

CATEGORY 9 - AEROSPACE AND PROPULSION

A. “END ITEMS,” “EQUIPMENT,” “ACCESSORIES,” “ATTACHMENTS,” “PARTS,” “COMPONENTS,” AND “SYSTEMS”

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 (See Supp. No. 1 to part 738)</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

List Based License Exceptions (See Part 740 for a description of all license exceptions)

LVS: N/A
GBS: N/A

List of Items Controlled

Related Controls: 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;

Note 1: 9A001 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 Wassenaar Arrangement 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).

Note 2: 9A001 does not apply to aero gas turbine engines designed for Auxiliary Power Units (APUs) approved by the civil aviation authority in a Wassenaar Arrangement Participating State (see Supplement No. 1 to part 743 of the EAR).

b. [Reserved]

9A002 ‘Marine gas turbine engines’ designed to use liquid fuel and having all of the following (see List of Items Controlled), and “specially designed” assemblies and “components” therefor.

License Requirements

Reason for Control: NS, AT

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

List Based License Exceptions (See Part 740 for

a description of all license exceptions)

LVS: \$5000
GBS: N/A

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

List of Items Controlled:

Related Controls: N/A
Related Definition: N/A
Items:

a. Maximum continuous power when operating in “steady state mode” at standard reference conditions specified by ISO 3977-2:1997 (or national equivalent) of 24,245 kW or more; and

b. ‘Corrected specific fuel consumption’ not exceeding 0.219 kg/kWh at 35% of the maximum continuous power when using liquid fuel.

Note: 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.

Technical Note: For the purposes of 9A002, ‘corrected specific fuel consumption’ is the specific fuel consumption of the engine corrected to a marine distillate liquid fuel having a net specific energy (i.e., net heating value) of 42 MJ/kg (ISO 3977-2:1997).

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

License Requirements

Reason for Control: NS, AT

Control(s)	Country Chart
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List Based License Exceptions (See Part 740 for a description of all license exceptions)

LVS: \$5000
GBS: N/A

List of Items Controlled

Related Controls: N/A
Related Definition: N/A
Items:

- a. Controlled by 9A001; or
- b. Whose design or production origins are either not from a Wassenaar Participating State (see Supplement No. 1 to part 743 of the EAR) or unknown to the manufacturer.

9A004 Space launch vehicles and “spacecraft,” “spacecraft buses”, “spacecraft payloads”, “spacecraft” on-board systems or equipment, terrestrial equipment, and air-launch platforms, and “sub-orbital craft”, as follows (see List of Items Controlled).

License Requirements

Reason for Control: NS, AT

Control(s)	Country Chart (See Supp. No. 1 to part 738)
NS applies to 9A004.g, .u, .v, .w and .x	NS Column 1
AT applies to 9A004.g, .u, .v, .w, .x and .y	AT Column 1

License Requirement Note: 9A004.b

through .f, and .h are controlled under ECCN 9A515.

List Based License Exceptions (See Part 740 for a description of all license exceptions)

LVS: N/A

GBS: N/A

List of Items Controlled

Related Controls: (1) See also 9A104, 9A515, and 9B515. (2) See ECCNs 9E001 (“development”) and 9E002 (“production”) for technology for items controlled by this entry. (3) See USML Categories IV for the space launch vehicles and XV for other spacecraft that are “subject to the ITAR” (see 22 CFR parts 120 through 130).

Related Definition: N/A

Items:

- a. Space launch vehicles;
- b. “Spacecraft”;
- c. “Spacecraft buses”;
- d. “Spacecraft payloads” incorporating items specified by 3A001.b.1.a.4 or z (if also described in 3A001.b.1.a.4), 3A002.g, 5A001.a.1, 5A001.b.3, 5A002.c, z.3 or z.8, 5A002.e, z.5, 6A002.a.1, 6A002.a.2, 6A002.b, 6A002.d, 6A003.b, 6A004.c, 6A004.e, 6A008.d, 6A008.e, 6A008.k, 6A008.l or 9A010.c;
- e. On-board systems or equipment, specially designed for “spacecraft” and having any of the following functions:
 - e.1. ‘Command and telemetry data handling’;

Note: For the purpose of 9A004.e.1, ‘command and telemetry data handling’ includes bus data management, storage, and processing.

- e.2. ‘Payload data handling’; or

Note: For the purpose of 9A004.e.2, ‘payload data handling’ includes payload data management, storage, and processing.

- e.3. ‘Attitude and orbit control’;

Note: For the purpose of 9A004.e.3, ‘attitude and orbit control’ includes sensing and actuation to determine and control the position and orientation of a “spacecraft”.

N.B.: Equipment specially designed for military use is “subject to the ITAR”. See 22 CFR parts 120 through 130.

- f. Terrestrial equipment specially designed for “spacecraft”, as follows:

- f.1. Telemetry and telecommand equipment “specially designed” for any of the following data processing functions:

- f.1.a. Telemetry data processing of frame synchronization and error corrections, for monitoring of operational status (also known as health and safe status) of the “spacecraft bus”; or

- f.1.b. Command data processing for formatting command data being sent to the “spacecraft” to control the “spacecraft bus”;

- f.2. Simulators “specially designed” for ‘verification of operational procedures’ of “spacecraft”.

Technical Note: For the purposes of 9A004.f.2, ‘verification of operational procedures’ is any of the following:

1. Command sequence confirmation;
2. Operational training;
3. Operational rehearsals; or
4. Operational analysis.

g. “Aircraft” “specially designed” or modified to be air-launch platforms for space launch vehicles or “sub-orbital craft”.

h. “Sub-orbital craft”.

i. through t. [RESERVED]

u. The James Webb Space Telescope (JWST) being developed, launched, and operated under the supervision of the U.S. National Aeronautics and Space Administration (NASA).

v. “Parts,” “components,” “accessories” and “attachments” that are “specially designed” for the James Webb Space Telescope and that are *not*:

v.1. Enumerated or controlled in the USML;

v.2. Microelectronic circuits;

v.3. Described in ECCN 7A004 or 7A104; *or*

v.4. Described in an ECCN containing “space-qualified” as a control criterion (*See* ECCN 9A515.x.4).

w. The International Space Station being developed, launched, and operated under the supervision of the U.S. National Aeronautics and Space Administration.

x. “Parts,” “components,” “accessories” and “attachments” that are “specially designed” for the International Space Station.

y. Items that would otherwise be within the scope of ECCN 9A004.v or .x but that have been identified in an interagency-cleared commodity classification (CCATS) pursuant to § 748.3(e) as warranting control in 9A004.y.

9A005 Liquid rocket propulsion systems containing any of the systems or “components,” controlled by 9A006. (These

items are “subject to the ITAR.” See 22 CFR parts 120 through 130.)

9A006 Systems, “components,” “specially designed” for liquid rocket propulsion systems. (These items are “subject to the ITAR.” See 22 CFR parts 120 through 130.)

9A007 Solid rocket propulsion systems. (These items are “subject to the ITAR.” See 22 CFR parts 120 through 130.)

9A008 “Components” “specially designed” for solid rocket propulsion systems. (These items are “subject to the ITAR.” See 22 CFR parts 120 through 130.)

9A009 Hybrid rocket propulsion systems. (These items are “subject to the ITAR.” See 22 CFR parts 120 through 130.)

9A010 “Specially Designed” “Parts”, “Components”, Systems and Structures, for Launch Vehicles, Launch Vehicle Propulsion Systems or “Spacecraft”. (See Related Controls paragraph.)

List of Items Controlled

Related Controls: (1) See USML Category IV of the International Traffic in Arms Regulations (ITAR) (22 CFR parts 120 through 130) and ECCN [9A604](#) for paragraphs 9A010.a, .b and .d. (2) See USML Category XV of the ITAR and ECCN [9A515](#) for paragraph 9A010.c. (3) See Supplement No. 4 to part 774, Order of Review for guidance on the process for determining classification of items.

Related Definitions: N/A

Items:

a. “Parts”, “components” and structures, each exceeding 10 kg and “specially designed” for launch vehicles manufactured using any of the following:

a.1. “Composite” materials consisting of “fibrous or filamentary materials” specified by 1C010.e and resins specified by 1C008 or 1C009.b;

a.2. Metal “matrix” “composites” reinforced by any of the following:

a.2.a. Materials specified by 1C007;

a.2.b. “Fibrous or filamentary materials” specified by 1C010; *or*

a.2.c. Aluminides specified by 1C002.a; *or*

a.3. Ceramic “matrix” “composite” materials specified by 1C007;

Note: The weight cut-off is not relevant for nose cones.

b. “Parts”, “components” and structures, “specially designed” for launch vehicle propulsion systems specified by 9A005 to 9A009, manufactured using any of the following:

b.1. “Fibrous or filamentary materials” specified by 1C010.e and resins specified by 1C008 or 1C009.b;

b.2. Metal “Matrix” “composites” reinforced by any of the following:

b.2.a. Materials specified by 1C007;

b.2.b. “Fibrous or filamentary materials” specified by 1C010; *or*

b.2.c. Aluminides specified by 1C002.a; *or*

b.3. Ceramic “matrix” “composite” materials

specified by 1C007;

c. Structural components and isolation systems, specially designed to control actively the dynamic response or distortion of “spacecraft” structures;

d. Pulsed liquid rocket engines with thrust-to-weight ratios equal to or more than 1 kN/kg and a ‘response time’ of less than 30 ms.

Technical Note: For the purposes of 9A010.d, ‘response time’ means the time required to achieve 90% of total rated thrust from start-up.

9A011 Ramjet, scramjet or ‘combined cycle engines’, and “specially designed” “parts” and “components” therefor. (These items are “subject to the ITAR.” See 22 CFR parts 120 through 130.)

Technical Note: For the purposes of 9A011, ‘combined cycle engines’ combine two or more of the following types of engines:

- Gas turbine engine (turbojet, turboprop and turbofan);

- Ramjet or scramjet;

- Rocket motor or engine (liquid/gel/solid-propellant and hybrid).

9A012 Non-military “Unmanned Aerial Vehicles,” (“UAVs”), unmanned “airships”, related 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 (See Supp. No. 1 to part 738)</i>
NS applies to entire entry	NS Column 1

MT applies to non-military Unmanned Aerial Vehicles (UAVs) and Remotely Piloted Vehicles (RPVs) that are capable of a maximum range of at least 300 kilometers (km), regardless of payload, and UAVs that meet the requirements of 9A120	MT Column 1
AT applies to entire entry	AT Column 1

1. For the purposes of 9A012.a, ‘operator’ is a person who initiates or commands the “UAV” or unmanned “airship” flight.

2. For the purposes of 9A012.a, ‘endurance’ is to be calculated for ISA conditions (ISO 2533:1975) at sea level in zero wind.

3. For the purposes of 9A012.a, ‘natural vision’ means unaided human sight, with or without corrective lenses.

List Based License Exceptions (See Part 740 for a description of all license exceptions)

LVS: N/A
 GBS: N/A

b. Related equipment and “components”, as follows:

- b.1 [Reserved]
- b.2. [Reserved]

List of Items Controlled

Related Controls: 1) See the U.S. Munitions List Category VIII (22 CFR Part 121). 2) Also see ECCN [9A610](#) and § 744.3 of the EAR. 3) For “UAVs” that are “sub-orbital craft,” see ECCNs [9A004.h](#) and [9A515.a](#).

Related Definitions: N/A

Items:

a. “UAVs” or unmanned “airships”, designed to have controlled flight out of the direct ‘natural vision’ of the ‘operator’ and having any of the following:

- a.1. Having all of the following:
 - a.1.a. A maximum ‘endurance’ greater than or equal to 30 minutes but less than 1 hour; and
 - a.1.b. Designed to take-off and have stable controlled flight in wind gusts equal to or exceeding 46.3 km/h (25 knots); *or*

a.2. A maximum ‘endurance’ of 1 hour or greater;

Technical Notes:

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 15,240 meters (50,000 feet).

9A018 Equipment on the Wassenaar Arrangement Munitions List.

(a) See ECCN 9A610 for the aircraft, refuelers, ground equipment, parachutes, harnesses, and instrument flight trainers, as well as “parts”, “accessories,” and “attachments” for the forgoing that, immediately prior to October 15, 2013, were classified under 9A018.a.1, .a.3, .c, .d, .e, or .f.

(b) See ECCN 9A619 for military trainer aircraft turbo prop engines and “parts” and “components” therefor that, immediately prior to October 15, 2013, were classified under ECCN 9A018.a.2 or .a.3.

(c) See ECCN 0A606.b for certain armored ground transport vehicles that prior to January 6, 2014 were classified under ECCN 9A018.b.

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

License Requirements

Reason for Control: MT, AT

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

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

LVS: N/A

GBS: N/A

List of Items Controlled

Related Controls: 9A101.b controls only engines for non-military unmanned aerial 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 ITAR” (see 22 CFR parts 120 through 130).

Related Definitions: N/A

Items:

a. Engines having all 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);

a.2. Specific fuel consumption of 0.15 kg N⁻¹ h⁻¹ or less;

a.3. 'Dry weight' less than 750 kg; *and*

a.4. 'First –stage rotor diameter' less than 1 m; *or*

Technical Notes:

1. 'Maximum thrust value' in 9A101.a.1 is the manufacturer's demonstrated maximum thrust for the engine type un-installed at sea level static conditions using the ICAO standard atmosphere. The civil type certified thrust value will be equal to or less than the manufacturer's demonstrated maximum thrust for the engine type.

2. Specific fuel consumption is determined at maximum continuous thrust for engine type un-installed at sea level static conditions using the ICAO standard atmosphere.

3. 'Dry weight' is the weight of the engine without fluids (fuel, hydraulic fluid, oil, etc.) and does not include the nacelle (housing).

4. 'First-stage rotor diameter' is the diameter of the first rotating stage of the engine, whether a fan or compressor, measured at the leading edge of the blade tips.

b. Engines designed or modified for use in “missiles” or UAVs with a range equal to or greater than 300 km, regardless of thrust, specific fuel consumption, 'dry weight' or 'first-stage rotor diameter'.

9A102 ‘Turboprop engine systems’ “specially designed” for items controlled in 9A012 for MT reasons, and “specially designed” “parts” and “components” therefor, having a maximum power greater than 10 kW (achieved uninstalled at sea level static conditions using the ICAO standard

atmosphere), excluding civil certified engines. 130.)

License Requirements

Reason for Control: MT, AT

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

List Based License Exceptions (See Part 740 for a description of all license exceptions)

LVS: N/A
GBS: N/A

List of Items Controlled

Related Controls: See also 9A001 and 9A101.
Related Definitions: N/A
Items:

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

Technical Note to 9A102: *For the purposes of 9A102 a ‘turboprop engine system’ incorporates all of the following:*

- a. *Turboshaft engine; and*
- b. *Power transmission system to transfer the power to a propeller.*

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 ITAR.” See 22 CFR parts 120 through 130.)

9A104 Sounding rockets, capable of a range of at least 300 km. (These items are “subject to the ITAR.” See 22 CFR parts 120 through

9A105 Liquid propellant rocket engines. (These items are “subject to the ITAR.” See 22 CFR parts 120 through 130.)

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

License Requirements

Reason for Control: MT, AT

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

List Based License Exceptions (See Part 740 for a description of all license exceptions)

LVS: N/A
GBS: N/A

List of Items Controlled

Related Controls: Items described in [9A106.a](#), [b](#), and [c](#) are “subject to the ITAR” (see 22 CFR parts 120 through 130).

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, slurry and gel propellant (including oxidizers) control systems, and “specially designed” “parts” and “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, pumps and gas turbines 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 at the maximum operating mode or with discharge pressures equal to or greater than 7 Mpa; or

c. Gas turbines, for liquid propellant turbopumps, with shaft speeds equal to or greater than 8,000 rpm at the maximum operating mode.

