

CATEGORY 9 - AEROSPACE AND PROPULSION

A. SYSTEMS, EQUIPMENT AND COMPONENTS

N.B.: For propulsion systems designed or rated against neutron or transient ionizing radiation, see the U.S. Munitions List, 22 CFR part 121.

9A001 Aero gas turbine engines having any of the following (see List of Items Controlled).

License Requirements

Reason for Control: NS, MT, AT

<i>Control(s)</i>	<i>Country Chart</i>
NS applies to entire entry	NS Column 1
MT applies to only to those engines that meet the characteristics listed in 9A101	MT Column 1
AT applies to entire entry	AT Column 1

License Exceptions

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

List of Items Controlled

Unit: Number
Related Controls: See also [9A101](#) and [9A991](#)
Related Definitions: N/A
Items:

a. Incorporating any of the technologies controlled by 9E003.a, 9E003.h, or 9E003.i; or

Note: 9A001.a. does not control aero gas turbine engines which meet all of the following:

a. Certified by the civil aviation authority in a country listed in Supplement No. 1 to Part 743; and

b. Intended to power non-military manned aircraft for which any of the following has been issued by a Participating State listed in Supplement No. 1 to Part 743 for the aircraft with this specific engine type:

b.1. A civil type certificate; or

b.2. An equivalent document recognized by the International Civil Aviation Organization (ICAO).

b. Designed to power an aircraft designed to cruise at Mach 1 or higher, for more than 30 minutes.

9A002 ‘Marine gas turbine engines’ with an ISO standard continuous power rating of 24,245 kW or more and a specific fuel consumption not exceeding 0.219 kg/kWh in the power range from 35 to 100%, and specially designed assemblies and components therefor.

License Requirements

Reason for Control: NS, AT

<i>Control(s)</i>	<i>Country Chart</i>
NS applies to entire entry	NS Column 2
AT applies to entire entry	AT Column 1

License Exceptions

LVS: \$5000
 GBS: N/A

CIV: N/A

List of Items Controlled:

Unit: Number

Related Controls: N/A

Related Definition: The term ‘marine gas turbine engines’ includes those industrial, or aero-derivative, gas turbine engines adapted for a ship’s electric power generation or propulsion.

Items:

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

9A003 Specially designed assemblies and components, incorporating any of the “technologies” controlled by 9E003.a, 9E003.h or 9E003.i, for any of the following gas turbine engine propulsion systems (see List of Items Controlled).

License Requirements

Reason for Control: NS, AT

<i>Control(s)</i>	<i>Country Chart</i>
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NS applies to entire entry	NS Column 2
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AT applies to entire entry	AT Column 1
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License Exceptions

LVS: \$5000

GBS: N/A

CIV: N/A

List of Items Controlled

Unit: Number

Related Controls: N/A

Related Definition: N/A

Items:

a. Controlled by 9A001; *or*

b. Whose design or production origins are either countries in Country Group D:1 or unknown to the manufacturer.

9A004 Space launch vehicles and “spacecraft”.

License Requirements

Reason for Control: NS and AT

<i>Control(s)</i>	<i>Country Chart</i>
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NS applies to entire entry	NS Column 1
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AT applies to entire entry	AT Column 1
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License Exceptions

LVS: N/A

GBS: N/A

CIV: N/A

List of Items Controlled

Unit: Number

Related Controls:

(1) See also [9A104](#).

(2) Space launch vehicles are under the jurisdiction of the Department of State.

(3) Effective March 15, 1999, all satellites, including commercial communications satellites, are subject to the ITAR. Effective March 15, 1999, all license applications for the export of commercial communications satellites will be processed by the State Department, Directorate of Defense Trade Controls. Retransfer of jurisdiction for commercial communications satellites and related items shall not affect the validity of any export license issued by the Department of Commerce prior to March 15, 1999, or of any export license application filed under the Export Administration Regulations on or

before March 14, 1999, and subsequently issued by the Department of Commerce. Commercial communications satellites licensed by the Department of Commerce, including those already exported, remain subject to the EAR and all terms and conditions of issued export licenses until their stated expiration date. All licenses issued by the Department of Commerce for commercial communications satellites, including licenses issued after March 15, 1999, remain subject to SI controls throughout the validity of the license. Effective March 15, 1999, Department of State jurisdiction shall apply to any instance where a replacement license would normally be required from the Department of Commerce. Transferring registration or operational control to any foreign person of any item controlled by this entry must be authorized on a license issued by the Department of State, Directorate of Defense Trade Controls. This requirement applies whether the item is physically located in the United States or abroad.

(4) All other “spacecraft” not controlled under 9A004 and their payloads, and specifically designed or modified components, parts, accessories, attachments, and associated equipment, including ground support equipment, are subject to the export licensing authority of the Department of State unless otherwise transferred to the Department of Commerce via a commodity jurisdiction determination by the Department of State.

(5) Exporters requesting a license from the Department of Commerce for “spacecraft” and their associated parts and components, other than the international space station, must provide a statement from the Department of State, Directorate of Defense Trade Controls, verifying that the item intended for export is under the licensing jurisdiction of the Department of Commerce. All specially designed or modified components, parts, accessories, attachments,

and associated equipment for “spacecraft” that have been determined by the Department of State through the commodity jurisdiction process to be under the licensing jurisdiction of the Department of Commerce and that are not controlled by any other ECCN on the Commerce Control List will be assigned a classification under this ECCN 9A004.

(6) Technical data required for the detailed design, development, manufacturing, or production of the international space station (to include specifically designed parts and components) remains under the jurisdiction of the Department of State. This control by the ITAR of detailed design, development, manufacturing or production technology for NASA’s international space station does not include that level of technical data necessary and reasonable for assurance that a U.S.-built item intended to operate on NASA’s international space station has been designed, manufactured, and tested in conformance with specified requirements (e.g., operational performance, reliability, lifetime, product quality, or delivery expectations). All technical data and all defense services, including all technical assistance, for launch of the international space station, including launch vehicle compatibility, integration, or processing data, are controlled and subject to the jurisdiction of the Department of State, in accordance with 22 CFR parts 120 through 130.

Items:

a. The international space station being developed, launched and operated under the supervision of the U.S. National Aeronautics and Space Administration. Hardware specific to the international space station transferred to the Department of Commerce by commodity jurisdiction action is also included.

b. Specific items as may be determined to be not subject to the ITAR through the commodity jurisdiction procedure administered by the Department of State after March 15, 1999.

9A005 Liquid rocket propulsion systems containing any of the systems or components, controlled by 9A006. (These items are subject to the export licensing authority of the U.S. Department of State, Directorate of Defense Trade Controls. See 22 CFR part 121.)

9A011 Ramjet, scramjet or combined cycle engines, and specially designed components therefor. (These items are subject to the export licensing authority of the U.S. Department of State, Directorate of Defense Trade Controls. See 22 CFR part 121.)

9A006 Systems and components, specially designed for liquid rocket propulsion systems. (These items are subject to the export licensing authority of the U.S. Department of State, Directorate of Defense Trade Controls. See 22 CFR part 121.)

9A012 Non-military “unmanned aerial vehicles,” (“UAVs”), unmanned “airships”, associated systems, equipment and components, as follows (see List of Items Controlled).

