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AEROSPACE MATERIAL SPECIFICATION

Submitted for recognition as an American National Standard

AMS 2431/2

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PEENING MEDIA
Cast Steel Shot, Hard
(55 - 62 HRC)

1. SCOPE: This specification, in conjunction with the general requirements covered in AMS 2431, establishes the requirements for hard cast steel shot to be used for peening of metal parts.

2. APPLICABLE DOCUMENTS: See AMS 2431.

3. TECHNICAL REQUIREMENTS:

3.1 Cast steel shot, hard, shall conform to AMS 2431 and the requirements specified herein.

3.2 Composition: Shall conform to the following percentages by weight:

	min	max
Carbon	0.85	1.20
Manganese	0.60	1.20
Silicon	0.40	--
Phosphorus	--	0.05
Sulfur	--	0.05

3.2.1 Hardness: Not less than 90% of the readings, using a microhardness tester, shall fall within the range of 600 - 740 HV (55 - 62 HRC), or equivalent.

3.2.2 Microstructure: Shall exhibit uniformly tempered martensite with fine, well-distributed carbides.

3.2.3 Density: Shall be not less than 7 g per mL and contain not more than 10% hollows.

3.2.4 Contamination: Shot shall be clean and free of dirt, grit, oil, or grease.

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3.3 Workmanship:

3.3.1 Shape: Shall be predominantly in accordance with Fig. A.

3.3.2 Marginal Shapes: Shapes conforming to Figure B, are permissible to the extent specified in Table 1.

3.3.3 Unacceptable Shapes: Any lot containing shapes as illustrated in Figure C shall be subject to rejection.

3.3.4 Soundness: Shot that exhibits fine-line cracks or draws, upon examination of microstructure sample, shall not exceed 15% by count. (See 8.2.1 and 8.2.2).

3.4. Size: Cast steel shot, hard, shall conform to the requirements of Table 1 and Figure A.

3.5 Test Methods and Procedures:

3.5.1 Composition: Shall be determined in accordance with ASTM A751.

3.5.2 Hardness: Shall be determined in accordance with ASTM E384.

3.5.3 Size Screening Test: The size of shot, specified in 3.4, shall be determined by using a 100 g sample and screening as follows: The required standard testing sieves in accordance with Federal RR-S-366 shall be nested in ascending order with a pan on the bottom. The 100 g sample shall be poured into the top sieve and the nested sieves shall be placed in a rotating and tapping type of shaking machine. The rotating speed shall be 275 to 295 rpm with 145 to 160 taps per minute using a 3/4 inch (19 mm) eccentric cam. Shaking and tapping shall be continued for 5 minutes ±5 seconds. After shaking, the percentage of shot on each screen shall be determined by weighing.

3.5.4 Density: Sixty grams of shot carefully weighed, and previously dried shall be placed in a 100 mL graduated cylinder containing 50 mL of distilled water. The total volume minus 50 mL represents the volume of the shot.

$$\text{Density} = \frac{60\ \text{g}}{\text{Shot Volume}}$$

4. QUALITY ASSURANCE PROVISIONS: See AMS 2431 and the following:

4.1 Sampling: Two samples of 800 g each shall be selected from separate containers chosen at random. Each sample shall be split to test quantities.

4.1.1 Composition: Not less than two samples from each shipment.

4.1.2 Hardness: Twenty microhardness readings shall be made from each sample with no more than one impression from any single shot.

4.1.2.1 Samples for microhardness testing shall be prepared by encapsulating a single layer of shot in a plastic mount and polishing down to nominal half spheres.

4.1.3 Microstructure: The sample population used for hardness testing shall also be used for microstructure evaluation.

4.1.4 Density: Two 60 g samples for density determinations.

4.1.5 Size: Two representative samples of not less than 100 g each.

4.1.6 Shape: A representative sample shall consist of a number of shot, in one layer, which completely fills the areas as specified in Table 1. An inspection paddle with recessed areas to accommodate one layer of shot shall be used.

4.1.6.1 A mechanical method of inspection for shape is permitted provided that it can be correlated to the optical method and is acceptable to purchaser.

4.1.7 Soundness: The sample prepared for hardness testing shall be used to evaluate soundness.

5. PREPARATION FOR DELIVERY: See AMS 2431 and the following:

5.1 Packaging and Identification: Steel shot shall be packaged in 50 pound (23 kg) units in plastic coated bags.

6. ACKNOWLEDGMENT: See AMS 2431.

7. REJECTIONS: See AMS 2431.

8. NOTES: See AMS 2431 and the following:

8.1 Intended Use: Cast steel shot, hard, conforming to this specification is intended for use in peening metal surfaces to impart compressive stresses to these surfaces thereby increasing resistance to fatigue and stress-corrosion cracking. Generally, hard cast steel shot is used on metal parts of hardness under 50 HRC.

8.2 Definitions:

8.2.1 Cracked Shot is one that exhibits a linear discontinuity with length greater than three times its width and length greater than 20% of the shot diameter.

8.2.2 Draws are round-bottomed recesses in the shot surface which extend into the shot more than 25% of the shot diameter.

8.2.3 Hollow is a center void with a diameter that is greater than 10% of the diameter of the shot.

TABLE 1

SCREENING AND SHAPE REQUIREMENTS

Identification	All pass U.S. Screen Size	Maximum 2% on U.S. Screen	Maximum 50% on U.S. Screen	Cumulative Minimum 90% on U.S. Screen	Maximum 8% on U.S. Screen	Maximum Permissible Number of Marginal Shapes per Fig. 1B
ASH 660	7 (.0111)	8 (.0937)	10 (.0787)	12 (.0661)	14 (.0555)	7 per area 1 inch (25 mm) square
ASH 550	8 (.0937)	10 (.0787)	12 (.0661)	14 (.0555)	16 (.0469)	10 per area 1 inch (25 mm) square
ASH 460	10 (.0787)	12 (.0661)	14 (.0555)	16 (.0469)	18 (.0394)	15 per area 1 inch (25 mm) square
ASH 330	14 (.0555)	16 (.0469)	18 (.0394)	20 (.0331)	25 (.0280)	7 per area 1/2 inch (13 mm) square
ASH 230	18 (.0394)	20 (.0331)	25 (.0280)	30 (.0232)	35 (.0197)	15 per area 1/2 inch (13 mm) square
ASH 170	25 (.0280)	30 (.0232)	35 (.0197)	40 (.0165)	5 (.0138)	25 per area 1/2 inch (13 mm) square
ASH 110	35 (.0197)	40 (.0165)	45 (.0138)	50 (.0117)	80 (.0070)	15 per area 1/4 inch (6 mm) square
ASH 70	40 (.0165)	45 (.0138)	50 (.0117)	80 (.0070)	120 (.0049)	40 per area 1/4 inch (6 mm) square

PREFIX "ASH" DENOTES "CAST STEEL SHOT, HARD (55 - 62 HRC)", PER AMS 2431/2 NOMINAL SIZE = ASH# x-10^4 [e.g.: ASH 930 = 0.093 INCH (2.36 mm)].

NOTE: Numbers in column headed "Maximum Permissible Number of Marginal Shapes", represent a consistent percentage of approximately 3%.