

strength filamentary materials). The bellows have all of the following dimensions:

1. 75-mm to 400-mm (3-in. to 16-in.) inside diameter;
2. 12.7 mm (0.5 in.) or more in length; and
3. single convolution depth more than 2 mm (0.08 in.).

4503. 3. Centrifugal multiplane balancing machines, fixed or portable, horizontal or vertical, as follows:

a. Centrifugal balancing machines designed for balancing flexible rotors having a length of 600 mm or more and having all of the following characteristics:

1. a swing or journal diameter of 75 mm or more;
2. mass capability of from 0.9 to 23 kg (2 to 50 lb); and
3. capable of balancing speed of revolution more than 5000 rpm;

b. Centrifugal balancing machines designed for balancing hollow cylindrical rotor components and having all of the following characteristics:

1. a journal diameter of 75 mm or more;
2. mass capability of from 0.9 to 23 kg (2 to 50 lb.);
3. capable of balancing to a residual imbalance of 0.010 kg mm/kg per plane or better; and
4. belt drive type;

and "specially designed software" therefor.

4503. 4. Filament winding machines in which the motions for positioning, wrapping, and winding fibres are coordinated and programmed in two or more axes, specially designed to fabricate composite structures or laminates from fibrous and filamentary materials and capable of winding cylindrical rotors of diameter between 75 mm (3 in.) and 400 mm (16 in.) and length of 600 mm (24 in.) or greater, coordinating and programming controls therefor; precision mandrels; and "specially designed software" therefor.

4503. 5. Frequency changers (also known as converters or inverters) or generators having all of the following characteristics:

- a. A multiphase output capable of providing a power of 40 W or more;
- b. Capable of operating in the frequency range between 600 and 2000 Hz;
- c. Total harmonic distortion below 10%; and
- d. Frequency control better than 0.1%.

except such frequency changers specially designed or prepared to supply "motor stators" (as defined below) and having the characteristics listed in (b) and (d) above, together with a total harmonic distortion of less than 2% and an efficiency of greater than 80%.

NOTE:

"Motor Stators":

specially designed or prepared ring-shaped stators for high-speed multiphase AC hysteresis (or reluctance) motors for synchronous operation within a vacuum in frequency range of 600-2000 Hz and a power range of 50-1000 VA. The stators consist of multiphase windings on a laminated low-loss iron core comprising thin layers typically 2.0 mm (0.08 in.) thick or less.

4503. 6. Lasers, laser amplifiers, and oscillators as follows:

- a. Copper vapor lasers with 40 W or greater average output power operating at wavelengths between 500 nm and 600 nm;
- b. Argon ion lasers with greater than 40 W average output power operating at wavelengths between 400 nm and 515 nm;
- c. Neodymium-doped (other than glass) lasers as follows:

4503. 6. c. 1. having an output wavelength between 1000 nm and 1100 nm, being pulse-excited and Q-switched with a pulse duration equal to or greater than 1 ns, and having either of the following:

- a. A single-transverse mode output having an average output power exceeding 40 W;
- b. A multiple-transverse mode output having an average output power exceeding 50 W;

2. operating at a wavelength between 1000 nm and 1100 nm and incorporating frequency doubling giving an output wavelength between 500 nm and 550 nm with an average power at the doubled frequency (new wavelength) of greater than 40 W;

4503. 6. d. Tunable pulsed single-mode dye oscillators capable of an average power output of greater than 1 W, a repetition rate greater than 30 W a repetition rate greater than

1 kHz, a pulse less than 100 ns, and a wavelength between 300 nm and 800 nm;

6. e. Tunable pulsed dye laser amplifiers and oscillators, except single mode oscillators, with an average power output of greater than 1 kHz, a pulse width less than 100 ns, and a wavelength between 300 nm and 800 nm; 4503.

4503. 6. f. Alexandrite lasers with a bandwidth of 0.005 nm or less, a repetition rate of greater than 125 Hz, and an average power output greater than 30 W operating at wavelengths between 720 nm and 800 nm;

g. Pulsed carbon dioxide lasers with a repetition rate greater than 250 Hz, an average power output of greater than 500 W, and a pulse of less than 200 ns operating at wavelengths between 9000 nm and 11,000 nm;

N.B.:

This Item 4503.6.g. does not include higher power (typically 1 to 5 kW) industrial CO₂ lasers used in applications such as cutting and welding, as these latter lasers are either continuous wave or are pulsed with a pulse width more than 200 ns.

h. Pulsed excimer lasers (XeF, XeCL, KrF) with a repetition rate greater than 250 Hz and an average power output of greater than 500 W operating at wavelengths of between 240 and 260 nm;

i. Para-hydrogen Raman shifters designed to operate at 16 m output wavelength and at a repetition rate greater than 250 Hz.

TECHNICAL NOTE:

Machine tools, measuring devices, and associated technology that have the potential for use in the nuclear industry are included in items 4501.2 and 4501.3 of this list.

4503. 7. Mass spectrometers capable of measuring ions of 230 atomic mass units or greater and having a resolution of better than 2 parts in 230, and ion sources therefor as follows:

a. Inductively coupled plasma mass spectrometers (ICP/MS);

b. Glow discharge mass spectrometers (GDMS);

c. Thermal ionization mass spectrometers (TIMS);

d. Electron bombardment mass spectrometers which have a source chamber constructed from or lined with or plated with materials resistant to UF₆;

e. Molecular beam mass spectrometers as follows:

1. which have a source chamber constructed from or lined with or plated with stainless steel or molybdenum and have a cold trap capable of cooling to 193 K (-80°C) or less; or
2. which have a source chamber constructed from or lined with or plated with materials resistant to UF₆;

f. Mass spectrometers equipped with a microfluorination ion source designed for use with actinide fluorides; **except** specially designed or prepared magnetic or quadrupole mass spectrometers capable of taking "on-line" samples of feed, product, or tails from UF₆ gas streams and having all of the following characteristic:

1. Unit resolution for mass greater than 320;
2. Ion sources constructed of or lined with nichrome or monel or nickel-plated;
3. Electron bombardment ionization sources;
4. Having a collector system suitable for isotopic analysis.

4503. 8. Instruments capable of measuring pressures up to 13 kPa (2 psi, 100 torr) to an accuracy of better than 1% (full-scale), with corrosion-resistant pressure-sensing elements constructed of nickel, nickel alloys, phosphor bronze, stainless steel, aluminum, or aluminum alloys.

4503. 9. Valves 5 mm (0.2 in.) or greater in diameter, with a bellows seal, wholly made of or lined with aluminum, aluminum alloy, nickel, or alloy containing 60% or more nickel, either manually or automatically operated.

4503. 10. Superconducting solenoidal electromagnets with all of the following characteristics:

- a. capable of creating magnetic fields or more than 2 teslas (20 kilogauss);
- b. with an L/D (length divided by inner diameter) greater than 2;
- c. with an inner diameter of more than 300 mm; and
- d. with a magnetic field uniform to better than 1% over the central 50% of the inner volume.