

norm**NEN-EN 12622**Safety of machine tools - Hydraulic press
brakes

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English version

Safety of machine tools - Hydraulic press brakes

Sécurité des machines-outils - Presses plieuses
hydrauliques

Werkzeugmaschinen - Sicherheit von Werkzeugmaschinen
- Hydraulische - Gesenkbiegepressen

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If this draft becomes a European Standard, CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

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Foreword

This document (prEN 12622:2003) has been prepared by Technical Committee CEN/TC 143 "Machine tools - Safety", the secretariat of which is held by SNV.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 12622:2001.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s), see informative annex ZA, which is an integral part of this document.

Organisation contributing to the preparation of this European Standard include the European Manufacturer Association CECIMO.

Annexes A , B and H to this standard are normative, where as annexes C to G and ZA are informative.

The European Standards produced by CEN/TC 143 are particular to machine-tools and complement the relevant A and B standards on the subject of general safety (see introduction of EN 292-1: 1991 for a description of A, B and C standards).

This standard also contains a "Bibliography".

prEN 12622:2003
Preview

0 Introduction

This European standard is a type C standard as defined in EN1070:1998.

This European standard has been prepared to be a harmonised standard to provide one means of conforming with the Essential safety requirements of the Machinery Directive and associated EFTA Regulations.

The machinery concerned and the extent to which hazards, hazardous situations and events are covered are indicated in the scope of this standard. When provisions of this C type standard are different from those which are stated in A or B standards, the provision of this C type standard take precedence over the provisions of the other standards for machines that have been designed and built according to the provisions of this C type standard.

In addition press-brakes shall comply as appropriate with EN 292:1991, part 1 and 2 for hazards which are not covered by this standard.

The requirements of this European Standard concern designers, manufacturers, suppliers and importers of machines described in the scope.

This standard also includes information to be provided by the manufacturer to the user.

"This Standard constitutes a revision of EN 12622:2001 for which it has been technically revised : the main modifications are listed below :

- complete reorder of clause 5 "Safety requirements and/or measures"
- reference to categories from EN 954-1
- addition to subclause 5.1 on "control systems" of use of electronic components (PES)
- addition of subclause 4.1.8.2 concerning mode selection for production mode
- addition of 5.1.9 "Speed monitoring"
- addition of subclause 5.2.5.5.3 "laser actuated AOPD moving with the beam"
- addition of subclause 5.2.5.5.4 "AOPDDR Scanner systems"
- addition of subclause 5.2.5.5.5 " AOPDDR combined with AOPD"

1 Scope

1.1 This standard specifies technical safety requirements and protective measures to be adopted by persons undertaking the design (as defined in 3.11 of EN 292-1:1991), manufacture and supply of hydraulic press brakes which are designed to work cold metal or material partly of metal and hereafter referred to as machines.

1.2 This standard also covers hydraulic press brakes, whose primary intended use is the cold working of metal, which are to be used in the same way to work other sheet materials such as cardboard or plastic.

1.3 The requirements in this standard take account of intended use, as defined in 3.12 of EN 292-1:1991. This standard presumes access to the press brake from all directions, deals with the hazards described in clause 4, and specifies the safety measures for both the operator and other exposed persons.

1.4 This standard also applies to ancillary devices which are an integral part of the press brake, e.g. back gauges and adjustable front sheet supports. This standard also applies to machines which are integrated into an automatic production line where the hazards and risk arising are comparable to those of machine working separately.

NOTE The requirements of this European Standard apply to all presses whatever their method of control, e.g. electromechanical and/ or electronic.

1.5 This standard does not cover machines whose principal designed purpose is:

- a) sheet folding by rotary action;
- b) tube and pipe bending by rotary action;
- c) roll bending.

Machines covered by this European Standard are listed under A 9 of annex IV of the Machinery Directive.

1.6 This standard applies to machines built after its date of issue of this standard.

2 Normative references

This European standard incorporates, by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European standard only when incorporated in it by amendment or revision. For undated references, the latest edition of the publication referred to applies. (including amendments).

