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**JIS B 1723** : 2014

(JGMA/JSA)

**Dimensions of cylindrical worm gears**

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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 Japan Gear Manufacturers Association (JGMA)/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 1723:1977** is replaced with this Standard.

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## Dimensions of cylindrical worm gears

### 1 Scope

This Japanese Industrial Standard specifies the general-use cylindrical worm gears with an axial module of 1 mm to 25 mm and a centre distance of 40 mm to 500 mm used for power transmission.

### 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 0102-1 *Vocabulary of gear terms — Part 1 : Definitions related to geometry*

JIS B 0102-2 *Vocabulary of gear terms — Part 2 : Definitions related to worm gear geometry*

### 3 Terms and definitions

For the purpose of this Standard, the terms and definitions given in JIS B 0102-1 and JIS B 0102-2 apply.

### 4 Symbols and units

The symbols and units used in this Standard shall be as given in Table 1.

**Table 1 Symbols**

| Symbol   | Term                                | Unit |
|----------|-------------------------------------|------|
| $a$      | Centre distance                     | mm   |
| $b_1$    | Cylindrical worm facewidth          | mm   |
| $b_2$    | Wormwheel facewidth                 | mm   |
| $d_{a1}$ | Cylindrical worm tip diameter       | mm   |
| $d_{a2}$ | Wormwheel tip diameter              | mm   |
| $d_f1$   | Cylindrical worm root diameter      | mm   |
| $d_{f2}$ | Wormwheel root diameter             | mm   |
| $d_{m1}$ | Cylindrical worm reference diameter | mm   |
| $d_{m2}$ | Wormwheel reference diameter        | mm   |
| $d_T$    | Throat diameter                     | mm   |
| $d_{w1}$ | Cylindrical worm pitch diameter     | mm   |
| $d_{w2}$ | Wormwheel pitch diameter            | mm   |
| $u$      | Gear ratio                          | —    |
| $m_{x1}$ | Axial module                        | mm   |
| $P_{x1}$ | Axial pitch                         | mm   |
| $q_1$    | Diameter quotient                   | —    |
| $r_t$    | Throat form radius                  | mm   |

**Table 1 Symbols (concluded)**

| Symbol        | Term                                  | Unit |
|---------------|---------------------------------------|------|
| $s_{mx1}$     | Thread thickness                      | mm   |
| $x$           | Profile shift coefficient             | —    |
| $z_1$         | Number of starts of cylindrical worm  | —    |
| $z_2$         | Number of teeth of wormwheel          | —    |
| $\gamma_{m1}$ | Lead angle                            | °    |
| $h_{am2}$     | Addendum                              | mm   |
| $T$           | Minimum rim thickness                 | mm   |
| $C$           | Chamfering of both ends of tooth tip  | mm   |
| $R$           | Form radius of both ends of tooth tip | mm   |
| Subscript     |                                       |      |
| Symbol        | Term                                  |      |
| 1             | Cylindrical worm                      |      |
| 2             | Wormwheel                             |      |

## 5 Dimensions of cylindrical worm gears

The main dimensions of cylindrical worm gears shall be as shown in Figure 1. The reference circle of cylindrical worm is a circle on which the shape of the cylindrical worm is based, and gear tooth dimensions are set according to this circle. The pitch circle of cylindrical worm is determined by the meshing with a wormwheel.

By using the centre distance of cylindrical worm gears ( $a$ ), reference diameter of cylindrical worm ( $d_{m1}$ ) and axial module ( $m_{x1}$ ), the main dimensions shall be expressed as follows :

Wormwheel reference diameter

$$d_{m2} = 2a - d_{m1}$$

Cylindrical worm pitch diameter

$$d_{w1} = 2a - d_{w2}$$

Wormwheel pitch diameter

$$d_{w2} = m_{x1} z_2$$

Axial pitch of cylindrical worm

$$P_{x1} = \pi m_{x1}$$

Profile shift coefficient

$$x = \frac{0.5(d_{w1} - d_{m1})}{m_{x1}} = \frac{a - 0.5(d_{m1} + m_{x1} z_2)}{m_{x1}}$$

The dimensions of cylindrical worm gears specified in this Standard shall be as given in Table 4. The values in Table 4 shall be as follows.

- The centre distance of cylindrical worm gears ( $a$ ) shall be as given in Table 2, taking R10 as a base number.