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 ITAR.” See 22 CFR parts 120 through 130.)

9A108 Solid rocket propulsion “parts” and “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 ITAR.” See 22 CFR parts 120 through 130.)

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” “parts” and “components” therefor. (These items are “subject to the ITAR.” See 22 CFR parts 120 through 130.)

9A110 Composite structures, laminates and manufactures thereof “specially designed” for 9A012 items that are controlled for MT reasons.

License Requirements

Reason for Control: MT, AT

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

List Based License Exceptions (See Part 740 for a description of all license exceptions)

LVS: N/A
 GBS: N/A

List of Items Controlled

Related Controls: See also 1A002.

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” “parts” and “components” therefor. (These items are “subject to the ITAR.” See 22 CFR parts 120 through 130.)

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.

License Requirements

Reason for Control: MT, AT

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

List Based License Exceptions (See Part 740 for a description of all license exceptions)

LVS: N/A

GBS: N/A

List of Items Controlled

Related Controls: See the U.S. Munitions List (22 CFR part 121). Also see ECCN 9A610.u.

Related Definitions: N/A

Items:

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

9A116 Reentry vehicles, usable in “missiles”, and equipment designed or modified therefor. (These items are “subject to the ITAR.” See 22 CFR parts 120 through 130.)

9A117 Staging mechanisms, separation mechanisms, and interstages therefor, usable in “missiles”. (These items are “subject to the ITAR.” See 22 CFR parts 120 through 130.)

9A118 Devices to regulate combustion usable in engines which are usable in rockets, missiles, and unmanned aerial vehicles capable of achieving a “range” equal to or greater than 300 km, controlled by 9A011 or 9A111. (These items are “subject to the ITAR.” See 22 CFR parts 120 through 130.)

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 ITAR.” See 22 CFR parts 120 through 130.)

9A120 Complete unmanned aerial vehicles, not specified in 9A012, having all of the following characteristics (see List of Items Controlled.)

License Requirements

Reason for Control: MT, AT

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
MT applies to entire entry	MT Column 1

AT applies to entire entry	AT Column 1
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List Based License Exceptions (See Part 740 for a description of all license exceptions)

LVS: N/A
 GBS: N/A

List of Items Controlled

Related Controls: See ECCN [9A012](#) or the U.S. Munitions List Category VIII (22 CFR part 121). Also see ECCN 2B352.i for controls on certain spraying or fogging systems, and “parts” 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.

9A515 “Spacecraft” and related commodities, as follows (see List of Items Controlled).

License Requirements

Reason for Control: NS, RS, MT, AT

Control(s)	Country Chart (See Supp. No. 1 to part 738)
NS applies to entire entry, except .e and .y.	NS Column 1
RS applies to entire entry, except .e and .y.	RS Column 1
RS applies to 9A515.e.	RS Column 2
RS applies to 9A515.y, except to Russia for use in, with, or for the International Space Station (ISS), including launch to the ISS.	China, Russia or Venezuela (see § 742.6(a)(7)).
MT applies to microcircuits in 9A515.d and 9A515.e.2 when “usable in” “missiles” for protecting “missiles” against nuclear effects (e.g., Electromagnetic Pulse (EMP), X-rays, combined blast and thermal effects). MT	MT Column 1

also applies to 9A515.h when the total impulse capacity is equal to or greater than 8.41×10^5 newton seconds.	
AT applies to entire entry	AT Column 1

License Requirement Note: *The Commerce Country Chart is not used for determining license requirements for commodities classified in ECCN 9A515.a.1, .a.2, .a.3, .a.4, and .g. See § 742.6(a)(9), which specifies that such commodities are subject to a worldwide license requirement.*

List Based License Exceptions (See Part 740 for a description of all license exceptions)

LVS: \$1500
 GBS: N/A

Special Conditions for STA

STA: (1) Paragraph (c)(1) of License Exception STA (§ 740.20(c)(1) of the EAR) may not be used for “spacecraft” in ECCNs 9A515.a.1, .a.2, .a.3, or .a.4, “sub-orbital craft,” or items in 9A515.g, unless determined by BIS to be eligible for License Exception STA in accordance with § 740.20(g) (License Exception STA eligibility requests for certain 9x515 and “600 series” items). (2) License Exception STA may not be used if the “spacecraft” controlled in ECCN 9A515.a.1, .a.2, .a.3, or .a.4 contains a separable or removable propulsion system enumerated in USML Category IV(d)(2) or USML Category XV(e)(12) and designated MT. (3) Paragraph (c)(2) of License Exception STA (§ 740.20(c)(2) of the EAR) may not be used for any item in 9A515.

List of Items Controlled

Related Controls: Spacecraft, launch vehicles and related articles that are enumerated in the USML, and technical data (including “software”) directly related thereto, and all services (including training) directly related to the integration of any satellite or spacecraft to a launch vehicle, including both planning and onsite support, or furnishing any assistance (including training) in the launch failure analysis or investigation for items in ECCN 9A515.a, are “subject to the ITAR.” All other “spacecraft,” as enumerated below and defined in § 772.1, are subject to the controls of this ECCN. See also ECCNs 3A001, 3A002, 3A991, 3A992, 6A002, 6A004, 6A008, and 6A998 for specific “space-qualified” items, 7A004 and 7A104 for star trackers, and 9A004 for the International Space Station (ISS), the James Webb Space Telescope (JWST), and “specially designed” “parts” and “components” therefor. See USML Category XI(c) for controls on certain “Monolithic Microwave Integrated Circuit” (“MMIC”) amplifiers. See ECCN 9A610.g for pressure suits used for high altitude aircraft.

Related Definitions: ‘Microcircuit’ means a device in which a number of passive or active elements are considered as indivisibly associated on or within a continuous structure to perform the function of a circuit.

Items:

“Spacecraft” and other items described in ECCN 9A515 remain subject to the EAR even if exported, reexported, or transferred (in-country) with defense articles “subject to the ITAR” integrated into and included therein as integral parts of the item. In all other cases, such defense articles are subject to the ITAR. For example, a 9A515.a “spacecraft” remains “subject to the

EAR” even when it is exported, reexported, or transferred (in-country) with a “hosted payload” described in USML Category XV(e)(17) incorporated therein. In all other cases, a “hosted payload” performing a function described in USML Category XV(a) always remains a USML item. The removal of the defense article subject to the ITAR from the spacecraft is a retransfer under the ITAR and would require an ITAR authorization, regardless of the CCL authorization the spacecraft is exported under. Additionally, transfer of technical data regarding the defense article subject to the ITAR integrated into the spacecraft would require an ITAR authorization.

a. “Spacecraft,” including satellites, and space vehicles and “sub-orbital craft,” whether designated developmental, experimental, research or scientific, not enumerated in USML Category XV or described in ECCN 9A004.u or .w, that:

a.1. Have electro-optical remote sensing capabilities and having a clear aperture greater than 0.35 meters, but less than or equal to 0.50 meters;

a.2. Have remote sensing capabilities beyond NIR (*i.e.*, SWIR, MWIR, or LWIR);

a.3. Have radar remote sensing capabilities (*e.g.*, AESA, SAR, or ISAR) having a center frequency equal to or greater than 1.0 GHz, but less than 10.0 GHz and having a bandwidth equal to or greater than 100 MHz, but less than 300 MHz;

a.4. Provide space-based logistics, assembly, or servicing of another “spacecraft”; *or*

a.5. Are not described in ECCN 9A515.a.1, .a.2, .a.3 or .a.4.

Note: *ECCN 9A515.a includes commercial communications satellites, remote sensing satellites, planetary rovers, planetary and*

interplanetary probes, in-space habitats, and “sub-orbital craft,” not identified in ECCN 9A004 or USML Category XV(a).

b. Ground control systems and training simulators “specially designed” for telemetry, tracking, and control of the “spacecraft” controlled in paragraphs 9A004.u or 9A515.a.

c. [Reserved]

d. Microelectronic circuits (*e.g.*, integrated circuits, microcircuits, or MOSFETs) and discrete electronic components rated, certified, or otherwise specified or described as meeting or exceeding all the following characteristics and that are “specially designed” for defense articles, “600 series” items, or items controlled by ECCNs 9A004.v or 9A515:

d.1. A total dose of 5×10^5 Rads (Si) (5×10^3 Gy (Si));

d.2. A dose rate upset threshold of 5×10^8 Rads (Si)/sec (5×10^6 Gy (Si)/sec);

d.3. A neutron dose of 1×10^{14} n/cm² (1 MeV equivalent);

d.4. An uncorrected single event upset sensitivity of 1×10^{-10} errors/bit/day or less, for the CRÈME-MC geosynchronous orbit, Solar Minimum Environment for heavy ion flux; and

d.5. An uncorrected single event upset sensitivity of 1×10^{-3} errors/part or less for a fluence of 1×10^7 protons/cm² for proton energy greater than 50 MeV.

e. Microelectronic circuits (*e.g.*, integrated circuits, microcircuits, or MOSFETs) and discrete electronic components that are rated, certified, or otherwise specified or described as meeting or exceeding the characteristics in either paragraph e.1 or e.2, AND “specially designed” for defense articles controlled by USML Category XV or items controlled by ECCNs

9A004.u or 9A515:

e.1. A total dose $\geq 1 \times 10^5$ Rads (Si) (1×10^3 Gy(Si)) and $< 5 \times 10^5$ Rads (Si) (5×10^3 Gy(Si)); and a single event effect (SEE) (*i.e.*, single event latchup (SEL), single event burnout (SEB), or single event gate rupture (SEGR)) immunity to a linear energy transfer (LET) ≥ 80 MeV-cm²/mg; *or*

e.2. A total dose $\geq 5 \times 10^5$ Rads (Si) (5×10^3 Gy (Si)) and not described in 9A515.d.

Note 1 to 9A515.d and .e: Application specific integrated circuits (ASICs), integrated circuits developed and produced for a specific application or function, specifically designed or modified for defense articles and not in normal commercial use are controlled by Category XI(c) of the USML regardless of characteristics.

Note 2 to 9A515.d and .e: See 3A001.a and .z for controls on radiation-hardened microelectronic circuits “subject to the EAR” that are not controlled by 9A515.d or 9A515.e.

f. Pressure suits (*i.e.*, space suits) capable of operating at altitudes 55,000 feet above sea level.

g. Remote sensing components “specially designed” for “spacecraft” described in ECCNs 9A515.a.1 through 9A515.a.4 as follows:

g.1. Space-qualified optics (*i.e.*, lens, mirror, membrane having active properties (*e.g.*, adaptive, deformable)) with the largest lateral clear aperture dimension equal to or less than 0.35 meters; or with the largest clear aperture dimension greater than 0.35 meters but less than or equal to 0.50 meters;

g.2. Optical bench assemblies “specially designed” for ECCN 9A515.a.1, 9A515.a.2, 9A515.a.3, or 9A515.a.4 “spacecraft;” *or*

g.3. Primary, secondary, or hosted payloads that perform a function of ECCN 9A515.a.1, 9A515.a.2, 9A515.a.3, or 9A515.a.4 “spacecraft.”

h. Spacecraft thrusters using bi-propellants or mono-propellants that provide thrust equal to or less than 150 lbf (*i.e.*, 667.23 N) vacuum thrust.

i. through w. [RESERVED]

x. “Parts,” “components,” “accessories” and “attachments” that are “specially designed” for defense articles controlled by USML Category XV or items controlled by 9A515, and that are NOT:

x.1. Enumerated or controlled in the USML or elsewhere within ECCNs 9A515 or 9A004;

x.2. Microelectronic circuits and discrete electronic components;

x.3. Described in ECCNs 7A004 or 7A104;

x.4. Described in an ECCN containing “space-qualified” as a control criterion (*i.e.*, 3A001.b.1, 3A001.e.4 or .z, 3A002.g.1, 3A991.o, 3A992.b.3, 6A002.a.1, 6A002.b.2, 6A002.d.1, 6A004.c and .d, 6A008.j.1, 6A998.b, or 7A003.d.2);

x.5. Microwave solid state amplifiers and microwave assemblies (refer to ECCN 3A001.b.4 and .z for controls on these items);

x.6. Travelling wave tube amplifiers (refer to ECCN 3A001.b.8 and .z for controls on these items); *or*

x.7. Elsewhere specified in ECCN 9A515.y.

Note to 9A515.x: “Parts,” “components,” “accessories,” and “attachments” specified in USML subcategory XV(e) or enumerated in other USML categories are subject to the controls of that paragraph or category.

	controls
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y. Items that would otherwise be within the scope of ECCN 9A515.x but that have been identified in an interagency-cleared commodity classification (CCATS) pursuant to § 748.3(e) as warranting control in 9A515.y.

y.1. Discrete electronic components not specified in 9A515.e;

y.2. Space grade or for spacecraft applications thermistors;

y.3. Space grade or for spacecraft applications RF microwave bandpass ceramic filters (Dielectric Resonator Bandpass Filters);

y.4. Space grade or for spacecraft applications hall effect sensors;

y.5. Space grade or for spacecraft applications subminiature (SMA and SMP) plugs and connectors, TNC plugs and cable and connector assemblies with SMA plugs and connectors; *and*

y.6. Space grade or for spacecraft applications flight cable assemblies.

9A604 Commodities related to launch vehicles, missiles, and rockets (see List of Items Controlled).

License Requirements

Reason for Control: NS, RS, MT, AT, UN

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
NS applies to entire entry	NS Column 1
RS applies to entire entry	RS Column 1
MT applies to 9A604.a, .c, .d, and .f.	MT Column 1
AT applies to entire entry	AT Column 1
UN applies to entire entry	See § 746.1(b) for UN

List Based License Exceptions (See Part 740 for a description of all license exceptions)

LVS: N/A
GBS: N/A

Special Conditions for STA

STA: Paragraph (c)(2) of License Exception STA (§ 740.20(c)(2) of the EAR) may not be used for any item in this ECCN 9A604.

List of Items Controlled

Related Controls: (1) Launch vehicles, missiles, and rockets are subject to the ITAR (see 22 CFR § 121.1, USML Category IV). (2) See ECCN 0A919 for foreign-made “military commodities” that incorporate more than a *de minimis* amount of U.S.-origin “600 series” controlled content.

Related Definitions: N/A

Items:

a. Thermal batteries “specially designed” for systems controlled under USML Category IV capable of a range equal to or greater than 300 km.

b. Thermal batteries, except for thermal batteries controlled by 9A604.a, that are “specially designed” for systems controlled under USML Category IV.

c. “Components” “specially designed” for ramjet, scramjet, pulse jet, or combined cycle engines controlled under USML Category IV, including devices to regulate combustion in such commodities.

d. “Components” “specially designed” for hybrid rocket motors controlled under USML Category IV usable in rockets, missiles, or unmanned aerial

vehicles capable of a range equal to or greater than 300 km.

e. “Components” “specially designed” for pressure gain combustion-based propulsion systems controlled under USML Category IV.

f. Composite structures, laminates and manufactures thereof “specially designed” for the following items controlled under USML Category IV:

f.1. Systems capable of a range equal to or greater than 300 km;

f.2. Individual rocket stages usable in 9A604.f.1 systems;

f.3. Solid propellant rocket motors or hybrid rocket motors having a total impulse capacity equal to or greater than 8.41×10^5 Ns; or

f.4. Liquid propellant rocket engines integrated, or designed or modified to be integrated, into a liquid propellant propulsion system which has a total impulse capacity equal to or greater than 8.41×10^5 Ns.

f.5. Thrust vector control systems usable in rockets, space launch vehicles (SLVs), and missiles capable of delivering at least a 500 kg payload to a range of at least 300 km.

f.6. Re-entry vehicles or warhead heat shields usable in rockets, SLVs, and missiles capable of delivering at least a 500 kg payload to a range of at least 300 km.

f.7. Safing, arming, fuzing, and firing components usable in rockets, SLVs, and missiles capable of delivering at least a 500 kg payload to a range of at least 300 km.

g. through w. [Reserved]

x. “Parts,” “components,” “accessories,” and “attachments” that are “specially designed” for a

commodity subject to control in paragraphs .a through .d of this ECCN, or a defense article controlled under USML Category IV, and not specified elsewhere on the USML.

