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Machining allowance for open die forgings

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Foreword

This translation has been made based on the original Japanese Industrial Standard revised by the Minister of International Trade and Industry through deliberations at Japanese Industrial Standards Committee in accordance with the Industrial Standardization Law. Consequently **JIS B 0418 : 1985** is replaced with **JIS B 0418 : 1999**.

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Machining allowance for open die forgings

1 Scope This Japanese Industrial Standard specifies the method for obtaining the reference machining allowance and the surface as forged dimension of hot open die forgings of carbon steels for machine structural use, alloy steels and steel forgings the mass, by hammer or press, of which is over 10 kg and not more than 10 000 kg (hereinafter referred to as “forgings”) and the tolerance on them.

2 Normative reference The following standard contains provisions which, through reference in this Standard, constitute provisions of this Standard. The most recent edition of the standard indicated below shall be applied.

JIS B 0112 *Forging—Vocabulary*

3 Definitions For the purposes of this Standard, the definitions given in JIS B 0112 and the following definitions apply.

a) **open die forgings** A stock which is struck, pressed, deformed, and plastically formed into the prescribed shape and dimensions, such as a bar, a shaft, a disk, and a ring, using an anvil of simple shape and jigs and tools for general use. The machining methods including forging, swaging, necking, and ring forging are used.

b) **reference machining allowances** The basic dimension to be added to the dimension after the machining in order to determine the surface as forged dimension.

c) **corrective machining allowances** The dimension to be added to the reference machining allowances in order to absorb the eccentricity of a stepped shaft and a single-flanged shaft when forged.

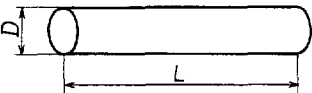
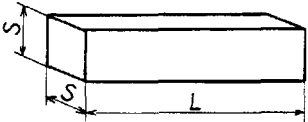
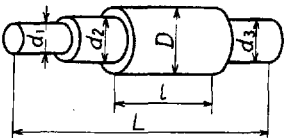
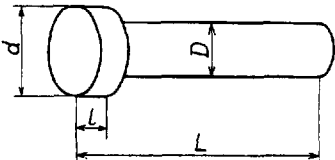
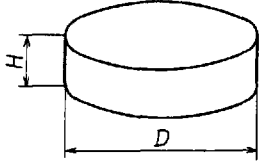
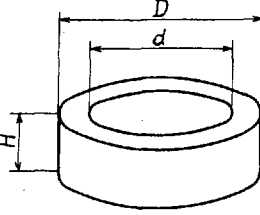
d) **surface as forged dimensions** The dimensions in which the reference machining allowances in 5 and the corrective machining allowances are added to the dimensions after the machining, and the added value is rounded up in accordance with the requirement in 6.

e) **tolerance** The manufacturing tolerance relative to the surface as forged dimension.

f) **machining allowances** The dimension of a part to be removed through cutting or grinding in order to obtain the dimension after the machining from forgings, in which the tolerance is added to the value subtracted the demention after maching from the surface as forged dimension.

4 Classification Forgings shall be classified according to the shape into 6 groups of round bar, square bar, stepped shaft, single-flanged shaft, disc and ring, as shown in Table 1.

Table 1 Classification of forgings

Classification	Shape and dimensions	Range of applicable dimensions
Round bar		A bar of circular section without step. Length L not less than the diameter D and not more than 50 times the diameter. $D \leq L \leq 50D$
Square bar		A square bar of square section without step. Length L not less than the opposite side distance S and not more than 50 times the opposite side distance. $S \leq L \leq 50S$
Stepped shaft		A shaft of circular section with at least two steps. Length L not less than the diameter D and not more than 50 times the diameter. The diameter D exceed the other diameters $d_1, d_2, d_3 \dots$ $D \leq L \leq 50D, d_1, d_2, d_3 \dots < D$
Single-flanged shaft		A shaft of circular section with a flange on one end. Length L not less than the diameter D and not more than 50 times the diameter. The flange is a projecting part whose diameter d is not less than 1.3 times the diameter D , and whose length is $1/2$ of the diameter or under. $D \leq L \leq 50D, 1.3D \leq d, l \leq \frac{d}{2}$
Disc		Diameter D exceeding the height H in axial direction and not more than 12 times the height. $H < D \leq 12H$
Ring		Outer diameter D exceeding the height H and not more than 12 times the height, and the difference $D-d$ between the outer diameter D and the inner diameter d being not more than $\frac{1}{2}$ and not less than $\frac{1}{10}$ of the outer diameter D . $H < D \leq 12H, \frac{D}{10} \leq (D-d) \leq \frac{D}{2}$