License Requirements

Reason for Control: NS, MT, AT

<i>Control(s)</i>	<i>Country Chart</i>
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NS applies to entire entry	NS Column 1
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MT applies to non-military unmanned air vehicle systems (UAVs) and remotely piloted vehicles (RPVs) that are capable of a maximum range of at least 300 kilometers (km), regardless of payload.	MT Column 1
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AT applies to entire entry	AT Column 1
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License Exceptions

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

List of Items Controlled

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

Related Controls: See the U.S. Munitions

9A007 Solid rocket propulsion systems. (These items are subject to the export licensing authority of the U.S. Department of State, Directorate of Defense Trade Controls. See 22 CFR part 121.)

9A008 Components specially designed for solid rocket propulsion systems. (These items are subject to the export licensing authority of the U.S. Department of State, Directorate of Defense Trade Controls. See 22 CFR part 121.)

9A009 Hybrid rocket propulsion systems. (These items are subject to the export licensing authority of the U.S. Department of State, Directorate of Defense Trade Controls. See 22 CFR part 121.)

9A010 Specially designed components, systems and structures, for launch vehicles, launch vehicle propulsion systems or “spacecraft”. (These items are subject to the export licensing authority of the U.S. Department of State, Directorate of Defense Trade Controls. See 22 CFR part 121.)

List Category VIII (22 CFR Part 121). Also see section 744.3 of the EAR.

Related Definitions: N/A

Items:

a. “UAVs” or unmanned “airships”, having any of the following:

a.1. An autonomous flight control and navigation capability (*e.g.*, an autopilot with an Inertial Navigation System); *or*

a.2. Capability of controlled flight out of the direct visual range involving a human operator (*e.g.*, televisual remote control);

b. Associated systems, equipment and components, as follows:

b.1. Equipment specially designed for remotely controlling the “UAVs” or unmanned “airships”, controlled by 9A012.a.;

b.2. Systems for navigation, attitude, guidance or control, other than those controlled in Category 7, specially designed to provide autonomous flight control or navigation capability to “UAVs” or unmanned “airships”, controlled by 9A012.a.;

b.3. Equipment or components specially designed to convert a manned “aircraft” or a manned “airship” to a “UAV” or unmanned “airship”, controlled by 9A012.a.;

b.4. Air breathing reciprocating or rotary internal combustion type engines, specially designed or modified to propel “UAVs” or unmanned “airships”, at altitudes above 50,000 feet (15,240 meters).

Note: 9A012 does not control model aircraft or model “airships”.

9A018 Equipment on the Wassenaar Arrangement Munitions List.

License Requirements

Reason for Control: NS, RS, AT, UN

Control(s) Country Chart

NS applies to entire entry NS Column 1

RS applies to 9A018.a and b RS Column 2

AT applies to entire entry AT Column 1

UN applies to entire entry See § 746.1(b) for UN controls.

License Exceptions

LVS: \$1500

GBS: N/A

CIV: N/A

List of Items Controlled

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

Related Controls: (a) Parachute systems designed for use in dropping military equipment, braking military aircraft, slowing spacecraft descent, or retarding weapons delivery; (b) Instrument flight trainers for combat simulation; and (c) military ground armed or armored vehicles and parts and components specific thereto described in 22 CFR part 121, Category VII; and all-wheel drive vehicles capable of off-road use that have been armed or armored with articles described in 22 CFR part 121, Category XIII (See §770.2(h) - Interpretation 8) are all subject to the export licensing jurisdiction of the U.S. Department of State, Directorate of Defense Trade Controls.

Related Definition: This entry controls parachute systems designed for use in dropping personnel only.

Items:

a. Military trainer aircraft bearing “T” designations:

Reason for Control: MT, AT

a.1. Using reciprocating engines; or

Control(s) Country Chart

a.2. Turbo prop engines with less than 600 horse power (h.p.); and

MT applies to entire entry MT Column 1

a.3. Specially designed component parts.

AT applies to entire entry AT Column 1

License Exceptions

b. Ground transport vehicles (including trailers) and parts and components therefor designed or modified for non-combat military use and unarmed all-wheel drive vehicles capable of off-road use which have been manufactured or fitted with materials to provide ballistic protection to level III (National Institute of Justice standard 0108.01, September 1985) or better. (See §770.2(h) - Interpretation 8).

LVS: N/A

GBS: N/A

CIV: N/A

List of Items Controlled

c. Pressure refuelers, pressure refueling equipment, equipment specially designed to facilitate operations in confined areas; and ground equipment, developed specially for military “aircraft”, and specially designed parts and accessories, n.e.s.;

Unit: Equipment in number

Related Controls: [9A101.b](#) controls only engines for non-military unmanned air vehicles [UAVs] or remotely piloted vehicles [RPVs], and does not control other engines designed or modified for use in “missiles”, which are subject to the export licensing authority of the U.S. Department of State, Directorate of Defense Trade Controls (see 22 CFR part 121).

Related Definitions: N/A

d. Pressurized breathing equipment specially designed for use in military “aircraft”;

Items:

e. Military parachutes and complete canopies, harnesses, and platforms and electronic release mechanisms therefor, except such types as are in normal sporting use;

a. Engines having both of the following characteristics:

a.1. Maximum thrust value greater than 400 N (achieved un-installed) excluding civil certified engines with a maximum thrust value greater than 8,890 N (achieved un-installed), *and*

a.2. Specific fuel consumption of 0.15 kg/N/hr or less (at maximum continuous power at sea level static and standard conditions); *or*

f. Military instrument flight trainers, except for combat simulation; and components and accessories specially designed for such equipment.

b. Engines designed or modified for use in “missiles”, regardless of thrust or specific fuel consumption.

9A101 Turbojet and turbofan engines, other than those controlled by 9A001, as follows (see List of Items Controlled).

License Requirements

9A103 Liquid propellant tanks specially

designed for the propellants controlled in ECCNs 1C011, 1C111 or other liquid propellants used in “missiles.” (These items are subject to the export licensing authority of the U.S. Department of State, Directorate of Defense Trade Controls. See 22 CFR part 121.)

9A104 Sounding rockets, capable of a range of at least 300 km. (These items are subject to the export licensing authority of the U.S. Department of State, Directorate of Defense Trade Controls. See 22 CFR part 121.)

9A105 Liquid propellant rocket engines. (These items are subject to the export licensing authority of the U.S. Department of State, Directorate of Defense Trade Controls. See 22 CFR part 121.)

9A106 Systems or components, other than those controlled by 9A006, usable in “missiles”, as follows (see List of Items Controlled), and specially designed for liquid rocket propulsion systems.

License Requirements

Reason for Control: MT, AT

<i>Control(s)</i>	<i>Country Chart</i>
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

License Exceptions

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

List of Items Controlled

Unit: Equipment and components in number;

parts and accessories in \$ value

Related Controls: Items described in 9A106.a, .b, and .c are subject to the export licensing authority of the U.S. Department of State, Directorate of Defense Trade Controls (See 22 CFR part 121).

Related Definitions: N/A

Items:

- a. Ablative liners for thrust or combustion chambers;
- b. Rocket nozzles;
- c. Thrust vector control sub-systems;

Technical Note: Examples of methods of achieving thrust vector control controlled by 9A106.c includes:

- 1. Flexible nozzle;
- 2. Fluid or secondary gas injection;
- 3. Movable engine or nozzle;
- 4. Deflection of exhaust gas steam (jet vanes or probes); or
- 5. Thrust tabs.

d. Liquid and slurry propellant (including oxidizers) control systems, and specially designed components therefor, designed or modified to operate in vibration environments greater than 10 g rms between 20 Hz and 2000 Hz.

