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Hot-rolled longitudinally profiled steel plate

Tôle d'acier profilée longitudinalement laminée à chaud

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Foreword

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This document was prepared by Technical Committee ISO/TC 17, *Steel*, Subcommittee SC 3, *Steels for structural purposes*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Hot-rolled longitudinally profiled steel plate

1 Scope

This document specifies requirements for hot-rolled longitudinally profiled steel plates (LP steel plates).

This document applies to hot-rolled LP steel plates with thickness between 4 mm and 400 mm for general structural and engineering purposes.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

ISO 630-1, *Structural steels — Part 1: General technical delivery conditions for hot-rolled products*

ISO 630-2, *Structural steels — Part 2: Technical delivery conditions for structural steels for general purposes*

ISO 630-3, *Structural steels — Part 3: Technical delivery conditions for fine-grain structural steels*

ISO 630-4, *Structural steels — Part 4: Technical delivery conditions for high yield strength quenched and tempered structural steel plates and wide flats*

ISO 630-5, *Structural steels — Part 5: Technical delivery conditions for structural steels with improved atmospheric corrosion resistance*

ISO 630-6, *Structural steels — Part 6: Technical delivery conditions for seismic-proof improved structural steels for building*

ISO 7452, *Hot-rolled steel plates — Tolerances on dimensions and shape*

ISO 7788, *Surface finish of hot-rolled plates and wide flats — Delivery requirements*

ISO 10474, *Steel and steel products — Inspection documents*

ISO 17577, *Steel — Ultrasonic testing of steel flat products of thickness equal to or greater than 6 mm*

3 Terms and definitions

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

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
longitudinally profiled steel plates
LP steel plates
steel plates with regular changes in thickness along rolling direction (longitudinal direction)

3.2
equal thickness section
longitudinally profiled steel section with parallel upper and lower surfaces

3.3
variable thickness section
longitudinally profiled steel section with non-parallel upper and lower surfaces

3.4
slope
k
gradient of thickness between the two ends of variable thickness section

Note 1 to entry: The slope is calculated as follows: Half thickness of the thick end minus half thickness of the thin end of the variable thickness section, divided by the length of the variable thickness section. The unit of the slope is %.

