

General tolerances for welded constructions
Tolerances for lengths, angles, shape and position
(ISO 13920:1996)
English version of DIN EN ISO 13920

DIN
EN ISO 13920

This standard incorporates the English version of **ISO 13920**.

ICS 25.160.00

Descriptors: Tolerances, welding.

Schweißen – Allgemeintoleranzen für Schweißkonstruktionen – Längen und Winkelmaße, Form und Lage (ISO 13920:1996)

Supersedes DIN 8570-1 and
DIN 8570-3, October 1987
editions.

European Standard EN ISO 13920: 1996 has the status of a DIN Standard.

A comma is used as the decimal marker.

National foreword

This standard has been published in accordance with a decision taken by CEN/TC 121 to adopt, without alteration, International Standard ISO 13920 as a European Standard.

The responsible German body involved in its preparation was the *Normenausschuß Schweißtechnik* (Welding Standards Committee).

The DIN Standards corresponding to the International/European Standards referred to in clause 2 of the EN are as follows:

ISO 3599	E DIN EN 13385
ISO 6906	E DIN EN 13385
ISO 8015	E DIN ISO 8015
ISO/DIS 463	E DIN EN ISO 463
prEN ISO 1101	E DIN ISO 1101

Amendments

DIN 8570-1 and DIN 8570-3, October 1987 editions, have been superseded by the specifications of EN ISO 13920, which is identical to ISO 13920. Tolerance class Z has been dropped.

Previous editions

DIN 8570-1: 1971-04, 1974-10, 1987-10; DIN 8570-3: 1974-10, 1987-10; DIN 25029: 1962-04.

Standards referred to

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

E DIN EN 13385

Geometrical Product Specifications (GPS) – Dimensional measuring instruments – Vernier callipers – Design and metrological requirements

E DIN EN ISO 463

Geometrical Product Specifications (GPS) – Dimensional measuring instruments – Dial gauges – Design and metrological requirements

EN comprises 5 pages.

ICS 25.160.00

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English version

Welding

General tolerances for welded constructions
Dimensions for lengths, angles, shape and position
(ISO 13920:1996)

Soudage – Tolérances générales relatives
aux constructions soudées – Dimensions
des longueurs et angles, formes et posi-
tions (ISO 13920:1996)

Schweißen – Allgemeintoleranzen für
Schweißkonstruktionen – Längen und
Winkelmaße, Form und Lage
(ISO 13920:1996)

This European Standard was approved by CEN on 1995-06-20 and is identical to the ISO Standard as referred to.

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 the United Kingdom.

CEN

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

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

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Foreword

This European Standard has been prepared by Technical Committee CEN/TC 121 'Welding', the Secretariat of which is held by DS, in collaboration with Technical Committee ISO/TC 44 'Welding and allied processes'.

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 February 1997 at the latest.

In accordance with the CEN/GENELEC Internal Regulations, the national standards organizations of 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 European Standard specifies general tolerances for linear and angular dimensions and for shape and position of welded structures in four tolerance classes, these being based on customary workshop accuracy. The main criterion for the selection of a particular tolerance class should be the functional requirements which are to be met.

The applicable tolerances are always those which are stated in the drawing. Instead of specifying individual tolerances, the tolerance classes according to this standard may be used.

General tolerances for linear and angular dimensions and for shape and position as specified in this standard apply for weldments, welding assemblies and welded structures etc.

Special provisions may be necessary for complex structures.

The specifications given in this standard are based on the principle of independency as specified in ISO 8015, according to which the dimensional and geometrical tolerances apply independently of each other.

Manufacturing documentation in which linear and angular dimensions or indications for shape and position are presented without individually indicated tolerances shall be deemed incomplete if there is no, or inadequate, reference to general tolerances. This does not apply to temporary dimensions.

