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BSI Standards Publication

Continuously hot-rolled patterned steel strip and plate/sheet cut from wide strip — Tolerances on dimensions and shape

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National foreword

This British Standard is the UK implementation of EN 10363:2016.

The UK participation in its preparation was entrusted to Technical Committee ISE/103, Structural Steels Other Than Reinforcements.

A list of organizations represented on this committee can be obtained on request to its secretary.

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EUROPEAN STANDARD

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EN 10363

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English Version

Continuously hot-rolled patterned steel strip and plate/sheet cut from wide strip - Tolerances on dimensions and shape

Bandes et tôles/feuilles larmées striées issues de larges bandes en acier laminé à chaud en continu - tolérances sur les dimensions et la forme

Kontinuierlich warmgewalztes Riffelband und -blech abgelängt aus Warmbreitband aus Stahl - Grenzabmaße und Formtoleranzen

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European foreword

This document (EN 10363:2016) has been prepared by Technical Committee ECISS/TC 103 “Structural steels other than reinforcements”, the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by January 2017, and conflicting national standards shall be withdrawn at the latest by January 2017.

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1 Scope

This European Standard specifies tolerances on dimensions and shape for continuously hot-rolled uncoated patterned steel strip and plate/sheet cut of it in nominal thicknesses up to 20 mm inclusive, of non-alloy and alloy steels in accordance with Table 1 (see also Annex A).

Table 1 — Field of application

Product	Nominal thickness	Steel grades according (but not limited) to:
Wide strip (width: $w \geq 600$ mm)[a] Sheet/plate cut from wide strip Strip $w < 600$ mm slit from wide strip	≤ 20 mm	EN 10025–2 EN 10025–3 EN 10025–4 EN 10025–5 EN 10149–2
[a] Usually these steel products are delivered in widths up to and including 2 200 mm. For widths values w over 2 200 mm, see 4.2, Option 4.		

Steel grades other than those given in Table 1 may be used by agreement only.

This European standard does not apply to stainless steels.

2 Normative references

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

EN 10020:2000, *Definition and classification of grades of steel*

EN 10079:2007, *Definition of steel products*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 10020:2000, EN 10079:2007 and the following apply.

3.1
hot-rolled patterned steel strip
hot-rolled steel strip which has been provided with a regular raised pattern (chequer or bulb) on one side to render the surface more non-slip and safer underfoot, with the reverse side usually smooth

4 Information to be supplied by the purchaser

4.1 General

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

a) quantity to be supplied;

b) product designation (wide strip, sheet/plate cut from wide strip, strip slit from wide strip);

c) the number of this standard (EN 10363);

d) symbol for surface design (T, R or A) (see 5.2);

e) nominal thickness in mm (see 6.1.1);

f) nominal width in mm (see 6.2.1);

g) nominal length in mm (for sheet/plate, see 6.3);

h) name or material number of steel grade;

i) edge camber requirements for strip < 600 mm wide, which was slit from wide strip (see 7.4).

4.2 Options

The following additional details may be given when ordering:

1) whether trimmed edges are required (GK), (see 5.1);

2) whether for sheet/plate the tolerances on out-of-squareness and edge camber shall be replaced by a requirement that a perfect rectangle formed by the ordered width and length dimensions can be superimposed into the sheets delivered;

3) whether the delivery of a different steel grade of steel than those specified in the scope of this standard is required (see Clause 1);

4) tolerances on thickness for widths values w > 2 200 mm (see Table 2, Footnote a);

5) special tolerances on width for products with trimmed edges (see Table 3, Footnote b).

If the customer does not specify otherwise, delivery shall be in accordance with the specifications of 4.1 and 5.1.

4.3 Example of designations

The designation shall be followed by the complete designation of the steel ordered.

