

DEPARTMENT OF COMMERCE**Bureau of Industry and Security****15 CFR Parts 734, 740, 742, 772, and 774****[Docket No. 210310–0051]****RIN 0694–A100****Export Administration Regulations: Implementation of Wassenaar Arrangement 2019 Plenary Decisions; Elimination of Reporting Requirements for Certain Encryption Items****AGENCY:** Bureau of Industry and Security, Commerce.**ACTION:** Final rule.

SUMMARY: The Bureau of Industry and Security (BIS) maintains, as part of its Export Administration Regulations (EAR), the Commerce Control List (CCL), which identifies certain items subject to Department of Commerce jurisdiction. This final rule revises the CCL, as well as corresponding parts of the EAR, to implement changes to the Wassenaar Arrangement List of Dual-Use Goods and Technologies (WA List) that were decided upon by governments participating in the Wassenaar Arrangement on Export Controls for Conventional Arms and Dual-Use Goods and Technologies (Wassenaar Arrangement, or WA) at the December 2019 WA Plenary meeting. The Wassenaar Arrangement advocates implementation of effective export controls on strategic items with the objective of improving regional and international security and stability. This rule harmonizes the CCL with the decisions reached at the 2019 Plenary meeting by revising Export Control Classification Numbers (ECCNs) controlled for national security reasons in each category of the CCL. This rule also makes associated changes to the EAR as well as corrections. This rule also makes changes to various provisions related to Category 5—Part 2 of the CCL in the EAR, including provisions on License Exception Encryption commodities, software, and technology (ENC). These changes, which include the elimination of reporting requirements for certain encryption items, are designed to reduce the regulatory burden for exporters while still fulfilling U.S. national security and foreign policy objectives.

DATES: This rule is effective March 29, 2021.**FOR FURTHER INFORMATION CONTACT:** For general questions, contact Sharron Cook, Office of Exporter Services, Bureau of Industry and Security, U.S.Department of Commerce at 202–482–2440 or by email: Sharron.Cook@bis.doc.gov.*For technical questions contact:**Categories 0, 1 & 2:* Joseph Giunta at 202–482–3127 or Joseph.Giunta@bis.doc.gov*Category 3:* Carlos Monroy at 202–482–3246 or Carlos.Monroy@bis.doc.gov*Categories 4 & 5:* Aaron Amundson or Anita Zinzuvadia 202–482–0707 or Aaron.Amundson@bis.doc.gov or Anita.Zinzuvadia@bis.doc.gov*Category 6 (optics):* John Varesi at 202–482–1114 or John.Varesi@bis.doc.gov*Category 6 (lasers and radar):* Michael Rithmire 202–482–6105 or Michael.Rithmire@bis.doc.gov*Category 6 (sensors and cameras):* John Varesi 202–482–1114 or John.Varesi@bis.doc.gov*Categories 7:* David Rosenberg at 202–482–5987, Michael Tu at 202–482–6462 or John Varesi at 202–482–1114 or David.Rosenberg@bis.doc.gov, Michael.Tu@bis.doc.gov or John.Varesi@bis.doc.gov*Category 8:* Michael Tu 202–6462 or Michael.Tu@bis.doc.gov*Category 9:* David Rosenberg at 202–482–5987 or Michael Tu at 202–6462 or David.Rosenberg@bis.doc.gov or Michael.Tu@bis.doc.gov*Category 9x515 (satellites):* Michael Tu 202–482–6462 or Michael.Tu@bis.doc.gov*Category “600 Series” (munitions items):* Jeffrey Leitz at 202–482–7417 or Jeffrey.Leitz@bis.doc.gov**SUPPLEMENTARY INFORMATION:****Background**

The Wassenaar Arrangement on Export Controls for Conventional Arms and Dual-Use Goods and Technologies (Wassenaar Arrangement or WA) (<http://www.wassenaar.org/>) is a group of 42 like-minded states committed to promoting responsibility and transparency in the global arms trade and preventing destabilizing accumulations of arms. As a Participating State of the WA (Participating State), the United States has committed to controlling for export all items on the WA control lists. The lists were first established in 1996 and have been revised annually thereafter. Proposals for changes to the WA control lists that achieve consensus are approved by Participating States at annual plenary meetings. Participating States are charged with implementing the list changes as soon as possible after approval. The United States’ implementation of WA control list changes ensures that U.S. companies have a level playing field with their

competitors in other WA Participating States.

BIS published a final rule on October 25, 2020 (85 FR 62583) implementing certain new controls on emerging technologies, as approved at the December 2019 WA Plenary meeting. The changes in this rule, which represent the remaining approved changes to the WA control lists, update the corresponding items listed in the EAR and reflect recent technical advancements and clarifications. Unless explicitly discussed below, the revisions made by this rule will not impact the number of license applications submitted to BIS.

Revisions to the Commerce Control List Related to WA 2019 Plenary Decisions Revises 22 ECCNs: 0A502, 0A503, 0A606, 1A002, 1A005, 1A006, 1A613, 1B002, 1C001, 1C002, 1C006, 1C010, 2A001, 3B001, 3E002, 5A002, 6A004, 6A005, 6A008, 9A011, 9D515, 9E003.

Category 0—Nuclear Materials, Facilities, and Equipment [and Miscellaneous Items]*0A502 Shotguns . . .*

The Header of ECCN 0A502 is amended by adding the phrase “to slaughter domestic animals” to the exclusion text. This phrase is added because shotguns are often used in the humane slaughter of domestic animals such as cattle, sheep, or horses.

0A503 Discharge Type Arms and Devices To Administer Electric Shock . . .

The header of ECCN 0A503 is amended by adding the phrase “to slaughter domestic animals” to the exclusion text. This phrase is added because discharge type arms are often used in the humane slaughter of domestic animals such as cattle, sheep, or horses.

0A606 Ground Vehicles and Related Commodities

Paragraphs 0A606.b.1 (unarmed vehicles that are derived from civilian vehicles) and 0A606.b.2 (Parts and components) are amended by revising the parameters in Items paragraphs b.1.a and b.2.b to add the defined term “equivalent standards” as an alternative to the U.S. standard of “level III (National Institute of Justice standard 0108.01, September 1985).” This revision is made to allow WA Participating States to be able to use “comparable national or international standards recognized by one or more Wassenaar Arrangement Participating States and applicable to the relevant

entry.” This definition of “equivalent standards” is added to part 772 of the EAR. The word “for” is added before the word “vehicles” in Items paragraph b.1.b as an editorial correction decided to by the WA.

Category 1—Special Materials and Related Equipment, Chemicals, “Microorganisms,” and “Toxins”

1A002 “Composite” Structures or Laminates

Note 5 is added at the end of the Items paragraph to exclude “mechanically chopped, milled, or cut carbon “fibrous or filamentary materials” 25.0 mm or less in length” from the control in Items paragraph b.1 (carbon “fibrous or filamentary materials”).

1A005 Body Armor and “Specially Designed” “Components” Therefor

Notes 2 and 3 in the Related Controls paragraph are amended to add the defined term “equivalent standards” after the U.S. “NIJ level III” standard, in order to allow WA Participating States to be able to use “comparable national or international standards recognized by one or more Wassenaar Arrangement Participating States and applicable to the relevant entry.” In Items paragraph .b (hard body armor plates that provide ballistic protection), the term “national equivalents,” which is not defined in the EAR, is replaced with the defined term “equivalent standards,” which is added to § 772.1 of the EAR by this rule. This change will also allow the use of equivalent national standards of Participating States and international standards recognized by one or more WA Participating States.

1A006 Equipment, “Specially Designed” or Modified for the Disposal of Improvised Explosive Devices (IEDs)

The Header is amended by capitalizing each of the individual words in the term “Improvised Explosive Devices”, as well as adding the acronym IEDs in parentheses. The Related Controls paragraph is amended by replacing “Improvised Explosive Devices” with the acronym IEDs. The unilateral definition for ‘disruptors’ is removed from the Related Definitions paragraph because the WA definition of this term is included in the Technical Note that is added to 1A006.b. A Note is also added at the end of the Items paragraph to inform the public that the controls of ECCN 1A006 do not apply to equipment that accompanies its operator.

1A613 Armored and Protective “Equipment” and Related Commodities

Items paragraphs .c (military helmets), d.1 (soft body armor and protective garments), d.2 (hard body armor plates), and the Note after Items paragraph d.2 are amended by adding “or “equivalent standard” after the National Institute of Justice (NIJ) standard, in order to allow the use of “comparable national or international standards recognized by one or more Wassenaar Arrangement Participating States and applicable to the relevant entry.”

1B002 Equipment Designed To Produce Metal Alloy Powder or Particulate Materials

The header is amended to revise the text of the header and move two unchanged control parameters into two sub-paragraphs in the Items paragraph section. The header text is amended by replacing “for producing metal alloys, metal alloy powder or alloyed materials, “specially designed” to avoid contamination and “specially designed” for use in one of the processes specified in 1C002.c.2.” with “designed to produce metal alloy powder or particulate materials and having any of the following (see List of Items Controlled).” Metal alloy powders are specified in 1C002.c, but the actual text refers to “metal alloy powder or particulate material”. The equipment in 1B002 make the metal alloy powder specified in 1C002.c, but not the metal alloys in 1C002.b. Therefore, “metal alloys” is removed from the header of 1B002.

1C001 Materials “Specially Designed” for Absorbing Electromagnetic Radiation, or Intrinsically Conductive Polymers

Exclusion Note 1 to 1C001.a is amended by revising paragraph d.2 relating to planar absorbers made of sintered ferrite to add “or less” to the end of the parameter relating to maximum operating temperature to clarify that the exclusion is not exclusively limited to materials having a maximum operating temperature of 548 K.

1C002 Metal Alloys, Metal Alloy Powder and Alloyed Materials

Technical Note 3, which defines ‘low cycle fatigue life,’ is amended by replacing the defined term “average stress” with “average stress ratio” to correctly state what the formula that follows calculates.

1C006 Fluids and Lubricating Materials

This rule amends Items paragraph 1C006.d by replacing “fluorocarbon electronic cooling fluids” with “fluorocarbon fluids designed for electronic cooling” to reflect the fact that certain fluorocarbon fluids are designed for electronic cooling. This revision narrows the scope of control to only those fluorocarbon fluids designed for electronic cooling.

1C010 “Fibrous or Filamentary Materials”

Items paragraph 1C010.c is intended to capture inorganic/ceramic fibers that are tested or used for applications involving high-stress and high-temperature environments. However, the current level of control captured a large number of inorganic fibers that are not suitable for critical structural applications requiring high modulus and strength retention at high temperatures. The following changes will narrow the scope to better target the control. This rule amends Items paragraph 1C010.c, inorganic “fibrous or filamentary materials,” by splitting paragraph c.1 into two subparagraphs c.1.a and c.1.b, by adding a silicon dioxide (SiO₂) composition element to the existing “specific modulus” parameter in 1C010.c.1.a, as well as by adding a new “specific modulus” parameter in paragraph c.1.b, “exceeding 5.6×10^6 m.”

Category 2—Materials Processing

2A001 Anti-Friction Bearings and Bearing Systems

The Heading of 2A001 is amended by moving “and “components” therefor” from the end of the heading to immediately after “bearing systems,” because only paragraph 2A001.c has controls on “components.” In addition, Items paragraph 2A001.c is amended by adding “and “specially designed” components therefor” because the component control in the heading no longer applies to all the Items paragraphs and 2A001.c does include a component control. Replacing “and “components” therefor” with “and specially designed” components therefor” narrows the scope of control to only those components that rise to the level of warranting control. Exclusion Note 2 to 2A001 relating to balls with tolerances specified by the manufacturer in accordance with ISO 3290 is removed because investigation into ISO 3290 has revealed that versions of this standard dated 1998 and 2001 have only applied to steel balls.

Category 3—Electronics**3B001** *Equipment for the Manufacturing of Semiconductor Devices or Materials*

A nota bene (N.B.) is added after the Note to 3B001.h to point the public to 6B002 for masks and reticles “specially designed” for optical sensors.

3E002 *“Technology” According to the General Technology Note Other Than That Controlled in 3E001 for the “Development” or “Production” of a “Microprocessor Microcircuit”, “Micro-Computer Microcircuit” and Microcontroller Microcircuit Core*

In order to better understand the control parameters, this rule adds two Technical Notes at the end of the Items paragraph to refer to IEEE-754 for ‘floating-point’ and to define ‘fixed-point,’ as a fixed-width real number with both an integer component and a fractional component, and which does not include integer-only formats. Single quotation marks are added around these terms throughout 3E002, as they are defined in the context of this ECCN.

Category 5—Part 2—“Information Security”**5A002** *“Information security” systems, equipment and “components”*

This rule amends 5A002.a by replacing “by means of “cryptographic activation” not employing a secure mechanism” with “by any means other than secure “cryptographic activation”.” This is an editorial change made to clarify what is controlled in 5A002.a. It does not change the scope of the entry.

This rule also expands the scope of paragraph f (wireless “personal area network” functionality) of the 5A002.a exclusion Note 2 by removing the limitations on range and number of connections specified in the two subparagraphs of paragraph f. As a result, any item using only published or commercial cryptographic standards where the “information security” functionality is limited to “personal area network” functionality, as defined in part 772 of the EAR, is excluded from Category 5 Part 2, regardless of the range or number of connections. In addition, a new Note is being added to the definition of “personal area network” in part 772 to clarify that a “local area network” is not a “personal area network”. Without the note, the definition of “personal area network” could be read to include some short-range “local area networks”.

This rule adds “gateways” to paragraph h of the 5A002.a exclusion

Note 2 to exclude gateways where the “information security” functionality is limited to the tasks of “Operations, Administration or Maintenance” (“OAM”) implementing only published or commercial cryptographic standards.

Category 6—Sensors and Lasers**6A004** *Optical Equipment and “Components”*

This rule amends Items paragraph 6A004.c.4 by moving the phrase “in any coordinate direction” from the end of the parameter to the middle of the paragraph after “linear thermal expansion,” as well as adding the unit “/K” (per Kelvin) after 5×10^{-6} . These changes make the control text clearer; they do not change the scope of the control.

6A005 *“Lasers,” “Components” and Optical Equipment*

This rule amends Items paragraphs a.6.a.1 and a.6.a.2.a (non-“tunable” continuous wave “(CW) lasers,” ‘single transverse mode’ output) to replace the term “average output power” with “output power” because CW lasers generally have a steady state output power after a transient time period.

6A008 *Radar Systems, Equipment and Assemblies*

This rule amends Items paragraph 6A008.j and the associated Note by replacing “instrumented range” with ‘instrumented range’ because this rule moves the definition for this term from § 772.1 to a Technical Note added above Items paragraph j. The definition is moved because it is only used in 6A008. There is no change to the definition.

Category 9—Aerospace and Propulsion**9A011** *Ramjet, Scramjet or “Combined Cycle Engines”, and “Specially Designed” “Parts” and “Components” Therefor*

This rule adds a Technical Note below the heading to define ‘combined cycle engines’ and adds single quotes around the term in the heading. Items specified in ECCN 9A011 are “subject to the International Traffic in Arms Regulations (ITAR),” see 22 CFR parts 120 through 130. The Technical Note is added to assist the public in identifying items specified in ECCN 9A011.

9D515 *“Software” “Specially Designed” for the “Development,” “Production,” Operation, Installation, Maintenance, Repair, Overhaul, or Refurbishing of “Spacecraft” and Related Commodities*

This rule numbers each sentence in the Related Controls paragraph and adds

a third sentence to direct people to use the appropriate associated “software” ECCN for items listed in 9A004.d when these items are incorporated into “spacecraft payloads” rather than using 9D515 as the classification for such “software”. Specifically, persons should use the appropriate associated software ECCN for any of the following incorporated items: 3A001.b.1.a.4, 3A002.g, 5A001.a.1, 5A001.b.3, 5A002.c, 5A002.e, 6A002.a.1, 6A002.a.2, 6A002.b, 6A002.d, 6A003.b, 6A004.c, 6A004.e, 6A008.d, 6A008.e, 6A008.k, 6A008.l or 9A010.c.

9E003 *Other “Technology”*

This rule amends Item paragraph 9E003.a.11 (‘fan blades’) to better define parameters for a fan blade with a substantially open interior. Since the origin of this entry, numerous fan blade construction methods have been developed utilizing materials such as metal foams, honeycombs, and other low density materials in order to reduce weight. As the term ‘hollow’ is undefined and has no threshold, the scope of the entry was not clear. Without a specific definition of ‘hollow’, it is both difficult to identify which components fall under 9.E.3.a.11, and the technology “required” to meet the ‘hollow’ characteristic, particularly in the absence of parameters or performance requirements. The term ‘fan blade’ is defined in order to precisely indicate the items of concern. The structure of the note identifies ‘fan blades’ as elements of turbofan engines, excluding other types of gas turbine engines.

Supplement No. 6 to Part 774— Sensitive List

Sensitive Items set forth in Supplement No. 6 to Part 774 and its subset of Very Sensitive Items set forth in Supplement No. 7 to Part 774 have reporting requirements in order for WA member countries to inform one another of transactions involving these items. This rule amends paragraphs (1)(i)—1A002.a.1 and (1)(vi)—1D002 of Supplement No. 6 to part 774 (Sensitive List) to align the EAR Sensitive List with the WA Sensitive List. (For the subset of Very Sensitive items, such as stealth technology materials and advanced radar, members are called on to “exert extreme vigilance” in exports.)

Changes to Various Provisions Related to Category 5—Part 2 Encryption Items

BIS is amending various provisions in the EAR related to items in Category 5—Part 2, including by eliminating reporting requirements in order to reduce exporters’ regulatory burdens. In

summary, this rule makes the following changes: (1) Eliminates the email notification requirement for ‘publicly available’ encryption source code and beta test encryption software, except for ‘publicly available’ encryption source code and beta test encryption software implementing “non-standard cryptography”; (2) eliminates the self-classification reporting requirement for certain ‘mass market’ encryption products under § 740.17(b)(1); and (3) allows self-classification reporting for ECCN 5A992.c or 5D992.c components of ‘mass market’ products (and their ‘executable software’). This rule moves “mass market” “components,” ‘executable software’, toolsets, and toolkits out of § 740.17(b)(3)(i) and into (b)(1). Of those four items, only “mass market” “components” and ‘executable software’ are subject to self-classification reporting. Mass market toolsets and toolkits are not subject to self-classification reporting.

This rule does not change any of the License Exception ENC requirements for any non-‘mass market’ encryption item, or for any encryption item (‘mass market’ or not) that implements “non-standard cryptography”.

§ 734.4 *De Minimis*

This rule revises the title of paragraph (b) and the introductory paragraph (b)(1) to accommodate the addition of digital forensics items (digital investigative tools). This rule also revises paragraph (b)(1)(i) by replacing “notification requirement of” with “criteria specified in,” because of the change that is simultaneously being made to the notification requirement provisions in § 742.15(b) of the EAR.

§ 734.17 *Export of Encryption Source Code and Object Code Software*

This rule revises paragraph (b)(2) by replacing “notification requirements for” with “additional requirements” in the second sentence and “notification requirements” in the last sentence with “additional requirements”, because of this rule’s removal of the notification requirement set forth in § 742.15(b) of the EAR for the majority of publicly available software. The reference to § 742.15(b) remains in light of the other requirements that this provision contains, including notification requirements that remain in effect for a small percentage of certain publicly available software.

