UDC 669.14.018.29-423.1:621.713.1 DEUTSCHE NORM March 1994

Structural steel I and H sections
Tolerances on shape and dimensions
English version of DIN EN 10034

DIN EN 10034

I- und H-Profile aus Baustahl; Grenzabmaße und Formtoleranzen

This standard, together with the March 1994 editions of DIN 1025 Parts 2 to 5, supersedes the October 1963 editions of DIN 1025 Parts 2, 3 and 4 and the March 1965 edition of DIN 1025 Part 5.

European Standard EN 10034:1993 has the status of a DIN Standard.

A comma is used as the decimal marker.

National foreword

This standard has been prepared by ECISS/TC 11.

The responsible German body involved in its preparation was the *Normenausschuß Eisen und Stahl* (Steel and Iron Standards Committee), Technical Committee *Warmgewalzte Profilerzeugnisse*.

The present standard specifies dimensional and geometrical tolerances for I and H sections and bearing piles, which had been given previously in DIN 1025 Parts 2 to 5.

The values no longer apply for specific section shapes. The scope of the present standard covers many more sizes than the DIN Standards did, and includes, for example, a flange width of 420 mm and a flange thickness of 75 mm. Negotiations are continuing within ECISS/TC 11 for harmonizing the sizes of I and H sections.

In specifying tolerances on the cross-sectional dimensions, ECISS/TC 11 endeavoured to specify values which, where lower limit deviations are chosen, do not lead to an automatic reduction of static parameters, which would necessitate the use of higher factors of safety when designing the particular steel structure. These efforts resulted in an asymmetrical distribution of limit deviations, and in a reduction of the tolerance on nominal mass for single sections to ± 4 %.

The DIN Standards corresponding to the European Standard and EURONORMs referred to in clause 2 of the EN are as follows:

EN Standard	DIN Standard
EN 10079	DIN EN 10079
EURONORM 19	DIN 1025 Part 5
EURONORM 53	DIN 1025 Parts 2 to 4

Standards referred to

(and not included in **Normative references**)

DIN EN 10079	Definition of steel products
DIN 1025 Part 2	Hot rolled I and H sections (IPB and IB series); dimensions, mass and static parameters
DIN 1025 Part 3	Hot rolled I and H sections (IPBl series); dimensions, mass and static parameters
DIN 1025 Part 4	Hot rolled I and H sections (IPBv series); dimensions, mass and static parameters
DIN 1025 Part 5	Hot rolled I and H sections (IPE series); dimensions, mass and static parameters

Continued overleaf.

EN comprises 5 pages.

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Previous editions

DIN 1612: 09.24, 01.32, 03.43x; DIN 1025 Part 2: 04.26, 10.28, 12.29, 04.32, 09.39, 07.40x, 07.59, 10.63; DIN 1025 Part 3: 10.63; DIN 1025 Part 4: 10.63; DIN 1025 Part 5: 03.65.

Amendments

In comparison with the October 1983 editions of DIN 1025 Parts 2 to 4 and the March 1965 edition of DIN 1025 Part 5, the following amendments have been made.

a) The specifications have been restricted to dimensional and geometrical tolerances.

b) Some of the limit deviations for section height, flange width and thickness and web thickness have been changed (cf. table 1).

c) Some of the tolerances on parallelism of flange, section symmetry and straightness of web have been changed (cf. tables 2 and 3).

d) The tolerance on nominal mass has been reduced to ± 4 %.

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 10034

September 1993

UDC 669.14.018.29-423.1:621.713.1

Descriptors: Iron and steel products, I beams, structural steels, dimensional tolerances, form tolerances.

English version

Structural steel I and H sections
Tolerances on shape and dimensions

Poutrelles I et H en acier de construction; tolérances de formes et de dimensions

I- und H-Profile aus Stahl; Grenzabmaße und Formtoleranzen

This European Standard was approved by CEN on 1993-08-30.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart 36, B-1050 Brussels

Contents list

Foreword

This European Standard has been prepared by ECISS/TC 11 'Sections: Tolerances and dimensions', the Secretariat of which is held by BSI.

The discussions within ECISS/TC 11 were based on

EURONORM 34-62 Broad flanged beams with parallel sides; rolling tolerances

and

EURONORM 44-63 Hot rolled IPE joists; rolling tolerances

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, and conflicting national standards withdrawn, by March 1994 at the latest.

In accordance with the CEN/CENELEC Internal Regulations, the following countries are bound to implement this European Standard:

Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

This standard specifies tolerances on the shape, dimensions and mass of structural steel I and H sections. These requirements do not apply to I and H sections rolled from stainless steel, nor to taper flange sections.

