note: 3B991.b.2.f does not control photo-optical contact and proximity mask align and expose equipment or contact image transfer equipment.

b.2.f.1. Production of a pattern size of less than 2.5 micrometer;

b.2.f.2. Alignment with a precision finer than ±0.25 micrometer (3 sigma);

b.2.f.3. Machine-to-machine overlay no better than ±0.3 micrometer; *or*

b.2.f.4. A light source wavelength shorter than 400 nm;

b.2.g. Electron beam, ion beam or X-ray equipment for projection image transfer capable of producing patterns less than 2.5 micrometer;

Note: For focused, deflected-beam systems (direct write systems), see 3B991.b.1.j or b.10.

b.2.h. Equipment using ''lasers'' for direct write on wafers capable of producing patterns less than 2.5 micrometer.

b.3. Equipment for the assembly of integrated circuits, as follows:

b.3.a. ''Stored program controlled'' die bonders having all of the following characteristics:

b.3.a.1. Specially designed for ''hybrid integrated circuits'';

b.3.a.2. X–Y stage positioning travel exceeding 37.5 x 37.5 mm; *and*

b.3.a.3. Placement accuracy in the X–Y plane of finer than ±10 micrometer;

b.3.b. ''Stored program controlled'' equipment for producing multiple bonds in a single operation (*e.g.*, beam lead bonders, chip carrier bonders, tape bonders);

b.3.c. Semi-automatic or automatic hot cap sealers, in which the cap is heated locally to a higher temperature than the body of the package, specially designed for ceramic microcircuit packages controlled by 3A001 and that have a throughput equal to or more than one package per minute.

Note: 3B991.b.3 does not control general purpose resistance type spot welders.

b.4. Filters for clean rooms capable of providing an air environment of 10 or less particles of 0.3 micrometer or smaller per 0.02832 m^3 and filter materials therefor.

■ 24. In Supplement No. 1 to part 774 (the Commerce Control List), Category 3—Electronics, Export Control Classification Number (ECCN) 3B992 is amended revising the ''items'' paragraph in the List of Items Controlled section, to read as follows:

3B992 Equipment not controlled by 3B002 for the inspection or testing of electronic components and materials, and specially designed components and accessories therefor.

* * * * *

List of Items Controlled

Unit: * * *

Related Controls: * * *

Related Definitions: * * *

Items:

a. Equipment specially designed for the inspection or testing of electron tubes, optical elements and specially designed components therefor controlled by 3A001 or 3A991;

b. Equipment specially designed for the inspection or testing of semiconductor devices, integrated circuits and ''electronic assemblies'', as follows, and systems incorporating or having the characteristics of such equipment:

Note: 3B992.b also controls equipment used or modified for use in the inspection or testing of other devices, such as imaging devices, electro-optical devices, acoustic-wave devices.

b.1. ''Stored program controlled'' inspection equipment for the automatic detection of defects, errors or contaminants of 0.6 micrometer or less in or on processed wafers, ''substrates'', other than printed circuit boards or chips, using optical image acquisition techniques for pattern comparison;

Note: 3B992.b.1 does not control general purpose scanning electron microscopes, except when specially designed and instrumented for automatic pattern inspection.

b.2. Specially designed ''stored program controlled'' measuring and analysis equipment, as follows:

b.2.a. Specially designed for the measurement of oxygen or carbon content in semiconductor materials;

b.2.b. Equipment for line width measurement with a resolution of 1 micrometer or finer;

b.2.c. Specially designed flatness measurement instruments capable of measuring deviations from flatness of 10 micrometer or less with a resolution of 1 micrometer or finer.

b.3. ''Stored program controlled'' wafer probing equipment having any of the following characteristics:

b.3.a. Positioning accuracy finer than 3.5 micrometer;

b.3.b. Capable of testing devices having more than 68 terminals; *or*

b.3.c. Capable of testing at a frequency exceeding 1 GHz;

b.4. Test equipment as follows:

b.4.a. ''Stored program controlled'' equipment specially designed for testing discrete semiconductor devices and unencapsulated dice, capable of testing at frequencies exceeding 18 GHz;

Technical Note: Discrete semiconductor devices include photocells and solar cells.

b.4.b. ''Stored program controlled'' equipment specially designed for testing integrated circuits and ''electronic assemblies'' thereof, capable of functional testing:

b.4.b.1. At a 'pattern rate' exceeding 20 MHz; *or*

b.4.b.2. At a 'pattern rate' exceeding 10 MHz but not exceeding 20 MHz and capable of testing packages of more than 68 terminals.

Notes: 3B992.b.4.b does not control test equipment specially designed for testing:

1. memories;

2. ''Assemblies'' or a class of ''electronic assemblies'' for home and entertainment applications; and

3. Electronic components, ''assemblies'' and integrated circuits not controlled by 3A001 or 3A991 provided such test equipment does not incorporate computing facilities with ''user accessible programmability''.

Technical Note: For purposes of 3B992.b.4.b, 'pattern rate' is defined as the maximum frequency of digital operation of a tester. It is therefore equivalent to the highest data rate that a tester can provide in non-multiplexed mode. It is also referred to as test speed, maximum digital frequency or maximum digital speed.

b.4.c. Equipment specially designed for determining the performance of focal-plane arrays at wavelengths of more than 1,200 nm, using ''stored program controlled'' measurements or computer aided evaluation and having any of the following characteristics:

b.4.c.1. Using scanning light spot diameters of less than 0.12 mm;

b.4.c.2. Designed for measuring photosensitive performance parameters and for evaluating frequency response, modulation transfer function, uniformity of responsivity or noise; *or*

b.4.c.3. Designed for evaluating arrays capable of creating images with more than 32 x 32 line elements;

b.5. Electron beam test systems designed for operation at 3 keV or below, or ''laser'' beam systems, for non-contactive probing of powered-up semiconductor devices having any of the following:

b.5.a. Stroboscopic capability with either beam blanking or detector strobing;

b.5.b. An electron spectrometer for voltage measurements with a resolution of less than 0.5 V; *or*

b.5.c. Electrical tests fixtures for performance analysis of integrated circuits;

Note: 3B992.b.5 does not control scanning electron microscopes, except when specially designed and instrumented for non-contactive probing of a powered-up semiconductor device.

b.6. ''Stored program controlled'' multifunctional focused ion beam systems specially designed for manufacturing, repairing, physical layout analysis and testing of masks or semiconductor devices and having either of the following characteristics:

b.6.a. Target-to-beam position feedback control precision of 1 micrometer or finer; *or*

b.6.b. Digital-to-analog conversion accuracy exceeding 12 bit;

b.7. Particle measuring systems employing ''lasers'' designed for measuring particle size and concentration in air having both of the following characteristics:

b.7.a. Capable of measuring particle sizes of 0.2 micrometer or less at a flow rate of 0.02832 m^3 per minute or more; *and*

b.7.b. Capable of characterizing Class 10 clean air or better.

■ 25. In Supplement No. 1 to part 774 (the Commerce Control List), Category 4—Computers, Export Control Classification Number (ECCN) 4A003 is amended by revising the ''items'' paragraph in the List of Items Controlled section, to read as follows:

4A003 ''Digital computers'', ''electronic assemblies'', and related equipment therefor, as follows, and specially designed components therefor.

* * * * *

List of Items Controlled

Unit: * * *

Related Controls: * * *

Related Definitions: * * *

Items:

Note 1: 4A003 includes the following:

a. Vector processors;

b. Array processors;

c. Digital signal processors;

d. Logic processors;

e. Equipment designed for ''image enhancement'';

f. Equipment designed for ''signal processing''.

Note 2: The control status of the ''digital computers'' and related equipment described in 4A003 is determined by the control status of other equipment or systems provided:

a. The ''digital computers'' or related equipment are essential for the operation of the other equipment or systems;

b. The ''digital computers'' or related equipment are not a ''principal element'' of the other equipment or systems; *and*

N.B. 1: The control status of ''signal processing'' or ''image enhancement'' equipment specially designed for other equipment with functions limited to those required for the other equipment is determined by the control status of the other equipment even if it exceeds the ''principal element'' criterion.

N.B. 2: For the control status of ''digital computers'' or related equipment for telecommunications equipment, see Category 5, Part 1 (Telecommunications).

c. The ''technology'' for the ''digital computers'' and related equipment is determined by 4E.

a. Designed or modified for ''fault tolerance'';

Note: For the purposes of 4A003.a., ''digital computers'' and related equipment are not considered to be designed or modified for ''fault tolerance'' if they utilize any of the following:

1. Error detection or correction algorithms in ''main storage'';

2. The interconnection of two ''digital computers'' so that, if the active central processing unit fails, an idling but mirroring central processing unit can continue the system's functioning;

3. The interconnection of two central processing units by data channels or by use of shared storage to permit one central processing unit to perform other work until the second central processing unit fails, at which time the first central processing unit takes over in order to continue the system's functioning; *or*

4. The synchronization of two central processing units by ''software'' so that one central processing unit recognizes when the other central processing unit fails and recovers tasks from the failing unit.

b. ''Digital computers'' having a ''composite theoretical performance'' (''CTP'') exceeding 190,000 million theoretical operations per second (MTOPS);

c. ''Electronic assemblies'' specially designed or modified to be capable of enhancing performance by aggregation of ''computing elements'' (''CEs'') so that the ''CTP'' of the aggregation exceeds the limit in 4A003.b.;

Note 1: 4A003.c applies only to ''electronic assemblies'' and programmable interconnections not exceeding the limit in 4A003.b. when shipped as unintegrated ''electronic assemblies''. It does not apply to ''electronic assemblies'' inherently limited by nature of their design for use as related equipment controlled by 4A003.e.