Note to 9A604.x: “Parts,” “components,” “accessories,” and “attachments” specified in USML Category IV(h) are subject to the controls of that paragraph.

9A610 Military aircraft and related commodities, other than those enumerated in 9A991.a (see List of Items Controlled).

License Requirements

Reason for Control: NS, RS, MT, AT, UN

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
NS applies to entire entry except: 9A610.b; parts and components controlled in 9A610.x if being exported or reexported for use in an aircraft controlled in 9A610.b; and 9A610.y.	NS Column 1
RS applies to entire entry except: 9A610.b; parts and components controlled in 9A610.x if being exported or reexported for use in an aircraft controlled in 9A610.b; and 9A610.y.	RS Column 1
RS applies to 9A610.y	China, Russia, or Venezuela (see §742.6(a)(7))
MT applies to 9A610.t, .u, .v, and .w	MT Column 1
AT applies to entire entry	AT Column 1
UN applies to entire entry except 9A610.y.	See § 746.1(b) for UN controls

List Based License Exceptions (See Part 740 for a description of all license exceptions)

LVS: \$1500

GBS: N/A

Special Conditions for STA

STA: (1) Paragraph (c)(1) of License Exception STA (§ 740.20(c)(1) of the EAR) may not be used for any item in 9A610.a (*i.e.*, “end item” military aircraft), unless determined by BIS to be eligible for License Exception STA in accordance with § 740.20(g) (License Exception STA eligibility requests for 9x515 and “600 series” items). (2) Paragraph (c)(2) of License Exception STA (§ 740.20(c)(2) of the EAR) may not be used for any item in 9A610.

List of Items Controlled

Related Controls: (1) Military aircraft and related articles that are enumerated in USML Category VIII, and technical data (including software) directly related thereto, are subject to the ITAR. (2) See ECCN 0A919 for controls on foreign-made “military commodities” that incorporate more than a *de minimis* amount of U.S.-origin “600 series” controlled content. (3) See USML Category XIX and ECCN [9A619](#) for controls on military aircraft gas turbine engines and related items.

Related Definitions: In paragraph .y of this entry, the term ‘fluid’ includes liquids and gases.

Items:

a. ‘Military Aircraft’ “specially designed” for a military use that are not enumerated in USML paragraph VIII(a).

Note 1: For purposes of paragraph .a the term

‘military aircraft’ means the LM-100J aircraft and any aircraft “specially designed” for a military use that are not enumerated in USML paragraph VIII(a). The term includes: Trainer aircraft; cargo aircraft; utility fixed wing aircraft; military helicopters; observation aircraft; military non-expansive balloons and other lighter-than-air aircraft; and unarmed military aircraft, regardless of origin or designation. Aircraft with modifications made to incorporate safety of flight features or other FAA or NTSB modifications such as transponders and air data recorders are “unmodified” for the purposes of this paragraph .a.

Note 2: 9A610.a does not control ‘military aircraft’ or “lighter-than-air vehicles” that:

a. Were first manufactured before 1946;

b. Do not incorporate defense articles enumerated or otherwise described on the U.S. Munitions List, unless the items are required to meet safety or airworthiness standards of civil aviation authorities of a Wassenaar Arrangement Participating State; and

c. Do not incorporate weapons enumerated or otherwise described on the U.S. Munitions List, unless inoperable and incapable of being returned to operation.

b. L-100 aircraft manufactured prior to 2013.

c. - d. [Reserved]

e. Mobile aircraft arresting and engagement runway systems for aircraft controlled by either USML Category VIII(a) or ECCN 9A610.a.

f. Pressure refueling equipment and equipment that facilitates operations in confined areas, “specially designed” for aircraft controlled by either USML paragraph VIII(a) or ECCN 9A610.a.

g. Aircrew life support equipment, aircrew safety

equipment and other devices for emergency escape from aircraft controlled by either USML paragraph VIII(a) or ECCN 9A610.a.

h. Parachutes, paragliders, complete parachute canopies, harnesses, platforms, electronic release mechanisms, “specially designed” for use with aircraft controlled by either USML paragraph VIII(a) or ECCN 9A610.a, and “equipment” “specially designed” for military high altitude parachutists, such as suits, special helmets, breathing systems, and navigation equipment.

i. Controlled opening equipment or automatic piloting systems, designed for parachuted loads.

j. Ground effect machines (GEMS), including surface effect machines and air cushion vehicles, “specially designed” for use by a military.

k. through s. [Reserved]

t. Composite structures, laminates, and manufactures thereof “specially designed” for unmanned aerial vehicles controlled under USML Category VIII(a) with a range equal to or greater than 300 km.

Note to paragraph .t: Composite structures, laminates, and manufactures thereof “specially designed” for unmanned aerial vehicles controlled under USML Category VIII(a) with a maximum range less than 300 km are controlled in paragraph .x of this entry.

u. Apparatus and devices “specially designed” for the handling, control, activation and non-ship-based launching of UAVs controlled by either USML paragraph VIII(a) or ECCN 9A610.a, and capable of a range equal to or greater than 300 km.

Note to paragraph .u: Apparatus and devices “specially designed” for the handling, control, activation and non-ship-based launching of UAVs controlled by either USML paragraph VIII(a) or ECCN 9A610.a with a maximum range less than 300 km are controlled in paragraph .x of this

entry.

v. Radar altimeters designed or modified for use in UAVs controlled by either USML paragraph VIII(a) or ECCN 9A610.a, and capable of delivering at least 500 kilograms payload to a range of at least 300 km.

Note to paragraph .v: Radar altimeters designed or modified for use in UAVs controlled by either USML paragraph VIII(a) or ECCN 9A610.a that are not capable of delivering at least 500 kilograms payload to a range of at least 300 km are controlled in paragraph .x of this entry.

w.1. Pneumatic hydraulic, mechanical, electro-optical, or electromechanical flight control systems (including fly-by-wire and fly-by-light systems) and attitude control equipment designed or modified for UAVs controlled by either USML paragraph VIII(a) or ECCN 9A610.a, and capable of delivering at least 500 kilograms payload to a range of at least 300 km.

Note to paragraph .w.1: Pneumatic, hydraulic, mechanical, electro-optical, or electromechanical flight control systems (including fly-by-wire and fly-by-light systems) and attitude control equipment designed or modified for UAVs controlled by either USML paragraph VIII(a) or ECCN 9A610.a, not capable of delivering at least 500 kilograms payload to a range of at least 300 km are controlled in paragraph .x of this entry.

w.2. Flight control servo valves designed or modified for the systems in 9A610.w.1 and designed or modified to operate in a vibration environment greater than 10g rms over the entire range between 20Hz and 2 kHz.

Note to paragraph .w: Paragraphs 9A610.w.1. and 9A610.w.2. include the systems, equipment and valves designed or modified to enable operation of manned aircraft as unmanned aerial vehicles.

x. “Parts,” “components,” “accessories,” and “attachments” that are “specially designed” for a commodity enumerated or otherwise described in ECCN 9A610 (except for 9A610.y) or a defense article enumerated or otherwise described in USML Category VIII and not elsewhere specified on the USML or in 9A610.y, 9A619.y, or 3A611.y.

y. Specific “parts,” “components,” “accessories,” and “attachments” “specially designed” for a commodity subject to control in this entry, ECCN 9A619, or for a defense article in USML Categories VIII or XIX and not elsewhere specified in the USML or the CCL, and other aircraft commodities “specially designed” for a military use, as follows, and “parts,” “components,” “accessories,” and “attachments” “specially designed” therefor:

- y.1. Aircraft tires;
- y.2. Analog gauges and indicators;
- y.3. Audio selector panels;
- y.4. Check valves for hydraulic and pneumatic systems;
- y.5. Crew rest equipment;
- y.6. Ejection seat mounted survival aids;
- y.7. Energy dissipating pads for cargo (for pads made from paper or cardboard);
- y.8. Fluid filters and filter assemblies;
- y.9. Galleys;
- y.10. Fluid hoses, straight and unbent lines (for a commodity subject to control in this entry or defense article in USML Category VIII), and fittings, couplings, clamps (for a commodity subject to control in this entry or defense article in USML Category VIII) and brackets therefor;

- y.11. Lavatories;
- y.12. Life rafts;
- y.13. Magnetic compass, magnetic azimuth detector;
- y.14. Medical litter provisions;
- y.15. Cockpit or cabin mirrors;
- y.16. Passenger seats including palletized seats;
- y.17. Potable water storage systems;
- y.18. Public address (PA) systems;
- y.19. Steel brake wear pads (does not include sintered mix or carbon/carbon materials);
- y.20. Underwater locator beacons;
- y.21. Urine collection bags/pads/cups/pumps;
- y.22. Windshield washer and wiper systems;
- y.23. Filtered and unfiltered panel knobs, indicators, switches, buttons, and dials;
- y.24. Lead-acid and Nickel-Cadmium batteries;
- y.25. Propellers, propeller systems, and propeller blades used with reciprocating engines;
- y.26. Fire extinguishers;
- y.27. Flame and smoke/CO₂ detectors;
- y.28. Map cases;
- y.29. ‘Military Aircraft’ that were first manufactured from 1946 to 1955 that do not incorporate defense articles enumerated or otherwise described on the U.S. Munitions List, unless the items are required to meet safety or airworthiness standards of a Wassenaar Arrangement Participating State; and do not

incorporate weapons enumerated or otherwise described on the U.S. Munitions List, unless inoperable and incapable of being returned to operation;

y.30. “Parts,” “components,” “accessories,” and “attachments,” other than electronic items or navigation equipment, for use in or with a commodity controlled by ECCN 9A610.h;

y.31. Identification plates and nameplates; *and*

y.32. Fluid manifolds.

9A619 Military gas turbine engines and related commodities (see List of Items Controlled).

License Requirements

Reason for Control: NS, RS, AT, UN

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
NS applies to entire entry except 9A619.y	NS Column 1
RS applies to entire entry except 9A619.y	RS Column 1
RS applies to 9A619.y.	China, Russia or Venezuela (see § 742.6(a)(7)).
AT applies to entire entry	AT Column 1
UN applies to entire entry except 9A619.y	See § 746.1(b) for UN controls

List Based License Exceptions (See Part 740 for a description of all license exceptions)

LVS: \$1,500

GBS: N/A

Special Conditions for STA

STA: Paragraph (c)(2) of License

Exception STA (§ 740.20(c)(2) of the EAR) may not be used for any item in ECCN 9A619.

List of Items Controlled

Related Controls: (1) Military gas turbine engines and related articles that are enumerated or otherwise described in USML Category XIX, and technical data (including software) directly related thereto, are subject to the jurisdiction of the International Traffic in Arms Regulations (ITAR). (2) Gas turbine engines designated 501-D22 are controlled in ECCN 9A991.d regardless of the aircraft type into which they will be installed. (3) See ECCN 0A919 for foreign-made “military commodities” that incorporate more than a de minimis amount of U.S.-origin “600 series” controlled content. (4) “Parts,” “components,” “accessories,” and “attachments” specified in USML Category XIX(f) are subject to the controls of that paragraph. (5) “Parts,” “components,” “accessories,” and “attachments” specified in ECCN 9A619.y are subject to the controls of that paragraph.

Related Definitions: In paragraph .y of this entry, the term ‘fluid’ includes liquids and gases.

Items:

a. “Military Gas Turbine Engines” “specially designed” for a military use that are not controlled in USML Category XIX(a), (b), (c), or (d).

Note: For purposes of ECCN 9A619.a, the term “military gas turbine engines” means gas turbine engines “specially designed” for “end items” enumerated in USML Categories VI, VII or VIII or on the CCL under ECCNs 0A606, 8A609 or 9A610.

b. Digital engine controls (e.g., Full Authority Digital Engine Controls (FADEC) and Digital

Electronic Engine Controls (DEEC)) “specially designed” for gas turbine engines controlled in this ECCN 9A619.

c. If “specially designed” for gas turbine engines controlled in 9A619.a, hot section components (i.e., combustion chambers and liners; high pressure turbine blades, vanes, disks and related cooled structure; cooled low pressure turbine blades, vanes, disks and related cooled structure; cooled augmenters; and cooled nozzles);

d. If “specially designed” for gas turbine engines controlled in 9A619.a, uncooled turbine blades, vanes, disks, and tip shrouds;

e. If “specially designed” for gas turbine engines controlled in 9A619.a, combustor cowls, diffusers, domes, and shells;

f. Engine monitoring systems (i.e., those that conduct prognostics, diagnostics, and monitor health) “specially designed” for gas turbine engines and components controlled in this ECCN 9A619.

g. through w. [RESERVED]

x. Parts,” “components,” “accessories,” and “attachments” that are “specially designed” for a commodity controlled by this ECCN 9A619 (other than ECCN 9A619.c) or for a defense article enumerated in USML Category XIX and not specified elsewhere on the USML or in ECCN 3A611.y, 9A610.y or 9A619.y.

Note to paragraph .x: “Parts,” “components,” “accessories,” and “attachments” specified in USML subcategory XIX(f) are subject to the controls of that paragraph. “Parts,” “components,” “accessories,” and “attachments” specified in ECCN 3A611.y, 9A610.y or 9A619.y are subject to the controls of that paragraph.

y. Specific “parts,” “components,” “accessories,”

and “attachments” “specially designed” for a commodity subject to control in this entry, ECCN 9A610, or for a defense article in USML Category VIII or Category XIX and not elsewhere specified on the USML or in the CCL, and other commodities, as follows, and “parts,” “components,” “accessories,” and “attachments” “specially designed” therefor:

y.1. Oil tank and reservoirs;

y.2. Oil lines and tubes;

y.3. Fluid hoses, and lines (for a commodity subject to control in this entry or a defense article in USML Category XIX), fittings, couplings, and brackets therefor;

y.4. Fluid filters and filter assemblies;

y.5. Clamps (for a commodity subject to control in this entry or a defense article in USML Category XIX);

y.6. Shims;

y.7. Identification plates and nameplates;

y.8. Fluid manifolds; and

y.9. Check valves for fluid systems.

9A620 Cryogenic and “superconductive” equipment, as follows (see list of items controlled).

License Requirements

Reason for Control: NS, RS, AT, UN

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

UN applies to entire entry	See §746.1(b) for UN controls
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List Based License Exceptions (see Part 740 for a description of all license exceptions)

LVS: \$1500.
 GBS: N/A

Special Conditions for STA

STA: Paragraph (c)(2) of License Exception STA (§740.20(c)(2) of the EAR) may not be used for any item in 9A620.

List of Items Controlled

Related Controls: Electronic items that are enumerated in USML Category XI or other USML categories, and technical data (including software) directly related thereto, are subject to the ITAR.

Related Definitions: N/A

Items:

a. Equipment “specially designed” to be installed in a vehicle for military ground, marine, airborne, or space applications, and capable of operating while in motion and of producing or maintaining temperatures below 103 K (–170 °C).

Note to 9A620.a: ECCN 9A620.a includes mobile systems incorporating or employing “accessories” or “components” manufactured from non-metallic or non-electrical conductive materials such as plastics or epoxy-impregnated materials.

b. “Superconductive” electrical equipment (rotating machinery and transformers) “specially designed” to be installed in a vehicle for military ground, marine, airborne, or space applications, and capable of operating while in motion.

c. through w. [Reserved].

x. “Parts,” “components,” “accessories” and “attachments” that are “specially designed” for a commodity controlled by ECCN 9A620.

