

	SURFACE VEHICLE RECOMMENDED PRACTICE	SAE J400 OCT2012
		Issued 1968-07 Reaffirmed 2012-10
		Superseding J400 NOV2002
Test for Chip Resistance of Surface Coatings		

RATIONALE

J400 has been reaffirmed to comply with the SAE five-year review policy.

1. **Scope**—This SAE Recommended Practice covers a laboratory procedure for testing and evaluating the resistance of surface coating to chipping by gravel impact. The test is designed to reproduce the effect of gravel or other media striking exposed paint or coated surfaces of an automobile and has been correlated with actual field results. The specific intent of the test is to evaluate organic surface coatings or systems on flat test panels; however, It may be possible to extend this type of testing to finished parts or other types of materials such as anodized aluminum or plated plastics if the results are interpreted with respect to the limitations and intent implied by the original testing procedures and rating system.

This document may involve hazardous materials, operations, and equipment. This document does not purport to address all of the safety problems associated with its use. It is the responsibility of whoever uses this document to consult and establish safety and health practices and determine the applicability of regulatory limitations prior to use.

All dimensions are nominal unless otherwise noted.

2. Reference

- 2.1 **Related Publication**—The following publication is provided for information purposes only and is not a required part of this document.

2.1.1 SAE PUBLICATION—Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

SAE 680046—Measurement of Chipping of Organic Coatings for Automobiles, John T. Young and Donald R. Hays, Ford Motor Co., Indust. and Chemical Products Div., Warrendale, PA, USA, Society of Automotive Engineers, Inc., 1968

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3. **Summary of Method**—The test consists of projecting standardized road gravel by means of a controlled air blast onto a suitable test panel. The testing apparatus is called a gravelometer, designed to contain road gravel, a test panel holder, and a gravel projecting mechanism. The projecting mechanism, located in front of the test panel, consists of an air nozzle in the base of an inverted pipe tee. The stem of the pipe tee points upward and is located beneath a vibrating hopper into which the gravel is poured. The gravel, falling into the air blast, is projected toward and impacts upon the test panel, which is usually held perpendicular to the impinging gravel. All testing is conducted under controlled temperature conditions, generally room temperature (ambient) or $-29\text{ }^{\circ}\text{C} \pm 3\text{ }^{\circ}\text{C}$ ($-20\text{ }^{\circ}\text{F} \pm 5\text{ }^{\circ}\text{F}$). After the gravel impact, tape is applied to remove any loose paint chips remaining on the panel, and the degree of chipping is determined by visual comparison with the SAE Chipping Rating Standards¹, by counting the number and sizes of all chips, or by other methods deemed suitable between the contractual parties involved.

4. Equipment and Materials

- 4.1 **Gravelometer**—A gravel projecting test apparatus which is constructed according to the design specifications shown in Figure 1.