Note: The only servo valves and pumps controlled by 9A106.d, are the following:

- a. Servo valves designed for flow rates equal to or greater than 24 liters per minute, at an absolute pressure equal to or greater than 7 MPa, that have an actuator response time of less than 100 ms;

b. Pumps, for liquid propellants, with shaft speeds equal to or greater than 8,000 rpm or with discharge pressures equal to or greater than 7 Mpa.

e. Flight control servo valves designed or modified for use in “missiles” and designed or modified to operate in a vibration environment greater than 10g rms over the entire range between 20Hz and 2 kHz.

9A107 Solid propellant rocket engines, usable in rockets with a range capability of 300 Km or greater, other than those controlled by 9A007, having total impulse capacity equal to or greater than 8.41×10^5 Ns, but less than 1.1×10^6 Ns. (These items are subject to the export licensing authority of the U.S. Department of State, Directorate of Defense Trade Controls. See 22 CFR part 121.)

9A108 Solid rocket propulsion components, other than those controlled by 9A008, usable in rockets with a range capability of 300 Km or greater. (These items are subject to the export licensing authority of the U.S. Department of State, Directorate of Defense Trade Controls. See 22 CFR part 121.)

9A109 Hybrid rocket motors, usable in rockets with a range capability of 300 Km or greater, other than those controlled by 9A009, and specially designed components therefor. (These items are subject to the export licensing authority of the U.S. Department of State, Directorate of Defense Trade Controls. See 22 CFR part 121.)

9A110 Composite structures, laminates and manufactures thereof, other than those controlled by entry 9A010, specially designed for use in “missiles” or the subsystems

controlled by entries 9A005, 9A007, 9A105.a, 9A106 to 9A108, 9A116, or 9A119.

License Requirements

Reason for Control: MT, AT

Control(s) Country Chart

MT applies to entire entry MT Column 1

AT applies to entire entry AT Column 1

License Exceptions

LVS: N/A

GBS: N/A

CIV: N/A

List of Items Controlled

Unit: Kilograms

Related Controls: 1.) See also 1A002. 2.) “Composite structures, laminates, and manufactures thereof, specially designed for use in missile systems are under the licensing authority of the Directorate of Defense Trade Controls, U.S. Department of State, except those specially designed for non-military unmanned air vehicles controlled in [9A012](#).

Related Definitions: N/A

Items:

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

9A111 Pulse jet engines, usable in rockets, missiles, or unmanned aerial vehicles capable of achieving a “range” equal to or greater than 300km, and specially designed components therefor. (These items are subject to the export licensing authority of the U.S. Department of State, Directorate of Defense Trade Controls. See 22 CFR part 121.)

9A115 Apparatus, devices and vehicles, designed or modified for the transport, handling, control, activation and launching of rockets, missiles, and unmanned aerial vehicles capable of achieving a “range” equal to or greater than 300 km. (These items are subject to the export licensing authority of the U.S. Department of State, Directorate of Defense Trade Controls. See 22 CFR part 121.)

9A116 Reentry vehicles, usable in “missiles”, and equipment designed or modified therefor. (These items are subject to the export licensing authority of the U.S. Department of State, Directorate of Defense Trade Controls. See 22 CFR part 121.)

9A117 Staging mechanisms, separation mechanisms, and interstages therefor, usable in “missiles”. (These items are subject to the export licensing authority of the U.S. Department of State, Directorate of Defense Trade Controls. See 22 CFR part 121.)

9A118 Devices to regulate combustion usable in engines which are usable in rockets with a range capability greater than 300 Km or greater, controlled by 9A011 or 9A111. (These items are subject to the export licensing authority of the U.S. Department of State, Directorate of Defense Trade Controls. See 22 CFR part 121.)

9A119 Individual rocket stages, usable in rockets with a range capability greater than 300 Km or greater, other than those controlled by 9A005, 9A007, 9A009, 9A105, 9A107 and 9A109. (These items are subject to the export licensing authority of the U.S. Department of State, Directorate of Defense

Trade Controls. See 22 CFR part 121.)

9A120 Complete unmanned aerial vehicles, not specified in 9A012, having all of the following:

License Requirements

Reason for Control: MT, AT

<i>Control(s)</i>	<i>Country Chart</i>
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MT applies to entire entry	MT Column 1
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AT applies to entire entry	AT Column 1
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License Exceptions

LVS: N/A

GBS: N/A

CIV: N/A

List of Items Controlled

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

Related Controls: See ECCN [9A012](#) or the U.S. Munitions List Category VIII (22 CFR part 121). Also see ECCN 2B352.h for controls on certain spraying or fogging systems, and components therefor, specially designed or modified for fitting to aircraft, “lighter than air vehicles,” or “UAVs.”

Related Definitions: N/A

Items:

a. Having any of the following:

a.1. An autonomous flight control and navigation capability; *or*

a.2. Capability of controlled-flight out of the direct vision range involving a human operator; *and*

b. Having any of the following:

b.1. Incorporating an aerosol dispensing system/mechanism with a capacity greater than 20 liters; *or*

b.2. Designed or modified to incorporate an aerosol dispensing system/mechanism with a capacity of greater than 20 liters.

Note: 9A120 does not control model aircraft, specially designed for recreational or competition purposes.

Technical Notes:

1. An aerosol consists of particulate or liquids other than fuel components, by-products or additives, as part of the “payload” to be dispersed in the atmosphere. Examples of aerosols include pesticides for crop dusting and dry chemicals for cloud seeding.

2. An aerosol dispensing system/mechanism contains all above devices (mechanical, electrical, hydraulic, etc.), which are necessary for storage and dispersion of an aerosol into the atmosphere. This includes the possibility of aerosol injection into the combustion exhaust vapor and into the propeller slip stream.

9A980 Nonmilitary mobile crime science laboratories; and parts and accessories, n.e.s.

License Requirements

Reason for Control: CC

Control(s) Country Chart

CC applies to entire entry CC Column 1

License Exceptions

LVS: N/A
GBS: N/A

CIV: N/A

List of Items Controlled

Unit: \$ value
Related Controls: N/A
Related Definitions: N/A
Items:

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

9A990 Diesel engines, n.e.s., and tractors and specially designed parts therefor, n.e.s.

License Requirements

Reason for Control: AT

Control(s) Country Chart

AT applies to entire entry except 9A990.a AT Column 1

AT applies to 9A990.a only AT Column 2

License Exceptions

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

List of Items Controlled

Unit: \$ value
Related Controls: N/A
Related Definitions: N/A

Items:

a. Diesel engines, n.e.s., for trucks, tractors, and automotive applications of continuous brake horsepower of 400 BHP (298 kW) or greater (performance based on SAE J1349 standard conditions of 100 Kpa and 25°)

b. Off highway wheel tractors of carriage capacity 9 mt (20,000 lbs) or more; and parts and accessories, n.e.s.

c. On-Highway tractors, with single or tandem rear axles rated for 9 mt per axel (20,000 lbs.) or greater and specially designed parts.

9A991 “Aircraft”, n.e.s., and gas turbine engines not controlled by 9A001 or 9A101 and parts and components, n.e.s.