Note 2: 4A003.c does not control ''electronic assemblies'' specially designed for a product or family of products whose maximum configuration does not exceed the limit of 4A003.b.

d. [RESERVED]

e. Equipment performing analog-to-digital conversions exceeding the limits in 3A001.a.5;

f. [RESERVED]

g. Equipment specially designed to provide external interconnection of ''digital computers'' or associated equipment that allows communications at data rates exceeding 1.25 Gbyte/s.

Note: 4A003.g does not control internal interconnection equipment (*e.g.*, backplanes, buses) passive interconnection equipment, ''network access controllers'' or ''communication channel controllers''.

■ 26. In Supplement No. 1 to part 774 (the Commerce Control List), Category 4—Computers, Export Control Classification Number (ECCN) 4A994 is amended by revising the ''items''

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

4A994 Computers, ''electronic assemblies'', and related equipment not controlled by 4A001 or 4A003, and specially designed components therefor.

* * * * *

List of Items Controlled

Unit: * * *
Related Controls: * * *
Related Definitions: * * *
Items:

Note 1: The control status of the ''digital computers'' and related equipment described in 4A994 is determined by the control status of other equipment or systems provided:

a. The ''digital computers'' or related equipment are essential for the operation of the other equipment or systems;

b. The ''digital computers'' or related equipment are not a ''principal element'' of the other equipment or systems; and

N.B. 1: The control status of ''signal processing'' or ''image enhancement'' equipment specially designed for other equipment with functions limited to those required for the other equipment is determined by the control status of the other equipment even if it exceeds the ''principal element'' criterion.

N.B. 2: For the control status of ''digital computers'' or related equipment for telecommunications equipment, see Category 5, Part 1 (Telecommunications).

c. The ''technology'' for the ''digital computers'' and related equipment is determined by 4E.

a. Electronic computers and related equipment, and ''electronic assemblies'' and specially designed components therefor, rated for operation at an ambient temperature above 343 K (70 °C);

b. ''Digital computers'' having a ''composite theoretical performance'' (''CTP'') equal to or greater than 6 million theoretical operations per second (MTOPS);

c. ''Electronic assemblies'' that are specially designed or modified to enhance performance by aggregation of ''computing elements'' (''CEs''), as follows:

c.1. Designed to be capable of aggregation in configurations of 16 or more ''computing elements'' (''CEs''); *or*

c.2. Having a sum of maximum data rates on all channels available for connection to associated processors exceeding 40 million Byte/s;

Note 1: 4A994.c applies only to ''electronic assemblies'' and programmable interconnections with a ''CTP'' not exceeding the limits in 4A994.b, when shipped as unintegrated ''electronic assemblies''. It does not apply to ''electronic assemblies'' inherently limited by nature of their design for use as related equipment controlled by 4A994.g and 4A994.k.

Note 2: 4A994.c does not control any ''electronic assembly'' specially designed for a product or family of products whose maximum configuration does not exceed the limits of 4A994.b.

d. Disk drives and solid state storage equipment:

d.1. Magnetic, erasable optical or magneto-optical disk drives with a ''maximum bit transfer rate'' exceeding 25 million bit/s;

d.2. Solid state storage equipment, other than ''main storage'' (also known as solid state disks or RAM disks), with a ''maximum bit transfer rate'' exceeding 36 million bit/s;

e. Input/output control units designed for use with equipment controlled by 4A994.d;

f. Equipment for ''signal processing'' or ''image enhancement'' having a ''composite theoretical performance'' (''CTP'') exceeding 8.5 million theoretical operations per second (MTOPS);

g. Graphics accelerators or graphics coprocessors that exceed a ''three dimensional vector rate'' of 400,000 or, if supported by 2–D vectors only, a ''two dimensional vector rate'' of 600,000;

Note: The provisions of 4A994.g do not apply to work stations designed for and limited to:

a. Graphic arts (*e.g.*, printing, publishing); and

b. The display of two-dimensional vectors.

h. Color displays or monitors having more than 120 resolvable elements per cm in the direction of the maximum pixel density;

Note 1: 4A994.h does not control displays or monitors not specially designed for electronic computers.

Note 2: Displays specially designed for air traffic control (ATC) systems are treated as specially designed components for ATC systems under Category 6.

i. Equipment containing ''terminal interface equipment'' exceeding the limits in 5A991.

Note: For the purposes of 4A994.i, ''terminal interface equipment'' includes ''local area network'' interfaces, modems and other communications interfaces. ''Local area network'' interfaces are evaluated as ''network access controllers''.

j. Equipment specially designed to provide external interconnection of ''digital computers'' or associated equipment that allows communications at data rates exceeding 80 Mbyte/s.

Note: 4A994.j does not control internal interconnection equipment (*e.g.*, backplanes, buses) passive interconnection equipment, ''network access controllers'' or ''communication channel controllers''.

k. ''Hybrid computers'' and ''electronic assemblies'' and specially designed components therefor, as follows:

k.1. Containing ''digital computers'' controlled by 4A003;

k.2. Containing analog-to-digital converters having all of the following characteristics:

k.2.a. 32 channels or more; *and*

k.2.b. A resolution of 14 bit (plus sign bit) or more with a conversion rate of 200,000 conversions/s or more.

■ 27. In Supplement No. 1 to part 774 (the Commerce Control List), Category 4—Computers, Export Control Classification Number (ECCN) 4D001 is amended by revising the License Requirements section, the ''TSR'' paragraph of the License Exception section, and the ''items'' paragraph in the List of Items Controlled section, to read as follows:

4D001 ''Software'' specially designed or modified for the ''development'', ''production'' or ''use'' of equipment or ''software'' controlled by 4A001 to 4A004, or 4D (except 4D980, 4D993 or 4D994), and other specified software, see List of Items Controlled.

License Requirements

Reason for Control: NS, CC, AT, NP, XP.

Control(s)	Country chart
NS applies to ''software'' for commodities or software controlled by 4A001 to 4A004, 4D001 to 4D003	NS Column 1.
CC applies to ''software'' for computerized finger-print equipment controlled by 4A003 for CC reasons	CC Column 1.
AT applies to entire entry	AT Column 1.

NP applies, unless a License Exception is available. *See* § 742.3(b) of the EAR for information on applicable licensing review policies.

XP applies to ''software'' for computers with a CTP greater than 190,000 MTOPS, unless a License Exception is available. XP controls vary according to destination and end-user and end-use; however, XP does not apply to Canada. *See* § 742.12 of the EAR for additional information.

License Exceptions

CIV: * * *

TSR: Yes, except software for commodities controlled by ECCN 4A003.b or ECCN 4A003.c is limited to software for computers or electronic assemblies with a CTP equal to or less than 190,000 MTOPS.

CTP: * * *

List of Items Controlled

Unit: * * *
Related Controls: * * *
Related Definitions: * * *
Items:

a. ''Software'' specially designed or modified for the ''development'', ''production'' or ''use'' of equipment or ''software'' controlled by 4A001 to 4A004, or 4D (except 4D980, 4D993 or 4D994).

b. ''Software'', other than that controlled by 4D001.a, specially designed or modified for the ''development'' or ''production'' of:

b.1. ''Digital computers'' having a ''composite theoretical performance'' (''CTP'') exceeding 75,000 MTOPS; *or*

b.2. ''Electronic assemblies'' specially designed or modified for enhancing performance by aggregation of ''computing elements'' (''CEs'') so that the ''CTP'' of the aggregation exceeds the limit in 4D001.b.1.

■ 28. In Supplement No. 1 to part 774 (the Commerce Control List), Category 4—Computers, Export Control Classification Number (ECCN) 4E001 is amended by revising the License Requirements section, the ''TSR'' paragraph in the License Exception section, and the ''items'' paragraph in the List of Items Controlled section, to read as follows:

4E001 ''Technology'' according to the General Technology Note, for the ''development'', ''production'' or ''use'' of equipment or ''software'' controlled by 4A (except 4A980, 4A993 or 4A994) or 4D (except 4D980, 4D993, 4D994), and other specified technology, see List of Items Controlled.

License Requirements

Reason for Control: NS, MT, CC, AT, NP, XP.

