

3. Optical opacity switches (filters) with a field of view of 30° or wider and a response time equal to or less than 1 ns;
1061. 4. e. Optical control equipment, as follows:
1. Specially designed to maintain the surface figure or orientation of the "space-qualified" components embargoed by 1061.4.c.1. or 3.;
  2. Having steering, tracking, stabilization or resonator alignment bandwidths equal to or more than 100 Hz and an accuracy of 10 microradians or less;
  3. Gimbals having a maximum slew exceeding 5°, a bandwidth equal to or more than 100 Hz, and either of the following:
    - a. 1. Exceeding 0.15 m but not exceeding 1 m in diameter or major axis length;
    2. Capable of angular accelerations exceeding 2 radians/s<sup>2</sup>; and
    3. Having angular pointing errors equal to or less than 200 microradians; or
    - b. 1. Exceeding 1 m in diameter or major axis length;
    2. Capable of angular accelerations exceeding 0.5 radian/s<sup>2</sup>; and
    3. Having angular pointing errors equal to or less than 200 microradians;
  4. Specially designed to maintain the alignment of phased array or phased segment mirror systems consisting of mirrors with a segment diameter or major axis length of 1 m or more;
1061. 4. f. "Fluoride fibre" cable, or optical fibres therefor, having an attenuation of less than 4 dB/km in the wavelength range exceeding 1,000 nm but not exceeding 3,000 nm;
1061. 5. Lasers
1061. 5. "Lasers", components and optical equipment, as follows:
- NOTES:**
1. Pulsed "lasers" include those that run in a continuous wave (CW) mode with pulses superimposed.
  2. Pulse-excited "lasers" include those that run in a continuously excited mode with pulse excitation superimposed.
  3. The embargo status of Raman "lasers" is determined by the parameters of the pumping source "lasers". The pumping source "lasers" can be any of the "lasers" described below.
1061. 5. a. Gas "lasers", as follows:
1. Excimer "lasers" having any of the following:
    - a. An output wavelength not exceeding 150 nm and:
      1. An output energy exceeding 50 mJ per pulse; or
      2. An average or CW output power exceeding 1 W;
    - b. An output wavelength exceeding 150 nm but not exceeding 190 nm and:
      1. An output energy exceeding 1.5 J per pulse; or
      2. An average or CW output power exceeding 120 W;
    - c. An output wavelength exceeding 190 nm but not exceeding 360 nm and:
      1. An output energy exceeding 10 J per pulse; or
      2. An average or CW output power exceeding 500 W; or
    - d. An output wavelength exceeding 360 nm and:
      1. An output energy exceeding 1.5 J per pulse; or
      2. An average or CW output power exceeding 30 W;
  2. Metal vapour "lasers", as follows:
    - a. Copper (Cu) "lasers" with an average or CW output power exceeding 20 W;
    - b. Gold (Au) "lasers" with an average or CW output power exceeding 5 W;
    - c. Sodium (Na) "lasers" with an output power exceeding 5 W;
    - d. Barium (Ba) "lasers" with an average or CW output power exceeding 2 W;
1061. 5. a. 3. Carbon monoxide (CO) "lasers" having either:
- a. An output energy exceeding 2 J per pulse and a pulsed "peak power" exceeding 5 kW; or

- b. An average or CW output power exceeding 5 kW;
1061. 5. a. 4. Carbon dioxide (CO<sub>2</sub>) "lasers" having any of the following:
- a. A CW output power exceeding 10 kW;
  - b. A pulsed output with a "pulse duration" exceeding 10 microseconds and:
    1. An average output power exceeding 10 kW; or
    2. A pulsed "peak power" exceeding 100 kW; or
  - c. A pulsed output with a "pulse duration" equal to or less than 10 microseconds and:
    1. A pulse energy exceeding 5 J per pulse and "peak power" exceeding 2.5 kW; or
    2. An average output power exceeding 2.5 kW;
1061. 5. a. 5. "Chemical lasers", as follows:
- a. Hydrogen Fluoride (HF) "lasers";
  - b. Deuterium Fluoride (DF) "lasers";
  - c. "Transfer lasers":
    1. Oxygen Iodine (O<sub>2</sub>-I) "lasers";
    2. Deuterium Fluoride-Carbon dioxide (DF-CO<sub>2</sub>) "lasers";
1061. 5. a. 6. Gas discharge and ion "lasers", i.e., krypton ion or argon ion "lasers", having either:
- a. An output energy exceeding 1.5 J per pulse and a pulsed "peak power" exceeding 50 W; or
  - b. An average or CW output power exceeding 50 W;
1061. 5. a. 7. Other gas "lasers", except nitrogen "lasers", having any of the following:
- a. An output wavelength not exceeding 150 nm and:
    1. An output energy exceeding 50 mJ per pulse and a pulsed "peak power" exceeding 1 W; or
    2. An average or CW output power exceeding 1 W;
  - b. An output wavelength exceeding 150 nm but not exceeding 800 nm and:
    1. An output energy exceeding 1.5 J per pulse and a pulsed "peak power" exceeding 30 W; or
    2. An average or CW output power exceeding 30 W;
  - c. An output wavelength exceeding 800 nm but not exceeding 1,400 nm and:
    1. An output energy exceeding 0.25 J per pulse and a pulsed "peak power" exceeding 10 W; or
    2. An average or CW output power exceeding 10 W; or
  - d. An output wavelength exceeding 1,400 nm and an average or CW output power exceeding 1 W;
1061. 5. b. Semiconductor "lasers", as follows:
- Technical Note:**  
Semiconductor "lasers" are commonly called "laser" diodes.
- NOTE:**  
The embargo status of semiconductor "lasers" specially designed for other equipment is determined by the embargo status of the other equipment.
1. Individual, single-transverse mode semiconductor "lasers" having:
    - a. An average output power exceeding 100 mW; or
    - b. A wavelength exceeding 1,050 nm;
  2. Individual, multiple-transverse mode semiconductor "lasers", or arrays of individual semiconductor "lasers", having:
    - a. An output energy exceeding 500 mJ per pulse and a pulsed "peak power" exceeding 10 W;
    - b. An average or CW output power exceeding 10 W; or
    - c. A wavelength exceeding 1,050 nm;
1061. 5. c. Solid state "lasers", as follows:
1. "Tunable" "lasers" having any of the following:
 

**NOTE:**  
1061.5.c.1. includes titanium - sapphire (Ti: Al<sub>2</sub>O<sub>3</sub>), thulium - YAG (Tm: YAG), thulium - YSGG (Tm: YSGG), alexandrite (Cr: BeAl<sub>2</sub>O<sub>4</sub>) and colour centre "lasers".

    - a. An output wavelength less than 600 nm and:
      1. An output energy exceeding 50 mJ per pulse and a pulsed "peak power" exceeding 1 W; or