2 Normative references

This European Standard incorporates, by dated or undated reference, provisions from other publications. These nor-

mative references are cited at the appropriate place 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 last edition of the publication referred to applies.

prEN ISO 1101

Technical drawings – Geometrical tolerancing – Tolerances of form, orientation, location and run-out – Generalities, definitions, symbols, indications on drawings

ISO/DIS 463

Geometrical Product Specifications (GPS) – Dimensional measuring instruments – Dial gauges: design and metrological requirements

ISO 3599:1976

Vernier callipers reading to 0,1 and 0,05 mm

ISO 6906:1984

Vernier callipers reading to 0,02 mm

ISO 8015:1985

Technical drawings – Fundamental tolerancing principle

3 Definitions

For the purposes of this standard, the definitions given in prEN ISO 1101 apply.

4 General tolerances

4.1 Tolerances for linear dimensions

See table 1.

Table 1: Tolerances for linear dimensions

Tolerance class	Range of nominal sizes, l , in mm										
	2 to 30	Over 30 up to 120	Over 120 up to 400	Over 400 up to 1 000	Over 1 000 up to 2 000	Over 2 000 up to 4 000	Over 4 000 up to 8 000	Over 8 000 up to 12 000	Over 12 000 up to 16 000	Over 16 000 up to 20 000	Over 20 000
	Tolerances, t , in mm										
A	± 1	± 1	± 1	± 2	± 3	± 4	± 5	± 6	± 7	± 8	± 9
B		± 2	± 2	± 3	± 4	± 6	± 8	± 10	± 12	± 14	± 16
C		± 3	± 4	± 6	± 8	± 11	± 14	± 18	± 21	± 24	± 27
D		± 4	± 7	± 9	± 12	± 16	± 21	± 27	± 32	± 36	± 40

4.2 Tolerances for angular dimensions

The length of the shorter angle leg shall be used to determine, on the basis of table 2, which tolerances are to apply. The length of the leg may also be assumed to extend to a specified reference point. In this case, the reference point concerned shall be indicated on the drawing.

See table 2 for the relevant tolerances.

Figures 1 to 5 show examples of how the shorter angle leg, l , is to be represented.

4.3 Straightness, flatness and parallelism tolerances

The straightness, flatness and parallelism tolerances as specified in the table 3 apply both for the overall dimensions of a weldment, a welding assembly, or a welded structure, and also for sections for which the dimensions are indicated.

Other tolerances of form and position (e.g. coaxiality and symmetry tolerances) have not been specified. If such tolerances are required for functional reasons, they shall be indicated on the drawings, as specified in prEN ISO 1101.

5 Indications on drawings

The designation of the selected tolerance class as specified in tables 1 and 2 (e.g. EN ISO 13920-B) or its combination with a tolerance class as specified in table 3 (e.g. EN ISO 13920-BE), shall be entered in the appropriate area on the drawing.

Table 2: Tolerances for angular dimensions

Tolerance class	Range of nominal sizes, l , in mm (length or shorter leg)		
	Up to 400	Over 400 up to 1000	Over 1000
	Tolerances, $\Delta\alpha$, (in degrees and minutes)		
A	± 20	± 15	± 10
B	± 45	± 30	± 20
C	± 1°	± 45	± 30
D	± 1°30	± 1°15	± 1°
	Calculated and rounded tolerances, t , in mm/m ¹)		
A	± 6	± 4,5	± 3
B	± 13	± 9	± 6
C	± 18	± 13	± 9
D	± 26	± 22	± 18

¹⁾ The value indicated in mm/m corresponds to the tangent value of the general tolerance. It is to be multiplied by the length, in m, of the shorter leg.

