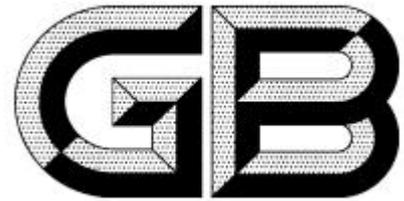


ICS 25.120.10

CCS J62



National Standard of the People's Republic of China

GB 17120-2025

Replaces GB 17120–2012 and others; partially replaces GB 26485–2011 and others

Metalforming machinery—Safety technical specification

Issued: October 5, 2025

Effective: May 1, 2026

State Administration for Market Regulation (SAMR)
Standardization Administration of the People's
Republic of China (SAC)

Issued

Translated by www.china-standards.com

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Foreword

This document is drafted in accordance with the provisions of GB/T 1.1-2020 Directives for Standardization—Part 1: Structure and Drafting Rules for Standard Documents.

This document replaces GB 17120-2012 Safety Technical Specifications for Forging and Stamping Machinery, GB 6077-1985 Safety Regulations for Shearing Machinery, GB 27607-2011 Safety Technical Requirements for Mechanical Presses and GB 28241-2012 Safety Technical Requirements for Hydraulic Presses; it partially replaces the mandatory provisions of GB 26485-2011 Safety Requirements for Uncoiling, Leveling and Shearing Lines, GB 27608-2011 Safety Requirements for Combined Punching and Shearing Machines, GB 28240-2012 Safety Technical Requirements for Plate Shears, GB 28242-2012 Safety Technical Requirements for Screw Presses, GB 28243-2012 Safety Technical Requirements for Hydraulic Press Brakes, GB 28244-2012 Safety Technical Requirements for Automatic Forging Presses, GB 28760-2012 Safety Technical Requirements for Pipe Bending Machines, GB 30458-2013 Safety Technical Requirements for Plate Bending Rolls and other relevant standards. Compared with the aforementioned standards, in addition to structural adjustments and editorial revisions, the main technical changes are as follows:

Revised the requirements for Hazards of Forging and Stamping Machinery (see Chapter 4, Chapter 4 of the 2012 edition of GB 17120-2012);

Revised the General Requirements (see 5.1, 5.1 of the 2012 edition of GB 17120-2012);

Revised the Transmission System (see 5.2, 5.2 of the 2012 edition of GB 17120-2012);

Revised the Overload Protection Device (see 5.2.5, 5.5 of the 2012 edition of GB 17120-2012);

Revised the requirements for the Electrical System (see 5.3, 5.7 of the 2012 edition of GB 17120-2012);

Revised the requirements for the Hydraulic System (see 5.4, 5.8 of the 2012 edition of GB 17120-2012);

Revised the requirements for the Pneumatic System (see 5.5, 5.9 of the 2012 edition of GB 17120-2012);

Revised the Control and Monitoring System (see 5.6, 5.6 of the 2012 edition of GB 17120-2012);

Revised the Safety Protection Measures for Hazardous Working Areas (see 5.7, 5.17 of the 2012 edition of GB 17120-2012);

Revised the Fixed Facilities for Access to Forging and Stamping Machinery (see 5.8, 5.18 of the 2012 edition of GB 17120-2012);

Added safety requirements for the Robot System (see 5.10);

Revised the requirements for Radiation (see 5.12, 5.14 of the 2012 edition of GB 17120-2012);

Revised the requirements for Noise (see 5.13, 5.11 of the 2012 edition of GB 17120-2012);

Revised the requirements for Hazards Arising from Materials and Substances (see 5.16, 5.15 of the 2012 edition of GB 17120-2012);

Revised the requirements for Ergonomics (see 5.17, 5.16 of the 2012 edition of GB 17120-2012);

Deleted the Lubrication System (5.10 of the 2012 edition of GB 17120-2012);

Deleted the Springs (5.19 of the 2012 edition of GB 17120-2012);

Revised the Clutches and Brakes (see 6.1, 5.3 of the 2012 edition of GB 17120-2012);

Revised the Balancing Device (see 6.7, 5.4 of the 2012 edition of GB 17120-2012);

Added specific safety requirements for various types of forging and stamping machinery (see Chapters 6 to 17);

Added the Inspection of Safety Requirements and/or Measures (see Chapter 18).

Attention is drawn to the possibility that some elements of this document may be subject to patent rights. The issuing body of this document shall not be responsible for identifying any such patent rights.

This document was proposed and administered by the Ministry of Industry and Information Technology of the People's Republic of China.