EXAMPLE

The slope of type LP01: $k=(h_2/2-h_1/2)/L_1$

where

k is the slope of type LP01 steel plate

h_1 is the thickness of the thin end section

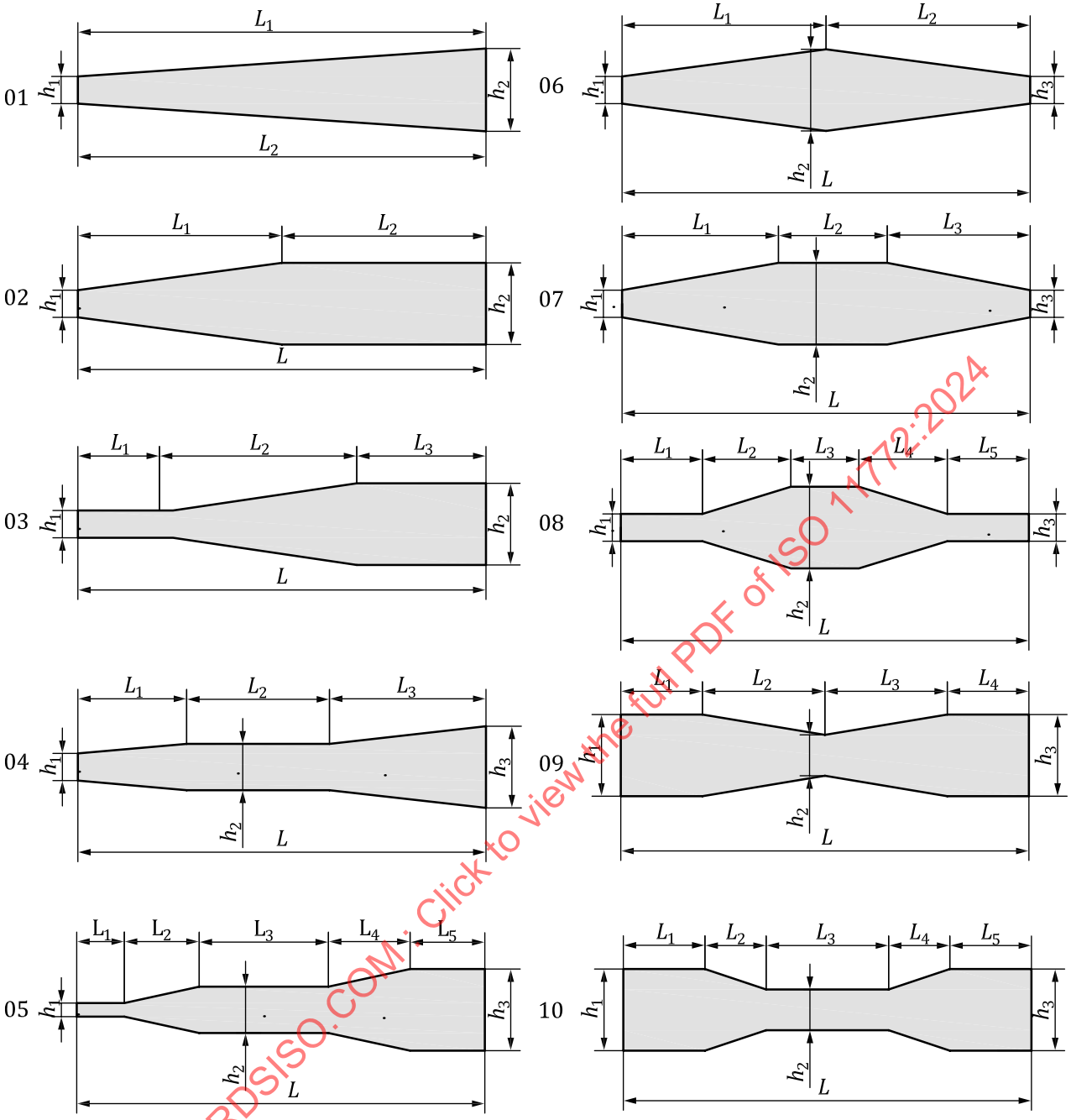
h_2 is the thickness of the thick end section

L_1 is the length of the LP steel plate

4 Classification and designation

4.1 Classification

There are 10 different commonly used types of LP steel plates, from Type 01 to Type 10. Figure 1 shows the shapes of the different types. Other types of LP steel plates may also be supplied by agreement between the purchaser and manufacturer.



Key

01 to 10	types of LP steel plates
$h_1/h_2/h_3$	thickness in different sections of LP steel plate
L	total length of LP steel plate
$L_1/L_2/ L_3/L_4/ L_5$	length in different sections of LP steel plate

NOTE LP plate from type 01 to 05 has the thickest and thinnest sections on both ends. LP plate from type 06 to type 10 has the thickest and thinnest sections on the middle of length.

Figure 1 — Commonly used types of LP steel plates

4.2 Designation

Designation of LP steel plates consists of steel grade, code and type number.

EXAMPLE S235-LP01

S235--A steel grade specified in ISO 630-2;

LP-- Longitudinally profiled steel plate;

01-- Type number.

4.3 Identification methods of LP steel plate

4.3.1 LP steel plate for commonly used types shall be identified by thickness × width × length as shown below.

Type 01: $h_1/h_2 \times W \times L_1$

Type 02: $h_1/h_2 \times W \times L_1/L_2$

Type 03: $h_1/h_2 \times W \times L_1/L_2/L_3$

Type 04: $h_1/h_2/h_3 \times W \times L_1/L_2/L_3$

Type 05: $h_1/h_2/h_3 \times W \times L_1/L_2/L_3/L_4/L_5$

Type 06: $h_1/h_2/h_3 \times W \times L_1/L_2$

Type 07: $h_1/h_2/h_3 \times W \times L_1/L_2/L_3$

Type 08: $h_1/h_2/h_3 \times W \times L_1/L_2/L_3/L_4/L_5$

Type 09: $h_1/h_2/h_3 \times \mathrm{W} \times L_1/L_2/L_3/L_4$

Type 10: $h_1/h_2/h_3 \times W \times L_1/L_2/L_3/L_4/L_5$

where

$h_1/h_2/h_3$ is the nominal thickness of different sections, in mm;

W is the width, in mm;

$L_1/L_2/L_3/L_4/L_5$ is the length in different sections, in mm.