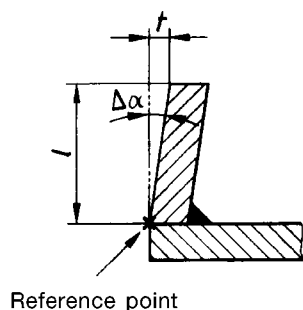


Figure 1

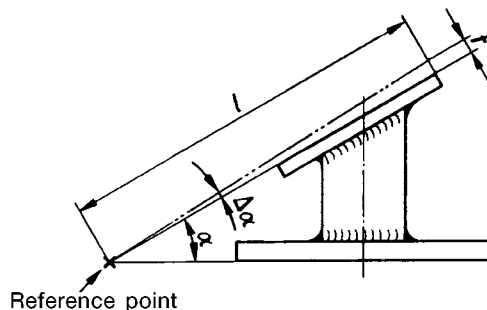


Figure 2

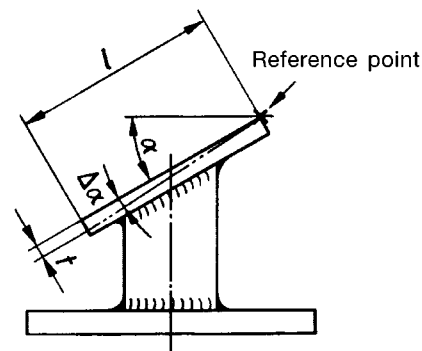


Figure 3

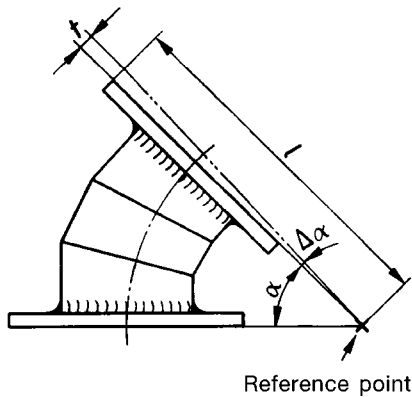


Figure 4

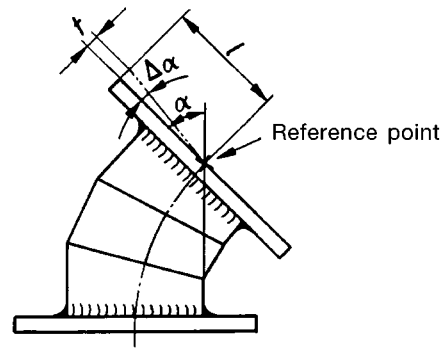


Figure 5

Table 3: Straightness, flatness and parallelism tolerances

Tolerance class	Range of nominal sizes, l , in mm (relates to longer side of the surface)									
	Over 30 up to 120	Over 120 up to 400	Over 400 up to 1000	Over 1000 up to 2000	Over 2000 up to 4000	Over 4000 up to 8000	Over 8000 up to 12000	Over 12000 up to 16000	Over 16000 up to 20000	Over 20000
	Tolerances, t , in mm									
E	0,5	1	1,5	2	3	4	5	6	7	8
F	1	1,5	3	4,5	6	8	10	12	14	16
G	1,5	3	5,5	9	11	16	20	22	25	25
H	2,5	5	9	14	18	26	32	36	40	40

6 Testing

6.1 General

Testing and measuring devices used shall be suitable and accurate for their intended purpose. The following shall be used:

- graduated steel straightedges;
- tape measures;
- straightedges;
- squares;
- vernier callipers (in accordance with ISO 3599 and ISO 6906).
- dial gauges (in accordance with ISO/DIS 463).

Other testing and measuring devices may be used by agreement.

The results of measurement may be influenced if they are obtained under unusual temperature or atmospheric conditions (e.g. large constructions in strong sunlight).

The actual size of an angle shall be determined by applying suitable measuring devices tangentially to the weldment, but away from the zone immediately influenced by the weld. The deviation shall be derived from the difference between the nominal size and the actual size. The angular deviation may be measured in degrees and minutes, or in millimetres.

6.2 Straightness

The edge of the weldment and the straightedge shall be aligned in such a way that the greatest distance between the straightedge and the actual surface is at its minimum.

The distance between the edge and the straightedge shall be measured (for example, see figure 6).

6.3 Flatness

The actual surface of the weldment and the measuring plane shall be aligned to each other in such a way that the greatest distance between the measuring plane and the actual surface is at its minimum. This may be effected, for example, with the aid of optical devices, tubular water levels, span wires, floor plates, surface plates, and machine beds.

The distances between the actual surface and the measuring plane shall be measured (for example, see figure 7).

6.4 Parallelism

The reference surface shall be aligned parallel to the reference plane.