License Requirements

Reason for Control: AT, UN

<i>Control(s)</i>	<i>Country Chart</i>
AT applies to entire entry	AT Column 1
UN applies to 9A991.a	See § 746.1(b) for UN controls.

License Requirement Notes: *There is no de minimis level for foreign-made aircraft described by this entry that incorporate commercial primary or standby instrument systems that integrate QRS11-00100-100/101 or commercial automatic flight control systems that integrate QRS11-00050-443/569 Micromachined Angular Rate Sensors (see §734.4(a) of the EAR).*

License Exceptions

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

List of Items Controlled

Unit: Number
Related Controls: QRS11 Micromachined Angular Rate Sensors are subject to the export licensing jurisdiction of the U.S. Department of State, Directorate of Defense Trade Controls, unless the

QRS11-00100-100/101 is integrated into and included as an integral part of a commercial primary or standby instrument system of the type described in ECCN 7A994, or aircraft of the type described in ECCN [9A991](#) that incorporates such a system, or is exported solely for integration into such a system; or the QRS11-00050-443/569 is integrated into an automatic flight control system of the type described in ECCN 7A994, or aircraft of the type described in ECCN [9A991](#) that incorporates such a system, or are exported solely for integration into such a system. (See Commodity Jurisdiction requirements in 22 CFR Part 121; Category VIII(e), Note(1)) In the latter case, such items are subject to the licensing jurisdiction of the Department of Commerce. Technology specific to the development and production of QRS11 sensors remains subject to the licensing jurisdiction of the Department of State.

Related Definitions: N/A

Items:

a. Military aircraft, demilitarized (not specifically equipped or modified for military operation), as follows:

a.1 Cargo aircraft bearing “C” designations and numbered C-45 through C-118 inclusive, C-121 through C-125 inclusive, and C-131, using reciprocating engines only.

a.2 Trainer aircraft bearing “T” designations and using reciprocating engines or turboprop engines with less than 600 horsepower (s.h.p.).

a.3 Utility aircraft bearing “U” designations and using reciprocating engines only.

a.4 All liaison aircraft bearing an “L” designation.

a.5 All observation aircraft bearing “O” designations and using reciprocating engines.

b. “Civil aircraft”;

Note: Specify make and model of aircraft and type of avionic equipment on aircraft.

c. Aero gas turbine engines, and specially designed parts therefor.

Note: 9A991.c does not control aero gas turbine engines that are destined for use in civil “aircraft” and that have been in use in bona fide civil “aircraft” for more than eight years. If they have been in use in bona fide civil “aircraft” for more than eight years, such engines are controlled under 9A991.d.

d. Aircraft parts and components, n.e.s.

e. Pressurized aircraft breathing equipment, n.e.s.; and specially designed parts therefor, n.e.s.

9A992 Complete canopies, harnesses, and platforms and electronic release mechanisms therefor, except such types as are in normal sporting use.

License Requirements

Reason for Control: AT

Control(s) Country Chart

AT applies to entire entry AT Column 1

License Exceptions

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

List of Items Controlled

Unit: Number
Related Controls: N/A
Related Definitions: N/A
Items:

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

B. TEST, INSPECTION AND PRODUCTION EQUIPMENT

9B001 Equipment, tooling and fixtures, specially designed for manufacturing gas turbine blades, vanes or “tip shroud” castings, as follows (see List of Items Controlled).

License Requirements

Reason for Control: NS, MT, AT

Control(s) Country Chart

NS applies to entire entry NS Column 1

MT applies only to equipment for engines that meet the characteristics described in 9A001

AT applies to entire entry AT Column 1

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

License Exceptions

LVS: \$5000, except N/A for MT
 GBS: Yes, except N/A for MT
 CIV: Yes, except N/A for MT
 STA: License Exception STA may not be used to ship commodities in 9B001.b to any of the eight destinations listed in § 740.20(c)(2) of the EAR.

List of Items Controlled

Unit: \$ value
Related Controls: For specially designed

production equipment of systems, sub-systems and components controlled by [9A005](#) to [9A009](#), [9A011](#), [9A101](#), [9A105](#) to [9A109](#), [9A111](#), and [9A116](#) to [9A119](#) usable in “missiles” see [9B115](#). See also [9B991](#).

Related Definitions: N/A

Items:

- a. Directional solidification or single crystal casting equipment;
- b. Ceramic cores or shells.

9B002 On-line (real time) control systems, instrumentation (including sensors) or automated data acquisition and processing equipment, having all of the following (See List of Items Controlled).

License Requirements

Reason for Control: NS, MT, AT

<i>Control(s)</i>	<i>Country Chart</i>
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NS applies to entire entry NS Column 1

MT applies only to equipment for engines that meet the characteristics described in 9A001 MT Column 1

AT applies to entire entry AT Column 1

License Exceptions

LVS: \$3000, except N/A for MT
GBS: Yes, except N/A for MT
CIV: Yes, except N/A for MT

List of Items Controlled

Unit: \$ value
Related Controls: N/A
Related Definitions: N/A
Items:

a. Specially designed for the “development” of gas turbine engines, assemblies or components; *and*

b. Incorporating “technologies” controlled by 9E003.h or 9E003.i.

9B003 Equipment specially designed for the “production” or test of gas turbine brush seals designed to operate at tip speeds exceeding 335 m/s, and temperatures in excess of 773 K (500°C), and specially designed components or accessories therefor.

License Requirements

Reason for Control: NS, MT, AT

<i>Control(s)</i>	<i>Country Chart</i>
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NS applies to entire entry NS Column 1

MT applies only to equipment for engines that meet the characteristics described in 9A001 MT Column 1

AT applies to entire entry AT Column 1

License Exceptions

LVS: \$5000, except N/A for MT
GBS: Yes, except N/A for MT
CIV: Yes, except N/A for MT

List of Items Controlled

Unit: \$ value
Related Controls: See also [9B115](#)
Related Definitions: N/A
Items:

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

9B004 Tools, dies or fixtures, for the solid state joining of “superalloy”, titanium or intermetallic airfoil-to-disk combinations described in 9E003.a.3 or 9E003.a.6 for gas turbines.

License Requirements

Reason for Control: NS, MT, AT

Control(s) Country Chart

NS applies to entire entry NS Column 1

MT applies only to equipment for engines that meet the characteristics described in 9A001 MT Column 1

AT applies to entire entry AT Column 1

License Exceptions

LVS: \$3000, except N/A for MT
 GBS: Yes, except N/A for MT
 CIV: Yes, except N/A for MT

List of Items Controlled

Unit: Number
Related Controls: N/A
Related Definitions: N/A
Items:

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

9B005 On-line (real time) control systems, instrumentation (including sensors) or automated data acquisition and processing equipment, specially designed for use with any of the following (see List of Items Controlled).

License Requirements

Reason for Control: NS, AT

Control(s) Country Chart

NS applies to entire entry NS Column 1

AT applies to entire entry AT Column 1

License Exceptions

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

List of Items Controlled

Unit: \$ value
Related Controls: See also [9B105](#)
Related Definitions: N/A
Items:

a. Wind tunnels designed for speeds of Mach 1.2 or more;

Note: 9B005.a does not control wind tunnels specially designed for educational purposes and having a ‘test section size’ (measured laterally) of less than 250 mm.