4.3.2 When agreed between the purchaser and manufacturer, LP steel plate for commonly used types may also be identified by thickness/slope × width × length as shown below.

Type 01: $h_1/k \times W \times L_1$

Type 02: $h_1/k \times W \times L_1/L_2$

Type 03: $h_1/k \times W \times L_1/L_2/L_3$

Type 04: $h_1/k_1/k_2 \times W \times L_1/L_2/L_3$

Type 05: $h_1/k_1/k_2 \times W \times L_1/L_2/L_3/L_4/L_5$

Type 06: $h_1/k_1/k_2 \times W \times L_1/L_2$

Type 07: $h_1/k_1/k_2 \times W \times \mathrm{L}_1/\mathrm{L}_2/\mathrm{L}_3$

Type 08: $h_1/k_1/k_2 \times W \times L_1/L_2/L_3/L_4/L_5$

Type 09: $h_1/k_1/k_2 \times W \times L_1/L_2/L_3/L_4$

Type 10: $h_1/k_1/k_2 \times W \times L_1/L_2/L_3/L_4/L_5$

where

h_1 is the thickness of one end of LP steel plate, in mm;

W is the width, in mm;

$L_1/L_2/L_3/L_4/L_5$ is the length in different sections, in mm;

$k/k_1/k_2$ is the slope in different sections, in %.

4.3.3 Other identification methods may be agreed at the time of enquiry and order.

5 Information to be supplied by the purchaser

The following information shall be supplied by the purchaser at the time of enquiry and order:

a) a reference to this document, ISO 11772:2024;

b) the number of product standard;

c) the steel name (grade);

d) delivery conditions;

e) the nominal dimensions and tolerances on dimensions and type of the LP steel plate;

f) the quantity required;

g) marking methods;

h) special requirements.

6 Dimensions, shapes, mass and permissible tolerance

6.1 Dimensions

The available dimensions of the LP steel plate for commonly used types are offered by the manufacturer (see Annex A). Other dimensions may be supplied upon the agreement between the purchaser and manufacturer. The calculation for the nominal dimensions of variable thickness sections can be done using Annex B.

6.2 Tolerances on dimensions

Tolerances on thickness for the equal thickness section and variable thickness section shall conform to ISO 7452 Class D. Tolerances on full length and width shall conform to ISO 7452.

6.3 Tolerances on shape

6.3.1 Tolerance on flatness

Tolerance on flatness shall conform to ISO 7452 Class N, Other special requirements on tolerances may also be agreed at the time of enquiry and order.

6.3.2 Tolerances on edge camber to length (L) and out-of-squareness to length (L)

Tolerances on edge camber to length and out-of-squareness to length shall conform to ISO 7452.

6.4 Mass

LP steel plate shall be delivered by calculated mass (see 9.2).

7 Technical requirements

7.1 Grades and chemical compositions

The chemical composition for each steel grades of LP plate shall conform to ISO 630-2, ISO 630-3, ISO 630-4, ISO 630-5 and ISO 630-6. Other steel grades may also be agreed at the time of enquiry and order.

7.2 Delivery conditions

The delivery conditions of LP steel plates shall conform to ISO 630-2, ISO 630-3, ISO 630-4, ISO 630-5 and ISO 630-6. Delivery conditions of other steel grades may also be agreed at the time of enquiry and order.

7.3 Mechanical properties

The mechanical properties for each steel grade shall conform to ISO 630-2, ISO 630-3, ISO 630-4, ISO 630-5 and ISO 630-6. The mechanical properties of other steel grades may be agreed at the time of enquiry and order.

7.4 Surface quality

The surface quality of LP steel plate shall conform to ISO 7788 Class B Subclass 1. Other requirements may also be agreed at the time of enquiry and order.

7.5 Internal soundness

If required by the purchaser, and indicated in the contract, internal soundness requirements together with the conditions of their verification must be specified at the time of enquiry and order (see 9.3).

7.6 Others

By agreement between the purchaser and manufacturer, LP steel plates with other requirements may be supplied (see 9.4).

8 Inspection

8.1 The type of inspection (specific or non-specific) and the type of inspection document according to ISO 10474 shall be specified at the time of order. Refer to ISO 630-1.

