



# Standard Specification for Commercial Steel (CS), Sheet, Carbon (0.16 % Maximum to 0.25 % Maximum), Cold-Rolled<sup>1</sup>

This standard is issued under the fixed designation A794/A794M; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

*This standard has been approved for use by agencies of the Department of Defense.*

## 1. Scope\*

1.1 This specification covers cold-rolled commercial steel (CS) sheet in coils and cut lengths, in which the maximum of the specified carbon range is over 0.15 and not over 0.25 %, and the maximum of the specified manganese range is not over 0.90 %. This material is ordered to chemical composition.

1.2 This specification is not applicable to the steels covered in Specifications [A109/A109M](#) and [A1008/A1008M](#).

1.3 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the standard.

## 2. Referenced Documents

2.1 *ASTM Standards:*<sup>2</sup>

[A109/A109M](#) Specification for Steel, Strip, Carbon (0.25 Maximum Percent), Cold-Rolled

[A568/A568M](#) Specification for Steel, Sheet, Carbon, Structural, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements for

[A749/A749M](#) Specification for Steel, Strip, Carbon and High-Strength, Low-Alloy, Hot-Rolled, General Requirements for

[A1008/A1008M](#) Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable

[E527](#) Practice for Numbering Metals and Alloys in the Unified Numbering System (UNS)

<sup>1</sup> This specification is under the jurisdiction of ASTM Committee [A01](#) on Steel, Stainless Steel and Related Alloys and is the direct responsibility of Subcommittee [A01.19](#) on Steel Sheet and Strip.

Current edition approved May 1, 2012. Published May 2012. Originally approved in 1982. Last previous edition approved in 2009 as A794 – 09. DOI: 10.1520/A0794\_A0794M-12.

<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

2.2 *Society of Automotive Engineers Standard:*<sup>3</sup>  
[J 1086](#) Numbering Metals and Alloys

## 3. Ordering Information

3.1 It is the purchaser's responsibility to specify in the purchase order all ordering information necessary to purchase the needed material. Examples of such information, include but are not limited to, the following:

3.1.1 ASTM specification number and year of issue,

3.1.2 Name of material (cold-rolled commercial steel (CS) sheet),

3.1.3 Grade designation or chemical composition or both,

3.1.4 Copper-bearing steel (if required),

3.1.5 Finish; indicate unexposed with matte (dull) finish, or exposed with either matte (dull), commercial bright or luster finish, as required,

3.1.6 Specify oiled or not oiled, as required,

3.1.7 Dimensions (thickness, width, and whether cut lengths or coils),

NOTE 1—Not all producers are capable of meeting all the limitations of the thickness tolerance tables in Specification [A568/A568M](#). The purchaser should contact the producer regarding possible limitations prior to placing an order.

3.1.8 Coil size (must include inside diameter, outside diameter, and maximum mass),

3.1.9 Quantity,

3.1.10 Application (show part identification and description),

3.1.11 Cast or heat analysis report (request, if required), and

3.1.12 Special requirements (if any).

3.1.12.1 When the purchaser requires thickness tolerances for  $\frac{3}{8}$  in. [10 mm] minimum edge distance (see Supplementary Requirement in Specification [A568/A568M](#)), this requirement shall be specified in the purchase order or contract.

NOTE 2—A typical ordering description is as follows: ASTM A794-XX, Cold-Rolled Commercial Steel (CS), Grade 1018, Exposed, Matte Finish, Oiled, 0.030 by 36 by 96 in., 100 000 lb., for Part No. 5226 Steel

<sup>3</sup> Available from Society of Automotive Engineers (SAE), 400 Commonwealth Dr., Warrendale, PA 15096-0001, <http://www.sae.org>.

\*A Summary of Changes section appears at the end of this standard

Shelving, or, ASTM A794M-XX, Cold-Rolled Commercial Steel (CS), Grade 1018, Exposed, Matte Finish, Oiled 0.75 by 915 by 2438 mm, 45,000 kg, for Part N. 5226 Steel Shelving.

## 4. Manufacture

4.1 *Condition*—The material shall be furnished in the annealed and temper-rolled condition but may be supplied full hard if specified.

## 5. Chemical Composition

5.1 The cast or heat (formerly ladle) analysis of the steel shall conform to the chemical requirements shown in **Table 1**, or chemical compositions can be specified from carbon 0.16 % maximum to 0.25 % maximum, inclusive, and manganese 0.90 % maximum, inclusive, which conforms to the standard chemical ranges and limits tables in the Appendix of Specification **A568/A568M**.

5.1.1 Unspecified elements may be present. Limits on elements shall be as stated in **Table 2**.

5.1.1.1 Each of the elements listed in **Table 2** shall be included in the report of the heat analysis. When the amount of copper, nickel, chromium, or molybdenum is less than 0.02 %, the analysis may be reported as <0.02 %. When the amount of vanadium or columbium is less than 0.008 %, the analysis may be reported as <0.008 %.

