The Proposed Amendment

In consideration of the foregoing, the Federal Aviation Administration proposes to amend 14 CFR part 71 as follows:

PART 71—DESIGNATION OF CLASS A, B, C, D, AND E AIRSPACE AREAS; AIR TRAFFIC SERVICE ROUTES; AND REPORTING POINTS

§ 71.1 [Amended]

1. The authority citation for part 71 continues to read as follows:


T-375 Bettles, AK to DERIK, AK [New]

BETTLES, AK (BTT) VOR/DME (Lat. 66°54′18.03″ N, long. 151°32′09.18″ W)

FEDEN, AK WP (Lat. 67°02′35.69″ N, long. 151°49′50.84″ W)

HEKDU, AK WP (Lat. 67°17′29.94″ N, long. 151°55′19.72″ W)

TOUTS, AK WP (Lat. 67°25′09.10″ N, long. 152°00′27.45″ W)

ZEBUR, AK WP (Lat. 67°32′54.42″ N, long. 152°06′57.25″ W)

RUTTY, AK WP (Lat. 67°48′23.58″ N, long. 152°23′44.42″ W)

FERRA, AK WP (Lat. 68°04′21.87″ N, long. 152°10′10.28″ W)

ZENSA, AK WP (Lat. 68°08′59.01″ N, long. 151°49′53.16″ W)

HAKSIA, AK WP (Lat. 68°21′02.57″ N, long. 151°28′53.81″ W)

DERIK, AK WP (Lat. 68°57′06.14″ N, long. 149°43′17.31″ W)

* * * * *

Issued in Washington, DC, on October 14, 2021.

Michael R. Beckles, Acting Manager, Rules and Regulations Group.

FOR FURTHER INFORMATION CONTACT: Michael Rithmire, Director, Sensors and Aviation Division, U.S. Department of Commerce, Room 2099B, 14th Street and Pennsylvania Avenue NW, Washington, DC 20230. Refer to RIN 0694–A158. If you seek to submit business confidential information, you must use the portal. BIS does not accept business confidential information, you must use the portal. BIS does not accept business confidential information by mail or delivery.

FOR FURTHER INFORMATION CONTACT: Michael Rithmire, Director, Sensors and Aviation Division, Office of National Security and Technology Transfer Controls, Bureau of Industry and Security, by phone at (202) 482–6105 or by email at Michael.Rithmire@bis.doc.gov.

SUPPLEMENTARY INFORMATION:

Background

In a final rule published on June 16, 2011 (76 FR 35276) (June 16 rule), BIS established License Exception Strategic Trade Authorization (License Exception STA or STA) in part 740 (License Exceptions) of the Export Administration Regulations (EAR), as part of the initial effort to reform and modernize U.S. export controls. License Exception STA is set forth in § 740.20 of the EAR and authorizes exports, reexports, and transfers (in-country) of certain specified items to STA-eligible destinations, including the release of certain software source code and technology, as well as certain "600 series" items. There are two groups of STA-eligible destinations: 37 destinations that are included in
“Country Group A:5” and are eligible under §740.20(c)(1), and eight destinations included in “Country Group A:6” and eligible under §740.20(c)(2). These country group listings appear in Supplement No. 1 to Part 740 (Country Groups). The destinations in these two country groups pose low risk that those items will be used for a purpose that BIS license requirements are designed to prevent. The requirements and conditions for use of License Exception STA include the creation and exchange by the parties to the transaction of notifications and statements designed to provide assurance against diversion of such items to other destinations.

Section 740.20(b) of the EAR sets forth various prohibitions and limitations on the use of License Exception STA, including in §740.20(b)(2)(viii), which prohibits use of STA, regardless of destination, for certain Category 9 export control classification numbers (ECCNs). Certain software and technology controlled under ECCNs 9D001, 9D002, 9D004, 9E001, 9E002, and 9E003 are among the Category 9 items to which this prohibition applies. However, as a result of text adopted in the June 16 rule in response to certain public comments, the “Special Conditions for STA” paragraphs of these Category 9 ECCNs are not as comprehensive as §740.20(b)(2)(viii), which potentially confuses exporters. More specifically, these paragraphs state that STA eligibility for certain software and technology controlled under the ECCNs is excluded to destinations in Country Group A:6, while the controlling text of §740.20(b)(2)(viii) excludes STA eligibility for these items regardless of destination. In this rule, BIS proposes to clarify the “Special Conditions for STA” paragraphs included under ECCNs 9D001, 9D002, 9D004, 9E001, 9E002 and 9E003 in order to reduce the possibility of confusion. The clarified text, which does not change license requirements or restrictions, would direct exporters, reexporters, and in-country transferors to the Category 9 limitations on the use of STA set forth in §740.20(b)(2)(viii), when determining STA availability for the export, reexport and in-country transfer of certain items controlled under those ECCNs.

The June 16 rule informed the public that BIS would undertake further review regarding whether technology controlled under ECCN 2E003.f related to the application of certain coatings is, in whole or in part, appropriate for exclusion from License Exception STA. See 76 FR 35276, 35278 (6/16/2011). ECCN 2E003.f controls technology for the application of inorganic overlay coatings or inorganic surface modification coatings to non-electronic substrates by certain coating processes. The coating processes specified in this ECCN are critical to the performance of gas turbine engine hot section parts, but are also used for other manufacturing processes, such as optics. The operating environment of engine hot section parts and components is above the actual melting point of the base alloy used to cast these parts; however, the alloy does not melt due to three key technologies: Casting (controlled in ECCN 9E0003), cooling (controlled in ECCNs 9E001 and 9E003), and coatings (controlled in ECCNs 2E003.f and 9E003). While hot section technologies (controlled for Significant Items (SI) reasons) require a license for export to destinations worldwide (except Canada) and are not eligible for export under license exceptions, coating technologies controlled in ECCN 2E003.f are not controlled for SI reasons and are currently eligible for export to destinations in Country Group A:5 under License Exception STA.

Recognizing that the scope of 2E003.f coating technology includes technology with sensitive industrial applications, this proposed rule would expand restrictions on the use of License Exception STA for ECCN 2E003.f technology, when the technology is used for the application of inorganic overlay coatings on gas turbine engine combustors, or turbine blades, vanes or “tip shrouds” by adding a new restriction in paragraph (b)(2)(ix) of §740.20.