EN 292-1:1991, *Safety of machinery - Basic concepts, general principles for design - Part 1: Basic terminology, methodology.*

EN 292-2:1991, *Safety of machinery - Basic concepts, general principles for design - Part 2: Technical principles and specifications (and Amendment A1:1995).*

EN 294:1992, *Safety of machinery - Safety distances to prevent danger zones being reached by the upper limbs.*

EN 349:1993, *Safety of machinery - Minimum gaps to avoid crushing of parts of the human body.*

EN 418:1992, *Safety of machinery - Emergency stop equipment, functional aspects - Principles for design.*

EN 563:1994, *Safety of machinery - Temperatures of touchable surfaces - Ergonomics data to establish temperature limit values for hot surfaces.*

EN 574:1996, *Safety of machinery - Two-hand control device.*

EN 614-1:1995, *Safety of machinery - Ergonomic design principles - Part 1: Terminology and general principles.*

EN 894-2:1997, *Safety of machinery - Ergonomics requirements for the design of displays and control actuators - Part 2: Displays.*

EN 894-3:2000, *Safety of machinery - Ergonomics requirements for the design of displays and control actuators - Part 3: Control actuators.*

EN 953:1997, *Safety of machinery - General requirements for the design and construction of guards (fixed, movable).*

EN 954-1:1996, *Safety of machinery - Safety-related parts of control systems - Part 1: General principles for design.*

EN ISO 13849-2:2003, *Safety of machinery - Safety-related parts of control systems - Part 2: Validation (ISO 13849-2:2003)*

EN 982:1996, *Safety requirements for fluid power systems and their components - Hydraulics.*

EN 983:1996, *Safety requirements for fluid power systems and their components - Pneumatics.*

EN 999:1998, *Safety of machinery - Approach speed of parts of the body for the positioning of safety devices.*

prEN 1005-2:1998, *Safety of machinery - Human physical performance - Part 2: Manual handling of objects associated to machinery.*

EN 1050:1996, *Safety of machinery - Risk assessment.*

EN 1070 :1998, *Safety of machinery -Terminology*

EN 1088:1995, *Safety of machinery - Interlocking devices with and without guard locking - General principles and provisions for design.*

EN 1837:1999, *Safety of machinery - Integral lighting of machines.*

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EN 50370-1:2002, *Electromagnetic compatibility (EMC) – Product family standard for machine-tools – Part 1: Emission.*

EN 50370-2:2002, *Electromagnetic compatibility (EMC) – Product family standard for machine-tools – Part 2: Immunity.*

EN 60204-1:1997, *Safety of machinery - Electrical equipment of machines - Part 1: General requirements (IEC 204-1:1992, modified).*

EN 60529:1991, *Degrees of protection provided by enclosures (IP code) (IEC 60529:1989).*

EN 60825-1:1994, *Safety of laser products – Part 1: Equipment classification, requirements and user's guide (IEC 60825:1993).*

EN 61310-2:1995, *Safety of machinery - Indication, marking and actuation - Part 2: Requirements for marking (IEC 1310-2:1995).*

EN 61496-1:1997, *Safety of machinery - Electrosensitive protective equipment - Part 1: General requirements and tests (IEC 61496-1:1997).*

prEN 61496-2:1997, *Safety of machinery - Electrosensitive protective equipment - Part 2: Particular requirements for equipment using active opto-electronic protective devices (IEC 61496-2:1997).*

EN ISO 3746:1995, *Acoustics - Determination of sound power levels of noise sources - Survey method (ISO/DIS 3746.2:1995).*

EN ISO 4871:1996, *Acoustics – Declaration and verification of noise emission values of machinery and equipment.*

EN ISO 11202:1995, *Acoustics - Noise emitted by machinery and equipment - Measurement of emission sound pressure levels at the work station and at other specified positions - Survey method in situ (ISO/DIS 11202:1993).*

ISO EN 11688-1:1998, *Acoustics - Recommended practice for the design of low-noise machinery and equipment - Part 1: Planning.*

prEN ISO 11688-2, *Acoustics – Recommended practice for the design of low-noise machinery and equipment – Part 2: Introduction to the physics of low noise design (ISO TR 11688-2:1991).*

3 Termes and definitions

3.1 Definitions

In addition to the terms and definitions given in EN 292-1:1991, and EN 1070:1998 for the purposes of this European Standard, the following terms and definitions apply.

