

**FIGURE 1 - CAST SHOT SPECIFICATIONS FOR SHOT PEENING OR BLAST CLEANING**

Sieve Opening Standard	Sieve Designation	Nominal Sieve Opening (In)	Teet Sleeve Opening Size and Designation With Maximum and Minimum Cumulative Percentages Allowed on Corresponding Test Sieves SAE Shot Number														
			81320	81110	8930	8780	8660	8550	8460	8390	8330	8260	8230	8170	8110	870	
(mm)'		(In)	81320	81110	8930	8780	8660	8550	8460	8390	8330	8260	8230	8170	8110	870	
4.75	4	0.187	All Pass	-	-	-	-	-	-	-	-	-	-	-	-	-	
4.00	5	0.157	-	All Pass	-	-	-	-	-	-	-	-	-	-	-	-	
3.35	6	0.132	90% min	-	All Pass	-	-	-	-	-	-	-	-	-	-	-	
2.80	7	0.111	97% min	90% min	-	All Pass	-	-	-	-	-	-	-	-	-	-	
2.36	8	0.0937	-	97% min	90% min	-	All Pass	-	-	-	-	-	-	-	-	-	
2.00	10	0.0787	-	-	97% min	85% min	-	All Pass	All Pass	-	-	-	-	-	-	-	
1.70	12	0.0661	-	-	-	97% min	85% min	-	5% max	All Pass	-	-	-	-	-	-	
1.40	14	0.0555	-	-	-	-	97% min	85% min	-	5% max	All Pass	-	-	-	-	-	
1.18	16	0.0469	-	-	-	-	-	97% min	85% min	-	5% max	All Pass	-	-	-	-	
1.00	18	0.0394	-	-	-	-	-	-	97% min	85% min	-	5% max	All Pass	-	-	-	
0.850	20	0.0331	-	-	-	-	-	-	-	97% min	85% min	-	10% max	All Pass	-	-	
0.710	25	0.0278	-	-	-	-	-	-	-	-	97% min	85% min	-	10% max	-	-	
0.600	30	0.0234	-	-	-	-	-	-	-	-	-	97% min	85% min	-	All Pass	-	
0.500	35	0.0197	-	-	-	-	-	-	-	-	-	-	97% min	-	10% max	-	
0.425	40	0.0165	-	-	-	-	-	-	-	-	-	-	-	85% min	-	All Pass	
0.355	45	0.0139	-	-	-	-	-	-	-	-	-	-	-	97% min	-	10% max	
0.300	50	0.0117	-	-	-	-	-	-	-	-	-	-	-	-	-	80% min	
0.180	80	0.0070	-	-	-	-	-	-	-	-	-	-	-	-	-	90% min	
0.125	120	0.0049	-	-	-	-	-	-	-	-	-	-	-	-	-	90% min	
0.075	200	0.0029	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

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Corresponds to ISO Recommendations

Peening Media (ASR)  
Cast Steel Shot, Regular Hardness (45 to 52 HRC)

1. SCOPE:

The complete requirements for procuring the product shall consist of this document and the latest issue of the basic specification, AMS 2431.

2. APPLICABLE DOCUMENTS:

The issue of the following documents in effect on the date of the purchase order forms a part of this specification to the extent specified herein. The supplier may work to a subsequent revision of a document unless a specific document issue is specified. When the referenced document has been canceled and no superseding document has been specified, the last published issue of that document shall apply.

2.1 SAE Publications:

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001 or [www.sae.org](http://www.sae.org).

AMS 2431 Peening Media, General Requirements

2.2 ASTM Publications:

Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959 or [www.astm.org](http://www.astm.org).

ASTM E 11 Wire Cloth and Sieves for Testing Purposes

ASTM E 350 Chemical Analysis of Carbon Steel, Low-Alloy Steel, Silicon Electrical Steel, Ingot Iron and Wrought Iron

ASTM E 384 Microindentation Hardness of Materials

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3. TECHNICAL REQUIREMENTS:

3.1 Cast steel shot, regular hardness, shall conform to AMS 2431 and the requirements specified herein

3.2 Composition:

Shall conform to the percentages by weight shown in Table 1, determined in accordance with ASTM E 350.

TABLE 1 - Composition

Element	min	max
Carbon	0.80	1.20
Manganese (3.2.1)	--	1.20
Silicon	0.40	1.50
Phosphorous	--	0.05
Sulfur	--	0.05

3.2.1 Minimum manganese content shall vary according to shot size and the minimum percentage by weight shown in Table 2.

TABLE 2 - Minimum Manganese Content

Shot Size	%
ASR-70 to ASR-130	0.35
ASR-170 and ASR-190	0.50
ASR-230 and up	0.60

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3.3 Hardness:

Not less than 90% of the readings, using a microhardness tester with a minimum 500 gram load, shall fall within the range of 45 to 52 HRC, or equivalent (See 8.3), determined in accordance with ASTM E 384.

3.4 Microstructure:

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

3.5 Density:

Shall be not less than 7.0 grams per milliliter, determined in accordance with 3.9.2.