During this review of coating technology, inconsistencies were also identified in the eligibility of License Exceptions STA and Technology and Software Under Restriction (TSR) provisions for ECCN 1E001 for the “development” or “production” of equipment and materials specified by ECCNs 1A002, 1C001, 1C007.c, 1C008.a.1, 1C009.b, and 1C010.b, c or d. This rule also proposes to correct the inconsistencies between License Exceptions STA and TSR and to exclude these same technologies from eligibility for License Exception TSR.

BIS also proposes to make conforming amendments throughout License Exception STA §740.20(b) and in affected ECCNs.

BIS seeks public comments on the amendments to the EAR proposed in this rule.

Export Control Reform Act of 2018

On August 13, 2018, the President signed into law the John S. McCain National Defense Authorization Act for Fiscal Year 2019, which included the Export Control Reform Act of 2018 (ECRA), 50 U.S.C. 4801–4852. ECRA provides the legal basis for BIS’s principal authorities and serves as the authority under which BIS issues this rule.

Rulemaking Requirements

1. 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, and other advantages; distributive impacts; and equity). Executive Order 13563 emphasizes the
importance of quantifying both costs and benefits, of reducing costs, of harmonizing rules, and of promoting flexibility. This proposed rule has been designated a “significant regulatory action,” although not economically significant, under section 3(f) of Executive Order 12866.

2. This rule does not contain policies with federalism implications as that term is defined in Executive Order 13132.

3. Notwithstanding any other provision of law, no person is required to respond to, nor may a person be made 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 regulation involves collections previously approved by OMB under control number 0649–0088, Simplified Network Application Processing System, which includes, among other things, license applications and carries a burden estimate of 42.5 minutes for a manual or electronic submission.

BIS expects the total burden hours associated with this collection to increase if this proposed rule is adopted in final form, because the proposal limits availability of License Exception STA. Transactions no longer eligible for this license exception will require licenses. Trying to estimate the number of licenses is difficult because exports of intangible technology are not reported as Electronic Export Information, limiting the broad availability of transaction data. This proposal with request for comments should help get input from the public to inform this issue. The request for comments, including supporting relevant data, on this rule is intended to inform further review of the proposed amendments, if they were to be issued in final form.

Any comments regarding the collection of information associated with this rule, including suggestions for reducing the burden, may be sent to Jasmeet K. Seehra, OMB, online at https://www.reginfo.gov/public/do/PRAMain.

List of Subjects
15 CFR Part 740
Administrative practice and procedure, Exports, Reporting and recordkeeping requirements.

15 CFR Part 774
Exports, Reporting and recordkeeping.

For the reasons set forth in the preamble, 15 CFR chapter VII, subchapter C, is proposed to be amended as follows:

PART 740—[AMENDED]

1. The authority citation for 15 CFR part 740 continues to read as follows:


2. Revise paragraph (b) of § 740.20 to read as follows:

§ 740.20 License Exception Strategic Trade Authorization (STA).

(b) Requirements and limitations—(1) Requirements for using License Exception STA. (i) All of the reasons for control that impose a license requirement under part 742 of the EAR on the export, reexport, or in country transfer must be addressed in at least one authorizing paragraph in paragraph (c) of this section.

(ii) The party using License Exception STA must comply with all the requirements in paragraph (d) of this section.

(2) Limitations on use of License Exception STA. The prohibitions and limits of this paragraph (b)(2) apply notwithstanding the authorizations in paragraph (c) of this section.

(i) License Exception STA may not be used in lieu of any license requirement imposed by part 744 or 746 of the EAR.

(ii) License Exception STA may not be used for ECCN 1A002; 1C001; 1C007.c or d; 1C008.a.1; 1C009.b; 1C010.b, .c or .d; 1C351.a., .b, .c, .d.11, .d.12 or .e; 1C353; or 1C354.

(vi) Toxins controlled by ECCN 1C351.d.1 through 1C351.d.10 and 1C351.d.13 through 1C351.d.19 are authorized under License Exception STA to destinations indicated in Country Group A:5 (See Supplement No. 1 to this part), subject to the following limits. For purposes of this paragraph (b)(2)(vi), all such toxins that are sent from one exporter, reexporter, or transferor to a single end-user, on the same day, constitute one shipment.

(A) The maximum amount of any one toxin in any one shipment may not exceed 100 milligrams.

(B) No exporter, reexporter, or transferor may send more than six shipments of any one toxin to any one end user in a single calendar year.

(vii) Commerce Control List Category 7 limitation on use of License Exception STA. License Exception STA may not be used for ECCN 7E004 “technology,” except for “technology” controlled under ECCN 7E004.a.7.

(viii) Commerce Control List Category 9 limitations on use of License Exception STA.

(A) License Exception STA may not be used for ECCN 9D001 or 9D002 “software” that is specially designed or modified for the “development” or “production” of:

(i) Components of engines controlled by ECCN 9A001 if such components incorporate any of the “technologies” controlled by ECCN 9E003.a.1, 9E003.a.2, 9E003.a.3, 9E003.a.4, 9E003.a.5, 9E003.c, 9E003.i (other than technology for fan or power turbines), 9E003.h; or

(B) Equipment controlled by ECCN 9B001.

(v) License Exception STA may not be used for ECCN 9D001 “software” that is specially designed or modified for the “development” of “technology” controlled by ECCN 9E003.a.1, 9E003.a.2, 9E003.a.3, 9E003.a.4, 9E003.a.5, 9E003.c, 9E003.i (other than technology for fan or power turbines) or ECCN 9E003.h. License Exception STA may not be used for ECCN 9D001 “software” that is specially designed or modified for the “development” of “technology” covered by 9E003.a.8 to any of the destinations listed in Country Group A:6.

(C) License Exception STA may not be used for ECCN 9D004.f or 9D004.g “software” to Country Group A:5 or A:6, and may not be used for ECCN 9D004.a or 9D004.c “software” to any of the destinations listed in Country Group A:6 (See Supplement No. 1 to part 740 of the EAR).
(D) License Exception STA may not be used for 9E001 “technology” to any of the destinations listed in Country Group A:6. In addition, License Exception STA may not be used to Country Group A:5 or A:6 for 9E001 “technology” according to the General Technology Note for the “development” of ECCN 9A001.b engines or components of engines controlled by ECCN 9A001.b if such components incorporate:

(1) Any of the “technologies” controlled by ECCN 9E003.a.1, 9E003.a.2, 9E003.a.3, 9E003.a.4, 9E003.a.5, 9E003.c, 9E003.i (other than technology for fan or power turbines) or 9E003.h; or

(2) Any of the ECCN 9D001 or 9D002 software in paragraph (b)(2)(viii)(A) or (B) of this section.