§ 740.9 *Temporary Imports, Exports, Reexports, and Transfers (In-Country) (TMP)*

This rule revises paragraph (c)(8), regarding the notification requirement

associated with beta test encryption software eligible under License Exception TMP, by narrowing the scope of the requirement to apply only to beta test encryption software implementing “non-standard cryptography,” as that term is defined in part 772 of the EAR.

§ 740.13 *Technology and Software Unrestricted (TSU)*

This rule revises paragraph (d)(2), regarding mass market software exclusions, by correcting citation references. In a rule published on September 20, 2016 (81 FR 64657), EAR requirements for “mass market” encryption software were updated and moved from § 742.15(b) to § 740.17(b). However, BIS inadvertently did not update the citations in paragraph (d)(2) at that time and is consequently correcting that oversight in this rule.

§ 740.17 *Encryption Commodities, Software and Technology (ENC)*

This rule revises the title of introductory paragraph (b), from “Classification request or self-classification report” to “Classification request or self-classification” because self-classification reports are required for some, but not all, items that exporters can self-classify. Introductory paragraph (b) is also revised by adding the word “certain” to the first sentence to indicate that as a consequence of changes made in this rule, not all products described in paragraph (b)(1) that are self-classified require a self-classification report. Paragraph (b)(3) is revised by removing a reference to (b)(3)(i) in the last sentence, because (b)(3)(i) no longer applies to any “mass market” component, toolset or toolkit as a consequence of the revisions made in this rule. This rule adds the term “Non-‘mass market’” to the title of paragraph (b)(3)(i). It also revises the sentence in this paragraph to read in this manner: “Specified components classified under ECCN 5A002.a and equivalent or related software classified under ECCN 5D002 that do not meet the criteria set forth in Note 3 to Category 5—Part 2 of the CCL (the “mass market” note) and are not described by paragraph (b)(2) or (b)(3)(ii) of this section, as follows:”. These changes eliminate mandatory submission of a classification request to BIS for the review of ECCN 5A992.c components and ECCN 5D992.c ‘executable software’ of “mass market” products, except for “non-standard cryptography”. With the elimination of this classification request requirement, the eligible “mass market” “components” and ‘executable software’ now default to (b)(1) status and consequently may be self-classified and

annually reported to BIS and the ENC Encryption Request Coordinator, Ft. Meade, MD (via email to crypt-supps8@bis.doc.gov and enc@nsa.gov, respectively). In addition, a reference to paragraph (b)(3)(ii) is added to the end of this sentence in paragraph (b)(3)(i) in order to avoid confusion related to “non-standard cryptography”, as the paragraph (b)(3)(ii) requirement to submit a classification request for “non-standard cryptography” remains. In summary, BIS is making the following changes to the License Exception ENC requirements for items formerly described in § 740.17(b)(3)(i) prior to this rule:

(a) “Mass market” chips, chipsets, electronic assemblies and field programmable logic devices, and their qualifying ‘executable software’, that are not described in paragraph (b)(2) of License Exception ENC are now authorized under § 740.17(b)(1) instead of § 740.17(b)(3)(i)(A). These items can now be self-classified and require a self-classification report. BIS anticipates that most cryptographic libraries and modules will remain in § 740.17(b)(3)(i)(B), because paragraph b of Category 5—Part 2 Note 3 (Cryptography Note) excludes items whose primary function is “information security”.

(b) “Mass market” development kits (toolsets) and toolkits that are stand-alone products (e.g., are not “components” or ‘executable software’ of another “mass market” product) are also now authorized under § 740.17(b)(1). These items can now be self-classified under ECCN 5A992.c or 5D992.c, and self-classification reporting is not required.

There is no change in the status of or requirements relating to items described in §§ 740.17(b)(3)(ii), (iii), or (iv).

Revisions to § 740.17(e) Reporting Requirements

Paragraph (e)(3), self-classification reporting, is revised by adding after the reference to commodities, software, and components in the second sentence “and components exported or reexported meeting the criteria specified in paragraph (b)(1) of this section.” It also adds a sentence immediately thereafter that explains that the reporting requirement applies to “mass market” encryption “components” and ‘executable software’ that meet the criteria of the Cryptography Note—Note 3 to Category 5—Part 2 of the CCL (“mass market” note) and are classified under ECCN 5A992.c or 5D992.c following self-classification, provided these items are not further described by paragraph (b)(2) or (b)(3) of Section

740.17. The reporting requirement also applies to non-“mass market” encryption commodities, software, and components that remain classified in ECCN 5A002, 5B002 or 5D002 following self-classification, provided these items are not further described by paragraph (b)(2) or (b)(3) of Section 740.17. A new note is added for this paragraph that defines ‘executable software,’ as well as clarifies that ‘executable software’ does not include complete binary images of the “software” running on an end-item, corresponding to similar notes in the Cryptography Note (Note 3 to Category 5—Part 2 in the CCL, Supplement No. 1 to part 774). Clarifying phrases are also added to this paragraph to indicate which non-“mass market” commodities and software still require self-classification reporting. Under these revisions, “mass market” encryption items that fall under § 740.17(b)(1) no longer require classification by BIS or submission of a self-classification report except as noted above. There is no change to the classification or self-classification reporting requirements for non-“mass market” encryption items controlled under ECCNs 5A002, 5B002 or 5D002. These revisions are estimated to produce a 60% reduction in encryption self-classification reports.

§ 742.15 Encryption Items

This rule renames and revises paragraph (b)(2), regarding the notification requirement for ‘publicly available’ encryption software, to eliminate email notification to BIS and the ENC Encryption Request Coordinator of such software except for “non-standard cryptography.” These revisions are estimated to produce an 80% reduction in notifications regarding publicly available encryption software.

Category 5—Part 2

This rule revises the Nota Bene (N.B.) to Note 3 (Cryptography Note) by adding the word “certain” before “mass market encryption commodities and software” in the first sentence to indicate that as a result of this rule, not all “mass market” encryption requires classification by BIS or the submission of a self-classification report to be released from encryption items (EI) and national security (NS) controls of ECCN 5A002 or 5D002. A sentence is added to the end of this N.B. to clarify the status of “mass market” commodities and software that no longer require a self-classification report, including that such items are released from EI and NS controls of ECCN 5A002 or 5D002 but remain controlled under ECCN 5A992.c or 5D992.c.

Export Control Reform Act of 2018

On August 13, 2018, the President signed the Export Control Reform Act of 2018 (ECRA), 50 U.S.C. Sections 4801–4852, which provides the legal basis for BIS’s principal authorities and serves as the authority under which BIS issues this rule.

Savings Clause

Shipments of items removed from license exception eligibility or eligibility for export, reexport or transfer (in-country) 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 March 29, 2021, pursuant to actual orders for exports, reexports and transfers (in-country) 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, reexported or transferred (in-country) before May 28, 2021. Any such items not actually exported, reexported or transferred (in-country) before midnight, on May 28, 2021, require a license in accordance with this final rule.

Executive Order Requirements

Executive Orders 13563 and 12866 direct agencies to assess all costs and benefits of available regulatory alternatives and, if regulation is necessary, to select regulatory approaches that maximize net benefits (including potential economic, environmental, public health and safety effects, distributive impacts, and equity). Executive Order 13563 emphasizes the importance of quantifying costs and benefits, reducing costs, harmonizing rules, and promoting flexibility.

This rule has been designated a “significant regulatory action” under Executive Order 12866.

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

Paperwork Reduction Act Requirements

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 the following OMB-approved collections of information subject to the PRA: 0694–0088, “Multi-Purpose Application” which carries a burden hour estimate of 29.6 minutes for a manual or electronic submission; 0694–0137 “License Exceptions and Exclusions”, which carries a burden hour estimate average of 1.5 hours per submission (Note: Submissions for License Exceptions are rarely required); 0694–0096 “Five Year Records Retention Period”, which carries a burden hour estimate of less than 1 minute; and 0607–0152 “Automated Export System (AES) Program”, which carries a burden hour estimate of 3 minutes per electronic submission. Specific license application submission estimates are discussed further in the preamble of this rule where the revisions are explained. BIS estimates that revisions that are editorial (*e.g.*, moving the location of control text on the CCL), or that are clarifications will result in no change in license application submissions. Regarding the self-classification notifications for License Exception ENC under collection 0694–137, 75% of encryption self-classification notifications are now entirely mass market submissions. Of those mass market submissions, BIS estimates that 80% of the encryption products in these submissions implement standards-based cryptography. Therefore, the elimination of encryption self-classification notifications for encryption products that implement standards-based cryptography under License Exception ENC is anticipated to result in a 60% reduction of submissions. However, because all 18 license exceptions set forth in Part 740 of the EAR are bundled into one collection, the revisions included in this rule result in no change to the overall burden for collection 0694–0137.

Administrative Procedure Act and Regulatory Flexibility Act Requirements

Pursuant to § 4821 of ECRA, this action is exempt from the Administrative Procedure Act (5 U.S.C. 553) (APA) requirements for notice of proposed rulemaking, opportunity for public participation, and delay in the date of effectiveness.

Because a notice of proposed rulemaking and an opportunity for public comment are not required to be given for this rule under the APA or by any other law, the analytical requirements of the Regulatory Flexibility Act (5 U.S.C. 601 *et seq.*) are not applicable. Accordingly, no

regulatory flexibility analysis is required, and none has been prepared.

List of Subjects

15 CFR Part 734

Administrative practice and procedure, Exports, Inventions and patents, Research, Science and technology.

15 CFR Part 740

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

15 CFR Part 742

Exports, Terrorism.

15 CFR Part 772

Exports.

15 CFR Part 774

Exports, Reporting and recordkeeping requirements.

Accordingly, parts 734, 740, 742, 772 and 774 of the Export Administration Regulations (15 CFR parts 730 through 774) are amended as follows:

PART 734—[AMENDED]

■ 1. The authority citation for part 734 is revised to read as follows:

Authority: 50 U.S.C. 4801–4852; 50 U.S.C. 4601 *et seq.*; 50 U.S.C. 1701 *et seq.*; E.O. 12938, 59 FR 59099, 3 CFR, 1994 Comp., p. 950; E.O. 13020, 61 FR 54079, 3 CFR, 1996 Comp., p. 219; E.O. 13026, 61 FR 58767, 3 CFR, 1996 Comp., p. 228; E.O. 13222, 66 FR 44025, 3 CFR, 2001 Comp., p. 783; E.O. 13637, 78 FR 16129, 3 CFR, 2014 Comp., p. 223; Notice of November 12, 2020, 85 FR 72897 (November 13, 2020).

■ 2. Section 734.4 is amended by revising the paragraph (b) subject heading and paragraphs (b)(1) introductory text and (b)(1)(i) to read as follows:

§ 734.4 De minimis U.S. content.

(b) *Special requirements for certain Category 5, Part 2 items.*

(1) The U.S.-origin commodities or software, if controlled under ECCN 5A002, ECCN 5B002, equivalent or related software therefor classified under ECCN 5D002, and “cryptanalytic items” or digital forensics items (investigative tools) classified under ECCN 5A004 or 5D002, must have been:

(i) Publicly available encryption source code classified under ECCN 5D002 that has met the criteria specified in § 742.15(b), see § 734.3(b)(3) of the EAR. Such source code does not have to be counted as controlled U.S.-origin content in a *de minimis* calculation;

■ 3. Section 734.17 is amended by revising paragraph (b)(2) to read as follows:

§ 734.17 Export of encryption source code and object code software.

* * * * *

(b) * * *

(2) Making such “software” available for transfer outside the United States, over wire, cable, radio, electromagnetic, photo optical, photoelectric or other comparable communications facilities accessible to persons outside the United States, including transfers from electronic bulletin boards, internet file transfer protocol and World Wide websites, unless the person making the “software” available takes precautions adequate to prevent unauthorized transfer of such code. See § 742.15(b) of the EAR for additional requirements pursuant to which exports or reexports of encryption source code “software” are considered to be publicly available consistent with the provisions of § 734.3(b)(3). Publicly available encryption source code “software” and corresponding object code are not subject to the EAR, when the encryption source code “software” meets the additional requirements in § 742.15(b) of the EAR.

* * * * *

PART 740—[AMENDED]

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

Authority: 50 U.S.C. 4801–4852; 50 U.S.C. 4601 *et seq.*; 50 U.S.C. 1701 *et seq.*; 22 U.S.C. 7201 *et seq.*; E.O. 13026, 61 FR 58767, 3 CFR, 1996 Comp., p. 228; E.O. 13222, 66 FR 44025, 3 CFR, 2001 Comp., p. 783.

■ 5. Section 740.9 is amended by revising paragraph (c)(8) to read as follows:

§ 740.9 Temporary Imports, Exports, Reexports, and Transfers (in-country) (TMP).

* * * * *

(c) * * *

(8) *Notification of beta test encryption software implementing “non-standard cryptography.”* For beta test encryption software eligible under this license exception that provides or performs “non-standard cryptography” as defined in part 772 of the EAR, by the time of export or reexport you must submit the information described in paragraphs (a) through (d) of supplement No. 6 to part 742 of the EAR by email to BIS at *crypt@bis.doc.gov* and to the ENC Encryption Request Coordinator at *enc@nsa.gov*.

* * * * *

■ 6. Section 740.13 is amended by revising paragraph (d)(2) to read as follows:

§ 740.13 Technology and software—unrestricted (TSU).

* * * * *

(d) * * *

(2) *Exclusions.* The provisions of this paragraph (d) are not available for encryption software controlled for “EI” reasons under ECCN 5D002 or for encryption software with symmetric key length exceeding 64-bits that qualifies as mass market encryption software under the criteria in the Cryptography Note (Note 3) of Category 5, Part 2, of the CCL (supplement No. 1 to part 774 of the EAR). (Once such mass market encryption software has been released from “EI” and “NS” controls pursuant to § 740.17(b) of the EAR, it is controlled under ECCN 5D992.c and is thus outside the scope of License Exception TSU.) See § 740.17(b) of the EAR for exports and reexports of mass market encryption products controlled under ECCN 5D992.c.

* * * * *

■ 7. Section 740.17 is amended by: ■ a. Revising the paragraph (b) subject heading;

■ b. Revising the first sentence of paragraph (b) introductory text;

■ c. Revising the last sentence of paragraph (b)(3) introductory text;

■ d. Revising paragraph (b)(3)(i) introductory text;

■ e. Revising paragraph (e)(3) introductory text; and

■ f. Adding a note to paragraph (e)(3) introductory text.

The revisions and addition read as follows:

§ 740.17 Encryption Commodities, Software and Technology (ENC).

* * * * *

(b) *Classification request or self-classification.* For certain products described in paragraph (b)(1) of this section that are self-classified, a self-classification report in accordance with paragraph (e)(3) of this section is required from specified exporters, reexporters and transferors; for products described in paragraph (b)(1) of this section that are classified by BIS via a CCATS, a self-classification report is not required. * * *

(3) * * * Thirty (30) days after a classification request is submitted to BIS in accordance with paragraph (d) of this section and subject to the reporting requirements in paragraph (e) of this section, this paragraph authorizes exports, reexports, and transfers (in-country) of the items submitted for classification, as further described in

this paragraph (b)(3), to any end user, provided the item does not perform the functions, or otherwise meet the specifications, of any item described in paragraph (b)(2) of this section. Items described in paragraph (b)(3)(ii) or (iv) of this section that meet the criteria set forth in Note 3 to Category 5—Part 2 of the CCL (the “mass market” note) are classified under ECCN 5A992.c or 5D992.c following classification by BIS.

* * * * *

(i) *Non-“mass market” “components,” toolsets, and toolkits.* Specified components classified under ECCN 5A002.a and equivalent or related software classified under ECCN 5D002 that do not meet the criteria set forth in Note 3 to Category 5—Part 2 of the CCL (the “mass market” note) and are not described by paragraph (b)(2) or (b)(3)(ii) of this section, as follows:

* * * * *

(e) * * *

(3) *Self-classification reporting for certain encryption commodities, software, and components.* This paragraph (e)(3) sets forth requirements for self-classification reporting to BIS and the ENC Encryption Request Coordinator (Ft. Meade, MD) of certain encryption commodities, software, and components exported or reexported meeting the criteria specified in paragraph (b)(1) of this section. Specifically, this reporting requirement applies to “mass market” encryption components and ‘executable software’ that meet the criteria of the Cryptography Note—Note 3 to Category 5—Part 2 of the CCL (“mass market” note) and are classified under ECCN 5A992.c or 5D992.c following self-classification, as well as to non-“mass market” encryption commodities and software that remain classified in ECCN 5A002, 5B002 or 5D002 following self-classification, provided these items are not further described by paragraph (b)(2) or (3) of this section.

Note to introductory text of paragraph (e)(3): For the purposes of this paragraph (e)(3), ‘executable software’ means “software” in executable form, from an existing hardware component excluded from ECCN 5A002 by the Cryptography Note. ‘Executable software’ does not include complete binary images of the “software” running on an end item.

* * * * *

PART 742—[AMENDED]

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

Authority: 50 U.S.C. 4801–4852; 50 U.S.C. 4601 *et seq.*; 50 U.S.C. 1701 *et seq.*; 22 U.S.C.

3201 *et seq.*; 42 U.S.C. 2139a; 22 U.S.C. 7201 *et seq.*; 22 U.S.C. 7210; 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, 68 FR 26459, 3 CFR, 2004 Comp., p. 320; Notice of November 12, 2020, 85 FR 72897 (November 13, 2020).

■ 9. Section 742.15 is amended by revising paragraph (b)(2) to read as follows:

§ 742.15 Encryption items.

* * * * *

(b) * * *

(2) *Notification requirement for “non-standard cryptography.”* For publicly available encryption source code classified under ECCN 5D002 that provides or performs “non-standard cryptography” as defined in part 772 of the EAR, you must notify BIS and the ENC Encryption Request Coordinator via email of the internet location (e.g., URL or internet address) of the source code or provide each of them a copy of the publicly available encryption source code. If you update or modify the source code, you must also provide additional copies to each of them each time the cryptographic functionality of the source code is updated or modified. In addition, if you posted the source code on the internet, you must notify BIS and the ENC Encryption Request Coordinator each time the internet location is changed, but you are not required to notify them of updates or modifications made to the encryption source code at the previously notified location. In all instances, submit the notification or copy to *crypt@bis.doc.gov* and to *enc@nsa.gov*.

* * * * *

PART 772—[AMENDED]

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

Authority: 50 U.S.C. 4801–4852; 50 U.S.C. 4601 *et seq.*; 50 U.S.C. 1701 *et seq.*; E.O. 13222, 66 FR 44025, 3 CFR, 2001 Comp., p. 783.

■ 11. Section 772.1 is amended by:

■ a. Adding a definition for “equivalent standards” in alphabetical order;

■ b. Removing the definition of “instrumented range”; and

■ c. Revising the definitions of “personal area network (Cat 5 Part 2)” and “superalloy”.

The addition and revisions read as follows:

§ 772.1 Definitions of Terms As Used In the Export Administration Regulations (EAR).

* * * * *

Equivalent standards. (Cat 1)—Comparable national or international standards recognized by one or more Wassenaar Arrangement Participating States and applicable to the relevant entry.

* * * * *

Personal area network (Cat 5 Part 2)—A data communication system having all of the following characteristics:

(1) Allows an arbitrary number of independent or interconnected ‘data devices’ to communicate directly with each other; and

(2) Is confined to the communication between devices within the immediate physical vicinity of an individual person or device controller (e.g., single room, office, or automobile).