EXAMPLE 1 Designation of an order of 20 t of hot-rolled patterned wide strip according to this European Standard, of surface design T, a nominal thickness of 5 mm and a nominal width of 1 300 mm, made from steel of grade S235JR (material number 1.0038) in accordance with EN 10025–2:

20 t strip EN 10363 — T – 5 × 1300

Steel EN 10025–2 — S235JR

or

20 t strip EN 10363 — T – 5 × 1300

Steel EN 10025–2 — 1.0038

EXAMPLE 2 Designation of an order of 15 sheets according to this European Standard, of surface design A, a nominal thickness of 5 mm, a nominal width of 1 900 mm and a nominal length of 2 500 mm, made from steel of grade S235JR (material number 1.0038) in accordance with EN 10025–2:

15 sheets EN 10363 — A – 5 × 1900 × 2500

Steel EN 10025–2 — S235JR

or

15 sheets EN 10363 — A – 5 × 1900 × 2500

Steel EN 10025–2 — 1.0038

5 Form of supply and design

5.1 Form of supply

Products according to this standard shall be supplied with mill edges or with trimmed edges (GK), as agreed at the time of enquiry and order (see 4.2, Option 1). In the absence of information on the form of supply, the products according to this standard shall be supplied with mill edges.

5.2 Design

5.2.1 Patterned steel in accordance with this standard is available as design T as shown in Figure 1, as design R as shown in Figure 2 or as design A as shown in Figure 3.

5.2.2 According to the nominal thickness, the height of the pattern h (see Figure 4) may vary between 1,0 mm and 2,2 mm for nominal thicknesses $t \geq$ 3,0 mm and between 0,5 mm and 2,2 mm for nominal thicknesses $t <$ 3,0 mm.