8.2 The inspection items, sampling quantity sampling methods and sampling frequency of LP steel plates shall conform to ISO 630-2, ISO 630-3, ISO 630-4, ISO 630-5 and ISO 630-6. For other steel grades, the requirements may be agreed at the time of enquiry and order.

8.3 From Type 01 to Type 05, sampling for mechanical properties, LP steel plates shall be sampled in the thicker end-section. When specified in product standards or order, LP steel plate may also be sampled in the thinner end-section for mechanical properties.

8.4 From Type 06 to Type 10 or similar ones, sampling for mechanical properties, LP steel plates shall be sampled in the thicker end-section. When specified in product standards or order, LP steel plate may also be sampled in the opposite position for mechanical properties.

9 Test methods

9.1 Dimension measurement

9.1.1 Thickness

9.1.1.1 The thickness of cutting LP steel plate shall be measured at a distance of 25 mm or above the longitudinal edge. The measuring position of the non-cutting LP steel plate shall be agreed between the purchaser and manufacturer.

9.1.1.2 The calculation method of nominal dimension for variable thickness sections should be in accordance with Annex B.

9.1.2 Width

The width shall be measured at the position perpendicular to the centre line of the LP steel plate.

9.1.3 Total length

The total length of LP steel plate shall be measured along the rolling direction in the maximum rectangle shape.

