

- (2) Materials for nuclear heat sources, that is, previously separated neptunium 237 in any form.

#### 4014. Specially Designed or Prepared Materials for Separation of Isotopes

Specially designed or prepared materials, including specially designed chemical exchange resins, for the separation of isotopes of special and other fissionable materials and for the separation of isotopes of natural and depleted uranium.

#### 4020. Calcium

Calcium that contains less than 0.01 weight per cent of impurities other than magnesium and less than 10 ppm of boron.

## Atomic Energy Equipment

#### 4100. Parts for specially designed equipment included in items 4101 to 4221.

#### 4101. Plants for the separation of isotopes of special and other fissionable materials and source materials, and specially designed or prepared equipment and components therefor, including

- (a) valves that are wholly made of or lined with UF<sub>6</sub>-resistant fully fluorinated hydrocarbon polymers, stainless steel, aluminum, aluminum alloys, aluminium oxide, nickel or alloys that contain 60 weight per cent or more nickel, and that are 40 mm or greater in diameter and have bellows seals;
- (b) blowers and compressors, turbo, centrifugal axial and positive displacement types, that are wholly made of or lined with UF<sub>6</sub>-resistant fully fluorinated hydrocarbon polymers, stainless steel, aluminium, aluminium alloys, aluminium oxide, nickel or alloys that contain 60 weight per cent or more nickel and that have a capacity of 1.3 m<sup>3</sup>/minute or greater, including compressor seals;
- (c) gaseous diffusion barriers;
- (d) gaseous diffuser housings;
- (e) heat exchangers that are made of or lined with UF<sub>6</sub>-resistant fully fluorinated hydrocarbon polymers, aluminium, aluminum alloys, aluminium oxide, copper, nickel or alloys that contain more than 60 weight per cent nickel, or combinations of those metals as clad tubes, and that are designed to operate at subatmospheric pressure with a leak rate of less than 10 Pa per hour under a pressure differential of 100 kPa;
- (f) jet-nozzle separation units;
- (g) vortex separation units;
- (h) laser-isotopic separation units;
- (i) chemical exchange separation units;
- (j) electromagnetic separation units;
- (k) plasma separation units;
- (l) gaseous diffusion separation units; and
- (m) gas centrifuges and related components, including
  - (i) complete rotor assemblies,
  - (ii) rotor tubes,
  - (iii) rings or bellows that are specially designed or prepared to give localized support to the rotor tube or to join together a number of rotor tubes,
  - (iv) baffles, in the form of disc-shaped components that are specially designed or prepared to be mounted inside a centrifuge rotor tube,
  - (v) top caps and bottom caps, in the form of disc-shaped components that are specially designed or prepared to fit the ends of rotor tubes,
  - (vi) magnetic suspension bearings that consist of an annular magnet which is suspended within a housing that contains a damping medium,

- (vii) bearings and dampers that comprise a pivot and cup assembly which is mounted on a damper,
- (viii) molecular pumps that comprise cylinders that have internally machined or extruded helical grooves and internally machined bores,
- (ix) stators for high speed multiphase AC hysteresis or reluctance motors that are designed for operation
  - (a) in a vacuum,
  - (b) at frequencies within the range of 600 to 2 000 Hz, and
  - (c) at an apparent power consumption within the range of 50 to 1 000 VA,
- (x) feed systems and product and tails withdrawal systems, including
  - (a) feed autoclaves or stations used for passing uranium hexafluoride to the centrifuge cascades,
  - (b) desublimers or cold traps used for removing uranium hexafluoride from the centrifuge cascades, and
  - (c) products or tails stations used for trapping uranium hexafluoride into containers, and
- (xi) machine header piping systems used for handling uranium hexafluoride within the centrifuge cascades.

#### 4102. Plants for the processing of irradiated nuclear materials in order to isolate or recover fissionable materials, and equipment and components specially designed or prepared therefor, including

- (a) nuclear fuel chopping or shredding machines;
- (b) chemical holding or storage vessels that
  - (i) are fabricated of low-carbon stainless steels, titanium, zirconium or any other material that is resistant to the corrosive effect of nitric acid,
  - (ii) are designed for remote operation and maintenance, and
  - (iii) incorporate features for the control of nuclear criticality such as
    - (a) walls or internal structures that have a boron equivalent of at least 2 per cent,
    - (b) a maximum diameter of 178 mm for cylindrical vessels, or
    - (c) a maximum width of 76.2 mm for a slab or annular vessel; and
- (c) solvent-extraction equipment including packed or pulsed columns, mixer settlers and centrifugal contactors.

#### 4103. Nuclear Reactors

##### (1) In this item,

"control rod" means a rod specially designed or prepared for the control of the reaction rate in a nuclear reactor; (*barre de commande*)  
 "nuclear reactor" means a reactor that is capable of operation so as to maintain a controlled self-sustaining fission chain reaction. (*réacteur nucléaire*)

##### (2) Nuclear reactors and equipment that is specially designed or prepared therefor, including

- (a) metal pressure vessels, as complete units or as major shop-fabricated parts therefor, that contain the core of a nuclear reactor and that are capable of withstanding the operating pressure of the primary coolant, including the top plate for a reactor pressure vessel;
- (b) fuel-element handling equipment, including reactor fuel charging and discharging machines;
- (c) control rods, including the neutron absorbing part thereof and the support or suspension structures therefor, and control rod guide tubes;
- (d) electronic controls for controlling the power levels in nuclear reactors, including reactor control rod drive mechanisms and radiation detection and measuring instruments that determine neutron flux levels;
- (e) pressure tubes in a nuclear reactor that contain, at an operating pressure greater than 5 MPa, fuel elements and the primary coolant in a nuclear reactor;
- (f) coolant pumps that circulate the primary coolant of nuclear reactors;
- (g) internals for the operation of a nuclear reactor, including core support structures, thermal shields, baffles, core grid plates and diffuser plates; and
- (h) heat exchangers.