Technical Note: ‘Test section size’ in 9B005.a means the diameter of the circle, or the side of the square, or the longest side of the rectangle, at the largest test section location.

b. Devices for simulating flow-environments at speeds exceeding Mach 5, including hot-shot tunnels, plasma arc tunnels, shock tubes, shock tunnels, gas tunnels and light gas guns; or

c. Wind tunnels or devices, other than two-dimensional sections, capable of simulating Reynolds number flows exceeding 25 x 10⁶.

9B006 Acoustic vibration test equipment capable of producing sound pressure levels of 160 Db or more (referenced to 20 µPa) with a

rated output of 4 kW or more at a test cell temperature exceeding 1,273 K (1,000°C), and specially designed quartz heaters therefor.

MT applies to entire entry

MT Column 1

AT applies to entire entry

AT Column 1

License Requirements

Reason for Control: NS, AT

Control(s) Country Chart

NS applies to entire entry NS Column 2

AT applies to entire entry AT Column 1

License Exceptions

LVS: \$3000
 GBS: Yes
 CIV: Yes

List of Items Controlled

Unit: Number
Related Controls: See also [9B106](#). Note that some items in [9B006](#) may also be controlled under [9B106](#).
Related Definitions: N/A
Items:

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

9B007 Equipment specially designed for inspecting the integrity of rocket motors and using Non-Destructive Test (NDT) techniques other than planar x-ray or basic physical or chemical analysis.

License Requirements

Reason for Control: NS, MT, AT

Control(s) Country Chart

NS applies to entire entry NS Column 1

License Exceptions

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

List of Items Controlled

Unit: Number
Related Controls: N/A
Related Definitions: N/A
Items:

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

9B008 Direct measurement wall skin friction transducers specially designed to operate at a test flow total (stagnation) temperature exceeding 833 K (560°C).

Reason for Control: NS, AT

Control(s) Country Chart

NS applies to entire entry NS Column 2

AT applies to entire entry AT Column 1

License Exceptions

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

List of Items Controlled

Unit: Number
Related Controls: N/A
Related Definitions: N/A
Items:

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

Control(s)

Country Chart

NS applies to entire entry

NS Column 1

AT applies to entire entry

AT Column 1

9B009 Tooling specially designed for producing turbine engine powder metallurgy rotor components capable of operating at stress levels of 60% of Ultimate Tensile Strength (UTS) or more and metal temperatures of 873 K (600°C) or more.

License Exceptions

LVS: N/A

GBS: N/A

CIV: N/A

License Requirements

Reason for Control: NS, AT

Control(s)

Country Chart

NS applies to entire entry

NS Column 2

AT applies to entire entry

AT Column 1

License Exceptions

LVS: \$5000

GBS: N/A

CIV: N/A

List of Items Controlled

Unit: Number

Related Controls: N/A

Related Definitions: N/A

Items:

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

List of Items Controlled

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

Related Controls: N/A

Related Definitions: N/A

Items:

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

9B105 Wind tunnels for speeds of Mach 0.9 or more, usable for rockets, missiles, or unmanned aerial vehicles capable of achieving a “range” equal to or greater than 300 km and their subsystems.

License Requirements

Reason for Control: MT, AT

Control(s)

Country Chart

MT applies to entire entry

MT Column 1

AT applies to entire entry

AT Column 1

9B010 Equipment specially designed for the production of “UAVs” and associated systems, equipment and components, controlled by 9A012.

License Exceptions

LVS: N/A

GBS: N/A

CIV: N/A

License Requirements

Reason for Control: NS, AT

List of Items Controlled

Unit: \$ value

Related Controls: See also [9B005](#)

Related Definitions: N/A

Items:

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

9B106 Environmental chambers usable for rockets, missiles, or unmanned aerial vehicles capable of achieving a “range” equal to or greater than 300 km and their subsystems, as follows (see List of Items Controlled).

License Requirements

Reason for Control: MT, AT

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

License Exceptions

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

List of Items Controlled

Unit: \$ value

Related Controls: N/A

Related Definitions: N/A

Items:

a. Environmental chambers capable of simulating all of the following flight conditions:

a.1. Having any of the following:

a.1.a. Altitude equal to or greater than 15,000 m; or

a.1.b. Temperature range of at least -50° C to +125° C; and

a.2. Incorporating, or designed or modified to incorporate, a shaker unit or other vibration test equipment to produce vibration environments equal to or greater than 10 g rms, measured ‘bare table’, between 20 Hz and 2 kHz imparting forces equal to or greater than 5 kN;

Technical Notes:

1. Item 9B106.a.2 describes systems that are capable of generating a vibration environment with a single wave (e.g., a sine wave) and systems capable of generating a broad band random vibration (i.e., power spectrum).

2. The term ‘bare table’ means a flat table, or surface, with no fixture or fittings.

3. In Item 9B106.a.2, designed or modified means the environmental chamber provides appropriate interfaces (e.g., sealing devices) to incorporate a shaker unit or other vibration test equipment as specified in this Item.

b. Environmental chambers capable of simulating all of the following flight conditions:

b.1. Acoustic environments at an overall sound pressure level of 140 dB or greater (referenced to 2×10^{-5} N/m²) or with a total rated acoustic power output of 4kW or greater; and

b.2. Any of the following:

b.2.a. Altitude equal to or greater than 15,000 m; or

b.2.b. Temperature range of at least -50° C to +125° C.

9B115 Specially designed “production equipment” for the systems, sub-systems and components controlled by 9A004 to 9A009,

9A011, 9A101, 9A104 to 9A109, 9A111, 9A116 to 9A119.

Reason for Control: MT, AT

Control(s) *Country Chart*

License Requirements

Reason for Control: MT, AT

MT applies to entire entry MT Column 1

Control(s) *Country Chart*

AT applies to entire entry AT Column 1

MT applies to entire entry MT Column 1

License Exceptions

AT applies to entire entry AT Column 1

LVS: N/A

GBS: N/A

CIV: N/A

License Exceptions

LVS: N/A

GBS: N/A

CIV: N/A

List of Items Controlled

List of Items Controlled

Unit: Equipment in number; components in \$ value

Unit: Equipment in number; components in \$ value

Related Controls: Although items described in ECCNs [9A004](#) to [9A009](#), [9A011](#), [9A101](#), [9A104](#) to [9A109](#); [9A111](#), [9A116](#) to [9A119](#) are subject to the export licensing authority of the Department of State, Directorate of Defense Trade Controls (22 CFR part 121), the “production equipment” controlled in this entry that is related to these items is subject to the export licensing authority of BIS.

Related Controls: Although items described in ECCNs [9A004](#) to [9A009](#), [9A011](#), [9A101](#), [9A104](#) to [9A109](#); [9A111](#), [9A116](#) to [9A119](#) are subject to the export licensing authority of the Department of State, Directorate of Defense Trade Controls (22 CFR part 121), the “production equipment” controlled in this entry that is related to these items is subject to the export licensing authority of BIS.

Related Definitions: NA.

Related Definitions: NA

Items:

Items:

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

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

9B116 Specially designed “production facilities” for the systems, sub-systems, and components controlled by 9A004 to 9A009, 9A011, 9A012, 9A101, 9A104 to 9A109, 9A111, 9A116 to 9A119.

9B117 Test benches and test stands for solid or liquid propellant rockets, motors or rocket engines, having either of the following characteristics (see List of Items Controlled).