3.1.1

beam

main reciprocating press brake member which normally holds the punch on a down-stroking press brake, and which normally holds the die on an up-stroking press brake

3.1.2

blanking

feature available for ESPEs using AOPDs in the form of light curtains in which some parts of the sensing field can be deactivated

3.1.3

cycle - automatic

operating mode where the operating cycle is repeated continuously or intermittently, all functions achieved without manual intervention after initiation

3.1.4**cycle - operating**

movement completed by the moving part of the tools from the cycle start position (normally the top dead centre) to the bottom dead centre and back to the cycle stop position (normally the top dead centre). The operating cycle includes all operations carried out during this movement.

3.1.5**cycle - single**

operating mode where each operating cycle of the slide has to be positively actuated by the operator

3.1.6**dead centres**

points at which the tool, during its travel, is

- either nearest/closest to the die (generally it corresponds to the end of the closing stroke), known as the bottom dead centre (BDC),
- or furthest from the die (generally it corresponds to the end of the opening stroke), known as the top dead centre (TDC)

On an up stroking press brake, the centres are reversed.

3.1.7**guard locking device**

mechanical device to maintain an interlocking guard gate in the closed and locked position until the risk of injury from the hazardous machine functions has passed

3.1.8**hydraulic press brake**

mechanical designed or intended to transmit energy to the moving part of the tools by hydraulic means principally for the purpose of bending between narrow forming tools along straight lines (see figure 1)

3.1.9**limited movement control device - inching device**

control device, the actuation of which permits only a limited amount of travel of a machine element, thus minimising risk as much as possible; further movement is precluded until there is a subsequent and separate actuation of the control. [3.23.8 of EN 292-1:1991]

3.1.10**monitoring (M)**

safety function which ensures that a safety measure is initiated if the ability of a component or an element to perform its function is diminished, or if the process conditions are changed in such a way that hazards are generated

3.1.11**muting**

temporary automatic suspension of a safety function(s) by Safety-related parts of the control system during otherwise safe conditions in the operation of a machine. [3.7 of EN 954-1:1996]

3.1.12**overall system stopping performance; overall response time**

time occurring from actuating the protective device to the cessation of hazardous motion, or to the machine assuming a safe condition

3.1.13**position switch**

switch which is operated by a moving part of the machine when this part reaches or leaves a predetermined position

3.1.14**redundancy (R)**

application of more than one device or system, or part of a device or a system, with the objective of ensuring that, in the event of one failing to perform its function, another is available to perform that function. [3.47 of EN 60204-1:1992] (see 3.7.5 of EN 292-2:1991)

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3.1.15

restraint valve

device which protects against a gravity fall of the beam

3.1.16

single stroke function

feature used to limit the motion of the tool to one operating cycle even if the stroke initiating means (e.g. a pedal) is held in the operating position

3.1.17

tools

term for the combination of tool and die

3.1.18

up-stroking press brake

press brake in which the lower tool moves upwards during the closing stroke (reciprocal to a down-stroking press, see figure 1)

3.1.19

PES

system for control, protection or monitoring based on one or more programmable electronic devices, including all elements of the system such as power supplies, sensors and other input devices, data highways and other communication paths, and actuators and other output devices(EN 61508-4:3.3.2)

3.1.20

safety PLC

programmable logic controller dedicated to Safety-related application

3.1.21

ESPE

An assembly of devices and/ or components working together to provide protective tripping or personal presence-sensing at a machine. This assembly comprises a sensing device (AOPD, AOPDDR), controlling monitoring devices, output devices and all interconnecting wiring.

3.1.22

Blanking

Blanking is a function by which one or more area(s) of the detection zone of an AOPD are rendered inoperative in order that a part of the workpiece or of the machine can project into the detection zone without actuating the protective equipment.

