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Technical drawings for mechanical engineering

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# Foreword

This translation has been made based on the original Japanese Industrial Standard revised by the Minister of Economy, Trade and Industry through deliberations at the Japanese Industrial Standards Committee as the result of proposal for revision of Japanese Industrial Standard submitted by The Japan Society of Mechanical Engineers (JSME)/Japanese Standards Association (JSA) with the draft being attached, based on the provision of Article 12 Clause 1 of the Industrial Standardization Law applicable to the case of revision by the provision of Article 14.

Consequently JIS B 0001:2000 has been replaced with this Standard.

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# Technical drawings for mechanical engineering

#### 1 Scope

This Japanese Industrial Standard specifies the technical drawings for mechanical engineering, mainly part drawings and assembly drawings based on JIS Z 8310.

In addition, the matters not stated in this Standard shall be in accordance with **JIS** Z 8310 and other individual Japanese Industrial Standards related to technical drawings (for example, drawing practices for mechanical engineering by CAD shall be in accordance with JIS B 3402).

#### **2** Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. The most recent editions of the standards (including amendments) indicated below shall be applied.

JIS B 0021	Geometrical product specifications (GPS)—Geometrical tolerancing— Tolerancing of form, orientation, location and run-out
JIS B 0026	Technical drawings—Dimensioning and tolerancing—Non-rigid parts
JIS B 0028	Technical drawings—Dimensioning and tolerancing—Cones
JIS B 0031	Geometrical Product Specifications (GPS)—Indication of surface tex- ture in technical product documentation
JIS B 0419	General tolerances—Part 2: Geometrical tolerances for features with- out individual tolerance indications
JIS B 0601	Geometrical Product Specifications (GPS)—Surface texture: Profile method—Terms, definitions and surface texture parameters
JIS B 3401	Glossary of terms used in CAD
JIS B 3402	Drawing practices for mechanical engineering by CAD
JIS Z 3021	Welding and allied processes—Symbolic representation
JIS Z 8114	Technical product documentation—Terms relating to technical draw- ings
JIS Z 8310	Technical drawings—General code of drafting practices
JIS Z 8311	Technical drawings—Sizes and layout of drawing sheets
JIS Z 8312	Technical drawings—General principles of presentation—Basic conven- tion for lines
JIS Z 8314	Technical drawings—Scales
JIS Z 8315-3	3 Technical drawings—Projection method—Part 3: Axonometric repre- sentations
JIS Z 8315-4	Technical drawings—Projection method—Part 4: Central projection
JIS Z 8318	Technical drawings—Tolerancing of linear and angular dimensions

JIS Z 8321 Technical drawings—General principles of presentation—Preparation of lines by CAD system

## **3** Terms and definitions

For the purposes of this Standard, the terms and definitions given in **JIS Z 8114** and **JIS B 3401**, and the following apply.

### 3.1 least square dimensions

dimensions obtained by performing computational processing for least square method of many measurement points (referred to as "data set") that have been obtained by measuring feature surfaces

NOTE : For the least square method, see JIS B 0672-1.

# 3.2 rough piece dimensions

dimensions which indicate the initial geometry of an object such as as-cast dimension, hot-rolled steel plate thickness and polished round bar diameter

# 3.3 tool size

dimension that indicates the size of a tool when parts are machined, such as drill diameter, reamer diameter, milling cutter diameter and cutter width (see figure 1)



Figure 1 Example of designation of tool size

# 3.4 angular size dimension

angular dimension formed by two planes or straight lines of the feature substance

NOTE : This does not include an angle formed by two axis lines of obliquelycrossed holes.

# 3.5 control radius, CR

radius controlled such that the junction between a straight section and a radial curved section is smoothly connected and there exists a radius between a maximum permissible radius and a minimum permissible radius (geometrical tolerance zone which is tangent to two curved surfaces) (see figure 2)

NOTE : CR is an abbreviation for control radius.



Figure 2 Control radius

#### 4 General matters

General matters concerning technical drawing for mechanical engineering shall be as follows:

a) The technical drawing shall be so drawn that the correct proportional relation between the size of view and the size of object is maintained. However, for drawings with no room for possible misreading, this proportional relation does not have to be maintained on a part or all parts of view.

NOTE : See 11.13.

b) The centre of the line in thickness direction shall coincide with the line to be theoretically drawn (see figure 3).