(E) License Exception STA may not be used for 9E002 “technology” to any of the destinations in Country Group A:6. In addition, License Exception STA may not be used for Country Group A:5 or A:6 for 9E002 “technology” according to the General Technology Note for the “production” of components of engines controlled by 9A001.b if such components incorporate any of the “technologies” controlled by 9E003.a.1, 9E003.a.2, 9E003.a.3, 9E003.a.4, 9E003.a.5, 9E003.c, 9E003.i (other than technology for fan or power turbines), or 9E003.h.

(F) License Exception STA may not be used for “technology” covered by 9E003.a.1, 9E003.a.2, 9E003.a.3, 9E003.a.4, 9E003.a.5, 9E003.c, 9E003.i (other than technology for fan or power turbines), or 9E003.h. License Exception STA may not be used for “technology” covered by 9E003.a.8 to any of the destinations listed in Country Group A:6.

(ix) License Exception STA may not be used for “technology” according to the General Technology Note for 2E003.f when used for the application of inorganic overlay coatings on gas turbine engine combustors, or turbine blades, vanes or “tip shrouds.”

(x) License Exception STA may not be used for items controlled by ECCNs 6A002; 6D002 (software “specially designed” for the “use” of commodities controlled under 6A002.b); 6D003.c; 6D991 (software “specially designed” for the “development,” “production,” or “use” of commodities controlled under 6A002 or 6A003); 6E001 (“technology” for the “development” of commodities controlled under ECCNs 6A002 or 6A003); or 6E002 “technology” (for the “production” of commodities controlled under ECCNs 6A002 or 6A003).

(xi) License Exception STA may not be used for any commodity controlled by ECCN 3A001.b.2 or .b.3 (except those that are being exported or reexported for use in civil telecommunications applications), or any “technology” controlled by 3E001 for the “production” or “development” of commodities controlled by 3A001.b.2 or .b.3.

(3) Limitations on the use of STA that are specific to “600 series” items. (i) License Exception STA may not be used for any “600 series” items identified in the relevant ECCN as not being eligible for STA.

(ii) License Exception STA may be used to export, reexport, and transfer (in-country) “600 series” items to persons in Country Group A:5, whether non-governmental or governmental, and, for natural persons, if they are nationals of a country listed in Country Group A:5 (See Supplement No. 1 to part 740 of the EAR) or the United States, and if:

(A) The ultimate end user for such items is the armed forces, police, paramilitary, law enforcement, customs, correctional, fire, or a search and rescue agency of a government of one of the countries listed in Country Group A:5, or the United States Government;

(B) For the “development,” “production,” operation, installation, maintenance, repair, overhaul, or refurbishing of an item in one of the countries listed in Country Group A:5 or the United States that will be for one, or more, of the following purposes:

(1) Ultimately to be used by any such government agencies in one of the countries listed in Country Group A:5 or the United States Government; or

(2) Sent to a person in the United States and not for subsequent export under §740.9(b)(1) (License Exception TMP for items moving in transit through the United States); or

(C) The United States Government has otherwise authorized the ultimate end use, the license or other authorization is in effect, and the consignee verifies in writing that such authorization exists and has provided the license or other approval identifier to the exporter, reexporter or transferee (as applicable).

(iii) License Exception STA may not be used to export, reexport, or transfer (in-country) end items described in ECCN 0A606.a, ECCN 8A609.a, ECCN 8A620.a or .b, or ECCN 9A610.a until after BIS has approved their export under STA. However, the original export, reexport, or transfer (in-country) made under License Exception STA for 9x515 and other non-600 series ECCNs authorized under License Exception STA. However, the original export, reexport, or transfer (in-country) made under License Exception STA for 9x515 and other non-600 series ECCNs still must comply with the original authorization—meaning the terms and conditions of License Exception STA.

PART 774—[AMENDED]

3. The authority citation for 15 CFR part 774 continues to read as follows:


4. In Supplement No. 1 to part 774, Category 1, Export Control Classification Number (ECCN) 1E001 is revised to read as follows:

SUPPLEMENT NO. 1 TO PART 774—THE COMMERCE CONTROL LIST

1E001 “Technology” according to the General Technology Note for the
"development" or "production" of items controlled by 1A002, 1A003, 1A004, 1A005, 1A006.b, 1A007, 1A008 1A101, 1A231, 1B (except 1B608, 1B613 or 1B990), or 1C (except 1C355, 1C608, 1C980 to 1C984, 1C988, 1C990, 1C991, 1C995 to 1C999).

License Requirements

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

<table>
<thead>
<tr>
<th>Control(s)</th>
<th>Country chart (See Supp. No. 1 to part 738)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NS applies to &quot;technology&quot; for items controlled by 1A002, 1A003, 1A005, 1A006.b, 1A007, 1B001 to 1B005, 1C001 to 1C11,</td>
<td>NS Column 1.</td>
</tr>
<tr>
<td>MT applies to &quot;technology&quot; for items controlled by 1A101, 1B001, 1B101, 1B102, 1B115 to 1B119, 1C001, 1C007, 1C011, 1C016, 1C102, 1C107, 1C111, 1C116, 1C117, or 1C118 for MT reasons,</td>
<td>MT Column 1.</td>
</tr>
<tr>
<td>NP applies to &quot;technology&quot; for items controlled by 1A002, 1A007, 1A231, 1B001, 1B101, 1B225, 1B226, 1B228 to 1B234, 1C002, 1C010, 1C111, 1C116, 1C202, 1C210, 1C216, 1C225 to 1C237, or 1C239 to 1C241 for NP reasons,</td>
<td>NP Column 1.</td>
</tr>
<tr>
<td>CB applies to &quot;technology&quot; for items controlled by 1C351, 1C353, or 1C354.</td>
<td>CB Column 1.</td>
</tr>
<tr>
<td>CB applies to &quot;technology&quot; for materials controlled by 1C350 and for chemical detection systems and dedicated detectors therefor, in 1A004.c that also have the technical characteristics described in 2B351.a.</td>
<td>CB Column 2.</td>
</tr>
<tr>
<td>RS applies to technology for equipment controlled in 1A004.d.</td>
<td>RS Column 2.</td>
</tr>
</tbody>
</table>

NS applies to entire entry. AT Column 1.

