SURFACE VEHICLE RECOMMENDED PRACTICE

J2175™ JUL2021

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Superseding J2175 JUN2015

Specifications for Low Carbon Cast Steel Shot

RATIONALE

SAE J2175 has been reaffirmed to comply with the SAE Five-Year Review policy.

1. SCOPE

This SAE Recommended Practice describes chemical analysis, hardness, microstructure, and physical characteristic requirements for low carbon cast steel shot to be used for shot peening or blast cleaning operations.

2. REFERENCES

2.1 Applicable Documents

The following publications form a part of this specification to the extent specified herein. Unless otherwise indicated, the latest issue of SAE publications shall apply.

2.1.1 SAE Publications

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

SAE J444 Cast Shot and Grit Size Specifications for Peening and Cleaning

SAE J445 Metallic Shot and Grit Mechanical Testing

TO PLACE A DOCUMENT ORDER: **Tel: 877-606-7323 (inside USA and Canada)**
Tel: +1 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: CustomerService@sae.org
SAE WEB ADDRESS: **http://www.sae.org**

For more information on this standard, visit
https://www.sae.org/standards/content/J2175_202107

2.1.2 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 A 370 Test Methods and Definitions for Mechanical Testing of Steel Products

ASTM E 384 Practice for Safeguarding Against Warpage and Distortion During Hot-Dip Galvanizing of Steel Assemblies

3. DESCRIPTION

Low carbon cast steel shot is the product obtained by atomizing and rapidly solidifying particles of molten steel in a controlled range of sizes. These shot particles are then screened to produce a range of sizes from LCS-70 to LCS-1320 or larger as described in SAE J444.

4. CLASSIFICATION

Low carbon cast steel shot shall be identified by LCS followed by the numbers representing the nominal size in ten thousandths of inches, in accordance with SAE J444, i.e., LCS-460.

5. CHEMICAL COMPOSITION

The finished low carbon steel shot shall have the following chemical composition as listed in Table 1:

TABLE 1 - CHEMICAL COMPOSITION

Low Carbon Steel Shot	Chemical Composition
Carbon	0.10 to 0.15%
Silicon	0.10 to 0.25%
Manganese	1.20 to 1.50%
Aluminum	0.05 to 0.15%
Phosphorus	0.035% maximum
Sulfur	0.035% maximum

6. HARDNESS

The hardness of 90% of all shot particles tested shall be within the range of 400 to 540 KHN (40 to 51 Rockwell C).

7. MICROSTRUCTURE

The microstructure of low carbon cast steel shot shall be an intermediate structure (bainite), a mechanical mixture of ferrite and cementite particles with random feather-like appearance (upper bainite) and accicular (lower bainite) with few or no free carbides (see 8.1.5).

8. GENERAL APPEARANCE

The low carbon steel shot shall be as spherical as commercially possible and no more than 20% of the shot particles shall have objectionable defects. Any one particle tested that has several different defects will only be counted once in the total. Notwithstanding the allowable percentages listed as follows, no more than a total of 20% objectionable particles are allowed.

8.1 Objectionable Defects

8.1.1 Particle Shape

No more than 5% of the particles in a shot sample shall be elongated. An elongated particle is one whose length is in excess of twice the maximum particle width.

8.1.2 Voids

No more than 10% of the particles in a sample shall contain voids. A void is a smooth surfaced internal hole and must be greater than 10% of the particle to be considered harmful and counted as a void.

8.1.3 Shrinkage

No more than 10% of the particles in a sample shall contain shrinkage. A shrinkage area is an internal cavity with an irregular dendritic surface, and must be greater than 40% of the particle area to be considered harmful.

8.1.4 Cracks

No more than 5% of the particles in a shot sample shall contain cracks. A crack is a linear discontinuity whose length is greater than three (3) times its width and its length is greater than 20% of the diameter or shortest dimension of the particle and radial in orientation.

8.1.5 Microstructure

Carbide networks, partial decarburization, and grain boundary segregation are undesirable. No more than 15% of the particles tested shall have these defects.

8.1.6 Nonmagnetic Material

No more than 1% of the shot sample, by weight, shall be nonmagnetic material.

9. DENSITY

The density of low carbon cast steel shot shall be not less than 7 g/cc.

10. MECHANICAL TESTS

To conform with revised SAE J445.

11. INSPECTION PROCEDURES

11.1 Sampling

Samples for chemical analysis, hardness, microstructure, density, objectionable defects, and mechanical testing shall be carefully obtained to be representative of each shipment of production lot.

11.2 Sample Mounting for Testing

Shot samples used for testing for hardness, microstructure, and objectionable defects shall be mounted one layer deep in bakelite or other suitable strong metallurgical sample mounting media.

The mounted sample shall be ground to the center of the particle and polished by acceptable methods for examination using a microscope. When grinding and polishing the sample, care must be taken not to overheat the sample and affect microstructure and/or hardness.