The release history of this document and the documents it replaces is as follows:

First issued in 1997 as GB 17120-1997; first revised in 2012;

This is the second revision, which simultaneously replaces GB 6077-1985 Safety Regulations for Shearing Machinery, GB 27607-2011 Safety Technical Requirements for Mechanical Presses and GB 28241-2012 Safety Technical Requirements for Hydraulic Presses, and partially replaces GB 26485-2011 Safety Requirements for Uncoiling, Leveling and Shearing Lines, GB 27608-2011 Safety Requirements for Combined Punching and Shearing Machines, GB 28240-2012 Safety Technical Requirements for Plate Shears, GB 28242-2012 Safety Technical Requirements for Screw Presses, GB 28243-2012 Safety Technical Requirements for Hydraulic Press Brakes, GB 28244-2012 Safety Technical Requirements for Automatic Forging Presses, GB 28760-2012 Safety Technical Requirements for Pipe Bending Machines and GB 30458-2013 Safety Technical Requirements for Plate Bending Rolls.

Introduction

This document incorporates the mandatory provisions of the following 8 standards during its revision: GB 26485-2011 Safety Requirements for Uncoiling, Leveling and Shearing Lines, GB 27608-2011 Safety Requirements for Combined Punching and Shearing Machines, GB 28240-2012 Safety Technical Requirements for Plate Shears, GB 28242-2012 Safety Technical Requirements for Screw Presses, GB 28243-2012 Safety Technical Requirements for Hydraulic Press Brakes, GB 28244-2012 Safety Technical Requirements for Automatic Forging Presses, GB 28760-2012 Safety Technical Requirements for Pipe Bending Machines and GB 30458-2013 Safety Technical Requirements for Plate Bending Rolls, all of which are safety clauses. Subsequently, the remaining content of these 8 standards will be incorporated into the supporting recommended national standards of this document in phases.

This document addresses the principal hazards associated with forging and stamping machinery and its auxiliary equipment, specifies the basic safety technical requirements and measures to ensure the safety of forging and stamping machinery, and encourages the adoption of additional risk mitigation measures to prevent the occurrence of hazardous incidents.

Metalforming machinery—Safety technical specification

1 Scope

This document specifies the safety requirements for the design, manufacture and use of forging and stamping machinery.

This document applies to the design, manufacture and acceptance of forging and stamping machinery.

This document does not apply to forging and stamping machinery manufactured prior to the implementation of this document.

2 Normative References

The contents of the following documents are incorporated into this document as indispensable clauses through normative reference in the text. For dated referenced documents, only the editions corresponding to those dates shall apply to this document; for undated referenced documents, their latest editions (including all amendment sheets) shall apply to this document.

GB/T 150 (All Parts) Pressure Vessels

GB/T 1251.2 Ergonomics—Visual Danger Signals—General Requirements, Design and Testing

GB 2894 Safety Colors and Safety Signs

GB/T 3766 Hydraulic Fluid Power—General Rules and Safety Requirements for Systems and Their Components

GB/T 4584 Technical Requirements for Photoelectric Protection Devices for Presses

GB/T 5091 Technical Requirements for Safety Guards and Devices for Presses

GB/T 5092 Technical Requirements for Inductive Safety Devices for Presses

GB/T 5226.1-2019 Electrical Safety of Machinery—Electrical Equipment of Machines—Part 1: General Requirements

GB/T 7247.1 Safety of Laser Products—Part 1: Equipment Classification and Requirements

GB/T 7932 Pneumatic Fluid Power—General Rules and Safety Requirements for Systems and Their Components

GB/T 8196 Machine Safety—Guards—General Requirements for the Design and Construction of Fixed and Movable Guards

GB 11291.1 Robots for Industrial Environments—Safety Requirements—Part 1: Robots

GB 11291.2 Robots and Robotic Devices—Safety Requirements for Industrial Robots—Part 2: Robot Systems and Integration

GB/T 14775 General Ergonomic Requirements for Manipulators

GB/T 14776 Ergonomics—Principles and Values for the Design of Workplace Dimensions

GB/T 15706-2012 Safety of Machinery—Basic Concepts, General Principles for Design—Risk Assessment and Risk Reduction