5.2.3 Informative values for nominal masses are given in Annex B, Table B.1.

5.2.4 The dimensions given in Figures 1, 2 and 3 are guideline values.

5.2.5 Embossing need not run parallel with the longitudinal edges of the strip or sheet/plate.

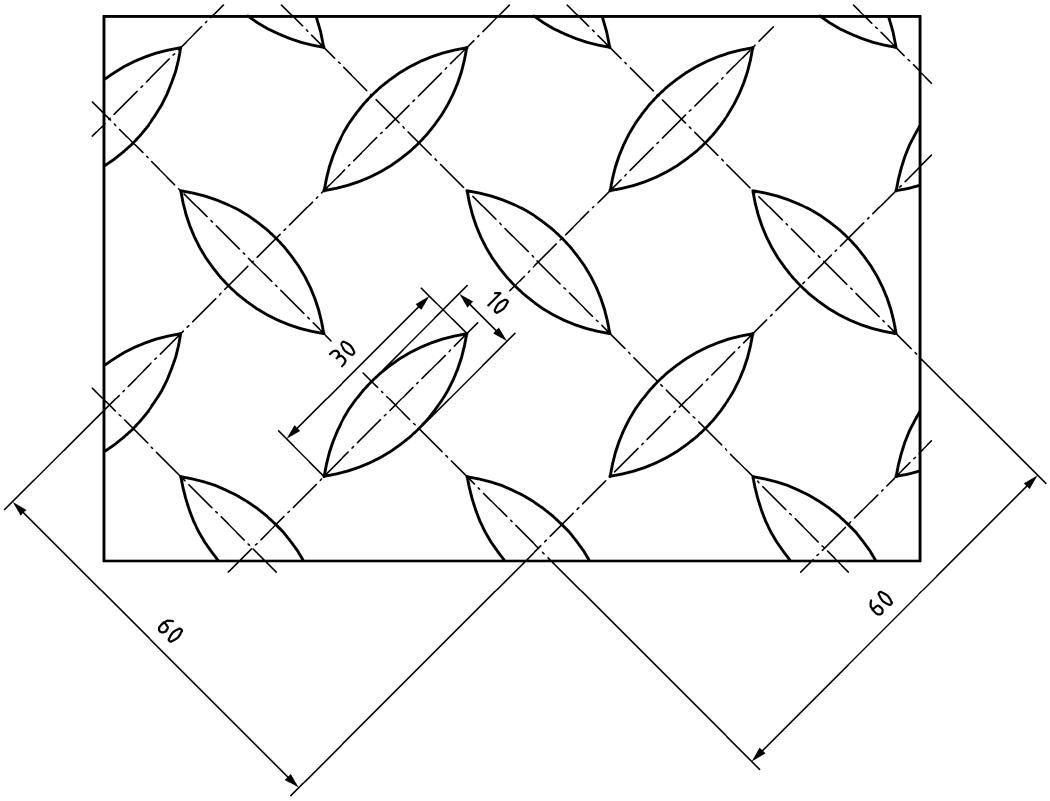


Figure 1 — Example of surface design T

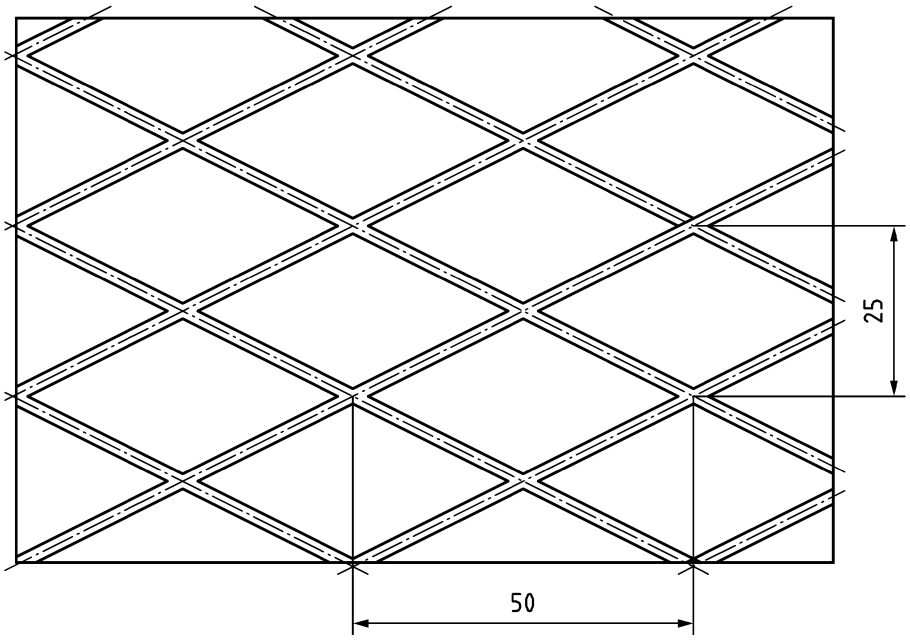


Figure 2 — Example of surface design R

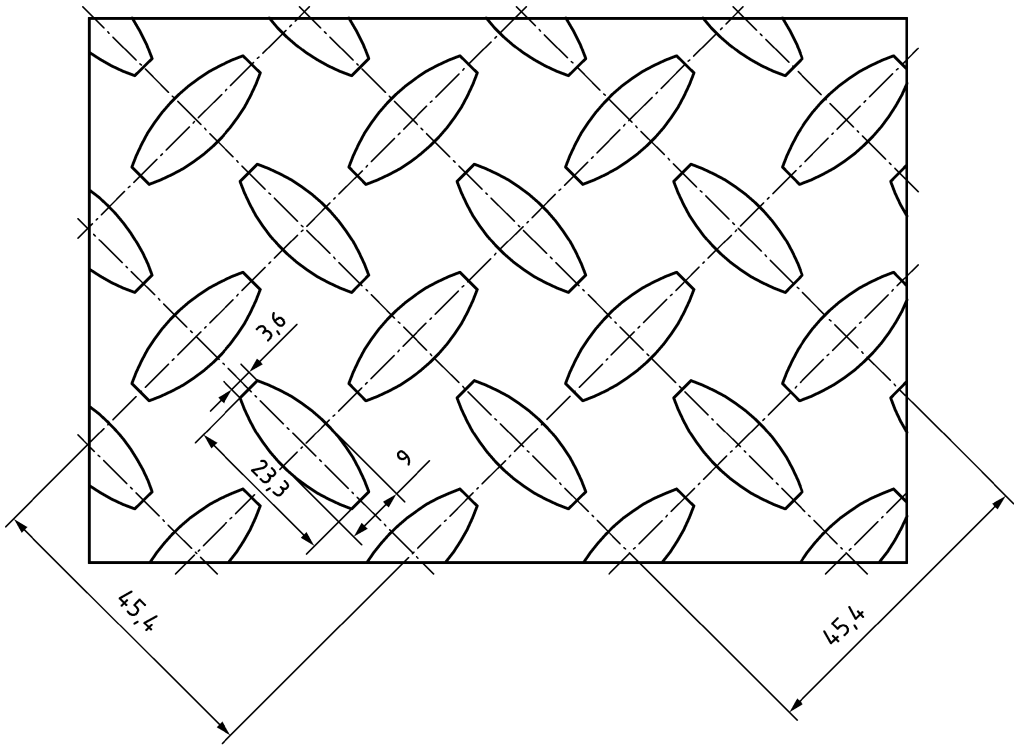


Figure 3 — Example of surface design A

6 Tolerances for sheet/plate

6.1 Thickness

6.1.1 The nominal thickness of the product t is always the thickness of the core without the pattern (see Figure 4). The height of the pattern h is at the discretion of manufacturer in the following ranges (see also 5.2.2):

a) 1,0 mm ≤ h ≤ 2,2 mm for nominal thickness $t \geq$ 3,0 mm;

and

b) 0,5 mm ≤ h ≤ 2,2 mm for nominal thickness $t <$ 3,0 mm.

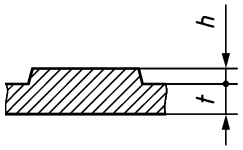


Figure 4 — Height of pattern

6.1.2 Tolerances on thickness are given in Table 2 (see also 8.2.1).

Table 2 —Tolerances on thickness for strip and sheet/plate [a]

Dimensions in millimetres

Nominal thickness ***t***	**Tolerances on the nominal thickness**		**Maximum thickness difference within a plate**
	Lower	Upper	
$t < 3,0$	- 0,4	+ 0,7	0,8
$3,0 \le t < 4,0$	- 0,5	+ 0,7	0,8
$4,0 \le t < 5,0$	- 0,5	+ 0,7	0,9
$5,0 \le t < 6,0$	- 0,5	+ 0,8	0,9
$6,0 \le t < 8,0$	- 0,5	+ 0,8	0,9
$8,0 \le t < 10,0$	- 0,6	+ 0,9	0,9