Note to 9A620.b: Forgings, castings, and other unfinished products, such as extrusions and machined bodies, that have reached a stage in manufacture where they are clearly identifiable by mechanical properties, material composition, geometry, or function as commodities controlled by ECCN 9A620.x are controlled by ECCN 9A620.x.

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

Heading Note: In order for a vehicle to be classified as a nonmilitary mobile crime scene laboratory under ECCN 9A980, the vehicle must contain one or more analytical or laboratory items controlled for Crime Control (CC) reasons on the CCL, such as ECCNs 3A980 and 3A981.

License Requirements

Reason for Control: CC

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

List Based License Exceptions (See Part 740 for a description of all license exceptions)

LVS: N/A
 GBS: N/A

List of Items Controlled

Related Controls: 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” and “components” therefor, n.e.s. (see List of Items Controlled).

License Requirements

Reason for Control: AT

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
AT applies to entire entry except 9A990.a.	AT Column 1
AT applies to 9A990.a only.	AT Column 2

List Based License Exceptions (See Part 740 for a description of all license exceptions)

LVS: N/A
GBS: N/A

List of Items Controlled

Related Controls: 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 major “components” 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” major “components”.

9A991 “Aircraft”, n.e.s., and gas turbine engines not controlled by 9A001 or 9A101 and “parts” and “components,” n.e.s. (see List of Items Controlled).

License Requirements

Reason for Control: AT, UN

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
AT applies to entire entry	AT Column 1
UN applies to 9A991.a.	See § 746.1(b) for UN controls.

List Based License Exceptions (See Part 740 for a description of all license exceptions)

LVS: N/A
GBS: N/A

List of Items Controlled

Related Controls: N/A
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. Aircraft n.e.s.;

c. Aero gas turbine engines, and “parts” and “components” “specially designed” 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. “Parts” and “components,” “specially designed” for “aircraft,” n.e.s.

e. Pressurized aircraft breathing equipment, n.e.s.; and “parts” and “components” “specially designed” 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

<i>Control(s)</i>	<i>Country Chart (See Supp. No.1 to part 738)</i>
AT applies to entire entry	AT Column 1

List Based License Exceptions (See Part 740 for a description of all license exceptions)

LVS: N/A
GBS: N/A

List of Items Controlled

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 Manufacturing equipment, tooling or fixtures, as follows (See List of Items Controlled).

License Requirements

Reason for Control: NS, MT, AT

<i>Control(s)</i>	<i>Country Chart (See Supp. No.1 to part 738)</i>
NS applies to entire entry	NS Column 1
MT applies to equipment for engines controlled under 9A001 for MT reasons and for engines controlled under 9A101	MT Column 1
AT applies to entire entry	AT Column 1

Reporting Requirements

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

List Based License Exceptions (See Part 740 for

a description of all license exceptions)

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

Special Conditions for STA

STA: License Exception STA may not be used to ship commodities in 9B001 to any of the destinations listed in Country Group A:6 (See Supplement No.1 to part 740 of the EAR).

List of Items Controlled

Related Controls: For “specially designed” production equipment of systems, sub-systems, “parts” 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 designed for “superalloys”;
- b. Casting tooling, “specially designed” for manufacturing gas turbine engine blades, vanes or “tip shrouds”, manufactured from refractory metals or ceramics, as follows:
 - b.1. Cores;
 - b.2. Shells (moulds);
 - b.3. Combined core and shell (mould) units;
- c. Directional-solidification or single-crystal additive-manufacturing equipment designed for “superalloys”.

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 (See Supp. No. 1 to part 738)</i>
NS applies to entire entry	NS Column 1
MT applies to equipment for engines controlled under 9A001 for MT reasons and for engines controlled under 9A101	MT Column 1
AT applies to entire entry	AT Column 1

List Based License Exceptions (See Part 740 for a description of all license exceptions)

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

List of Items Controlled

Related Controls: N/A

Related Definitions: N/A

Items:

- a. “Specially designed” for the “development” of gas turbine engines, assemblies, “parts” or “components”; *and*
- b. Incorporating any of the “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 (See Supp. No. 1 to part 738)</i>
NS applies to entire entry	NS Column 1
MT applies to equipment for engines controlled under 9A001 for MT reasons and for engines controlled under 9A101	MT Column 1
AT applies to entire entry	AT Column 1

List Based License Exceptions (See Part 740 for a description of all license exceptions)

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

List of Items Controlled

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

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
NS applies to entire entry	NS Column 1
MT applies to equipment for engines controlled under 9A001 for MT	MT Column 1

reasons and for engines controlled under 9A101	
AT applies to entire entry	AT Column 1

List Based License Exceptions (See Part 740 for a description of all license exceptions)

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

List of Items Controlled

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

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
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)

LVS: N/A
GBS: N/A

List of Items Controlled

Related Controls: See also [9B105](#)
Related Definitions: N/A

Items:

LVS: \$3000

GBS: Yes

- 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: For the purposes of 9B005.a ‘test section size’ 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 25×10^6 .

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.

License Requirements

Reason for Control: NS, AT

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

List Based License Exceptions (See Part 740 for a description of all license exceptions)

List of Items Controlled

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 (See Supp. No. 1 to part 738)
NS applies to entire entry	NS Column 1
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

List Based License Exceptions (See Part 740 for a description of all license exceptions)

LVS: N/A

GBS: N/A

List of Items Controlled

Related Controls: N/A

Related Definitions: N/A

Items:

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

AT applies to entire entry	AT Column 1
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9B008 Direct measurement wall skin friction transducers “specially designed” to operate at a test flow total (stagnation) temperature exceeding 833 K (560°C).

List Based License Exceptions (See Part 740 for a description of all license exceptions)

LVS: \$5000
GBS: N/A

Reason for Control: NS, AT

List of Items Controlled

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

Related Controls: See 9B002.
Related Definitions: N/A
Items:

List Based License Exceptions (See Part 740 for a description of all license exceptions)

LVS: \$5000
GBS: N/A

- a. Designed to operate at stress levels of 60% of Ultimate Tensile Strength (UTS) or more measured at a temperature of 873 K (600°C); and
- b. Designed to operate at a temperature of 873 K (600°C) or more.

List of Items Controlled

Note: 9B009 does not specify tooling for the production of powder.

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

9B010 Equipment “specially designed” for the production of items specified by 9A012.

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

License Requirements

Reason for Control: NS, AT

9B009 Tooling “specially designed” for producing gas turbine engine powder metallurgy rotor “parts” or “components” having all of the following (see List of Items Controlled).

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

License Requirements

List Based License Exceptions (See Part 740 for a description of all license exceptions)

Reason for Control: NS, AT

LVS: N/A
GBS: N/A

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

List of Items Controlled

Related Controls: N/A

Related Definitions: N/A

Items:

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

9B104 ‘Aerothermodynamic test facilities’, usable for rockets, missiles, or unmanned aerial vehicles capable of achieving a “range” equal to or greater than 300 km and their subsystems, and having an electrical power supply equal to or greater than 5 MW or a gas supply total pressure equal to or greater than 3 MPa.

License requirements

Reasons for Control: MT, AT

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

List Based License Exceptions (See Part 740 for a description of all license exceptions)

LVS: N/A
GBS: N/A

List of Items Controlled

Related Controls: See ECCNs 9D101, 9E001 and 9E002.

Related Definitions: ‘Aerothermodynamic test facilities’ include plasma arc jet facilities and plasma wind tunnels for the study of thermal and mechanical effects of airflow on objects.

Items:

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

9B105 ‘Aerodynamic test facilities’ 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

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

List Based License Exceptions (See Part 740 for a description of all license exceptions)

LVS: N/A
GBS: N/A

List of Items Controlled

Related Controls: See also [9B005](#)
Related Definitions: N/A

Items:

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

Note: 9B105 does not control wind tunnels for speeds of Mach 3 or less with the dimension of the ‘test cross section size’ equal to or less than 250 mm.

Technical Notes:

1. ‘Aerodynamic test facilities’ includes wind tunnels and shock tunnels for the study of airflow over objects.

2. ‘Test cross section size’ means the diameter of the circle, or the side of the square, or the longest side of the rectangle, or the major axis of the ellipse at the largest ‘test cross section’ location. ‘Test cross section’ is the

section perpendicular to the flow direction.

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

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

List Based License Exceptions (See Part 740 for a description of all license exceptions)

LVS: N/A
GBS: N/A

List of Items Controlled

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

a. Environmental chambers having all of the following characteristics:

a.1. Capable of simulating any of the following flight conditions:

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

a.1.b. Temperature range from below -50° C to above 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 while 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 systems, sub-systems, and “components” controlled by ECCN 9A101 or by USML Category IV(d)(2), (d)(3), (d)(4), or (h)(17).

License Requirements

Reason for Control: MT, AT

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

List Based License Exceptions (See Part 740 for a description of all license exceptions)

LVS: N/A

GBS: N/A

List of Items Controlled

Related Controls: (1) Although items described in USML Category IV(d)(2), (d)(3), (d)(4) or h(17) are “subject to the ITAR” (see 22 CFR parts 120 through 130), the production “equipment” controlled in this entry that is related to these items is subject to the export licensing authority of BIS. (2) “Specially designed” production “equipment” for systems, sub-systems, and “components” described in USML Category IV(d)(1), (d)(7), (h)(1), (h)(4), (h)(6), (h)(7), (h)(8), (h)(9), (h)(11), (h)(20), (h)(21), (h)(26), or (h)(28) are controlled by ECCN 9B604. (3) See ECCN 0A919 for foreign-made “military commodities” that incorporate more than a *de minimis* amount of US-origin “600 series” controlled content.

Related Definitions: NA.

Items:

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

9B116 “Specially designed” “production facilities” for the systems, sub-systems, “parts” and “components” controlled ECCN 9A012 (applies to MT-controlled items only) or 9A101 or by USML Category IV(d)(2), (d)(3), (d)(4), or (h)(17).

License Requirements

Reason for Control: MT, AT

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

List Based License Exceptions (See Part 740 for a description of all license exceptions)

LVS: N/A

GBS: N/A

List of Items Controlled

Related Controls: (1) Although items described in USML Category IV(d)(2), (d)(3), (d)(4), or (h)(17) are “subject to the ITAR” (see 22 CFR parts 120 through 130), the “production facilities” controlled in this entry that are related to these items are subject to the export licensing authority of BIS. (2) “Specially designed” “production facilities” for systems, sub-systems, and “components” described in USML Category IV(d)(1), (d)(7), (h)(1), (h)(4), (h)(6), (h)(7), (h)(8), (h)(9), (h)(11), (h)(20), (h)(21), (h)(26), or (h)(28) are controlled by ECCN 9B604. (3) See ECCN 0A919 for foreign-made “military commodities” that incorporate more than a *de minimis* amount of US-origin “600 series” controlled content.

Related Definitions: NA

Items:

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

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

Reason for Control: MT, AT

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

List Based License Exceptions (See Part 740 for a description of all license exceptions)

LVS: N/A
GBS: N/A

List of Items Controlled

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.

9B515 Test, inspection, and production “equipment” “specially designed” for “spacecraft” and related commodities, as follows (see List of Items Controlled).

License Requirements

Reason for Control: NS, RS, AT

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
NS applies to entire entry	NS Column 1

MT applies to equipment in 9B515.a for the “development” or “production” of commodities in USML Category XV(e)(12) and XV(e)(19) that are MT controlled.	MT Column 1
RS applies to entire entry	RS Column 1
AT applies to entire entry	AT Column 1

List Based License Exceptions (See Part 740 for a description of all license exceptions)

LVS: \$1500; \$5000 for 9B515.b
GBS: N/A

Special Conditions for STA

STA: Paragraph (c)(2) of License Exception STA (§ 740.20(c)(2) of the EAR) may not be used for any item in 9B515.

List of Items Controlled

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

- a. Test, inspection, and production “equipment” “specially designed” for the “production” or “development” of commodities enumerated in ECCNs 9A004.u, 9A515.a, or USML Category XV(a) or XV(e).

Note: ECCN 9B515.a includes equipment, cells, and stands “specially designed” for the analysis or isolation of faults in commodities enumerated in ECCNs 9A004.u or 9A515.a, or USML Category XV(a) or XV(e).

- b. Environmental test chambers capable of pressures below (10⁻⁴) Torr, and “specially designed” for commodities enumerated in 9A515.a or USML Category XV(a).

9B604 Test, inspection, and production “equipment” and related commodities “specially designed” for the “development,” “production,” repair, overhaul, or refurbishing of commodities in ECCN 9A604 or related defense articles in USML Category IV (see List of Items Controlled).

License Requirements

Reason for Control: NS, RS, MT, AT, UN

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
NS applies to entire entry	NS Column 1
RS applies to entire entry	RS Column 1
MT applies to 9B604.a and .b and to 9B604.d “specially designed” “production facilities” or production “equipment” for defense articles identified as MTCR Annex items in USML Category IV(d)(1), (h)(1), (h)(4), (h)(6), (h)(7), (h)(8), (h)(9), (h)(11), (h)(20), (h)(21), or (h)(26).	MT Column 1
AT applies to entire entry	AT Column 1
UN applies to entire entry	See § 746.1(b) for UN controls

List Based License Exceptions (See Part 740 for a description of all license exceptions)

LVS: \$1,500
GBS: N/A

Special Conditions for STA

STA: Paragraph (c)(2) of License Exception STA (§ 740.20(c)(2) of the EAR) may not be used for any item in this ECCN 9B604.

List of Items Controlled

Related Controls: (1) “Production facilities” for the “production” or “development” of commodities enumerated or otherwise described in ECCN 9A012 or 9A101 or in USML Category IV(d)(2), (d)(3), (d)(4), or (h)(17) are controlled by ECCN 9B116. (2) Test, inspection, and other production “equipment” “specially designed” for the “production” or “development” of commodities enumerated or otherwise described in ECCN 9A101 or in USML Category IV(d)(2), (d)(3), (d)(4), or (h)(17) are controlled by ECCN 9B115. (3) See ECCN 0A919 for foreign-made “military commodities” that incorporate more than a *de minimis* amount of US-origin “600 series” controlled content.

Related Definitions: N/A

Items:

- a. “Production facilities” “specially designed” for items that are controlled by USML Category IV(a)(1) or (a)(2).
- b. Test, calibration, and alignment equipment “specially designed” for items that are controlled by USML Category IV(h)(28).
- c. Test, inspection, and other production “equipment” that is “specially designed” for the “development,” “production,” repair, overhaul, or refurbishing of commodities described in ECCN 9A604, or defense articles controlled under USML Category IV, and not specified in ECCN 0B604.a or in ECCN 9B604.a, .b, or .d.
- d. “Specially designed” “production facilities” or production “equipment” for systems, sub-systems, and “components” controlled by USML Category IV(d)(1), (d)(7), (h)(1), (h)(4), (h)(6), (h)(7), (h)(8), (h)(9), (h)(11), (h)(20), (h)(21), (h)(26), or (h)(28).
- e. through w. [Reserved]
- x. “Parts,” “components,” “accessories,” and

“attachments” that are “specially designed” for a commodity subject to control in paragraph .a or .b of this ECCN.

9B610 Test, inspection, and production “equipment” and related commodities “specially designed” for the “development” or “production” of commodities enumerated or otherwise described in ECCN 9A610 or USML Category VIII (see List of Items Controlled).

License Requirements

Reason for Control: NS, RS, MT, AT, UN

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
NS applies to entire entry except 9B610.c.	NS Column 1
RS applies to entire entry	RS Column 1
MT applies to 9B610.c.	MT Column 1
AT applies to entire entry	AT Column 1
UN applies to entire entry	See §746.1(b) for UN controls

List Based License Exceptions (See Part 740 for a description of all license exceptions)

LVS: \$1500
GBS: N/A

Special Conditions for STA

STA: Paragraph (c)(2) of License Exception STA (§ 740.20(c)(2) of the EAR) may not be used for any item in 9B610.