Control(s)	Country chart
NS applies to ''technology'' for commodities or software controlled by 4A001 to 4A004, 4D001 to 4D003	NS Column 1.
MT applies to ''technology'' for items controlled by 4A001.a and 4A101 for MT reasons	MT Column 1.
CC applies to ''technology'' for computerized fingerprint equipment controlled by 4A003 for CC reasons	CC Column 1.
AT applies to entire entry	AT Column 1.

NP applies, unless a License Exception is available. *See* § 742.3(b) of the EAR for information on applicable licensing review policies.

XP applies to ''technology'' for computers with a CTP greater than 190,000 MTOPS, unless a License Exception is available. XP controls vary according to destination and end-user and end-use, however, XP does not apply to Canada. *See* § 742.12 of the EAR for additional information.

License Exceptions

CIV: * * *

TSR: Yes, except technology for commodities controlled by ECCN 4A003.b or ECCN 4A003.c is limited to technology for computers or electronic assemblies with a CTP equal to or less than 190,000 MTOPS.

CTP: * * *

List of Items Controlled

Unit: * * *

Related Controls: * * *

Related Definitions: * * *

Items:

a. ''Technology'' according to the General Technology Note, for the ''development,'' ''production,'' or ''use'' of equipment or ''software'' controlled by 4A (except 4A980, 4A993 or 4A994) or 4D (except 4D980, 4D993, 4D994).

b. ''Technology'', other than that controlled by 4E001.a, specially designed or modified for the ''development'' or ''production'' of:

b.1. ''Digital computers'' having a ''composite theoretical performance'' (''CTP'') exceeding 75,000 MTOPS; or

b.2. ''Electronic assemblies'' specially designed or modified for enhancing performance by aggregation of ''computing elements'' (''CEs'') so that the ''CTP'' of the aggregation exceeds the limit in 4E001.b.1.

■ 29. 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 revising the License Requirements and License Exceptions sections, and revising the ''Related Controls'' and ''items'' paragraphs in the List of Items Controlled section, to read as follows:

5A001 Telecommunications systems, equipment, and components.

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, or .d	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.

License Exceptions

LVS: N/A for 5A001.a, b.5, .e $5000 for 5A001b.1, b.2, b.3, b.6, and .d $3000 for 5A001.c.

GBS: Yes, except 5A001.a, b.5, .e.

CIV: Yes, except 5A001.a, b.3, b.5, .e.

List of Items Controlled

Unit: * * *

Related Controls: Telecommunications equipment defined in 5A001.a.1 through A001.a.3 for use on board satellites is subject to the export licensing authority of the Department of State, Directorate of Defense Trade Controls (22 CFR part 121). Direction finding equipment defined in 5A001.e is subject to the export licensing authority of the Department of State, Directorate of Defense Trade Controls (22 CFR part 121). See also 5A101 and 5A991.

Related Definitions: * * *

Items:

a. Any type of telecommunications equipment having any of the following characteristics, functions or features:

a.1. Specially designed to withstand transitory electronic effects or electromagnetic pulse effects, both arising from a nuclear explosion;

a.2. Specially hardened to withstand gamma, neutron or ion radiation; or

a.3. Specially designed to operate outside the temperature range from 218 K (−55 °C) to 397 K (124 °C).

Note: 5A001.a.3 applies only to electronic equipment.

Note: 5A001.a.2 and 5A001.a.3 do not apply to equipment on board satellites.

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

b.1 Being underwater communications systems having any of the following characteristics:

b.1.a. An acoustic carrier frequency outside the range from 20 kHz to 60 kHz;

b.1.b. Using an electromagnetic carrier frequency below 30 kHz; or

b.1.c. Using electronic beam steering techniques;

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

b.2.a. Incorporating adaptive techniques providing more than 15 dB suppression of an interfering signal; *or*

b.2.b. Having all of the following:

b.2.b.1. Automatically predicting and selecting frequencies and ''total digital transfer rates'' per channel to optimize the transmission; *and*

b.2.b.2. Incorporating a linear power amplifier configuration having a capability to support multiple signals simultaneously at an output power of 1 kW or more in the 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;

b.3. Being radio equipment employing ''spread spectrum'' techniques, including ''frequency hopping'' techniques, having any of the following characteristics:

b.3.a. User programmable spreading codes; *or*

b.3.b. A total transmitted bandwidth which is 100 or more times the bandwidth of any one information channel and in excess of 50 kHz;

Note: 5A001.b.3.b does not control radio equipment specially designed for use with civil cellular radio-communications systems.

Note: 5A001.b.3 does not control equipment operating at an output power of 1.0 Watt or less.

b.4 Being radio equipment employing ''time-modulated ultra-wideband'' techniques, having user programmable channelizing or scrambling codes;

b.5. Being digitally controlled radio receivers having all of the following:

b.5.a. More than 1,000 channels;

b.5.b. A ''frequency switching time'' of less than 1 ms;

b.5.c. Automatic searching or scanning of a part of the electromagnetic spectrum; *and*

b.5.d. Identification of the received signals or the type of transmitter; *or*

Note: 5A001.b.5 does not control radio equipment specially designed for use with civil cellular radio-communications systems.

b.6. Employing functions of digital ''signal processing'' to provide voice coding output at rates of less than 2,400 bit/s.

Technical Note: For variable rate voice coding, 5A001.b.6 applies to the voice coding output of continuous speech.

c. Optical fiber communication cables, optical fibers and accessories, as follows:

c.1. Optical fibers of more than 500 m in length specified by the manufacturer as being capable of withstanding a proof test tensile stress of 2×10^9 N/m^2 or more;

Technical Note: Proof Test: On-line or off-line production screen testing that dynamically applies a prescribed tensile stress over a 0.5 to 3 m length of fiber at a running rate of 2 to 5 m/s while passing between capstans approximately 150 mm in diameter. The ambient temperature is a nominal 293 K (20 °C) and relative humidity 40%. Equivalent national standards may be used for executing the proof test.

c.2. Optical fiber cables and accessories designed for underwater use.

Note: 5A001.c.2 does not control standard civil telecommunication cables and accessories.

N.B. 1: For underwater umbilical cables, and connectors thereof, see 8A002.a.3.

N.B. 2: For fiber-optic hull penetrators or connectors, see 8A002.c.

d. ''Electronically steerable phased array antennae'' operating above 31.8 GHz.

Note: 5A001.d does not control ''electronically steerable phased array antennae'' for landing systems with instruments meeting ICAO standards covering microwave landing systems (MLS).

e. Direction finding equipment operating at frequencies above 30 MHz and having all of the following characteristics, and specially designed components therefor:

e.1. ''Instantaneous bandwidth'' of 1 MHz or more;

e.2. Parallel processing of more than 100 frequency channels; and

e.3. Processing rate of more than 1,000 direction finding results per second and per frequency channel.

■ 30. In Supplement No. 1 to part 774 (the Commerce Control List), Category 6—Sensors, Export Control Classification Number (ECCN) 6A001 is amended by revising the ''LVS'' paragraph in the License Exceptions section, and the ''items'' paragraph in the List of Items Controlled section, to read as follows:

6A001 Acoustics.

* * * * *

License Exceptions

LVS: $3000; N/A for 6A001.a.1.b.1 object detection and location systems having a transmitting frequency below 5 kHz or a sound pressure level exceeding 210 dB (reference 1 μPa at 1 m) for equipment with an operating frequency in the band from 30 kHz to 2 kHz inclusive; 6A001.a.2.a.1, a.2.a.2, 6A001.a.2.a.3, a.2.a.5, a.2.a.6, 6A001.a.2.b; processing equipment controlled by 6A001.a.2.c, and specially designed for real time application with towed acoustic hydrophone arrays; a.2.e.1, a.2.e.2; and bottom or bay cable systems controlled by 6A001.a.2.f and having processing equipment specially designed for real time application with bottom or bay cable systems.

GBS: * * *

CIV: * * *

List of Items Controlled

Unit: * * *

Related Controls: * * *

Related Definitions: * * *

Items:

a. Marine acoustic systems, equipment and specially designed components therefor, as follows:

a.1. Active (transmitting or transmitting-and-receiving) systems, equipment and specially designed components therefor, as follows:

Note: 6A001.a.1 does not control:

a. Depth sounders operating vertically below the apparatus, not including a scanning function exceeding ±20°, and limited to measuring the depth of water, the distance of submerged or buried objects or fish finding;

b. Acoustic beacons, as follows:

1. Acoustic emergency beacons;

2. Pingers specially designed for relocating or returning to an underwater position.

a.1.a. Wide-swath bathymetric survey systems designed for sea bed topographic mapping, having all of the following:

a.1.a.1. Being designed to take measurements at an angle exceeding 20° from the vertical;

a.1.a.2. Being designed to measure depths exceeding 600 m below the water surface; *and*

a.1.a.3. Being designed to provide any of the following:

a.1.a.3.a. Incorporation of multiple beams any of which is less than 1.9°; *or*

a.1.a.3.b. Data accuracies of better than 0.3% of water depth across the swath averaged over the individual measurements within the swath;

a.1.b. Object detection or location systems having any of the following:

a.1.b.1. A transmitting frequency below 10 kHz;

a.1.b.2. Sound pressure level exceeding 224dB (reference 1 μPa at 1 m) for equipment with an operating frequency in the band from 10 kHz to 24 kHz inclusive;

a.1.b.3. Sound pressure level exceeding 235 dB (reference 1 μPa at 1 m) for equipment with an operating frequency in the band between 24 kHz and 30 kHz;

a.1.b.4. Forming beams of less than 1° on any axis and having an operating frequency of less than 100 kHz;

a.1.b.5. Designed to operate with an unambiguous display range exceeding 5,120 m; *or*

a.1.b.6. Designed to withstand pressure during normal operation at depths exceeding 1,000 m and having transducers with any of the following:

a.1.b.6.a. Dynamic compensation for pressure; *or*

a.1.b.6.b. Incorporating other than lead zirconate titanate as the transduction element;

a.1.c. Acoustic projectors, including transducers, incorporating piezoelectric, magnetostrictive, electrostrictive, electrodynamic or hydraulic elements operating individually or in a designed combination, having any of the following:

Notes: 1. The control status of acoustic projectors, including transducers, specially designed for other equipment is determined by the control status of the other equipment.

