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Technical product documentation — Indication of dimensions and tolerances —

Part 5: Dimensioning of structural metal work

Technique du produit documentation — Indication des cotes et tolérances —

Partie 5: Cotes des ouvrages de structure métallique

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 10, *Technical product documentation,* Subcommittee SC 6, *Mechanical engineering documentation*.

A list of all parts in the ISO 129 series can be found on the ISO website.

Technical product documentation — Indication of dimensions and tolerances —

Part 5:
Dimensioning of structural metal work

1 Scope

This document specifies the dimensioning of drawings for general use on structural metal work mainly consisting of plates, bars and profile sections.

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 129-1, *Technical drawings — Indication of dimensions and tolerances Part 1: General principles*

ISO 129-4, *Technical product documentation (TPD) — Indication of dimensions and tolerances — Part 4: Dimensioning of shipbuilding drawings*

ISO 5261:1995, *Technical drawings — Simplified representation of bars and profile sections*

ISO 657-1, *Hot-rolled steel sections — Part 1: Equal-leg angles — Dimensions*

ISO 657-2, *Hot-rolled steel sections — Part 2: Unequal-leg angles — Dimensions*

ISO 657-16, *Hot-rolled steel sections — Part 16: Sloping flange column sections (metric series) — Dimensions and sectional properties*

ISO 657-18, *Hot-rolled steel sections — Part 18: L sections for shipbuilding (metric series) — Dimensions, sectional properties and tolerances*

ISO 657-21, *Hot-rolled steel sections — Part 21: T-sections with equal depth and flange width — Dimensions*

ISO 10209, *Technical product documentation — Vocabulary — Terms relating to technical drawings, product definition and related documentation*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 10209, ISO 129-1 and the following apply.

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

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

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

3.1
centroidal line
line passing through the centre of mass

4 Basic requirements

Basic requirements of dimensioning are as follows:

a) The indication of dimensions and tolerances shall follow the general principles specified in ISO 129-1.

b) The dimensions of structural metal work shall be simple and clear. The standard plates and profile sections should be represented with code.

c) The datum line of dimensioning should be the centroidal line of component.

To maintain readability of drawings and to simplify drawing, dimension lines can be omitted as shown in Figure 1.

5 Simplified dimensioning of structural metal work

Schematic dimensioning of structural metal work shall conform to the representation method specified by ISO 5261.

The arc length of a circular structure in the frame should be dimensioned on one side of its line. An example is shown in Figure 1.

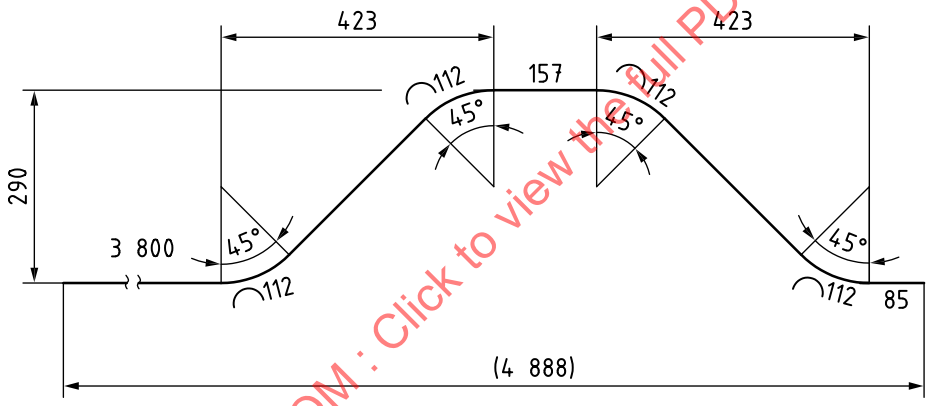


Figure 1 — Dimensioning of arc sketch

6 Dimensioning of component profile

6.1 Profile code

The representation of profile sections shall use the form of Figure 2. A type code of “C” is required to indicate cold formed sections and that the type code can be omitted for all other types of section. "Graphical symbol or letter code" represents the shape of profile sections, see Table 1 to Table 3. The proportion and dimensions of the graphical symbols shall be as specified in Annex A. "Standard number" is the code of technical standard which specifies the technical requirements of the section. "Necessary size" is the main size of the section. The parameters of size should be separated with the times sign, "×", see Table 1 to 3.

