



SURFACE VEHICLE RECOMMENDED PRACTICE

J2745™

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Categorization and Properties of Advanced High Strength Automotive Sheet Steels

RATIONALE

SAE J2745 covers advanced high strength automotive sheet steels that are now incorporated in SAE J2947.

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FOREWORD

The grades described in this specification are distinguished by their higher yield strengths, tensile strengths, and formability than those of conventional low-carbon sheet steel, which are described in SAE J2329. Dual Phase and Martensitic grades along with TRIP grades are being incorporated in this specification. Higher strength steels are desirable for dent resistance, increased load bearing capability, better crash energy management, better intrusion control performance, or part mass reduction through a decrease in sheet metal thickness.

An increase in strength generally leads to reduced ductility or formability. Care must be taken in designing parts, tooling, and fabrication processes to obtain the greatest benefit from the higher strength sheet steels. Consultation in grade selection between user and steel producer is recommended to insure compatibility of the strength, forming, and joining characteristics.

Strength in these steels is achieved through chemical composition (alloying) and thermo-mechanical processing. Thermo-mechanical processing includes mechanical rolling techniques, temperature control in hot rolling, and time/temperature control in annealing of cold-reduced steel. Steel users should be aware that further thermal treatment may modify the as-produced mechanical properties.

1. SCOPE

This SAE Recommended Practice defines various grades of continuously cast high-strength sheet steels and establishes mechanical property ranges. These sheet steels can be formed, welded, assembled and painted in automotive manufacturing processes. They can be specified as hot-rolled or cold-rolled sheet. Furthermore, they can be coated (hot-dipped galvanized, hot-dipped galvanized, and electrogalvanized) or uncoated. Not all combinations of strength, dimensions and coatings may be commercially available; consult your steel supplier for details.

2. REFERENCES

2.1 Applicable Publications

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

2.1.1 SAE Publications

Available from SAE, 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 J1562	Selection of Zinc and Zinc-Alloy (Hot Dipped and Electrodeposited) Coated Steel Sheet
SAE J2329	Categorization and Properties of Low Carbon Automotive Sheet Steels
SAE J2340	Categorization and Properties of Dent Resistant, High Strength, and Ultra High Strength Automotive Sheet Steel

2.1.2 ASTM Publications

Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959, Tel: (610) 832-9585, www.astm.org.

ASTM A 370	Standard Test Methods and Definitions for Mechanical Testing of Steel Products
ASTM A 980	Standard Specification for Steel Sheet, Carbon, Ultra High Strength Cold Rolled
ASTM E 8/E 8M	Standard Test Methods of Tension of Metallic Materials
ASTM E 517	Standard Test Method for Plastic Strain Ratio r for Sheet Metal
ASTM E 646	Standard Test Method for Tensile Strain-Hardening Exponents (n value) of Metallic Sheet Materials
ASTM A 568/A 568M	General Requirements Specification for Steel, Sheet, Carbon, Structural, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled
ASTM A 635/A 635M	Standard Specification for Steel, Sheet and Strip, Heavy-Thickness Coils, Hot-Rolled Carbon, Structural, High Strength Low-Alloy with Improved Formability
ASTM A 924/A 924M	General Requirements for Steel Sheet Metallic Coated by the Hot Dip Process

2.1.3 ISO Publications

Available from ANSI, 25 West 43rd Street, New York, NY 10036-8002, Tel: 212-642-4900, www.ansi.org.

ISO 377-1	Selection of preparation of samples and test pieces of wrought steel
ISO 6892	Metallic materials—Tensile testing at ambient temperature
ISO 7438	Metallic materials—Bend test
ISO 7500	Metallic materials—Verification of static uniaxial testing machines
ISO 9513	Metallic materials—Calibration of extensometers used in uniaxial testing
ISO 10113	Metallic materials—Sheet and strip—Determination of plastic strain ratio
ISO 10275	Metallic materials—Sheet and strip—Determination of tensile strain hardening exponent
ISO TS 16630	Hole expansion testing

2.1.4 JIS Publications

Available from Japanese Standards Association, 4-1-24, Akasaka Minato-ku, Tokyo 107-8440, Japan; Phone: +81-3-3583-8005, Fax: +81-3-3586-2014, www.jsa.or.jp/.

JIS Z 2201 Test Pieces for Tensile Test for Metallic Materials

JIS Z 2204 Bend Test Pieces for Metallic Materials

2.1.5 EN Publications

Available from CEN Management Centre, 36 rue de Stassart, B-1050 Brussels, Belgium, Tel: +32-2-550-08-11, www.cenorm.be.

EN 10 051 Hot Rolled Flat Strips and Sheets without Coating Unalloyed and Alloyed

EN 10 131 Cold Rolled Flat Strips without Coating with Low and Higher YS

EN 10 143 Continuously Hot Dipped Coated Steel Sheet and Strip—Tolerances on Dimensions and Shape

2.1.6 ANSI/AWS/SAE Publications

Available from ANSI, 25 West 43rd Street, New York, NY 10036-8002, Tel: 212-642-4900, www.ansi.org.

ANSI/AWS/SAE D8.7M-05 Recommended Practices for Automotive Weld Quality—Resistance Spot Welding

ANSI/AWS/SAE D8.8-97 A Specification for Automotive and Light Truck Component Weld Quality—Arc Welding

2.1.7 Other Publication

Available from Auto/Steel Partnership (A/SP), 2000 Town Center, Suite 320, Southfield, MI 48075, www.A-SP.org.

AZ-017-02-295 1.0C RI Weld Quality Test Method Manual; Standardized Welding Test Method Task Force, Auto/Steel Partnership (A/SP)

2.2 Related Publications

The following publications are provided for information purposes only and are not a required part of this document.

2.2.1 SAE Publication

Available from SAE, 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 J810 Classifications of Common Imperfections in Sheet Steel