2. 6A001.a.1.c does not control electronic sources that direct the sound vertically only, or mechanical (*e.g.*, air gun or vapor-shock gun) or chemical (*e.g.*, explosive) sources.

a.1.c.1. An instantaneous radiated acoustic power density exceeding 0.01 mW/mm^2/Hz for devices operating at frequencies below 10 kHz;

a.1.c.2. A continuously radiated acoustic power density exceeding 0.001 Mw/mm^2/Hz for devices operating at frequencies below 10 kHz; *or*

Technical Note: Acoustic power density is obtained by dividing the output acoustic power by the product of the area of the radiating surface and the frequency of operation.

a.1.c.3. Side-lobe suppression exceeding 22 dB;

a.1.d. Acoustic systems, equipment and specially designed components for determining the position of surface vessels or underwater vehicles designed to operate at a range exceeding 1,000 m with a positioning

accuracy of less than 10 m rms (root mean square) when measured at a range of 1,000 m;

Note: 6A001.a.1.d includes:

a. Equipment using coherent ''signal processing'' between two or more beacons and the hydrophone unit carried by the surface vessel or underwater vehicle;

b. Equipment capable of automatically correcting speed-of-sound propagation errors for calculation of a point.

a.2. Passive (receiving, whether or not related in normal application to separate active equipment) systems, equipment and specially designed components therefor, as follows:

a.2.a. Hydrophones having any of the following characteristics:

Note: The control status of hydrophones specially designed for other equipment is determined by the control status of the other equipment.

a.2.a.1. Incorporating continuous flexible sensing elements;

a.2.a.2. Incorporating flexible assemblies of discrete sensing elements with either a diameter or length less than 20 mm and with a separation between elements of less than 20 mm;

a.2.a.3. Having any of the following sensing elements:

a.2.a.3.a. Optical fibers; *or*

a.2.a.3.b. Piezoelectric polymer films other than polyvinylidene-fluoride (PVDF) and its co-polymers {P(VDF–TrFE) and P(VDF–TFE)}; *or*

a.2.a.3.c. Flexible piezoelectric composites;

a.2.a.4. A hydrophone sensitivity better than −180dB at any depth with no acceleration compensation;

a.2.a.5. When designed to operate at depths exceeding 35 m with acceleration compensation; *or*

a.2.a.6. Designed for operation at depths exceeding 1,000 m;

Technical Notes: 1. ''Piezoelectric polymer film'' sensing elements consist of polarized polymer film that is stretched over and attached to a supporting frame or spool (mandrel).

2. 'Flexible piezoelectric composite' sensing elements consist of piezoelectric ceramic particles or fibers combined with an electrically insulating, acoustically transparent rubber, polymer or epoxy compound, where the compound is an integral part of the sensing elements.

3. Hydrophone sensitivity is defined as twenty times the logarithm to the base 10 of the ratio of rms output voltage to a 1 V rms reference, when the hydrophone sensor, without a pre-amplifier, is placed in a plane wave acoustic field with an rms pressure of 1 μPa. For example, a hydrophone of −160 dB (reference 1 V per μPa) would yield an output voltage of 10^{-8} V in such a field, while one of −180 dB sensitivity would yield only 10^{-9} V output. Thus, −160 dB is better than −180 dB.

a.2.b. Towed acoustic hydrophone arrays having any of the following:

a.2.b.1. Hydrophone group spacing of less than 12.5 m or ''able to be modified'' to have hydrophone group spacing of less than 12.5 m;

a.2.b.2. Designed or 'able to be modified' to operate at depths exceeding 35m;

Technical Note: ''Able to be modified'' in 6A001.a.2.b means having provisions to allow a change of the wiring or interconnections to alter hydrophone group spacing or operating depth limits. These provisions are: spare wiring exceeding 10% of the number of wires, hydrophone group spacing adjustment blocks or internal depth limiting devices that are adjustable or that control more than one hydrophone group.

a.2.b.3. Heading sensors controlled by 6A001.a.2.d;

a.2.b.4. Longitudinally reinforced array hoses;

a.2.b.5. An assembled array of less than 40 mm in diameter;

a.2.b.6. Multiplexed hydrophone group signals designed to operate at depths exceeding 35 m or having an adjustable or removable depth sensing device in order to operate at depths exceeding 35 m; *or*

a.2.b.7. Hydrophone characteristics controlled by 6A001.a.2.a;

a.2.c. Processing equipment, specially designed for towed acoustic hydrophone arrays, having ''user accessible programmability'' and time or frequency domain processing and correlation, including spectral analysis, digital filtering and beamforming using Fast Fourier or other transforms or processes;

a.2.d. Heading sensors having all of the following:

a.2.d.1. An accuracy of better than ±0.5°; *and*

a.2.d.2. Designed to operate at depths exceeding 35 m or having an adjustable or removable depth sensing device in order to operate at depths exceeding 35 m;

a.2.e. Bottom or bay cable systems having any of the following:

a.2.e.1. Incorporating hydrophones controlled by 6A001.a.2.a; *or*

a.2.e.2. Incorporating multiplexed hydrophone group signal modules having all of the following characteristics:

a.2.e.2.a. Designed to operate at depths exceeding 35 m or having an adjustable or removal depth sensing device in order to operate at depths exceeding 35 m; *and*

a.2.e.2.b. Capable of being operationally interchanged with towed acoustic hydrophone array modules;

a.2.f. Processing equipment, specially designed for bottom or bay cable systems, having ''user accessible programmability'' and time or frequency domain processing and correlation, including spectral analysis, digital filtering and beamforming using Fast Fourier or other transforms or processes;

b. Correlation-velocity sonar log equipment designed to measure the horizontal speed of the equipment carrier relative to the sea bed at distances between the carrier and the sea bed exceeding 500 m.

■ 31. 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 ''items'' paragraph in the List of Items Controlled section, to read as follows:

6A002 Optical sensors.

* * * * *

List of Items Controlled

Unit: * * *

Related Controls:

Related Definitions: * * *

Items:

a. Optical detectors, as follows:

Note: 6A002.a does not control germanium or silicon photodevices.

N.B. Silicon and other material based ''microbolometer'' non ''space-qualified'' ''focal plane arrays'' are only specified under 6A002.a.3.f.

a.1. ''Space-qualified'' solid-state detectors, as follows:

a.1.a. ''Space-qualified'' solid-state detectors, having all of the following:

a.1.a.1. A peak response in the wavelength range exceeding 10 nm but not exceeding 300 nm; *and*

a.1.a.2. A response of less than 0.1% relative to the peak response at a wavelength exceeding 400 nm;

a.1.b. ''Space-qualified'' solid-state detectors, having all of the following:

a.1.b.1. A peak response in the wavelength range exceeding 900 nm but not exceeding 1,200 nm; *and*

a.1.b.2. A response ''time constant'' of 95 ns or less;

a.1.c. ''Space-qualified'' solid-state detectors having a peak response in the wavelength range exceeding 1,200 nm but not exceeding 30,000 nm;

a.2. Image intensifier tubes and specially designed components therefor, as follows:

a.2.a. Image intensifier tubes having all of the following:

a.2.a.1. A peak response in the wavelength range exceeding 400 nm but not exceeding 1,050 nm;

a.2.a.2. A microchannel plate for electron image amplification with a hole pitch (center-to-center spacing) of 12 μm or less; *and*

a.2.a.3. Any of the following photocathodes:

a.2.a.3.a. S-20, S-25 or multialkali photocathodes with a luminous sensitivity exceeding 350 μA/lm;

a.2.a.3.b. GaAs or GaInAs photocathodes; *or*

a.2.a.3.c. Other III–V compound semiconductor photocathodes;

Note: 6A002.a.2.a.3.c does not apply to compound semiconductor photocathodes with a maximum radiant sensitivity of 10 mA/W or less.

a.2.b. Specially designed components, as follows:

a.2.b.1. Microchannel plates having a hole pitch (center-to-center spacing) of 12 μm or less;

a.2.b.2. GaAs or GaInAs photocathodes;

a.2.b.3. Other III–V compound semiconductor photocathodes;

Note: 6A002.a.2.b.3 does not control compound semiconductor photocathodes with a maximum radiant sensitivity of 10 mA/W or less.

a.3. Non-''space-qualified'' ''focal plane arrays'', as follows:

N.B. Silicon and other material based 'microbolometer' non ''space-qualified'' ''focal plane arrays'' are only specified in 6A002.a.3.f.