5. In Supplement No. 1 to part 774, Category 2. ECCN 2E003 is revised to read as follows:

<table>
<thead>
<tr>
<th>Control(s)</th>
<th>Country chart (See Supp. No. 1 to part 738)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NS applies to entire entry.</td>
<td>NS Column 1.</td>
</tr>
</tbody>
</table>

Reported 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)

TSTR: Yes, except for the following:

1. Items controlled for MT reasons; or
2. Exports and reexports of "technology" for the "development" or "production" of the following:
   a. Items controlled by 1A002, 1C001, 1C007.c, 1C008.a.1, 1C009.b, 1C100.b, c, or d (b) [Reserved]

Special Conditions for STA

STA: See § 740.20(b)(2)(v) of License Exception STA for limitations on availability of STA for items in this entry.

List of Items Controlled

Related Controls: See 2E001, 2E002, and 2E101 for "development" and "use" technology for equipment that are designed or modified for densification of carbon-carbon composites, structural composite rocket nozzle and reentry vehicle nose tips.

Related Definitions: N/A

Item:

a. [Reserved]
b. "Technology" for metal-working manufacturing processes, as follows:
   b.1. "Technology" for the design of tools, dies or fixtures "specially designed" for any of the following processes:
       b.1.a. Superplastic forming;
       b.1.b. Diffusion bonding; or
       b.1.c. Direct-acting hydraulic pressing;
   b.2. Technical data consisting of process methods or parameters as listed below used to control:
       b.2.a. Superplastic forming of aluminum alloys, titanium alloys or "superalloys":
       b.2.a.1. Surface preparation;
       b.2.a.2. Strain rate;
       b.2.a.3. Temperature;
       b.2.a.4. Pressure;
       b.2.b. Diffusion bonding of "superalloys" or titanium alloys:
       b.2.b.1. Surface preparation;
       b.2.b.2. Temperature;
       b.2.b.3. Pressure;
       b.2.c. Direct-acting hydraulic pressing of aluminum alloys or titanium alloys:
       b.2.c.1. Pressure;
   b.3. Certificate of origin;
   b.4. "Hot isostatic densification" of titanium alloys, aluminum alloys or "superalloys":
   b.2.d.1. Temperature;
   b.2.d.2. Pressure;
   b.2.d.3. Cycle time;

Technical Notes:

1. "Direct-acting hydraulic pressing" is a deformation process which uses a fluid-filled flexible bladder in direct contact with the workpiece.
2. "Hot isostatic densification" is a process of pressurizing a casting at temperatures exceeding 375 K (102°C) in a closed cavity through various media (gas, liquid, solid particles, etc.) to create equal force in all directions to reduce or eliminate internal voids in the casting.
3. "Technology" for the "development" of "production" of hydraulic stretch-forming machines and dies therefor, for the manufacture of airframe structures;
   d. [Reserved]
4. "Technology" for the development of "software" for incorporation of...
According to expert systems for advanced decision support of shop floor operations into "numerical control" units;

f. "Technology" for the application of inorganic overlay coatings or inorganic surface modification coatings (specified in column 3 of the following table) to non-electronic substrates (specified in column 2 of the following table), by processes specified in column 1 of the following table and defined in the Technical Note.

N.B.: This table should be read to control the technology of a particular 'Coating Process' only when the resultant coating in column 3 is in a paragraph directly across from the relevant 'Substrate' under column 2.

For example, Chemical Vapor Deposition (CVD) 'coating process' control the "technology" for a particular application of 'silicides' to 'Carbon-carbon, Ceramic and Metal 'matrix' 'composites' substrates, but are not controlled for the application of 'silicides' to 'Cemented tungsten carbide (16), Silicon carbide (18)' substrates. In the second case, the resultant coating is not listed in the paragraph under column 3 directly across from the paragraph under column 2 listing 'Cemented tungsten carbide (16), Silicon carbide (18)'.