A measuring plane shall be established parallel to the reference plane and apart from the weldment, using the measuring devices referred to in 6.3. The distances between the actual surface and the measuring plane shall be measured (example see figure 8).

7 Non-conformity

A decision on the acceptance of components not complying with this standard may be made on the basis of the suitability for their intended purpose.

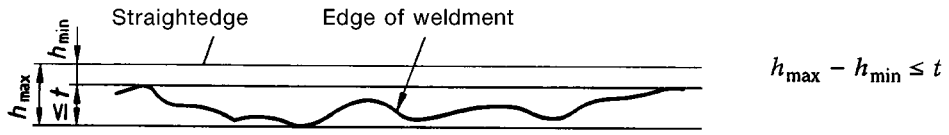


Figure 6: Straightness test

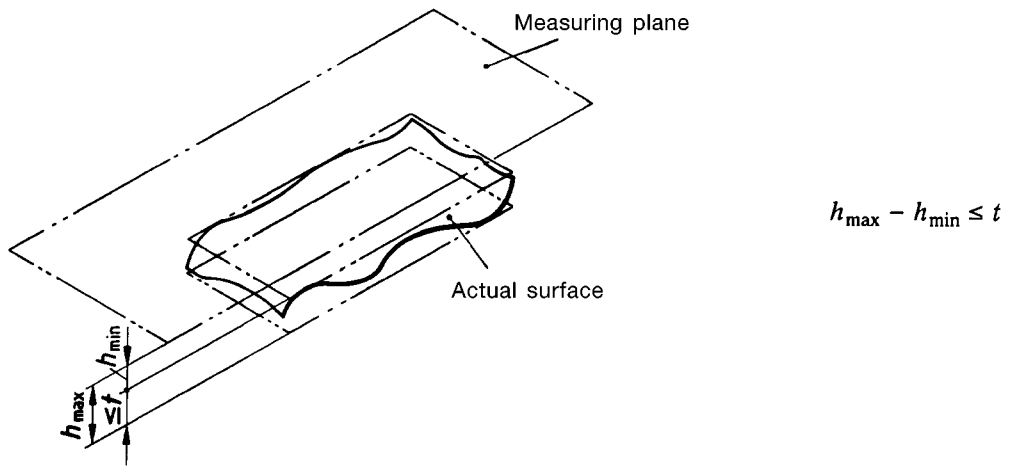


Figure 7: Flatness test

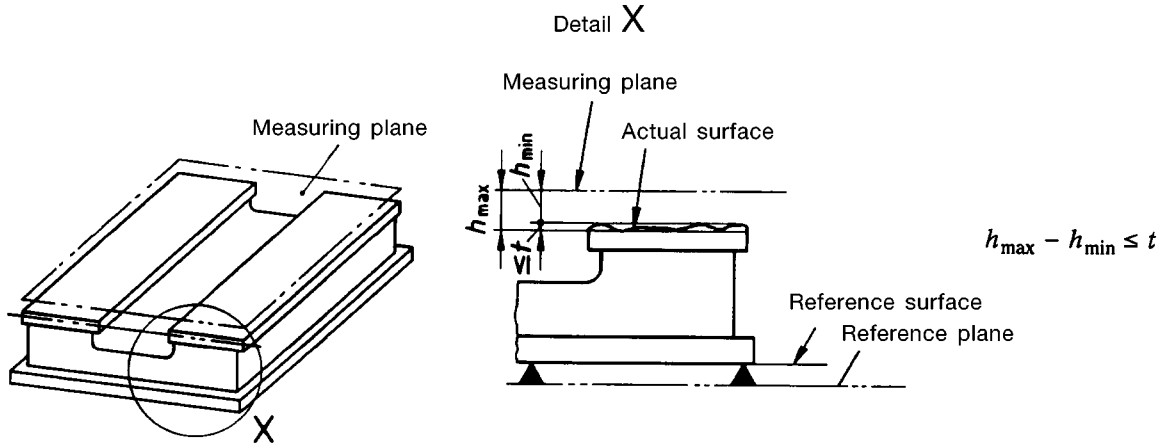


Figure 8: Parallelism test