License Requirements

License Requirements

Reason for Control: MT, AT

Control(s) *Country Chart*

MT applies to entire entry MT Column 1

AT applies to entire entry AT Column 1

License Exceptions

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

List of Items Controlled

Unit: \$ value
Related Controls: See also [9B990](#)
Related Definitions: N/A
Items:

- a. The capacity to handle solid or liquid propellant rocket motors or rocket engines having a thrust greater than 68 kN; *or*
- b. Capable of simultaneously measuring the three axial thrust components.

9B990 Vibration test equipment and specially designed parts and components, n.e.s.

License Requirements

Reason for Control: AT

Control(s) Country Chart

AT applies to entire entry AT Column 1

License Exceptions

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

List of Items Controlled

Unit: \$ value
Related Controls: N/A
Related Definitions: N/A
Items:

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

9B991 Specially designed equipment, tooling or fixtures, not controlled by 9B001, as described in the List of Items Controlled, for manufacturing or measuring gas turbine blades, vanes or tip shroud castings.

License Requirements

Reason for Control: AT

Control(s) Country Chart

AT applies to entire entry AT Column 1

License Exceptions

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

List of Items Controlled

Unit: \$ value
Related Controls: N/A
Related Definitions: N/A
Items:

- a. Automated equipment using non-mechanical methods for measuring airfoil wall thickness;
- b. Tooling, fixtures or measuring equipment for the “laser”, water jet or ECM/EDM hole drilling processes controlled by 9E003.c;
- c. Ceramic core leaching equipment;
- d. Ceramic core manufacturing equipment or tools;
- e. Ceramic shell wax pattern preparation equipment;

f. Ceramic shell burn out or firing equipment.

C. MATERIALS

9C110 Resin impregnated fiber prepregs and metal coated fiber preforms therefor, for composite structures, laminates and manufactures specified in 9A110, made either with organic matrix or metal matrix utilizing fibrous or filamentary reinforcements having a “specific tensile strength” greater than 7.62×10^4 m and a “specific modulus” greater than 3.18×10^6 m.

License Requirements

Reason for Control: MT, AT

Control(s) *Country Chart*

MT applies to entire entry MT Column 1

AT applies to entire entry AT Column 1

License Exceptions

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

List of Items Controlled

Unit: Kilograms

Related Controls: 1.) See also 1C010 and 1C210.c. 2.) The only resin impregnated fiber prepregs controlled by entry [9C110](#) are those using resins with a glass transition temperature (T_g), after cure, exceeding 418 K (145 °C) as determined by ASTM D4065 or national equivalents.

Related Definitions: N/A

Items:

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

D. SOFTWARE

9D001 “Software” specially designed or modified for the “development” of equipment or “technology”, controlled by 9A (except 9A018, 9A990 or 9A991), 9B (except 9B990 or 9B991) or 9E003.

License Requirements

Reason for Control: NS, MT, AT

Control(s) *Country Chart*

NS applies to “software” for equipment controlled by 9A001 to 9A003, 9A012, 9B001 to 9B010, and technology controlled By 9E003. NS Column 1

MT applies to “software” for equipment controlled by 9A106.a and .b, or 9B116 for MT reasons MT Column 1

AT applies to entire entry AT Column 1

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

License Exceptions

CIV: N/A
 TSR: N/A
 STA: License Exception STA may not be used to ship or transmit “software” specially designed or modified for the “development” of equipment or “technology”, specified by ECCNs 9B001.b. or 9E003.a.1, 9E003.a.2 to a.5, 9E003.a.8, or 9E003.h to any of the eight destinations listed in

§ 740.20(c)(2) of the EAR.

AT applies to entire entry AT Column 1

List of Items Controlled

Unit: \$ value

Related Controls: 1.) “Software” “required” for the “development” of items controlled by [9A004](#) is subject to the export licensing authority of the U.S. Department of State, Directorate of Defense Trade Controls. (See 22 CFR part 121.) 2.) “Software” “required” for the “development” of equipment or “technology” subject to the export licensing authority of the U.S. Department of State, Directorate of Defense Trade Controls is also subject to the same licensing jurisdiction. (See 22 CFR part 121.)

Related Definitions: N/A

Items:

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

9D002 “Software” specially designed or modified for the “production” of equipment controlled by 9A (except 9A018, 9A990, or 9A991) or 9B (except 9B990 or 9B991).

License Requirements

Reason for Control: NS, MT, AT

Control(s) *Country Chart*

NS applies to “software” for equipment controlled by 9A001 to 9A003, 9A012, 9B001 to 9B010, and technology controlled by 9E003. NS Column 1

MT applies to “software” for equipment controlled by 9B116 for MT reasons MT Column 1

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

License Exceptions

CIV: N/A

TSR: N/A

STA: License Exception STA may not be used to ship or transmit “software” specially designed or modified for the “production” of equipment specified by 9B001.b to any of the eight destinations listed in § 740.20(c)(2) of the EAR.

List of Items Controlled

Unit: \$ value

Related Controls: 1.) “Software” “required” for the “production” of items controlled by [9A004](#) is subject to the export licensing authority of the U.S. Department of State, Directorate of Defense Trade Controls. (See 22 CFR part 121.) 2.) “Software” “required” for the “production” of equipment or “technology” subject to the export licensing authority of the U.S. Department of State, Directorate of Defense Trade Controls is also subject to the same licensing jurisdiction. (See 22 CFR part 121.)

Related Definitions: N/A

Items:

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

9D003 “Software” incorporating “technology” specified by 9E003.h and used in “FADEC Systems” for propulsion systems controlled by 9A (except 9A018, 9A990 or 9A991) or equipment controlled by 9B (except 9B990 or 9B991).

License Requirements

Reason for Control: NS, MT, AT

Control(s) *Country Chart*

NS applies to “software” for “use” of “FADEC systems” for equipment controlled by 9A001 to 9A003 NS Column 1

MT applies to “software” required for the “use” of “FADEC systems” for gas turbine engines controlled by 9A101, or 9A106 MT Column 1

AT applies to entire entry AT Column 1

Reason for Control: NS, MT, AT

Control(s) *Country Chart*

NS applies to entire entry NS Column 1

MT applies to entire entry, except 9D004.g and .f MT Column 1

AT applies to entire entry AT Column 1

License Exceptions

CIV: Yes, except N/A for MT
 TSR: Yes, except N/A for MT

License Exceptions

CIV: N/A
 TSR: N/A
 STA: License Exception STA may not be used to ship or transmit software in 9D004.a and 9D004.c to any of the eight destinations listed in § 740.20(c)(2) of the EAR.

List of Items Controlled

Unit: \$ value
Related Controls: 1.) See also [9D103](#). 2.) “Software” “required” for the “use” of equipment or “technology” subject to the export licensing authority of the U.S. Department of State, Directorate of Defense Trade Controls is also subject to the same licensing jurisdiction. (See 22 CFR part 121.)
Related Definitions: N/A
Items:

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

9D004 Other “software” as follows (see List of Items Controlled).

License Requirements

List of Items Controlled

Unit: \$ value
Related Controls: N/A
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 engines, assemblies or components, specially designed to collect, reduce and analyze data in real time and capable of feedback control, including the dynamic adjustment of test articles or test conditions, as the test is in progress;
- c. “Software” specially designed to control directional solidification or single crystal casting;
- d. [RESERVED]
- e. “Software” specially designed or modified for the operation of “UAVs” and associated systems,

equipment and components, controlled 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.

9D018 “Software” for the “use” of equipment controlled by 9A018.

