



AEROSPACE MATERIAL SPECIFICATION

AMS2431™/9

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Peening Media
Ceramic Shot, High Density

RATIONALE

AMS2431/9 is for high density ceramic peening of high hardness steels and non-ferrous metals.

1. SCOPE

1.1 Purpose

This specification, in conjunction with the general requirements for peening media covered in AMS2431, establishes the requirements for the procurement of high density ceramic shot.

1.2 Application

High density ceramic shot conforming to this specification is typically intended for use in peening metal surfaces to impart compressive stresses to these surfaces thereby increasing resistance to fatigue and stress-corrosion cracking. Generally, ceramic shot is used where ferrous contamination of the part is undesirable or where high hardness parts are to be peened for maximum residual compressive stress. High density ceramic shot can also be used for peen forming applications.

2. APPLICABLE DOCUMENTS

Shall be in accordance with AMS2431 and as follows:

2.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

AMS2431 Peening Media, General Requirements

2.2 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org.

ASTM C1327 Vickers Indentation Hardness of Advanced Ceramics

2.3 Definitions

SPHERICITY: Sphericity refers to the aspect ratio of short to long axes of the hypothetical ellipse that would contain the actual image of the ceramic shot as seen through a microscope. Every shot examined by microscope has two diameters: the small diameter "d" and the large diameter "D." Sphericity of one shot is expressed as a ratio of the two diameters:

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Documents

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$$Sphericity = \frac{d}{D}$$

3. TECHNICAL REQUIREMENTS

3.1 Ceramic shot shall be in accordance with AMS2431 and the requirements specified herein.

3.2 Composition

Shall be a mixture of zirconium oxide, hafnium oxide, and cerium oxide. The percentage variation by weight shall be in accordance with Table 1 determined by X-ray fluorescence or by other method acceptable to the cognizant engineering organization.

Table 1 - Composition

Constituent	Min %	Max %
Zirconium Oxide Hafnium oxide	78	85
Cerium oxide	15	18
Other Constituents, total		3

3.3 Contamination

Magnetic particles shall not exceed 0.1% by weight.

3.4 Hardness

Hardness shall be HV 1100 to 1300 determined in accordance with ASTM E384 or C1327 using a pyramid penetrator with a 1000 gram load.

3.5 Density

Density shall be not less than 6.15 g/cc (3.56 oz/in³), when measured at 70 °F ± 20 °F (21 °C ± 11 °C).

3.6 Surface Color Homogeneity

Not more than 15% of the shot shall show discoloration determined microscopically using the same magnification as stated in Table 3 for shape. A single shot shall be considered objectionable for discoloration when more than 25% of its surface area is discolored.

3.7 Coatings

Shot shall not be coated.

3.8 Shape

Ceramic shot shall be spherical to ellipsoid in shape. Table 2 shows the minimum percentage of ceramic shot having a sphericity of 0.8 and above (true spheres). Maximum percentage of ceramic shot having a sphericity lower than 0.5 and maximum number of permissible broken or angular shot is also shown on Table 2.

3.9 Size and Distribution

3.9.1 Shot size and distribution shall be in accordance with AMS2431 and Table 2.

Table 2 - Ceramic shot for peening - sizes, distribution, and sphericity