### CATEGORY 2E—MATERIALS PROCESSING TABLE; DEPOSITION TECHNIQUES

<table>
<thead>
<tr>
<th>1. Coating process (1)</th>
<th>2. Substrate</th>
<th>3. Resultant coating</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A. Chemical Vapor Deposition (CVD).</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&quot;Superalloys&quot;</td>
<td>Ceramics (19) and Low-expansion glasses (14).</td>
<td>Silicides, Carbides, Dielectric layers (15), Diamond, Diamond-like carbon (17).</td>
</tr>
<tr>
<td></td>
<td>Carbon-carbon, Ceramic, and Metal &quot;matrix&quot; &quot;composites&quot;.</td>
<td>Silicides, Carbides, Refractory metals, Mixtures thereof (4), Dielectric layers (15), Aluminides, Alloyed aluminides (2), Boron nitride.</td>
</tr>
<tr>
<td></td>
<td>Cemented tungsten carbide (16), Silicon carbide (18).</td>
<td>Carbides, Tungsten, Mixtures thereof (4), Dielectric layers (15).</td>
</tr>
<tr>
<td></td>
<td>Molybdenum and Molybdenum alloys.</td>
<td>Dielectric layers (15).</td>
</tr>
<tr>
<td></td>
<td>Beryllium and Beryllium alloys</td>
<td>Dielectric layers (15), Diamond, Diamond-like carbon (17).</td>
</tr>
<tr>
<td></td>
<td>Sensor window materials (9)</td>
<td>Dielectric layers (15), Diamond, Diamond-like carbon (17).</td>
</tr>
<tr>
<td><strong>B. Thermal-Evaporation, Physical Vapor.</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Corrosion resistant steel (7)</td>
<td>Corrosion resistant steel (7), Crysasilicon (3), MCrAlX (5), Modified zirconia (12), Silicides, Alumina, Mixtures thereof (4).</td>
</tr>
<tr>
<td></td>
<td>Carbon-carbon, Ceramic, and Metal &quot;matrix&quot; &quot;composites&quot;.</td>
<td>Carbides, Tungsten, Mixtures thereof (4), Dielectric layers (15), Boron nitride.</td>
</tr>
<tr>
<td></td>
<td>Cemented tungsten carbide (16), Silicon carbide (18).</td>
<td>Dielectric layers (15).</td>
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<tr>
<td></td>
<td>Molybdenum and Molybdenum alloys.</td>
<td>Dielectric layers (15).</td>
</tr>
<tr>
<td></td>
<td>Beryllium and Beryllium alloys</td>
<td>Dielectric layers (15), Diamond, Diamond-like carbon (17).</td>
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<td></td>
<td>Sensor window materials (9)</td>
<td>Dielectric layers (15), Diamond, Diamond-like carbon (17).</td>
</tr>
<tr>
<td></td>
<td>Titanium alloys (13)</td>
<td>Dielectric layers (15), Diamond-like carbon (17).</td>
</tr>
<tr>
<td><strong>2. Ion assisted resistive heating Physical Vapor Deposition (PVD) (Ion Plating).</strong></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Ceramic (19) and Low-expansion glasses (14).</td>
<td>Ceramic (19) and Low-expansion glasses (14), MCrAlX (5), Modified zirconia (12), Silicides, Alumina, Mixtures thereof (4).</td>
</tr>
<tr>
<td></td>
<td>Dielectric layers (15).</td>
<td>Dielectric layers (15).</td>
</tr>
<tr>
<td><strong>3. Physical Vapor Deposition (PVD): &quot;Laser&quot; Vaporization.</strong></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Ceramic (19) and Low-expansion glasses (14).</td>
<td>Ceramic (19) and Low-expansion glasses (14).</td>
</tr>
<tr>
<td></td>
<td>Cemented tungsten carbide (16), Silicon carbide.</td>
<td>Cemented tungsten carbide (16), Silicon carbide.</td>
</tr>
<tr>
<td></td>
<td>Molybdenum and Molybdenum alloys.</td>
<td>Molybdenum and Molybdenum alloys.</td>
</tr>
<tr>
<td></td>
<td>Beryllium and Beryllium alloys</td>
<td>Beryllium and Beryllium alloys.</td>
</tr>
<tr>
<td></td>
<td>Sensor window materials (9)</td>
<td>Sensor window materials (9).</td>
</tr>
<tr>
<td></td>
<td>Titanium alloys (13)</td>
<td>Titanium alloys (13).</td>
</tr>
<tr>
<td><strong>4. Physical Vapor Deposition (PVD): Cathodic Arc Discharge.</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>&quot;Superalloys&quot;</td>
<td>Ceramic (19) and Low-expansion glasses (14).</td>
</tr>
<tr>
<td></td>
<td>Polymers (11) and Organic &quot;matrix&quot; &quot;composites&quot;.</td>
<td>Polymers (11) and Organic &quot;matrix&quot; &quot;composites&quot;.</td>
</tr>
<tr>
<td><strong>C. Pack cementation (see A above for out-of-pack cementation) (10).</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Carbon-carbon, Ceramic and Metal &quot;matrix&quot; &quot;composites&quot;.</td>
<td>Carbides, Alumina, Aluminides, Alloyed aluminides (2).</td>
</tr>
<tr>
<td></td>
<td>Titanium alloys (13)</td>
<td>Titanium alloys (13).</td>
</tr>
<tr>
<td></td>
<td>Refractory metals and alloys (8)</td>
<td>Silicides, Carbides, Mixtures thereof (4).</td>
</tr>
<tr>
<td></td>
<td>Silicones, Oxides.</td>
<td>Silicones, Oxides.</td>
</tr>
<tr>
<td>1. Coating process (1)</td>
<td>2. Substrate</td>
<td>3. Resultant coating</td>
</tr>
<tr>
<td>-----------------------</td>
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<td>---------------------</td>
</tr>
<tr>
<td>D. Plasma spraying</td>
<td>“Superalloys”</td>
<td>MCrAlX (5), Modified zirconia (12), Mixtures thereof (4), Abradable Nickel-Graphite, Abradable materials containing, Ni-Cr-Al Abradable Al-Si-Polyester Alloyed aluminides (2).</td>
</tr>
<tr>
<td></td>
<td>Aluminum alloys (6)</td>
<td>McRAiX (5), Modified zirconia (12), Mixtures thereof (4), Abradable Nickel-Graphite, Abradable Al-Si-Polyester Alloyed aluminides (2).</td>
</tr>
<tr>
<td></td>
<td>Refractory metals and alloys (8), Carbides, Corrosion resistant steel (7).</td>
<td>Carbides, Aluminides, Silicides, Aluminides, (2).</td>
</tr>
<tr>
<td></td>
<td>Titanium alloys (13)</td>
<td>Abradable Nickel Graphite,... Carbides, Aluminides, Silicides, Aluminides, (2).</td>
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<tr>
<td></td>
<td>Abradable Nickel Graphite</td>
<td>Abradable Nickel Graphite,... Carbides, Aluminides, Silicides, Aluminides, (2).</td>
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<tr>
<td></td>
<td>Refractory metals and alloys (8)</td>
<td>McRAiX (5), Modified zirconia (12), Mixtures thereof (4), Abradable Nickel-Graphite, Abradable Al-Si-Polyester Alloyed aluminides (2).</td>
</tr>
<tr>
<td></td>
<td>Carbon-carbon, Ceramic and Metal “matrix” “composites”.</td>
<td>McRAiX (5), Modified zirconia (12), Mixtures thereof (4), Abradable Nickel-Graphite, Abradable Al-Si-Polyester Alloyed aluminides (2).</td>
</tr>
<tr>
<td></td>
<td>“Superalloys”</td>
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<td>Ceramics and Low-expansion glasses (14).</td>
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</tr>
<tr>
<td></td>
<td>Cemented tungsten carbide (16), Silicon carbide (18).</td>
<td>McRAiX (5), Modified zirconia (12), Mixtures thereof (4), Abradable Nickel-Graphite, Abradable Al-Si-Polyester Alloyed aluminides (2).</td>
</tr>
<tr>
<td></td>
<td>Molybdenum and Molybdenum al-</td>
<td>McRAiX (5), Modified zirconia (12), Mixtures thereof (4), Abradable Nickel-Graphite, Abradable Al-Si-Polyester Alloyed aluminides (2).</td>
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<td>loys.</td>
<td>McRAiX (5), Modified zirconia (12), Mixtures thereof (4), Abradable Nickel-Graphite, Abradable Al-Si-Polyester Alloyed aluminides (2).</td>
</tr>
<tr>
<td></td>
<td>Beryllium and Beryllium alloys</td>
<td>McRAiX (5), Modified zirconia (12), Mixtures thereof (4), Abradable Nickel-Graphite, Abradable Al-Si-Polyester Alloyed aluminides (2).</td>
</tr>
<tr>
<td></td>
<td>Sensor window materials (9)</td>
<td>McRAiX (5), Modified zirconia (12), Mixtures thereof (4), Abradable Nickel-Graphite, Abradable Al-Si-Polyester Alloyed aluminides (2).</td>
</tr>
<tr>
<td></td>
<td>Refractory metals and alloys (8)</td>
<td>McRAiX (5), Modified zirconia (12), Mixtures thereof (4), Abradable Nickel-Graphite, Abradable Al-Si-Polyester Alloyed aluminides (2).</td>
</tr>
<tr>
<td></td>
<td>High temperature bearing steels</td>
<td>McRAiX (5), Modified zirconia (12), Mixtures thereof (4), Abradable Nickel-Graphite, Abradable Al-Si-Polyester Alloyed aluminides (2).</td>
</tr>
<tr>
<td></td>
<td>Titanium alloys (13)</td>
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</tr>
</tbody>
</table>