License Requirements

Reason for Control: NS, RS, AT, UN

<i>Control(s)</i>	<i>Country Chart</i>
NS applies to entire entry	NS Column 1
RS applies to 9A018.a and .b	RS Column 2
AT applies to entire entry	AT Column 1
UN applies to entire entry	See § 746.1(b) for UN controls.

License Exceptions

CIV: N/A
 TSR: Yes for Australia, Japan, New Zealand, and NATO countries that are also listed in Country Group B of Supplement No. 1 to part 740 of the EAR.

List of Items Controlled

Unit: \$ value
Related Controls: N/A
Related Definitions: N/A
Items:

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

9D101 “Software” specially designed or modified for the “use” of commodities controlled by 9B105, 9B106, 9B116, or 9B117.

License Requirements

Reason for Control: MT, AT

<i>Control(s)</i>	<i>Country Chart</i>
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

License Exceptions

CIV: N/A
 TSR: N/A

List of Items Controlled

Unit: \$ value
Related Controls: N/A
Related Definitions: N/A
Items:

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

9D103 “Software” specially designed for modelling, simulation or design integration of “missiles”, or the subsystems controlled by 9A005, 9A007, 9A105.a, 9A106, 9A108, 9A116 or 9A119. (This entry is subject to the export

licensing authority of the U.S. Department of State, Directorate of Defense Trade Controls. See 22 CFR part 121.)

9D104 “Software” specially designed and modified for the “use” of equipment controlled by 9A001, 9A005, 9A006.d, 9A006.g, 9A007.a, 9A008.d, 9A009.a, 9A010.d, 9A011, 9A012 (for MT controlled items only), 9A101, 9A105, 9A106.c and .d, 9A107, 9A108.c, 9A109, 9A111, 9A115.a, 9A116.d, 9A117, or 9A118.

License Requirements

Reason for Control: MT, AT

Control(s) *Country Chart*

MT applies to entire entry MT Column 1

AT applies to entire entry AT Column 1

License Exceptions

CIV: N/A
 TSR: N/A

List of Items Controlled

Unit: \$ value

Related Controls: “Software” for commodities controlled by [9A005](#) to [9A011](#), [9A105](#), [9A106.c](#), [9A107](#) to [9A109](#), [9A111](#), [9A115](#), [9A116](#), [9A117](#), and [9A118](#) are subject to the export licensing authority of the U.S. Department of State, Directorate of Defense Trade Controls (see 22 CFR part 121).

Related Definitions: N/A

Items:

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

9D105 “Software” that coordinates the function of more than one subsystem,

specially designed or modified for “use” in “missiles.” (These items are subject to the export licensing authority of the U.S. Department of State, Directorate of Defense Trade Controls. See 22 CFR part 121.)

9D990 “Software”, n.e.s., for the “development” or “production” of equipment controlled by 9A990 or 9B990.

License Requirements

Reason for Control: AT

Control(s) *Country Chart*

AT applies to “software” for equipment under 9A990 except 9A990.a AT Column 1

AT applies to “software” for equipment under 9A990.a only AT Column 2

License Exceptions

CIV: N/A
 TSR: N/A

List of Items Controlled

Unit: \$ value

Related Controls: N/A

Related Definitions: N/A

Items:

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

9D991 “Software”, for the “development” or “production” of equipment controlled by 9A991 or 9B991.

License Requirements

<i>Reason for Control:</i>	AT	<i>Control(s)</i>	<i>Country Chart</i>
<i>Control(s)</i>	<i>Country Chart</i>	NS applies to “technology” for items controlled by 9A001.b, 9A012, 9B001 to 9B010, 9D001 to 9D004 for NS reasons	NS Column 1
AT applies to entire entry	AT Column 1		

License Exceptions

CIV: N/A
TSR: N/A

MT applies to “technology” for items controlled by 9B001, 9B002, 9B003, 9B004, 9B005, 9B007, 9B105, 9B106, 9B116, 9B117, 9D001, 9D002, 9D003, and 9D004 for MT reasons

MT Column 1

List of Items Controlled

Unit: \$ value
Related Controls: N/A
Related Definitions: N/A
Items:

AT applies to entire entry AT Column 1

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

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

E. TECHNOLOGY

Note: “Development” or “production” “technology” controlled by 9E001 to 9E003 for gas turbine engines remains controlled when used for repair or overhaul. Excluded from 9E001 to 9E003 control are: technical data, drawings or documentation for maintenance activities directly associated with calibration, removal or replacement of damaged or unserviceable line replaceable units, including replacement of whole engines or engine modules.

9E001 “Technology” according to the General Technology Note for the “development” of equipment or “software”, controlled by 9A001.b, 9A004 to 9A012, 9B (except 9B990 or 9B991), or 9D (except 9D990 or 9D991).

License Requirements

Reason for Control: NS, MT, AT

License Exceptions

CIV: N/A
TSR: N/A
STA: License Exception STA may not be used to ship or transmit any technology in this entry to any of the eight destinations listed in § 740.20(c)(2) of the EAR.

List of Items Controlled

Unit: N/A
Related Controls: 1.) See also [9E101](#) and 1E002.f (for controls on “technology” for the repair of controlled structures, laminates or materials). 2.) The “technology” required for the “development” of equipment controlled by [9A004](#) is subject to the export licensing authority of the U.S. Department of State, Directorate of Defense Trade Controls. (See 22 CFR part 121.) 3.) “Technology”, required for the “development” of equipment or “software” subject to the export licensing authority of the U.S. Department of State,

Directorate of Defense Trade Controls, is also subject to the same licensing jurisdiction. (See 22 CFR part 121).

Related Definitions: N/A

Items:

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

9E002 “Technology” according to the General Technology Note for the “production” of equipment controlled by 9A001.b, 9A004 to 9A011 or 9B (except 9B990 or 9B991).

License Requirements

Reason for Control: NS, MT, AT

<i>Control(s)</i>	<i>Country Chart</i>
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NS applies to entire entry	NS Column 1
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MT applies to “technology” for equipment controlled by 9B001, 9B002, 9B003, 9B004, 9B005, 9B007, 9B105, 9B106, 9B116, and 9B117 for MT reasons	MT Column 1
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AT applies to entire entry	AT Column 1
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License Requirement Notes: See §743.1 of the EAR for reporting requirements for exports under License Exceptions.

License Exceptions

CIV: N/A

TSR: N/A

STA: License Exception STA may not be used to ship or transmit any technology in this entry to any of the eight destinations listed in § 740.20(c)(2) of the EAR.

List of Items Controlled

Unit: N/A

Related Controls: 1.) See also [9E102](#). 2.) See also 1E002.f for “technology” for the repair of controlled structures, laminates or materials. 3.) The “technology” required for the “development” of equipment controlled by [9A004](#) is subject to the export licensing authority of the U.S. Department of State, Directorate of Defense Trade Controls. (See 22 CFR part 121.) 4.) “Technology”, required for the “development” of equipment or “software” subject to the export licensing authority of the U.S. Department of State, Directorate of Defense Trade Controls, is also subject to the same licensing jurisdiction. (See 22 CFR part 121).

Related Definitions: N/A

Items:

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

9E003 Other “technology” as follows (see List of Items Controlled).