Technical Notes:

1. ‘Data device’ means equipment capable of transmitting or receiving sequences of digital information.

2. The “local area network” extends beyond the geographical area of the “personal area network”.

* * * * *

Superalloy. (Cat 2 and 9) Nickel, cobalt, or iron base alloys having a stress rupture life greater than 1,000 hours at 400 MPa and an ultimate tensile strength greater than 850 MPa, at 922 K (649 °C) or higher.

* * * * *

PART 774—[AMENDED]

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

Authority: 50 U.S.C. 4801–4852; 50 U.S.C. 4601 *et seq.*; 50 U.S.C. 1701 *et seq.*; 10 U.S.C. 8720; 10 U.S.C. 8730(e); 22 U.S.C. 287c, 22 U.S.C. 3201 *et seq.*; 22 U.S.C. 6004; 42 U.S.C. 2139a; 15 U.S.C. 1824; 50 U.S.C. 4305; 22 U.S.C. 7201 *et seq.*; 22 U.S.C. 7210; E.O. 13026, 61 FR 58767, 3 CFR, 1996 Comp., p. 228; E.O. 13222, 66 FR 44025, 3 CFR, 2001 Comp., p. 783.

Supplement No. 1 to Part 774—[Amended]

■ 13. In supplement no. 1 to part 774 (the CCL), Category 0, ECCN 0A502 is revised to read as follow:

Supplement No. 1 to Part 774—The Commerce Control List

0A502 Shotguns; shotguns “parts” and “components,” consisting of complete trigger mechanisms; magazines and magazine extension tubes; “complete breech mechanisms;” except equipment used to slaughter domestic animals or used exclusively to treat or tranquilize animals, and except arms designed solely for signal, flare, or saluting use.

License Requirements

Reason for Control: RS, CC, FC, UN, AT, NS

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
NS applies to shotguns with a barrel length less than 18 inches (45.72 cm).	NS Column 1
RS applies to shotguns with a barrel length less than 18 inches (45.72 cm).	RS Column 1
FC applies to entire entry ..	FC Column 1
CC applies to shotguns with a barrel length less than 24 in. (60.96 cm) and shotgun "components" controlled by this entry regardless of end user.	CC Column 1
CC applies to shotguns with a barrel length greater than or equal to 24 in. (60.96 cm), regardless of end user.	CC Column 2
CC applies to shotguns with a barrel length greater than or equal to 24 in. (60.96 cm) if for sale or resale to police or law enforcement.	CC Column 3
UN applies to entire entry	See § 746.1(b) of the EAR for UN controls
AT applies to shotguns with a barrel length less than 18 inches (45.72 cm).	AT Column 1

List Based License Exceptions (See Part 740 for a Description of All License Exceptions)

LVS: \$500 for 0A502 shotgun "parts" and "components," consisting of complete trigger mechanisms; magazines and magazine extension tubes. \$500 for 0A502 shotgun "parts" and "components," consisting of complete trigger mechanisms; magazines and magazine extension tubes, "complete breech mechanisms" if the ultimate destination is Canada.
GBS: N/A

List of Items Controlled

Related Controls: Shotguns that are fully automatic are "subject to the ITAR."

Related Definitions: N/A

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

Note 1 to 0A502: Shotguns made in or before 1898 are considered antique shotguns and designated as EAR99.

Technical Note: Shot pistols or shotguns that have had the shoulder stock removed and a pistol grip attached are controlled by ECCN 0A502. Slug guns are also controlled under ECCN 0A502.

■ 14. In supplement no. 1 to part 774 (the CCL), Category 0, ECCN 0A503 is revised to read as follows:

0A503 Discharge type arms; non-lethal or less-lethal grenades and projectiles, and "specially designed" "parts" and

"components" of those projectiles; and devices to administer electric shock, for example, stun guns, shock batons, shock shields, electric cattle prods, immobilization guns and projectiles; except equipment used to slaughter domestic animals or used exclusively to treat or tranquilize animals, and except arms designed solely for signal, flare, or saluting use; and "specially designed" "parts" and "components," n.e.s.

License Requirements

Reason for Control: CC, UN

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
CC applies to entire entry.	A license is required for ALL destinations, except Canada, regardless of end use. Accordingly, a column specific to this control does not appear on the Commerce Country Chart. (See part 742 of the EAR for additional information)
UN applies to entire entry.	See § 746.1(b) of the EAR for UN controls

List Based License Exceptions (See Part 740 for a Description of All License Exceptions)

LVS: N/A
GBS: N/A

List of Items Controlled

Related Controls: Law enforcement restraint devices that administer an electric shock are controlled under ECCN 0A982.

Electronic devices that monitor and report a person's location to enforce restrictions on movement for law enforcement or penal reasons are controlled under ECCN 3A981.

Related Definitions: N/A

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

■ 15. In supplement no. 1 to part 774 (the CCL), Category 0, ECCN 0A606 is revised to read as follows:

0A606 Ground vehicles and related commodities, as follows (see List of Items Controlled).

License Requirements

Reason for Control: NS, RS, AT, UN

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
NS applies to entire entry, except 0A606.b and .y.	NS Column 1
NS applies to 0A606.b.	NS Column 2
RS applies to entire entry, except 0A606.b and .y.	RS Column 1

Control(s)

RS applies to 0A606.b.
RS applies to 0A606.y.
AT applies to entire entry.
UN applies to entire entry, except 0A606.y.

*Country Chart
(See Supp. No. 1 to part 738)*

RS Column 2
China, Russia, or Venezuela (see § 742.6(a)(7))
AT Column 1
See § 746.1(b) for UN controls

List Based License Exceptions (See Part 740 for a Description of All License Exceptions)

LVS: \$1500
GBS: N/A

Special Conditions for STA

STA: (1) Paragraph (c)(1) of License Exception STA (§ 740.20(c)(1) of the EAR) may not be used for any item in 0A606.a, unless determined by BIS to be eligible for License Exception STA in accordance with § 740.20(g) (License Exception STA eligibility requests for 9x515 and "600 series" items). (2) Paragraph (c)(2) of License Exception STA (§ 740.20(c)(2) of the EAR) may not be used for any item in 0A606.

List of Items Controlled

Related Controls: (1) The ground vehicles, other articles, technical data (including software) and services described in 22 CFR part 121, Category VII are subject to the jurisdiction of the International Traffic in Arms Regulations. (2) See ECCN 0A919 for foreign-made "military commodities" that incorporate more than a *de minimis* amount of U.S.-origin "600 series" controlled content.

Related Definitions: N/A

Items:

a. Ground vehicles, whether manned or unmanned, "specially designed" for a military use and not enumerated or otherwise described in USML Category VII.

Note 1 to paragraph .a: For purposes of paragraph .a, "ground vehicles" include (i) tanks and armored vehicles manufactured prior to 1956 that have not been modified since 1955 and that do not contain a functional weapon or a weapon capable of becoming functional through repair; (ii) military railway trains except those that are armed or are "specially designed" to launch missiles; (iii) unarmored military recovery and other support vehicles; (iv) unarmored, unarmed vehicles with mounts or hard points for firearms of .50 caliber or less; and (v) trailers "specially designed" for use with other ground vehicles enumerated in USML Category VII or ECCN 0A606.a, and not separately enumerated or otherwise described in USML Category VII. For purposes of this note, the term "modified" does not include incorporation of safety features required by law, cosmetic changes (e.g., different paint or repositioning of bolt holes) or addition of "parts" or "components" available prior to 1956.

Note 2 to paragraph .a: A ground vehicle's being "specially designed" for

military use for purposes of determining controls under paragraph .a. entails a structural, electrical or mechanical feature involving one or more "components" that are "specially designed" for military use. Such "components" include:

- a. Pneumatic tire casings of a kind "specially designed" to be bullet-proof;
- b. Armored protection of vital "parts" (e.g., fuel tanks or vehicle cabs);
- c. Special reinforcements or mountings for weapons;
- d. Black-out lighting.

b. Other ground vehicles, "parts" and "components," as follows:

b.1. Unarmed vehicles that are derived from civilian vehicles and that have all of the following:

b.1.a. Manufactured or fitted with materials or "components" other than reactive or electromagnetic armor to provide ballistic protection equal to or better than level III (National Institute of Justice standard 0108.01, September 1985) or "equivalent standards";

b.1.b. A transmission to provide drive to both front and rear wheels simultaneously, including those for vehicles having additional wheels for load bearing purposes whether driven or not;

b.1.c. Gross vehicle weight rating (GVWR) greater than 4,500 kg; and

b.1.d. Designed or modified for off-road use.

b.2. "Parts" and "components" having all of the following:

b.2.a. "Specially designed" for vehicles specified in paragraph .b.1 of this entry; and

b.2.b. Providing ballistic protection equal to or better than level III (National Institute of Justice standard 0108.01, September 1985) or "equivalent standards".

Note 1 to paragraph b: Ground vehicles otherwise controlled by 0A606.b.1 that contain reactive or electromagnetic armor are subject to the controls of USML Category VII.

Note 2 to paragraph b: ECCN 0A606.b.1 does not control civilian vehicles "specially designed" for transporting money or valuables.

Note 3 to paragraph b: "Unarmed" means not having installed weapons, installed mountings for weapons, or special reinforcements for mounts for weapons.

c. Air-cooled diesel engines and engine blocks for armored vehicles that weigh more than 40 tons.

d. Fully automatic continuously variable transmissions for tracked combat vehicles.

e. Deep water fording kits "specially designed" for ground vehicles controlled by ECCN 0A606.a or USML Category VII.

f. Self-launching bridge "components" not enumerated in USML Category VII(g) "specially designed" for deployment by ground vehicles enumerated in USML Category VII or this ECCN.

g. through w. [Reserved]

x. "Parts," "components," "accessories," and "attachments" that are "specially designed" for a commodity enumerated or otherwise described in ECCN 0A606 (other than 0A606.b or 0A606.y) or a defense article enumerated in USML Category VII and not

elsewhere specified on the USML or in 0A606.y.

Note 1: Forgings, castings, and other unfinished products, such as extrusions and machined bodies, that have reached a stage in manufacture where they are clearly identifiable by mechanical properties, material composition, geometry, or function as commodities controlled by ECCN 0A606.x are controlled by ECCN 0A606.x.

Note 2: "Parts," "components," "accessories" and "attachments" enumerated in USML paragraph VII(g) are subject to the controls of that paragraph. "Parts," "components," "accessories" and "attachments" described in ECCN 0A606.y are subject to the controls of that paragraph.

y. Specific "parts," "components," "accessories," and "attachments" "specially designed" for a commodity enumerated or otherwise described in this ECCN (other than ECCN 0A606.b) or for a defense article in USML Category VII and not elsewhere specified on the USML or the CCL, as follows, and "parts," "components," "accessories," and "attachments" "specially designed" therefor:

y.1. Brake discs, rotors, drums, calipers, cylinders, pads, shoes, lines, hoses, vacuum boosters, and parts therefor;

y.2. Alternators and generators;

y.3. Axles;

y.4. Batteries;

y.5. Bearings (e.g., ball, roller, wheel);

y.6. Cables, cable assemblies, and connectors;

y.7. Cooling system hoses;

y.8. Hydraulic, fuel, oil, and air filters, not controlled by ECCN 1A004;

y.9. Gaskets and o-rings;

y.10. Hydraulic system hoses, fittings, couplings, adapters, and valves;

y.11. Latches and hinges;

y.12. Lighting systems, fuses, and "components;"

y.13. Pneumatic hoses, fittings, adapters, couplings, and valves;

y.14. Seats, seat assemblies, seat supports, and harnesses;

y.15. Tires, except run flat; and

y.16. Windows, except those for armored vehicles.

■ 16. In supplement no. 1 to part 774 (the CCL), Category 1, ECCN 1A002 is revised to read as follow:

1A002 "Composite" structures or laminates, as follows (see List of Items Controlled).

License Requirements

Reason for Control: NS, NP, AT

Control(s)	Country Chart (See Supp. No. 1 to part 738)
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NS applies to entire entry.	NS Column 2
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NP applies to 1A002.b.1 in the form of tubes with an inside diameter between 75 mm and 400 mm.	NP Column 1
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Control(s)	Country Chart (See Supp. No. 1 to part 738)
AT applies to entire entry.	AT Column 1

Reporting Requirements

See § 743.1 of the EAR for reporting requirements for exports under License Exceptions, and Validated End-User authorizations.

List Based License Exceptions (See Part 740 for a Description of All License Exceptions)

LVS: \$1,500; N/A for NP; N/A for "composite" structures or laminates controlled by 1A002.a, having an organic "matrix" and made from materials controlled by 1C010.c or 1C010.d.

GBS: N/A

Special Conditions for STA

STA: License Exception STA may not be used to ship any item in this entry to any of the destinations listed in Country Group A:6 (See Supplement No. 1 to part 740 of the EAR).

List of Items Controlled

Related Controls: (1) See ECCNs 1E001 ("development" and "production") and 1E201 ("use") for technology for items controlled by this entry. (2) Also see ECCNs 1A202, 1C010, 1C210, 9A010, and 9A110. (3) "Composite" structures "specially designed" for missile applications (including "specially designed" subsystems, "parts," and "components") are controlled by ECCN 9A110. (4) "Composite" structures or laminates "specially designed" or prepared for use in separating uranium isotopes are subject to the export licensing authority of the Nuclear Regulatory Commission (see 10 CFR part 110).

Related Definitions: N/A

Items:

a. Made from any of the following:

- a.1. An organic "matrix" and "fibrous or filamentary materials" specified by 1C010.c or 1C010.d; or
- a.2. Prepregs or preforms specified by 1C010.e;

b. Made from a metal or carbon "matrix", and any of the following:

b.1. Carbon "fibrous or filamentary materials" having all of the following:

b.1.a. A "specific modulus" exceeding

10.15 x 10⁶ m; and

b.1.b. A "specific tensile strength"

exceeding 17.7 x 10⁴ m; or

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

Note 1: 1A002 does not control "composite" structures or laminates made from epoxy resin impregnated carbon "fibrous or filamentary materials", for the repair of "civil aircraft" structures or laminates, having all of the following:

a. An area not exceeding 1 m²;

b. A length not exceeding 2.5 m; and

c. A width exceeding 15 mm.

Note 2: 1A002 does not control semi-finished items, "specially designed" for civilian applications as follows:

a. Sporting goods;

- b. Automotive industry;
- c. Machine tool industry;
- d. Medical applications.

Note 3: 1A002.b.1 does not apply to semi-finished items containing a maximum of two dimensions of interwoven filaments and "specially designed" for applications as follows:

- a. Metal heat-treatment furnaces for tempering metals;
- b. Silicon boule production equipment.

Note 4: 1A002 does not apply to finished items "specially designed" for a specific application.

Note 5: 1A002.b.1 does not apply to mechanically chopped, milled, or cut carbon "fibrous or filamentary materials" 25.0 mm or less in length.

■ 17. In supplement no. 1 to part 774 (the CCL), Category 1, ECCN 1A005 is revised to read as follow:

1A005 Body armor and "specially designed" "components" therefor, as follows (see List of Items Controlled).

License Requirements

Reason for Control: NS, UN, AT

Control(s)	Country Chart (See Supp. No. 1 to part 738)
NS applies to entire entry.	NS Column 2
UN applies to entire entry.	See § 746.1(b) for UN controls
AT applies to entire entry.	AT Column 1

License Requirements Notes: 1. Soft body armor not manufactured to military standards or specifications must provide ballistic protection equal to or less than NIJ level III (NIJ 0101.06, July 2008) to be controlled under 1A005.a. 2. For purposes of 1A005.a, military standards and specifications include, at a minimum, specifications for fragmentation protection.

List Based License Exceptions (See Part 740 for a Description of All License Exceptions)

LVS: N/A

GBS: Yes, except UN

List of Items Controlled

Related Controls: (1) Bulletproof and bullet resistant vests (body armor) providing NIJ Type IV protection or greater are "subject to the ITAR" (see 22 CFR 121.1 Category X(a)). (2) Soft body armor and protective garments manufactured to military standards or specifications that provide protection equal to or less than NIJ level III or "equivalent standards" are classified under ECCN 1A613.d.1. (3) Hard armor plates providing NIJ level III or "equivalent standard" ballistic protection are classified under ECCN 1A613.d.2. (4) Police helmets and shields are classified under ECCN 0A979. (5) Other personal protective "equipment" "specially designed" for military applications not controlled by the USML or elsewhere in the CCL is classified under ECCN 1A613.e. (6) For "fibrous or

filamentary materials" used in the manufacture of body armor, see ECCN 1C010.

Related Definitions: N/A
Items:

- a. Soft body armor not manufactured to military standards or specifications, or to their equivalents, and "specially designed" "components" therefor;
- b. Hard body armor plates that provide ballistic protection less than NIJ level III (NIJ 0101.06, July 2008) or "equivalent standards".

Notes to ECCN 1A005:

- 1. This entry does not control body armor when accompanying its user for the user's own personal protection.
- 2. This entry does not control body armor designed to provide frontal protection only from both fragment and blast from non-military explosive devices.
- 3. This entry does not apply to body armor designed to provide protection only from knife, spike, needle or blunt trauma.

■ 18. In supplement no. 1 to part 774 (the CCL), Category 1, ECCN 1A006 is revised to read as follow:

1A006 Equipment, "specially designed" or modified for the disposal of Improvised Explosive Devices (IEDs), as follows (see List of Items Controlled), and "specially designed" "components" and "accessories" therefor.

License Requirements

Reason for Control: NS, AT

Control(s)	Country Chart (See Supp. No. 1 to part 738)
NS applies to entire entry.	NS Column 2
AT applies to entire entry.	AT Column 1

License Requirement Note: 1A006 does not apply to equipment when accompanying its operator.

List Based License Exceptions (See Part 740 for a Description of All License Exceptions)

LVS: N/A

GBS: N/A

List of Items Controlled

Related Controls: Equipment "specially designed" for military use for the disposal of IEDs is "subject to the ITAR" (see 22 CFR parts 120 through 130, including USML Category IV).

Related Definitions: N/A

Items:

- a. Remotely operated vehicles;
- b. "Disruptors".

Technical Note: For the purpose of 1A006.b 'disruptors' are devices "specially designed" for the purpose of preventing the operation of an explosive device by projecting a liquid, solid or frangible projectile.

Note: 1A006 does not apply to equipment when accompanying its operator.

■ 19. In supplement no. 1 to part 774 (the CCL), Category 1, ECCN 1A613 is revised to read as follow:

1A613 Armored and protective "equipment" and related commodities, as follows (see List of Items Controlled).

License Requirements

Reason for Control: NS, RS, AT, UN

Control(s)	Country Chart (See Supp. No. 1 to part 738)
NS applies to entire entry except 1A613.y.	NS Column 1
RS applies to entire entry except 1A613.y.	RS Column 1
RS applies 1A613.y ..	China, Russia, or Venezuela (see § 742.6(a)(7))
AT applies to entire entry.	AT Column 1
UN applies to entire entry, except 1A613.y.	See § 746.1(b) for UN controls

List Based License Exceptions (See Part 740 for a Description of All License Exceptions)

LVS: \$1500

GBS: N/A

Special Conditions for STA

STA: Paragraph (c)(2) of License Exception STA (§ 740.20(c)(2) of the EAR) may not be used for any item in 1A613.