3.1.23

passive safety function

safety function which does not itself initiate any hazardous movement but permits or disables a hazardous movement of the machine if a fault is detected.

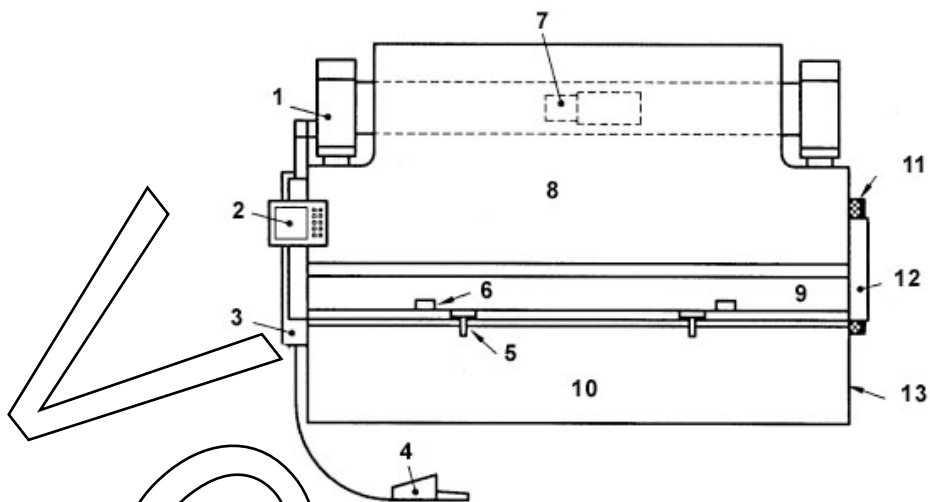


Figure 1 — Example of a down-stroking hydraulic press brake

Key

1 Press cylinder	6 Backstop	11 Side safeguard
2 Control panel	7 Hydraulic system	12 Light Curtain
3 Electrical Switch Gear Cabinet	8 Beam	13 Frame
4 Foot pedal	9 Tools	
5 Work-piece support		

3.2 Abbreviations

3.2.1

M

Monitoring (see 3.1.10)

3.2.2

R

Redundancy (see 3.1.14)

3.2.3

S

single system

3.2.4

BDC

Bottom Dead Centre (see 3.1.6)

3.2.5

TDC

Top Dead Centre (see 3.1.6)

3.2.6

PES

Programmable Electronic System (see 3.1.19)

3.2.7

AOPD

Active Opto-electronic Protective Device

3.2.8

ESPE

Electro-sensitive Protective Equipment (see 3.1.21)

3.2.9

NC

Numerical Control

3.2.10

AOPDDR

Active Opto-electronic Protective Device responsive to Diffuse Reflection (Scanner)

3.2.11

OSSD (output signal switching device)

Component of the electro-sensitive protective device (ESPE) connected to the machine control system which, when the sensing device is actuated during normal operation, responds by going to the OFF-state. (EN 61496-1)

4 List of significant hazards

This clause contains the significant and other relevant hazards, hazardous situations and events (see EN 1050:1996) as far as they are dealt with in this European Standard, identified by risk assessment as significant for the machines as defined in the scope and which require action to eliminate or reduce the risk. This European Standard deals with:

- significant hazards by defining safety requirements and/ or measures or by reference to relevant type B standards;
- hazards which are present but not significant e.g. general, minor or secondary hazards by reference to EN 292-1:1991 and EN 292-2:1991/ A1:1995.

These hazards are listed in table 1 in accordance with annex A of EN 1050:1996.

Particular attention is given to hazards dealing with:

- crushing and shearing between moving tools, slide, back gauges, work-piece supports (see 1 in table 1);
- entanglement on or drawing into moving parts of the machine, guards, motor and drive machinery, mechanical handling device (see 1 in table 1);
- ejection of machine components, tools, work-pieces or parts of them (see 1 in table 1).

Main danger zones are:

- tools area with moving slide, back gauges, work-piece supports, guards,
- mechanical handling device,
- motor and drive machinery.

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