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Manufacturer, Exporter, Stockiest, Supplier, Trader for Carbon Steel, Stainless Steel, Alloy Steel And High Nickel Alloy, Nickel Alloy Plate, Sheets And Coils.

Deeignatian A 633/A 632t8-95

Standard Specification for Normalized High-Strength Low-Alloy Structural Steel Plates'

This standard is issued under the fixed designation A 633/A 633M; 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. Consult the DoD Index of Specifications ana Standards for the specific year of issue which has been adopted by the Department of Defense.

NOTE—Table 2 was corrected editorially in June 1995.

1. Scope

i.I This specification covers normalized K gh-st« ngtf too'-aJloy siruc\ural steel plates For welded. riveted, or bolted construction.

I.2 Thus » a1criaj is panicuTarly suJted For service ation ambient temperatures nf -50‘f [-45’C3 and higher where belch loughncss better than tial expected in as-rolled material of a comparable strengh level is des:reit

I.3 Four grades, designated Grades A, C, D, «ad E (niially former Specification A 633 without a grade desienat ion) cre co 'ered by this specification. Grade A provides a minimum yield poirt of 42 ksi [290 MPa] in thicknesses through 4 in, {100 mm]. inc1usis'e. Grsdcs C and D provide a minimum yield pninl of 50 I:st [345 I•JPa] in thiiikncss‹s up to 2.50 in. [65 mm). inclusive and 45.0 ksi {315 MPn3 in thief:messes over 2.50 in. to 4.0 in. [65 to 100 mm3, inclusi›c. Grade E proi4des a minimum yield point of 60 ksi (4 15 MPa] in thicknesses up to 4.0 in. { 100 mm], inclusive and 55 ksi *[?8Q* M Pa] in thick noses, o ter 4 in. to h in. (1 00 to 1 50 mm], inclusive.

1.4 Current practice nor» slJy limit plates Furnished uodcr IIt›s specification to the osx‹mum thicknesses shown in 1.3. The individual macufacturrr ibu»ld br consultcd om sire limiiations for oiber product forms.

I.3 Wfieo the seel is to t›c v«lded. it is presupposed thai a welding procedure suitable for the grade of steel and in - ended use or service will be utilized. A0 Appendix X3 of Sg«:iftcafion A 6/A 6M for inFormafion out ueldabi\ity.

1.6 The values stated in cithcr i nch-yound units or St units are to be regarded as standard. **W jlb in the text,** the SI units are shnwn in brackets. The values stated in each system are not exact equivalents; therefore, each system must be used independently of the other. Combining values from the fwo systems may rssu\t in ro›tc0nf0rinance with this spect-fication.

2. £teferencod Documents

i.i .‹sr.w standards.-

A **6/A** 6M flpecificaiion for General Req invents for Rolled Structural 5tvc\ n. elutes. Shapes, and Slteel Piling'

A 673/A 673M Spccificai4O0 !D7 QBfTt]Dling Procedure For Impact Testing of Sli-uctural Steel°

3. G•eneral Requirements for Deliiei-y

3.l Material fumished ander this specific:aiion shall con-form to the teqo‹rcmcriu of the current edition of Spccifics-tion A 6/A 6M, for the ordered material, unless a confliN exists in «hich case this speciii‹:ation shall prevail.

4. Manufacture

4.1 *Melting Process:*

4. I.\ The suet msy 6c made by any of tlte Ioflov.'in8 processes. ojxn-fic8rtli, basic-osvBen, or electric-Furnace.

4. I .2 The stci st«tI b< killed and shall conform to the ftse 8us‹enitic Bmin size i-e‹juirement of Specification A6/A6M.

5. Hc›it TrexMent

5,t The m\cr¡,zt sbs\l be «o‹mat\z<a bY heating \o s «vitebI« temperature akirh produces an austeoitic struGTf re, b t not exceeding l 700”F [9?3”C], holding a sufficient time to attain uoiforo h ra‹ throu@out the material and cooling in air.

5.l . I Grade E material over 5 in. {75 mm] in thickness shall be double normalized,

5.2 If the purchaser elects to per:form the required heat ii-caimenp ibe material shaft be accepted on the basis of mill tests made from test coupons heat treated in accordance with the purchase orrler zegujrefneo\s. If the test cougon]q ept treatment requirements aze not indicated oo the purchaa nrder, the manufacturer **shall** heat treat the test coupons under conditions considered «ppropriate. Tbe manufacturer shall inform the purchaser of the heat-treatment procedure foliuwcd in hot treating the test coupons at the mill.