Technical Notes:

1. Linear or two-dimensional multi-element detector arrays are referred to as ''focal plane arrays''.

2. For the purposes of 6A002.a.3. 'cross scan direction' is defined as the axis parallel to the linear array of detector elements and the 'scan direction' is defined as the axis perpendicular to the linear array of detector elements.

Note 1: 6A002.a.3 includes photoconductive arrays and photovoltaic arrays.

Note 2: 6A002.a.3 does not control:

a. Multi-element (not to exceed 16 elements) encapsulated photoconductive cells using either lead sulphide or lead selenide;

b. Pyroelectric detectors using any of the following:

b.1. Triglycine sulphate and variants;

b.2. Lead-lanthanum-zirconium titanate and variants;

b.3. Lithium tantalate;

b.4. Polyvinylidene fluoride and variants; *or*

b.5. Strontium barium niobate and variants.

a.3.a. Non-''space-qualified'' ''focal plane arrays'', having all of the following:

a.3.a.1. Individual elements with a peak response within the wavelength range exceeding 900 nm but not exceeding 1,050 nm; *and*

a.3.a.2. A response ''time constant'' of less than 0.5 ns;

a.3.b. Non-''space-qualified'' ''focal plane arrays'', having all of the following:

a.3.b.1. Individual elements with a peak response in the wavelength range exceeding 1,050 nm but not exceeding 1,200 nm; *and*

a.3.b.2. A response ''time constant'' of 95 ns or less;

a.3.c. Non-''space-qualified'' non-linear (2-dimensional) ''focal plane arrays'', having individual elements with a peak response in the wavelength range exceeding 1,200 nm but not exceeding 30,000 nm;

N.B. Silicon and other material based 'microbolometer' non-''space-qualified'' ''focal plane arrays'' are only specified in 6A002.a.3.f.

a.3.d. Non-''space-qualified'' linear (1-dimensional) ''focal plane arrays'', having all of the following :

a.3.d.1. Individual elements with a peak response in the wavelength range exceeding 1,200 nm but not exceeding 2,500 nm; *and*

a.3.d.2. Any of the following:

a.3.d.2.a. A ratio of scan direction dimension of the detector element to the cross-scan direction dimension of the detector element of less than 3.8; *or*

a.3.d.2.b. Signal processing in the element (SPRITE);

a.3.e. Non-''space-qualified'' linear (1-dimensional) ''focal plane arrays'', having individual elements with a peak response in the wavelength range exceeding 2,500 nm but not exceeding 30,000 nm.

a.3.f. Non-''space-qualified'' non-linear (2-dimensional) infrared ''focal plane arrays'' based on 'microbolometer' material having individual elements with an unfiltered response in the wavelength range equal to or exceeding 8,000 nm but not exceeding 14,000 nm.

Technical Notes:

1. For the purposes of 6A002.a.3.f. 'microbolometer' is defined as a thermal imaging detector that, as a result of a temperature change in the detector caused by the absorption of infrared radiation, is used to generate any usable signal.

2. Non-imaging thermal detectors are not controlled by 6A002.a.3. Imaging thermal detectors are a multi-element array of thermal detectors with the capacity to form a visual, electronic or other representation of an object with sufficient fidelity to enable understanding of its shape or other spatial characteristics, such as height, width, or area. A multi-element array of thermal detectors without the capacity to form spatial representation of an object is non-imaging.

3. 6A002.a.3.f captures all non-''space-qualified'' non-linear (2-dimensional) infrared ''focal plane arrays'' based on microbolometer material having individual elements with any unfiltered response between 8,000 nm and 14,000 nm.

b. ''Monospectral imaging sensors'' and ''multispectral imaging sensors'' designed for remote sensing applications, having any of the following:

b.1. An Instantaneous-Field-Of-View (IFOV) of less than 200 µrad (microradians); *or*

b.2. Being specified for operation in the wavelength range exceeding 400 nm but not exceeding 30,000 nm and having all the following;

b.2.a. Providing output imaging data in digital format; *and*

b.2.b. Being any of the following:

b.2.b.1. ''Space-qualified''; *or*

b.2.b.2. Designed for airborne operation, using other than silicon detectors, and having an IFOV of less than 2.5 mrad (milliradians).

c. Direct view imaging equipment operating in the visible or infrared spectrum, incorporating any of the following:

c.1. Image intensifier tubes having the characteristics listed in 6A002.a.2.a; *or*

c.2. ''Focal plane arrays'' having the characteristics listed in 6A002.a.3.

Technical Note: ''Direct view'' refers to imaging equipment, operating in the visible or infrared spectrum, that presents a visual image to a human observer without converting the image into an electronic signal for television display, and that cannot record or store the image photographically, electronically or by any other means.

Note: 6A002.c does not control the following equipment incorporating other than GaAs or GaInAs photocathodes:

a. Industrial or civilian intrusion alarm, traffic or industrial movement control or counting systems;

b. Medical equipment;

c. Industrial equipment used for inspection, sorting or analysis of the properties of materials;

d. Flame detectors for industrial furnaces;

e. Equipment specially designed for laboratory use.

d. Special support components for optical sensors, as follows:

d.1. ''Space-qualified'' cryocoolers;

d.2. Non-''space-qualified'' cryocoolers, having a cooling source temperature below 218 K (− 55 °C), as follows:

d.2.a. Closed cycle type with a specified Mean-Time-To-Failure (MTTF), or Mean-Time-Between-Failures (MTBF), exceeding 2,500 hours;

d.2.b. Joule-Thomson (JT) self-regulating minicoolers having bore (outside) diameters of less than 8 mm;

d.3. Optical sensing fibers specially fabricated either compositionally or structurally, or modified by coating, to be acoustically, thermally, inertially, electromagnetically or nuclear radiation sensitive.

e. ''Space qualified'' ''focal plane arrays'' having more than 2,048 elements per array and having a peak response in the wavelength range exceeding 300 nm but not exceeding 900 nm.

■ 32. In Supplement No. 1 to part 774 (the Commerce Control List), Category 6—Sensors, Export Control Classification Number (ECCN) 6A003 is amended by revising the ''Items'' paragraphs in the List of Items Controlled section, to read as follows:

6A003 Cameras.

* * * * *

List of Items Controlled

Unit: * * *

Related Controls: * * *

Related Definitions: * * *

Items:

a. Instrumentation cameras and specially designed components therefor, as follows:

Note: Instrumentation cameras, controlled by 6A003.a.3 to 6A003.a.5, with modular structures should be evaluated by their maximum capability, using plug-ins available according to the camera manufacturer's specifications.

a.1. High-speed cinema recording cameras using any film format from 8 mm to 16 mm inclusive, in which the film is continuously advanced throughout the recording period, and that are capable of recording at framing rates exceeding 13,150 frames/s;

Note: 6A003.a.1 does not control cinema recording cameras designed for civil purposes.

a.2. Mechanical high speed cameras, in which the film does not move, capable of recording at rates exceeding 1,000,000 frames/s for the full framing height of 35 mm film, or at proportionately higher rates for lesser frame heights, or at proportionately lower rates for greater frame heights;

a.3. Mechanical or electronic streak cameras having writing speeds exceeding 10 mm/µs;

a.4. Electronic framing cameras having a speed exceeding 1,000,000 frames/s;

a.5. Electronic cameras, having all of the following:

a.5.a. An electronic shutter speed (gating capability) of less than 1 μs per full frame; *and*

a.5.b. A read out time allowing a framing rate of more than 125 full frames per second.

a.6. Plug-ins, having all of the following characteristics:

a.6.a. Specially designed for instrumentation cameras which have modular structures and that are controlled by 6A003.a; *and*

a.6.b. Enabling these cameras to meet the characteristics specified in 6A003.a.3, 6A003.a.4 or 6A003.a.5, according to the manufacturer's specifications.

b. Imaging cameras, as follows:

Note: 6A003.b does not control television or video cameras specially designed for television broadcasting.

b.1. Video cameras incorporating solid state sensors, having a peak response in the wavelength range exceeding 10nm, but not exceeding 30,000 nm and having all of the following:

b.1.a. Having any of the following:

b.1.a.1. More than 4×10^6 ''active pixels'' per solid state array for monochrome (black and white) cameras;

b.1.a.2. More than 4×10^6 ''active pixels'' per solid state array for color cameras incorporating three solid state arrays; *or*

b.1.a.3. More than 12×10^6 ''active pixels'' for solid state array color cameras incorporating one solid state array; *and*

b.1.b. Having any of the following:

b.1.b.1. Optical mirrors controlled by 6A004.a.;

b.1.b.2. Optical control equipment controlled by 6A004.d.; *or*

b.1.b.3. The capability for annotating internally generated camera tracking data.