TABLE 3 - Shape Requirements

Shot Size	Area per Field Square Inch (mm <sup>2</sup> )	Number of Fields Viewed	Number of Marginal Particles max <sup>(1)</sup>	Number of Unacceptable Particles max <sup>(2)</sup>
ASR 930	1 (645)	1	8	2
ASR 780	1 (645)	1	12	2
ASR 660	1 (645)	1	16	3
ASR 550	1 (645)	1	20	4
ASR 460	1 (645)	1	28	5
ASR 390	1 (645)	1	39	7
ASR 330	0.25 (161)	1	14	3
ASR 280	0.25 (161)	1	20	4
ASR 230	0.25 (161)	1	14	5
ASR 190	0.25 (161)	1	20	7
ASR 170	0.25 (161)	1	28	10
ASR 130	0.0625 (40)	1	10	4
ASR 110	0.0625 (40)	1	14	5
ASR 70	0.0625 (40)	1	39	13

Notes: (1) Maximum number of marginal shapes is approximately 3% of the total number of particles viewed for ASR 70 to ASR 230, 6% for ASR 280 to ASR 550, and 7% for ASR 660 to ASR 930.

(2) Maximum number of unacceptable shapes is approximately 1% of the total number of particles viewed.

## 3.8 Size:

Shall conform to the requirements of Table 4, determined in accordance with 3.9.1.

TABLE 4 - Screening Requirements

Shot Size	All Pass Screen	2% max on Screen	50% max Cumulative on Screen	90% min Cumulative on Screen	98% min Cumulative on Screen
ASR 930	5 (0.157)	6 (0.132)	7 (0.111)	8 (0.0937)	10 (0.0787)
ASR 780	6 (0.132)	7 (0.111)	8 (0.0937)	10 (0.0787)	12 (0.0661)
ASR 660	7 (0.111)	8 (0.0937)	10 (0.0787)	12 (0.0661)	14 (0.0555)
ASR 550	8 (0.0937)	10 (0.0787)	12 (0.0661)	14 (0.0555)	16 (0.0469)
ASR 460	10 (0.0787)	12 (0.0661)	14 (0.0555)	16 (0.0469)	18 (0.0394)
ASR 390	12 (0.0661)	14 (0.0555)	16 (0.0469)	18 (0.0394)	20 (0.0331)
ASR 330	14 (0.0555)	16 (0.0469)	18 (0.0394)	20 (0.0331)	25 (0.0278)
ASR 280	16 (0.0469)	18 (0.0394)	20 (0.0331)	25 (0.0278)	30 (0.0234)
ASR 230	18 (0.0394)	20 (0.0331)	25 (0.0278)	30 (0.0234)	35 (0.0197)
ASR 190	20 (0.0331)	25 (0.0278)	30 (0.0234)	35 (0.0197)	40 (0.0165)
ASR 170	25 (0.0278)	30 (0.0234)	35 (0.0197)	40 (0.0165)	45 (0.0139)
ASR 130	30 (0.0234)	35 (0.0197)	40 (0.0165)	45 (0.0139)	50 (0.0117)
ASR 110	35 (0.0197)	40 (0.0165)	45 (0.0139)	50 (0.0117)	80 (0.0070)
ASR 70	40 (0.0165)	45 (0.0139)	50 (0.0117)	80 (0.0070)	120 (0.0049)

Notes: (1) Nominal Size = 90% Screen Opening (e.g.: Nominal size of ASR 230 shot is 0.0234 diameter.

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## 3.9 Test Methods and Procedures:

3.9.1 Size Screening Test: The size of shot, specified in 3.8, shall be determined by using a 100-gram sample and screening as follows: The required standard testing sieves in accordance with ASTM E 11 shall be nested in ascending order with a pan on the bottom. The 100-gram sample shall be poured onto 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 and the tapping speed shall be 145 to 160 taps per minute. Shaking and tapping shall be continued for 5 minutes  $\pm$  5 seconds for sieves 30 mesh and coarser and 10 minutes  $\pm$  5 seconds for sieves finer than 30 mesh. After shaking, the percentage of shot on each screen shall be determined by weighing the shot retained on each screen.

- 4.1.6.1 Alternate methods of inspection for shape are permitted provided that they can be correlated to the optical method and are acceptable to purchaser.
- 4.1.7 Internal Defects The mount prepared for microhardness testing shall be also used to evaluate defects. A minimum of 100 particles shall be evaluated for defects. Internal defects (Figure 4) include cracks, hollows, and shrinkage. A maximum of 10%, by count, of particles evaluated may contain cracks. A maximum of 10%, by count, of particles evaluated may contain hollows. A maximum of 10%, by count, of particles evaluated may contain shrinkage. A maximum total of 15%, by count, of particles evaluated may exhibit any defects, cracks, hollows, or shrinkage (See 3.7.4). Particles with more than one defect shall be counted only once in the total. A magnification of 10 to 30X shall be used for evaluation of defects.

## 5. PREPARATION FOR DELIVERY:

See AMS 2431 and the following:

### 5.1 Packaging and Identification:

Steel shot shall be packaged in 40 to 55 pound (18 to 25 kg) units in plastic coated bags or pails.

## 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, regular hardness, 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, regular hardness cast steel shot is used on 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 particle diameter.
- 8.2.2 Hollow is a void with an area that is greater than 10% of the area of the shot particle.

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