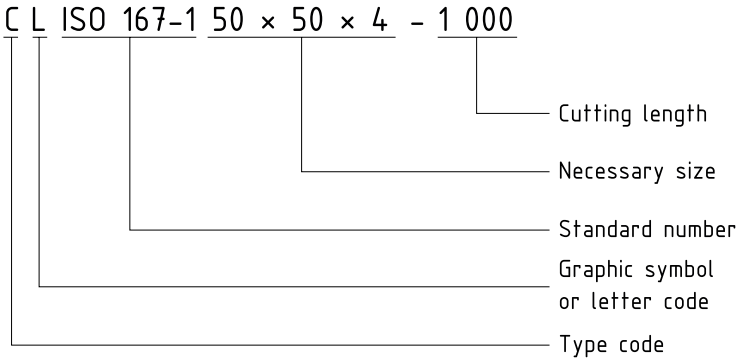


Figure 2 — Profile code

6.2 Dimensioning samples

Equal leg angle iron, size 50 mm × 50 mm × 4 mm, length 1 000 mm:

∟ ISO 167-1 50 × 50 × 4 – 1 000

The standard code can be omitted when no such standard exists or the omission does not lead to a misunderstanding:

∟ 50 × 50 × 4 – 1 000

For simplification, a capital 'L' can be used instead of the graphical symbol:

L 50 × 50 × 4 – 1 000

Table 1 — Hot rolled sections

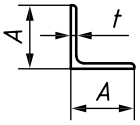
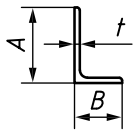
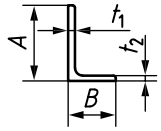
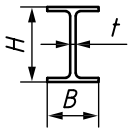
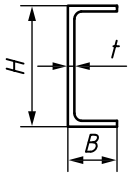
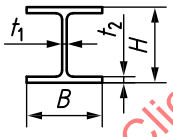
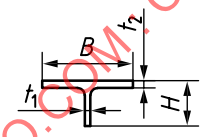
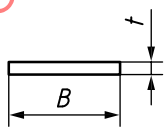
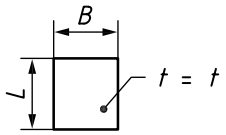
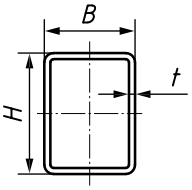
No.	Classification	Shape of section	Graphical symbol	Letter code	Representation
1	Equal leg angle		Shall conform to the designation specified by ISO 5261:1995, Table 2		Shall conform to the designation specified by ISO 657-1
2	Unequal leg angle				Shall conform to the designation specified by ISO 657-2
3	L section				Shall conform to the designation specified by ISO 657-18
4	I-beam section				⌶ H × B × t – L or I H × B × t – L
5	Channel section				C ⌊ H × B × t – L
6	H-beam section				Shall conform to the designation specified by ISO 657-16
7	T section				Shall conform to the designation specified by ISO 657-21
8	Flat bar		——		Shall conform to the designation specified by ISO 129-4
9	Plate		——		—B × t L
10	Rectangular hollow section				□ H × B × t – L

Table 2 — Cold drawn sections

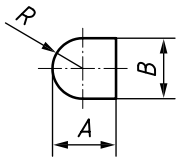
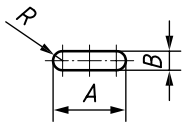
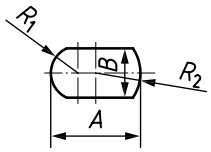
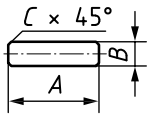
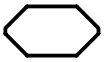
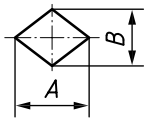
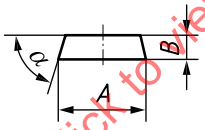
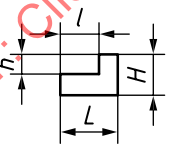
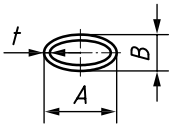
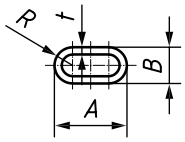
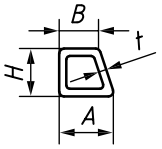
No.	Classification	Shape of section	Graphical symbol	Letter code	Representation
1	Single round-headed flats				A × B × R – L
2	Double round-headed flats				A × B × R – L
3	Unequal round-headed flats				A × B × R1 × R2 – L
4	Chamfered flats				A × B × C – L
5	Diamond section				A × B – L
6	Trapezoidal section				A × B × α – L
7	Angle–square section				H × L × h × l – L
8	Oval tube				A × B × t – L
9	Slot with round end tube				A × B × R × t – L
10	Right-angled trapezoid tube				A × B × H × t – L

