Designation: A786/A786M – 15 (Reapproved 2021)

Standard Specification for Hot-Rolled Carbon, Low-Alloy, High-Strength Low-Alloy, and Alloy Steel Floor Plates[1]

This standard is issued under the fixed designation A786/A786M; 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 U.S. Department of Defense.

1. Scope

1.1 This specification covers carbon, low-alloy, high-strength low-alloy, and alloy steel hot-rolled floor plates for flooring, stairways, transportation equipment, and general structural purposes. While it is generally provided in the as-rolled condition, floor plate also may be provided in the heat-treated condition, depending on the material specification. Rolled floor plates have raised figures at regular intervals on one surface of the plate.

1.2 Floor plate is available in dimensions that meet the classification size limits for sheet, heavy thickness sheet coil, or plate. Maximum thickness for product delivered under this specification is 1 in. [25 mm].

1.3 When the steel is to be welded, it is presupposed that a welding procedure suitable for the grade of steel and intended use or service will be utilized. See Appendix X3 of Specification A6/A6M for information on weldability.

1.4 The values stated in either inch-pound units or SI units are to be regarded separately as standard. The values stated in each system are not necessarily exact equivalents; therefore, to ensure conformance with the standard, each system shall be used independently of the other, and the values from the two systems shall not be combined.

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

A6/A6M Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling

A36/A36M Specification for Carbon Structural Steel

A131/A131M Specification for Structural Steel for Ships

A242/A242M Specification for High-Strength Low-Alloy Structural Steel

A514/A514M Specification for High-Yield-Strength, Quenched and Tempered Alloy Steel Plate, Suitable for Welding

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

A572/A572M Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel

A573/A573M Specification for Structural Carbon Steel Plates

A588/A588M Specification for High-Strength Low-Alloy Structural Steel, up to 50 ksi [345 MPa] Minimum Yield Point, with Atmospheric Corrosion Resistance

A606/A606M Specification for Steel, Sheet and Strip, High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, with Improved Atmospheric Corrosion Resistance

A635/A635M Specification for Steel, Sheet and Strip, Heavy-Thickness Coils, Hot-Rolled, Alloy, Carbon, Structural, High-Strength Low-Alloy, and High-Strength Low-Alloy with Improved Formability, General Requirements for

A659/A659M Specification for Commercial Steel (CS), Sheet and Strip, Carbon (0.16 Maximum to 0.25 Maximum Percent), Hot-Rolled

A709/A709M Specification for Structural Steel for Bridges

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

Current edition approved Sept. 1, 2021. Published September 2021. Originally approved in 1981. Last previous edition approved in 2015 as A786/A786M – 15. DOI: 10.1520/A0786_A0786M-15R21.

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

A829/A829M Specification for Alloy Structural Steel Plates
A830/A830M Specification for Plates, Carbon Steel, Structural Quality, Furnished to Chemical Composition Requirements
A941 Terminology Relating to Steel, Stainless Steel, Related Alloys, and Ferroalloys
A1011/A1011M Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength
A1018/A1018M Specification for Steel, Sheet and Strip, Heavy-Thickness Coils, Hot-Rolled, Carbon, Commercial, Drawing, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength

3. Terminology

3.1 *Definitions*—For definitions of terms used in this specification, refer to Terminology A941.

4. Surface Pattern

4.1 Individual floor plate patterns are unique to each manufacturer and are not identical in dimension or appearance to patterns manufactured by other manufacturers, although there may be a close resemblance. Typical patterns are shown in Fig. 1. Manufacturers generally produce only one of the patterns shown.

4.2 Pattern size and shape are not addressed in this specification due to the differences in individual manufacturer's patterns and production methods. Where a need for these attributes exists, purchasers should consult the manufacturer.

4.3 Minimum pattern height shall be 0.020 in. [0.5 mm] for material with a base thickness equal to or greater than 0.070 in. [1.8 mm]. The minimum pattern height shall be 0.015 in. [0.4 mm] for material with a base thickness less than 0.070 in. [1.8 mm].

5. Ordering Information

5.1 Information items to be considered, if appropriate, for inclusion in purchase orders are as follows:

5.1.1 Quantity (weight [mass] or number of pieces),

5.1.2 ASTM designation and year of issue,

5.1.3 Chemical composition limits or ASTM material designation and grade (if applicable) and year of issue (if neither is specified, the product will be supplied 0.33 % maximum carbon, by heat analysis, and without specified mechanical properties).