NOTE: Until a European Standard covering the dimensions of I and H beams is published, EURONORM 19 and EURONORM 53, or corresponding national standards, may be used.

2 Normative references

This European Standard incorporates, by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references, the latest edition of the publication referred to applies.

EN 10079	Definition of steel products
EURONORM 19-57	IPE beams, parallel flanged beams
EURONORM 53-62	Wide flanged beams with parallel flanges

3 Definitions

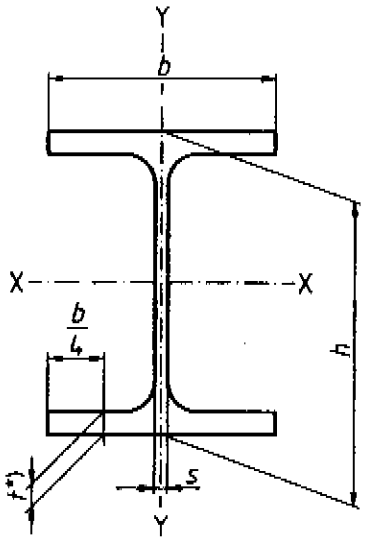
For the purposes of this European Standard, the definitions given in EN 10079 apply.

4 Rolling tolerances for structural steel I and H sections

4.1 Section height (h)

The deviation from the nominal section height, measured at the centreline of the web thickness, shall be within the tolerance given in table 1.

Table 1: Dimensional tolerances for structural steel I and H sections



*) t shall be measured at $\frac{b}{4}$ (see subclause 4.4).

Section height, h		Flange width, b		Web thickness, s		Flange thickness, t	
Nominal size mm	Limit deviation mm	Nominal size mm	Limit deviation mm	Nominal size mm	Limit deviation mm	Nominal size mm	Limit deviation mm
$h \leq 180$	$^{+3,0}_{-2,0}$	$b \leq 110$	$^{+4,0}_{-1,0}$	$s < 7$	±0,7	$t < 6,5$	$^{+1,5}_{-0,5}$
$180 < h \leq 400$	$^{+4,0}_{-2,0}$	$110 < b \leq 210$	$^{+4,0}_{-2,0}$	$7 \leq s < 10$	±1,0	$6,5 \leq t < 10$	$^{+2,0}_{-1,0}$
$400 < h \leq 700$	$^{+5,0}_{-3,0}$	$210 < b \leq 325$	±4,0	$10 \leq s < 20$	±1,5	$10 \leq t < 20$	$^{+2,5}_{-1,5}$
$h > 700$	±5,0	$b > 325$	$^{+6,0}_{-5,0}$	$20 \leq s < 40$	±2,0	$20 \leq t < 30$	$^{+2,5}_{-2,0}$
				$40 \leq s < 60$	±2,5	$30 \leq t < 40$	±2,5
				$s \geq 60$	±3,0	$40 \leq t < 60$	±3,0
						$t \geq 60$	±4,0

4.2 Flange width (b)

The deviation from the nominal flange width shall be within the tolerance given in table 1.

4.3 Web thickness (s)

The deviation from the nominal web thickness, measured at the mid-point of dimension h, shall be within the tolerance given in table 1.

4.4 Flange thickness (t)

The deviation from the nominal flange thickness, measured at a point corresponding to one-fourth of the flange width, shall be within the tolerance given in table 1.

4.5 Out-of-squareness ($k + k'$)

The out-of-squareness of the section shall not exceed the maximum values given in table 2.