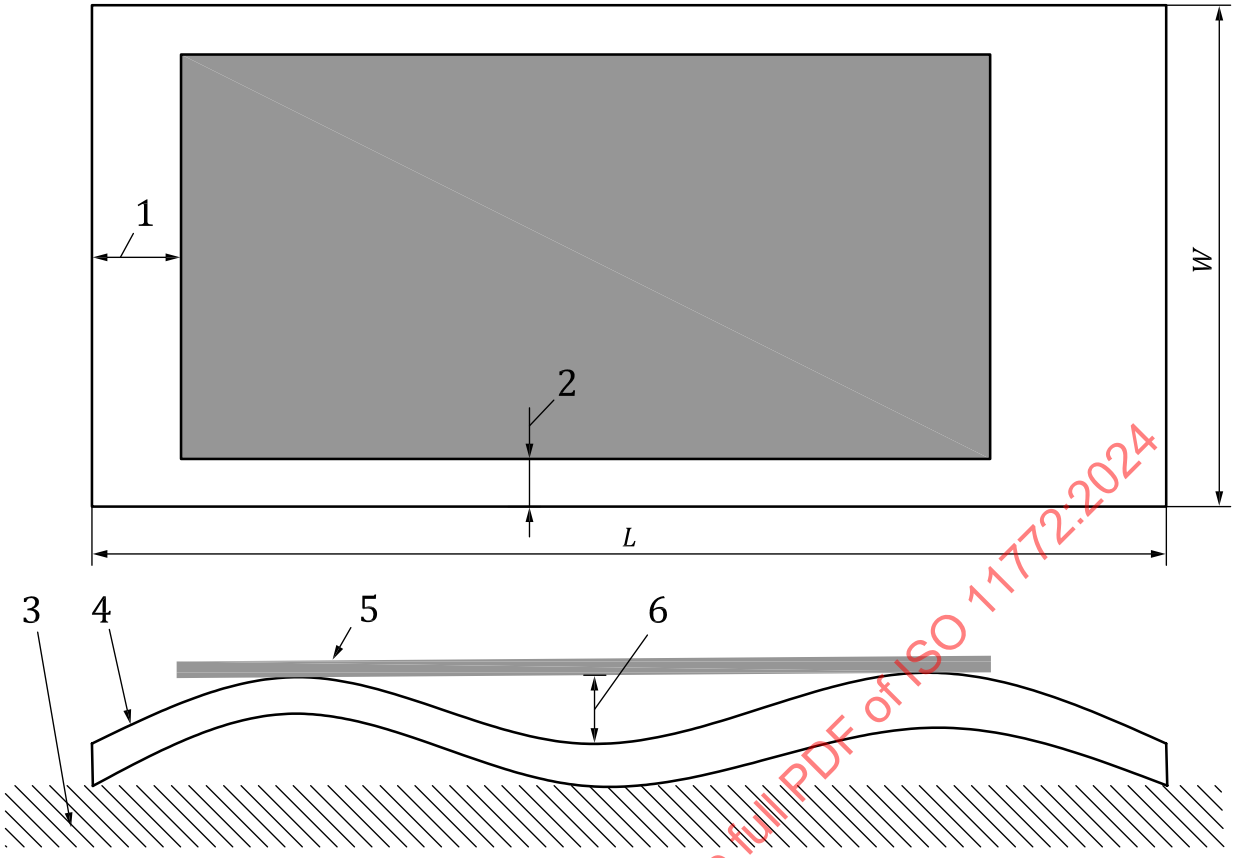
9.1.4 Flatness

Place the LP steel plate freely on a plane without any pressure except the mass of the steel plate itself.

The maximum distance between the upper surface of the steel plate and the ruler shall be measured by a ruler with the length of 1 000 mm or 2 000 mm, at least 25 mm from the longitudinal edge of the steel plate and at least 200 mm from the transverse edge of the steel plate and in any direction, as shown in Figure 2.

The measurement of the uniform thickness variation region shall be carried out on separately (i.e. equal thickness section and variable thickness section of the LP steel plate), as shown in Figure 3.

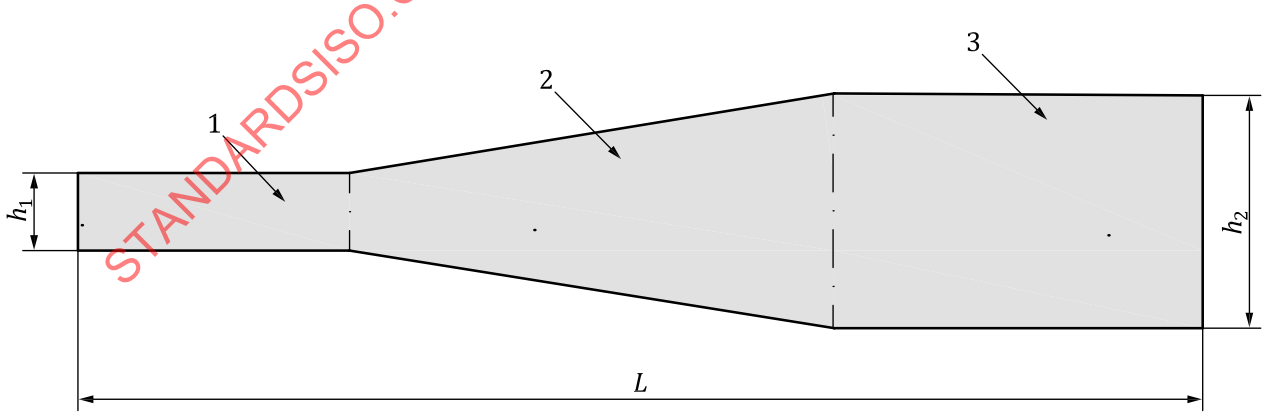
The measuring position of the non-cutting LP steel plate shall be agreed between the purchaser and manufacturer.



Key

1	flatness measurement area: 1-200 mm (from the transverse edge)	3	platform
2	flatness measurement area: 2-25 mm (from the longitudinal edge)	4	steel plate to be tested
L	total length of LP steel plate	5	ruler (line)
W	total width	6	flatness

Figure 2 — Measurement of flatness



Key

1/2/3	different sections of the LP steel plate
L	total length of LP steel plate
h_1/h_2	thickness in different sections of the LP steel plate

Figure 3 — Division of flatness measurement sections

9.1.5 Edge camber

The edge camber shall be in accordance with ISO 7452.

