



Mechanical and Quality Requirements for Die Drawn Suspension U-Bolts

1 Scope

1.1 Material Description. This standard covers the mechanical, material and quality requirements for two (2) grades of die drawn carbon and alloy steel suspension type U-Bolts in nominal thread diameters of M10 thru M24. The term U-Bolt as referred to herein applies to a cold drawn cylindrical rod, threaded on both ends and formed as round bend or square bend U-Bolt. Property classes, Grade A and B, are designated as follows:

- GMW16820: Grade A.
- GMW16820: Grade A Stress Relieved.
- GMW16820: Grade B.
- GMW16820: Grade B Stress Relieved.

1.2 Symbols. Not applicable.

1.3 Applicability. Leaf Spring U-Bolts.

1.4 Remarks. See Appendix A, Table A1 for regional cross reference chart.

2 References

Note: Only the latest approved standards are applicable unless otherwise specified.

2.1 External Standards/Specifications.

ASTM E18	SAE J403	SAE/USCAR-5
ISO 6157	SAE J417	SAE/USCAR-7

2.2 GM Standards/Specifications.

GMW3059	GMW14270	GMW16551
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3 Requirements

3.1 Requirements on Test Specimens. Not applicable.

3.2 General Requirements.

3.2.1 The tensile strength will take precedence to hardness. When the specified hardness and tensile strength cannot be met simultaneously, a revised hardness range shall be established by agreement between the supplier and purchaser.

3.2.2 The U-Bolt must be free of burrs which may be detrimental to satisfactory assembly, safe handling or function as defined by the purchaser.

3.3 Material and Process.

3.3.1 U-Bolts shall be made of medium carbon or medium carbon alloy steel as shown in Table 1.

Table 1: Chemical Composition Requirements

Property Class	Material Description	Steel Grade per SAE J403
Grade A and Grade A Stress Relieved	Medium Carbon or Medium Carbon Alloy Steel	1050, 1541, 1547,1548, 1552
Grade B and Grade B Stress Relieved	Medium Carbon Alloy Steel	1541, 1547,1548, 1552

3.3.2 Threading Process. Threads shall be roll formed unless otherwise specified on the product drawing. Thread quality must meet GMW16551.

3.3.3 Cleaning. Concentrated acids, such as, hydrochloric acid, shall not be used during the manufacturing or plating/coating of the U-Bolt.

3.3.4 Stress Relief.

- Grade A Stress Relieved and Grade B Stress Relieved shall be identified on the drawing as shown in 1.1.
- Finished U-Bolts shall be stress relieved at a temperature of not less than 288 °C for a minimum of 30 minutes.

3.3.5 Hydrogen Embrittlement. All U-Bolts processed through a hydrogen generating process, such as acid cleaning or electroplating, shall be hydrogen embrittlement relieved per SAE/USCAR-5. Verification of embrittlement relief shall be performed per SAE/USCAR-7.

3.4 Mechanical Properties.

3.4.1 The U-Bolts shall meet the Mechanical Properties shown in Table 2. The listed tensile strength represents the minimum value for the threaded portion of one U-Bolt leg.

Table 2: Mechanical Properties

Property Class	Tensile Strength, (Rm) Minimum	Yield Strength, Minimum	Hardness, HRc, for Reference	Hardness, Vickers HV10 for Reference
Grade A and Grade A Stress Relieved	900 MPa	720 MPa	25 to 32	280
Grade B and Grade B Stress Relieved	1040 MPa	832 MPa	30 to 36	320

3.4.2 Mechanical properties shall be determined by testing the U-Bolt over a test saddle. The Saddle Tensile Test is described in A1.1. Hardness Testing is described in A1.2. The minimum tensile load, (LT) in