List of Items Controlled

Related Controls: (1) Defense articles, such as materials made from classified information, that are controlled by USML Category X or XIII of the ITAR, and technical data (including software) directly related thereto, are "subject to the ITAR." (2) See ECCN 0A919 for foreign-made "military commodities" that incorporate more than a *de minimis* amount of US-origin "600 series" controlled content. (3) See ECCN 9A610.g for anti-gravity suits ("G-suits") and pressure suits capable of operating at altitudes higher than 55,000 feet above sea level.

Related Definitions: References to "NIJ Type" protection are to the National Institute of Justice Classification guide at NIJ Standard 0101.06, Ballistic Resistance of Body Armor, and NIJ Standard 0108.01, Ballistic Resistant Protective Materials.

Items:

a. Metallic or non-metallic armored plate "specially designed" for military use and not controlled by the USML.

Note to paragraph a: For controls on body armor plates, see ECCN 1A613.d.2 and USML Category X(a)(1).

b. Shelters "specially designed" to:
b.1. Provide ballistic protection for military systems; or

b.2. Protect against nuclear, biological, or chemical contamination.

c. Military helmets (other than helmets controlled under 1A613.y.1) providing less than NIJ Type IV or "equivalent standards"

protection and “specially designed” helmet shells, liners, or comfort pads therefor.

Note 1: See ECCN 0A979 for controls on police helmets.

Note 2: See USML Category X(a)(5) and (a)(6) for controls on other military helmets.

d. Body armor and protective garments, as follows:

d.1. Soft body armor and protective garments manufactured to military standards or specifications, or to their equivalents, that provide ballistic protection equal to or less than NIJ level III (NIJ 0101.06, July 2008) or “equivalent standards”; or

Note: For 1A613.d.1, military standards or specifications include, at a minimum, specifications for fragmentation protection.

d.2. Hard body armor plates that provide ballistic protection equal to NIJ level III (NIJ 0101.06, July 2008) or “equivalent standards”.

Note: See ECCN 1A005 for controls on soft body armor not manufactured to military standards or specifications and hard body armor plates providing less than NIJ level III or “equivalent standards” protection. For body armor providing NIJ Type IV protection or greater, see USML Category X(a)(1).

e. Atmospheric diving suits “specially designed” for rescue operations for submarines controlled by the USML or the CCL.

f. Other personal protective “equipment” “specially designed” for military applications not controlled by the USML, not elsewhere controlled on the CCL.

g. to w. [Reserved]

x. “Parts,” “components,” “accessories,” and “attachments” that are “specially designed” for a commodity controlled by ECCN 1A613 (except for 1A613.y) or an article enumerated in USML Category X, and not controlled elsewhere in the USML.

Note: Forgings, castings, and other unfinished products, such as extrusions and machined bodies, that have reached a stage in manufacturing where they are clearly identifiable by mechanical properties, material composition, geometry, or function as commodities controlled by ECCN 1A613.x are controlled by ECCN 1A613.x.

y. Other commodities as follows:

y.1 Conventional military steel helmets.

N.B. to paragraph y.1: For other military helmet “components” or “accessories,” see the relevant ECCN in the CCL or USML Entry.

y.2 [Reserved]

■ 20. In supplement no. 1 to part 774 (the CCL), Category 1, ECCN 1B002 is revised to read as follow:

1B002 Equipment designed to produce metal alloy powder or particulate materials and having any of the following (see List of Items Controlled).

License Requirements

Reason for Control: NS, AT

Control(s)	Country Chart (See Supp. No. 1 to part 738)
NS applies to entire entry.	NS Column 2
AT applies to entire entry.	AT Column 1

List Based License Exceptions (See Part 740 for a Description of All License Exceptions)

LVS: \$5000

GBS: N/A

List of Items Controlled

Related Controls: N/A

Related Definitions: N/A

Items:

- “Specially designed” to avoid contamination; and
- “Specially designed” for use in one of the processes specified by 1C002.c.2.

■ 21. In supplement no. 1 to part 774 (the CCL), Category 1, ECCN 1C001 is revised to read as follow:

1C001 Materials “specially designed” for absorbing electromagnetic radiation, or intrinsically conductive polymers, as follows (see List of Items Controlled).

License Requirements

Reason for Control: NS, MT, AT

Control(s)	Country Chart (See Supp. No. 1 to part 738)
NS applies to entire entry.	NS Column 1
MT applies to items that meet or exceed the parameters of ECCN 1C101.	MT Column 1
AT applies to entire entry.	AT Column 1

Reporting Requirements

See § 743.1 of the EAR for reporting requirements for exports under License Exceptions, and Validated End-User authorizations.

List Based License Exceptions (See Part 740 for a Description of All License Exceptions)

LVS: N/A

GBS: N/A

Special Conditions for STA

STA: License Exception STA may not be used to ship any item in this entry to any of the destinations listed in Country Group A:6 (See Supplement No.1 to part 740 of the EAR).

List of Items Controlled

Related Controls: See also 1C101

Related Definitions: N/A

Items:

a. Materials for absorbing frequencies exceeding 2×10^8 Hz but less than 3×10^{12} Hz.

Note 1: 1C001.a does not control:
a. Hair type absorbers, constructed of natural or synthetic fibers, with non-magnetic loading to provide absorption;

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

c. Planar absorbers, having all of the following:

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

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

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

2. Tensile strength less than 7×10^6 N/m²; and

3. Compressive strength less than 14×10^6 N/m²;

d. Planar absorbers made of sintered ferrite, having all of the following:

1. A specific gravity exceeding 4.4; and
2. A maximum operating temperature of 548 K (275 °C) or less;

e. Planar absorbers having no magnetic loss and fabricated from ‘open-cell foams’ plastic material with a density of 0.15 grams/cm³ or less.

Technical Note: ‘Open-cell foams’ are flexible and porous materials, having an inner structure open to the atmosphere. ‘Open-cell foams’ are also known as reticulated foams.

Note 2: Nothing in Note 1 releases magnetic materials to provide absorption when contained in paint.

b. Materials not transparent to visible light and specially designed for absorbing near-infrared radiation having a wavelength exceeding 810 nm but less than 2,000 nm (frequencies exceeding 150 THz but less than 370 THz);

Note: 1C001.b does not apply to materials, “specially designed” or formulated for any of the following applications:

a. “Laser” marking of polymers; or
b. “Laser” welding of polymers.

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

c.1. Polyaniline;
c.2. Polypyrrole;
c.3. Polythiophene;
c.4. Poly phenylene-vinylene; or
c.5. Poly thienylene-vinylene.

Note: 1C001.c does not apply to materials in a liquid form.

Technical Note: ‘Bulk electrical conductivity’ and ‘sheet (surface) resistivity’

should be determined using ASTM D-257 or national equivalents.

■ 22. In supplement no. 1 to part 774 (the CCL), Category 1, ECCN 1C002 is revised to read as follows:

1C002 Metal alloys, metal alloy powder and alloyed materials, as follows (see List of Items Controlled).

License Requirements

Reason for Control: NS, NP, AT

Control(s)	Country Chart (See Supp. No. 1 to part 738)
NS applies to entire entry.	NS Column 2
NP applies to 1C002.b.3 or b.4 if they exceed the parameters stated in 1C202.	NP Column 1
AT applies to entire entry.	AT Column 1

List Based License Exceptions (See Part 740 for a Description of All License Exceptions)

LVS: \$3000; N/A for NP

GBS: N/A

List of Items Controlled

Related Controls: (1) See ECCNs 1E001 (“development”) and “production”) and 1E201 (“use”) for technology for items controlled by this entry. (2) Also see ECCN 1C202. (3) Aluminum alloys and titanium alloys in physical forms and finished products “specially designed” or prepared for use in separating uranium isotopes are subject to the export licensing authority of the Nuclear Regulatory Commission (see 10 CFR part 110).

Related Definition: N/A

Items:

Note: 1C002 does not control metal alloys, metal alloy powder and alloyed materials, specially formulated for coating purposes.

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

Technical Note 2: ‘Stress-rupture life’ should be measured in accordance with ASTM standard E-139 or national equivalents.

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

a. Aluminides, as follows:

a.1. Nickel aluminides containing a minimum of 15% by weight aluminum, a maximum of 38% by weight aluminum and at least one additional alloying element;

a.2. Titanium aluminides containing 10% by weight or more aluminum and at least one additional alloying element;

b. Metal alloys, as follows, made from the powder or particulate material controlled by 1C002.c:

b.1. Nickel alloys having any of the following:

b.1.a. A ‘stress-rupture life’ of 10,000 hours or longer at 923 K (650 °C) at a stress of 676 MPa; or

b.1.b. A ‘low cycle fatigue life’ of 10,000 cycles or more at 823 K (550 °C) at a maximum stress of 1,095 MPa;

b.2. Niobium alloys having any of the following:

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

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

b.3. Titanium alloys having any of the following:

b.3.a. A ‘stress-rupture life’ of 10,000 hours or longer at 723 K (450 °C) at a stress of 200 MPa; or

b.3.b. A ‘low cycle fatigue life’ of 10,000 cycles or more at 723 K (450 °C) at a maximum stress of 400 MPa;

b.4. Aluminum alloys having any of the following:

b.4.a. A tensile strength of 240 MPa or more at 473 K (200 °C); or

b.4.b. A tensile strength of 415 MPa or more at 298 K (25 °C);

b.5. Magnesium alloys having all the following:

b.5.a. A tensile strength of 345 MPa or more; and

b.5.b. A corrosion rate of less than 1 mm/year in 3% sodium chloride aqueous solution measured in accordance with ASTM standard G-31 or national equivalents;

c. Metal alloy powder or particulate material, having all of the following:

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

Technical Note: X in the following equals one or more alloying elements.

c.1.a. Nickel alloys (Ni-Al-X, Ni-X-Al) qualified for turbine engine “parts” or “components,” i.e., with less than 3 non-metallic particles (introduced during the manufacturing process) larger than 100 μm in 10⁹ alloy particles;

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

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

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

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

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

c.2.a. ‘Vacuum atomization’;

c.2.b. ‘Gas atomization’;

c.2.c. ‘Rotary atomization’;

c.2.d. ‘Splat quenching’;

c.2.e. ‘Melt spinning’ and ‘comminution’;

c.2.f. ‘Melt extraction’ and ‘comminution’;

c.2.g. ‘Mechanical alloying’; or

c.2.h. ‘Plasma atomization’; and

c.3. Capable of forming materials controlled by 1C002.a or 1C002.b;

d. Alloyed materials, having all the following:

d.1. Made from any of the composition systems specified by 1C002.c.1;

d.2. In the form of uncomminuted flakes, ribbons or thin rods; and

d.3. Produced in a controlled environment by any of the following:

d.3.a. ‘Splat quenching’;

d.3.b. ‘Melt spinning’; or

d.3.c. ‘Melt extraction’.

Technical Notes:

1. ‘Vacuum atomization’ is a process to reduce a molten stream of metal to droplets of a diameter of 500 μm or less by the rapid evolution of a dissolved gas upon exposure to a vacuum.

2. ‘Gas atomization’ is a process to reduce a molten stream of metal alloy to droplets of 500 μm diameter or less by a high pressure gas stream.

3. ‘Rotary atomization’ is a process to reduce a stream or pool of molten metal to droplets of a diameter of 500 μm or less by centrifugal force.

4. ‘Splat quenching’ is a process to ‘solidify rapidly’ a molten metal stream impinging upon a chilled block, forming a flake-like product.

5. ‘Melt spinning’ is a process to ‘solidify rapidly’ a molten metal stream impinging upon a rotating chilled block, forming a flake, ribbon or rod-like product.

6. ‘Comminution’ is a process to reduce a material to particles by crushing or grinding.

7. ‘Melt extraction’ is a process to ‘solidify rapidly’ and extract a ribbon-like alloy product by the insertion of a short segment of a rotating chilled block into a bath of a molten metal alloy.

8. ‘Mechanical alloying’ is an alloying process resulting from the bonding, fracturing and rebonding of elemental and master alloy powders by mechanical impact. Non-metallic particles may be incorporated in the alloy by addition of the appropriate powders.

9. ‘Plasma atomization’ is a process to reduce a molten stream or solid metal to droplets of 500 μm diameter or less, using plasma torches in an inert gas environment.

10. ‘Solidify rapidly’ is a process involving the solidification of molten material at cooling rates exceeding 1000 K/sec.

■ 23. In supplement no. 1 to part 774 (the CCL), Category 1, ECCN 1C006 is revised to read as follows:

1C006 Fluids and lubricating materials, as follows (see List of Items Controlled).

License Requirements

Reason for Control: NS, AT

Control(s)	Country Chart (See Supp. No. 1 to part 738)
NS applies to entire entry.	NS Column 2
AT applies to entire entry.	AT Column 1

List Based License Exceptions (See Part 740 for a Description of All License Exceptions)

LVS: \$3000

GBS: Yes for 1C006.d

List of Items Controlled

Related Controls: See also 1C996.

Related Definitions: N/A

Items:

- a. [Reserved]
- b. Lubricating materials containing, as their principal ingredients, any of the following:
 - b.1. Phenylene or alkylphenylene ethers or thio-ethers, or their mixtures, containing more than two ether or thio-ether functions or mixtures thereof; or
 - b.2. Fluorinated silicone fluids with a kinematic viscosity of less than 5,000 mm²/s (5,000 centistokes) measured at 298 K (25 °C);
 - c. Damping or flotation fluids having all of the following:
 - c.1. Purity exceeding 99.8%;
 - c.2. Containing less than 25 particles of 200 μm or larger in size per 100 ml; and
 - c.3. Made from at least 85% of any of the following:
 - c.3.a. Dibromotetrafluoroethane (CAS 25497-30-7, 124-73-2, 27336-23-8);
 - c.3.b. Polychlorotrifluoroethylene (oily and waxy modifications only); or
 - c.3.c. Polybromotrifluoroethylene;
 - d. Fluorocarbon fluids designed for electronic cooling and having all of the following:
 - d.1. Containing 85% by weight or more of any of the following, or mixtures thereof:
 - d.1.a. Monomeric forms of perfluoropolyalkylether-triazines or perfluoroaliphatic-ethers;
 - d.1.b. Perfluoroalkylamines;
 - d.1.c. Perfluorocycloalkanes; or
 - d.1.d. Perfluoroalkanes;
 - d.2. Density at 298 K (25 °C) of 1.5 g/ml or more;
 - d.3. In a liquid state at 273 K (0 °C); and
 - d.4. Containing 60% or more by weight of fluorine.

Note: 1C006.d does not apply to materials specified and packaged as medical products.

■ 24. In supplement no. 1 to part 774 (the CCL), Category 1, ECCN 1C010 is revised to read as follow:

1C010 “Fibrous or filamentary materials” as follows (see List of Items Controlled).

License Requirements

Reason for Control: NS, NP, AT

Control(s)	Country Chart (See Supp. No. 1 to part 738)
NS applies to entire entry.	NS Column 2
NP applies to 1C010.a (aramid “fibrous or filamentary materials”, b (carbon “fibrous and filamentary materials”), and e.1 for “fibrous and filamentary materials” that meet or exceed the control criteria of ECCN 1C210.	NP Column 1

Control(s)

AT applies to entire entry.

Reporting Requirements

See § 743.1 of the EAR for reporting requirements for exports under License Exceptions, and Validated End-User authorizations.

List Based License Exceptions (See Part 740 for a Description of All License Exceptions)

LVS: \$1500, N/A for NP

GBS: N/A

Special Conditions for STA

STA: License Exception STA may not be used to ship any item in 1C010.c to any of the destinations listed in Country Group A:6 (See Supplement No.1 to part 740 of the EAR).

List of Items Controlled

Related Controls: (1) See ECCNs 1E001 (“development” and “production”) and 1E201 (“use”) for technology for items controlled by this entry. (2) Also see ECCNs 1C210 and 1C990. (3) See also 9C110 for material not controlled by 1C010.e, as defined by notes 1 or 2.

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

Items:

Technical Notes:

1. For the purpose of calculating “specific tensile strength”, “specific modulus” or specific weight of “fibrous or filamentary materials” in 1C010.a, 1C010.b or 1C010.c, the tensile strength and modulus should be determined by using Method A described in ISO 10618 (2004) or national equivalents.

2. Assessing the “specific tensile strength”, “specific modulus” or specific weight of non-unidirectional “fibrous or filamentary materials” (e.g., fabrics, random mats or braids) in 1C010 is to be based on the mechanical properties of the constituent unidirectional monofilaments (e.g., monofilaments, yarns, rovings or tows) prior to processing into the non-unidirectional “fibrous or filamentary materials”.

- a. Organic “fibrous or filamentary materials”, having all of the following:
 - a.1. “Specific modulus” exceeding 12.7 x 10⁶ m; and
 - a.2. “Specific tensile strength” exceeding 23.5 x 10⁴ m;

Note: 1C010.a does not control polyethylene.

- b. Carbon “fibrous or filamentary materials”, having all of the following:
 - b.1. “Specific modulus” exceeding 14.65 x 10⁶ m; and

**Country Chart
(See Supp. No. 1 to part 738)**

AT Column 1

b.2. “Specific tensile strength” exceeding 26.82 x 10⁴ m;

Note: 1C010.b does not control:

a. “Fibrous or filamentary materials”, for the repair of “civil aircraft” structures or laminates, having all of the following:

- 1. An area not exceeding 1 m²;
- 2. A length not exceeding 2.5 m; and
- 3. A width exceeding 15 mm.

b. Mechanically chopped, milled or cut carbon “fibrous or filamentary materials” 25.0 mm or less in length.

c. Inorganic “fibrous or filamentary materials”, having all of the following:

- c.1. Having any of the following:
 - c.1.a. Composed of 50% or more by weight silicon dioxide (SiO₂) and having a “specific modulus” exceeding 2.54 x 10⁶ m; or
 - c.1.b. Not specified in 1C010.c.1.a and having a “specific modulus” exceeding 5.6 x 10⁶ m; and
 - c.2. Melting, softening, decomposition or sublimation point exceeding 1,922 K (1,649 °C) in an inert environment;

Note: 1C010.c does not control:

a. Discontinuous, multiphase, polycrystalline alumina fibers in chopped fiber or random mat form, containing 3% by weight or more silica, with a “specific modulus” of less than 10 x 10⁶ m;

b. Molybdenum and molybdenum alloy fibers;

c. Boron fibers;

d. Discontinuous ceramic fibers with a melting, softening, decomposition or sublimation point lower than 2,043 K (1,770 °C) in an inert environment.

d. “Fibrous or filamentary materials”, having any of the following:

- d.1. Composed of any of the following:
 - d.1.a. Polyetherimides controlled by 1C008.a; or
 - d.1.b. Materials controlled by 1C008.b to 1C008.f; or
 - d.2. Composed of materials controlled by 1C010.d.1.a or 1C010.d.1.b and ‘commingled’ with other fibers controlled by 1C010.a, 1C010.b or 1C010.c;

Technical Note: ‘Commingled’ is filament to filament blending of thermoplastic fibers and reinforcement fibers in order to produce a fiber reinforcement “matrix” mix in total fiber form.

e. Fully or partially resin impregnated or pitch impregnated “fibrous or filamentary materials” (prepregs), metal or carbon coated “fibrous or filamentary materials” (preforms) or ‘carbon fiber preforms’, having all of the following:

- e.1. Having any of the following:
 - e.1.a. Inorganic “fibrous or filamentary materials” controlled by 1C010.c; or
 - e.1.b. Organic or carbon “fibrous or filamentary materials”, having all of the following:
 - e.1.b.1. “Specific modulus” exceeding 10.15 x 10⁶ m; and
 - e.1.b.2 “Specific tensile strength” exceeding 17.7 x 10⁴ m; and
 - e.2. Having any of the following:
 - e.2.a. Resin or pitch, controlled by 1C008 or 1C009.b;
 - e.2.b. ‘Dynamic Mechanical Analysis glass transition temperature (DMA T_g)’ equal to or exceeding 453 K (180 °C) and having a phenolic resin; or

e.2.c. ‘Dynamic Mechanical Analysis glass transition temperature (DMA T_g)’ equal to or exceeding 505 K (232 °C) and having a resin or pitch, not specified by 1C008 or 1C009.b, and not being a phenolic resin;

Note 1: Metal or carbon coated “fibrous or filamentary materials” (preforms) or ‘carbon fiber preforms’, not impregnated with resin or pitch, are specified by “fibrous or filamentary materials” in 1C010.a, 1C010.b or 1C010.c.