Table 3 — Cold formed sections

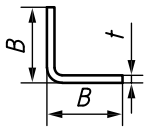
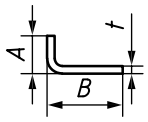
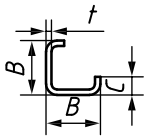
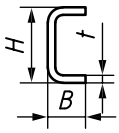
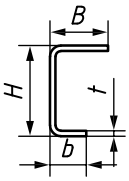
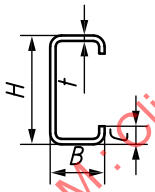
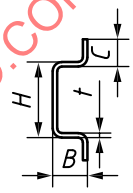
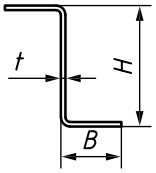
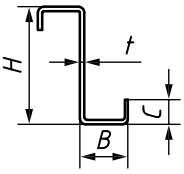
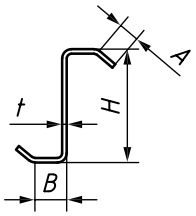
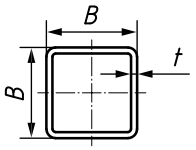
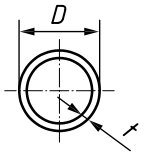
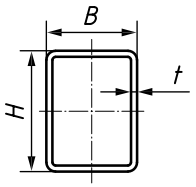
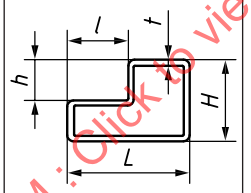
No.	Classification	Shape of section	Graphical symbol	Letter code	Representation
1	Thin-walled equal leg angle		Shall conform to the designation specified by ISO 5261:1995, Table 2		C L B × t – L
2	Thin-walled unequal leg angle				C L B × A × t – L
3	Thin-walled equal leg angle with inner edge				C L B × t – L
4	Thin-walled channel section				C [H × B × t – L
5	Scalene channel section				C H × B × b × t – L
6	Channel section with inner edge				C [H × B × C × t – L
7	Hat section				C H × B × C × t – L
8	Z-section			Z	C L H × B × t – L or C Z H × B × t – L
9	Thin-walled lip Z section				C L H × B × C × t – L

Table 3 *(continued)*

No.	Classification	Shape of section	Graphical symbol	Letter code	Representation
10	Thin-walled oblique lip Z section				C ⟅ H × B × A × t – L
11	Thin-walled square tube		Shall conform to ISO 129-1:2017, Figure A.2		C □ B × t – L
12	Thin-walled welding circular tube				C Ø D × t – L
13	Rectangle tube				C □ H × B × t – L
14	P section tube				C ⌐ H × L × h × l × t – L

6.3 Profile dimensioning in drawing

The profile codes should be shown close to the corresponding component, see Figure 3 a).

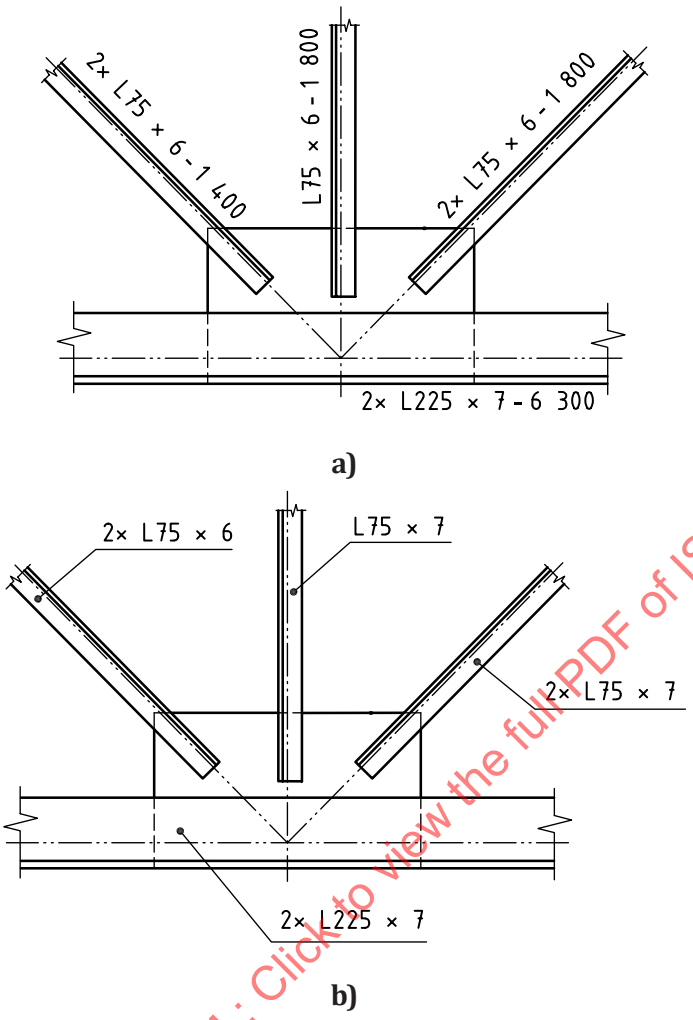
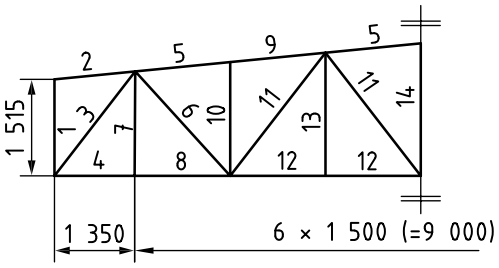


