Designation: A 914/A 914M – 92 (Reapproved 1999)$^{\epsilon 1}$

Standard Specification for Steel Bars Subject to Restricted End-Quench Hardenability Requirements[1]

This standard is issued under the fixed designation A 914/A 914M; 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.

ϵ[1] NOTE—Fig. 19 was editorially replaced with the correct information on Hardenability Band 8620 RH in February 2002.

1. Scope

1.1 This specification covers hot-worked alloy and carbon-boron steels designed to attain restricted depth of hardening in the end-quench test. These steel compositions are identified by the suffix letter "RH" added to the conventional grade number.

1.2 In general, steels with restricted hardenability (RH steels) will exhibit a hardness range not greater than 5 HRC at the initial position on the end-quench hardenability bar and not greater than 65 % of the hardness range for standard H-band steels (Specification A 304) in the inflection region. Generally the restricted hardenability band follows the middle of the corresponding standard H-band. An example of the RH band compared with the H band is given for Grade 4140 in Fig. 1.

1.3 This specification is expressed in both inch-pound units and SI units. However, the material will be supplied to inch-pound units unless the purchase order specifies the "M" specification designation.

2. Referenced Documents

2.1 *ASTM Standards:*

A 29/A 29M Specification for Steel Bars, Carbon and Alloy, Hot-Wrought and Cold Finished, General Requirements for[2]

A 255 Test Methods for Determining Hardenability of Steel[2]

A 304 Specification for Steel Bars, Alloy, Subject to End-Quench Hardenability Requirements[2]

E 112 Test Method for Determining Average Grain Size[3]

E 527 Practice for Numbering Metals and Alloys (UNS)[4]

2.2 *SAE Standards:*[5]

J 406 Methods of Determining Hardenability of Steels

J 1268 Hardenability Bands for Carbon and Alloy H Steels

J 1868 Restricted Hardenability Bands for Selected Alloy Steels

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *hardenability*—the relative ability of a steel to harden under heat treatment becomes apparent in the degree to which the material hardens when quenched at different cooling rates.

3.1.1.1 *Discussion*— Hardenability is measured quantitatively, usually by noting the extent or depth of hardening of a standard size and shape test specimen in a standardized quench. In the end-quench test the depth of hardening is the distance along the specimen from the quenched end to a given hardness.

4. Ordering Information

4.1 Orders for material under this specification should include the following information, in proper sequence:

4.1.1 Quantity (weight),
4.1.2 Name of material (alloy or carbon-boron steel),
4.1.3 Cross-sectional shape,
4.1.4 Size,
4.1.5 Length,
4.1.6 Grade,
4.1.7 End-quenched hardenability (see Section 9),
4.1.8 Report of heat analysis, if desired (see Section 7),
4.1.9 Special straightness, if required,
4.1.10 ASTM designation and date of issue, and
4.1.11 End use or special requirements.

NOTE 1—A typical ordering description is as follows: 10 000 lb, alloy bars, round, 4.0-in. diameter by 10 ft, Grade 4140RH, heat analysis required, complete hardenability data required, ASTM AXXX, [AXXXM] dated _____ worm gear.

4.2 The purchaser shall specify the desired grade, including the suffix letters "RH", in accordance with Table 1.

4.3 Band limits are shown graphically and as tabulations in Figs. 2-23, inclusive. For specification purposes, one must use tabulated values of Rockwell hardness (HRC) as a function of distance from the quenched end of the hardenability bar, either

[1] This specification is under the jurisdiction of ASTM Committee A-1 on Steel, Stainless Steel, and Related Alloys and is the direct responsibility of Subcommittee A01.15 on Bars.

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[2] *Annual Book of ASTM Standards*, Vol 01.05.

[3] *Annual Book of ASTM Standards*, Vol 03.01.

[4] *Annual Book of ASTM Standards*, Vol 01.01.

[5] Available from Society of Automotive Engineers, 400 Commonwealth Dr., Warrendale, PA 15096.

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