$10,0 \le t < 12,5$	- 0,6	+ 0,9	0,9
$12,5 \le t < 15,0$	- 0,7	+ 0,9	0,9
$15,0 \le t \le 20,0$	- 0,7	+ 1,0	1,0

[a] For widths values over 2 200 mm values shall be agreed at time of enquiry and order. See 4.2, Option 4.

6.2 Width

6.2.1 Hot-rolled patterned steel is usually supplied in widths from 600 mm to 2 200 mm.

6.2.2 The tolerances on width for hot-rolled patterned steel shall be as given in Table 3 (see also 8.2.2).

Table 3 — Tolerances on width for strip and sheet/plate

Dimensions in millimetres

Nominal width ***w***	**Normal tolerances[a]**		**Special tolerances[b]**	
	Lower	Upper	Lower	Upper
$w < 1\,500$	0	+ 20	0	+ 3
$w \ge 1\,500$			0	+ 5

[a] Normal tolerances apply for products ordered with mill or trimmed edges (see Option 1).

[b] Special tolerances apply only for products ordered with trimmed edges and with nominal thicknesses $t < 10,0$ mm. For nominal thicknesses $10,0 \text{ mm} \le t \le 20,0$ mm special tolerances shall be agreed at the time of enquiry and order. See 4.2, Options 1 and 5.

6.3 Length

6.3.1 The tolerances on length for sheet/plate shall be as given in Table 4 (see also 8.2.3).

Table 4 — Tolerances on length for sheet/plate

Dimensions in millimetres

Nominal length *l*	Tolerances on the nominal length	
	Lower	Upper
$l < 4\,000$	0	+ 20
$4\,000 \le l < 6\,000$	0	+ 30
$6\,000 \le l \le 8\,000$	0	+ 40
$l > 8\,000$	0	a

a The upper tolerances for nominal length over 8 000 mm shall be agreed at time of enquiry and order.

