

Industrial Standard JIS-R-7601, Paragraph 6.6.2., and based on lot average.

1013. 10. c. Inorganic "fibrous or filamentary materials" with:
1. A "specific modulus" exceeding  $2.54 \times 10^6$  m; and
  2. A melting, decomposition or sublimation point exceeding 1,922 K (1,649°C) in an inert environment;

**NOTE:**

1013.10.c. does not embargo:

1. Discontinuous, multiphase, polycrystalline alumina fibres in chopped fibre or random mat form, containing 3 weight percent or more silica, with a "specific modulus" of less than  $10 \times 10^6$  m;
2. Molybdenum and molybdenum alloy fibres;
3. Boron fibres;
4. Discontinuous ceramic fibres with a melting, decomposition or sublimation point lower than 2,043 K (1,770°C) in an inert environment.

1013. 10. d. "Fibrous or filamentary materials":

1. Composed of any of the following:
  - a. Polyetherimides embargoed by 1013.8.a; or
  - b. Materials embargoed by 1013.8.b, c., d., e. or f.; or
2. Composed of materials embargoed by 1013.10.d.1.a. or b. and "commingled" with other fibres embargoed by 1013.10.a., b. or c.;

1013. 10. e. Resin- or pitch-impregnated fibres (prepregs), metal or carbon-coated fibres (preforms) or "carbon fibre preforms", as follows:

1. Made from "fibrous or filamentary materials" embargoed by 1013.10.a., b. or c.;
2. Made from organic or carbon "fibrous or filamentary materials":
  - a. With a "specific tensile strength" exceeding  $17.7 \times 10^4$  m;
  - b. With a specific modulus exceeding  $10.15 \times 10^6$  m;
  - c. Not embargoed by 1013.10.a. or b.; and
  - d. When impregnated with materials embargoed by 1013.8. or 1013.9.b., or with phenolic or epoxy resins, having a glass transition temperature ( $T_g$ ) exceeding 383 K (110°C);

**Technical Notes:**

1. Specific modulus: Young's modulus in pascals, equivalent to  $N/m^2$  divided by specific weight in  $N/m^3$ , measured at a temperature of  $(296 \pm 2)$  K ( $(23 \pm 2)^\circ C$ ) and a relative humidity of  $(50 \pm 5)\%$ .
2. Specific tensile strength: ultimate tensile strength in pascals, equivalent to  $N/m^2$  divided by specific weight in  $N/m^3$ , measured at a temperature of  $(296 \pm 2)$  K ( $(23 \pm 2)^\circ C$ ) and a relative humidity of  $(50 \pm 5)\%$ .  
(See Technical Note 2 to the Atomic Energy List.)

## 1014. Software

1014. 1. "Software" specially designed or modified for the "development", "production" or "use" of equipment embargoed by 1.B.
1014. 2. "Software" for the "development" of organic "matrix", metal "matrix" or carbon "matrix" laminates or "composites".

## 1015. Technology

1015. 1. Technology according to the General Technology Note for the "development" or "production" of equipment or materials embargoed by 1011.1.b., 1011.1.c., 1011.2., 1011.3., 1012. or 1013.;
1015. 2. Other technology:
  1015. 2. a. Technology for the "development" or "production" of polybenzothiazoles or polybenzoxazoles;
  1015. 2. b. Technology for the "development" or "production" of fluoroelastomer compounds containing at least one vinyl ether monomer;
  1015. 2. c. Technology for the design or "production" of the following base materials or non-"composite" ceramic materials:
    1. Base materials having all of the following characteristics:
      - a. Any of the following compositions:

1. Single or complex oxides of zirconium and complex oxides of silicon or aluminium;
  2. Single nitrides of boron (cubic crystalline forms);
  3. Single or complex carbides of silicon or boron; or
  4. Single or complex nitrides of silicon;
- b. Total metallic impurities, excluding intentional additions, of less than:
1. 1,000 ppm for single oxides or carbides; or
  2. 5,000 ppm for complex compounds or single nitrides; and
1. Average particle size equal to or less than 5 micrometre and no more than 10% of the particles larger than 10 micrometre; or
- NOTE:**  
For zirconia, these limits are 1 micrometre and 5 micrometre respectively;
- a. Platelets with a length to thickness ratio exceeding 5;
  - b. Whiskers with a length to diameter ratio exceeding 10 for diameters less than 2 micrometre; and
  - c. Continuous or chopped fibres less than 10 micrometre in diameter;
2. Non-"composite" ceramic materials (except abrasives) composed of the materials described in 1015.2.c.1.;
1015. 2. d. Technology for the "production" of aromatic polyamide fibres;
1015. 2. e. Technology for the installation, maintenance or repair of materials embargoed by 1013.1.;
1015. 2. f. Technology for the repair of "composite" structures, laminates or materials embargoed by 1011.2., 1013.7.c. or 1013.7.d.

## 1020. MATERIALS PROCESSING

### 1021. Equipment, Assemblies and Components

1021. Anti-friction bearings or bearing systems, as follows, and components therefor:

**NOTE:**

1021. does not embargo balls with tolerances specified by the manufacturer in accordance with ISO 3290 as grade 5 or worse.

1021. 1. Ball bearings or solid roller bearings (except tapered roller bearings) having tolerances specified by the manufacturer in accordance with ABEC 7, ABEC 7P, ABEC 7T or ISO Standard Class 4 or better (or national equivalents), and having any of the following characteristics:
  - a. Rings, balls or rollers made from monel or beryllium;
  - b. Manufactured for use at operating temperatures above 573 K (300°C) either by using special materials or by special heat treatment; or
  - c. With lubricating elements or component modifications that, according to the manufacturer's specifications, are specially designed to enable the bearings to operate at speeds exceeding 2.3 million DN;
1021. 2. Other ball bearings or solid roller bearings (except tapered roller bearings) having tolerances specified by the manufacturer in accordance with ABEC 9, ABEC 9P or ISO Standard Class 2 or better (or national equivalents);
1021. 3. Solid tapered roller bearings, having tolerances specified by the manufacturer in accordance with ANSI/AFBMA Class 00 (inch) or Class A (metric) or better (or national equivalents) and having either of the following characteristics:
  - a. With lubricating elements or component modifications that, according to the manufacturer's specifications, are specially designed to enable the bearings to operate at speeds exceeding 2.3 million DN; or
  - b. Manufactured for use at operating temperatures below 219 K (-54°C) or above 423 K (150°C);
1021. 4. Gas-lubricated foil bearings manufactured for use at operating temperatures of 561 K (288°C) or higher and with a unit load capacity exceeding 1 MPa;
1021. 5. Active magnetic bearing systems;
1021. 6. Fabric-lined self-aligning or fabric-lined journal sliding bearings manufactured for use at operating temperatures below 219 K (-54°C) or above 423 K (150°C);