5.1.4 Dimensions (decimal thickness, width, and either cut length of plate or coil size and weight [mass] requirements as applicable),

5.1.5 Condition, if other than as-rolled,

5.1.6 Product form (plate, sheet, or coil) and pattern from Fig. 1. As indicated in 4.2, if specific pattern attributes, or some alternative pattern, are desired, the purchaser will need to consult with the manufacturer,

5.1.7 Product analysis (see 9.3),

5.1.8 Copper-bearing steel, if required (see 9.4).

6. General Requirements

6.1 Except as otherwise specified, product furnished under this specification as plate shall conform to the applicable requirements of Specification A6/A6M.

6.2 Except as otherwise specified, product furnished under this specification as sheet shall conform to the applicable requirements of Specification A568/A568M.

6.3 Except as otherwise specified, product furnished under this specification as heavy-thickness coil shall conform to the applicable requirements of Specification A635/A635M.

6.4 In case of any conflict in requirements with this specification and a referenced material specification, the requirements of this specification shall prevail.

7. Material

7.1 ASTM specifications that are currently available for floor plate production include, but are not limited to, the following specifications: A36/A36M, A131/A131M, A242/A242M, A514/A514M, A572/A572M, A573/A573M, A588/A588M, A606/A606M, A659/A659M, A709/A709M, A829/A829M, A830/A830M, A1011/A1011M, and A1018/A1018M.

8. Manufacture

8.1 The steel shall be made by any process that conforms to the requirements of the material specification specified in the purchase order (see 5.1.3), if any.

9. Chemical Composition Limits

9.1 *Specified to Chemical Composition Limits Only*—The heat analysis shall conform to the chemical limits specified in the purchase order.

9.2 *Specified to an ASTM Specification*—The heat analysis shall conform to the chemical requirements listed in the applicable specification.

9.3 Where specified in the purchase order, product analyses shall be performed at the frequency specified in the purchase order, and such analyses shall conform to the applicable specified limits for heat analysis, subject to the permitted variations in product analysis in Specification A6/A6M.

9.4 If copper-bearing is specified in the purchase order, the material shall contain at least 0.20 % copper, by heat analysis.

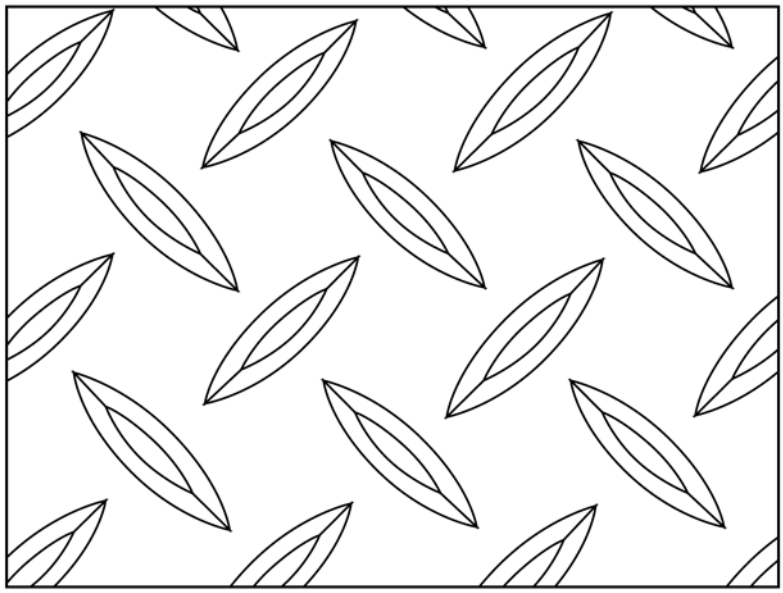
10. Tensile Properties

10.1 The material as represented by the test specimen shall conform to the requirements for yield point or yield strength, and tensile strength in the ordered specification. The tension test shall be conducted on specimens with the raised figures present. Thickness is measured at a position between the raised figures in an area unaffected by the pattern.