Note 2: 1C010.e does not apply to:
a. Epoxy resin “matrix” impregnated carbon “fibrous or filamentary materials” (prepregs) for the repair of “civil aircraft” structures or laminates, having all of the following:

1. An area not exceeding 1 m²;
2. A length not exceeding 2.5 m; and
3. A width exceeding 15 mm;

b. Fully or partially resin-impregnated or pitch-impregnated mechanically chopped, milled or cut carbon “fibrous or filamentary materials” 25.0 mm or less in length when using a resin or pitch other than those specified by 1C008 or 1C009.b.

Technical Notes:

1. ‘Carbon fiber preforms’ are an ordered arrangement of uncoated or coated fibers intended to constitute a framework of a part before the “matrix” is introduced to form a “composite”.

2. The ‘Dynamic Mechanical Analysis glass transition temperature (DMA T_g)’ for materials controlled by 1C010.e is determined using the method described in ASTM D 7028 –07, or equivalent national standard, on a dry test specimen. In the case of thermoset materials, degree of cure of a dry test specimen shall be a minimum of 90% as defined by ASTM E 2160 04 or equivalent national standard.

■ 25. In supplement no. 1 to part 774, Category 2, ECCN 2A001 is revised to read as follows:

2A001 Anti-friction bearings, bearing systems and “components,” as follows, (see List of Items Controlled).

License Requirements

Reason for Control: NS, MT, AT

Control(s)	Country Chart (See Supp. No. 1 to part 738)
NS applies to entire entry.	NS Column 2

Control(s)	Country Chart (See Supp. No. 1 to part 738)
MT applies to radial ball bearings having all tolerances specified in accordance with ISO 492 Tolerance Class 2 (or ANSI/ABMA Std 20 Tolerance Class ABEC–9, or other national equivalents) or better and having all the following characteristics: an inner ring bore diameter between 12 and 50 mm; an outer ring outside diameter between 25 and 100 mm; and a width between 10 and 20 mm.	MT Column 1
AT applies to entire entry.	AT Column 1

List Based License Exceptions (See Part 740 for a Description of All License Exceptions)

LVS: \$3000, N/A for MT
GBS: Yes, for 2A001.a, N/A for MT

List of Items Controlled

Related Controls: (1) See also 2A991. (2) Quiet running bearings are “subject to the ITAR” (see 22 CFR parts 120 through 130.)
Related Definitions: Annular Bearing Engineers Committee (ABEC).
Items:

Note: 2A001.a includes ball bearing and roller elements “specially designed” for the items specified therein.

a. Ball bearings and solid roller bearings, having all tolerances specified by the manufacturer in accordance with ISO 492 Tolerance Class 4 or Class 2 (or national equivalents), or better, and having both ‘rings’ and ‘rolling elements’, made from monel or beryllium;

Note: 2A001.a does not control tapered roller bearings.

Technical Notes:

1. ‘Ring’—annular part of a radial rolling bearing incorporating one or more raceways (ISO 5593:1997).

2. ‘Rolling element’—ball or roller which rolls between raceways (ISO 5593:1997).

- b. [Reserved]
- c. Active magnetic bearing systems using any of the following, and “specially designed” components therefor:
 - c.1. Materials with flux densities of 2.0 T or greater and yield strengths greater than 414 MPa;
 - c.2. All-electromagnetic 3D homopolar bias designs for actuators; or
 - c.3. High temperature (450 K (177°C) and above) position sensors.

■ 26. In supplement no. 1 to part 774, Category 3, ECCN 3B001 is revised to read as follows:

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

License Requirements

Reason for Control: NS, AT

Control(s)	Country Chart (See Supp. No. 1 to part 738)
NS applies to entire entry.	NS Column 2
AT applies to entire entry.	AT Column 1

List Based License Exceptions (See Part 740 for a Description of All License Exceptions)

LVS: \$500
GBS: Yes, except a.3 (molecular beam epitaxial growth equipment using gas sources), .e (automatic loading multi-chamber central wafer handling systems only if connected to equipment controlled by 3B001. a.3, or .f), and .f (lithography equipment).

List of Items Controlled

Related Controls: See also 3B991.

Related Definitions: N/A

Items:

a. Equipment designed for epitaxial growth as follows:

a.1. Equipment designed or modified to produce 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;

Note: 3B001.a.1 includes atomic layer epitaxy (ALE) equipment.

a.2. Metal Organic Chemical Vapor Deposition (MOCVD) reactors designed for compound semiconductor epitaxial growth of material having two or more of the following elements: aluminum, gallium, indium, arsenic, phosphorus, antimony, or nitrogen;

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

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

- b.1. [Reserved]
- b.2. Being designed and optimized to operate at a beam energy of 20 keV or more and a beam current of 10 mA or more for hydrogen, deuterium, or helium implant;
- b.3. Direct write capability;
- 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”; or
- b.5. Being designed and optimized to operate at beam energy of 20keV or more and a beam current of 10mA or more for silicon implant into a semiconductor material “substrate” heated to 600 °C or greater;
- c. [Reserved]
- d. [Reserved]
- 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 functionally different ‘semiconductor process tools’ controlled by 3B001.a.1, 3B001.a.2, 3B001.a.3 or 3B001.b are designed 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 “specially designed” for parallel wafer processing.

Technical Notes:

1. For the purpose of 3B001.e, ‘semiconductor process tools’ refers to modular tools that provide physical processes for semiconductor production that

are functionally different, such as deposition, implant or thermal processing.

2. For the purpose of 3B001.e, ‘sequential multiple wafer processing’ means the capability to process each wafer in different ‘semiconductor process tools’, such as by transferring each wafer from one tool to a second tool and on to a third tool with the automatic loading multi-chamber central wafer handling systems.

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 and having any of the following:

f.1.a. A light source wavelength shorter than 193 nm; or

f.1.b. Capable of producing a pattern with a “Minimum Resolvable Feature size” (MRF) of 45 nm or less;

Technical Note: The ‘Minimum Resolvable Feature size’ (MRF) is calculated by the following formula:

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

where the K factor = 0.35

f.2 Imprint lithography equipment capable of production features of 45 nm or less;

Note: 3B001.f.2 includes:

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

f.3. Equipment “specially designed” for mask making having all of the following:

f.3.a. A deflected focused electron beam, ion beam or “laser” beam; and

f.3.b. Having any of the following:

f.3.b.1. A Full-Width Half-Maximum (FWHM) spot size smaller than 65 nm and an image placement less than 17 nm (mean + 3 sigma); or

f.3.b.2. [Reserved]

f.3.b.3. A second-layer overlay error of less than 23 nm (mean + 3 sigma) on the mask;

f.4. Equipment designed for device processing using direct writing methods, having all of the following:

f.4.a. A deflected focused electron beam; and

f.4.b. Having any of the following:

f.4.b.1. A minimum beam size equal to or smaller than 15 nm; or

f.4.b.2. An overlay error less than 27 nm (mean + 3 sigma);

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

h. Multi-layer masks with a phase shift layer not specified by 3B001.g and designed to be used by lithography equipment having a light source wavelength less than 245 nm;

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.

N.B.: For masks and reticles, “specially designed” for optical sensors, see 6B002.

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

j. Mask “substrate blanks” with multilayer reflector structure consisting of molybdenum and silicon, and having all of the following:

- j.1. “Specially designed” for ‘Extreme Ultraviolet (EUV)’ lithography; and
- j.2. Compliant with SEMI Standard P37.

Technical Note: ‘Extreme Ultraviolet (EUV)’ refers to electromagnetic spectrum wavelengths greater than 5 nm and less than 124 nm.

■ 27. In supplement no. 1 to part 774, Category 3, ECCN 3E002 is revised to read as follows:

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

License Requirements

Reason for Control: NS, AT

Control(s)	Country Chart (See Supp. No. 1 to part 738)
NS applies to entire entry.	NS Column 1
AT applies to entire entry.	AT Column 1

License Requirements Note: See § 744.17 of the EAR for additional license requirements for microprocessors having a processing speed of 5 GFLOPS or more and an arithmetic logic unit with an access width of 32 bit or more, including those incorporating “information security” functionality, and associated “software” and “technology” for the “production” or “development” of such microprocessors.

List Based License Exceptions (See Part 740 for a Description of All License Exceptions)

TSR: Yes

List of Items Controlled

Related Controls: N/A

Related Definitions: N/A

Items:

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

Technical Note: A ‘vector processor unit’ is a processor element with built-in instructions that perform multiple calculations on ‘floating-point’ vectors (one-dimensional arrays of 32-bit or larger numbers) simultaneously, having at least one vector arithmetic logic unit and vector registers of at least 32 elements each.

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

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

Note 1: 3E002 does not control “technology” for multimedia extensions.

Note 2: 3E002 does not control “technology” for microprocessor cores, having all of the following:

a. Using “technology” at or above 0.130 μm; and

b. Incorporating multi-layer structures with five or fewer metal layers.

Note 3: 3E002 includes “technology” for the “development” or “production” of digital signal processors and digital array processors.

Technical Notes:

1. For the purpose of 3E002.a and 3E002.b, ‘floating-point’ is defined by IEEE-754.

2. For the purpose of 3E002.c, ‘fixed-point’ refers to a fixed-width real number with both an integer component and a fractional component, and which does not include integer-only formats.

■ 28. In supplement no. 1 to part 774, Category 5 Part 2 is amended by revising the Nota Bene to Note 3 (Cryptography Note) to read as follows:

* * * * *

Category 5—Telecommunications and “Information Security”

Part 2—“Information Security”

* * * * *

Note 3: * * *

N.B. to Note 3 (Cryptography Note):
 You must submit a classification request or self-classification report to BIS for certain mass market encryption commodities and software eligible for the Cryptography Note employing a key length greater than 64 bits for the symmetric algorithm (or, for commodities and software not implementing any symmetric algorithms, employing a key length greater than 768 bits for asymmetric algorithms described by Technical note 2.b to 5A002.a or greater than 128 bits for elliptic curve algorithms, or any asymmetric algorithm described by Technical Note 2.c to 5A002.a) in accordance with the requirements of § 740.17(b) of the EAR in order to be released from the “EI” and “NS” controls of ECCN 5A002 or 5D002. For mass market commodities and software that do not require a self-classification report pursuant to § 740.17(b) and (e)(3) of the EAR, such items are also released from “EI” and “NS” controls and controlled under ECCN 5A992.c or 5D992.c.

* * * * *

■ 28. In supplement no. 1 to part 774, Category 5 Part 2, ECCN 5A002 is revised to read as follows:

5A002 “Information security” systems, equipment and “components,” as follows (see List of Items Controlled).

License Requirements

Reason for Control: NS, AT, EI

Control(s)	Country Chart (See Supp. No. 1 to part 738)
NS applies to entire entry.	NS Column 1
AT applies to entire entry.	AT Column 1
EI applies to entire entry.	Refer to § 742.15 of the EAR

License Requirements Note: See § 744.17 of the EAR for additional license requirements for microprocessors having a processing speed of 5 GFLOPS or more and an arithmetic logic unit with an access width of 32 bit or more, including those incorporating “information security” functionality, and associated “software” and “technology” for the “production” or “development” of such microprocessors.

List Based License Exceptions (See Part 740 for a Description of All License Exceptions)

LVS: Yes; \$500 for “components”. N/A for systems and equipment.

GBS: N/A

ENC: Yes for certain EI controlled commodities, see § 740.17 of the EAR for eligibility.

List of Items Controlled

Related Controls: (1) ECCN 5A002.a controls “components” providing the means or functions necessary for “information security.” All such “components” are presumptively “specially designed” and controlled by 5A002.a. (2) See USML Categories XI (including XI(b)) and XIII(b) (including XIII(b)(2)) for controls on systems, equipment, and components described in 5A002.d or .e that are subject to the ITAR. (3) For “satellite navigation system” receiving equipment containing or employing decryption see 7A005, and for related decryption “software” and “technology” see 7D005 and 7E001. (4) Noting that items may be controlled elsewhere on the CCL, examples of items not controlled by ECCN 5A002.a.4 include the following: (a) An automobile where the only ‘cryptography for data confidentiality’ having a ‘described security algorithm’ is performed by a Category 5—Part 2 Note 3 eligible mobile telephone that is built into the car. In this case, secure phone communications support a non-primary function of the automobile but the mobile telephone (equipment), as a standalone item, is not controlled by ECCN 5A002 because it is excluded by the Cryptography Note (Note 3) (See ECCN 5A992.c). (b) An exercise bike with an embedded Category 5—Part 2 Note 3 eligible web browser, where the only controlled cryptography is performed by the web browser. In this case, secure web browsing supports a non-primary function of the exercise bike but the web browser (“software”), as a standalone item, is not controlled by ECCN 5D002 because it is excluded by the Cryptography Note (Note 3) (See ECCN 5D992.c). (5) After classification or self-classification in accordance with § 740.17(b) of the EAR, mass market encryption commodities that meet eligibility requirements are released from “EI” and “NS” controls. These commodities are designated 5A992.c.

Related Definitions: N/A

Items:

- a. Designed or modified to use ‘cryptography for data confidentiality’ having a ‘described security algorithm’, where that cryptographic capability is usable, has been activated, or can be activated by any means other than secure “cryptographic activation”, as follows:
 - a.1. Items having “information security” as a primary function;
 - a.2. Digital communication or networking systems, equipment or components, not specified in paragraph 5A002.a.1;
 - a.3. Computers, other items having information storage or processing as a primary function, and components therefor, not specified in paragraphs 5A002.a.1 or .a.2;

N.B.: For operating systems see also 5D002.a.1 and .c.1.

a.4. Items, not specified in paragraphs 5A002.a.1 to a.3, where the ‘cryptography for data confidentiality’ having a ‘described security algorithm’ meets all of the following:

a.4.a. It supports a non-primary function of the item; and

a.4.b. It is performed by incorporated equipment or “software” that would, as a standalone item, be specified by ECCNs 5A002, 5A003, 5A004, 5B002 or 5D002.

N.B. to paragraph a.4: See Related Control Paragraph (4) of this ECCN 5A002 for examples of items not controlled by 5A002.a.4.

Technical Notes:

1. For the purposes of 5A002.a, ‘cryptography for data confidentiality’ means “cryptography” that employs digital techniques and performs any cryptographic function other than any of the following:

- 1.a. “Authentication;”
- 1.b. Digital signature;
- 1.c. Data integrity;
- 1.d. Non-repudiation;
- 1.e. Digital rights management, including the execution of copy-protected “software;”
- 1.f. Encryption or decryption in support of entertainment, mass commercial broadcasts or medical records management; or
- 1.g. Key management in support of any function described in paragraphs 1.a to 1.f of this Technical Note paragraph 1.

2. For the purposes of 5A002.a, ‘described security algorithm’ means any of the following:

- 2.a. A “symmetric algorithm” employing a key length in excess of 56 bits, not including parity bits;
- 2.b. An “asymmetric algorithm” where the security of the algorithm is based on any of the following:
 - 2.b.1. Factorization of integers in excess of 512 bits (e.g., RSA);
 - 2.b.2. Computation of discrete logarithms in a multiplicative group of a finite field of size greater than 512 bits (e.g., Diffie-Hellman over Z/pZ); or
 - 2.b.3. Discrete logarithms in a group other than mentioned in paragraph 2.b.2 of this Technical Note in excess of 112 bits (e.g., Diffie-Hellman over an elliptic curve); or
- 2.c. An “asymmetric algorithm” where the security of the algorithm is based on any of the following:

- 2.c.1. Shortest vector or closest vector problems associated with lattices (e.g., NewHope, Frodo, NTRUEncrypt, Kyber, Titanium);
- 2.c.2. Finding isogenies between Supersingular elliptic curves (e.g., Supersingular Isogeny Key Encapsulation); or
- 2.c.3. Decoding random codes (e.g., McEliece, Niederreiter).

Technical Note: An algorithm described by Technical Note 2.c. may be referred to as being post-quantum, quantum-safe or quantum-resistant.

Note 1: Details of items must be accessible and provided upon request, in order to establish any of the following:

- a. Whether the item meets the criteria of 5A002.a.1 to a.4; or

b. Whether the cryptographic capability for data confidentiality specified by 5A002.a is usable without “cryptographic activation.”