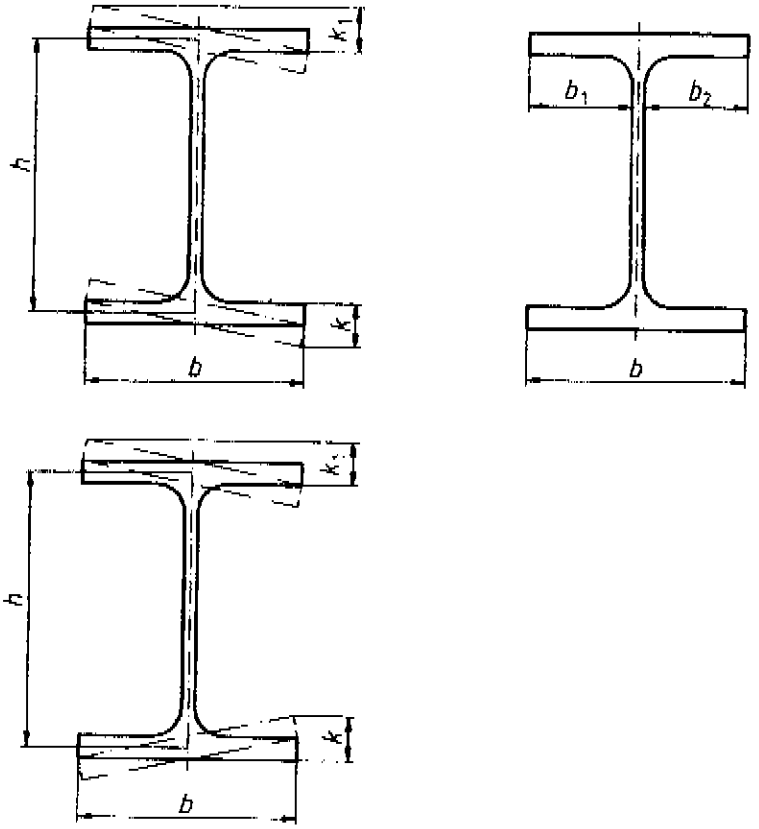
4.6 Web off-centre (e)

The mid-thickness of the web shall not deviate from the mid-width position on the flange by more than the distance e, given in table 2.

4.7 Deviation from straightness (q_{xx} or q_{yy})

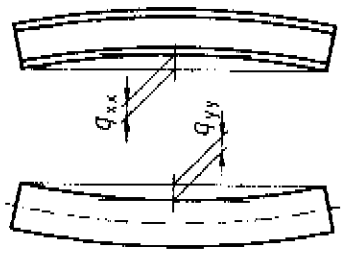
The straightness shall comply with the requirements given in table 3.

Table 2: Tolerance on out-of-squareness and web off-centre of structural steel I and H sections



Out-of-squareness $k + k'$		Web off-centre, e $\left(e = \frac{b_1 - b_2}{2}\right)$	
Flange width, b mm	Tolerance mm	Flange width, b mm	Tolerance mm
$b \leq 110$	1,5	Where $t < 40$ mm	
		$b \leq 110$	2,5
		$110 < b \leq 325$	3,5
		$b > 325$	5,0
$b > 110$	2 % of b (max. 6,5 mm)	Where $t \geq 40$ mm	
		$110 < b \leq 325$	5,0
		$b > 325$	8,0

Table 3: Tolerances on straightness of structural steel I and H sections



Section height, h mm	Tolerance on straightness, q_{xx} and q_{yy}
$80 < h \leq 180$	0,30 % of L
$180 < h \leq 360$	0,15 % of L
$h > 360$	0,1 % of L

5 Tolerance on mass

The deviation from the nominal mass of a batch or an item shall not exceed ± 4,0 %.

The mass deviation is the difference between the actual mass of the batch or item and the calculated mass.

The calculated mass shall be determined using a density of 7,85 kg/dm³.

6 Tolerance on length

The sections shall be cut to ordered lengths, within tolerances of:

a) ± 50 mm, or

b) ± 100 mm, where minimum lengths are ordered.

L represents the longest useable length of the section, assuming that the ends of the section have been cut square (see figure 1).

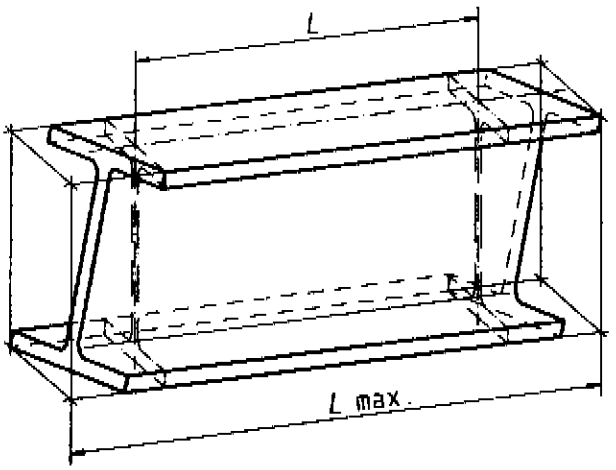


Figure 1: Measurement of length L of I and H sections

Annex A (informative)

Straightness measurement

Straightness measurement requires the use of a straight edge from which deviations in section straightness are measured. A taut string line is an acceptable straight edge, provided that deviations in the horizontal plane only are measured.