6.4 Flatness

6.4.1 The deviation from flatness shall not exceed the tolerances given in Table 5 (see also 8.2.4).

Table 5 — Tolerances on flatness for sheet/plate

Dimensions in millimetres

Nominal thickness *t*	Nominal width *w*	Tolerances on flatness
$t < 7{,}0$	$w < 1\,200$	19
	$1\,200 \le w \le 1\,500$	24
	$w > 1\,500$	35
$7{,}0 \le t < 10{,}0$	$w < 1\,200$	16
	$1\,200 \le w \le 1\,500$	19
	$w > 1\,500$	29
$10{,}0 \le t \le 20{,}0$	$w < 1\,200$	13
	$1\,200 \le w \le 1\,500$	14
	$w > 1\,500$	19

6.4.2 Deviation from flatness is liable to increase considerably through inexpert handling and storage.

6.5 Edge camber

The edge camber shall not exceed 0,5 % of the actual length of the sheet/plate for a nominal length $l < 5\,000$ mm.

For sheet/plate with a nominal length $l \ge 5\,000$ mm, the edge camber shall not exceed 20 mm for any length of 5 000 mm in case of sheet/plate with mill edges and 15 mm in the case of sheet plate with trimmed edges (see also 8.2.5).

6.6 Out-of-squareness

The deviation from out-of-squareness shall not exceed 1 % of the actual width of the sheet/plate (see also 8.2.6).

6.7 Superimposement of dimensions

By agreement at the time of enquiry and order the upper tolerances on out-of-squareness and edge camber may be replaced by a requirement that a perfect rectangle formed by the ordered width and length dimensions can be superimposed into the sheets delivered (see 4.2, Option 2). In this case, the upper tolerances on width and length shall be agreed at the time of enquiry and order.

7 Tolerances for wide strip and strip slit from wide strip

7.1 General

The specified values for tolerances shall not apply to the uncropped ends of the coil for a total length *l*, which is calculated using the formula:

$$l(m) = \frac{90}{nominal\,thickness(mm)}$$

provided that the result does not exceed 20 m.

7.2 Thickness

The tolerances for thickness shall be the same as those for sheet/plate (see 6.1).

The thickness (within one coil) shall change gradually and the changes should not be discontinuous.

7.3 Width

The tolerances on width for strip shall be the same as for sheet/plate (see 6.2).

7.4 Edge camber

For strip $w \geq 600$ mm, the edge camber shall not exceed 20 mm for any length of 5 000 mm in the case of strip with mill edges and 15 mm in the case of strip with trimmed edges.

For strip $w < 600$ mm slit from wide strip, the tolerances shall be agreed at the time of enquiry and order (see 4.1 i)).

8 Testing — Testing for dimensional accuracy

8.1 Extent of inspection

If an acceptance inspection has been agreed, the number of plates to be tested for dimensional accuracy by the manufacturer shall also be agreed.

Measurements listed in 8.2.1 to 8.2.6 shall be used in case of dispute and be carried out at ambient temperature.

8.2 Test procedure

8.2.1 Thickness

The thickness shall be measured at any point, which is not affected by the pattern, not less than 40 mm from the edges in case of mill edges and not less than 25 mm from the edges in case of trimmed edges.

8.2.2 Width

The width shall be measured perpendicular to the longitudinal axis of the product.

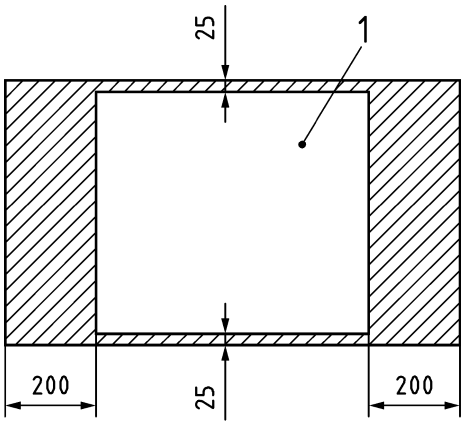
8.2.3 Length of sheet/plate

The length of the plate is the length of the largest rectangle enclosed in it.