6, Chemical Requirements

6. i Tl›e heat anat sis shall conform ‹o the rhemica-l composition requirements listed in Table 1.

6.2 The steel shall enn furm on prnduci analysis to the rcqu i rcmcnts prcsrribe ip Table 1, subject to the product analysis tolcra ueri in spcifle«tion .s 6/A 6M.

7. ?1echanical Requirements

7.1 *Tension Tests*—The material as represented by the test specimens shall conform to the requirements listed in Table 2.

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pecification is under the jurisdiction of ASTM Committee A-1 on Steel, Stainless Steel, and Related Alloys and is the direct responsibility of Subcommittee A01.02 on Structural Steel for Bridges, Buildings, Rolling Stock, and Ships.

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[2] *Annual Book of ASTM Standards,* Vol 01.04.

TABLE I chemical R ulr nan

NOTE—Where "..." appears in this table there is no requi

Carbon, max				
Manganese:				
1½ in. [40 mm] and under in thickness	1.00–1.35	1.15–1.50[B]	0.7Q-1.30	1.15–1.50
Over 1½ in. to 4 in. [40 to 100 mm], incl	1.00–1.35	1.15–1.50[B]	1.0@1.80	1.15–1.50
Over 4 in. to 6 in. [100 to 150 mm], incl	[D]	[D]	[D]	1.15–1.50
osphorus, max				0.035
Sulfur,				
Silicon	0.15–0.50	0.15–0.50	0.15–0.50	0.15–0.50
Vanadium	...		...	0.04–0.11
	0.05 max		...	[C]
	...	...	...	0.01–0.03
	...	...	0.35	...
	...	...	0.25	...
Chromium, max	...	...	0.25	...
	...	...	0.08	...

[A] For Grade E the minimum total aluminum content shall be 0.018 %, or the vanadium nitrogen ratio shall be 4:1
[B] For Grade C manganese content may be increased to 1.60 % maximum provided the carbon content does not
[C] Columbium may be present in the amount of 0.01 to 0.05 %.
[D] The size and grade is not described in this specification

	Grade A	Grades C and D	Grade E
Yield point, min, ksi [MPa]:			
Over 2.5 in. to 4 in. [65 to 100 mm], incl	42 [290]	46 [315]	60 [415]
Over 4 in. to 6 in. [100 to 150 mm], incl	[B]	[B]	55 [380]
Tensile strength, ksi [MPa]:			
2.5 in. [65 mm] and under			80 to 100 [550 to 690]
Over 2.5 in. to 4 in. [65 to 100 mm], incl			80 to 100 [550 to 690]
Over 4 in. to 6 in. [100 to 150 mm], incl			75 to 95 [515 to 655]

[A] See specimen Orientation under the Tension Tests of Specification A
[B] The size and grade is not described in this specification.
[C] For plates wider than 24 in. (610 mm), the elongation requirement is r
section of Specification A 6/A 6M.

t•o p•‹›•r»•g• p•'n = * +

8. Keywords

8.1 bolted construction; high-strength; low-alloy; low am- biertt **teropcratum; noroizJ¡zcd; aotch** toughness, glaies› zivet«J construction; **sieel; sti-uctuzal** steel; welded consrruc- tion

SUPPLEMENTARY REQU MF:

Sjaadazdizecl supptemertzry ccgu?eaiei›ts for Jzsc at 6ie optJoo **o[tbe purchaser** aze listca io Specification A 6/A 6M. Those **that** are considered suitable for tree with **lbls specification ate** listed b/ title:

S5. Charpy V-Notch Impact Test.
5 l4. Ilcod T‹›st.

523. Copper-Bcazt•g Stee] (for i£4proved atQ ghe?c corrosion resistance).

APPENDIX

(Nonmandatory Information)

X1. CHARPY V-NOTCH IMPACT TEST

X1.1 The values shown in Table X1.1 are included only a information as to the guarantees which are generally availabl is a matter for agreement between the purchaser and the manufacturer.

TABLE X1.1 Charpy V-Notch Impact Test Minimum Energy Values (Average of Three Specimens)

Test Temperature, °F [°C]	Longitudinal Specimens, ft	Transverse Specimens, ft·lbf [J]
−75 [−60]		15 [20]
−60 [−50]	20 [27]	15 [20]
−50 [−45]	25 [34]	20 [27]
−40 [−40]	25 [34]	20 [27]
−30 [−35]	30 [41]	25 [34]
0 [−20]	40 [54]	30 [41]
32 [0]	45 [61]	30 [41]
75 [25]	50 [68]	30 [41]