Measurement for q_{xx} shall be carried out as follows: The section is laid in the 'H' position on a flat surface, and the string is taken from the outside of the centre of the flange width between the two ends of the unconstrained section.

Measurement for q_{yy} shall be carried out as follows: The section is laid in the 'I' position on a flat surface, and the string is taken along the flange tip between the two ends of the unconstrained section.

DIN 1025-1

August 1998 (May 1995)

Hot-Rolled I-Sections
Part 1: Narrow-Flanged I-Sections, I-Series
Dimensions, Masses, Section Properties

original language version

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GERMAN STANDARD May 1995

Hot-Rolled I-Sections
Part 1: Narrow-Flanged I-Sections, I-Series
Dimensions, Masses, Section Properties

DIN 1025-1

ICS 77.140.70

With DIN EN 10024: 1995-05 Edition,
replaces the 1963-10 Edition.

Descriptors: I-Section, I-beam, hot-rolled, dimensions, masses, section properties

Profilés I laminés à chaud - Partie I: Serie I; dimensions, masses et caractéristiques rapportées aux axes

Foreword

The new edition of DIN 10024, which contains the European standardized requirements regarding dimension limits and shape tolerances for steel I-sections with tapered internal flange surfaces made it necessary to revise and update DIN 1025-1. The field of application of the new edition is confined to the nominal dimensions and properties calculated from them. Apart from the deletion of three series of sections, all the data have been incorporated unchanged from the earlier versions of the DIN standards (see Table 1).

DIN 1025 Hot-rolled I-sections consists of:

Part 1: Narrow-flanged I-sections, I-series; dimensions, masses and section properties;

Part 2: Wide-flanged I-sections, IPB- and IB-series; dimensions, masses and section properties;

Part 3: Wide-flanged I-sections, light-weight design, IPBl-series; dimensions, masses and section properties;

Part 4: Wide-flanged I-sections, strengthened design, IPB_v-series; dimensions, masses and section properties;

Part 5: I-sections with medium-width flanges, IPE-series; dimensions, masses and section properties.

Amendments

The following amendments have been made to the October 1963 edition:

a) All statements regarding the dimension limits, dimensional tolerances and shape tolerances have been replaced by reference to DIN EN 10024.

b) The series I-425, I-475 and I-600 have been deleted.

Previous Editions

DIN 1612: 1924-09, 1932-01, 1943x-03

DIN 1025-1: 1926-10, 1932-02, 1939-08, 1940x-07, 1959-07, 1963-10

1 Field of Application

This standard covers hot-rolled narrow-flanged I-sections with tapered internal flange surfaces (I-series) in accordance with Table 1 produced from the grades of steel specified in Clause 6.

This standard does not cover:

Hot-rolled I-sections, wide-flanged I-sections, IPB- and IB-series; see DIN 1025-2

Hot-rolled I-sections, wide-flanged I-sections, light-weight design, IPBl-series; see DIN 1025-3

Hot-rolled I-sections, strengthened design, IPB_v-series; see DIN 1025-4

Hot-rolled I-sections with medium-width flanges, IPE series; see DIN 1025-5.

2 Normative References

This standard contains dated or undated references to provisions from other publications. These references to standards are cited at appropriate places in the text and the publications are listed below. In the case of dated references, subsequent amendments or revisions of these publications shall apply to this standard only if they have been incorporated in it as a result of amendment or revision. In the case of undated references, the latest edition of the publication referred to shall apply.

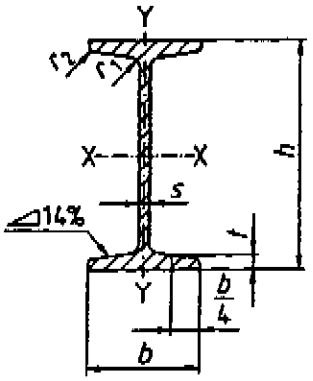
DIN EN 10024

I-sections with tapered internal flange surfaces - dimension limits and shape

tolerances; German version of EN 10024: 1995

DIN EN 10025

Hot-rolled products of unalloyed structural steels - Technical supply conditions; German version of EN 10025: 1990 + A1: 1993.



3 Designation

The components making up the standard designation shall be stated in the following order:

- Name (I-section)
- DIN Number (DIN 1025)
- Short Form or Material Number of the Steel Grade
- Abbreviated Designation (see Table 1).

EXAMPLE:

Designation of a hot-rolled I-section produced from a steel with the abbreviated designation S235JR and/or the material number 1.0037 to DIN EN 10025 with the abbreviated section designation I 360:

I-Section DIN 1025-S235JR-I 360

or

I-Section DIN 1025-1.0037-I 360.