Figure 3 — Indication of profiles

The size and specification of a component could be indicated by a leader line. The cutting length in profile code can be omitted when it has been presented in the schematic drawing and the general drawing. See Figure 3 b).

The number of components shall be indicated in front of the specification, see Figure 3.

When the number of components is large, they should be numbered in the drawing, and the sizes and specifications presented in appropriate columns in a table. See Figure 4.



NO.	SPECIFICATION	LENGTH	AMOUNT
1	L75 × 5	1 500	2
2	[120 × 53 × 5,5	1 400	2
3	L50 × 4	2 300	2
4	[140 × 58 × 6	1 350	2
5	[120 × 53 × 5,5	1 550	4
6	… …	… …	… …

Figure 4 — Tabular indication of profiles

7 Detail requirement

7.1 Typical component dimensioning

On a bent component, the radius of the arc shall be dimensioned (see Figure 5).

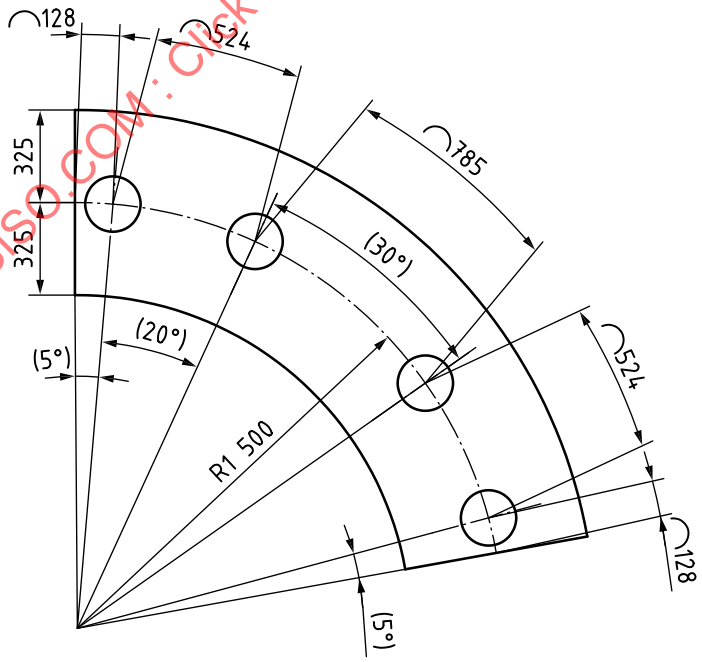


Figure 5 — Dimensioning of bent component

On a cutting plate drawing, the size of features should be dimensioned in the direction of the main axes. See Figure 6.