Notes to Table on Deposition Techniques:

1. The term “coating process” includes coating repair and refurbishing as well as original coating.
2. The term “alloyed aluminide coating” includes single or multiple-step coatings in which an element or elements are deposited prior to or during application of the aluminide coating, even if these elements are deposited by another coating process. It does not, however, include the multiple use of single-step pack cementation processes to achieve alloyed aluminides.
3. The term “noble metal modified aluminide” coating includes multiple-step coatings in which the noble metal or noble metals are laid down by some other coating process prior to application of the aluminide coating.
4. The term “mixtures thereof” includes infiltrated material, graded compositions, co-deposits and multilayer deposits and are obtained by one or more of the coating processes specified in the Table.
5. McRAiX refers to a coating alloy where M equals cobalt, iron, nickel or combinations thereof and X equals hafnium, yttrium, silicon, tantalum in any amount or other intentional additions over 0.01% by weight in various proportions and combinations, except:
   a. CoCrAlY coatings which contain less than 22% by weight of chromium, less than 7% by weight of aluminum and less than 2% by weight of yttrium;
   b. CoCrAIY coatings which contain 22 to 24% by weight of chromium, 10 to 12% by weight of aluminum and 0.5 to 0.7% by weight of yttrium; or
   c. NiCrAIY coatings which contain 21 to 23% by weight of chromium, 10 to 12% by weight of aluminum and 0.9 to 1.1% by weight of yttrium.
6. The term “aluminum alloys” refers to alloys having an ultimate tensile strength of 190 MPa or more measured at 293 K (20°C).
7. The term “corrosion resistant steel” refers to AISI (American Iron and Steel Institute) 300 series or equivalent national standard steels.
8. “Refractory metals and alloys” include the following metals and their alloys: Nickel (columbium), molybdenum, tungsten and tantalum.
9. “Sensor window materials”, as follows: Alumina, silicon, germanium, zinc sulfide, zinc selenide, gallium arsenide, diamond, gallium phosphide, sapphire and the following metal halides: Sensor window materials of more than 40 mm diameter for zirconium fluoride and hafnium fluoride.
10. Category 2 does not include “technology” for single-step pack cementation of solid airfoils.
11. “Polymers”, as follows: Polyimide, polyester, polysulfide, polycarbonates and polyurethanes.
12. “Modified zincoria” refers to additions of other metal oxides, (e.g., calcium, magnesium, yttria, hafnia, rare earth oxides) to zirconia in order to stabilize certain crystallographic phases and phase compositions. Thermal barrier coatings made of zirconia, modified with calcium or magnesium by mixing or fusion, are not controlled.
13. “Titanium alloys” refers only to aerospace alloys having an ultimate tensile strength of 900 MPa or more measured at 293 K (20°C).
14. “Low-expansion glasses” refers to glasses which have a coefficient of thermal expansion of 1 x 10⁻⁷ K⁻¹ or less measured at 293 K (20°C).
15. “Dielectric layers” are coatings constructed of multi-layers of insulator materials in which the interference properties of a design composed of materials of various refractive indices are used to reflect, transmit or absorb various wavelength bands. Dielectric layers refers to more than four dielectric layers or dielectric/metal “composite” layers.
17. “Technology” for depositing diamond-like carbon on any of the following is not controlled: Magnetic disk drives and heads, equipment for the manufacture of disposables, valves for faucets, acoustic diaphragms for speakers, engine parts for automobiles, cutting tools, punching-pressing...
dies, office automation equipment, microphones, medical devices or molds, for casting or molding of plastics, manufactured from alloys containing less than 5% beryllium.

18. “Silicon carbide” does not include cutting or forming tool materials.

19. Ceramic substrates, as used in this entry, does not include ceramic materials containing 5% by weight, or greater, clay or cement content, either as separate constituents or in combination.

**Techniques**

<table>
<thead>
<tr>
<th>Technique</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. <strong>Chemical Vapor Deposition</strong></td>
<td>A thermal decomposition or chemical reaction process wherein a metal, alloy, “composite”, dielectric or ceramic is deposited upon a heated substrate. Gaseous reactants are decomposed or combined in the vicinity of a substrate resulting in the deposition of the desired elemental, alloy or compound material on the substrate. Energy for this decomposition or chemical reaction process may be provided by the heat of the substrate, a glow discharge plasma, or “laser” irradiation.</td>
</tr>
<tr>
<td>Note 1:</td>
<td>CVD includes the following processes: Directed gas flow out-of-pack deposition, pulsed CVD, controlled nucleation thermal decomposition (CNTD), plasma enhanced or plasma assisted CVD processes.</td>
</tr>
<tr>
<td>Note 2:</td>
<td>Pack denotes a substrate immersed in a powder mixture.</td>
</tr>
<tr>
<td>Note 3:</td>
<td>The gaseous reactants used in the out-of-pack process are produced using the same basic reactions and parameters as the pack cementation process, except that the substrate to be coated is not in contact with the powder mixture.</td>
</tr>
<tr>
<td>c. <strong>Pack Cementation</strong></td>
<td>A process wherein a substrate is immersed in a powder mixture (a pack), that consists of: 1. The metallic powders that are to be deposited (usually aluminum, chromium, silicon or combinations thereof); 2. An activator (normally a halide salt); and 3. An inert powder, most frequently alumina.</td>
</tr>
<tr>
<td>Note:</td>
<td>The substrate and powder mixture is contained within a retort which is heated to between 1,030 K (757°C) to 1,375 K (1,102°C) for sufficient time to deposit the coating.</td>
</tr>
<tr>
<td>d. <strong>Plasma Spraying</strong></td>
<td>Plasma Spraying is an overlay coating process wherein a jet of plasma is directed at the substrate, which produces and controls a plasma accepts powder or wire coating materials, melts them and propels them towards a substrate, whereas an integrally bonded coating is formed. Plasma spraying constitutes either low pressure plasma spraying or high velocity plasma spraying.</td>
</tr>
<tr>
<td>Note 1:</td>
<td>Low pressure means less than ambient atmospheric pressure.</td>
</tr>
<tr>
<td>Note 2:</td>
<td>High velocity refers to nozzle-exit gas velocity exceeding 750 m/s calculated at 293 K (20 °C) at 1.1 MPa.</td>
</tr>
<tr>
<td>e. <strong>Slurry Deposition</strong></td>
<td>Slurry Deposition is a surface modification coating or overlay coating process wherein a metallic or ceramic powder with an organic binder is suspended in a liquid and is applied to a substrate by either spraying, dipping or painting, subsequent air or oven drying, and heat treatment to obtain the desired coating.</td>
</tr>
<tr>
<td>f. <strong>Sputter Deposition</strong></td>
<td>Sputter Deposition is an overlay coating process based on a momentum transfer phenomenon, wherein positive ions are accelerated by an electric field towards the surface of a target (coating material). The kinetic energy of the impacting ions is sufficient to cause target surface atoms to be released and deposited on an appropriately positioned substrate.</td>
</tr>
<tr>
<td>Note 1:</td>
<td>The Table refers only to triode, magnetron or reactive sputter deposition which is used to increase adhesion of the coating and rate of deposition and to radio frequency (RF) augmented sputter deposition used to permit vaporization of non-metallic coating materials.</td>
</tr>
<tr>
<td>g. <strong>Ion Implantation</strong></td>
<td>Ion Implantation is a surface modification coating process in which the element to be alloyed is ionized, accelerated through a potential gradient and implanted into the surface region of the substrate. This includes processes in which ion implantation is performed simultaneously with electron beam physical vapor deposition or sputter deposition.</td>
</tr>
</tbody>
</table>