Figure 3 Centre position of line in thickness direction

- c) The minimum clearance between lines to be drawn adjacent to each other is to be twice the thickness of the thickest line in the case of parallel lines and the clearance between the lines should preferably be 0.7 mm or more, as a rule. Further, in the case of densely aggregating intersecting lines, the minimum clearance between lines shall be not less than 3 times the thickness of the thickest line [see figure 4 a)].
- d) In the case where many lines concentrate to a point, unless it is not confusing, the lines should stop at a position where the minimum clearance between lines is about twice the thickness of the thickest line, and the periphery of the point should be clear [see figure 4 b)].



Figure 4 Minimum clearance between lines

- e) The objects or parts made of transparent material shall be all drawn in project view as being opaque.
- f) For the dimensions indicating the size, unless otherwise specified <sup>1</sup>), the two pointmeasurement of the object shall be designated. In this case, dimensional tolerances are not to regulate the shape, unless otherwise specified.

In addition, when the dimension is obtained using the least square method  $^{2)}$ , it shall be indicated within or adjacent to a title block that **JIS B 0672-1** is applied.

- Notes <sup>1)</sup> In the case where the application of envelope requirement (see **JIS B 0024**) is designated, and others.
  - <sup>2)</sup> In the case of the circular feature, the least square dimension shall be the diameter of the least square circle shown in figure 5.



Figure 5 Least square circle

- g) For the dimensions, except for special ones (reference dimensions, theoretically exact dimensions, etc.), the permissible limits shall be designated directly or collectively.
- h) Only where it is indispensable depending on the functional requirement, interchangeability and technical level of manufacture the geometrical tolerances shall be designated in accordance with **JIS B 0021** or **JIS B 0419**.
- i) When the designation on surface texture is required, it shall be in accordance with **JIS B 0031** based on the definition in **JIS B 0601**.
- j) In the case where the designation of requirements concerning the welding is made by means of welding symbols, it shall be in accordance with **JIS Z 3021**.
- k) The representation of special parts such as screws and springs shall be in accordance with separately specified individual **JIS** standards.
- In the case where the symbols given in **JIS** that are specifically intended for technical drawings are used in strict accordance with the specifications, giving a note concerning the matter is not generally required. In the case where the symbols given in **JIS** that are not specifically designed for technical drawings, or symbols specified in other publicly known standards are used, the number of the applied standard shall be noted on a proper portion of the drawing.

Further, where symbols other than the above are used, their meanings shall be noted on a proper portion of the drawing.

#### 5 Size and format of drawings

#### 5.1 Size of drawings

The size of drawings shall be as follows:

- a) The size of paper used for drawings shall be selected from the series shown in tables 1, 2 and 3 in this order.
- b) For the original drawing, a paper of minimum size capable of keeping the clarity and appropriate size required by the object shall be used.

Designation	Dimension $a \times b$
A0	841 × 1 189
A1	$594 \times 841$
A2	$420 \times 594$
A3	$297 \times 420$
A4	$210 \times 297$

#### Table 1 Row A size (first priority)

Unit: mm

	Unit: mm
Designation	Dimension $a \times b$
A3 × 3	$420 \times 891$
$A3 \times 4$	$420 \times 1\ 189$
A4 × 3	$297 \times 630$
$A4 \times 4$	$297 \times 841$
$A4 \times 5$	$297 \times 1.051$

#### Table 2 Specially extended size (second priority)

Table 3	Specially	extended	size	(third	priority)
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Designation	Dimension $a \times b$	
$A0 \times 2^{(a)}$	$1\ 189 \times 1\ 682$	
$A0 \times 3$	$1\ 189 \times 2\ 523^{\ {f b})}$	
$A1 \times 3$	$841 \times 1\ 783$	
$A1 \times 4$	$841\times2~378^{\rm{\ b)}}$	
$A2 \times 3$	$594 \times 1\ 261$	
$A2 \times 4$	$594 \times 1~682$	
$A2 \times 5$	$594 \times 2\ 102$	
$A3 \times 5$	$420 \times 1\ 486$	
$A3 \times 6$	$420 \times 1~783$	
$A3 \times 7$	420 × 2 080	
$A4 \times 6$	$297 \times 1.261$	
$A4 \times 7$	$297 \times 1\ 471$	
$A4 \times 8$	$297 \times 1682$	
$A4 \times 9$	$297 \times 1892$	
Notes <sup>a)</sup> This size	ze is equal to 2A0 in row A.	
<sup>b)</sup> Use of this size is not recommended		
due to handling reasons.		

Unit: mm

#### 5.2 Format of drawings

Format of drawings shall be as follows:

- a) The drawing shall be used with its long side in the horizontal direction. However, A4 may be used with its long side in the vertical direction.
- b) On the drawing, the border line of minimum thickness 0.5 mm shall be drawn in conformity to the sizes specified in table 4.