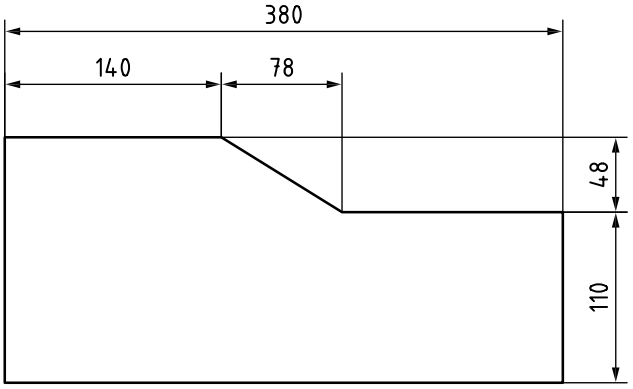


Figure 6 — Dimensioning of cutting plate

The position of centroidal lines shall be indicated in the drawing. When the centroidal lines of two adjacent components are close, they shall be separated in the intersection area before dimensioning, see Figure 7.

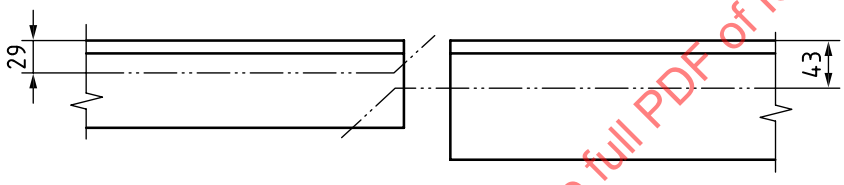


Figure 7 — Dimensioning of centroidal line

The width of one leg of an unequal leg angle component shall be dimensioned, see Figure 8.

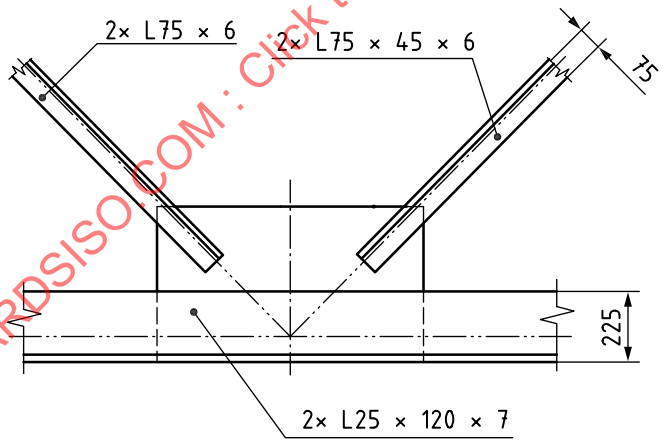


Figure 8 — Dimensioning of unequal leg component

For the connection part of components, the following features shall be dimensioned (see Figure 9):

a) the size of the gusset plate;

b) the location of bolt hole centres and centre distance of all components;

c) the distance between component end and intersection point of datum lines.

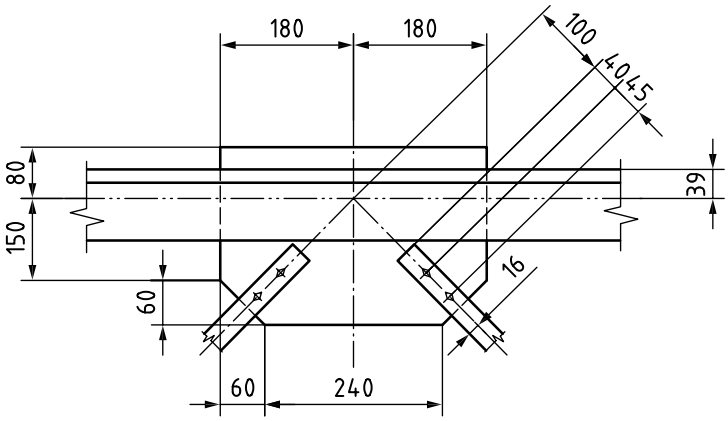


Figure 9 — Dimensioning of connection part

For double profile combined component, the number and size of batten plates shall be indicated, see Figure 10. The number and profile specification shall be located above the leader line, with the length beneath.

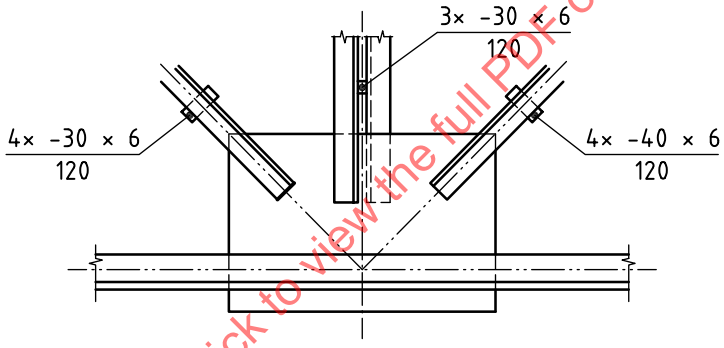


Figure 10 — Dimensioning of batten plates

For gusset plates, the following features shall be dimensioned (see Figure 11):

a) the size of the gusset plate;

b) the distance between bolt holes and intersection points of component centroidal lines.