License Requirements

Reason for Control: NS, SI, AT

<i>Control(s)</i>	<i>Country Chart</i>
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NS applies to entire entry	NS Column 1
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SI applies to 9E003.a.1 through a.8,.h, .i, and .j. See §742.14 of the EAR for additional information.

AT applies to entire entry	AT Column 1
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License Requirement Notes: See §743.1 of the EAR for reporting requirements for exports under License Exceptions.

License Exceptions

CIV: N/A
 TSR: N/A
 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 eight destinations listed in § 740.20(c)(2) of the EAR.

List of Items Controlled

Unit: N/A

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 licensing authority of the U.S. Department of State. 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 Commerce in respect to a specific export, or in the case of use for broad categories of aircraft, engines, or components, a commodity jurisdiction determination from 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 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;

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 Note: ‘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. Components manufactured from any of the following:

a.3.a. Organic “composite” materials designed to operate above 588 K (315°C);

a.3.b. Metal “matrix” “composite”, ceramic “matrix”, intermetallic or intermetallic reinforced materials, controlled by 1C007; *or*

a.3.c. “Composite” material controlled by 1C010 and manufactured with resins controlled by 1C008;

a.4. Uncooled turbine blades, vanes,

“tip-shrouds” or other components, designed to operate at gas path total (stagnation) temperatures of 1,323 K (1,050°C) or more at sea-level static take-off (ISA) in a ‘steady state mode’ of engine operation;

a.5. Cooled turbine blades, vanes or “tip-shrouds”, other than those described in 9E003.a.1, exposed to gas path total (stagnation) temperatures of 1,643 K (1,370°C) or more at sea-level static take-off (ISA) in a ‘steady state mode’ of engine operation;

Technical Note: The term ‘steady state mode’ defines engine operation conditions, where the engine parameters, such as thrust/power, rpm and others, have no appreciable fluctuations, when the ambient air temperature and pressure at the engine inlet are constant.

a.6. Airfoil-to-disk blade combinations using solid state joining;

a.7. Gas turbine engine components using “diffusion bonding” “technology” controlled by 2E003.b;

a.8. ‘Damage tolerant’ gas turbine engine rotor components using powder metallurgy materials controlled by 1C002.b;or

Technical Note: ‘Damage tolerant’ 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. Hollow fan blades;

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 kW at flight speeds exceeding Mach 0.55;

c. “Technology” “required” for manufacturing cooling holes, in gas turbine engine 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", water jet, Electro-Chemical Machining (ECM) or Electrical Discharge Machining (EDM) methods.

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 center-line to the top plane of the valve cover (or cylinder head) plus twice the stroke; or

b. The diameter of the flywheel housing.

f. "Technology" "required" for the "production" of specially designed components for high output diesel engines, as follows:

f.1. "Technology" "required" for the "production" of engine systems having all of the following 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 components (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 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 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 the civil aviation certification authorities 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 components that maintain engine stability;

i.2. “Development” or “production” “technology” for 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 “development” or “production” “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” 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 and components of civil derivatives of military engines controlled on the U.S. Munitions List.

9E018 “Technology” for the “development”, “production”, or “use” of equipment controlled by 9A018.

License Requirements

Reason for Control: NS, RS, AT, UN

Control(s) Country Chart

NS applies to entire entry NS Column 1

RS applies to 9A018.a and .b RS Column 2

AT applies to entire entry AT Column 1

UN applies to entire entry See § 746.1(b) for UN controls.

License Exceptions

CIV: N/A

TSR: Yes for Australia, Japan, New Zealand, and NATO countries that are also listed in Country Group B of Supplement No. 1 to part 740 of the EAR.

List of Items Controlled

Unit: N/A

Related Controls: N/A

Related Definitions: N/A

Items:

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

9E101 “Technology” according to the General Technology Note for the “development”, “production”, or “use” of commodities or software controlled by 9A012, 9A101, 9A104 to 9A111, 9A115 to 9A119, 9C110, 9D101, 9D103, 9D104 or 9D105.

License Requirements

Reason for Control: MT, AT

Control(s) Country Chart

MT applies to entire entry MT Column 1

AT applies to entire entry AT Column 1

License Exceptions

CIV: N/A

TSR: N/A

List of Items Controlled

Unit: N/A

Related Controls: “Technology” controlled by [9E101](#) for items in [9A012](#), [9A101.b](#), [9A104](#), [9A105](#), to [9A109](#), [9A110](#) that are specially designed for use in missile systems and subsystems, [9A111](#), [9A115](#), [9A116](#) to [9A119](#), [9D103](#), and [9D105](#) are subject to the export licensing authority of the U.S. Department of State, Directorate of Defense Trade Controls (see 22 CFR part 121).

Related Definitions: N/A

Items:

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

9E102 “Technology” according to the General Technology Note for the “use” of space launch vehicles specified in 9A004, or commodities or software controlled by 9A005 to 9A012, 9A101, 9A104 to 9A111, 9A115 to 9A119, 9B105, 9B106, 9B115, 9B116, 9B117, 9D101, 9D103, 9D104 or 9D105.

License Requirements

Reason for Control: MT, AT

Control(s) *Country Chart*

MT applies to entire entry MT Column 1

AT applies to entire entry AT Column 1

License Exceptions

CIV: N/A

TSR: N/A

List of Items Controlled

Unit: N/A

Related Controls: 1.) For the purpose of this entry, “use” “technology” is limited to items controlled for MT and their subsystems. 2.) “Technology” controlled by [9E102](#) for commodities or software subject to the export licensing jurisdiction of the Department of State in [9A004](#) to [9A012](#), [9A101.b](#), [9A104](#), [9A105](#), [9A106.a](#) to [.c](#), [9A107](#) to [9A109](#), [9A110](#) that are specially designed for use in missile systems and subsystems, [9A111](#), [9A115](#) to [9A119](#), [9B115](#), [9B116](#), [9D103](#), specified software in [9D104](#), and [9D105](#) are subject to the export licensing authority of the U.S. Department of State, Directorate of Defense Trade Controls (see 22 CFR part 121).

Related Definitions: N/A

Items:

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

9E990 “Technology”, n.e.s., for the “development” or “production” or “use” of equipment controlled by 9A990 or 9B990.

License Requirements

Reason for Control: AT

Control(s) *Country Chart*

AT applies to “technology” for equipment under 9A990 and 9B990 except 9A990.a

AT applies to “technology” for equipment under 9A990.a only

License Exceptions

CIV: N/A

TSR: N/A

List of Items Controlled

Unit: \$ value

Related Controls: N/A

Related Definitions: N/A

Items:

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

9E991 “Technology”, for the “development”, “production” or “use” of equipment controlled by 9A991 or 9B991.

License Requirements

Reason for Control: AT

Control(s) *Country Chart*

AT applies to entire entry AT Column 1

License Exceptions

CIV: N/A
TSR: N/A

List of Items Controlled

Unit: \$ value
Related Controls: N/A
Related Definitions: N/A
Items:

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

9E993 Other “technology”, not described by 9E003, as follows (see List of Items Controlled).

License Requirements

Reason for Control: AT

Control(s) *Country Chart*

AT applies to entire entry AT Column 1

License Exceptions

CIV: N/A
TSR: N/A

List of Items Controlled

Unit: \$ value
Related Controls: N/A
Related Definitions: N/A
Items:

- a. Rotor blade tip clearance control systems employing active compensating casing “technology” limited to a design and development data base; *or*
- b. Gas bearing for turbine engine rotor assemblies.

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