Technical Notes:

1. For the purposes of this entry, digital video cameras should be evaluated by the maximum number of ''active pixels'' used for capturing moving images.

2. For the purpose of this entry, camera tracking data is the information necessary to define camera line of sight orientation with respect to the earth. This includes: (1) the horizontal angle the camera line of sight makes with respect to the earth's magnetic field direction and; (2) the vertical angle between the camera line of sight and the earth's horizon.

b.2. Scanning cameras and scanning camera systems, having all of the following:

b.2.a. A peak response in the wavelength range exceeding 10 nm, but not exceeding 30,000 nm;

b.2.b. Linear detector arrays with more than 8,192 elements per array; *and*

b.2.c. Mechanical scanning in one direction;

b.3. Imaging cameras incorporating image intensifier tubes having the characteristics listed in 6A002.a.2.a;

b.4. Imaging cameras incorporating ''focal plane arrays'' having any of the following:

b.4.a. Incorporating ''focal plane arrays'' controlled by 6A002.a.3.a. to 6A002.a.3.e.; or

b.4.b. Incorporating ''focal plane arrays'' controlled by 6A002.a.3.f.

Note 1: ''Imaging cameras'' described in 6A003.b.4 include ''focal plane arrays'' combined with sufficient signal processing electronics, beyond the read out integrated circuit, to enable as a minimum the output of an analog or digital signal once power is supplied.

Note 2: 6A003.b.4.a does not control imaging cameras incorporating linear ''focal plane arrays'' with twelve elements or fewer, not employing time-delay-and-integration within the element, designed for any of the following:

a. Industrial or civilian intrusion alarm, traffic or industrial movement control or counting systems;

b. Industrial equipment used for inspection or monitoring of heat flows in buildings, equipment or industrial processes;

c. Industrial equipment used for inspection, sorting or analysis of the properties of materials;

d. Equipment specially designed for laboratory use; or

e. Medical equipment.

Note 3: 6A003.b.4.b. does not control imaging cameras having any of the following characteristics:

a. A maximum frame rate equal to or less than 9 Hz;

b. Having all of the following:

1. Having a minimum horizontal or vertical Instantaneous-Field-of-View (IFOV) of at least 10 mrad/pixel (milliradians/pixel);

2. Incorporating a fixed focal-length lens that is not designed to be removed;

3. Not incorporating a direct view display, *and*

Technical Note: ''Direct view'' refers to an imaging camera operating in the infrared spectrum that presents a visual image to a human observer using a near-to-eye micro display incorporating any light-security mechanism.

4. Having any of the following:

a. No facility to obtain a viewable image of the detected field-of-view, *or*

b. The camera is designed for a single kind of application and designed not to be user modified, *or*

Technical Note: Instantaneous Field of View (IFOV) specified in Note 3.b is the lesser figure of the Horizontal FOV or the Vertical FOV.

Horizontal IFOV = horizontal Field of View (FOV) / number of horizontal detector elements

Vertical IFOV = vertical Field of View (FOV) / number of vertical detector elements

c. Where the camera is specially designed for installation into a civilian passenger land vehicle of less than three tons (gross vehicle weight) and having all of the following:

1. Is operable only when installed in any of the following:

a. The civilian passenger land vehicle for which it was intended; *or*

b. A specially designed, authorized maintenance test facility; *and*

2. Incorporates an active mechanism that forces the camera not to function when it is removed from the vehicle for which it was intended.

Note: When necessary, details of the items will be provided, upon request, to the Bureau of Industry and Security in order to ascertain compliance with the conditions described in Note 3.b.4. and Note 3.c. in this Note to 6A003.b.4.b.

■ 33. In Supplement No. 1 to part 774 (the Commerce Control List), Category 6—Sensors, Export Control Classification Number (ECCN) 6A006 is amended by revising the ''LVS'' paragraph in the License Exceptions section, and the ''items'' paragraph in the List of Items Controlled section, to read as follows:

6A006 ''Magnetometers'', ''magnetic gradiometers'', ''intrinsic magnetic gradiometers'' and compensation systems, and specially designed components therefor, as follows (see List of Items Controlled).

* * * * *

License Exceptions

LVS: $1500, N/A for 6A006.a.1; ''Magnetometers'' and subsystems defined in 6A006.a.2 using optically pumped or nuclear precession (proton/Overhauser) having a ''noise level'' (sensitivity) lower (better) than 2 pT rms per square root Hz; and 6A006.c.

GBS: * * *

CIV: * * *

List of Items Controlled

Unit: * * *

Related Controls: * * *

Related Definitions: * * *

Items:

a. ''Magnetometers'' and subsystems, as follows:

a.1. Using ''superconductive'' (SQUID) ''technology'' and having any of the following characteristics:

a.1.a. SQUID systems designed for stationary operation, without specially designed subsystems designed to reduce in-motion noise, and having a ''noise level'' (sensitivity) equal to or lower (better) than 50 fT (rms) per square root Hz at a frequency of 1 Hz; *or*

a.1.b. SQUID systems having an in-motion-magnetometer ''noise level'' (sensitivity) lower (better) than 20 pT (rms) per square root Hz at a frequency of 1 Hz and specially designed to reduce in-motion noise;

a.2. Using optically pumped or nuclear precession (proton/Overhauser) ''technology'' having a ''noise level'' (sensitivity) lower (better) than 20 pT (rms) per square root Hz;

a.3. Using fluxgate ''technology'' having a ''noise level'' (sensitivity) equal to or lower (better) than 10 pT (rms) per square root Hz at a frequency of 1 Hz;

a.4. Induction coil ''magnetometers'' having a ''noise level'' (sensitivity) lower (better) than any of the following:

a.4.a. 0.05 nT rms/square root Hz at frequencies of less than 1 Hz;

a.4.b. 1×10^{-3} nT rms/square root Hz at frequencies of 1 Hz or more but not exceeding 10 Hz; *or*

a.4.c. 1×10^{-4} nT rms/square root Hz at frequencies exceeding 10 Hz;

a.5. Fiber optic ''magnetometers'' having a ''noise level'' (sensitivity) lower (better) than 1 nT rms per square root Hz;

b. Magnetic gradiometers, as follows:

b.1. ''Magnetic gradiometers'' using multiple ''magnetometers'' controlled by 6A006.a;

b.2. Fiber optic ''intrinsic magnetic gradiometers'' having a magnetic gradient field ''noise level'' (sensitivity) lower (better) than 0.3 nT/m rms per square root Hz;

b.3. ''Intrinsic magnetic gradiometers'', using ''technology'' other than fiber-optic ''technology'', having a magnetic gradient field ''noise level'' (sensitivity) lower (better) than 0.015 nT/m rms per square root Hz; *and*

c. Magnetic compensation systems for magnetic sensors designed for operation on mobile platforms.

■ 34. In Supplement No. 1 to part 774 (the Commerce Control List), Category 6—Sensors, Export Control Classification Number (ECCN) 6A993 is added after ECCN 6A992 and before ECCN 6A994, to read as follows:

6A993 Cameras, not controlled by 6A003 or 6A203, as follows (see List of Items Controlled).

License Requirements

Reason for Control: AT

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

License Exceptions

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

List of Items Controlled

Unit: Number
Related Controls: N/A
Related Definitions: N/A
Items:

a. Cameras that meet the criteria of Note 3 to 6A003.b.4.

b. [Reserved.]

■ 35. In Supplement No. 1 to part 774 (the Commerce Control List), Category 6—Sensors, Export Control Classification Number (ECCN) 6A996 is amended by revising the heading and the ''items'' paragraph in the List of Items Controlled section, to read as follows:

6A996 ''Magnetometers'' not controlled by ECCN 6A006, ''Superconductive'' electromagnetic sensors, and specially designed components therefor, as follows (see List of Items Controlled).

* * * * *

List of Items Controlled

Unit: * * *
Related Controls: * * *
Related Definitions: * * *
Items:

a. ''Magnetometers'', n.e.s., having a ''noise level'' (sensitivity) lower (better) than 1.0 nT rms per square root Hz.

b. ''Superconductive'' electromagnetic sensors, components manufactured from ''superconductive'' materials:

b.1. Designed for operation at temperatures below the ''critical temperature'' of at least one of their ''superconductive'' constituents (including Josephson effect devices or ''superconductive'' quantum interference devices (SQUIDS));

b.2. Designed for sensing electromagnetic field variations at frequencies of 1 KHz or less; *and*

b.3. Having any of the following characteristics:

b.3.a. Incorporating thin-film SQUIDS with a minimum feature size of less than 2 μm and with associated input and output coupling circuits;

b.3.b. Designed to operate with a magnetic field slew rate exceeding 1×10^6 magnetic flux quanta per second;

b.3.c. Designed to function without magnetic shielding in the earth's ambient magnetic field; *or*

b.3.d. Having a temperature coefficient less (smaller) than 0.1 magnetic flux quantum/K.