Note 2: 5A002.a does not control any of the following items, or specially designed “information security” components therefor:

a. Smart cards and smart card readers/writers’ as follows:

a.1. A smart card or an electronically readable personal document (e.g., token coin, e-passport) that meets any of the following:

a.1.a. The cryptographic capability meets all of the following:

a.1.a.1. It is restricted for use in any of the following:

a.1.a.1.a. Equipment or systems, not described by 5A002.a.1 to a.4;

a.1.a.1.b. Equipment or systems, not using ‘cryptographic for data confidentiality’ having a ‘described security algorithm’; or

a.1.a.1.c. Equipment or systems, excluded from 5A002.a by entries b. to f. of this Note; and

a.1.a.2. It cannot be reprogrammed for any other use; or

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

a.1.b.1. It is specially designed and limited to allow protection of ‘personal data’ stored within;

a.1.b.2. Has been, or can only be, personalized for public or commercial transactions or individual identification; and

a.1.b.3. Where the cryptographic capability is not user-accessible;

Technical Note to paragraph a.1.b of

Note 2: ‘Personal data’ includes any data specific to a particular person or entity, such as the amount of money stored and data necessary for “authentication.”

a.2. ‘Readers/writers’ specially designed or modified, and limited, for items specified by paragraph a.1 of this Note;

Technical Note to paragraph a.2 of

Note 2: ‘Readers/writers’ include equipment that communicates with smart cards or electronically readable documents through a network.

b. Cryptographic equipment specially designed and limited for banking use or ‘money transactions’;

Technical Note to paragraph b. of Note 2: ‘Money transactions’ in 5A002 Note 2 paragraph b. includes the collection and settlement of fares or credit functions.

c. Portable or mobile radiotelephones for civil use (e.g., for use with commercial civil cellular radio communication systems) that are not capable of transmitting encrypted data directly to another radiotelephone or equipment (other than Radio Access Network (RAN) equipment), nor of passing encrypted data through RAN equipment (e.g., Radio Network Controller (RNC) or Base Station Controller (BSC));

d. Cordless telephone equipment not capable of end-to-end encryption where the maximum effective range of unboosted cordless operation (i.e., a single, unrelayed hop between terminal and home base station) is less than 400 meters according to the manufacturer’s specifications;

e. Portable or mobile radiotelephones and similar client wireless devices for civil use,

that implement only published or commercial cryptographic standards (except for anti-piracy functions, which may be non-published) and also meet the provisions of paragraphs a.2 to a.4 of the Cryptography Note (Note 3 in Category 5—Part 2), that have been customized for a specific civil industry application with features that do not affect the cryptographic functionality of these original non-customized devices;

f. Items, where the “information security” functionality is limited to wireless “personal area network” functionality implementing only published or commercial cryptographic standards;

g. Mobile telecommunications Radio Access Network (RAN) equipment designed for civil use, which also meet the provisions of paragraphs a.2 to a.4 of the Cryptography Note (Note 3 in Category 5—Part 2), having an RF output power limited to 0.1W (20 dBm) or less, and supporting 16 or fewer concurrent users;

h. Routers, switches, gateways or relays, where the “information security” functionality is limited to the tasks of “Operations, Administration or Maintenance” (“OAM”) implementing only published or commercial cryptographic standards;

i. General purpose computing equipment or servers, where the “information security” functionality meets all of the following:

i.1. Uses only published or commercial cryptographic standards; and

i.2. Is any of the following:
i.2.a. Integral to a CPU that meets the provisions of Note 3 in Category 5—Part 2;

i.2.b. Integral to an operating system that is not specified by 5D002; or

i.2.c. Limited to “OAM” of the equipment; or

j. Items specially designed for a ‘connected civil industry application’, meeting all of the following:

j.1. Being any of the following:

j.1.a. A network-capable endpoint device meeting any of the following:

j.1.a.1. The “information security” functionality is limited to securing ‘non-arbitrary data’ or the tasks of “Operations, Administration or Maintenance” (“OAM”); or

j.1.a.2. The device is limited to a specific ‘connected civil industry application’; or

j.1.b. Networking equipment meeting all of the following:

j.1.b.1. Being specially designed to communicate with the devices specified by paragraph j.1.a. above; and

j.1.b.2. The “information security” functionality is limited to supporting the ‘connected civil industry application’ of devices specified by paragraph j.1.a. above, or the tasks of “OAM” of this networking equipment or of other items specified by paragraph j. of this Note; and

j.2. Where the “information security” functionality implements only published or commercial cryptographic standards, and the cryptographic functionality cannot easily be changed by the user.

Technical Notes:

1. ‘Connected civil industry application’ means a network-connected consumer or

civil industry application other than “information security”, digital communication, general purpose networking or computing.

2. ‘Non-arbitrary data’ means sensor or metering data directly related to the stability, performance or physical measurement of a system (e.g., temperature, pressure, flow rate, mass, volume, voltage, physical location, etc.), that cannot be changed by the user of the device.

b. Being a ‘cryptographic activation token’;

Technical Note: A ‘cryptographic activation token’ is an item designed or modified for any of the following:

1. Converting, by means of “cryptographic activation”, an item not specified by Category 5—Part 2 into an item specified by 5A002.a or 5D002.c.1, and not released by the Cryptography Note (Note 3 in Category 5—Part 2); or

2. Enabling by means of “cryptographic activation”, additional functionality specified by 5A002.a of an item already specified by Category 5—Part 2;

c. Designed or modified to use or perform “quantum cryptography”;

Technical Note: “Quantum cryptography” is also known as Quantum Key Distribution (QKD).

d. Designed or modified to use cryptographic techniques to generate channelizing codes, scrambling codes or network identification codes, for systems using ultra-wideband modulation techniques and having any of the following:

d.1. A bandwidth exceeding 500 MHz; or

d.2. A “fractional bandwidth” of 20% or more;

e. Designed or modified to use cryptographic techniques to generate the spreading code for “spread spectrum” systems, not specified by 5A002.d, including the hopping code for “frequency hopping” systems.

■ 29. In supplement no. 1 to part 774, Category 6, ECCN 6A004 is revised to read as follows:

6A004 Optical equipment and “components,” as follows (see List of Items Controlled).

License Requirements

Reason for Control: NS, AT

Control(s)	Country Chart (See Supp. No. 1 to part 738)
NS applies to entire entry.	NS Column 2
AT applies to entire entry.	AT Column 1

Reporting Requirements

See § 743.1 of the EAR for reporting requirements for exports under License

Exceptions, and Validated End-User authorizations.

List Based License Exceptions (See Part 740 for a Description of All License Exceptions)

LVS: \$3000

GBS: Yes for 6A004.a.1, a.2, a.4, .b, d.2, and .f.

Special Conditions for STA

STA: Paragraph (c)(2) of License Exception STA may not be used to ship any commodity in 6A004.c or .d to any of the destinations listed in Country Group A:6 (See Supplement No.1 to part 740 of the EAR).

List of Items Controlled

Related Controls: (1) For optical mirrors or 'aspheric optical elements' "specially designed" for lithography "equipment," see ECCN 3B001. (2) See USML Category XII(e) for gimbals "subject to the ITAR." (3) See also 6A994.

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

Items:

a. Optical mirrors (reflectors) as follows:

Technical Note: For the purpose of 6A004.a, Laser Induced Damage Threshold (LIDT) is measured according to ISO 21254-1:2011.

a.1. 'Deformable mirrors' having an active optical aperture greater than 10 mm and having any of the following, and specially designed components therefor:

a.1.a. Having all the following:

a.1.a.1. A mechanical resonant frequency of 750 Hz or more; and

a.1.a.2. More than 200 actuators; or

a.1.b. A Laser Induced Damage Threshold (LIDT) being any of the following:

a.1.b.1. Greater than 1 kW/cm² using a "CW laser"; or

a.1.b.2. Greater than 2 J/cm² using 20 ns "laser" pulses at 20 Hz repetition rate;

Technical Notes:

1. 'Deformable mirrors' are mirrors having any of the following:

a. A single continuous optical reflecting surface which is dynamically deformed by the application of individual torques or forces to compensate for distortions in the optical waveform incident upon the mirror; or

b. Multiple optical reflecting elements that can be individually and dynamically repositioned by the application of torques or forces to compensate for distortions in the optical waveform incident upon the mirror.

2. 'Deformable mirrors' are also known as adaptive optic mirrors.

a.2. Lightweight monolithic mirrors having an average "equivalent density" of less than 30 kg/m² and a total mass exceeding 10 kg;

a.3. Lightweight "composite" or foam mirror structures having an average "equivalent density" of less than 30 kg/m² and a total mass exceeding 2 kg;

Note: 6A004.a.2 and 6A004.a.3 do not apply to mirrors "specially designed" to direct solar radiation for terrestrial heliostat installations.

a.4. Mirrors specially designed for beam steering mirror stages specified in 6A004.d.2.a with a flatness of $\lambda/10$ or better (λ is equal to 633 nm) and having any of the following:

a.4.a. Diameter or major axis length greater than or equal to 100 mm; or

a.4.b. Having all of the following:

a.4.b.1. Diameter or major axis length greater than 50 mm but less than 100 mm; and

a.4.b.2. A Laser Induced Damage Threshold (LIDT) being any of the following:

a.4.b.2.a. Greater than 10 kW/cm² using a "CW laser"; or

a.4.b.2.b. Greater than 20 J/cm² using 20 ns "laser" pulses at 20 Hz repetition rate;

N.B. For optical mirrors specially designed for lithography equipment, see 3B001.

b. Optical "components" made from zinc selenide (ZnSe) or zinc sulphide (ZnS) with transmission in the wavelength range exceeding 3,000 nm but not exceeding 25,000 nm and having any of the following:

b.1. Exceeding 100 cm³ in volume; or

b.2. Exceeding 80 mm in diameter or length of major axis and 20 mm in thickness (depth);

c. "Space-qualified" "components" for optical systems, as follows:

c.1. "Components" lightweighted to less than 20% "equivalent density" compared with a solid blank of the same aperture and thickness;

c.2. Raw substrates, processed substrates having surface coatings (single-layer or multi-layer, metallic or dielectric, conducting, semiconducting or insulating) or having protective films;

c.3. Segments or assemblies of mirrors designed to be assembled in space into an optical system with a collecting aperture equivalent to or larger than a single optic 1 m in diameter;

c.4. "Components" manufactured from "composite" materials having a coefficient of linear thermal expansion, in any coordinate direction, equal to or less than $5 \times 10^{-6}/K$;

d. Optical control equipment as follows:

d.1. Equipment "specially designed" to maintain the surface figure or orientation of the "space-qualified" "components" controlled by 6A004.c.1 or 6A004.c.3;

d.2. Steering, tracking, stabilisation and resonator alignment equipment as follows:

d.2.a. Beam steering mirror stages designed to carry mirrors having diameter or major axis length greater than 50 mm and having all of the following, and specially designed electronic control equipment therefor:

d.2.a.1. A maximum angular travel of ± 26 mrad or more;

d.2.a.2. A mechanical resonant frequency of 500 Hz or more; and

d.2.a.3. An angular "accuracy" of 10 μ rad (microradians) or less (better);

d.2.b. Resonator alignment equipment having bandwidths equal to or more than 100 Hz and an "accuracy" of 10 μ rad or less (better);

d.3. Gimbals having all of the following:

d.3.a. A maximum slew exceeding 5°;

d.3.b. A bandwidth of 100 Hz or more;

d.3.c. Angular pointing errors of 200 μ rad (microradians) or less; and

d.3.d. Having any of the following:

d.3.d.1. Exceeding 0.15 m but not exceeding 1 m in diameter or major axis length and capable of angular accelerations exceeding 2 rad (radians)/s²; or

d.3.d.2. Exceeding 1 m in diameter or major axis length and capable of angular accelerations exceeding 0.5 rad (radians)/s²;

d.4. [Reserved]

e. 'Aspheric optical elements' having all of the following:

e.1. Largest dimension of the optical-aperture greater than 400 mm;

e.2. Surface roughness less than 1 nm (rms) for sampling lengths equal to or greater than 1 mm; and

e.3. Coefficient of linear thermal expansion's absolute magnitude less than $3 \times 10^{-6}/K$ at 25 °C;

Technical Note:

1. [See Related Definitions section of this ECCN]

2. Manufacturers are not required to measure the surface roughness listed in 6A004.e.2 unless the optical element was designed or manufactured with the intent to meet, or exceed, the control parameter.

Note: 6A004.e does not control 'aspheric optical elements' having any of the following:

a. Largest optical-aperture dimension less than 1 m and focal length to aperture ratio equal to or greater than 4.5:1;

b. Largest optical-aperture dimension equal to or greater than 1 m and focal length to aperture ratio equal to or greater than 7:1;

c. Designed as Fresnel, flyeye, stripe, prism or diffractive optical elements;

d. Fabricated from borosilicate glass having a coefficient of linear thermal expansion greater than $2.5 \times 10^{-6}/K$ at 25 °C; or

e. An x-ray optical element having inner mirror capabilities (e.g., tube-type mirrors).

f. Dynamic wavefront measuring equipment having all of the following:

f.1. 'Frame rates' equal to or more than 1 kHz; and

f.2. A wavefront accuracy equal to or less (better) than $\lambda/20$ at the designed wavelength.

Technical Note: For the purposes of 6A004.f, 'frame rate' is a frequency at which all "active pixels" in the "focal plane array" are integrated for recording images projected by the wavefront sensor optics.

■ 30. In supplement no. 1 to part 774, Category 6, ECCN 6A005 is revised to read as follows:

6A005 "Lasers," "components" and optical equipment, as follows (see List of Items Controlled), excluding items that are subject to the export licensing authority of the Nuclear Regulatory Commission (see 10 CFR part 110).

License Requirements

Reason for Control: NS, NP, AT

Control(s)	Country Chart (See Supp. No. 1 to part 738)
NS applies to entire entry.	NS Column 2

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
NP applies to lasers controlled by 6A005.a.2, a.3, a.4, b.2.b, b.3, b.4, b.6.c, c.1.b, c.2.b, d.2, d.3.c, or d.4.c that meet or exceed the technical parameters described in 6A205.	NP Column 1
AT applies to entire entry.	AT Column 1

List Based License Exceptions (See Part 740 for a Description of All License Exceptions)

LVS: N/A for NP items, \$3,000 for all other items

GBS: Neodymium-doped (other than glass) “lasers” controlled by 6A005.b.6.d.2 (except 6A005.b.6.d.2.b) that have an output wavelength exceeding 1,000 nm, but not exceeding 1,100 nm, and an average or CW output power not exceeding 2kW, and operate in a pulse-excited, non-“Q-switched” multiple-transverse mode, or in a continuously excited, multiple-transverse mode; Dye and Liquid Lasers controlled by 6A005.c.1, c.2 and c.3, except for a pulsed single longitudinal mode oscillator having an average output power exceeding 1 W and a repetition rate exceeding 1 kHz if the “pulse duration” is less than 100 ns; CO “lasers” controlled by 6A005.d.2 having a CW maximum rated single or multimode output power not exceeding 10 kW; CO₂ or CO/CO₂ “lasers” controlled by 6A005.d.3 having an output wavelength in the range from 9,000 to 11,000 nm and having a pulsed output not exceeding 2 J per pulse and a maximum rated average single or multimode output power not exceeding 5 kW; and CO₂ “lasers” controlled by 6A005.d.3 that operate in CW multiple-transverse mode, and having a CW output power not exceeding 15kW.

List of Items Controlled

Related Controls: (1) See ECCN 6D001 for “software” for items controlled under this entry. (2) See ECCNs 6E001 (“development”), 6E002 (“production”), and 6E201 (“use”) for “technology” for items controlled under this entry. (3) Also see ECCNs 6A205 and 6A995. (4) See ECCN 3B001 for excimer “lasers” “specially designed” for lithography equipment. (5) “Lasers” “specially designed” or prepared for use in isotope separation are subject to the export licensing authority of the Nuclear Regulatory Commission (see 10 CFR part 110). (6) See USML Category XII(b) and (e) for laser systems or lasers subject to the ITAR. (7) See USML Category XVIII for certain laser-based directed energy weapon systems, equipment, and components subject to the ITAR.

Related Definitions: (1) ‘Wall-plug efficiency’ is defined as the ratio of “laser” output power (or “average output power”) to total electrical input power required to operate the “laser”, including the power supply/

conditioning and thermal conditioning/ heat exchanger, see 6A005.a.6.b.1 and 6A005.b.6; (2) ‘Non-repetitive pulsed’ refers to “lasers” that produce either a single output pulse or that have a time interval between pulses exceeding one minute, see Note 2 of 6A005 and 6A005.d.6.

Items:

Notes:

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

2. Excimer, semiconductor, chemical, CO, CO₂, and ‘non-repetitive pulsed’ Nd:glass “lasers” are only specified by 6A005.d.

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

3. 6A005 includes fiber “lasers”.

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

5. 6A005 does not control “lasers” as follows:

- a. Ruby with output energy below 20 J;
- b. Nitrogen;
- c. Krypton.

6. For the purposes of 6A005.a and 6A005.b, ‘single transverse mode’ refers to “lasers” with a beam profile having an M²-factor of less than 1.3, while ‘multiple transverse mode’ refers to “lasers” with a beam profile having an M²-factor of 1.3 or higher.

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

- a.1. Output wavelength less than 150 nm and output power exceeding 1 W;
- a.2. Output wavelength of 150 nm or more but not exceeding 510 nm and output power exceeding 30 W;

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

a.3. Output wavelength exceeding 510 nm but not exceeding 540 nm and any of the following:

- a.3.a. ‘Single transverse mode’ output and output power exceeding 50 W; or
- a.3.b. ‘Multiple transverse mode’ output and output power exceeding 150 W;
- a.4. Output wavelength exceeding 540 nm but not exceeding 800 nm and output power exceeding 30 W;
- a.5. Output wavelength exceeding 800 nm but not exceeding 975 nm and any of the following:

- a.5.a. ‘Single transverse mode’ output and output power exceeding 50 W; or
- a.5.b. ‘Multiple transverse mode’ output and output power exceeding 80 W;
- a.6. Output wavelength exceeding 975 nm but not exceeding 1,150 nm and any of the following:

- a.6.a. ‘Single transverse mode’ output and any of the following:
- a.6.a.1. Output power exceeding 1,000 W;

or

a.6.a.2. Having all of the following:
a.6.a.2.a. Output power exceeding 500 W;
and

a.6.a.2.b. Spectral bandwidth less than 40 GHz; or

a.6.b. ‘Multiple transverse mode’ output and any of the following:

a.6.b.1. ‘Wall-plug efficiency’ exceeding 18% and output power exceeding 1,000 W; or

a.6.b.2. Output power exceeding 2 kW;

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

Note 2: 6A005.a.6.b does not apply to ‘multiple transverse mode’, industrial “lasers” having any of the following:

- a. [Reserved];
- b. Output power exceeding 1 kW but not exceeding 1.6 kW and having a BPP exceeding 1.25 mm-mrad;
- c. Output power exceeding 1.6 kW but not exceeding 2.5 kW and having a BPP exceeding 1.7 mm-mrad;
- d. Output power exceeding 2.5 kW but not exceeding 3.3 kW and having a BPP exceeding 2.5 mm-mrad;
- e. Output power exceeding 3.3 kW but not exceeding 6 kW and having a BPP exceeding 3.5 mm-mrad;
- f. [Reserved]
- g. [Reserved]
- h. Output power exceeding 6 kW but not exceeding 8 kW and having a BPP exceeding 12 mm-mrad; or
- i. Output power exceeding 8 kW but not exceeding 10 kW and having a BPP exceeding 24 mm-mrad;

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

a.7.a. ‘Single transverse mode’ and output power exceeding 50 W; or

a.7.b. ‘Multiple transverse mode’ and output power exceeding 80 W;

a.8. Output wavelength exceeding 1,555 nm but not exceeding 1,850 nm and output power exceeding 1 W;

a.9. Output wavelength exceeding 1,850 nm but not exceeding 2,100 nm, and any of the following:

a.9.a. ‘Single transverse mode’ and output power exceeding 1 W; or

a.9.b. ‘Multiple transverse mode’ output and output power exceeding 120 W; or

a.10. Output wavelength exceeding 2,100 nm and output power exceeding 1 W;

b. Non-“tunable” “pulsed lasers” having any of the following:

b.1. Output wavelength less than 150 nm and any of the following:

b.1.a. Output energy exceeding 50 mJ per pulse and “peak power” exceeding 1 W; or

b.1.b. “Average output power” exceeding 1 W;

b.2. Output wavelength of 150 nm or more but not exceeding 510 nm and any of the following:

b.2.a. Output energy exceeding 1.5 J per pulse and “peak power” exceeding 30 W; or
 b.2.b. “Average output power” exceeding 30 W;