8.2.4 Flatness

For checking sheet/plate for deviation from flatness, lay a single sheet/plate on a flat horizontal surface so that it rests freely under its own mass.

Deviation from flatness shall be measured as the maximum distance between the smooth side of a plate and a straight edge 1 000 mm or 2 000 mm long, laid on it in any direction. Measurements shall be taken at points not less than 25 mm from the longitudinal edges and not less than 200 mm from either end of the plate (see Figure 5). Only a section between two points of contact between the straight edge and the plate shall be considered.



Key

1 area for determining the deviation from flatness

Figure 5 — Determining of deviation from flatness

8.2.5 Edge camber

The edge camber is the maximum deviation of a longitudinal edge from a straight edge measuring base applied to it.

The camber is measured on the concave edge.

For sheet/plate measuring base shall be the length of the product for a nominal length $l < 5\,000$ mm.

For strip and sheet plate with a nominal length $l \geq 5\,000$ mm, the measuring base shall be 5 000 mm, taken anywhere along the edge but excluding the uncropped ends.

8.2.6 Out-of-squareness for sheet/plate

Out-of-squareness, u is the vertical projection of a cross edge on a longitudinal edge (see Figure 6).

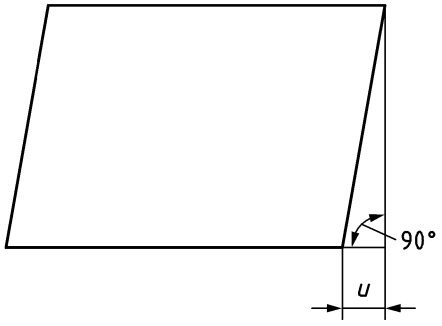


Figure 6 — Determining out-of squareness

Annex A
(informative)

Standards with steel grades for this dimensional standard

EN 10025-2, *Hot rolled products of structural steels — Part 2: Technical delivery conditions for non-alloy structural steels*

EN 10025-3, *Hot rolled products of structural steels — Part 3: Technical delivery conditions for normalized/normalized rolled weldable fine grain structural steels*

EN 10025-4, *Hot rolled products of structural steels — Part 4: Technical delivery conditions for thermomechanical rolled weldable fine grain structural steels*

EN 10025-5, *Hot rolled products of structural steels — Part 5: Technical delivery conditions for structural steels with improved atmospheric corrosion resistance*

EN 10149-2, *Hot rolled flat products made of high yield strength steels for cold forming — Part 2: Technical delivery conditions for thermomechanically rolled steels*

Annex B
(informative)

Indicative typical weight

Table B.1 gives the indicative typical weight of patterned steel plate, calculated taking the density of steel of 7,85 kg/dm^3, and considering an additional allowance of 2 kg/m^2 for design T and A and 4 kg/m^2 for design R sheet/plate.

Table B.1 — Indicative typical weight

Nominal thickness t (mm)	**Nominal mass in kg/m^2 for design**		
	R	**T**	**A**
2	19,70	17,70	19,70
3	27,55	25,55	27,55
4	35,40	33,40	35,40
5	43,25	41,25	43,25
6	51,10	49,10	51,10
8	66,80	64,80	66,80
10	82,50	80,50	82,50
12	98,20	96,20	98,20
15	121,75	119,75	121,75
20	161,00	159,00	161,00

Bibliography

[1] EN 10025-2, *Hot rolled products of structural steels — Part 2: Technical delivery conditions for non-alloy structural steels*

[2] EN 10025-3, *Hot rolled products of structural steels — Part 3: Technical delivery conditions for normalized/normalized rolled weldable fine grain structural steels*

[3] EN 10025-4, *Hot rolled products of structural steels — Part 4: Technical delivery conditions for thermomechanical rolled weldable fine grain structural steels*

[4] EN 10025-5, *Hot rolled products of structural steels — Part 5: Technical delivery conditions for structural steels with improved atmospheric corrosion resistance*

[5] EN 10149-2, *Hot rolled flat products made of high yield strength steels for cold forming — Part 2: Technical delivery conditions for thermomechanically rolled steels*

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