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SURFACE VEHICLE RECOMMENDED PRACTICE

An American National Standard

SAE J441

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Superseding J441 MAY87

(R) CUT WIRE SHOT

1. ***Scope—***This SAE Recommended Practice is considered to be tentative and is subject to modification to meet new developments or requirements. It is offered as a guide in the selection and use of cut wire shot.

2. ***References***

2.1 Applicable Publications—The following publications form a part of this specification to the extent specified herein.

2.1.1 ASTM PUBLICATIONS—Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

ASTM A 370—Test Methods and Definitions for Mechanical Testing of Steel Products
ASTM E 384—Test Method for Microhardness of Materials

3. ***Description—***Cut wire shot shall be the product of carbon steel wire or stainless wire Type 302, 304, Condition B, Spring Temper, cut into the form of cylinders with lengths approximately equal to the wire diameter. Conditioned cut wire shot with edges prerounded shall be required for shot peening applications.

4. ***Classification—***All cut wire shot shall be identified according to the wire size from which it is obtained. It shall be identified by the prefix letters CW meaning cut steel wire or SCW meaning stainless cut wire. This designation shall be followed by a two-digit suffix number equivalent to the mean diameter, in inches, of the wire from which the shot is produced times 1000 Table 1.

5. ***Chemical Composition—***The chemical composition shall conform to the following specifications:

5.1 Carbon Steel

Carbon: 0.45 to 0.85
Manganese: 0.30 to 1.30
Phosphorus: 0.040 max
Sulphur: 0.050 max
Silicon: 0.15 to 0.35

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TABLE 1—WIRE DIAMETER USED FOR CUT WIRE SHOT

Shot Size	Mean Wire Diameter (mm)	Mean Wire Diameter (in)
SCW/CW-62	1.6	0.062
SCW/CW-54	1.4	0.054
SCW/CW-47	1.2	0.047
SCW/CW-41	1.0	0.041
SCW/CW-35	0.9	0.035
SCW/CW-32	0.8	0.032
SCW/CW-28	0.7	0.028
SCW/CW-23	0.6	0.023
SCW/CW-20	0.5	0.020
SCW/CW-17	0.45	0.017
SCW/CW-14	0.35	0.014
SCW/CW-12	0.30	0.012

5.2 Stainless Steel

Carbon: 0.15 max
Manganese: 2.00 max
Phosphorus: 0.045 max
Sulphur: 0.030 max
Silicon: 1.00 max
Chromium: 17.00 to 20.00
Nickel: 8.00 to 10.50

6. ***Tensile Properties—***Shot shall be made from wire conforming to the tensile strengths shown in Table 2. In order to meet purchaser specified hardness requirements, other tensile strengths may be permitted.

7. ***Hardness—***Carbon steel cut wire particles shall have a minimum hardness of 426 KHN (42 HRC). Stainless cut wire shot shall have a minimum hardness of 466 KHN (45 HRC). The hardness shall be determined per ASTM E 384 and using a 500 gf load for sizes CW-28 and finer or a 1000 gf load for sizes larger than CW-28. Other microhardness test methods may be used as long as a reliable hardness conversion can be obtained by calibrating various machines against known standards. Approximate conversions to Rockwell C Hardness Numbers (HRC) from Knoop Hardness Numbers (KHN) are obtained from ASTM A 370. Other hardness values can be specified by the purchaser.

8. ***Size Classification—***Cut wire shot shall be made from wire of the diameters shown in Table 1. The weight of random as-cut particles shall be within the limits of Table 3. The weight of random conditioned particles shall be within the limits of Table 4. Shot sizes varying from those shown are available and may be obtained by arrangement between shot manufacturer and purchaser.

