

# SURFACE VEHICLE RECOMMENDED PRACTICE

**SAE** J416

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## Tensile Test Specimens

**Foreword**—This Document has not changed other than to put it into the new SAE Technical Standards Board Format.

1. **Scope**—When required, unless otherwise specified in the SAE Standards or Recommended Practices, tensile test specimens for metals shall be selected and prepared in accordance with this report. ASTM E 8, Methods of Tension Testing of Metallic Materials, gives more detailed information on tensile testing procedure, and ASTM E 4, Methods of Load Verification of Testing Machines, provides information on testing equipment calibration.

In recommending these specimens for use in tensile tests it is not intended to exclude entirely the use of other test specimens for special materials or for special forms of material. It is, however, recommended that these specimens be used wherever it is feasible.

Machining of specimens shall be done in such a manner as to avoid leaving severe machining strains in the material. Specimens shall be finished so that the surfaces are smooth and free from nicks and tool marks. All ragged edges shall be smoothed.

## 2. References

- 2.1 **Applicable Publications**—The following publications form a part of the specification to the extent specified herein. Unless otherwise indicated, the latest revision of SAE publications shall apply.

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

ASTM E 4—Methods of Load Verification of Testing Machines

ASTM E 8—Methods of Tension Testing of Metallic Materials

3. **Full Section Test Specimens**—For wire, rod, and bars less than 19 mm (3/4 in) diameter or distance between flats, specimens having the full cross section of the material are recommended. It is permissible to reduce the cross section slightly by grinding or machining throughout the test section to insure fracture between gage marks. This may be done either without changing shape of cross section or, on squares, hexagons, or octagons by turning to a round. The following limits apply to such reduction:

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- a. If the same cross sectional shape is retained the final area must be not less than 90% of the original area and the diameter or distance between flats must not be reduced more than 0.3 mm (0.01 in).
- b. If the rod is turned to a round, the final area must be not less than 90% of the area of the maximum inscribed circle and the final diameter must not be less than the original distance between flats minus 0.3 mm (0.01 in).

Fillets must be used at the ends of the reduced section. The fillet radius should be not less than the section diameter.

4. **Flat Test Specimens**—The tensile test specimen shown in Fig. 1 [200 mm (8 in) gage length] is recommended for plates, shapes, and flat material having a thickness 4.8 mm (3/16 in) or over.

The tensile test specimen shown in Fig. 1 [50 mm (2 in) gage length] is recommended for sheet, plate, flat wire, strip, band, and hoop ranging in thickness from 0.13–16 mm (0.005–5/8 in) in either case. Where size of material permits, one of the specimens shown in Fig. 2 may also be used.

5. **Round Test Specimens**—The 12.5 mm (1/2 in) diameter round test specimen shown in Fig. 2 is considered standard and is recommended for general testing of metals. Small size specimens proportional to the standard specimen should be used only when it is necessary to test material from which the standard specimen or the specimens shown in Fig. 1 cannot be prepared. Examples of small size specimens are given in Fig. 2.

Smaller miniature specimens for so-called microtensile tests may be used on agreement between supplier and user.