5 Reference machining allowance for forgings The machining allowance Y_D for the diameter, the machining allowance Y_S for the opposite side distance, the machining allowances Y_L , Y_l for the length, and the machining allowance Y_H for the height shall be specified as follows based on the kinds of the forgings, and shall be the total quantity on each side.

- a) The machining allowances Y_D and Y_L for the diameter D and the length L of round bars shall be as shown in Attached Table 1.
- b) The machining allowances Y_S and Y_L for the opposite side distance S and the length L of square bars shall be as shown in Attached Table 2.
- c) The machining allowances Y_D , Y_l and Y_L for the diameter D , the length l of the largest diameter section, and the length L of stepped shafts shall be as shown in Attached Table 3. The machining allowances Y_{d1} , Y_{d2} , Y_{d3} ... for the diameters d_1 , d_2 , d_3 ... of those shaft sections other than the largest diameter section shall be found by adding the corrective machining allowance α obtained according to Attached Table 3A to the machining allowance for the diameter D obtained according to Attached Table 3.
- d) The machining allowances Y_D , Y_l and Y_L for the shaft diameter D , the flange length l , and the length L of single-flanged shafts shall be as shown in Attached Table 4. The machining allowance for the flange diameter d shall be found by adding the corrective machining allowance α obtained according to Attached Table 4A to the machining allowance for the shaft diameter D obtained according to Attached Table 4.
- e) The machining allowances Y_D and Y_H for the diameter D and height H of discs shall be as shown in Attached Table 5.
- f) The machining allowances Y_D , Y_d and Y_H for the outer diameter D , the inner diameter d , and the height H of rings shall be as shown in Attached Table 6.

6 Surface as forged dimensions of forgings The surface as forged dimensions shall be found by adding the machining allowances to the dimensions after machining (drawing dimensions specified by a purchaser) and rounding the sum according to the following methods.

- a) Where the value of the diameter D of a round bar, the largest diameter D of a stepped shaft or single-flanged shaft, or the opposite side distance S of a square bar is not more than 200 mm, the value not more than the first decimal place shall be rounded up to an integer, and where the value exceeds 200 mm, it shall be rounded up by the fractions of 5 mm.

For the longitudinal dimension of the said products, where the length L is not more than 1 000 mm, the value in the decimal places shall be rounded up to an integer, and where the total length is over 1 000 mm up to and including 5 000 mm, the value shall be rounded up by the fractions of 5 mm, and where the length exceeds 5 000 mm, the value shall be rounded up by the fractions of 10 mm.

JIS B 0418 : 1999

b) Where the diameter D of a disc or the outer diameter D of a ring is not more than 200 mm, the value in the decimal places shall be rounded up for the diameter or the outer diameter, and rounded off for the inner diameter d , to an integer, and where it exceeds 200 mm, the value shall be rounded up by the fractions of 5 mm for the diameter or the outer diameter, and rounded off for the inner diameter.

Where the height of a disc or ring is not more than 200 mm, the value in the decimal places shall be rounded off to an integer, and where it exceeds 200 mm, the value shall be rounded up by the fractions of 5 mm.

7 Tolerance on the surface as forged dimensions The tolerance on the surface as forged dimensions of forgings shall be found by multiplying the difference between the surface as forged dimensions obtained according to 6 and the dimensions of the machined forgings by the value shown in Table 2. The decimal places shall be rounded up.

Table 2 Tolerance

Unit : %

Product form	Location	
	Diameter or opposite side distance	Length or height
Round bar and square bar	± 35	± 60
Stepped shaft and single-flanged shaft	± 50	
Disc and ring	± 40	± 40