5.2 Where material is used for fabrication by welding, care must be exercised in selection of the chemical composition to assure compatibility with the welding process and its effects on altering the properties of the steel.

**TABLE 1 Typical Grade Designations and Chemical Compositions<sup>A</sup>**

Steel Designation No.	Carbon, %	Mn, %	P, Max, %	S, Max, %
1015	0.13–0.18	0.30–0.60	0.030	0.035
1016	0.13–0.18	0.60–0.90	0.030	0.035
1017	0.15–0.20	0.30–0.60	0.030	0.035
1018	0.15–0.20	0.60–0.90	0.030	0.035
1020	0.18–0.23	0.30–0.60	0.030	0.035
1021	0.18–0.23	0.60–0.90	0.030	0.035
1023	0.20–0.25	0.30–0.60	0.030	0.035

<sup>A</sup> Copper, when specified, shall have a minimum content of 0.20 % by cast or heat analysis.

**TABLE 2 Limits on Additional Elements (see 5.1.1)**

Copper, max % <sup>A</sup>	Heat analysis	0.20
Nickel, max % <sup>A</sup>	Product analysis	0.23
Chromium, max % <sup>AB</sup>	Heat analysis	0.20
Molybdenum, max % <sup>AB</sup>	Product analysis	0.23
Vanadium, max %	Heat analysis	0.15
Columbium, max %	Product analysis	0.19
	Heat analysis	0.06
	Product analysis	0.07
	Heat analysis	0.008
	Product analysis	0.018
	Heat analysis	0.008
	Product analysis	0.018

<sup>A</sup> The sum of copper, nickel, chromium, and molybdenum shall not exceed 0.50 % on heat analysis. When one or more of these elements are specified, the sum does not apply; in which case, only the individual limits on the remaining unspecified elements will apply.

<sup>B</sup> The sum of chromium and molybdenum shall not exceed 0.16 % on heat analysis. When one or more of these elements are specified, the sum does not apply; in which case, only the individual limits on the remaining unspecified elements will apply.

## 6. Bending Properties

6.1 The minimum forming radius (radii) which steel covered by this specification can be expected to sustain is listed in the appendix and is discussed in more detail in Specifications **A568/A568M** and **A749/A749M**. When tighter bend radii are required, or curved or offset bends are involved, or when stretching or drawing are also a consideration, the producers shall be consulted.

## 7. General Requirements for Delivery

7.1 Material furnished under this specification shall conform to the applicable requirements of the current edition of Specification **A568/A568M**, unless otherwise provided herein.

## 8. Certification and Reports

8.1 When requested, the producer shall furnish copies of a report showing test results of the cast or heat analysis. The report shall include the purchase order number, ASTM designation number, and the cast or heat number representing the material.

## 9. Keywords

9.1 carbon steel sheet; carbon steel strip; cold rolled steel sheet; cold rolled steel strip; steel sheet; steel strip

## APPENDIX

### (Nonmandatory Information)

#### X1. BENDING PROPERTIES

**TABLE X1.1 Suggested Minimum Inside Radii for Cold Bending<sup>A</sup>**

NOTE 1—( $t$ ) equals a radius equivalent to the steel thickness.

NOTE 2—The suggested radii should be used as minimums for 90° bends in actual shop practice.

Maximum of Specified Manganese Range, %	Minimum Inside Radius for Cold Bending
To 0.60 incl.	$1\frac{1}{2} t$
Over 0.60 to 0.90 incl.	$2 t$

<sup>A</sup> Material that does not perform satisfactorily, when fabricated in accordance with the above requirements, may be subject to rejection pending negotiation with the steel supplier.

## SUMMARY OF CHANGES

Committee A01 has identified the location of selected changes to this standard since the last issue (A794 – 09) that may impact the use of this standard. (Approved May 1, 2012.)

(1) Deleted UNS designations from Table 1.

*ASTM International takes no position respecting the validity of any patent rights asserted in connection with any item mentioned in this standard. Users of this standard are expressly advised that determination of the validity of any such patent rights, and the risk of infringement of such rights, are entirely their own responsibility.*

*This standard is subject to revision at any time by the responsible technical committee and must be reviewed every five years and if not revised, either reapproved or withdrawn. Your comments are invited either for revision of this standard or for additional standards and should be addressed to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee, which you may attend. If you feel that your comments have not received a fair hearing you should make your views known to the ASTM Committee on Standards, at the address shown below.*

*This standard is copyrighted by ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959, United States. Individual reprints (single or multiple copies) of this standard may be obtained by contacting ASTM at the above address or at 610-832-9585 (phone), 610-832-9555 (fax), or service@astm.org (e-mail); or through the ASTM website (www.astm.org). Permission rights to photocopy the standard may also be secured from the ASTM website (www.astm.org/COPYRIGHT/).*