List of Items Controlled

Related Controls: USML Category VIII(h)(1) controls “parts,” “components,” “accessories,” and “attachments” “specially designed” for the aircraft

enumerated or otherwise described in Category VIII(h)(1), but does not control the commodities enumerated or otherwise described in ECCN 9B610. USML Category VIII(h)(2)-(28) controls other aircraft “parts,” “components,” “accessories,” “attachments,” and “systems.”

Related Definitions: N/A

Items:

a. Test, inspection, and production “equipment” “specially designed” for the “production,” “development,” operation, installation, maintenance, repair, overhaul, or refurbishing of commodities enumerated or otherwise described in ECCN 9A610 (except 9A610.y) or USML Category VIII, and “parts,” “components,” “accessories,” and “attachments” “specially designed” therefor.”

b. Environmental test facilities “specially designed” for the certification, qualification, or testing of commodities enumerated or otherwise described in ECCN 9A610 (except for 9A610.y) or USML Category VIII and “parts,” “components,” “accessories,” and “attachments” “specially designed” therefor.

c. “Production facilities” designed or modified for UAVs or drones that are (i) controlled by either USML paragraph VIII(a) or ECCN 9A610.a and (ii) capable of a range equal to or greater than 300 km.

9B619 Test, inspection, and production “equipment” and related commodities “specially designed” for the “development” or “production” of commodities enumerated or otherwise described in ECCN 9A619 or USML Category XIX (see List of Items Controlled).

License Requirements

Reason for Control: NS, RS, AT, UN

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
NS applies to entire entry except 9B619.y.	NS Column 1
RS applies to entire entry except 9B619.y.	RS Column 1
RS applies to 9B619.y.	China, Russia or Venezuela (see § 742.6(a)(7)).
AT applies to entire entry	AT Column 1
UN applies to entire entry except 9B619.y.	See § 746.1(b) for UN controls

List Based License Exceptions (See Part 740 for a description of all license exceptions)

LVS: \$1,500
GBS: N/A

Special Conditions for STA

STA: Paragraph (c)(2) of License Exception STA (§ 740.20(c)(2) of the EAR) may not be used for any item in ECCN 9B619.

List of Items Controlled

Related Controls: USML Category XIX(f)(1) controls “parts,” “components,” “accessories,” and “attachments” “specially designed” for the engines described in Category XIX(f)(1), but does not control the commodities enumerated or otherwise described in ECCN 9B619. USML Category XIX(f)(2)-(11) controls other engine “parts,” “components,” “accessories,” “attachments,” and “systems.”

Related Definitions: N/A

Items:

a. Test, inspection, and production “equipment” “specially designed” for the “production,” “development,” operation, installation, maintenance, repair, overhaul, or refurbishing of

commodities enumerated or otherwise described in ECCN 9A619 (except for 9A619.y) or in USML Category XIX, and “parts,” “components,” “accessories,” and “attachments” “specially designed” therefor.

b. Equipment, cells, or stands “specially designed” for testing, analysis and fault isolation of engines, “systems,” “components,” “parts,” “accessories,” and “attachments” enumerated or otherwise described in ECCN 9A619 (except for 9A619.y) on the CCL or in Category XIX on the USML.

c. through x. [Reserved]

y. Bearing pullers “specially designed” for the - “production” or “development” of commodities enumerated or otherwise described in ECCN 9A619 (except for 9A619.y) or USML Category XIX and “parts,” “components,” “accessories,” and “attachments” “specially designed” therefor.

9B620 Test, inspection, and production commodities for cryogenic and “superconductive” equipment (see List of Items controlled).

License Requirements

Reason for Control: NS, RS, AT, UN

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

List Based License Exceptions (see Part 740 for a description of all license exceptions)

LVS: \$1500.

GBS: N/A

ECCN heading.

Special Conditions for STA

STA: Paragraph (c)(2) of License Exception STA (§740.20(c)(2) of the EAR) may not be used for any item in 9B620.

9B991 “Specially designed” “equipment,” tooling or fixtures, not controlled by 9B001, for manufacturing or measuring gas turbine blades, vanes or tip shroud castings, as follows (see List of Items Controlled).

List of Items Controlled

Related Controls: N/A

Related Definitions: N/A

Items:

a. Test, inspection, and production end items and equipment “specially designed” for the “development,” “production,” repair, overhaul or refurbishing of items controlled in ECCN 9A620.

License Requirements

Reason for Control: AT

b. [Reserved]

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
AT applies to entire entry	AT Column 1

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

List Based License Exceptions (See Part 740 for a description of all license exceptions)

LVS: N/A

GBS: N/A

License Requirements

Reason for Control: AT

List of Items Controlled

<i>Control(s)</i>	<i>Country Chart (See Supp. No.1 to part 738)</i>
AT applies to entire entry	AT Column 1

Related Controls: N/A

Related Definitions: N/A

Items:

List Based License Exceptions (See Part 740 for a description of all license exceptions)

LVS: N/A

GBS: N/A

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;

List of Items Controlled

Related Controls: N/A

Related Definitions: N/A

Items:

c. Ceramic core leaching equipment;

d. Ceramic core manufacturing equipment or tools;

e. Ceramic shell wax pattern preparation equipment;

The list of items controlled is contained in the

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

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

List Based License Exceptions (See Part 740 for a description of all license exceptions)

LVS: N/A
GBS: N/A

List of Items Controlled

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.

9C610 Materials “specially designed” for commodities controlled by USML Category VIII or ECCN 9A610 and not elsewhere specified in the CCL or the USML (see List of Items Controlled).

License Requirements

Reason for Control: NS, RS, AT, UN

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

List Based License Exceptions (See Part 740 for a description of all license exceptions)

LVS: \$1500
GBS: N/A

Special Conditions for STA

STA: Paragraph (c)(2) of License Exception STA (§ 740.20(c)(2) of the EAR) may not be used for any item in 9C610.

List of Items Controlled

Related Controls: USML subcategory XIII(f) controls structural materials specifically designed, developed, configured, modified, or adapted for defense articles, such as USML subcategory VIII(a) aircraft. See ECCN 0A919 for foreign made “military commodities” that incorporate more than a *de minimis* amount of U.S.-origin “600 series” controlled content.

Related Definitions: N/A
Items:

- a. Materials not elsewhere specified in the

USML or the CCL and “specially designed” for commodities enumerated or otherwise described in USML Category VIII or ECCN 9A610 (except 9A610.y).

the EAR) may not be used for any item in ECCN 9C619.

Note 1: Materials enumerated elsewhere in the CCL, such as in a CCL Category 1 ECCN, are controlled pursuant to controls of the applicable ECCN.

Note 2: Materials “specially designed” for both aircraft enumerated in USML Category VIII and aircraft enumerated in ECCN 9A610 are subject to the controls of this ECCN.

b. [Reserved]

9C619 Materials “specially designed” for commodities controlled by USML Category XIX or ECCN 9A619 and not elsewhere specified in the CCL or on the USML (see List of Items Controlled).

License Requirements

Reason for Control: NS, RS, AT, UN

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

List Based License Exceptions (See Part 740 for a description of all license exceptions)

LVS: \$1,500

GBS: N/A

Special Conditions for STA

STA: Paragraph (c)(2) of License Exception STA (§ 740.20(c)(2) of

List of Items Controlled

Related Controls: (1) See USML subcategory XIII(f) for controls on structural materials specifically designed, developed, configured, modified, or adapted for defense articles, such as USML Category XIX engines. (2) See ECCN 0A919 for foreign made “military commodities” that incorporate more than a *de minimis* amount of U.S.-origin “600 series” controlled content.

Related Definitions: N/A

Items:

a. Materials not controlled by paragraph .b of this entry and not elsewhere specified in the CCL or on the USML, and “specially designed” for commodities enumerated or otherwise described in USML Category XIX or ECCN 9A619 (except 9A619.y).

b. Materials “specially designed” for use in certain gas turbine engines, as follows:

b.1. Powders “specially designed” for thermal or environmental barrier coating of defense articles enumerated or described in USML Category XIX paragraphs (f)(1) – (f)(4) for engines listed in (f)(1);

b.2. Superalloys (i.e., nickel, cobalt or iron based), used in directionally solidified or single crystal casting, “specially designed” for defense articles enumerated or described in USML Category XIX paragraphs (f)(1) – (f)(4) for engines listed in paragraph (f)(1); *or*

b.3. Imide matrix, metal matrix, or ceramic matrix composite material (i.e., reinforcing fiber combined with a matrix) “specially designed” for defense articles enumerated or described in USML Category XIX paragraphs (f)(1) – (f)(4) for engines listed in paragraph (f)(1).

Note 1: Materials enumerated elsewhere in the CCL, such as in a CCL Category 1 ECCN, are controlled pursuant to the controls of the applicable ECCN.

Note 2: Materials described in paragraph .a of this entry that are “specially designed” for both an engine enumerated in USML Category XIX and an engine enumerated in ECCN 9A619 are subject to the controls of this ECCN 9C619.

Note 3: Materials described in this entry that are or have been used in gas turbine engines in production (i.e., not in development) that are not enumerated or otherwise described on the USML or ECCN 9A619 are not controlled by this entry.

D. “SOFTWARE”

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, MT, AT

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
NS applies to “software” for equipment controlled by 9A001 to 9A004, 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
AT applies to entire entry	AT Column 1

Reporting Requirements

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

List Based License Exceptions (See Part 740 for a description of all license exceptions)

TSR: N/A

Special Conditions for STA

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

List of Items Controlled

Related Controls “Software” that is “required” for the “development” 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

Items:

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

9D002 “Software”, not specified in 9D003 or 9D004, “specially designed” or modified for the “production” of equipment 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).

destinations listed in Country Group A:6 (See Supplement No.1 to part 740 of the EAR).

License Requirements

Reason for Control: NS, MT, AT

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
NS applies to “software” for equipment controlled by 9A001 to 9A004, 9A012, 9B001 to 9B010.	NS Column 1
MT applies to “software” for equipment controlled by 9B116 for MT reasons.	MT Column 1
AT applies to entire entry	AT Column 1

Reporting Requirements

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

List Based License Exceptions (See Part 740 for a description of all license exceptions)

TSR: N/A.

Special Conditions for STA

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

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

Items:

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

9D003 “Software” incorporating “technology” specified by ECCN 9E003.h and used in “FADEC Systems” for systems controlled by ECCN 9A001 to 9A003, 9A101 (except for items in 9A101.b that are “subject to the ITAR”, see 22 CFR part 121), 9A106.d or .e, or 9B (except for ECCNs 9B604, 9B610, 9B619, 9B990, and 9B991).

License Requirements

Reason for Control: NS, MT, AT

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
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	MT Column 1

“FADEC systems” for gas turbine engines controlled by 9A101, or 9A106.	
AT applies to entire entry	AT Column 1

AT applies to entire entry	AT Column 1
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List Based License Exceptions (See Part 740 for a description of all license exceptions)

List Based License Exceptions (See Part 740 for a description of all license exceptions)

TSR: Yes, except N/A for MT

TSR: N/A.

List of Items Controlled

Special Conditions for STA

Related Controls: (1) See also [9D103](#). (2) “Software” “required” for the “use” of equipment specified in ECCNs 9A004 (except for items that are subject to the EAR), 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” (see 22 CFR parts 120 through 130). (3) “Software” directly related to defense articles that are “subject to the ITAR” (see 22 CFR parts 120 through 130) is also “subject to the ITAR” (see 22CFR parts 120 through 130).

STA: License Exception STA may not be used to ship or transmit software in 9D004.a and 9D004.c to any of the destinations listed in Country Group A:6 (See Supplement No.1 to part 740 of the EAR)

Related Definitions: N/A

List of Items Controlled

Items:

Related Controls: See also 9D104.

Related Definitions: N/A

Items:

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

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, “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:

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

License Requirements

Reason for Control: NS, AT

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
NS applies to entire entry	NS Column 1

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 9D004.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.

9D005 “Software” specially designed or modified for the operation of items specified by 9A004.e or 9A004.f. (This “software” is controlled by ECCN 9D515)

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

(a) See ECCN 9D610 for “software” related to aircraft, refuelers, ground equipment, parachutes, harnesses, instrument flight trainers and “parts”, “accessories,” and “attachments” for the forgoing that, immediately prior to October 15, 2013, were classified under 9A018.a.1, .a.3, .c, .d, .e, or .f.

(b) See ECCN 9D619 for “software” related to military trainer aircraft turbo prop engines and “parts” and “components” therefor that, immediately prior to October 15, 2013, were classified under ECCN 9A018.a.2 or .a.3.

(c) Software related to certain armored ground transport vehicles that prior to January 6, 2014 were classified under ECCN 9A018.b is EAR99 (See 0D606).

9D101 “Software” “specially designed” or modified for the “use” of commodities controlled by 9B104, 9B105, 9B106, 9B116, or 9B117.

License Requirements

Reason for Control: MT, AT

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

List Based License Exceptions (See Part 740 for a description of all license exceptions)

TSR: N/A

List of Items Controlled

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, 9A009, 9A105, 9A106, 9A107, 9A108, 9A109, 9A116 or 9A119. (This entry is “subject to the ITAR.” See 22 CFR parts 120 through 130.)

9D104 “Software” specially designed or modified for the “use” of equipment controlled by ECCN 9A001, 9A012 (for MT controlled items only), 9A101 (except for items in 9A101.b that are “subject to the ITAR,” see 22 CFR part 121), or 9A106.d.

License Requirements

Reason for Control: MT, AT

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
MT applies to entire entry	MT Column 1
AT applies to entire entry	AT Column 1

List Based License Exceptions (See Part 740 for a description of all license exceptions)

TSR: N/A

List of Items Controlled

Related Controls: “Software” for commodities specified in ECCNs 9A005 to 9A011, 9A103 to 9A105, 9A101.b (except for items that are subject to the EAR), 9A106.a, .b, and .c, 9A107 to 9A109, 9A111, 9A115 to 9A118 is “subject to the ITAR” (see 22 CFR parts 120 through 130).

Related Definitions: N/A

Items:

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

Note: For a manned aircraft converted to operate as an unmanned aerial vehicle specified in 9A012 and controlled for MT reasons, 9D104 includes “software”, as follows:

a. “Software” “specially designed” or modified to integrate the conversion equipment with the aircraft system functions;

b. “Software” “specially designed” or modified to operate the aircraft as an unmanned aerial vehicle.

9D105 “Software” that coordinates the function of more than one subsystem, “specially designed” or modified for “use” in rockets, missiles, or unmanned aerial vehicles capable of achieving a “range” equal to or greater than 300km. (These items are “subject to the ITAR.” See 22 CFR parts 120 through 130.)

9D515 “Software” “specially designed” for the “development,” “production,” operation, installation, maintenance, repair, overhaul, or refurbishing of “spacecraft” and related commodities, as follows (see List of Items Controlled).

License Requirements

Reason for Control: NS, RS, AT

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
NS applies to entire entry except 9D515.y.	NS Column 1
RS applies to entire entry except 9D515.y.	RS Column 1
RS applies to 9D515.y.	China, Russia

except to Russia for use in, with, or for the International Space Station (ISS), including launch to the ISS.	or Venezuela (see § 742.6(a)(7)).
AT applies to entire entry	AT Column 1

List Based License Exceptions (See Part 740 for a description of all license exceptions)

TSR: N/A

Special Conditions for STA

STA: (1) Paragraph (c)(1) of License Exception STA (§ 740.20(c)(1) of the EAR) may not be used for 9D515.b, .d, or .e. (2) Paragraph (c)(2) of License Exception STA (§ 740.20(c)(2) of the EAR) may not be used for any “software” in 9D515.