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

b.3. Output wavelength exceeding 510 nm, but not exceeding 540 nm and any of the following:

b.3.a. ‘Single transverse mode’ output and any of the following:

b.3.a.1. Output energy exceeding 1.5 J per pulse and “peak power” exceeding 50 W; or

b.3.a.2. “Average output power” exceeding 50 W; or

b.3.b. ‘Multiple transverse mode’ output and any of the following:

b.3.b.1. Output energy exceeding 1.5 J per pulse and “peak power” exceeding 150 W; or

b.3.b.2. “Average output power” exceeding 150 W;

b.4. Output wavelength exceeding 540 nm but not exceeding 800 nm and any of the following:

b.4.a. “Pulse duration” less than 1 ps and any of the following:

b.4.a.1. Output energy exceeding 0.005 J per pulse and “peak power” exceeding 5 GW; or

b.4.a.2. “Average output power” exceeding 20 W; or

b.4.b. “Pulse duration” equal to or exceeding 1 ps and any of the following:

b.4.b.1. Output energy exceeding 1.5 J per pulse and “peak power” exceeding 30 W; or

b.4.b.2. “Average output power” exceeding 30 W;

b.5. Output wavelength exceeding 800 nm but not exceeding 975 nm and any of the following:

b.5.a. “Pulse duration” less than 1 ps and any of the following:

b.5.a.1. Output energy exceeding 0.005 J per pulse and “peak power” exceeding 5 GW; or

b.5.a.2. ‘Single transverse mode’ output and “average output power” exceeding 20 W;

b.5.b. “Pulse duration” equal to or exceeding 1 ps and not exceeding 1 μ s and any of the following:

b.5.b.1. Output energy exceeding 0.5 J per pulse and “peak power” exceeding 50 W;

b.5.b.2. ‘Single transverse mode’ output and “average output power” exceeding 20 W; or

b.5.b.3. ‘Multiple transverse mode’ output and “average output power” exceeding 50 W; or

b.5.c. “Pulse duration” exceeding 1 μ s and any of the following:

b.5.c.1. Output energy exceeding 2 J per pulse and “peak power” exceeding 50 W;

b.5.c.2. ‘Single transverse mode’ output and “average output power” exceeding 50 W; or

b.5.c.3. ‘Multiple transverse mode’ output and “average output power” exceeding 80 W.

b.6. Output wavelength exceeding 975 nm but not exceeding 1,150 nm and any of the following:

b.6.a. “Pulse duration” of less than 1 ps, and any of the following:

b.6.a.1. Output “peak power” exceeding 2 GW per pulse;

b.6.a.2. “Average output power” exceeding 30 W; or

b.6.a.3. Output energy exceeding 0.002 J per pulse;

b.6.b. “Pulse duration” equal to or exceeding 1 ps and less than 1 ns, and any of the following:

b.6.b.1. Output “peak power” exceeding 5 GW per pulse;

b.6.b.2. “Average output power” exceeding 50 W; or

b.6.b.3. Output energy exceeding 0.1 J per pulse;

b.6.c. “Pulse duration” equal to or exceeding 1 ns but not exceeding 1 μ s and any of the following:

b.6.c.1. ‘Single transverse mode’ output and any of the following:

b.6.c.1.a. “Peak power” exceeding 100 MW;

b.6.c.1.b. “Average output power” exceeding 20 W limited by design to a maximum pulse repetition frequency less than or equal to 1 kHz;

b.6.c.1.c. ‘Wall-plug efficiency’ exceeding 12%, “average output power” exceeding 100 W and capable of operating at a pulse repetition frequency greater than 1 kHz;

b.6.c.1.d. “Average output power” exceeding 150 W and capable of operating at a pulse repetition frequency greater than 1 kHz; or

b.6.c.1.e. Output energy exceeding 2 J per pulse; or

b.6.c.2. ‘Multiple transverse mode’ output and any of the following:

b.6.c.2.a. “Peak power” exceeding 400 MW;

b.6.c.2.b. ‘Wall-plug efficiency’ exceeding 18% and “average output power” exceeding 500 W;

b.6.c.2.c. “Average output power” exceeding 2 kW; or

b.6.c.2.d. Output energy exceeding 4 J per pulse; or

b.6.d. “Pulse duration” exceeding 1 μ s and any of the following:

b.6.d.1. ‘Single transverse mode’ output and any of the following:

b.6.d.1.a. “Peak power” exceeding 500 kW;

b.6.d.1.b. ‘Wall-plug efficiency’ exceeding 12% and “average output power” exceeding 100 W; or

b.6.d.1.c. “Average output power” exceeding 150 W; or

b.6.d.2. ‘Multiple transverse mode’ output and any of the following:

b.6.d.2.a. “Peak power” exceeding 1 MW;

b.6.d.2.b. ‘Wall-plug efficiency’ exceeding 18% and “average output power” exceeding 500 W; or

b.6.d.2.c. “Average output power” exceeding 2 kW;

b.7. Output wavelength exceeding 1,150 nm but not exceeding 1,555 nm and any of the following:

b.7.a. “Pulse duration” not exceeding 1 μ s and any of the following:

b.7.a.1. Output energy exceeding 0.5 J per pulse and “peak power” exceeding 50 W;

b.7.a.2. ‘Single transverse mode’ output and “average output power” exceeding 20 W; or

b.7.a.3. ‘Multiple transverse mode’ output and “average output power” exceeding 50 W; or

b.7.b. “Pulse duration” exceeding 1 μ s and any of the following:

b.7.b.1. Output energy exceeding 2 J per pulse and “peak power” exceeding 50 W;

b.7.b.2. ‘Single transverse mode’ output and “average output power” exceeding 50 W; or

b.7.b.3. ‘Multiple transverse mode’ output and “average output power” exceeding 80 W;

b.8. Output wavelength exceeding 1,555 nm but not exceeding 1,850 nm, and any of the following:

b.8.a. Output energy exceeding 100 mJ per pulse and “peak power” exceeding 1 W; or

b.8.b. “Average output power” exceeding 1 W;

b.9. Output wavelength exceeding 1,850 nm but not exceeding 2,100 nm, and any of the following:

b.9.a. ‘Single transverse mode’ and any of the following:

b.9.a.1. Output energy exceeding 100 mJ per pulse and “peak power” exceeding 1 W; or

b.9.a.2. “Average output power” exceeding 1 W;

b.9.b. ‘Multiple transverse mode’ and any of the following:

b.9.b.1. Output energy exceeding 100 mJ per pulse and “peak power” exceeding 10 kW; or

b.9.b.2. “Average output power” exceeding 120 W; or

b.10. Output wavelength exceeding 2,100 nm and any of the following:

b.10.a. Output energy exceeding 100 mJ per pulse and “peak power” exceeding 1 W; or

b.10.b. “Average output power” exceeding 1 W;

c. “Tunable” lasers having any of the following:

c.1. Output wavelength less than 600 nm and any of the following:

c.1.a. Output energy exceeding 50 mJ per pulse and “peak power” exceeding 1 W; or

c.1.b. Average or CW output power exceeding 1 W;

Note: 6A005.c.1 does not apply to dye “lasers” or other liquid “lasers,” having a multimode output and a wavelength of 150 nm or more but not exceeding 600 nm and all of the following:

1. Output energy less than 1.5 J per pulse or a “peak power” less than 20 W; and

2. Average or CW output power less than 20 W.

c.2. Output wavelength of 600 nm or more but not exceeding 1,400 nm, and any of the following:

c.2.a. Output energy exceeding 1 J per pulse and “peak power” exceeding 20 W; or

c.2.b. Average or CW output power exceeding 20 W; or

c.3. Output wavelength exceeding 1,400 nm and any of the following:

c.3.a. Output energy exceeding 50 mJ per pulse and “peak power” exceeding 1 W; or

c.3.b. Average or CW output power exceeding 1 W;

d. Other “lasers”, not controlled by 6A005.a., 6A005.b., or 6A005.c as follows:

d.1. Semiconductor “lasers” as follows:

Note:

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

2. The control status of semiconductor “lasers” “specially designed” for other

equipment is determined by the control status of the other equipment.

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

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

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

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

d.1.b.1. Wavelength of less than 1,400 nm and average or CW output power, exceeding 15 W;

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

d.1.b.3. Wavelength equal to or greater than 1,900 nm and average or CW output power, exceeding 1 W;

d.1.c. Individual semiconductor "laser" 'bars' having any of the following:

d.1.c.1. Wavelength of less than 1,400 nm and average or CW output power, exceeding 100 W;

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

d.1.c.3. Wavelength equal to or greater than 1,900 nm and average or CW output power, exceeding 10 W;

d.1.d. Semiconductor "laser" 'stacked arrays' (two dimensional arrays) having any of the following:

d.1.d.1. Wavelength less than 1,400 nm and having any of the following:

d.1.d.1.a. Average or CW total output power less than 3 kW and having average or CW output 'power density' greater than 500 W/cm²;

d.1.d.1.b. Average or CW total output power equal to or exceeding 3 kW but less than or equal to 5 kW, and having average or CW output 'power density' greater than 350 W/cm²;

d.1.d.1.c. Average or CW total output power exceeding 5 kW;

d.1.d.1.d. Peak pulsed 'power density' exceeding 2,500 W/cm²; or

Note: 6A005.d.1.d.1.d does not apply to epitaxially-fabricated monolithic devices.

d.1.d.1.e. Spatially coherent average or CW total output power, greater than 150 W;

d.1.d.2. Wavelength greater than or equal to 1,400 nm but less than 1,900 nm, and having any of the following:

d.1.d.2.a. Average or CW total output power less than 250 W and average or CW output 'power density' greater than 150 W/cm²;

d.1.d.2.b. Average or CW total output power equal to or exceeding 250 W but less than or equal to 500 W, and having average or CW output 'power density' greater than 50 W/cm²;

d.1.d.2.c. Average or CW total output power exceeding 500 W;

d.1.d.2.d. Peak pulsed 'power density' exceeding 500 W/cm²; or

Note: 6A005.d.1.d.2.d does not apply to epitaxially-fabricated monolithic devices.

d.1.d.2.e. Spatially coherent average or CW total output power, exceeding 15 W;

d.1.d.3. Wavelength greater than or equal to 1,900 nm and having any of the following:

d.1.d.3.a. Average or CW output 'power density' greater than 50 W/cm²;

d.1.d.3.b. Average or CW output power greater than 10 W; or

d.1.d.3.c. Spatially coherent average or CW total output power, exceeding 1.5 W; or

d.1.d.4. At least one "laser" 'bar' specified by 6A005.d.1.c;

Technical Note: For the purposes of 6A005.d.1.d, 'power density' means the total "laser" output power divided by the emitter surface area of the 'stacked array'.

d.1.e. Semiconductor "laser" 'stacked arrays', other than those specified by 6.A005.d.1.d, having all of the following:

d.1.e.1. "Specially designed" or modified

to be combined with other 'stacked arrays' to form a larger 'stacked array'; and

d.1.e.2. Integrated connections, common for both electronics and cooling;

Note 1: 'Stacked arrays', formed by combining semiconductor "laser" 'stacked arrays' specified by 6A005.d.1.e, that are not designed to be further combined or modified are specified by 6A005.d.1.d.

Note 2: 'Stacked arrays', formed by combining semiconductor "laser" 'stacked arrays' specified by 6A005.d.1.e, that are designed to be further combined or modified are specified by 6A005.d.1.e.

Note 3: 6A005.d.1.e does not apply to modular assemblies of single 'bars' designed to be fabricated into end to end stacked linear arrays.

Technical Notes:

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

2. A "bar" (also called a semiconductor "laser" 'bar', a "laser" diode 'bar' or diode 'bar') consists of multiple semiconductor "lasers" in a one dimensional array.

3. A 'stacked array' consists of multiple 'bars' forming a two dimensional array of semiconductor "lasers".

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

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

d.2.b. Average or CW output power, exceeding 5 kW;

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

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

d.3.b. Pulsed output with "pulse duration" exceeding 10 μs and any of the following:

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

d.3.b.2. "Peak power" exceeding 100 kW;

or

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

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

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

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

d.4.a. Output wavelength not exceeding 150 nm and any of the following:

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

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

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

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

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

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

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

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

d.4.d. Output wavelength exceeding 360 nm and any of the following:

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

d.4.d.2. "Average output power" exceeding 30 W;

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

d.5. "Chemical lasers" as follows:

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

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

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

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

d.5.c.2. Deuterium Fluoride-Carbon dioxide (DF-CO₂) "lasers";

Technical Note: 'Transfer lasers' are "lasers" in which the lasing species are excited through the transfer of energy by collision of a non-lasing atom or molecule with a lasing atom or molecule species.

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

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

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

e. "Components" as follows:

e.1. Mirrors cooled either by 'active cooling' or by heat pipe cooling;

Technical Note: 'Active cooling' is a cooling technique for optical "components" using flowing fluids within the subsurface (nominally less than 1 mm below the optical surface) of the optical component to remove heat from the optic.

e.2. Optical mirrors or transmissive or partially transmissive optical or electro-optical-"components," other than fused tapered fiber combiners and Multi-Layer Dielectric gratings (MLDs), "specially designed" for use with controlled "lasers";

Note to 6A005.e.2: Fiber combiners and MLDs are specified by 6A005.e.3.

e.3. Fiber "laser" "components" as follows:

e.3.a. Multimode to multimode fused tapered fiber combiners having all of the following:

e.3.a.1. An insertion loss better (less) than or equal to 0.3 dB maintained at a rated total average or CW output power (excluding output power transmitted through the single mode core if present) exceeding 1,000 W; and

e.3.a.2. Number of input fibers equal to or greater than 3;

e.3.b. Single mode to multimode fused tapered fiber combiners having all of the following:

e.3.b.1. An insertion loss better (less) than 0.5 dB maintained at a rated total average or CW output power exceeding 4,600 W;

e.3.b.2. Number of input fibers equal to or greater than 3; and

e.3.b.3. Having any of the following:

e.3.b.3.a. A Beam Parameter Product (BPP) measured at the output not exceeding 1.5 mm mrad for a number of input fibers less than or equal to 5; or

e.3.b.3.b. A BPP measured at the output not exceeding 2.5 mm mrad for a number of input fibers greater than 5;

e.3.c. MLDs having all of the following:

e.3.c.1. Designed for spectral or coherent beam combination of 5 or more fiber "lasers;" and

e.3.c.2. CW "Laser" Induced Damage Threshold (LIDT) greater than or equal to 10 kW/cm²;

f. Optical equipment as follows:

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

f.1. [Reserved]

N.B.: For items previously specified by 6A005.f.1, see 6A004.f.

f.2. "Laser" diagnostic equipment "specially designed" for dynamic measurement of "SHPL" system angular beam steering errors and having an angular "accuracy" of 10 μrad (microradians) or less (better);

f.3. Optical equipment and "components", "specially designed" for coherent beam combination in a phased-array "SHPL" system and having any of the following:

f.3.a. An "accuracy" of 0.1 μm or less, for wavelengths greater than 1 μm; or

f.3.b. An "accuracy" of λ/10 or less (better) at the designed wavelength, for wavelengths equal to or less than 1 μm;

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

g. "Laser acoustic detection equipment" having all of the following:

g.1. CW "laser" output power greater than or equal to 20 mW;

g.2. "Laser" frequency stability equal to or better (less) than 10 MHz;

g.3. "Laser" wavelengths equal to or exceeding 1,000 nm but not exceeding 2,000 nm;

g.4. Optical system resolution better (less) than 1 nm; and

g.5. Optical Signal to Noise ratio equal or exceeding to 10³.

Technical Note: "Laser acoustic detection equipment" is sometimes referred to as a "Laser" Microphone or Particle Flow Detection Microphone.

■ 31. In supplement no. 1 to part 774, Category 6, ECCN 6A008 is revised to read as follows:

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

License Requirements

Reason for Control: NS, MT, RS, AT

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
NS applies to entire entry.	NS Column 2
MT applies to items that are designed for airborne applications and that are usable in systems controlled for MT reasons.	MT Column 1
RS applies to 6A008.j.1.	RS Column 1
AT applies to entire entry.	AT Column 1

Reporting Requirements

See § 743.1 of the EAR for reporting requirements for exports under License Exceptions, and Validated End-User authorizations.

List Based License Exceptions (See Part 740 for a Description of All License Exceptions)

LVS: \$5000; N/A for MT and for 6A008.j.1.
GBS: Yes, for 6A008.b, .c, and l.1 only

Special Conditions for STA

STA: License Exception STA may not be used to ship any commodity in 6A008.d, 6A008.h or 6A008.k to any of the destinations listed in Country Group A:6 (See Supplement No.1 to part 740 of the EAR).

List of Items Controlled

Related Controls: (1) See also ECCNs 6A108 and 6A998. ECCN 6A998 controls, inter alia, the Light Detection and Ranging (LIDAR) equipment excluded by the note to paragraph j of this ECCN (6A008). (2) See USML Category XII(b) for certain LIDAR, Laser Detection and Ranging (LADAR), or range-gated systems subject to the ITAR.

Related Definitions: N/A
Items:

Note: 6A008 does not control:
—Secondary surveillance radar (SSR);
—Civil Automotive Radar;
—Displays or monitors used for air traffic control (ATC);
—Meteorological (weather) radar;
—Precision Approach Radar (PAR) equipment conforming to ICAO standards and employing electronically steerable linear (1-dimensional) arrays or mechanically positioned passive antennas.

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

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

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

b. A tunable bandwidth exceeding ±6.25% of the 'center operating frequency';

Technical Note: The 'center operating frequency' equals one half of the sum of the highest plus the lowest specified operating frequencies.

c. Capable of operating simultaneously on more than two carrier frequencies;

d. Capable of operating in synthetic aperture (SAR), inverse synthetic aperture (ISAR) radar mode, or sidelooking airborne (SLAR) radar mode;

e. Incorporating electronically scanned array antennae;

Technical Note: Electronically scanned array antennae are also known as electronically steerable array antennae.

f. Capable of heightfinding non-cooperative targets;

g. "Specially designed" for airborne (balloon or airframe mounted) operation and having Doppler "signal processing" for the detection of moving targets;

h. Employing processing of radar signals and using any of the following:

h.1. "Radar spread spectrum" techniques; or

h.2. "Radar frequency agility" techniques;
i. Providing ground-based operation with a maximum 'instrumented range' exceeding 185 km;

Note: 6A008.i does not control:

a. Fishing ground surveillance radar;

b. Ground radar equipment "specially designed" for en route air traffic control, and having all of the following:

1. A maximum 'instrumented range' of 500 km or less;

2. Configured so that radar target data can be transmitted only one way from the radar site to one or more civil ATC centers;

3. Contains no provisions for remote control of the radar scan rate from the en route ATC center; and

4. Permanently installed;

c. Weather balloon tracking radars.

Technical Note: For the purposes of 6A008.i, 'instrumented range' is the specified unambiguous display range of a radar.

j. Being "laser" radar or Light Detection and Ranging (LIDAR) equipment and having any of the following:

j.1. "Space-qualified";

j.2. Employing coherent heterodyne or homodyne detection techniques and having an angular resolution of less (better) than 20 μrad (microradians); or

j.3. Designed for carrying out airborne bathymetric littoral surveys to International Hydrographic Organization (IHO) Order 1a Standard (5th Edition February 2008) for Hydrographic Surveys or better, and using one or more "lasers" with a wavelength exceeding 400 nm but not exceeding 600 nm;

Note 1: LIDAR equipment "specially designed" for surveying is only specified by 6A008.j.3.

Note 2: 6A008.j does not apply to LIDAR equipment "specially designed" for meteorological observation.

Note 3: Parameters in the IHO Order 1a Standard 5th Edition February 2008 are summarized as follows:

Horizontal Accuracy (95% Confidence Level) = 5 m + 5% of depth.