**Accompanying Technical Information to Table on Deposition Techniques**

<table>
<thead>
<tr>
<th>Technique</th>
<th>Description</th>
</tr>
</thead>
</table>
d. Post heat treatment visual and macroscopic criteria for acceptance of the coated substrates;
4. Technical information for quality assurance techniques for the evaluation of the coated substrates listed in the Table, as follows:
a. Statistical sampling criteria;
b. Microscopic criteria for:
   1. Magnification;
   2. Coating thickness, uniformity;
   3. Coating integrity;
   4. Coating composition;
   5. Coating and substrates bonding;
   6. Microstructural uniformity.
c. Criteria for optical properties assessment (measured as a function of wavelength):
   1. Reflectance;
   2. Transmission;
   3. Absorption;
   4. Scatter;
5. Technical information and parameters related to specific coating and surface modification processes listed in the Table, as follows:
a. For Chemical Vapor Deposition (CVD):
   1. Coating source composition and formulation;
   2. Carrier gas composition;
   3. Substrate temperature;
   4. Time-temperature-pressure cycles;
   5. Gas control and part manipulation;
   b. For Thermal Evaporation-Physical Vapor Deposition (PVD):
   1. Ingot or coating material source composition;
   2. Substrate temperature;
   3. Reactive gas composition;
   4. Ingot feed rate or material vaporization rate;
   5. Time-temperature-pressure cycles;
   6. Beam and part manipulation;
   7. "Laser" parameters, as follows:
      a. Wave length;
      b. Power density;
      c. Pulse length;
      d. Repetition ratio;
      e. Source;
   c. For Pack Cementation:
      1. Pack composition and formulation;
      2. Carrier gas composition;
      3. Time-temperature-pressure cycles;
   d. For Plasma Spraying:
      1. Powder composition, preparation and size distributions;
      2. Feed gas composition and parameters;
      3. Substrate temperature;
      4. Gun power parameters;
      5. Spray distance;
      6. Spray angle;
      7. Cover gas composition, pressure and flow rates;
   e. For Sputter Deposition:
      1. Target composition and fabrication;
      2. Geometrical positioning of part and target;
   3. Reactive gas composition;
   4. Electrical bias;
   5. Time-temperature-pressure cycles;
   6. Triode power;
   7. Part manipulation;
   f. For Ion Implantation:
      1. Beam control and part manipulation;
      2. Ion source design details;
      3. Control techniques for ion beam and deposition rate parameters;
g. For Ion Plating:
   1. Beam control and part manipulation;
   2. Ion source design details;
   3. Control techniques for ion beam and deposition rate parameters;
   4. Time-temperature-pressure cycles;
   5. Coating material feed rate and vaporization rate;
   6. Substrate temperature;
   7. Substrate bias parameters.

6. In Supplement No. 1 to part 774, Category 9, ECCN 9D001 is revised to read as follows:
   9D001 "Software", not specified in 9D003 or 9D004, "specially designed" or modified for the "development" of equipment or "technology" controlled by ECCN 9A001 to 9A004, 9A012, 9A101 (except for items in 9A101.b that are "subject to the ITAR," see 22 CFR part 121), 9A106.d or.e, 9A110, or 9A120, 9B (except for ECCNs 9B604, 9B610, 9B619, 9B990, and 9B991), or ECCN 9E003.

License Requirements

Reason for Control: NS, AT

Control(s) Country chart
NS Column 1.
MT 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: See § 740.20(b)(2)(viii) of License Exception STA for limitations on availability of STA for Commerce Control List Category 9 items in this entry.

List of Items Controlled

Related Controls: "Software" that is "required" for the "production" of items specified in ECCNs 9A005 to 9A011, 9A101.b (except for items that are subject to the EAR), 9A103 to 9A105, 9A106.a, b, and c, 9A107 to 9A109, 9A110 (for items that are "specially designed" for use in missile systems and subsystems), and 9A111 to 9A119 is "subject to the ITAR."

Related Definitions: N/A

License Requirements

Reason for Control: NS, MT, AT

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Reporting Requirements

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Related Definitions: N/A

License Requirements

Reason for Control: NS, MT, AT

Control(s) Country chart
NS Column 1.
MT Column 1.

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

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Special Conditions for STA

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Related Definitions: N/A

License Requirements

Reason for Control: NS, AT

Control(s) Country chart
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Reporting Requirements

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

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Related Definitions: N/A

License Requirements

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Control(s) Country chart
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MT Column 1.

Reporting Requirements

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

TSR: N/A.
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.

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

TSR: N/A.

Special Conditions for STA

STA: See §740.20(b)(2)(viii) of License Exception STA for limitations on availability of STA for Commerce Control List Category 9 items in this entry.

List of Items Controlled

Related Controls: See also 9D104.