4 Dimensions and Masses

4.1 Hot-rolled, narrow-flanged I-sections with tapered internal flange surfaces shall be supplied in accordance with Table 1.

4.2 The required nominal length shall be specified when the order is placed.

4.3 The mass values per unit length specified in Table 1 have been calculated assuming a density of 7.85 kg/dm^3.

5 Dimensional and Shape Tolerances

The dimensional and shape tolerances shall be those specified in DIN 10024.

6 Steel Grades

I-sections to this standard shall be produced preferentially from the steels specified in DIN EN 10025.

The required steel grade shall be stated in the designation code.

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Table 1: Narrow-flanged I-sections with tapered internal flange surfaces (I-series)

Abbrev. Designation I.	DIMENSION FOR: h	b	s	t	r_1	r_2	Cross Section cm^2	Mass kg/m	Surface Area per Unit Length m^2/m	FOR THE BENDING AXIS I: I_x cm^4	$x-x$ W_x cm^3	i_x cm	I_y cm^4	$y-y$ W_y cm^3	i_y cm	S_x [1] cm^3	S_y [2] cm
80	80	42	3.9	5.9	3.9	2.3	7.57	5.94	0.304	77.8	19.5	3.20	6.29	3.00	0.91	11.4	6.84
100	100	50	4.5	6.8	4.5	2.7	10.6	8.34	0.370	171	34.2	4.01	12.2	4.88	1.07	19.9	8.57
120	120	58	5.1	7.7	5.1	3.1	14.2	11.1	0.439	328	54.7	4.81	21.5	7.41	1.23	31.5	10.3
140	140	66	5.7	8.6	5.7	3.4	18.1	14.3	0.502	573	81.9	5.61	35.2	10.7	1.40	47.7	12.0
160	160	74	6.3	9.5	6.3	3.8	22.8	17.9	0.575	935	117	6.40	54.7	14.8	1.55	68.0	13.7
180	180	82	6.9	10.4	6.9	4.1	27.9	21.9	0.640	1450	161	7.20	81.3	19.8	1.71	93.4	15.5
200	200	90	7.5	11.3	7.5	4.5	33.4	26.2	0.709	2140	214	8.00	117	26.0	1.87	125	17.2
220	220	98	8.1	12.2	8.1	4.9	39.5	31.1	0.775	3060	278	8.80	162	33.1	2.02	162	18.9
240	240	106	8.7	13.1	8.7	5.2	46.1	36.2	0.844	4250	354	9.59	221	41.7	2.20	206	20.6
260	260	113	9.4	14.1	9.4	5.6	53.3	41.9	0.906	5740	442	10.4	288	51.0	2.32	257	22.3
280	280	119	10.1	15.2	10.1	6.1	61.0	47.9	0.966	7590	542	11.1	364	61.2	2.45	316	24.0
300	300	125	10.8	16.2	10.8	6.5	69.0	54.2	1.03	9800	653	11.9	451	72.2	2.56	381	25.7
320	320	131	11.5	17.3	11.5	6.9	77.7	61.0	1.09	12510	782	12.7	555	84.7	2.67	457	27.4
340	340	137	12.2	18.3	12.2	7.3	86.7	68.0	1.15	15700	923	13.5	674	98.4	2.80	540	29.3
360	360	143	13.0	19.5	13.0	7.8	97.0	76.1	1.21	19610	1090	14.2	818	114	2.90	638	30.7
380	380	149	13.7	20.5	13.7	8.2	107	84.0	1.27	24010	1260	15.0	975	131	3.01	741	32.4
400	400	155	14.4	21.6	14.4	8.6	118	92.4	1.33	29210	1460	15.7	1160	149	3.13	857	34.1
450	450	170	16.2	24.3	16.2	9.7	147	115	1.48	45850	2040	17.7	1730	203	3.43	1200	38.3
500	500	185	18.0	27.0	18.0	10.8	179	141	1.63	68740	2750	19.6	2480	268	3.72	1620	42.4
550	550	200	19.0	30.0	19.0	11.9	212	166	1.80	99180	3610	21.6	3490	349	4.02	2128	46.8

[1] I = second moment of area; W = section modulus

i = radius of gyration referred in each case to the pertinent bending axis.

[2] S_x = first moment of area of half the cross section

[3] $s_x = I_x : S_x$ = distance between the compression and tension centre points

The cross sections, masses, surface areas and static section values are calculated from the dimensions stated in the table.