9.1.6 Out-of-squareness

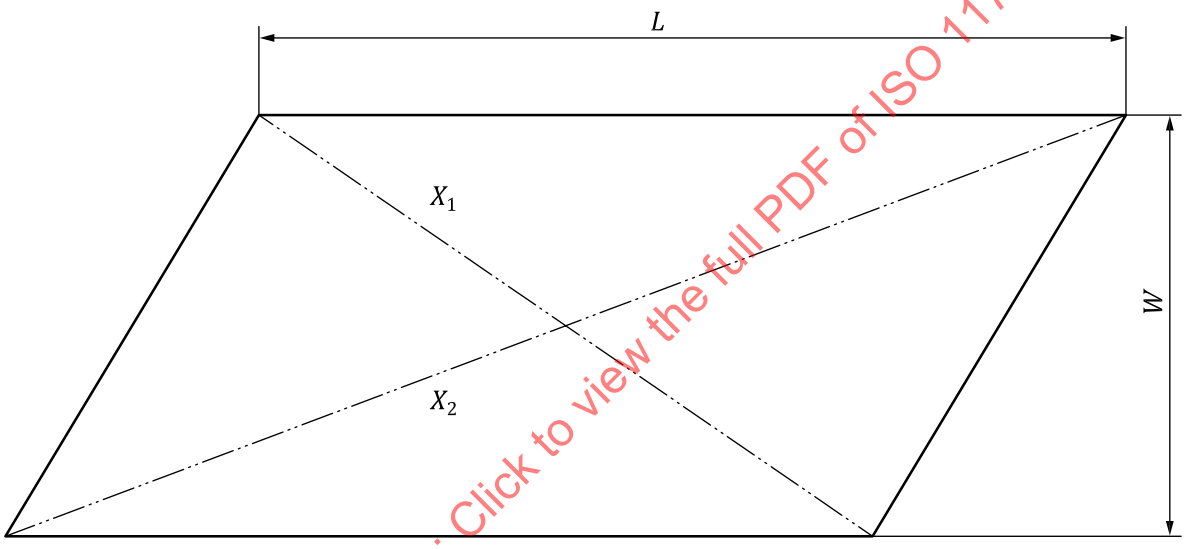
9.1.6.1 Projection method

The measurement of projection method shall be according to ISO 7452.

9.1.6.2 Diagonal method

The measurement of the diagonal shall be 1/2 of the absolute value of the difference between the two diagonal lengths of the steel plate (X_1 and X_2 as shown in Figure 4), as specified in Formula (1):

$$\frac{(X_1 - X_2)}{2} \tag{1}$$



Key

L total length of LP steel plate
X_1/X_2 diagonal lengths of LP steel plate
W total width of LP steel plate

Figure 4 — Out-of-square measurement (Diagonal method)

9.2 Calculation of mass

The calculation method of the mass shall be in accordance with Annex C.

9.3 Internal soundness

The inspection method for internal soundness shall conform to ISO 17577.

9.4 Others

For LP steel plates with special requirements, the test methods shall be agreed between the purchaser and manufacturer.

10 Marking

Marking shall conform to ISO 630-1. A special marking may be ordered or applied by the manufacturer.

Annex A
(informative)

Applicable dimensions of LP steel plate to be supplied

A.1 Applicable dimensions of LP steel plate to be supplied are given in Table A.1.

Table A.1 — Applicable dimensions of LP steel plate to be supplied

Types	Thickness mm	Width W mm	Length L mm	Thickness h_1 mm	Length L_1 mm	Length L_2 mm	Thickness h_2 mm	Length L_3 mm	Length L_4 mm	Length L_5 mm	Thickness h_3 mm	Slope k / k_1/k_2[a]
01	4 to 400	900 to 5 200	2 000 to 25 000	4 to 399	>2 000	—	5 to 400	—	—	—	—	0,05 %, 0,10 %, 0,15 %, 0,20 %, 0,25 %, 0,30 %, 0,35 %, 0,40 %, 0,45 %, 0,50 %, 0,55 %, 0,60 %
02				4 to 399	>1 000	>200	5 to 400	—	—	—	—	
03				4 to 399	>200	>1 000	5 to 400	>200	—	—	—	
04				4 to 398	>1 000	>200	5 to 399	>1 000	—	—	6 to 400	
05				4 to 398	>200	>1 000	5 to 399	>200	>1 000	>200	6 to 400	
06				5 to 399	>1 000	>1 000	4 to 400	—	—	—	5 to 399	
07				5 to 399	>1 000	>200	4 to 400	>1 000	—	—	5 to 399	
08				5 to 399	>200	>1 000	4 to 400	>200	>1 000	>200	5 to 399	
09				4 to 400	>200	>1 000	4 to 399	>1 000	>200	—	4 to 400	
10				4 to 400	>200	>1 000	4 to 399	>200	>1 000	>200	4 to 400	

[a] The maximum thickness difference of LP steel plates is 45 mm.