■ 36. In Supplement No. 1 to part 774 (the Commerce Control List), Category 6—Sensors, Export Control Classification Number (ECCN) 6E001 is amended by revising the License Exceptions section, to read as follows:

6E001 ''Technology'' according to the General Technology Note for the ''development'' of equipment, materials or ''software'' controlled by 6A (except 6A991, 6A992, 6A994, 6A995, 6A996, 6A997, or 6A998), 6B (except 6B995), 6C (except 6C992 or 6C994), or 6D (except 6D991, 6D992, or 6D993).

* * * * *

License Exceptions

CIV: N/A
TSR: Yes, except for the following:

(1) Items controlled for MT reasons;

(2) ''Technology'' for commodities controlled by 6A002.e, 6A004.e, or 6A008.j.1;

(3) ''Technology'' for ''software'' specially designed for ''space qualified'' ''laser'' radar or Light Detection and Ranging (LIDAR) equipment defined in 6A008.j.1 and controlled by 6D001 or 6D002;

(4) Exports or reexports to destinations outside of Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Luxembourg, the Netherlands, Portugal, Spain, Sweden, or the United Kingdom of ''technology'' for the ''development'' of the following: (a) Items controlled by 6A001.a.1.b.1, 6A001.a.2.a.1, 6A001.a.2.a.2, 6A001.a.2.a.3, 6A001.a.2.a.5, 6A001.a.2.a.6,6A001.a.2.b, 6A001.a.2.e., 6A002.a.1.c, 6A008.l.3, 6B008, 6D003.a; (b) Equipment controlled by 6A001.a.2.c or 6A001.a.2.f when specially designed for real time applications; *or* (c) ''Software'' controlled by 6D001 and specially designed for the ''development'' or ''production'' of equipment controlled by 6A008.l.3 or 6B008; or

(5) Exports or reexports to Rwanda.

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■ 37. In Supplement No. 1 to part 774 (the Commerce Control List), Category 6—Sensors, Export Control Classification Number (ECCN) 6E002 is amended by revising the License Exceptions section, to read as follows:

6E002 ''Technology'' according to the General Technology Note for the ''production'' of equipment or materials controlled by 6A (except 6A991, 6A992, 6A994, 6A995, 6A996, 6A997 or 6A998), 6B (except 6B995) or 6C (except 6C992 or 6C994).

* * * * *

License Exceptions

CIV: N/A
TSR: Yes, except for the following:

(1) Items controlled for MT reasons;

(2) ''Technology'' for commodities controlled by 6A002.e, 6A004.e, 6A008.j.1;

(3) Exports or reexports to destinations outside of Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Luxembourg, the Netherlands, Portugal, Spain, Sweden, or the United Kingdom of ''technology'' for the ''development'' of the following: (a) Items controlled by 6A001.a.1.b.1, 6A001.a.2.a.1, 6A001.a.2.a.2, 6A001.a.2.a.3, 6A001.a.2.a.5, 6A001.a.2.a.6, 6A001.a.2.b, and 6A001.a.2.c; and (b) Equipment controlled by 6A001.a.2.e and 6A001.a.2.f when specially designed for real time applications; or (c) ''Software'' controlled by 6D001 and specially designed for the ''development'' or ''production'' of equipment controlled by 6A002.a.1.c, 6A008.l.3 or 6B008; or

(4) Exports or reexports to Rwanda.

* * * * *

■ 38. In Supplement No. 1 to part 774 (the Commerce Control List), Category 6—Sensors, Export Control Classification Number (ECCN) 6E003 is amended by revising the ''items'' paragraph in the List of Items Controlled section, to read as follows:

6E003 Other ''technology'', as follows (see List of Items Controlled).

* * * * *

List of Items Controlled

Unit: * * *
Related Controls: * * *
Related Definitions: * * *
Items:

a. Acoustics. None.

b. Optical sensors. None.

c. Cameras. None.

d. Optics, ''technology'', as follows:

d.1. Optical surface coating and treatment ''technology'' ''required'' to achieve uniformity of 99.5% or better for optical coatings 500 mm or more in diameter or major axis length and with a total loss (absorption and scatter) of less than 5×10^{-3};

N.B.: See also 2E003.f.

d.2. Optical fabrication ''technology'' using single point diamond turning techniques to produce surface finish accuracies of better than 10 nm rms on non-planar surfaces exceeding 0.5 m^2;

e. Lasers. ''Technology'' ''required'' for the ''development'', ''production'' or ''use'' of specially designed diagnostic instruments or targets in test facilities for ''SHPL'' testing or testing or evaluation of materials irradiated by ''SHPL'' beams;

f. Magnetometers. None

g. Gravimeters. None

h. Radar. None

■ 39. In Supplement No. 1 to part 774 (the Commerce Control List), Category 6—Sensors, Export Control Classification Number (ECCN) 6E991 is amended by revising the heading to read as follows:

6E991 ''Technology'' for the ''development'', ''production'' or ''use'' of equipment controlled by 6A991, 6A996, 6A997, or 6A998.

* * * * *

■ 40. In Supplement No. 1 to part 774 (the Commerce Control List), Category 6—Sensors, Export Control Classification Number (ECCN) 6E993 is amended by revising the heading and the ''items'' paragraph in the List of Items Controlled section, to read as follows:

6E993 Other ''technology'', not controlled by 6E003, as follows (see List of Items Controlled).

* * * * *

List of Items Controlled

Unit: * * *

Related Controls: * * *

Related Definitions: * * *

Items:

a. Optical fabrication technologies for serially producing optical components at a rate exceeding 10 m^2 of surface area per year on any single spindle and with:

a.1. An area exceeding 1 m^2; *and*

a.2. A surface figure exceeding lambda/10 rms at the designed wavelength;

b. ''Technology'' for optical filters with a bandwidth equal to or less than 10 nm, a field of view (FOV) exceeding 40° and a resolution exceeding 0.75 line pairs per milliradian;

c. ''Technology'' for the ''development'' or ''production'' of cameras controlled by 6A993;

d. ''Technology'' ''required'' for the ''development'' or ''production'' of non-triaxial fluxgate ''magnetometers'' or non-triaxial fluxgate ''magnetometer'' systems, having any of the following:

d.1. A ''noise level'' of less than 0.05 nT rms per square root Hz at frequencies of less than 1 Hz; *or*

d.2. A ''noise level'' of less than 1×10^{-3} nT rms per square root Hz at frequencies of 1 Hz or more.

■ 41. 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 License Requirements section, and the ''items'' paragraph in the List of Items Controlled section, to read as follows:

7A002 Gyros, and angular or rotational accelerometers, 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 described in this entry that meet the parameters of 7A102	MT Column 1.
AT applies to entire entry	AT Column 1.

* * * * *

List of Items Controlled

Unit: * * *

Related Controls: * * *

Related Definitions: * * *

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:

a.1. Less (better) than 0.1 degree per hour when specified to function at linear acceleration levels below 12 g; *or*

a.2. Less (better) than 0.5 degree per hour when specified to function at linear acceleration levels from 12 g to 100 g inclusive;

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).

Technical Note: For the purpose of 7A002.b, ''angle random walk'' is the angular error buildup with time that is due to white noise in angular rate. (IEEE STD 528–2001).

c. Specified to function at linear acceleration levels exceeding 100 g.

■ 42. In Supplement No. 1 to part 774 (the Commerce Control List), Category 7—Navigation and Avionics, Export Control Classification Number (ECCN) 7A007 is removed.

■ 43. In Supplement No. 1 to part 774 (the Commerce Control List), Category 8—Marine, Export Control Classification Number (ECCN) 8A002 is amended by revising the ''items'' paragraph in the List of Items Controlled section, to read as follows:

8A002 Systems and equipment, as follows (see List of Items Controlled).

