



SLOVENSKI STANDARD

SIST EN 12622:2002

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Safety of machine tools - Hydraulic press brakes

Safety of machine tools - Hydraulic press brakes

Werkzeugmaschinen - Sicherheit von Werkzeugmaschinen - Hydraulische -
Gesenkbiegepressen

Sécurité des machines-outils - Presses plieuses hydrauliques

Ta slovenski standard je istoveten z: EN 12622:2001

ICS:

25.120.10	Kovaški stroji. Stiskalnice. Škarje	Forging equipment. Presses. Shears
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English version

Safety of machine tools - Hydraulic press brakes

Sécurité des machines-outils - Presses plieuses
hydrauliques

Sicherheit von Werkzeugmaschinen - Hydraulische
Gesenkbiegepressen

This European Standard was approved by CEN on 7 March 2001.

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. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Management Centre has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Foreword

This European Standard has been prepared by Technical Committee CEN/TC 143 "Machine tools - Safety", the secretariat of which is held by SNV.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by October 2001, and conflicting national standards shall be withdrawn at the latest by October 2001.

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

For relationship with EC Directive(s), see informative Annex ZA, which is an integral part of this standard.

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

This standard also contains a "Bibliography".

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

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0 Introduction

0.1 This standard is applicable to hydraulic press brakes as defined in 3.1.9.

0.2 This standard has been prepared to be a harmonized standard to provide one means of conforming with the essential safety requirements of the Machinery Directive 98/37/EEC and associated EFTA Regulations. It is a type C standard as described in EN 292-1:1991.

0.3 The extent to which hazards are covered is indicated in the scope of this standard.

0.4 Complementary guidance is given in the type A and type B standards to which reference is made in the text (see clause 2). The figures are intended to be examples only and not to give the only interpretation of the text.

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 intended for cold working of metal or material partly of metal.

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. For the safeguarding of integrated manufacturing systems using press brakes, see also prEN 1921: 1995.

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.

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

NOTE An amendment is under preparation to take into account the use of laser/scanner devices for the safeguarding of operators on press-brakes.

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 +A1:1995	Safety of machinery - Basic concepts, general principles for design - Part 2: Technical principles and specifications
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 devices - Functional aspects, Principles for design
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 – Guards - General requirements for the design and construction of fixed and movable guards
EN 954-1:1996	Safety of machinery - Safety related parts of control systems - Part 1: General principles for design
EN 982:1996	Safety of machinery - Safety requirements for fluid power systems and their components - Hydraulics
EN 983:1996	Safety of machinery - Safety requirements for fluid power systems and their components - Pneumatics
EN 999:1998	Safety of machinery – The positioning of protective equipment in respect of approach speeds of parts of the human body
prEN 1005-2:1998	Safety of machinery - Human physical performance - Part 2: Manual handling of machinery and components parts of machinery
EN 1050:1996	Safety of machinery - Principles for risk assessment
EN 1088:1995	Safety of machinery - Interlocking devices associated with guards - Principles for design and selection
EN 1837:1999	Safety of machinery - Integral lighting of machines
prEN 1921:1995	Industrial automation systems - Safety of integrated manufacturing systems - Basic requirements (ISO 11161:1994 modified)
EN ISO 3746:1995	Acoustics - Determination of sound power levels of noise sources using sound pressure - Survey method using an enveloping measurement surface over a reflecting plane (ISO 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 11202:1995)
EN ISO 11688-1:1998	Acoustics - Recommended practice for the design of low-noise machinery and equipment - Part 1: Planning (ISO/TR 11688:1995). EN ISO 14122:2001 Safety of machinery - Permanent means of access to machines and industrial plants Part 1: Choice of a fixed means of access between two levels Part 2: Working platforms and gangways Part 3: Stairways, stepladders and guard-rails
prEN ISO 14122:1999	Safety of machinery - Permanent means of access to machines and industrial plants Part 4: Fixed ladders
EN 60204-1:1997	Safety of machinery - Electrical equipment of machines - Part 1: General requirements (IEC 60204-1:1997)
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 61310-2:1995)
EN 61496-1:1997	Safety of machinery – Electro-sensitive protective equipment - Part 1: General requirements and tests (IEC 61496-1:1997)
prEN 61496-2:1997	Safety of machinery – Electro-sensitive protective equipment - Part 2: Particular requirements for equipment using active opto-electronic devices https://standards.iteh.ai/catalog/standards/sist/0dc8eabc-97f8-41f9-bca7-3d18b5396eed/sist-en-12622-2002

3 Definitions and abbreviations

3.1 Terms and definitions

For the purposes of this standard, the following definitions apply. Further definitions are provided in relevant type A and type B standards and in annex A of EN 292-2:1991/A1:1995.