List of Items Controlled

Related Controls: 1) “Software” directly related to articles enumerated in USML Category XV is subject to the control of USML paragraph XV(f). 2) See also ECCNs 3D001, 6D001, 6D002, and 6D991 for controls of specific “software” “specially designed” for certain “space-qualified” items. 3) For “software” for items listed in 9A004.d that are incorporated into “spacecraft payloads”, see the appropriate “software” ECCN within those Categories.

Related Definitions: N/A

Items:

a. “Software” (other than “software” controlled in paragraphs .b, .d, or .e of this entry) “specially designed” for the “development,” “production,” operation, installation, maintenance, repair, overhaul, or refurbishing of commodities controlled by ECCN 9A515 (except 9A515.d or .e) or 9B515.

b. “Source code” that:

b.1. Contains the algorithms or control principles (e.g., for clock management), precise orbit determination (e.g., for ephemeris or pseudo range analysis), signal construct (e.g., pseudo-random noise (PRN) anti-spoofing) “specially designed” for items controlled by ECCN 9A515;

b.2. Is “specially designed” for the integration, operation, or control of items controlled by ECCN 9A515;

b.3. Contains algorithms or modules “specially designed” for system, subsystem, component, part, or accessory calibration, manipulation, or control of items controlled by ECCN 9A515;

b.4. Is “specially designed” for data assemblage, extrapolation, or manipulation of items controlled by ECCN 9A515;

b.5. Contains the algorithms or control laws “specially designed” for attitude, position, or flight control of items controlled in ECCN 9A515; or

b.6. Is “specially designed” for built-in test and diagnostics for items controlled by ECCN 9A515.

c. [Reserved]

d. “Software” “specially designed” for the “development,” “production,” operation, failure analysis or anomaly resolution of commodities controlled by ECCN 9A515.d.

e. “Software” “specially designed” for the “development,” “production,” operation, failure analysis or anomaly resolution of commodities controlled by ECCN 9A515.e.

f. through x. [Reserved]

y. Specific “software” “specially designed” for the “development,” “production,” operation, or maintenance of commodities enumerated in ECCN 9A515.y.

9D604 “Software” “specially designed” for the “development,” “production,” operation, or maintenance of commodities controlled by ECCN 9A604 or 9B604 (see List of Items Controlled).

License Requirements

Reason for Control: NS, RS, MT, AT, UN

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
NS applies to entire entry	NS Column 1
RS applies to entire entry	RS Column 1
MT applies to “software,” as described in paragraph .a of this entry, for commodities controlled for MT reasons in ECCN 9A604.c or .d, or ECCN 9B604.	MT Column 1
AT applies to entire entry	AT Column 1
UN applies to entire entry	See § 746.1(b) for UN controls

List Based License Exceptions (See Part 740 for a description of all license exceptions)

TSR: N/A

Special Conditions for STA

STA: Paragraph (c)(2) of License Exception STA (§ 740.20(c)(2) of the EAR) may not be used for any item in this ECCN 9D604.

List of Items Controlled

Related Controls: (1) Software directly related to articles enumerated or otherwise

described in USML Category IV is controlled under USML Category IV(i). (2) See also ECCNs 9D101 and 9D104 for controls on “software” for the “use” of missiles and related commodities. (3) See ECCN 0A919 for foreign-made “military commodities” that incorporate more than a *de minimis* amount of U.S.-origin “600 series” controlled content.

Related Definitions: N/A

Items:

a. “Software” “specially designed” for the “development,” “production,” operation or maintenance of commodities controlled by ECCN 9A604 or ECCN 9B604.

b. [RESERVED]

9D610 Software “specially designed” for the “development,” “production,” operation, or maintenance of military aircraft and related commodities controlled by 9A610, equipment controlled by 9B610, or materials controlled by 9C610 (see List of Items Controlled).

License Requirements

Reason for Control: NS, RS, MT, AT, UN

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
NS applies to entire entry except 9D610.y.	NS Column 1
MT applies to software “specially designed” for the operation, installation, maintenance, repair, overhaul, or refurbishing of commodities controlled for MT reasons in 9A610 or 9B610.	MT Column 1
RS applies to entire entry except 9D610.y.	RS Column 1
RS applies to 9D610.y.	China, Russia or Venezuela

	(see § 742.6(a)(7)).
AT applies to entire entry	AT Column 1
UN applies to entire entry except 9D610.y.	See § 746.1(b) for UN controls

List Based License Exceptions (See Part 740 for a description of all license exceptions)

TSR: N/A

Special Conditions for STA

STA: (1) Paragraph (c)(1) of License Exception STA (§ 740.20(c)(1) of the EAR) may not be used for 9D610.b. (2) Paragraph (c)(2) of License Exception STA (§ 740.20(c)(2) of the EAR) may not be used for any software in 9D610.

List of Items Controlled

Related Controls: Software directly related to articles enumerated or otherwise described in USML Category VIII is subject to the control of USML paragraph VIII(i).

Related Definitions: N/A

Items:

a. “Software” (other than software controlled in paragraphs .b or .y of this entry) “specially designed” for the “development,” “production,” operation, or maintenance of commodities controlled by ECCN 9A610, ECCN 9B610, or ECCN 9C610.

b. “Software” “specially designed” for the “development” or “production” of any of the following:

b.1. Static structural members;

b.2. Exterior skins, removable fairings, non-removable fairings, radomes, access doors and

panels, and in-flight opening doors;

b.3. Control surfaces, leading edges, trailing edges, and leading edge flap seals;

b.4. Leading edge flap actuation system commodities (i.e., power drive units, rotary geared actuators, torque tubes, asymmetry brakes, position sensors, and angle gearboxes) “specially designed” for fighter, attack, or bomber aircraft controlled in USML Category VIII;

b.5. Engine inlets and ducting;

b.6. Fatigue life monitoring systems “specially designed” to relate actual usage to the analytical or design spectrum and to compute amount of fatigue life “specially designed” for aircraft controlled by either USML subcategory VIII(a) or ECCN 9A610.a, except for Military Commercial Derivative Aircraft;

b.7. Landing gear, and “parts” and “components” “specially designed” therefor, “specially designed” for use in aircraft weighing more than 21,000 pounds controlled by either USML subcategory VIII(a) or ECCN 9A610.a, except for Military Commercial Derivative Aircraft;

b.8. Conformal fuel tanks and “parts” and “components” “specially designed” therefor;

b.9. Electrical “equipment,” “parts,” and “components” “specially designed” for electromagnetic interference (EMI) – i.e., conducted emissions, radiated emissions, conducted susceptibility and radiated susceptibility – protection of aircraft that conform to the requirements of MIL-STD-461;

b.10. HOTAS (Hand-on Throttle and Stick) controls, HOCAS (Hands on Collective and Stick), Active Inceptor Systems (i.e., a combination of Active Side Stick Control Assembly, Active Throttle Quadrant Assembly,

and Inceptor Control Unit), rudder pedal assemblies for digital flight control systems, and parts and components “specially designed” therefor;

b.11. Integrated Vehicle Health Management Systems (IVHMS), Condition Based Maintenance (CBM) Systems, and Flight Data Monitoring (FDM) systems;

b.12. Equipment “specially designed” for system prognostic and health management of aircraft;

b.13. Active Vibration Control Systems; or

b.14. Self-sealing fuel bladders “specially designed” to pass a .50 caliber or larger gunfire test (MIL-DTL-5578, MIL-DTL-27422).

c. to x. [Reserved]

y. Specific “software” “specially designed” for the “development,” “production,” operation, or maintenance of commodities enumerated in ECCN 9A610.y.

9D619 Software “specially designed” for the “development,” “production,” operation or maintenance of military gas turbine engines and related commodities controlled by 9A619, equipment controlled by 9B619, or materials controlled by 9C619 (see List of Items Controlled).

License Requirements

Reason for Control: NS, RS, AT, UN

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
NS applies to entire entry except 9D619.y.	NS Column 1
MT applies to software	RS Column 1

“specially designed” for the operation, installation, maintenance, repair, overhaul, or refurbishing of commodities controlled for MT reasons in 9A610 or 9B610.	
RS applies to entire entry except 9D619.y.	RS Column 1
RS applies to 9D619.y.	China, Russia or Venezuela (see § 742.6(a)(7)).
AT applies to entire entry	AT Column 1
UN applies to entire entry except 9D619.y.	See § 746.1(b) for UN controls

List Based License Exceptions (See Part 740 for a description of all license exceptions)

TSR: N/A

Special Conditions for STA

STA: (1) Paragraph (c)(1) of License Exception STA (§ 740.20(c)(1) of the EAR) may not be used for 9D619.b. (2) Paragraph (c)(2) of License Exception STA (§ 740.20(c)(2) of the EAR) may not be used for any software in ECCN 9D619.

List of Items Controlled

Related Controls: Software directly related to articles enumerated or otherwise described in USML Category XIX is subject to the control of USML paragraph XIX(g).

Related Definitions: N/A

Items:

a. “Software” (other than software controlled in paragraph .b of this entry) “specially designed” for the “development,” “production,” operation, or maintenance of commodities controlled by ECCN 9A619 (except 9A619.y), ECCN 9B619

(except 9B619.y), or ECCN 9C619.

b. “Software” “specially designed” for the “development” or “production” of any of the following:

b.1. Front, turbine center, and exhaust frames;

b.2. Low pressure compressor (i.e., fan) “components” and “parts” as follows: nose cones, casings, blades, vanes, spools, shrouds, blisks, shafts and disks;

b.3. High pressure compressor “components” and “parts” as follows: casings, blades, vanes, spools, shrouds, blisks, shafts, disks, and impellers;

b.4. Combustor “components” and “parts” as follows: casings, fuel nozzles, swirlers, swirler cups, deswirlers, valve injectors, igniters, diffusers, liners, chambers, cowlings, domes and shells;

b.5. High pressure turbine “components” and “parts” as follows: casings, shafts, disks, blades, vanes, nozzles, and tip shrouds;

b.6. Low pressure turbine “components” and “parts” as follows: casings, shafts, disks, blades, vanes, nozzles, and tip shrouds;

b.7. Augmentor “components” and “parts” as follows: casings, flame holders, spray bars, pilot burners, augmentor fuel controls, flaps (external, convergent, and divergent), guide and synchronization rings, and flame detectors and sensors;

b.8. Mechanical “components” and “parts” as follows: fuel metering units and fuel pump metering units, valves (fuel throttle, main metering, oil flow management), heat exchangers (air/air, fuel/air, fuel/oil), debris monitoring (inlet and exhaust), seals (carbon, labyrinth, brush, balance piston, and knife-edge), permanent magnetic alternator and generator, eddy current

sensors;

b.9. Torquemeter assembly (i.e., housing, shaft, reference shaft, and sleeve);

b.10. Digital engine control systems (e.g., Full Authority Digital Engine Controls (FADEC) and Digital Electronic Engine Controls (DEEC)) “specially designed” for gas turbine engines controlled in this ECCN; or

b.11. Engine monitoring systems (i.e., prognostics, diagnostics, and health) “specially designed” for gas turbine engines and components controlled in this ECCN.

c. to x. [RESERVED]

y. Specific “software” “specially designed” for the “development,” “production,” operation, or maintenance of commodities enumerated in ECCN 9A619.y or 9B619.y.

9D620 “Software” “specially designed” for cryogenic and “superconductive” equipment, as follows (see List of Items Controlled).

License Requirements

Reasons for Control: NS, RS, AT, UN

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

List Based License Exceptions (see Part 740 for a description of all license exceptions)

TSR: N/A

Special Conditions for STA

STA: Paragraph (c)(2) of License Exception STA (§740.20(c)(2) of the EAR) may not be used for any “software” in 9D620.

List of Items Controlled

Related Controls: “Software” directly related to articles enumerated on USML are subject to the control of that USML category.

Related Definitions: N/A

Items:

Software “specially designed” for the “development,” “production,” operation, or maintenance of commodities controlled by ECCNs 9A620 or 9B620.

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

License Requirements

Reason for Control: AT

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
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

List Based License Exceptions (See Part 740 for a description of all license exceptions)

TSR: N/A

List of Items Controlled

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

Reason for Control: AT

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
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

List of Items Controlled

Related Controls: N/A

Related Definitions: N/A

Items:

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

E. “TECHNOLOGY”

Note 1: “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.

Note 2: *USML Category XV(f) and ECCNs 9E001, 9E002 and 9E515 do not control the data transmitted to or from a satellite or “spacecraft,” whether real or simulated, when limited to information about the health, operational status, or measurements or function of, or raw sensor output from, the “spacecraft,” “spacecraft” payload(s), or its associated subsystems or components. Such information is not within the scope of information captured within the definition of “technology” in the EAR for purposes of Category 9 Product Group E. Examples of such information, which are commonly referred to as “housekeeping data,” include (i) system, hardware, component configuration, and operation status information pertaining to temperatures, pressures, power, currents, voltages, and battery charges; (ii) “spacecraft” or payload orientation or position information, such as state vector or ephemeris information; (iii) payload raw mission or science output, such as images, spectra, particle measurements, or field measurements; (iv) command responses; (v) accurate timing information; and (vi) link budget data. The act of processing such telemetry data – i.e., converting raw data into engineering units or readable products – or encrypting it does not, in and of itself, cause the telemetry data to become subject to the ITAR or to ECCN 9E515 for purposes of 9A515, or to ECCNs 9E001 or 9E002 for purposes of 9A004. All classified technical data directly related to items controlled in USML Category XV or ECCNs 9A515, and defense services using the classified technical data remains subject to the ITAR. This note does not affect controls in USML XV(f), ECCN 9D515, or ECCN 9E515 on software source code or commands that control a “spacecraft,” payload, or associated subsystems for purposes of 9A515. This note also does not affect controls in ECCNs 9D001, 9D002, 9E001, or 9E002 on software source code or commands that control a “spacecraft,” payload, or associated subsystems for purposes of 9A004.*

9E001 “Technology” according to the General Technology Note for the “development” of equipment or “software”, controlled by 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

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
NS applies to “technology” for items controlled by 9A004, 9A012, 9B001 to 9B010, 9D001 to 9D004 for NS reasons.	NS Column 1
MT applies to “technology” for items controlled by 9A012, 9B001, 9B002, 9B003, 9B004, 9B005, 9B007, 9B104, 9B105, 9B106, 9B115, 9B116, 9B117, 9D001, 9D002, 9D003, or 9D004 for MT reasons.	MT Column 1
AT applies to entire entry	AT Column 1

Reporting Requirements

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

List Based License Exceptions (See Part 740 for a description of all license exceptions)

TSR: N/A

Special Conditions for STA

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

List of Items Controlled

Related Controls: (1) See also [9E101](#) and 1E002.f (for controls on “technology” for the repair of controlled structures, laminates or materials). (2) “Technology” required for the “development” of equipment described in ECCNs 9A005 to 9A011 or “software” described in ECCNs 9D103 and 9D105 is “subject to the ITAR.”

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 ECCN 9A004 or 9B (except for ECCNs 9B117, 9B604, 9B610, 9B619, 9B990, and 9B991).

License Requirements

Reason for Control: NS, MT, AT

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
NS applies to entire entry	NS Column 1
MT applies to “technology” for equipment controlled by 9B001, 9B002, 9B003, 9B004, 9B005, 9B007, 9B104, 9B105, 9B106, 9B115 or 9B116 for MT reasons.	MT Column 1
AT applies to entire entry	AT Column 1

Reporting Requirements

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

List Based License Exceptions (See Part 740 for a description of all license exceptions)

TSR: N/A

Special Conditions for STA

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

List of Items Controlled

Related Controls: (1) See also [9E102](#). (2) See also 1E002.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.