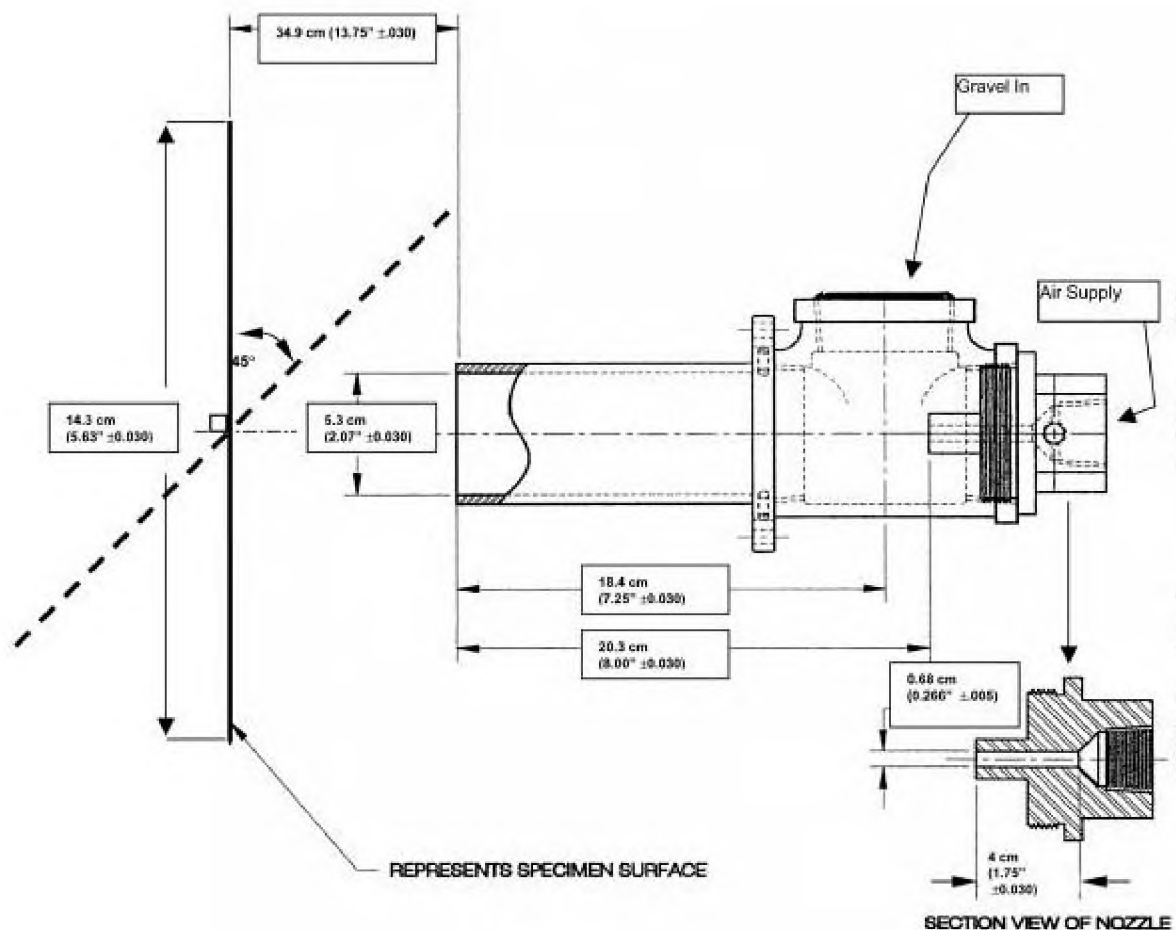


FIGURE 1—TEST APPARATUS

1. Available from Society of Automotive Engineers, Inc., 400 Commonwealth Drive, Warrendale, PA 15096-0001—Identified as EA-400.

- 4.1.1 OPERATION/MAINTENANCE CHECKLIST—The operation/maintenance checklist shown in Figure 2 shall be completed at least once a month for testers that are operated on a weekly basis and once every 6 months for testers that are operated less frequently.

NOTE— Values in chart are specific to the standard gravel testing protocol. Different specifications may be necessary for other media types.

If the answer to any of the following questions is NO, discontinue testing until the problem has been corrected.

Gravelometer Checklist

Question	Yes	No	Data
Is a pipe size ID of 2.54 cm (1 in) airline connected from the supply pipe to the gravelometer?			
Are the pipe joints free of leaks?			
Does the air pressure hold 483 kPa (70 ± 3 psi) for 10 secs?			
Is the air pressure gauge calibrated?			
Date Last Calibrated:			
Date Last Replaced:			
Is nozzle orifice clear?			
Insert a 6.75 mm (17/64 in.) drill bit or 6.75 ± 0.01mm (0.266 ± .005 in.) plug gauge into nozzle to verify that the nozzle orifice is clear.			
Is the distance of nozzle to sample surface 55.25 cm (21.75 ± .030 in.)?			
Is the distance of gun barrel to sample 34.93 cm (13.75 ± .030 in.)?			
Is sample mounting bracket level top-to-bottom/front-back?			
Is the backer panel edge supported (not solid)?			
Is backer panel tight?			
Are the backer panel angles correct?			
Are stones hitting target in an even/centered pattern?			
Is the gravel screened?			
For older cabinet type gravelometers, is the amount of gravel collected on screen less than 10 pt.?			
Is the correct type and size of gravel being used?			
Does 1pt of gravel empty from the hopper in 7 to 10 seconds?			
Is the filter clear of obstructions?			
Date of last filter cleaning or replacement.			
For older type gravelometers, replace vibrator and bushings if gravel takes longer than 10 s to empty.			
For gravelometers with electronic feed mechanisms, adjust vibrator speed and hopper height so that hopper empties in 7 to 10 seconds.			
Compressor Capacity and Type:			

Below Ambient Testing Information (if required)

Question	Yes	No	Data
Are panels frozen prior to testing?			
How long are panels conditioned in freezer?			
What is the conditioning temperature?			
What is the ambient temperature?			
Time panels exposed to ambient prior to test.			
How far is the QGR from freezer?			

FIGURE 2—CHECKLIST