**Table 2 Centre distance**

| Unit: mm        |                                                        |
|-----------------|--------------------------------------------------------|
| Centre distance | 40, 50, 63, 80, 100, 125, 160, 200, 250, 315, 400, 500 |

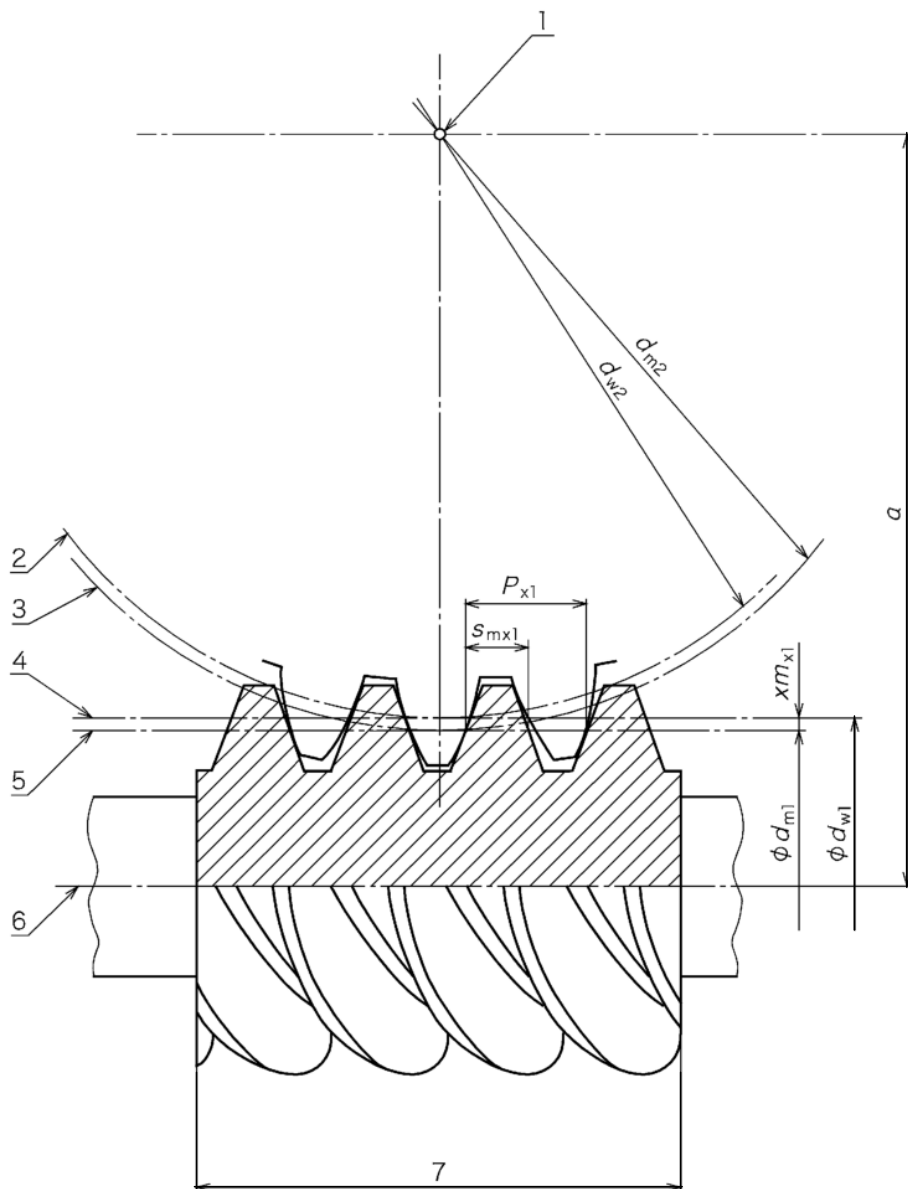
- b) The cylindrical worm reference diameter ( $d_{m1}$ ) shall be the number obtained by taking R20 as a base number.
- c) The axial module of cylindrical worm ( $m_{x1}$ ) shall be as given in Table 3.

**Table 3 Axial module**

| Unit: mm     |                                                                |
|--------------|----------------------------------------------------------------|
| Axial module | 1, 1.25, 1.6, 2, 2.5, 3.15, 4, 5, 6.3, 8, 10, 12.5, 16, 20, 25 |

- d) The number of teeth of wormwheel shall be within the range such that the profile shift coefficient ( $x$ ) is between  $-0.3$  and  $0.25$ .
- e) The lead angle of cylindrical worm ( $\gamma_{m1}$ ) shall be the value upon the worm reference cylinder, and shall be calculated by the following formula :

$$\tan \gamma_{m1} = \frac{m_{x1} z_1}{d_{m1}}$$



- |                                 |                                     |
|---------------------------------|-------------------------------------|
| 1 Wormwheel central axis        | 5 Cylindrical worm reference circle |
| 2 Wormwheel pitch circle        | 6 Cylindrical worm central axis     |
| 3 Wormwheel reference circle    | 7 Cylindrical worm facewidth        |
| 4 Cylindrical worm pitch circle |                                     |

**Figure 1 Main dimensions of cylindrical worm gears**

## 6 Shape and dimensions of cylindrical worm

### 6.1 Tooth profiles of cylindrical worm

The tooth profiles of cylindrical worm are composed of five types : Types A, I, N, K and C. These types shall be as specified in **JIS B 0102-2**. For the details of these tooth profiles, see Annex A.

### 6.2 Pressure angle

For Type A, the pressure angle on the axial plane shall be 20°; for Types N, K and C,