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 (See Supp. No.)</i>

	<i>1 to part 738)</i>
NS applies to entire entry	NS Column 1
SI applies to 9E003.a.1 through a.8, .h, .i, and .l.	See §742.14 of the EAR for additional information.
AT applies to entire entry	AT Column 1

Reporting Requirements

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

List Based License Exceptions (See Part 740 for a description of all license exceptions)

TSR: N/A

Special Conditions for STA

STA: License Exception STA may not be used to ship or transmit any technology in 9E003.a.1 to a.5, 9E003.c, 9E003.h, or 9E003.i (other than technology for fan or power turbines) to any of the destinations listed in Country Group A:5 or A:6 (See Supplement No.1 to part 740 of the EAR).

License Exception STA may not be used to ship or transmit any technology in 9E003.k to any of the destinations listed in Country Group A:6 (See Supplement No.1 to part 740 of the EAR).

List of Items Controlled

Related Controls: (1) 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

Items:

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

a.1. Gas turbine blades, vanes or “tip shrouds”, made from Directionally Solidified (DS) or Single Crystal (SC) alloys and having (in the 001 Miller Index Direction) a stress-rupture life exceeding 400 hours at 1,273 K (1,000°C) at a stress of 200 MPa, based on the average property values;

Technical Note: For the purposes of 9E003.a.1, stress-rupture life testing is typically conducted on a test specimen.

a.2. Combustors having any of the following:

a.2.a. ‘Thermally decoupled liners’ designed to operate at ‘combustor exit temperature’ exceeding 1,883 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.c;

a.2.e. Utilizing ‘pressure gain combustion’;

Technical Note: For the purposes of 9E003.a.2.e, in ‘pressure gain combustion’ the bulk average stagnation pressure at the combustor outlet is greater than the bulk average stagnation pressure at the combustor inlet due primarily to the combustion process, when the engine is running in a “steady state mode” of operation.

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. For the purposes of 9E003.a.2.a, ‘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. For the purposes of 9E003.a.2.d, ‘combustor exit temperature’ is the bulk average gas path total (stagnation) temperature between the combustor exit plane and the leading edge of the turbine inlet guide vane (i.e., measured at engine station T40 as defined in SAE ARP 755A) when the engine is running in a “steady state mode” of operation at the certificated maximum continuous operating temperature.

N.B.: See 9E003.c for “technology” “required” for manufacturing cooling holes.

a.3. “Parts” or “components,” that are any of the following:

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

a.3.b. Manufactured from any of the following:

a.3.b.1. Metal “matrix” “composites” reinforced by any of the following:

a.3.b.1.a. Materials controlled by 1C007;

a.3.b.1.b. “Fibrous or filamentary materials” specified by 1C010; or

a.3.b.1.c. Aluminides specified by 1C002.a; or

a.3.b.2. Ceramic “matrix” “composites” specified by 1C007; or

a.3.c. Stators, vanes, blades, tip seals (shrouds), rotating blings, rotating blisks or ‘splitter ducts’, that are all of the following:

a.3.c.1. Not specified in 9E003.a.3.a;

a.3.c.2. Designed for compressors or fans; and

a.3.c.3. Manufactured from material controlled by 1C010.e with resins controlled by 1C008;

Technical Note: For the purposes of 9E003.a.3.c, a ‘splitter duct’ performs the initial separation of the air-mass flow between the bypass and core sections of the engine.

a.4. Uncooled turbine blades, vanes or “tip shrouds” designed to operate at a ‘gas path temperature’ of 1,373 K (1,100°C) or more;

a.5. Cooled turbine blades, vanes or “tip shrouds”, other than those described in 9E003.a.1, designed to operate at a ‘gas path temperature’ of 1,693 K (1,420°C) or more;

Technical Note: For the purposes of 9E003.a.5, ‘gas path temperature’ is the bulk average gas path total (stagnation) temperature at the leading edge plane of the turbine component when the engine is running in a “steady state mode” of operation at the certificated or specified maximum continuous operating temperature.

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

a.7. [Reserved]

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

Technical Note: For the purposes of 9E003.a.8, ‘damage tolerant’ “parts” and “components” are designed using methodology and substantiation to predict and limit crack growth.

a.9. [Reserved]

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

a.10. [Reserved]

N.B.: For adjustable flow path geometry, see 9E003.i.

a.11. ‘Fan blades’ having all of the following:

a.11.a. 20% or more of the total volume being one or more closed cavities containing vacuum or gas only; and

a.11.b. One or more closed cavities having a volume of 5 cm³ or larger;

Technical Note: For the purposes of 9E003.a.11, a ‘fan blade’ is the aerofoil portion of the rotating stage or stages, which provide

both compressor and bypass flow in a gas turbine engine.

b. “Technology” “required” for the “development” or “production” of any of the following:

b.1. Wind tunnel aero-models equipped with non-intrusive sensors capable of transmitting data from the sensors to the data acquisition system; or

b.2. “Composite” propeller blades or prop-fans, capable of absorbing more than 2,000 kW at flight speeds exceeding Mach 0.55;

c. “Technology” “required” for manufacturing cooling holes in gas turbine engine “parts” or “components” incorporating any of the “technologies” specified by 9E003.a.1, 9E003.a.2 or 9E003.a.5, and having any of the following:

c.1. Having all of the following:

c.1.a. Minimum ‘cross-sectional area’ less than 0.45 mm²;

c.1.b. ‘Hole shape ratio’ greater than 4.52; and

c.1.c. ‘Incidence angle’ equal to or less than 25°; or

c.2. Having all of the following:

c.2.a. Minimum ‘cross-sectional area’ less than 0.12 mm²;

c.2.b. ‘Hole shape ratio’ greater than 5.65; and

c.2.c. ‘Incidence angle’ more than 25°;

Note: 9E003.c does not apply to “technology” for manufacturing constant radius cylindrical holes that are straight through and

enter and exit on the external surfaces of the component.

Technical Notes:

1. For the purposes of 9E003.c, the ‘cross-sectional area’ is the area of the hole in the plane perpendicular to the hole axis.

2. For the purposes of 9E003.c, ‘hole shape ratio’ is the nominal length of the axis of the hole divided by the square root of its minimum ‘cross-sectional area’.

3. For the purposes of 9E003.c, ‘incidence angle’ is the acute angle measured between the plane tangential to the airfoil surface and the hole axis at the point where the hole axis enters the airfoil surface.

4. For the purposes of 9E003.c, methods for manufacturing holes include “laser” beam machining, water jet machining, Electro-Chemical Machining (ECM) or Electrical Discharge Machining (EDM).

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: For the purposes of 9E003.e.1., ‘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” “parts” or “components” for high output diesel engines, as follows:

f.1. “Technology” “required” for the “production” of engine systems having all of the following “parts” and “components” employing ceramics materials controlled by 1C007:

f.1.a. Cylinder liners;

f.1.b. Pistons;

f.1.c. Cylinder heads; *and*

f.1.d. One or more other “part” or “component” (including exhaust ports, turbochargers, valve guides, valve assemblies or insulated fuel injectors);

f.2. “Technology” “required” for the “production” of turbocharger systems with

single-stage compressors and having all of the following:

f.2.a. Operating at pressure ratios of 4:1 or higher;

f.2.b. Mass flow in the range from 30 to 130 kg per minute; *and*

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

f.3. “Technology” “required” for the “production” of fuel injection systems with a “specially designed” multifuel (*e.g.*, diesel or jet fuel) capability covering a viscosity range from diesel fuel (2.5 cSt at 310.8 K (37.8°C)) down to gasoline fuel (0.5 cSt at 310.8 K (37.8°C)) and having all of the following:

f.3.a. Injection amount in excess of 230 mm³ per injection per cylinder; *and*

f.3.b. Electronic control features “specially designed” for switching governor characteristics automatically depending on fuel property to provide the same torque characteristics by using the appropriate sensors;

g. “Technology” “required” for the “development” or “production” of ‘high output diesel engines’ for solid, gas phase or liquid film (or combinations thereof) cylinder wall lubrication and permitting operation to temperatures exceeding 723 K (450°C), measured on the cylinder wall at the top limit of travel of the top ring of the piston;

Technical Note: For the purposes of 9E003.g, ‘high output diesel engines’ are diesel engines with a specified brake mean effective pressure of 1.8 MPa or more at a speed of 2,300 r.p.m., provided the rated speed is 2,300 r.p.m. or more.

h. “Technology” for gas turbine engine “FADEC systems” as follows:

h.1. “Development” “technology” for deriving the functional requirements for the “parts” or “components” necessary for the “FADEC system” to regulate engine thrust or shaft power (*e.g.*, feedback sensor time constants and accuracies, fuel valve slew rate);

h.2. “Development” or “production” “technology” for control and diagnostic “parts” or “components” unique to the “FADEC system” and used to regulate engine thrust or shaft power;

h.3. “Development” “technology” for the control law algorithms, including “source code”, unique to the “FADEC system” and used to regulate engine thrust or shaft power;

Note: 9E003.h does not apply to technology related to engine-“aircraft” integration required by civil aviation authorities of one or more Wassenaar Arrangement Participating States (See Supplement No. 1 to part 743 of the EAR) to be published for general airline use (e.g., installation manuals, operating instructions, instructions for continued airworthiness) or interface functions (e.g., input/output processing, airframe thrust or shaft power demand).

i. “Technology” for adjustable flow path systems designed to maintain engine stability for gas generator turbines, fan or power turbines, or propelling nozzles, as follows:

i.1. “Development” “technology” for deriving the functional requirements for the “parts” or “components” that maintain engine stability;

i.2. “Development” or “production” “technology” for “parts” or “components” unique to the adjustable flow path system and that maintain engine stability;

i.3. “Development” “technology” for the control law algorithms, including “source code”,

unique to the adjustable flow path system and that maintain engine stability;

Note: 9E003.i does not apply to “technology” for any of the following:

- a. Inlet guide vanes;
- b. Variable pitch fans or prop-fans;
- c. Variable compressor vanes;
- d. Compressor bleed valves; or
- e. Adjustable flow path geometry for reverse thrust.

j. “Technology” “required” for the “development” of wing-folding systems designed for fixed-wing “aircraft” powered by gas turbine engines.

N.B.: For “technology” “required” for the “development” of wing-folding systems designed for fixed-wing “aircraft” specified in USML Category VIII (a), see USML Category VIII (i).

k. “Technology”, not specified in 9E003.a, 9E003.h, or 9E003.i, “required” for the “development” of any of the following components or systems, “specially designed” for aero gas turbine engines to enable “aircraft” to cruise at Mach 1 or greater for more than 30 minutes:

- k.1. Propulsion inlet systems;
- k.2. Propulsion exhaust systems;
- k.3. ‘Reheat systems’;
- k.4. ‘Active thermal management systems’ to condition fluids used to lubricate or cool ‘engine rotor supports’;
- k.5. Oil-free ‘engine rotor supports’; or
- k.6. Systems to remove heat from ‘compression system’ core gas path flow.

Technical Notes: For the purposes of

9E003.k:

1. Propulsion inlet systems include core flow pre-coolers.
2. ‘Reheat systems’ provide additional thrust by combusting fuel in exhaust and/or bypass flow downstream of the last turbomachinery stage. ‘Reheat systems’ are also referred to as afterburners.
3. ‘Active thermal management systems’ employ methods other than passive oil-to-air cooling or oil-to-fuel cooling, such as vapor cycle systems.
4. ‘Compression system’ is any stage or combination of stages between the engine inlet face and the combustor that increases gas path pressure through mechanical work.
5. An ‘engine rotor support’ is the bearing supporting the main engine shaft that drives the compression system or turbine rotors.

N.B. 1 See 9E003.h for engine control technology.

N.B. 2 See 9E003.i for adjustable flow path systems technology.

l. “Technology” not otherwise controlled in 9E003.a.1 through a.8, a.10, and .h and used in the “development”, “production”, or overhaul of hot section “parts” or “components” of civil derivatives of military engines controlled on the U.S. Munitions List.

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

(a) See ECCN 9E610 for “technology” related to aircraft, refuelers, ground equipment, parachutes, harnesses, instrument flight trainers and “parts”, “accessories” and “attachments” for the forgoing that, immediately prior to

October 15, 2013, were classified under 9A018.a.1, .a.3, .c, .d, .e, or .f.

(b) See ECCN 9E619 for “technology” related to military trainer aircraft turbo prop engines and “parts” and “components” therefor that, immediately prior to October 15, 2013, were classified under ECCN 9A018.a.2 or .a.3.

(c) Technology related to certain armored ground transport vehicles that prior to January 6, 2014 were classified under ECCN 9A018.b is EAR99 (See 0E606).

9A101.b (except for items that are “subject to the EAR”), 9A104, 9A105, 9A106.a, .b, and .c, 9A107 to 9A109, 9A110 (for items that are “specially designed” for use in missile systems and subsystems), 9A111, 9A115 to 9A119, 9D103, and 9D105 is “subject to the ITAR” (see 22 CFR parts 120 through 130).

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” or “production” of commodities or “software” controlled by ECCN 9A012 (applies only to “production” “technology” for MT-controlled items in 9A012), 9A101 (except for items in 9A101.b that are “subject to the ITAR,” see 22 CFR part 121), 9A106.d or .e, 9A110 (for items that are “specially designed” for non-military unmanned aerial vehicles controlled by 9A012), 9C110, 9D101, or 9D104.

9E102 “Technology” according to the General Technology Note for the “use” of commodities or “software” controlled by ECCN 9A004 (except for items in 9A004 that are “subject to the ITAR,” see 22 CFR part 121), 9A012, 9A101 (except for items in 9A101.b that are “subject to the ITAR,” see 22 CFR part 121), 9A106.d or .e, 9A110 (for items that are “specially designed” for non-military unmanned aerial vehicles controlled by 9A012), 9B105, 9B106, 9B115, 9B116, 9D101, or 9D104.

License Requirements

Reason for Control: MT, AT

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

List Based License Exceptions (See Part 740 for a description of all license exceptions)

TSR: N/A

List of Items Controlled

Related Controls: “Technology” that is required for items specified in ECCNs

License Requirements

Reason for Control: MT, AT

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

List Based License Exceptions (See Part 740 for a description of all license exceptions)

TSR: N/A

List of Items Controlled

Related Controls: (1) For the purpose of this entry, “use” “technology” is limited to items

controlled for MT and their subsystems. (2) “Technology” for items specified in ECCNs 9A004 (except for items that are “subject to the EAR”), 9A005 to 9A011, 9A101.b (except for items that are “subject to the EAR”), 9A104, 9A105, 9A106.a, .b and .c, 9A107 to 9A109, 9A110 (for items that are “specially designed” for use in missile systems and subsystems), 9A111, 9A115 to 9A119, 9D103, and 9D105 is “subject to the ITAR” (see 22 CFR part 121).

Related Definitions: N/A

Items:

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

9E515 “Technology” “required” for the “development,” “production,” operation, installation, repair, overhaul, or refurbishing of “spacecraft” and related commodities, as follows (see List of Items Controlled).

License Requirements

Reason for Control: NS, MT, RS, AT

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
NS applies to entire entry except 9E515.y	NS Column 1.
MT applies to technology for items in 9A515.d, 9A515.e.2, 9A515.h, and 9B515.a controlled for MT reasons	MT Column 1
RS applies to entire entry except 9E515.y	RS Column 1.
RS applies to 9E515.y, except to Russia for use in, with, or for the International Space Station (ISS), including launch to the ISS	China, Russia, or Venezuela (see § 742.6(a)(7)).
AT applies to entire entry	AT Column 1

License Requirement Note: *The Commerce Country Chart is not used for determining license requirements for “technology” classified ECCN 9E515.f. See § 742.6(a)(9), which specifies that such “technology” is subject to a worldwide license requirement.*

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

TSR: N/A

Special Conditions for STA

STA: (1) Paragraph (c)(1) of License Exception STA (§ 740.20(c)(1) of the EAR) may not be used for ECCN 9E515.b, .d, .e, or .f unless determined by BIS to be eligible for License Exception STA in accordance with § 740.20(g) (License Exception STA eligibility requests for certain 9x515 and “600 series” items). (2) Paragraph (c)(2) of License Exception STA (§ 740.20(c)(2) of the EAR) may not be used for any “technology” in 9E515.

