MATERION

Data Sheet

I-70-H and I-220-H Beryllium

Materion offers two high-purity beryllium metals that are specially formulated for use in the challenging environments found in space and aerospace applications.

I-70-H optical-grade beryllium is produced through the consolidation of beryllium powder by hot isostatic pressing. It contains at least 99% pure beryllium and a maximum of 0.7% beryllium oxide. The low oxide content gives it good polishing characteristics and greater isotropy, and it maintains stability at extreme temperatures.

I-220-H instrument-grade beryllium consists of at least 98% pure beryllium. It is used in applications requiring high resistance to plastic deformation at low stress levels. It has the highest tensile, yield and micro yield strength values of any as-pressed beryllium-grade material.

Chemical Composition

Compounds	I-70-H (wt%)	I-220-H (wt%)
Beryllium (Be) Assay - minimum	99.0	98.0
Beryllium Oxide (BeO) - maximum	0.70	2.2
Aluminum (Al) - maximum	0.07	0.10
Carbon (C) - maximum	0.07	0.15
Iron (Fe) - maximum	0.10	0.15
Magnesium (Mg) - maximum	0.07	0.08
Silicon (Si) - maximum	0.07	0.08
Other Metallic Impurities - maximum	0.04	0.04

Typical Physical Properties

Density*	Elastic Modulus	Solidus	Specific Heat Capacity	Thermal Conductivity @ 25°C	Thermal Expansion @ 25-100°C
1.85 g/cm^3 0.067 lb./in^3	290 GPa 42 msi	1287°C 2349°F	1.95 J/g/°C 0.46 BTU/lb./°F	216 W/m·K 125 BTU/hr·ft·°F	11.3 ppm/°C 6.3 ppm/°F

*The minimum bulk density is 99.7% of theoretical density, which is determined using the water displacement method.

Mechanical Properties

Minimum tensile properties for the material at room temperature, as determined per ASTM E8 and MAB-205 M:

	I-70-H	I-220-H
Ultimate Tensile Strength, MPa (ksi), min	345 (50)	448 (65)
Yield Strength (0.2% offset), MPa (ksi), min	207 (30)	345 (50)
Elongation (% in 4 diameters), min	2.0	2.0 (1.0*)
Micro-Yield Strength, MPa (ksi), min	21 (3.0)	Grade 1 min: 41 (6.0) Grade 2 min: 55 (8.0)

* Use when material consists of blanks with either a calculated volume greater than 1500 cubic inches (0.0246 m^3) or a major dimension greater than 20 inches (0.787 m).

Materials furnished under this specification shall conform to the dimensions and dimensional tolerances established by the purchase order and applicable drawings. If tolerances are not specified by the purchase order, the following standard tolerances shall apply employing ANSI/ASME Y14.5:

Diameter, Width or Thickness	Tolerance
Up to 76 mm (3”), inclusive	-0 / +0.40 mm (-0 / +1/64”)
Over 76 to 508 mm (3” to 20”), inclusive	-0 / +1.59 mm (-0 / +1/16”)
Over 508 mm (20”)	-0 / +6.35 mm (-0 / + ¼”)

Length	Tolerance
Up to 508 mm (20”), inclusive	-0 / +3.18 mm (-0 / +1/8")
Over 508 mm (20”)	-0 / +6.35 mm (-0 / +¼”)

Non-Destructive Testing

Penetrant inspection is only done when required by purchase order. Penetrant inspection shall be performed per ASTM E1417, and for I-70-H using penetrants and a dry developer conforming to MIL-I-25135, Type 1, Level 2, Method B, Form A.

Radiography shall be accomplished in accordance with ASTM E-1742, quality level 1 (2-1T) sensitivity. A 254 mm (10”) maximum thickness of beryllium can be inspected with radiography.

Exceptions are taken to the penetrameter contrast requirements and applicable area of penetrameter density ranges of +30% to -15% from the density measured through the body of the penetrameter location(s). Accept/reject decisions may be made beneath the penetrameter(s).

Related Information

Certification of compliance with this specification will be furnished upon request. When requested, actual test results will be certified. Testing in accordance with the individual customer’s instructions will be performed if mutually acceptable, and actual test results will be certified.

The method of packaging, labeling and shipping will be in accordance with applicable government regulations. Special packaging will be provided when mutually acceptable and in accordance with government regulations. Each container will be legibly marked with the following minimum information: company name, material lot or part number, serial number, specification number, X-ray number, purchase order number and beryllium warning information.

Health and Safety

Processing beryllium-containing alloys poses a health risk if safe practices are not followed. Inhalation of airborne beryllium can cause serious lung diseases in some individuals. Occupational safety and health regulatory agencies worldwide have set mandatory limits on occupational respiratory exposures. Read and follow the guidance in the Safety Data Sheet (SDS) before working with this material. The SDS and additional important beryllium health and safety information and guidance can be found at berylliumsafety.com, berylliumsafety.eu and Materion.com. For questions on safe practices for beryllium-containing alloys, contact the Materion Product Stewardship Group at +1.800.862.4118 or contact us by email at Materion-PS@Materion.com.

Disclaimer:

Only the buyer can determine the appropriateness of any processing practice, end-product or application. Materion does not make any warranty regarding its recommendations, the suitability of Materion's product, or its processing suggestions for buyer's end product, application or equipment.

The properties presented on this data sheet are for reference purposes only, intended only to initiate the material selection process. They do not constitute, nor are they intended to constitute, a material specification. Material will be produced to one of the applicable industry standards, if any, listed in the Industry Standards and Specification section.

Actual properties may vary by thickness and/or part number. Please contact your local sales engineer for detailed properties to be used in simulation.

Any properties marked as preliminary are subject to change at any time as the manufacturing process is further refined.

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