Related Definitions: N/A

Items:

- a. 2D or 3D viscous “software”, validated with wind tunnel or flight test data required for detailed engine flow modelling;
- b. “Software” for testing aero gas turbine engine assemblies, “parts” or “components”, having all of the following:
  - b.1. “Specially designed” for testing any of the following:
    - b.1.a. Aero gas turbine engines, assemblies or components, incorporating “technology” specified by 9E003.a, 9E003.h or 9E003.i; or
    - b.1.b. Multi-stage compressors providing either bypass or core flow, specially designed for aero gas turbine engines incorporating “technology” specified by 9E003.a or 9E003.h; and
  - b.2. “Specially designed” for all of the following:
    - b.2.a. Acquisition and processing of data, in real time; and
    - b.2.b. Feedback control of the test article or test conditions (e.g., temperature, pressure, flow rate) while the test is in progress; Note D004.b does not specify software for operation of the test facility or operator safety (e.g., overspeed shutdown, fire detection and suppression), or production, repair or maintenance acceptance-testing limited to determining if the item has been properly assembled or repaired.
- c. “Software” “specially designed” to control directional solidification or single crystal material growth in equipment specified by 9B001.a or 9B001.c;
- d. [RESERVED]
- e. “Software” “specially designed” or modified for the operation of items specified by 9A012;
- f. “Software” “specially designed” to design the internal cooling passages of aero gas turbine engine blades, vanes and “tip shrouds”;
- g. “Software” having all of the following:
  - g.1. “Specially designed” to predict aero thermal, aeromechanical and combustion conditions in aero gas turbine engines; and
  - g.2. Theoretical modeling predictions of the aero thermal, aeromechanical and combustion conditions, which have been validated with actual turbine engine (experimental or production) performance data.
- h. 9. In supplement No. 1 to part 774, Category 9, ECCN 9E001 is revised to read as follows:

  9E001 “Technology” according to the General Technology Note for the “development” of equipment or “software”, controlled by 9A001.b, 9A004, 9A012, 9B (except for ECCNs 9B604, 9B610, 9B619, 9B990 and 9B991), or ECCN 9D001 to 9D004, 9D101, or 9D104.

License Requirements

Reason for Control: NS, MT, AT

Control(s) Country chart (See Supp. No. 1 to part 738)
NS applies to “technology” for items controlled by 9A001.b, 9A004, 9A012, 9B001 to 9B010, 9D001 to 9D004 for NS reasons.
MT applies to “technology” for items controlled by 9A012, 9B001, 9B002, 9B003, 9B004, 9B005, 9B007, 9B104, 9B105, 9B106, 9B115, 9B116, 9D001, 9D002, 9D003, or 9D004 for MT reasons.
AT applies to “technology” for items controlled by 9B001, 9B002, 9B003, 9B004, 9B005, 9B007, 9B104, 9B105, 9B106, 9B115 or 9B116 for MT reasons.

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: See §740.20(b)(2)(viii) of License Exception STA for limitations on availability of STA for Commerce Control List Category 9 items in this entry.

List of Items Controlled

Related Controls: (1) See also 9E102. (2) See also 9E002.f for “technology” for the repair of controlled structures, laminates or materials. (3) “Technology” that is required for the “production” of equipment described in ECCNs 9A005 to 9A011 is “subject to the ITAR.”

Related Definitions: N/A

Items:

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

11. 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.
List of Items Controlled

Related Controls: (1) Hot section “technology” specifically designed, modified, or equipped for military uses or purposes, or developed principally with U.S. Department of Defense funding, is “subject to the 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

a. “Technology” “required” for the “development” or “production” of any of the following gas turbine engine “parts,” “components” or systems:

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.

2. Combustors having any of the following:

   a.2.a. Thermally decoupled liners’ design is to operate at “combustor exit temperature” exceeding 1,883 K (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 1,883 K (1,610 °C) and having holes that meet the parameters specified by 9E003.a.

   **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.

**Technical Note:** For the purposes of 9E003.a.1, designed to operate at a ‘gas path temperature’ exceeding 1,883 K (1,610 °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; 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.

**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 propfans, capable of absorbing more than 2,000 kWs at flight speeds exceeding Mach 0.55.

**Technical Note:** “Damage tolerant” “parts” and “components” are designed using methodology and substantiation to predict and limit crack growth.

b.9. [Reserved]

**N.B.** For “FADEC systems”, see 9E003.h.

b.10. [Reserved]

b.11. For adjustable flow path geometry, see 9E003.i.

b.11.a. 20% or more of the total volume being one or more closed cavities containing vacuum or gas only; and b.11.b. One or more closed cavities having a volume of 5 cm³ or larger.
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 “parts” or “components” that maintain engine stability; or
      f.2. “Technology” “required” for the “production” of engine systems having all of the following “parts” and “components” employed in jet engines.

   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); and

   f.2. “Technology” “required” for the “production” of engine systems having all of the following “parts” and “components” employed in jet engines.

   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;
   f.2.c. Variable flow area capability within the compressor or turbine sections;

   h. “Technology” “required” for the “production” of fuel injection systems with a “specially designed” fuel system, or with a fuel system designed for fixed-wing “aircraft” powered by gas turbine engines.

   j. “Technology” “required” for the “production” of “parts” or “components” of military engines controlled on the USML.

Matthew S. Borman,
Deputy Assistant Secretary for Export Administration.

[Docket No. 21–CRB–0001–PR (2023–2027)]

Determination of Rates and Terms for Making and Distributing Phonorecords (Phonorecords IV)

AGENCY: Copyright Royalty Board, Library of Congress.
ACTION: Proposed rule; second reopening of comment period.

SUMMARY: Because a comment filed by settling parties included additional material (in particular a memorandum of understanding) that relates to statements in some of the comments the Copyright Royalty Judges received, the Judges are reopening the comment period for an additional 30 days. The proposed rule published for comment sets certain rates and terms applicable during the period beginning January 1, 2023, and ending December 31, 2027, for the section 115 statutory license for making and distributing phonorecords of nondramatic musical works and is based on regulations proposed pursuant to a partial settlement among the settling parties.

DATES: The comment period for the proposed rule published June 25, 2021, at 86 FR 33601, which was reopened on July 29, 2021, at 86 FR 40793, is reopened a second time. Comments are due no later than November 22, 2021.


Instructions: To send your comment through eCRB, if you don’t have a user account, you will first need to register for an account and wait for your registration to be approved. Approval of user accounts is only available during business hours. Once you have an approved account, you can only sign in and file your comment after setting up multi-factor authentication, which can be done at any time of day. All comments must include the Copyright Royalty Board name and the docket number for this proposed rule. All properly filed comments will appear