Depth Accuracy for Reduced Depths (95% confidence level) = ±√(a²+(b*d)²) where:

a = 0.5 m = constant depth error, i.e. the sum of all constant depth errors

$b = 0.013$ = factor of depth dependent error
 $b*d$ = depth dependent error, i.e. the sum of all depth dependent errors
 d = depth

Feature Detection = Cubic features >2 m in depths up to 40 m; 10% of depth beyond 40 m

k. Having “signal processing” sub-systems using “pulse compression” and having any of the following:

- k.1. A “pulse compression” ratio exceeding 150; or
- k.2. A compressed pulse width of less than 200 ns; or

Note: 6A008.k.2 does not apply to two dimensional ‘marine radar’ or ‘vessel traffic service’ radar, having all of the following:

- a. “Pulse compression” ratio not exceeding 150;
- b. Compressed pulse width of greater than 30 ns;
- c. Single and rotating mechanically scanned antenna;
- d. Peak output power not exceeding 250 W; and
- e. Not capable of “frequency hopping”.

l. Having data processing sub-systems and having any of the following:

- l.1. ‘Automatic target tracking’ providing, at any antenna rotation, the predicted target position beyond the time of the next antenna beam passage; or

Note: 6A008.l.1 does not control conflict alert capability in ATC systems, or ‘marine radar’.

Technical Note: ‘Automatic target tracking’ is a processing technique that automatically determines and provides as output an extrapolated value of the most probable position of the target in real time.

- 1.2. [Reserved]
- 1.3. [Reserved]
- 1.4. Configured to provide superposition and correlation, or fusion, of target data within six seconds from two or more ‘geographically dispersed’ radar sensors to improve the aggregate performance beyond that of any single sensor specified by 6A008.f, or 6A008.i.

Technical Note: Sensors are considered ‘geographically dispersed’ when each location is distant from any other more than 1,500 m in any direction. Mobile sensors are always considered ‘geographically dispersed’.

N.B.: See also the USML (22 CFR part 121).

Note: 6A008.l does not apply to systems, equipment and assemblies designed for ‘vessel traffic services’.

Technical Notes:

- 1. For the purposes of 6A008, ‘marine radar’ is a radar that is used to navigate safely at sea, inland waterways or near-shore environments.
- 2. For the purposes of 6A008, ‘vessel traffic service’ is a vessel traffic monitoring and control service similar to air traffic control for ‘aircraft.’

■ 32. In supplement no. 1 to part 774, Category 9, ECCN 9A011 is revised to read as follows:

9A011 Ramjet, scramjet or ‘combined cycle engines’, and “specially designed”

“parts” and “components” therefor. (These items are “subject to the ITAR.” See 22 CFR parts 120 through 130.)

Technical Note: For the purposes of 9A011, ‘combined cycle engines’ combine two or more of the following types of engines:

- Gas turbine engine (turbojet, turboprop and turbofan);
- Ramjet or scramjet;
- Rocket motor or engine (liquid/gel/solid-propellant and hybrid).

■ 33. In supplement no. 1 to part 774, Category 9, ECCN 9D515 is revised to read as follows:

9D515 “Software” “specially designed” for the “development,” “production,” operation, installation, maintenance, repair, overhaul, or refurbishing of “spacecraft” and related commodities, as follows (see List of Items Controlled).

License Requirements

Reason for Control: NS, RS, AT

Control(s)	Country Chart (See Supp. No. 1 to part 738)
NS applies to entire entry except 9D515.y.	NS Column 1
RS applies to entire entry except 9D515.y.	RS Column 1
RS applies to 9D515.y, except to Russia for use in, with, or for the International Space Station (ISS), including launch to the ISS.	China, Russia, or Venezuela (see *§ 742.6(a)(7))
AT applies to entire entry.	AT Column 1

List Based License Exceptions (See Part 740 for a Description of All License Exceptions)

TSR: N/A

Special Conditions for STA

STA: (1) Paragraph (c)(1) of License Exception STA (§ 740.20(c)(1) of the EAR) may not be used for 9D515.b, .d, or .e. (2) Paragraph (c)(2) of License Exception STA (§ 740.20(c)(2) of the EAR) may not be used for any “software” in 9D515.

List of Items Controlled

Related Controls: (1) “Software” directly related to articles enumerated in USML Category XV is subject to the control of USML paragraph XV(f). (2) See also ECCNs 3D001, 6D001, 6D002, and 6D991 for controls of specific “software” “specially designed” for certain “space-qualified” items. (3) For “software” for items listed in 9A004.d that are incorporated into “spacecraft payloads”, see the appropriate “software” ECCN within those Categories.

Related Definitions: N/A
 Items:

- a. “Software” (other than “software” controlled in paragraphs .b, .d, or .e of this entry) “specially designed” for the “development,” “production,” operation,

installation, maintenance, repair, overhaul, or refurbishing of commodities controlled by ECCN 9A515 (except 9A515.d or .e) or 9B515.

- b. “Source code” that:
 - b.1. Contains the algorithms or control principles (e.g., for clock management), precise orbit determination (e.g., for ephemeris or pseudo range analysis), signal construct (e.g., pseudo-random noise (PRN) anti-spoofing) “specially designed” for items controlled by ECCN 9A515;
 - b.2. Is “specially designed” for the integration, operation, or control of items controlled by ECCN 9A515;
 - b.3. Contains algorithms or modules “specially designed” for system, subsystem, component, part, or accessory calibration, manipulation, or control of items controlled by ECCN 9A515;
 - b.4. Is “specially designed” for data assemblage, extrapolation, or manipulation of items controlled by ECCN 9A515;
 - b.5. Contains the algorithms or control laws “specially designed” for attitude, position, or flight control of items controlled in ECCN 9A515; or
 - b.6. Is “specially designed” for built-in test and diagnostics for items controlled by ECCN 9A515.
- c. [Reserved]
- d. “Software” “specially designed” for the “development,” “production,” operation, failure analysis or anomaly resolution of commodities controlled by ECCN 9A515.d.
- e. “Software” “specially designed” for the “development,” “production,” operation, failure analysis or anomaly resolution of commodities controlled by ECCN 9A515.e.
- f. through x. [Reserved]
- y. Specific “software” “specially designed” for the “development,” “production,” operation, or maintenance of commodities enumerated in ECCN 9A515.y.

■ 34. In supplement no. 1 to part 774, Category 9, ECCN 9E003 is revised to read as follows:

9E003 Other “technology” as follows (see List of Items Controlled).

License Requirements

Reason for Control: NS, SI, AT

Control(s)	Country Chart (See Supp. No. 1 to part 738)
NS applies to entire entry.	NS Column 1
SI applies to 9E003.a.1 through a.8, .h, .i, and .k.	See § 742.14 of the EAR for additional information
AT applies to entire entry.	AT Column 1

Reporting Requirements

See § 743.1 of the EAR for reporting requirements for exports under License Exceptions, and Validated End-User authorizations.

List Based License Exceptions (See Part 740 for a Description of All License Exceptions)

TSR: N/A

Special Conditions for STA

STA: License Exception STA may not be used to ship or transmit any “technology” in 9E003.a.1, 9E003.a.2 to a.5, 9E003.a.8, or 9E003.h to any of the destinations listed in Country Group A:6 (See Supplement No.1 to part 740 of the EAR).

List of Items Controlled

Related Controls: (1) Hot section “technology” specifically designed, modified, or equipped for military uses or purposes, or developed principally with Department of Defense funding, is “subject to the ITAR” (see 22 CFR parts 120 through 130). (2) “Technology” is subject to the EAR when actually applied to a commercial “aircraft” engine program. Exporters may seek to establish commercial application either on a case-by-case basis through submission of documentation demonstrating application to a commercial program in requesting an export license from the Department of Commerce in respect to a specific export, or in the case of use for broad categories of “aircraft,” engines, “parts” or “components,” a commodity jurisdiction determination from the Department of State.

Related Definitions: N/A

Items:

a. “Technology” “required” for the “development” or “production” of any of the following gas turbine engine “parts,” “components” or systems:

a.1. Gas turbine blades, vanes or “tip shrouds”, made from directionally solidified (DS) or single crystal (SC) alloys and having (in the 001 Miller Index Direction) a stress-rupture life exceeding 400 hours at 1,273 K (1,000 °C) at a stress of 200 MPa, based on the average property values;

Technical Note: For the purposes of 9E003.a.1, stress-rupture life testing is typically conducted on a test specimen.

a.2. Combustors having any of the following:

a.2.a. ‘Thermally decoupled liners’ designed to operate at ‘combustor exit temperature’ exceeding 1,883K (1,610 °C);
a.2.b. Non-metallic liners;
a.2.c. Non-metallic shells; or
a.2.d. Liners designed to operate at ‘combustor exit temperature’ exceeding 1,883K (1,610 °C) and having holes that meet the parameters specified by 9E003.c;

Note: The “required” “technology” for holes in 9E003.a.2 is limited to the derivation of the geometry and location of the holes.

Technical Notes:

1. ‘Thermally decoupled liners’ are liners that feature at least a support structure designed to carry mechanical loads and a combustion facing structure designed to protect the support structure from the heat of combustion. The combustion facing structure and support structure have independent thermal displacement (mechanical displacement due to thermal load) with respect to one another, i.e., they are thermally decoupled.

2. ‘Combustor exit temperature’ is the bulk average gas path total (stagnation) temperature between the combustor exit

plane and the leading edge of the turbine inlet guide vane (i.e., measured at engine station T40 as defined in SAE ARP 755A) when the engine is running in a “steady state mode” of operation at the certificated maximum continuous operating temperature.

N.B.: See 9E003.c for “technology” “required” for manufacturing cooling holes.

a.3. “Parts” or “components,” that are any of the following:

a.3.a. Manufactured from organic “composite” materials designed to operate above 588 K (315 °C);

a.3.b. Manufactured from any of the following:

a.3.b.1. Metal “matrix” “composites” reinforced by any of the following:

a.3.b.1.a. Materials controlled by 1C007;

a.3.b.1.b. “Fibrous or filamentary materials” specified by 1C010; or

a.3.b.1.c. Aluminides specified by 1C002.a; or

a.3.b.2. Ceramic “matrix” “composites” specified by 1C007; or

a.3.c. Stators, vanes, blades, tip seals (shrouds), rotating blings, rotating blisks or ‘splitter ducts’, that are all of the following:

a.3.c.1. Not specified in 9E003.a.3.a;

a.3.c.2. Designed for compressors or fans; and

a.3.c.3. Manufactured from material controlled by 1C010.e with resins controlled by 1C008;

Technical Note: A ‘splitter duct’ performs the initial separation of the air-mass flow between the bypass and core sections of the engine.

a.4. Uncooled turbine blades, vanes or “tip shrouds” designed to operate at a ‘gas path temperature’ of 1,373 K (1,100 °C) or more;

a.5. Cooled turbine blades, vanes or “tip-shrouds”, other than those described in 9E003.a.1, designed to operate at a ‘gas path temperature’ of 1,693 K (1,420 °C) or more;

Technical Note: ‘Gas path temperature’ is the bulk average gas path total (stagnation) temperature at the leading edge plane of the turbine component when the engine is running in a “steady state mode” of operation at the certificated or specified maximum continuous operating temperature.

a.6. Airfoil-to-disk blade combinations using solid state joining;

a.7. [Reserved]

a.8. ‘Damage tolerant’ gas turbine engine rotor “parts” or “components” using powder metallurgy materials controlled by 1C002.b; or

Technical Note: ‘Damage tolerant’ “parts” and “components” are designed using methodology and substantiation to predict and limit crack growth.

a.9. [Reserved]

N.B.: For “FADEC systems”, see 9E003.h.

a.10. [Reserved]

N.B.: For adjustable flow path geometry, see 9E003.i.

a.11. ‘Fan blades’ having all of the following:

a.11.a. 20% or more of the total volume being one or more closed cavities containing vacuum or gas only; and

a.11.b. One or more closed cavities having a volume of 5 cm³ or larger;

Technical Note: For the purposes of 9E003.a.11, a ‘fan blade’ is the aerofoil portion of the rotating stage or stages, which provide both compressor and bypass flow in a gas turbine engine.

b. “Technology” “required” for the “development” or “production” of any of the following:

b.1. Wind tunnel aero-models equipped with non-intrusive sensors capable of transmitting data from the sensors to the data acquisition system; or

b.2. “Composite” propeller blades or prop-fans, capable of absorbing more than 2,000 kW at flight speeds exceeding Mach 0.55;

c. “Technology” “required” for manufacturing cooling holes, in gas turbine engine “parts” or “components” incorporating any of the “technologies” specified by 9E003.a.1, 9E003.a.2 or 9E003.a.5, and having any of the following:

c.1. Having all of the following:

c.1.a. Minimum ‘cross-sectional area’ less than 0.45 mm²;

c.1.b. ‘Hole shape ratio’ greater than 4.52; and

c.1.c. ‘Incidence angle’ equal to or less than 25°; or

c.2. Having all of the following:

c.2.a. Minimum ‘cross-sectional area’ less than 0.12 mm²;

c.2.b. ‘Hole shape ratio’ greater than 5.65; and

c.2.c. ‘Incidence angle’ more than 25°;

Note: 9E003.c does not apply to “technology” for manufacturing constant radius cylindrical holes that are straight through and enter and exit on the external surfaces of the component.

Technical Notes:

1. For the purposes of 9E003.c, the ‘cross-sectional area’ is the area of the hole in the plane perpendicular to the hole axis.

2. For the purposes of 9E003.c, ‘hole shape ratio’ is the nominal length of the axis of the hole divided by the square root of its minimum ‘cross-sectional area’.

3. For the purposes of 9E003.c, ‘incidence angle’ is the acute angle measured between the plane tangential to the airfoil surface and the hole axis at the point where the hole axis enters the airfoil surface.

4. Techniques for manufacturing holes in 9E003.c include “laser” beam machining, water jet machining, Electro-Chemical Machining (ECM).

d. “Technology” “required” for the “development” or “production” of helicopter power transfer systems or tilt rotor or tilt wing “aircraft” power transfer systems;

e. “Technology” for the “development” or “production” of reciprocating diesel engine ground vehicle propulsion systems having all of the following:

e.1. ‘Box volume’ of 1.2 m³ or less;

e.2. An overall power output of more than 750 kW based on 80/1269/EEC, ISO 2534 or national equivalents; and

e.3. Power density of more than 700 kW/m³ of ‘box volume’;

Technical Note: ‘Box volume’ is the product of three perpendicular dimensions measured in the following way:

Length: The length of the crankshaft from front flange to flywheel face;

Width: The widest of any of the following:
a. The outside dimension from valve cover to valve cover;

b. The dimensions of the outside edges of the cylinder heads; or

c. The diameter of the flywheel housing;
Height: The largest of any of the following:

a. The dimension of the crankshaft centerline to the top plane of the valve cover (or cylinder head) plus twice the stroke; or

b. The diameter of the flywheel housing.
f. "Technology" "required" for the "production" of "specially designed" "parts" or "components" for high output diesel engines, as follows:

f.1. "Technology" "required" for the "production" of engine systems having all of the following "parts" and "components" employing ceramics materials controlled by 1C007:

- f.1.a. Cylinder liners;
- f.1.b. Pistons;
- f.1.c. Cylinder heads; and
- f.1.d. One or more other "part" or "component" (including exhaust ports, turbochargers, valve guides, valve assemblies or insulated fuel injectors);

f.2. "Technology" "required" for the "production" of turbocharger systems with single-stage compressors and having all of the following:

- f.2.a. Operating at pressure ratios of 4:1 or higher;
- f.2.b. Mass flow in the range from 30 to 130 kg per minute; and
- f.2.c. Variable flow area capability within the compressor or turbine sections;

f.3. "Technology" "required" for the "production" of fuel injection systems with a "specially designed" multifuel (e.g., diesel or jet fuel) capability covering a viscosity range from diesel fuel (2.5 cSt at 310.8 K (37.8 °C)) down to gasoline fuel (0.5 cSt at 310.8 K (37.8 °C)) and having all of the following:

- f.3.a. Injection amount in excess of 230 mm³ per injection per cylinder; and
- f.3.b. Electronic control features "specially designed" for switching governor characteristics automatically depending on fuel property to provide the same torque characteristics by using the appropriate sensors;

g. "Technology" "required" for the development" or "production" of 'high

output diesel engines' for solid, gas phase or liquid film (or combinations thereof) cylinder wall lubrication and permitting operation to temperatures exceeding 723 K (450 °C), measured on the cylinder wall at the top limit of travel of the top ring of the piston;

Technical Note: 'High output diesel engines' are diesel engines with a specified brake mean effective pressure of 1.8 MPa or more at a speed of 2,300 r.p.m., provided the rated speed is 2,300 r.p.m. or more.

h. "Technology" for gas turbine engine "FADEC systems" as follows:

h.1. "Development" "technology" for deriving the functional requirements for the "parts" or "components" necessary for the "FADEC system" to regulate engine thrust or shaft power (e.g., feedback sensor time constants and accuracies, fuel valve slew rate);

h.2. "Development" or "production" "technology" for control and diagnostic "parts" or "components" unique to the "FADEC system" and used to regulate engine thrust or shaft power;

h.3. "Development" "technology" for the control law algorithms, including "source code", unique to the "FADEC system" and used to regulate engine thrust or shaft power;

Note: 9E003.h does not apply to technical data related to engine-"aircraft" integration required by civil aviation authorities of one or more Wassenaar Arrangement Participating States (see Supplement No. 1 to part 743 of the EAR) to be published for general airline use (e.g., installation manuals, operating instructions, instructions for continued airworthiness) or interface functions (e.g., input/output processing, airframe thrust or shaft power demand).

i. "Technology" for adjustable flow path systems designed to maintain engine stability for gas generator turbines, fan or power turbines, or propelling nozzles, as follows:

i.1. "Development" "technology" for deriving the functional requirements for the "parts" or "components" that maintain engine stability;

i.2. "Development" or "production" "technology" for "parts" or "components" unique to the adjustable flow path system and that maintain engine stability;

i.3. "Development" "technology" for the control law algorithms, including "source

code", unique to the adjustable flow path system and that maintain engine stability;

Note: 9E003.i does not apply to "technology" for any of the following:

- a. Inlet guide vanes;
- b. Variable pitch fans or prop-fans;
- c. Variable compressor vanes;
- d. Compressor bleed valves; or
- e. Adjustable flow path geometry for reverse thrust.

j. "Technology" "required" for the "development" of wing-folding systems designed for fixed-wing "aircraft" powered by gas turbine engines.

N.B.: For "technology" "required" for the "development" of wing-folding systems designed for fixed-wing "aircraft" specified in USML Category VIII (a), see USML Category VIII (i).

k. "Technology" not otherwise controlled in 9E003.a.1 through a.8, a.10, and .h and used in the "development", "production", or overhaul of hot section "parts" or "components" of civil derivatives of military engines controlled on the USML.

■ 35. Supplement no. 6 to part 774 is amended in Category 1 by revising paragraphs (1)(i) and (1)(vi) to read as follows:

Supplement No. 6 to Part 774—Sensitive List
* * * * *

(1) Category 1

(i) 1A002.a.1—"Composite" structures or laminates made from an organic "matrix" and "fibrous or filamentary materials" specified by 1C010.c or 1C010.d.
* * * * *

(vi) 1D002—"Software" for the "development" of organic "matrix", metal "matrix", or carbon "matrix" laminates or composites controlled under 1A002.a.1, 1C001, 1C007.c, 1C010.c, 1C010.d, or 1C012.
* * * * *

Matthew S. Borman,
Deputy Assistant Secretary for Export Administration.

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