TABLE 2—TENSILE PROPERTIES OF CUT WIRE SHOT

Shot Size (mm)	Shot Size (in)	Tensile Strength Carbon Steel Wire MPa	Tensile Strength Carbon Steel Wire (ksi)	Tensile Strength Stainless Steel Wire MPa	Tensile Strength Stainless Steel Wire (ksi)
1.6	SCW/CW-62	1630/1880	(237/272)	1758/1965	(255/285)
1.4	SCW/CW-54	1680/1920	(243/279)	1793/1999	(260/290)
1.2	SCW/CW-47	1710/1970	(248/286)	1806/2013	(262/292)
1.0	SCW/CW-41	1760/2020	(255/293)	1855/2062	(269/299)
0.9	SCW/CW-35	1800/2080	(261/301)	1882/2089	(273/303)
0.8	SCW/CW-32	1830/2110	(266/306)	1910/2117	(277/307)
0.7	SCW/CW-28	1870/2140	(271/311)	1972/2179	(286/316)
0.6	SCW/CW-23	1920/2200	(279/319)	2013/2220	(292/322)
0.5	SCW/CW-20	1950/2230	(283/323)	2068/2275	(300/330)
0.45	SCW/CW-17	1980/2250	(287/327)	2095/2300	(304/334)
0.35	SCW/CW-14	2010/2280	(291/331)	2135/2341	(310/340)
0.30	SCW/CW-12	2030/2300	(294/334)	2165/2370	(314/344)

TABLE 3—WEIGHT LIMITS FOR AS-CUT PARTICLES

Shot Size (mm)	Shot Size (in)	Weight of 50 Random Pieces (grams)
1.6	SCW/CW-62	1.090 – 1.330
1.4	SCW/CW-54	0.720 – 0.880
1.2	SCW/CW-47	0.480 – 0.580
1.0	SCW/CW-41	0.310 – 0.390
0.9	SCW/CW-35	0.200 – 0.240
0.8	SCW/CW-32	0.140 – 0.180
0.7	SCW/CW-28	0.100 – 0.120
0.6	SCW/CW-23	0.050 – 0.070
0.5	SCW/CW-20	0.040 – 0.050
		Weight of 100 Random Pieces (grams)
0.45	SCW/CW-17	0.040 – 0.060
0.35	SCW/CW-14	0.020 – 0.040
0.30	SCW/CW-12	0.010 – 0.025

TABLE 4—WEIGHT LIMITS FOR CONDITIONED CUT WIRE SHOT

Shot Size (mm)	Shot Size (in)	Weight of 50 Random Pieces (grams)
1.6	SCW/CW-62	1.040 – 1.260
1.4	SCW/CW-54	0.680 – 0.840
1.2	SCW/CW-47	0.460 – 0.550
1.0	SCW/CW-41	0.290 – 0.370
0.9	SCW/CW-35	0.190 – 0.230
0.8	SCW/CW-32	0.130 – 0.170
0.7	SCW/CW-28	0.095 – 0.115
0.6	SCW/CW-23	0.045 – 0.065
0.5	SCW/CW-20	0.040 – 0.050
		Weight of 100 Random Pieces (grams)
0.45	SCW/CW-17	0.035 – 0.055
0.35	SCW/CW-14	0.020 – 0.040
0.30	SCW/CW-12	0.010 – 0.025

9. Inspection Procedure—Shot particles to be checked for hardness are to be mounted, ground, and polished to the centerline.

10. Soundness—As-cut shot particles shall be free of shear cracks and laps and shall not contain excessive seams or burns. Conditioned particles shall be free of shear cracks and shall not contain excessive seams.

11. Packaging—This material shall be packaged to prevent loss during shipping and storage.

12. Notes

12.1 Marginal Indicia—The change bar (l) located in the left margin is for the convenience of the user in locating areas where technical revisions have been made to the previous issue of the report. An (R) symbol to the left of the document title indicates a complete revision of the report.

PREPARED BY THE SAE SURFACE ENHANCEMENT COMMITTEE OF THE
SAE FATIGUE, DESIGN, AND EVALUATION DIVISION

Rationale—Not applicable.

Relationship of SAE Standard to ISO Standard—Not applicable.

Application—This SAE Recommended Practice is considered to be tentative and is subject to modification to meet new developments or requirements. It is offered as a guide in the selection and use of cut wire shot.

Reference Section

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

ASTM E 384—Test Method for Microhardness of Materials

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