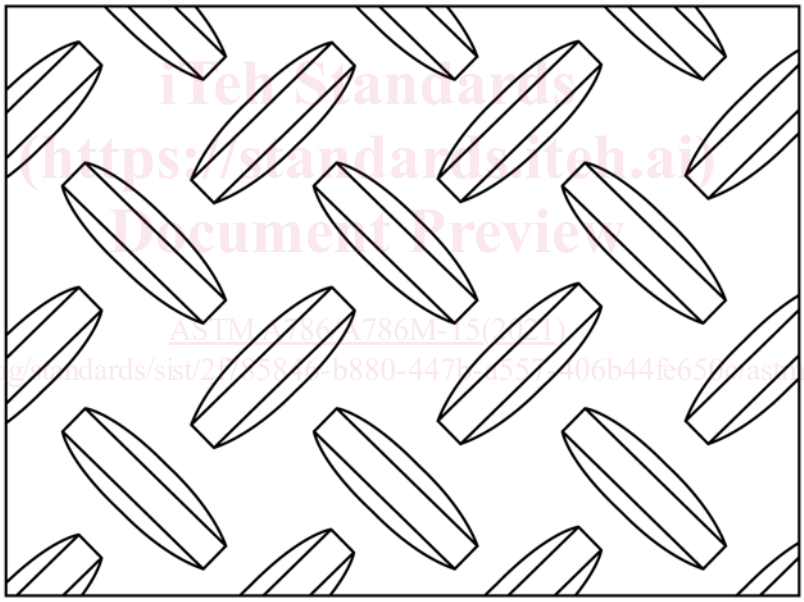
10.2 Percent elongation, and reduction of area where applicable, are not required for rolled floor plate.

11. Permitted Variations

11.1 For plates and sheets, the permitted variations in dimensions shall be as given in Tables 1-3, Fig. 3, Table 4, Fig. 4, Table 5, Fig. 5, and Table 6 [Tables A1.1 to A1.6], inclusive.



Pattern No. 2



Pattern No. 4

FIG. 1 Floor Plate Patterns (Full Scale)

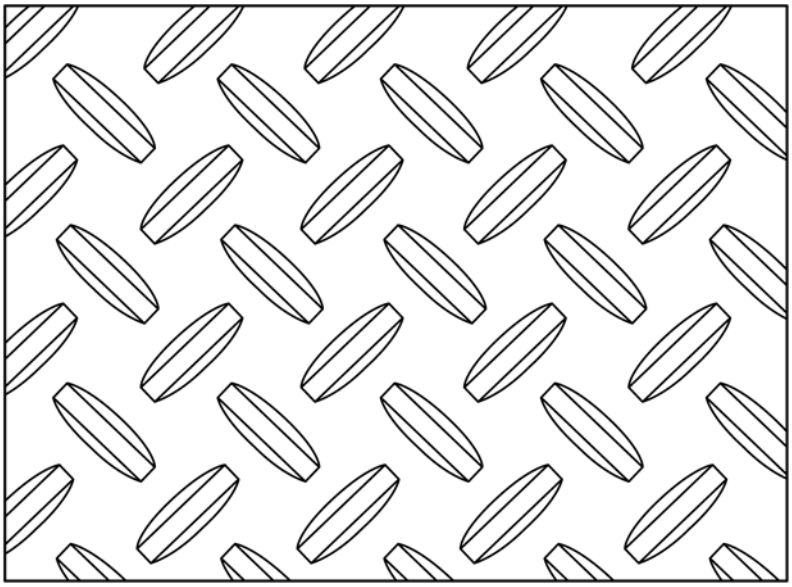
12. Certification

12.1 *Test Reports*—Test reports shall be furnished as required by Specifications A6/A6M, A568/A568M, or A635/A635M as applicable, and shall include the ASTM designation and year of issue of this specification and the ASTM product standard, if applicable.

12.2 *Identification*—Identification markings shall indicate the designation (year of issue not required) of this specification and the ASTM product standard, if applicable.

13. Keywords

13.1 alloy; carbon; floor plate; flooring; high-strength low-alloy; pattern; raised figures; stairways; steel; structural steel; transportation equipment



Pattern No. 5

FIG. 2

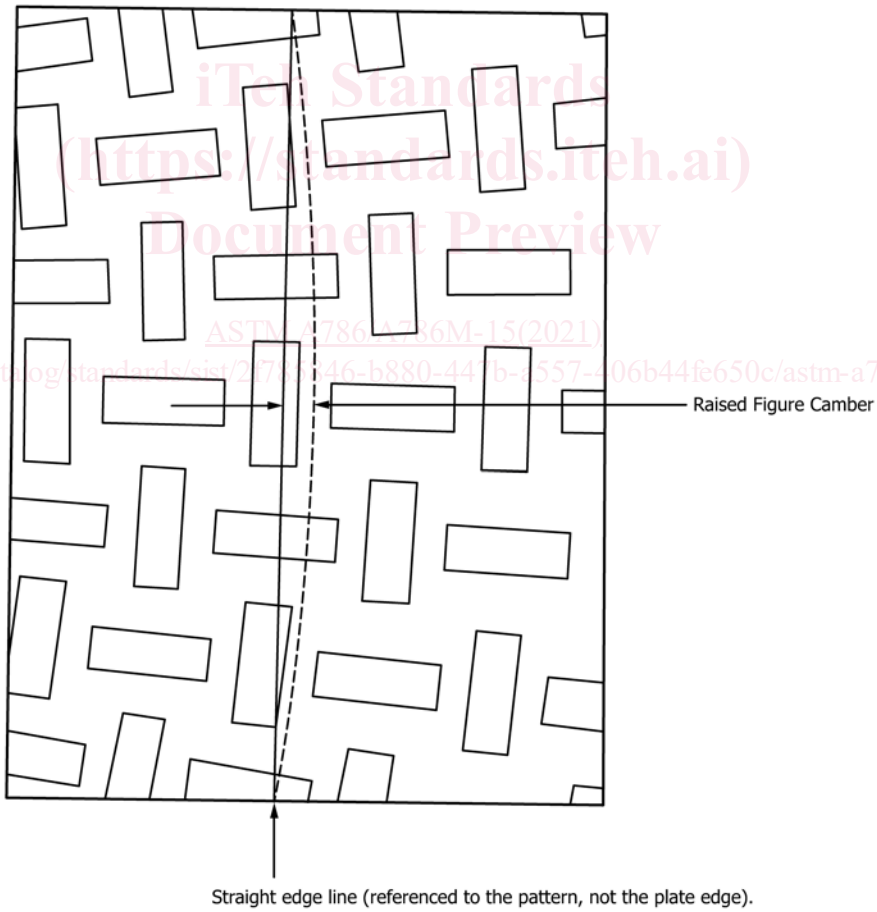


FIG. 3 Camber for Raised Figures for Floor Plates (see Table 4 or Table A1.3)

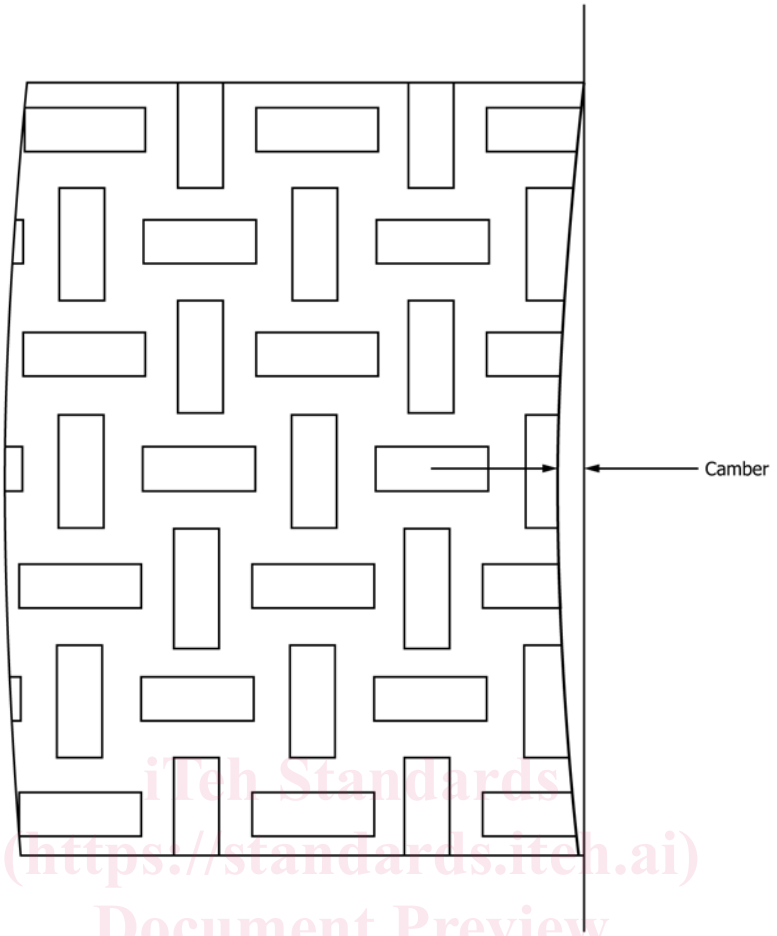


FIG. 4 Camber for Rectangular Sheared Floor Plates and Gas-Cut Floor Plates (see Table 5 or Table A1.4)

TABLE 1 Permitted Variations in Thickness for Floor Plates

NOTE 1—Thickness to be measured at ⅜ to ¾ in. from the longitudinal edge.

NOTE 2—For thickness measured at any location other than that specified in Note 1, the permitted variations over specified thickness shall be 1¾ times the amounts in this table, rounded to the nearest 0.010 in. for sheets, and to the nearest 0.01 in. for plates.

NOTE 3—Where ". . ." appears in this table, there is no requirement.

Specified Thickness, in.	Permitted Variation Over and Under Specified Thickness for Sheets, in.[A]	Permitted Variation Over Specified Thickness for Plates, in.[B]
To 0.080, incl	0.012	. . .
Over 0.080 to 0.125, incl	0.014	. . .
Over 0.125 to 0.190, incl	0.015	0.03
Over 0.190 to 0.250, incl	0.017	0.04
Over 0.250 to 0.395, incl	0.018	0.05
Over 0.395 to 1.000, incl	0.020	0.05

[A] The specified thickness range captions also apply when rolled floor plate is specified to a minimum thickness, in which case the permitted variations are all over and equal to twice the tabular values.
[B] Permitted variation under specified thickness, 0.01 in.

TABLE 2 Permitted Variations in Width and Length for Floor Plates

Specified Dimension, in.		Permitted Variations Over Specified Width and Length for Specified Thicknesses Given in Inches, in.[A]					
		Under 0.375		0.375 to 0.625, excl		0.625 to 1.000, incl	
Width	Length	Width	Length	Width	Length	Width	Length
To 96, incl	Under 120	3/8	1/2	7/16	5/8	1/2	1
	120 to 240, excl	3/8	3/4	1/2	7/8	5/8	1-1/8
	240 to 360, excl	3/8	1	1/2	1-1/8	5/8	1-1/2
	360 to 480, incl	7/16	1-1/4	1/2	1-3/8	5/8	1-5/8
	Over 480	1/2	1-1/2	9/16	1-1/2	3/4	1-3/4

[A] Permitted variations under specified width and length:
1/4 in., for specified thicknesses of 0.188 in. and over; and
1/8 in., for specified thicknesses under 0.188 in.

TABLE 3 Permitted Variations from a Flat Surface for Rectangular, Circular, and Sketch Floor Plates[A]

NOTE 1—When the longer dimension is under 36 in., the permitted variation from a flat surface shall not exceed 1/4 in. When the longer dimension is from 36 to 72 in., incl, the permitted variation from a flat surface shall not exceed 75 % of the tabular amount for the specified width, but in no case less than 1/4 in.

NOTE 2—These permitted variations apply to plates that have a specified minimum tensile strength of not more than 60 ksi or comparable chemical composition or hardness. The limits in this table are increased 50 % for floor plates that have a higher specified minimum tensile strength or comparable chemical composition or hardness.

NOTE 3—This table and these notes cover the permitted variations from a flat surface for circular and sketch floor plates, based upon the maximum dimensions of such plates.

NOTE 4—Where an ellipsis (...) appears in the table, that product has not been defined.

Specified Thickness, in.	Permitted Variations from a Flat Surface for Specified Widths Given in Inches, in.[B,C]						
	To 36, excl	36 to 48, excl	48 to 60, excl	60 to 72, excl	72 to 84, excl	84 to 96, excl	96
To 0.100, excl	3/4	7/8	1-1/16	1-3/8	...	...	...
0.100 to 0.250, excl	9/16	3/4	15/16	1-1/4	1-3/8	1-1/2	1-5/8
0.250 to 0.375, excl	1/2	5/8	3/4	15/16	1-1/8	1-1/4	1-3/8
0.375 to 0.500, excl	1/2	9/16	5/8	5/8	3/4	7/8	1
0.500 to 0.750, excl	7/16	1/2	9/16	5/8	5/8	3/4	1
0.750 to 1.000, excl	7/16	1/2	9/16	5/8	5/8	5/8	3/4
1.000	3/8	1/2	1/2	9/16	9/16	5/8	5/8

[A] For coils, the requirements of either Specification A568/A568M or Specification A635/A635M apply.
[B] *Permitted Variation from a Flat Surface Along the Length*—The longer dimension specified is considered the length, and the permitted variation from a flat surface along the length shall not exceed the tabular amount for the specified width for plates up to 4000 mm in length, or in any 4000 mm for longer plates.
[C] *Permitted Variation from a Flat Surface Across the Width*—The permitted variation from a flat surface across the width shall not exceed the tabular amount for the specified width.

TABLE 4 Permitted Raised Figure Camber for Floor Plates (see Fig. 3)

Permitted raised figure camber,[A] in. = 3/8 × (number of feet of length/5)

[A] Raised figure camber is the curvature of the raised figures in the length direction, measured over the entire length of the plate.

TABLE 5 Permitted Camber for Rectangular Sheared Plates and Gas-Cut Floor Plates (see Fig. 4)

Specified Thickness, in.	Specified Width, in.	Permitted Camber,[A] in.
To 1.000, incl	To 96, incl	1/8 × (number of feet of length)/5

[A] Camber is the horizontal edge curvature in the length, measured over the entire length of the plate in the flat position.

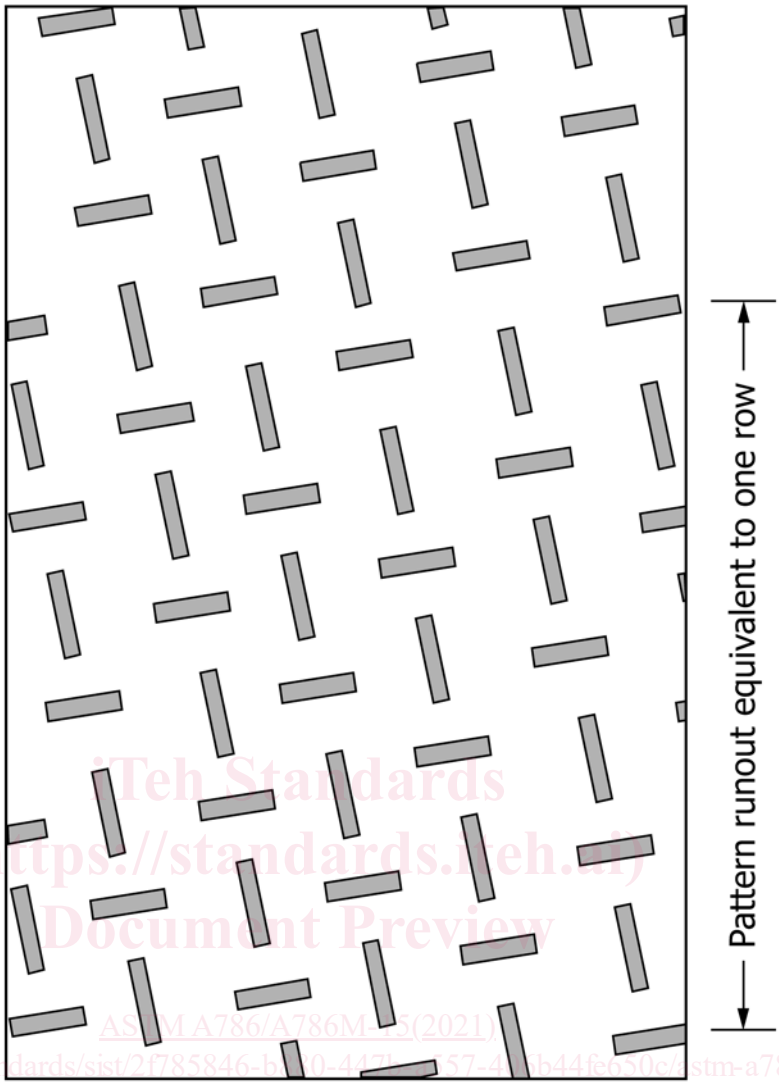


FIG. 5 Description of Pattern Runout

TABLE 6 Permitted Pattern Runout for Raised Figures for Floor Plates Carbon, Low-Alloy, High-Strength Low-Alloy, and Alloy Steel (see Fig. 5)

Permitted pattern runout[A] = three (3) rows in 10 ft

[A] Pattern runout is the degree to which the pattern deviates from parallel to the longitudinal direction of the rolled plate.