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# Heavy Mechanical General Techniques and Standards – Part 9: Cutting

# 重型机械通用技术条件 第 9 部分：切削加工件

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# Heavy Mechanical General Techniques and Standards – Part 9: Cutting

## 1 Scope

This part of JB/T 5000 specifies general requirements of cutting and tolerance without indication; and specific requirements on key groove, hole diameter and hole distance, center hole, tolerance without indication and allowed shape of cutter, etc.

This part is applicable to cutting of heavy machinery product parts.

All the product drawings and technical documents, if without special requirements, shall meet the requirements of this part.

## 2 Normative References

The following documents contain provisions which, through reference in this text, constitute provisions of this part. For dated references, subsequent amendments to (excluding corrigendum), or revisions of, any of these publications do not apply. However, parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards. For undated references, the latest edition applies.

GB/T 3 *Run-outs, Undercuts and Chamfers for General Purpose Metric Screw Threads (GB/T 3-1997, eqv ISO 3508:1976, ISO 4755: 1983)*

GB/T 197-2003 *General Purpose Metric Screw Threads - Tolerances (ISO 965-1: 1998, MOD)*

GB/T 1184-1996 *Geometrical Tolerance - Geometrical Tolerances for Features without Individual Tolerance Indications (eqv ISO 2768-2: 1989)*

GB/T 1804-2000 *General Tolerances - Tolerances for Linear and Angular Dimensions without Individual Tolerance Indication (eqv ISO 2768-1:1989)*

GB/T 5277-1985 *Fasteners; Clearance Holes for Bolts and Screws (eqv ISO 273:1979)*

## 3 General Requirements

**3.1** The parts after machining shall meet the requirements of product drawing and technical document as well as this part.

**3.2** Parts shall be subjected to inspection and acceptance according to procedures, and next procedure can start only after the previous procedure is qualified.

**3.5** Parts after fine machining is not allowed to be placed directly on the ground, and necessary support and protective measures shall be taken. The machined surface shall be free from rust as well as bumping, scratching and other defects that affect property, service life or appearance.

**3.6** The fitting surface, friction surface, locating surface and other working surfaces after fine machining is not allowed to be with stamped with mark.

**3.7** As for parts whose final procedure is heat treatment, after heat treatment, their surfaces shall be free from oxide skin after heat treatment. Fitting surface and tooth surface after fine machining shall be free from annealing, bluing, discoloration, etc.

# 4 Tolerance without Indication

## 4.1 Length Dimension, Rounding Radius and Chamfering Height, Angular Dimension

**4.1.1** Applicable Objects:

Size without tolerance indication between two cutting surfaces (size without tolerance indication of parts that are cut short through sawing shall be specified separately).

Size without tolerance indication is applicable to:

-- Length dimension, such as external dimension, internal dimension, step dimension, diameter and distance dimension.

-- Rounding radius and chamfering height.

-- Angular dimension, including dimension with angle indication and without angle indication, such as the angles of regular polygon.

-- Machining length and angular dimension of parts that are combined together.

Size without tolerance indication is not applicable to:

-- Auxiliary dimension in brackets.

#### 4.2.3.2 Roundness, Cylindricity, Line Profile and Surface Profile

Form tolerances are limited by the dimensional tolerance range; unnoted tolerance of roundness, cylindricity, line profile and surface profile shall be less than the value of its unnoted dimensional tolerance.

### 4.2.4 Tolerance of Position

#### 4.2.4.1 Tolerance of Parallelism

The straightness (flatness) of two parallel elements and the unnoted tolerance of size for their distance, whichever is larger shall be taken as the unnoted tolerance of parallelism. The unnoted tolerance of straightness (flatness) shall be subject to that of the longer one in the elements.

#### 4.2.4.2 Tolerance of Perpendicularity

Unnoted tolerance of perpendicularity shall be in accordance with those specified in Table 7.

#### 4.2.4.3 Tolerance of Inclination

Unnoted tolerance of inclination shall be in accordance with those specified in Table 5.

#### 4.2.4.4 Tolerance of Symmetry

Unnoted tolerance of symmetry of non-rotating symmetry elements shall be in accordance with those specified in Table 8. Unnoted tolerance also applies if one of symmetry elements is rotating symmetry and another is non-rotating symmetry (such as, axle head and sleeve of universal shaft).

#### 4.2.4.5 Tolerances of Coaxiality and Circular Run-out

Unnoted tolerance of coaxiality and circular run-out (radial direction, end surface and diagonal direction) shall be in accordance with those specified in Table 9.

## 5 Unnoted Tolerance for Symmetry of Key Groove

Unnoted tolerance for symmetry of key groove shall be in accordance with those specified in Table 10.

## 6 Positional Tolerancing without Indication of Threaded Hole and Unthreaded Hole

Table 11 is applicable to the threaded hole and unthreaded hole connected with bolt or screw; hole diameter of unthreaded hole shall be given according to the moderate mounting dimension specified in GB/T 5277-1985; for positional tolerancing of coarse fit unthreaded hole, refer to this requirement.

Indication of positional tolerancing is excluded from accumulation of error. It means that each hole distance is the theoretical and correct coordinate dimension without deviation. Positional tolerancing without indication for cylinder of threaded hole and unthreaded hole shall be in accordance with these specified in Table 11.

# 7 Thread

**7.1** Regular thread accuracy shall be in accordance with 6H/6g specified in GB/T 197-2003.

**7.2** Size of run-outs, undercuts and chamfers for general-purpose metric screw threads shall be in accordance with the requirements of GB/T 3.

**7.3** The machined thread surface shall be free from casting skin, bumping, chasing, burr and other defects.

**7.4** Before machining of thread, threading-in side of male and female thread must be chamfered, by 45° for male threads; by 60° for female threads. The depth of chamfer is equal to the height of teeth pattern.

**7.5** Surface roughness of general-purpose metric screw threads shall not be greater than $R_a$ 12.5μm for female threads or $R_a$ 6.3μm for male threads.

# 8 Center Hole

**8.1** It shall be indicated clearly that the center hole needs be reserved or removed in the drawing; otherwise it shall be considered that reservation or removal of center hole is allowed.

**8.2** Types and size of center hole shall be subject to corresponding standard.

**8.3** Surface roughness on conical surface of center hole: when used for rough machining, $R_a$ value shall be not greater than 6.3μm; when used for fine machining, $R_a$ value shall be not greater than 3.2μm; when used for processing of precision component, $R_a$ value shall be not greater than 1.6μm.

# 9 Unnoted Surface Roughness

Surface roughness not indicated in the drawing shall be in accordance with the requirements in Table 12.

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