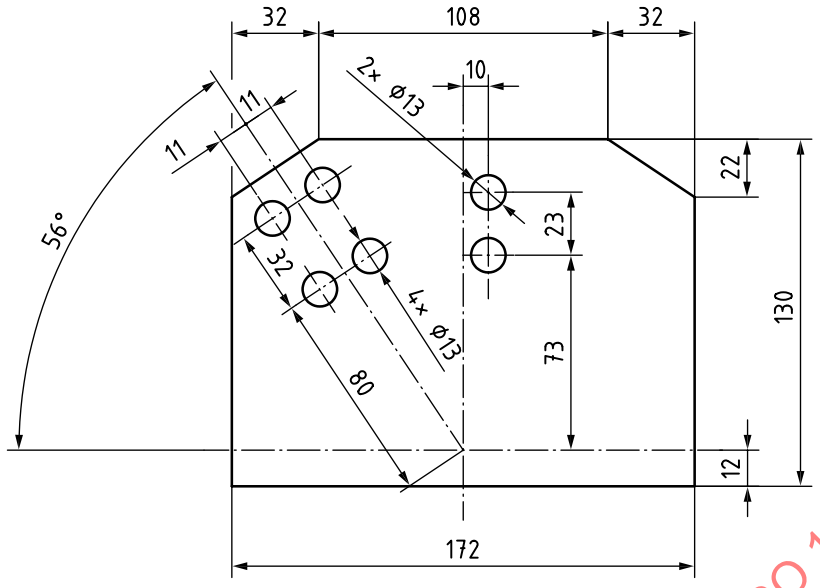


Figure 11 — Dimensioning of gusset plate

7.2 Dimensioning of bolts and rivets

On structural metal work drawings, bolts and rivets can be drawn in a simplified form and indicated with a leader line. See Figure 12 and Table 4.

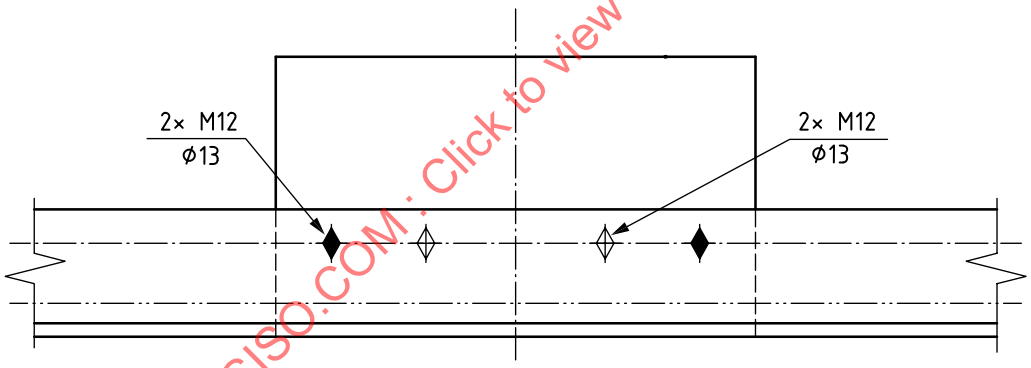
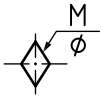
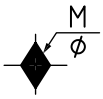
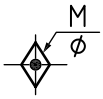
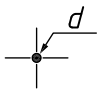
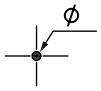
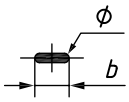


Figure 12 — Dimensioning of bolts

7.3 Dimensioning of welding components

Annex B provides dimensioning methods of typical welding components.

Table 4 — Indication of bolts and rivet

No.	Name	Sample	Explanation
1	Permanent bolt		a) "+" represents the location of the connection
2	High-strength bolted connection		b) "M" represents the specification of the bolt
3	Installation bolted connection		c) "⌀"represents the diameter of the hole
4	Expanding bolted connection		d) "d" represents the diameter of the expanding bolt and Welding rivet
5	Circular bolt hole		e) "b" represents the total length of the slotted hole
6	Slotted hole		f) The specification of the bolt shall be located above the leader line
7	Welding rivet		g) The diameter of the hole shall be located beneath the leader line