1013. cont'd.

Technical Note:

Absorption test samples for 1013.1.a.3.a. should be a square at least 5 wavelengths of the centre frequency on a side and positioned in the far field of the radiating element.

1. a. 3. a. 1. Plastic foam materials (flexible or non-flexible) with carbon-loading, or organic materials, including binders, providing more than 5% echo compared with metal over a bandwidth exceeding ±15% of the centre frequency of the incident energy, and not capable of withstanding temperatures exceeding 450 K (177°C); **or**
   2. Ceramic materials providing more than 20% echo compared with metal over a bandwidth exceeding ±15% of the centre frequency of the incident energy, and not capable of withstanding temperatures exceeding 800 K (527°C);
   b. Tensile strength less than 7×10^6 N/m^2; **and**
   c. Compressive strength less than 14×10^6 N/m^2;
   4. Planar absorbers made of sintered ferrite, with:
      a. A specific gravity exceeding 4.4; **and**
      b. A maximum operating temperature of 548 K (275°C);
   b. Materials for absorbing frequencies exceeding 1.5×10^{14} Hz but less than 3.7×10^{14} Hz and not transparent to visible light;
   c. Intrinsically conductive polymeric materials with a bulk electrical conductivity exceeding 10,000 S/m (Siemens per metre) or a sheet (surface) resistivity of less than 100 ohms/square, based on any of the following polymers:
      1. Polyaniline;
      2. Polypyrrole;
      3. Polythiophene;
      4. Poly phenylene-vinylene; **or**
      5. Poly thienylene-vinylene;

   Technical Note:

   Bulk electrical conductivity and sheet (surface) resistivity should be determined using ASTM D-257 or national equivalents.

2. Metal alloys, metal alloy powder or alloyed materials, as follows:

   Note:

   1013.2. does not embargo metal alloys, metal alloy powder or alloyed materials for coating substrates.

   a. Metal alloys, as follows:
      1. Nickel or titanium-based alloys in the form of aluminides, as follows, in crude or semi-fabricated forms:
         a. Nickel aluminides containing 10 weight percent or more aluminium;
         b. Titanium aluminides containing 12 weight percent or more aluminium;
      2. Metal alloys, as follows, made from metal alloy powder or particulate material embargoed by 1013.2.b.:
         a. Nickel alloys with:
            1. A stress-rupture life of 10,000 hours or longer at 923 K (650°C) at a stress of 550 MPa; **or**
            2. A low cycle fatigue life of 10,000 cycles or more at 823 K (550°C) at a maximum stress of 700 MPa;
         b. Niobium alloys with:
            1. A stress-rupture life of 10,000 hours or longer at 1,073 K (800°C) at a stress of 400 MPa; **or**
            2. A low cycle fatigue life of 10,000 cycles or more at 973 K (700°C) at a maximum stress of 700 MPa;
         c. Titanium alloys with:
            1. A stress-rupture life of 10,000 hours or longer at 723 K (450°C) at a stress of 200 MPa; **or**
            2. A low cycle fatigue life of 10,000 cycles or more at 723 K (450°C) at a maximum stress of 400 MPa;
         d. Aluminium alloys with a tensile strength of:
            1. 240 MPa or more at 473 K (200°C); **or**
            2. 415 MPa or more at 298 K (25°C);
         e. Magnesium alloys with a tensile strength of 345 MPa or more and a corrosion rate of less than 1 mm/year in 3% sodium chloride aqueous solution measured in accordance with ASTM standard G-31 or national equivalents;

   Technical Notes:

   1. *The metal alloys in 1013.2.a. are those containing a higher percentage by weight of the stated metal than of any other element.*
   2. *Stress-rupture life should be measured in accordance with ASTM standard E-139 or national equivalents.*
   3. *Low cycle fatigue life should be measured in accordance with ASTM Standard E-606 'Recommended Practice for Constant-Amplitude Low-Cycle Fatigue Testing' or national equivalents. Testing should be axial with an average stress ratio equal to 1 and a stress-concentration factor (K_t) equal to 1. The average stress is defined as maximum stress minus minimum stress divided by maximum stress.*

   b. Metal alloy powder or particulate material for materials embargoed by 1013.2.a., as follows:
      1. Made from any of the following composition systems:

         Technical Note:

         X in the following equals one or more alloying elements.

         a. Nickel alloys (Ni-Al-X, Ni-X-Al) qualified for turbine engine parts or components, i.e. with less than 3 non-metallic particles (introduced during the manufacturing process) larger than 100 µm in 109 alloy particles;
         b. Niobium alloys (Nb-Al-X or Nb-X-Al, Nb-Si-X or Nb-X-Si, Nb-Ti-X or Nb-X-Ti);
         c. Titanium alloys (Ti-Al-X or Ti-X-Al);
         d. Aluminium alloys (Al-Mg-X or Al-X-Mg, Al-Zn-X or Al-X-Zn, Al-Fe-X or Al-X-Fe); or
         e. Magnesium alloys (Mg-Al-X or Mg-X-Al); **and**
      2. Made in a controlled environment by any of the following processes:
         a. "Vacuum atomization";
         b. "Gas atomization";
         c. "Rotary atomization";
         d. "Splat quenching";
         e. "Melt spinning" and "comminution";
         f. "Melt extraction" and "comminution"; **or**
         g. "Mechanical alloying";
   c. Alloyed materials, in the form of uncomminuted flakes, ribbons or thin rods produced in a controlled environment by "splat quenching," "melt spinning" or "melt extraction", used in the manufacture of metal alloy powder or particulate material embargoed by 1013.2.b.;

3. Magnetic metals, of all types and of whatever form, having any of the following characteristics:
   a. Initial relative permeability of 120,000 or more and a thickness of 0.05 mm or less ;

      Technical Note:

      Measurement of initial permeability must be performed on fully annealed materials.

   b. Magnetostrictive alloys with:
      1. A saturation magnetostriction of more than 5×10^{-4}; **or**
      2. A magnetomechanical coupling factor (k) of more than 0.8; **or**
   c. Amorphous alloy strips with:
      1. A composition having a minimum of 75 weight percent of iron, cobalt or nickel; **and**
      2. A saturation magnetic induction (B_s) of 1.6 T or more, **and**
         a. A strip thickness of 0.02 mm or less; **or**
         b. An electrical resistivity of 2×10^{-4} ohm cm or more;
4. Uranium titanium alloys or tungsten alloys with a "matrix" based on iron, nickel or copper, with:
   a. A density exceeding 17.5 g/cm^3;
   b. An elastic limit exceeding 1,250 MPa;
   c. An ultimate tensile strength exceeding 1,270 MPa; **and**
   d. An elongation exceeding 8%;
5. "Superconductive" "composite" conductors in lengths exceeding 100 m or with a mass exceeding 100 g, as follows:
   a. Multifilamentary "superconductive" "composite" conductors containing one or more niobium-titanium filaments:
      1. Embedded in a "matrix" other than a copper or copper-based mixed "matrix"; **or**
      2. With a cross-section area less than 0.28×10^{-4} mm^2 (6 µm in diameter for circular filaments);
   b. "Superconductive" "composite" conductors consisting of one or more "superconductive" filaments other than niobium-titanium: