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Dimension, shape, weight and tolerance for hot-rolled steel strip, plate and sheet

热轧钢板和钢带的尺寸、外形、重量及允许偏差

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Dimension, shape, weight and tolerance for hot-rolled steel strip, plate and sheet

1 Scope

This Standard specifies terms and definitions, classification and code, dimensions, dimension tolerances, shape, measurement of dimensions and shape of hot-rolled steel plates/sheets and strips.

This Standard applies to plates with a rolling width of not less than 600 mm (hereinafter referred to plates), wide strips, slit wide strips, and plates/sheets cut from strips.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

GB/T 8170 Rules of rounding off for numerical values & expression and judgement of limiting values

3 Terms and definitions

For the purpose of this document, the following terms and definitions apply.

3.1

plate

Hot-rolled flat steel that is directly rolled and does not have fixed edge deformation.

3.2

wide strip

Steel strips with a width of not less than 600 mm and delivered in rolls.

3.3

slit wide strip

Steel strips that are slit from wide strips and delivered in rolls.

3.4

plate/sheet cut from strip

Steel plates/sheets that are cut from wide strips or slit wide strips and delivered in plates/sheets.

4 Classification and code

4.1 Classification according to edge state is as follows:

a) cut-edge, EC;

b) mill-edge, EM.

4.2 Classification according to thickness tolerance classes and code are as follows:

a) Class N tolerance: the upper tolerance and the lower tolerance are equal;

b) Class A tolerance: the lower tolerance is specified according to the nominal thickness;

c) Class B tolerance: the fixed lower tolerance is -0.30 mm;

d) Class C tolerance: the fixed lower tolerance is 0.00 mm.

4.3 Classification according to precision of thickness and code are as follows:

a) general precision of thickness, PT.A;

b) higher precision of thickness, PT.B.

4.4 Classification according to precision of flatness and code are as follows:

a) general precision of flatness, PF.A;

b) higher precision of flatness, PF.B.

5 Dimensions

5.1 Nominal dimension range

Table 2 (Class N).

6.1.1.2 As required by the demand party, and indicating the tolerance class in the contract, it may supply plates with other tolerance classes and with tolerance values equal to the tolerance values specified in Table 2, such as Class A, Class B and Class C tolerances. It may also supply plates of which the upper tolerance is limited and the tolerance values are equal to the tolerance values specified in Table 2. The upper and lower tolerances are agreed upon between the supply and demand parties.

6.1.1.3 For steel plates/sheets with a thickness greater than 200 mm, the thickness tolerance may also be agreed upon between the supply and demand parties and specified in the contract.

6.1.1.4 Agreed upon between the supply and demand parties, it may also supply in accordance with the tolerances given in Annex A.

6.1.2 Thickness tolerance of steel strips (including plates/sheets cut from strips)

6.1.2.1 The thickness tolerance of steel strips (including plates/sheets cut from strips), of which the specified minimum yield strength R_e is less than 360 MPa, shall comply with the requirements of Table 3. If the demand party requires supply according to the higher precision of thickness (PT.B), it shall be indicated in the contract. If not indicated, supply according to the general precision of thickness (PT.A). According to the requirements of the demand party, the upper and lower deviations of steel strips may be adjusted within the tolerances specified in Table 3.

6.1.2.2 The thickness tolerance of steel strips (including plates/sheets cut from strips), of which the specified minimum yield strength R_e is not less than 360 MPa, shall comply with the requirements of Table 4. If the demand party requires supply according to the higher precision of thickness (PT.B), it shall be indicated in the contract. If not indicated, supply according to the general precision of thickness (PT.A). According to the requirements of the demand party, the upper and lower deviations of steel strips may be adjusted within the tolerances specified in Table 4.

6.1.2.3 When the yield strength is not specified in the product standard and the thickness tolerance is not specified, the thickness tolerance of steel strips (including plates/sheets cut from strips) shall be agreed upon between the supply and demand parties and indicated in the contract.

7.1.1.1.2 The flatness shall be determined by measuring the maximum distance between the upper surface of the plate and the ruler. If the wave spacing (the distance between the two contact points of the ruler and the plate) is not more than 1000 mm, use a 1000 mm long ruler. For longer wave spacing, use a 2000 mm long ruler. For flatness with a height of no more than 2 mm, it shall not be regarded as a wave.

7.1.1.2 Technical requirements

7.1.1.2.1 The flatness of plates shall comply with the requirements of Table 10. If the demand party requires supply according to the higher precision of flatness (PF.B), it shall be indicated in the contract. If not indicated, supply according to the general precision of flatness (PF.A).

7.1.1.2.2 When the wave spacing (the distance between the two contact points of the ruler and the plate) is between 300 mm and 1000 mm, the maximum flatness of the plate shall also comply with the following requirements:

a) General precision of flatness (PF.A): the maximum flatness of steel type L is 1.0 % of the wave spacing, and the maximum flatness of steel type H is 1.5 % of the wave spacing, both of which shall not exceed those specified in Table 10;

b) Higher precision of flatness (PF.B): the maximum flatness of steel type L is 0.5 % of the wave spacing, and the maximum flatness of steel type H is 1.0 % of the wave spacing, both of which shall not exceed those specified in Table 10.

Table 10 -- Flatness of plates

Dimensions in millimeters

Nominal thickness	Flatness							
	Steel type L				Steel type H			
	Measurement length							
	1 000		2 000		1 000		2 000	
	PF.A	PF.B	PF.A	PF.B	PF.A	PF.B	PF.A	PF.B
3.00~5.00	9	5	14	10	12	7	17	14
>5.00~8.00	8	5	12	10	11	7	15	13
>8.00~15.0	7	3	11	6	10	7	14	12
>15.0~25.0	7	3	10	6	10	7	13	11
>25.0~40.0	6	3	9	6	9	7	12	11
>40.0~250	5	3	8	6	8	6	12	10
>250~450	Agreed upon							

7.1.2 Plates/sheets cut from strips

Table 13 -- Height of tower shape

Dimensions in millimeters

Nominal width	Height of tower shape	
	Cut-edge	Mill-edge
≤1 000	20	50
>1 000	30	60

8 Measurement of dimensions and shape

8.1 Length that is not assessed

When inspecting the thickness and width of mill-edge steel strips without cutting the head and tail, the total length *L* of the two ends that is not assessed is 90/nominal thickness (*L* is in mm, the nominal thickness is in mm) and shall be no more than 20 m.

8.2 Thickness

For cut-edge steel strips (including plates/sheets cut from strips), it is measured at a distance of not less than 25 mm from the longitudinal side. For mill-edge steel strips (including plates/sheets cut from strips), it is measured at a distance of not less than 40 mm from the longitudinal side. For cut-edge plates, it is measured at a distance of not less than 25 mm from the edge (longitudinal and transverse sides). The measurement site of mill-edge plates is agreed upon between the supply and demand parties.

8.3 Width

The width shall be measured at where perpendicular to the centerline of steel plates/sheets or strips.

8.4 Length

The length of the largest rectangle in steel plates/sheets.

8.5 Flatness

8.5.1 Place the steel plate/sheet freely on a flat surface without applying any pressure other than the weight of the steel plate/sheet itself.

8.5.2 Use a ruler with a length of 1000 mm or 2000 mm, in any direction within a region of at least 25 mm from the longitudinal side and at least 200 mm or 100 mm from the lateral side of the plate, measure the maximum distance between the upper surface of the plate and the ruler, see Figure 1.

9.2 When steel plates/sheets are delivered according to theoretical weight, the theoretical weight is calculated using nominal dimensions and the carbon steel density of 7.85 kg/dm^3. Other steel grades are weighted according to the corresponding standards.

9.3 When the thickness tolerance of steel plates/sheets is limited to negative or positive tolerance, the thickness used for the theoretical weight is the average value of the maximum thickness and the minimum thickness allowed.

9.4 The theoretical weight of steel plates/sheets is calculated according to the calculation method specified in Table 14.

Table 14 -- Calculation method for theoretical weight of steel plates/sheets

Calculation sequence	Calculation method	Rounding off of results
Basic weight/kg/(mm • m^2)	7.85 (weight of 1 mm thickness and 1 m^2 area)	
Unit weight/kg/m^2	Basic weight [kg/(mm • m^2)] × thickness (mm)	Rounded off to 4 significant figures
Area of steel plate/sheet/m^2	Width (m) × length (m)	Rounded off to 4 significant figures
Weight of a steel plate/sheet/kg	Unit weight (kg/m^2) × area (m^2)	Rounded off to 3 significant figures; rounded off to integer value of kg when it exceeds 1000 kg
Total weight/kg	Sum of the weights of steel plates/sheets	Integer value of kg

10 Rounding off of numerical values

The measurement results are rounded off according to the rounded off value comparison method. Rules of rounding off are implemented in accordance with the provisions of GB/T 8170.

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