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Steel cold extrusion part - Technical specification

钢质冷挤压件 工艺规范

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Foreword

This Standard is drafted in accordance with the rules given in GB/T 1.1-2009.

This Standard was proposed by and shall be under the jurisdiction of National Technical Committee 74 on Forging of Standardization Administration of China (SAC/TC 74).

Drafting organizations of this Standard: Shanghai Jiao Tong University, Jiangsu Pacific Precision Forging Co., Ltd., Jiangsu Longcheng Precision Forging Co., Ltd., Beijing Research Institute of Mechanical & Electrical Technology, Wuhu Hetian Automotive Industry Co., Ltd.

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Steel cold extrusion part - Technical specification

1 Scope

This Standard specifies the technical specification of steel cold extrusion part (hereafter known as “cold extrusion part” for short), including the classification of deformation modes, the determination of process plans, and principles for the development of deformation processes, the determination of main process parameters, the preparation of blanks, and for equipment selection.

This Standard applies to steel cold extrusion parts.

2 Normative references

The following documents are indispensable for the application of this document. For the dated references, only the versions with the dates indicated are applicable to this document. For the undated references, the latest version (including all the amendments) are applicable to this document.

GB/T 700 Carbon structural steels

GB/T 1591 High strength low alloy structural steels

GB/T 8541 Terminology of forging and stamping

3 Terms and definitions

The terms and definitions defined in GB/T 8541 apply to this document.

4 Symbols

The following symbols apply to this document.

d_0 - The diameter of cold extrusion part blank, in millimeters (mm).

d_1 - The outer diameter of the extrusion part of forward extrusion part, the inner diameter of backward extrusion part, in millimeters (mm).

F_0 - The cross-sectional area of cold extrusion part before deformation, in square millimeters (mm^2).

F_1 - The cross-sectional area of cold extrusion part after deformation, in square

millimeters (mm^2).

h_0 - The height of cold extrusion part blank, in millimeters (mm).

L_1 - The depth of cup-shaped backward extrusion part hole, in millimeters (mm).

P - Extrusion force, in kilonewtons (kN).

p - Unit extrusion force, in megapascals (MPa).

S - The wall thickness of cold extrusion part, in millimeters (mm).

t - The bottom thickness of cold extrusion part, in millimeters (mm).

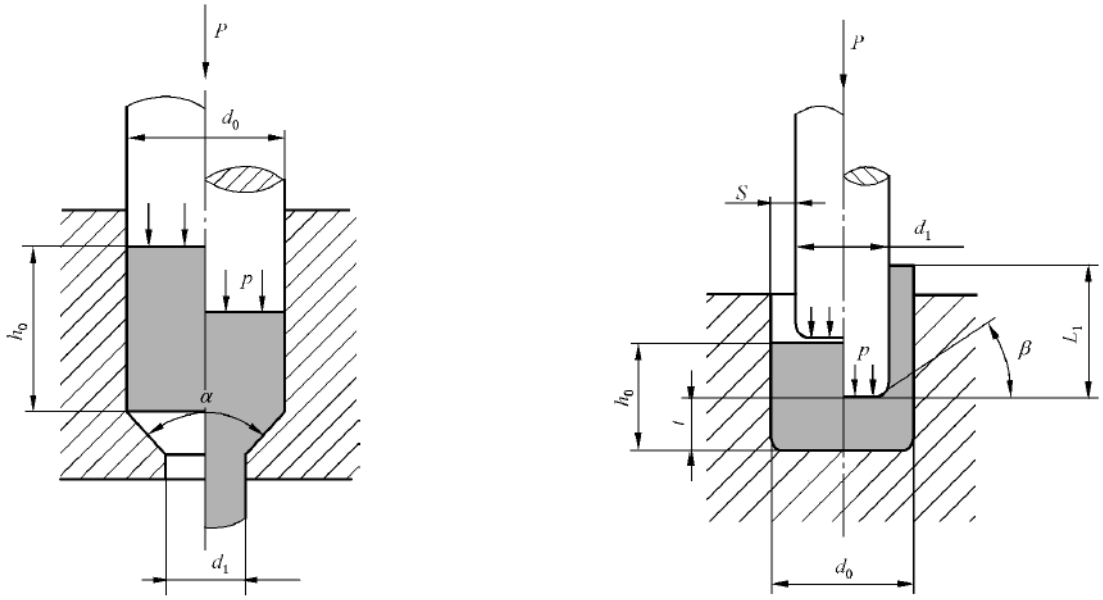
α - The inlet angle of forward extrusion female die, in degrees (°).

β - The cone angle of backward extrusion male die, in degrees (°).

ε_F - Section reduction rate, $\varepsilon_F=\frac{F_0-F_1}{F_0}\times 100\%$.

$[\varepsilon_F]$ - Allowable deformation degree.

Note: The above symbols are shown in Figure 1.



a) Forward extrusion

b) Backward extrusion

Figure 1 -- Schematic diagram of symbols

5 Technical specification

Appendix A

(Informative)

Example of determining cold extrusion deformation force by using nomogram

A.1 The material is 10# steel. The blank diameter d_0=75 mm. The diameter after extrusion d_1=45 mm. The blank height h_0=112 mm. The inlet angle of female die α=100°. USE nomogram to determine the unit extrusion force and extrusion force for solid part under cold forward extrusion.

SEE Figure A.1: Starting from the diameter d_0 of male die, FIND the intersection of d_0 and the curve representing the diameter d_1 after extrusion in ① zone, and PROJECT upward to find the section reduction rate ε_F=63%. PROJECT upward by ε_F=63% to the curve corresponding to 10# steel in ② zone, and then PROJECT onto the curve of h_0/d_0=1.5 in ③ zone. Then CORRECT it according to the inlet angle α=100° of forward extrusion female die in ③ zone, it can be found the corrected unit extrusion force p=1030 MPa. The point of p=1030 MPa is projected into the ④ zone, intersecting the projection of d_0 in ④ zone, and the extrusion force P=4400 kN is obtained.

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