

SURFACE VEHICLE RECOMMENDED PRACTICE

J1173™

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Size Classification and Characteristics of Glass Beads for Peening

1. SCOPE:

This specification covers the characteristics of glass beads used for peening, and provides for standard glass bead size numbers.

2. INTRODUCTION:

The glass bead classification number is the approximate nominal diameter of the glass spheres in that classification, in hundredths of a millimeter, with the prefix GB added. Glass beads used for peening shall be made from high quality glass of the soda-lime type. They should be as resistant as possible to breakage from shock-impact, or by abrasion during shipment and handling. The particles should be substantially round, free-flowing, and free from chemical impurities or contaminants that might be detrimental to the workpiece.

3. SELECTION OF SAMPLE:

A representative sample of the shipment shall be selected for evaluation. This can be accomplished by:

- (a) Splitting the entire large quantity by repeated passes through the sample reducer (16:1/1:1) splitter as described in ASTM D271, or
- (b) Randomly selecting a number of containers equal to the nearest integer of the cube root of the total number of containers in the entire large quantity. Selected containers can then be reduced, as in (a) above, in order to obtain a representative sample. Other sampling techniques may be used if agreed upon between the supplier and vendor. Representative samples of the whole should result in 50 g test quantities that can be sealed in properly labeled containers for the required tests.

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4. SIEVE ANALYSIS FOR SIZE CLASSIFICATION:

- 4.1 This test shall be performed on a 50 g representative sample prior to the performance of roundness or other tests on that sample.
- 4.2 The sieve analysis shall be performed in accordance with ASTM D1241, "Sieve Analysis of Glass Spheres."
- 4.3 The screens shall be in accordance with the U.S. Standard Series sieves described in ASTM Specification E-11, "Wire Cloth Sieves for Testing Purposes."
- 4.4 Classification limits shall be as shown in Table 1.

5. ROUNDNESS TEST:

Glass beads should be spherical to elliptical in shape. Minimum percentage of "true spheres" (aspect ratio 1.2:1 or less) must conform to Table 1. An actual count shall be made of a field of approximately 100 beads using a microscope with 20X magnification and substage lighting or a mounted sample and projector. Scored, broken, or angular particles by count must conform to Table 1.

6. COATINGS:

- 6.1 The beads shall not be coated with silicone or any other coating.
- 6.2 Method of testing for silicone coating shall be as follows: Slowly pour 50 g of the sample beads into a 250 mL beaker containing 200 mL of distilled water. A small number of beads floating on the water is acceptable, but no coagulation (which is an indication of silicone coating) is permitted.

7. COMPOSITION:

- 7.1 Silica content shall not be less than 67% in order to provide the highest chemical stability.
- 7.2 The method of analysis for silica shall be in accordance with ASTM C169, "Chemical Analysis of Soda-lime Glass, (for silicon dioxide.)"

8. SPECIFIC GRAVITY:

- 8.1 The density of the glass particles may be determined by a specific gravity measurement with a pycnometer as follows:
 - 8.1.1 Dry a quantity of the beads by placing them in an open dish in a furnace at 105–110°F (40.6–43.3°C) until a constant weight is achieved.
 - 8.1.2 Place a 50 g sample of the beads in a 100 mL graduated cylinder containing 50 mL of distilled water.
 - 8.1.3 The total volume less fifty (TV-50) represents the volume of the glass particles.

8.1.4 Specific gravity is calculated as follows:

$$\text{Sp. Gr.} = \frac{\text{Weight of original sample of dried beads (g)}}{\text{Final total volume (mL) - original volume of water (mL)}}$$

8.2 Specific gravity shall be not less than 2.3 g/cm³.

9. HARDNESS:

Unless otherwise specified, glass beads for peening shall have the following hardness:

480 to 550 KHN (100gf)
458 to 528 DPH (50gf)

(for reference only approximately 48-50 HR_C)

10. FREE IRON CONTENT:

10.1 Magnetic particles shall not exceed 0.1% of the original sample, by weight.

10.2 Iron particle content is determined by slowly sprinkling 1500 g of the sample bead material on an inclined aluminum tray that is 1.6 mm (0.62 in) deep x 152 mm (6 in) wide x 305 mm (12 in) long. The tray is supported by a non-magnetic frame so that it is inclined with a 152 mm (6 in) rise from end to end (30 deg from horizontal). Four 25 x 25 x 152 mm (1 x 1 x 6 in) barmagnets are positioned against the under surface and crosswise of the inclined tray about the middle of its length. Magnets shall be of not less than 10 000 Gauss magnetic strength each, and shall be arranged so that magnetic north and south poles alternate.

10.3 The magnetic particles (iron) that accumulate on the tray as the beads roll down are carefully brushed into a preweighed dish. The procedure is repeated until all visible magnetic particles are collected.

10.4 The dish is then reweighed and the magnetic particle content is calculated as percent of the total original sample.