- GB/T 16754-2021 Safety of Machinery—Principles for the Design of Emergency Stop Functions
- GB/T 16855.1 Safety of Machinery—Safety-Related Control Systems—Part 1: General Principles for Design
- GB/T 17454.1 Safety of Machinery—Pressure-Sensitive Protective Devices—Part 1: General Principles for Design and Testing of Pressure-Sensitive Mats and Pressure-Sensitive Floors
- GB/T 17888 (All Parts) Safety of Machinery—Fixed Means of Access to Machinery
- GB/T 18153 Safety of Machinery—Safety Data for Determining Thermal Surface Temperatures Limiting Contact
- GB/T 18490.1 Safety of Machinery—Laser Processing Machines—Part 1: General Safety Requirements
- GB/T 18569.1 Safety of Machinery—Reduction of Risks to Health Resulting from Hazardous Substances Emitted by Machinery—Part 1: Principles and Specifications for Machinery Manufacturers
- GB/T 19671-2022 Safety of Machinery—Principles for the Design and Selection of Interlocking Devices Associated with Guards
- GB/T 18831-2017 Safety of Machinery—Two-Hand Control Devices—Principles for Design and Selection
- GB/T 19876 Safety of Machinery—Positioning of Safety Guards with Respect to the Approach Speeds of Parts of the Human Body
- GB/T 23281 Method for Measuring Sound Pressure Level of Noise Emitted by Forging and Stamping Machinery
- GB/T 23821-2022 Safety of Machinery—Safety Distances to Prevent Hazardous Zones from Being Reached by Upper and Lower Limbs
- GB/T 24388 Bending Machinery—Noise Limits
- GB/T 24389 Shearing Machinery—Noise Limits
- GB/T 26483 Mechanical Presses—Noise Limits
- GB/T 26484 Hydraulic Presses—Noise Limits
- GB/T 28245 Automatic Forging and Stamping Presses—Noise Limits
- GB/T 34380-2017 Numerically Controlled Laser Cutting Machines
- GB/T 36484 Terminology for Forging and Stamping Machinery

3 Terms and Definitions

The terms and definitions specified in GB/T 15706-2012 and GB/T 36484, as well as the following ones, apply to this document.

3.1 hazard

A potential source of harm.

[Source: GB/T 15706-2012, 3.6]

3.2 risk

A combination of the probability of occurrence of harm and the severity of that harm.

[Source: GB/T 15706-2012, 3.12]

3.3 risk assessment

The entire process comprising risk analysis and risk evaluation.

[Source: GB/T 15706-2012, 3.17]

3.4 emergency stop; emergency stop function

This function is intended to:

- Prevent ongoing harm or mitigate existing hazards to personnel, damage to machinery or work in progress;
- Be triggered by a single person's action.

[Source: GB/T 15706-2012, 3.40]

3.5 interlocking device

A mechanical, electrical or other type of device used to prevent a hazardous machine function from operating under specific conditions, usually when the guard is not closed.

[Source: GB/T 15706-2012, 3.28]

3.6 safety function

A machine function whose loss would immediately lead to an increase in risk.

[Source: GB/T 15706-2012, 3.30]

3.7 hazard zone of working

The area on a forging and stamping machine where workpiece processing is performed.

Note: It refers to the space covered by the projection of the tools and dies (including auxiliary devices) mounted on the reciprocating linear-motion working parts or between the relative-motion working parts onto the worktable along the stroke direction; or the space between the flame, laser, high-pressure fluid and the workpiece.

3.8 working stroke

The stroke of the reciprocating working parts of a forging and stamping machine moving from the fully open position to the fully closed position.

3.9 safety distance

The minimum distance between the protective device and the hazard zone of working to ensure safety.

3.10 multi-synchronous actuation

An operation mode where two or more operators perform the operation collaboratively, and the working parts can only be activated when each operator operates the two-hand control device simultaneously.

3.11 impeding device

A physical obstacle (e.g., low barriers, railings, etc.).

Note: The installation of physical obstacles shall not prevent personnel from accessing the hazard zone, but can reduce the probability of entering the hazard zone by blocking free access.

[Source: GB/T 15706-2012, 3.29, modified]

3.12 remote service

Remote control of forging and stamping machinery for data exchange to achieve the purposes of fault detection, diagnosis, maintenance, data analysis or optimization of remote control.

4 Hazard Identification of Forging and Stamping Machinery

4.1 A risk assessment of forging and stamping machinery shall be conducted in accordance with the relevant provisions of Chapter 4 and Chapter 5 of GB/T 15706-2012.

4.2 During hazard identification, the potential hazards under various conditions throughout the service life cycle of forging and stamping machinery (commissioning, operation, adjustment, cleaning, repair and maintenance) shall be considered, at minimum including the following:

- Unintended start-up;
- Control system failure;
- Hazards arising from operators and other personnel accessing the hazard zone;
- Intended use and reasonably foreseeable misuse;
- Other significant hazards associated with forging and stamping machinery.

4.3 The potential hazards of forging and stamping machinery shall be identified, and the hazard classification shall be based on Table B.1 of GB/T 15706-2012.

4.4 The following potential hazards in the hazard zone of working of forging and stamping machinery shall be identified:

- Crushing and shearing between moving parts;

- Entanglement or drawing-in by moving machine parts, guards, motors, transmission mechanisms and mechanical feeding devices;
- Ejection of mechanical components;
- Hot workpieces;
- Thermal and optical radiation.