List of Items Controlled

Related Controls: Technical data directly related to articles enumerated in USML Category XV are subject to the control of USML paragraph XV(f). See also ECCNs 3E001, 3E003, 6E001, and 6E002 for specific “space-qualified” items. See ECCNs 9E001 and 9E002 for technology for the International Space Station, the James Webb Space Telescope (JWST) and “parts,” “components,” “accessories,” and “attachments” “specially designed” therefor. See USML category XV(f) for controls on technical data and defense services related to launch vehicle integration.

Related Definitions: N/A

Items:

a. “Technology” “required” for the “development,” “production,” installation, repair (including on-orbit anomaly resolution and analysis beyond established procedures),

overhaul, or refurbishing of commodities controlled by ECCN 9A515 (except 9A515.a.1, .a.2, .a.3, .a.4, .b, .d, .e, or .g), ECCN 9B515, or “software” controlled by ECCN 9D515.a.

b. “Technology” “required” for the “development,” “production,” failure analysis or anomaly resolution of software controlled by ECCN 9D515.b.

c. [Reserved]

d. “Technology” “required” for the “development,” “production,” operation, failure analysis or anomaly resolution of commodities controlled by ECCN 9A515.d.

e. “Technology” “required” for the “development,” “production,” failure analysis or anomaly resolution of commodities controlled by ECCN 9A515.e.

f. “Technology” “required” for the “development,” “production,” installation, repair (including on-orbit anomaly resolution and analysis beyond established procedures), overhaul, or refurbishing of commodities controlled by ECCN 9A515.a.1, .a.2, .a.3, .a.4, or .g.

g. through x. [Reserved]

y. Specific “technology” “required” for the “production,” “development,” operation, installation, maintenance, repair, overhaul, or refurbishing of commodities or software enumerated in ECCN 9A515.y or 9D515.y.

Note 1: [Reserved]

Note 2: *Activities and technology/technical data directly related to or required for the spaceflight (e.g., sub-orbital, orbital, lunar, interplanetary, or otherwise beyond Earth orbit) passenger or participant experience, regardless of whether the passenger or participant experience is for space tourism,*

scientific or commercial research, commercial manufacturing/production activities, educational, media, or commercial transportation purposes, are not subject to the ITAR or the EAR. Such activities and technology/technical data include those directly related to or required for:

(i) *“Spacecraft” access, ingress, and egress, including the operation of all “spacecraft” doors, hatches, and airlocks;*

(ii) *Physiological training (e.g., human-rated centrifuge training or parabolic flights, pressure suit or spacesuit training/operation);*

(iii) *Medical evaluation or assessment of the spaceflight passenger or participant;*

(iv) *Training for and operation by the passenger or participant of health and safety related hardware (e.g., seating, environmental control and life support, hygiene facilities, food preparation, exercise equipment, fire suppression, communications equipment, safety-related clothing or headgear) or emergency procedures;*

(v) *Viewing of the interior and exterior of the spacecraft or terrestrial mock-ups;*

(vi) *Observing “spacecraft” operations (e.g., pre-flight checks, landing, in-flight status);*

(vii) *Training in “spacecraft” or terrestrial mock-ups for connecting to or operating passenger or participant equipment used for purposes other than operating the “spacecraft”; or*

(viii) *Donning, wearing or utilizing the passenger's or participant's flight suit, pressure suit or spacesuit, and personal equipment.*

9E604 “Technology” “required” for the “development,” “production,” operation, installation, maintenance, repair, overhaul, or refurbishing of commodities controlled by ECCN 9A604 or 9B604, or “software” controlled by ECCN 9D604 (see List of Items Controlled).

“development,” “production,” and “use” of missiles and related items controlled on the CCL.

Related Definitions: N/A

Items:

a. “Technology” “required” for the “development,” “production,” operation, installation, maintenance, repair, overhaul, or refurbishing of commodities controlled by ECCN 9A604 or 9B604, or “software” controlled by ECCN 9D604.

b. [Reserved]

License Requirements

Reason for Control: NS, RS, MT, AT, UN

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
NS applies to entire entry	NS Column 1
RS applies to entire entry	RS Column 1
MT applies to “technology,” as described in paragraph .a of this entry, for commodities and “software” controlled for MT reasons in ECCN 9A604, 9B604 or 9D604.	MT Column 1
AT applies to entire entry	AT Column 1
UN applies to entire entry	See § 746.1(b) for UN controls

9E610 Technology “required” for the “development,” “production,” operation, installation, maintenance, repair, overhaul, or refurbishing of military aircraft and related commodities controlled by 9A610, equipment controlled by 9B610, materials controlled by 9C610, or software controlled by 9D610 (see List of Items Controlled).

License Requirements

Reason for Control: NS, RS, MT, AT, UN

List Based License Exceptions (See Part 740 for a description of all license exceptions)

TSR: N/A

Special Conditions for STA

STA: Paragraph (c)(2) of License Exception STA (§ 740.20(c)(2) of the EAR) may not be used for any item in this ECCN 9E604.

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
NS applies to entire entry except 9E610.y.	NS Column 1
RS applies to entire entry except 9E610.y.	RS Column 1
RS applies to 9E610.y.	China, Russia or Venezuela (see § 742.6(a)(7)).
MT applies to “technology” “required” for the “development,” “production,” operation, installation, maintenance, repair, overhaul, or refurbishing of commodities or software controlled for MT reasons in	MT Column 1

List of Items Controlled

Related Controls: (1) Technical data directly related to articles enumerated or otherwise described in USML Category IV is controlled under USML Category IV(i). (2) See also ECCNs 9E002, 9E101, and 9E102 for controls on “technology” for the

9A610, 9B610, or 9D610 for MT reasons.	
AT applies to entire entry	AT Column 1
UN applies to entire entry except 9E610.y.	See §746.1(b) for UN controls

List Based License Exceptions (See Part 740 for a description of all license exceptions)

TSR: N/A

Special Conditions for STA

STA: (1) Paragraph (c)(1) of License Exception STA (§ 740.20(c)(1) of the EAR) may not be used for 9E610.b. (2) Paragraph (c)(2) of License Exception STA (§ 740.20(c)(2) of the EAR) may not be used for any technology in 9E610.

List of Items Controlled

Related Controls: Technical data directly related to articles enumerated or otherwise described in USML Category VIII are subject to the control of USML paragraph VIII(i).

Related Definitions: N/A

Items:

a. “Technology” (other than technology controlled by paragraphs .b or .y of this entry) “required” for the “development,” “production,” operation, installation, maintenance, repair, overhaul, or refurbishing of commodities or software controlled by ECCN 9A610, 9B610, 9C610, or 9D610.

Note: “Build-to-print technology” “required” for the “production” of items described in paragraphs b.1 through b.15 of this entry is classified under 9E610.a.

b. “Technology” (other than “build-to-print technology”) “required” for the “development” or “production” of any of the following:

- b.1. Static structural members;
- b.2. Exterior skins, removable fairings, non-removable fairings, radomes, access doors and panels, and in-flight opening doors;
- b.3. Control surfaces, leading edges, trailing edges, and leading edge flap seals;
- b.4. Leading edge flap actuation system commodities (i.e., power drive units, rotary geared actuators, torque tubes, asymmetry brakes, position sensors, and angle gearboxes) “specially designed” for fighter, attack, or bomber aircraft controlled in USML Category VIII;
- b.5. Engine inlets and ducting;
- b.6. Fatigue life monitoring systems “specially designed” to relate actual usage to the analytical or design spectrum and to compute amount of fatigue life “specially designed” for aircraft controlled by either USML subcategory VIII(a) or ECCN 9A610.a, except for Military Commercial Derivative Aircraft;
- b.7. Landing gear, and “parts” and “components” “specially designed” therefor, “specially designed” for use in aircraft weighing more than 21,000 pounds controlled by either USML subcategory VIII(a) or ECCN 9A610.a, except for Military Commercial Derivative Aircraft;
- b.8. Conformal fuel tanks and “parts” and “components” “specially designed” therefor;
- b.9. Electrical “equipment,” “parts,” and “components” “specially designed” for electromagnetic interference (EMI) – i.e., conducted emissions, radiated emissions, conducted susceptibility and radiated susceptibility – protection of aircraft that conform to the requirements of MIL-STD-461;

b.10. HOTAS (Hand-on Throttle and Stick) controls, HOCAS (Hands on Collective and Stick), Active Inceptor Systems (i.e., a combination of Active Side Stick Control Assembly, Active Throttle Quadrant Assembly, and Inceptor Control Unit), rudder pedal assemblies for digital flight control systems, and parts and components “specially designed” therefor;

b.11. Integrated Vehicle Health Management Systems (IVHMS), Condition Based Maintenance (CBM) Systems, and Flight Data Monitoring (FDM) systems;

b.12. Equipment “specially designed” for system prognostic and health management of aircraft;

b.13. Active Vibration Control Systems;

b.14. Self-sealing fuel bladders “specially designed” to pass a .50 caliber or larger gunfire test (MIL-DTL-5578, MIL-DTL-27422); *or*

b.15. Technology “required” for the “development” or “production” of “parts” or “components” controlled in 9A610.x and “specially designed” for damage or failure-adaptive flight control systems controlled in Category VIII(h)(7) of the USML.

c. through x. [Reserved]

y. Specific “technology” “required” for the “production,” “development,” operation, installation, maintenance, repair, overhaul, or refurbishing of commodities or software enumerated in ECCN 9A610.y or 9D610.y.

9E619 “Technology” “required” for the “development,” “production,” operation, installation, maintenance, repair, overhaul, or refurbishing of military gas turbine engines and related commodities controlled by 9A619, equipment controlled by 9B619, materials

controlled by 9C619, or software controlled by 9D619 (see List of Items Controlled).

License Requirements

Reason for Control: NS, RS, AT, UN

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
NS applies to entire entry except 9E619.y.	NS Column 1
RS applies to entire entry except 9E619.y.	RS Column 1
RS applies to 9E619.y.	China, Russia or Venezuela (see § 742.6(a)(7)).
AT applies to entire entry	AT Column 1
UN applies to entire entry except 9E619.y.	See §746.1(b) for UN controls

List Based License Exceptions (See Part 740 for a description of all license exceptions)

TSR: N/A

Special Conditions for STA

STA: (1) Paragraph (c)(1) of License Exception STA (§ 740.20(c)(1) of the EAR) may not be used for 9E619.b. or .c. (2) Paragraph (c)(2) of License Exception STA (§ 740.20(c)(2) of the EAR) may not be used for any technology in ECCN 9E619.

List of Items Controlled

Related Controls: Technical data directly related to articles enumerated or otherwise described in USML Category XIX are subject to the control of USML Category XIX(g).

Related Definitions: N/A

Items:

a. “Technology” (other than “technology” controlled by paragraphs .b and .c of this entry) “required” for the “development,” “production,” operation, installation, maintenance, repair, overhaul, or refurbishment of items controlled by ECCN 9A619 (except 9A619.y), ECCN 9B619 (except 9B619.y), ECCN 9C619, or ECCN 9D619 (except 9D619.y).

Note: “Build-to-print technology” “required” for the “production” of items described in paragraphs b.1 through b.10 of this entry is classified under 9E619.a.

b. “Technology” (other than “build-to-print technology”) “required” for the “development” or “production” of any of the following:

b.1. Front, turbine center, and exhaust frames;

b.2. Low pressure compressor (i.e., fan) “components” and “parts” as follows: nose cones and casings;

b.3. High pressure compressor “components” and “parts” as follows: casings;

b.4. Combustor “components” and “parts” as follows: casings, fuel nozzles, swirlers, swirler cups, deswirlers, valve injectors, and igniters;

b.5. High pressure turbine “components” and “parts” as follows: casings;

b.6. Low pressure turbine “components” and “parts” as follows: casings;

b.7. Augmentor “components” and “parts” as follows: casings, flame holders, spray bars, pilot burners, augmentor fuel controls, flaps (external, convergent, and divergent), guide and synchronization rings, and flame detectors and sensors;

b.8. Mechanical “components” and “parts” as follows: fuel metering units and fuel pump metering units, valves (fuel throttle, main

metering, oil flow management), heat exchangers (air/air, fuel/air, fuel/oil), debris monitoring (inlet and exhaust), seals (carbon, labyrinth, brush, balance piston, and “knife-edge”), permanent magnetic alternator and generator, eddy current sensors;

b.9. Torquemeter assembly (i.e., housing, shaft, reference shaft, and sleeve); or

b.10. Materials controlled by ECCN 9C619.b.

c. “Technology” “required” for the “development” or “production” of any of the following:

c.1. Low pressure compressor (i.e., fan) “components” and “parts” as follows: blades, vanes, spools, shrouds, blisks, shafts and disks;

c.2. High pressure compressor “components” and “parts” as follows: blades, vanes, spools, shrouds, blisks, shafts, disks, and impellers;

c.3. Combustor “components” and “parts” as follows: diffusers, liners, chambers, cowlings, domes and shells;

c.4. High pressure turbine “components” and “parts” as follows: shafts and disks, blades, vanes, nozzles, tip shrouds;

c.5. Low pressure turbine “components” and “parts” as follows: shafts and disks, blades, vanes, nozzles, tip shrouds;

c.6. Digital engine control systems (e.g., Full Authority Digital Engine Controls (FADEC) and Digital Electronic Engine Controls (DEEC)) “specially designed” for gas turbine engines controlled in this ECCN; or

c.7. Engine monitoring systems (i.e., prognostics, diagnostics, and health) “specially designed” for gas turbine engines and components controlled in this ECCN.

d. through x. [Reserved]

y. Specific “technology” “required” for the “development,” “production,” operation, installation, maintenance, repair, overhaul, or refurbishment of commodities controlled by 9A619.y or 9B619.y, or “software” controlled by ECCN 9D619.y.

9E620 Technology “required” for cryogenic and “superconductive” equipment, as follows (see List of Items Controlled).

License Requirements

Reason for Control: NS, RS, AT, UN

<i>Control(s)</i>	<i>Country chart (see Supp. No. 1 to part 738)</i>
NS applies to entire entry	NS Column 1
RS applies to entire entry	RS Column 1
AT applies to entire entry	AT Column 1
UN applies to entire entry	See §746.1(b) for UN controls

List Based License Exceptions (see Part 740 for a description of all license exceptions)

TSR: N/A

Special Conditions for STA

STA: Paragraph (c)(2) of License Exception STA (§740.20(c)(2) of the EAR) may not be used for any technology in 9E620.

List of Items Controlled

Related Controls: Technical data directly related to articles enumerated on USML are subject to the control of that USML category.

Related Definitions: N/A

Items:

“Technology” “required” for the “development,” “production,” operation, installation, maintenance, repair, overhaul, or refurbishing of commodities or software controlled by ECCN 9A620, 9B620 or 9D620.

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

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
AT applies to “technology” for equipment under 9A990 and 9B990 except 9A990.a	AT Column 1
AT applies to “technology” only for equipment under 9A990.a	AT Column 2

List Based License Exceptions (See Part 740 for a description of all license exceptions)

TSR: N/A

List of Items Controlled

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

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
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

List of Items Controlled

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

<i>Control(s)</i>	<i>Country Chart (See Supp. No. 1 to part 738)</i>
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

List of Items Controlled

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*.