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List of Items Controlled

Unit: * * *

Related Controls: * * *

Related Definitions: * * *

Items:

a. Systems and equipment, specially designed or modified for submersible vehicles, designed to operate at depths exceeding 1,000 m, as follows:

a.1. Pressure housings or pressure hulls with a maximum inside chamber diameter exceeding 1.5 m;

a.2. Direct current propulsion motors or thrusters;

a.3. Umbilical cables, and connectors therefor, using optical fiber and having synthetic strength members;

b. Systems specially designed or modified for the automated control of the motion of submersible vehicles controlled by 8A001 using navigation data and having closed loop servo-controls:

b.1. Enabling a vehicle to move within 10 m of a predetermined point in the water column;

b.2. Maintaining the position of the vehicle within 10 m of a predetermined point in the water column; *or*

b.3. Maintaining the position of the vehicle within 10 m while following a cable on or under the seabed;

c. Fiber optic hull penetrators or connectors;

d. Underwater vision systems, as follows:

d.1. Television systems and television cameras, as follows:

d.1.a. Television systems (comprising camera, monitoring and signal transmission equipment) having a limiting resolution when measured in air of more than 800 lines and specially designed or modified for remote operation with a submersible vehicle;

d.1.b. Underwater television cameras having a limiting resolution when measured in air of more than 1,100 lines;

d.1.c. Low light level television cameras specially designed or modified for underwater use containing all of the following:

d.1.c.1. Image intensifier tubes controlled by 6A002.a.2.a; *and*

d.1.c.2. More than 150,000 ''active pixels'' per solid state area array;

Technical Note: Limiting resolution in television is a measure of horizontal resolution usually expressed in terms of the maximum number of lines per picture height discriminated on a test chart, using IEEE Standard 208/1960 or any equivalent standard.

d.2. Systems, specially designed or modified for remote operation with an underwater vehicle, employing techniques to minimize the effects of back scatter, including range-gated illuminators or ''laser'' systems;

e. Photographic still cameras specially designed or modified for underwater use below 150 m having a film format of 35 mm or larger, and having any of the following:

e.1. Annotation of the film with data provided by a source external to the camera;

e.2. Automatic back focal distance correction; *or*

e.3. Automatic compensation control specially designed to permit an underwater camera housing to be usable at depths exceeding 1,000 m;

f. Electronic imaging systems, specially designed or modified for underwater use, capable of storing digitally more than 50 exposed images;

g. Light systems, as follows, specially designed or modified for underwater use:

g.1. Stroboscopic light systems capable of a light output energy of more than 300 J per flash and a flash rate of more than 5 flashes per second;

g.2. Argon arc light systems specially designed for use below 1,000 m;

h. ''Robots'' specially designed for underwater use, controlled by using a dedicated computer, having any of the following:

h.1. Systems that control the ''robot'' using information from sensors which measure force or torque applied to an external object, distance to an external object, or tactile sense between the ''robot'' and an external object; *or*

h.2. The ability to exert a force of 250 N or more or a torque of 250 Nm or more and using titanium based alloys or ''fibrous or filamentary'' ''composite'' materials in their structural members;

i. Remotely controlled articulated manipulators specially designed or modified for use with submersible vehicles, having any of the following:

i.1. Systems which control the manipulator using the information from sensors which measure the torque or force applied to an external object, or tactile sense between the manipulator and an external object; *or*

i.2. Controlled by proportional master-slave techniques or by using a dedicated computer, and having 5 degrees of freedom of movement or more;

Note: Only functions having proportional control using positional feedback or by using a dedicated computer are counted when determining the number of degrees of freedom of movement.

j. Air independent power systems, specially designed for underwater use, as follows:

j.1. Brayton or Rankine cycle engine air independent power systems having any of the following:

j.1.a. Chemical scrubber or absorber systems specially designed to remove carbon dioxide, carbon monoxide and particulates from recirculated engine exhaust;

j.1.b. Systems specially designed to use a monoatomic gas;

j.1.c. Devices or enclosures specially designed for underwater noise reduction in frequencies below 10 kHz, or special mounting devices for shock mitigation; *or*

j.1.d. Systems specially designed:

j.1.d.1. To pressurize the products of reaction or for fuel reformation;

j.1.d.2. To store the products of the reaction; *and*

j.1.d.3. To discharge the products of the reaction against a pressure of 100 kPa or more;

j.2. Diesel cycle engine air independent systems, having all of the following:

j.2.a. Chemical scrubber or absorber systems specially designed to remove carbon dioxide, carbon monoxide and particulates from recirculated engine exhaust;

j.2.b. Systems specially designed to use a monoatomic gas;

j.2.c. Devices or enclosures specially designed for underwater noise reduction in frequencies below 10 kHz or special mounting devices for shock mitigation; *and*

j.2.d. Specially designed exhaust systems that do not exhaust continuously the products of combustion;

j.3. Fuel cell air independent power systems with an output exceeding 2 kW having any of the following:

j.3.a. Devices or enclosures specially designed for underwater noise reduction in frequencies below 10 kHz or special mounting devices for shock mitigation; *or*

j.3.b. Systems specially designed:

j.3.b.1. To pressurize the products of reaction or for fuel reformation;

j.3.b.2. To store the products of the reaction; *and*

j.3.b.3. To discharge the products of the reaction against a pressure of 100 kPa or more;

j.4. Stirling cycle engine air independent power systems, having all of the following:

j.4.a. Devices or enclosures specially designed for underwater noise reduction in frequencies below 10 kHz or special mounting devices for shock mitigation; *and*

j.4.b. Specially designed exhaust systems which discharge the products of combustion against a pressure of 100 kPa or more;

k. Skirts, seals and fingers, having any of the following:

k.1. Designed for cushion pressures of 3,830 Pa or more, operating in a significant wave height of 1.25 m (Sea State 3) or more and specially designed for surface effect vehicles (fully skirted variety) controlled by 8A001.f; *or*

k.2. Designed for cushion pressures of 6,224 Pa or more, operating in a significant wave height of 3.25 m (Sea State 5) or more and specially designed for surface effect vehicles (rigid sidewalls) controlled by 8A001.g;

l. Lift fans rated at more than 400 kW specially designed for surface effect vehicles controlled by 8A001.f or 8A001.g;

m. Fully submerged subcavitating or supercavitating hydrofoils specially designed for vessels controlled by 8A001.h;

n. Active systems specially designed or modified to control automatically the sea-induced motion of vehicles or vessels controlled by 8A001.f, 8A001.g, 8A001.h or 8A001.i;

o. Propellers, power transmission systems, power generation systems and noise reduction systems, as follows:

o.1. Water-screw propeller or power transmission systems, as follows, specially designed for surface effect vehicles (fully skirted or rigid sidewall variety), hydrofoils or small waterplane area vessels controlled by 8A001.f, 8A001.g, .8A001.h or 8A001.i:

o.1.a. Supercavitating, super-ventilated, partially-submerged or surface piercing propellers rated at more than 7.5 MW;

o.1.b. Contrarotating propeller systems rated at more than 15 MW;

o.1.c. Systems employing pre-swirl or post-swirl techniques for smoothing the flow into a propeller;

o.1.d. Light-weight, high capacity (K factor exceeding 300) reduction gearing;

o.1.e. Power transmission shaft systems, incorporating ''composite'' material components, capable of transmitting more than 1 MW;

o.2. Water-screw propeller, power generation systems or transmission systems designed for use on vessels, as follows:

o.2.a. Controllable-pitch propellers and hub assemblies rated at more than 30 MW;

o.2.b. Internally liquid-cooled electric propulsion engines with a power output exceeding 2.5 MW;

o.2.c. ''Superconductive'' propulsion engines, or permanent magnet electric propulsion engines, with a power output exceeding 0.1 MW;

o.2.d. Power transmission shaft systems, incorporating ''composite'' material components, capable of transmitting more than 2 MW;

o.2.e. Ventilated or base-ventilated propeller systems rated at more than 2.5 MW;

o.3. Noise reduction systems designed for use on vessels of 1,000 tons displacement or more, as follows:

o.3.a. Systems that attenuate underwater noise at frequencies below 500 Hz and consist of compound acoustic mounts for the acoustic isolation of diesel engines, diesel generator sets, gas turbines, gas turbine generator sets, propulsion motors or propulsion reduction gears, specially designed for sound or vibration isolation, having an intermediate mass exceeding 30% of the equipment to be mounted;

o.3.b. Active noise reduction or cancellation systems, or magnetic bearings, specially designed for power transmission systems, and incorporating electronic control systems capable of actively reducing equipment vibration by the generation of anti-noise or anti-vibration signals directly to the source;

p. Pumpjet propulsion systems having a power output exceeding 2.5 MW using divergent nozzle and flow conditioning vane

techniques to improve propulsive efficiency or reduce propulsion-generated underwater-radiated noise.

q. Self-contained, closed or semi-closed circuit (rebreathing) diving and underwater swimming apparatus.

Note: 8A002.q does not control an individual apparatus for personal use when accompanying its user.

■ 44. In Supplement No. 1 to part 774 (the Commerce Control List), Category 9—Propulsion Systems, Space Vehicles and Related Equipment, Export Control Classification Number (ECCN) 9A001 is amended by revising the ''items'' paragraph in the List of Items Controlled section, to read as follows:

9A001 Aero gas turbine engines having any of the following (see List of Items Controlled).

* * * * *

List of Items Controlled

Unit: * * *

Related Controls: * * *

Related Definitions: * * *

Items:

a. Incorporating any of the technologies controlled by 9E003.a.; *or*

Note: 9A001.a. does not control aero gas turbine engines which meet all of the following:

1. Certified by the civil aviation authority in a country listed in Supplement No. 1 to part 743; and

2. Intended to power non-military manned aircraft for which a civil Type Certificate has been issued by a country listed in Supplement No. 1 to part 743.

b. Designed to power an aircraft designed to cruise at Mach 1 or higher for more than 30 minutes.

Dated: July 1, 2005.

Matthew S. Borman,

Deputy Assistant Secretary for Export Administration.

[FR Doc. 05–13581 Filed 7–14–05; 8:45 am]

BILLING CODE 3510–33–P