3.1.1

beam

main reciprocating press brake member which normally holds the punch on a downstroking press brake, and which normally holds the die on an upstroking 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 moving part of the tools has to be positively actuated by the operator

3.1.6

dead centres

points at which the punch on a downstroking press brake is

- either nearest/closest to the die, known as the bottom dead centre (BDC),
- or furthest from the die, known as the top dead centre (TDC).

On an upstroking press brake, the centres are reversed.

3.1.7

early opening interlocking guard

guard associated with an interlocking device which, if opened when any hazardous movement in the tools area has ceased, does not interrupt the operating cycle

3.1.8

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

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3.1.9

hydraulic press brake

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machine 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)

3.1.10

limited movement control device; inching device

control device, the actuation of which permits only a limited amount of travel of a machine element, thus minimizing 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]

3.1.11

monitoring

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

3.1.12

muting

temporary automatic suspension of a safety function(s) by safety related parts of the control system [3.7 of EN 954-1:1996]

3.1.13

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

3.1.14

position switch

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

3.1.15

redundancy

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 [3.44 of EN 60204-1:1998]

3.1.16

restraint valve

device which protects against a gravity fall of the beam

3.1.17

single stroke function

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

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3.1.18

tools

term for the combination of punch and die [SIST EN 12622:2002](#)

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3.1.19

tools – closed

tools designed and constructed to be inherently safe

3.1.20

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)

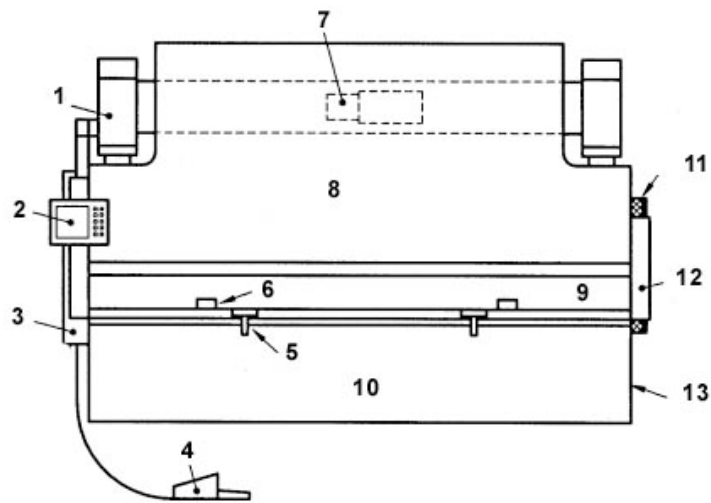


Figure 1 - Example of a downstroking hydraulic press brake

Key

- | | | |
|-------------------------------------|---------------------|--------------------|
| 1 : Press cylinder | 6 :Backstop | 11: Side Safeguard |
| 2 :Control panel | 7 :Hydraulic System | 12 : Light Curtain |
| 3 : Electirical Switch Gear Cabinet | 8 :Beam | 13 : Frame |
| 4 :Foot pedal | 9 :Tools | |
| 5 :Workpiece Support | 10 : Bed | |

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3.2 Abbreviations

3.2.1

M
Monitoring (see 3.1.11)

3.2.2

R
Redundancy (see 3.1.15)

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 systems

3.2.7

PPS

Programmable pneumatic systems

3.2.8

AOPD

Active opto-electronic protective devices

3.2.9

ESPE

Electro-sensitive protective equipment

3.2.10

THCD

Two-hand control device

4 List of significant hazards

4.1 The list of hazards contained in table 1 is the result of a hazard identification, their associated danger zones and reference to protective measures for hydraulic press brakes covered by the scope of this standard. The safety requirements and/or protective measures and information for use contained in clauses 5 and 7 are based on a risk assessment and deal with the identified hazards by either eliminating them or reducing the effects of the risks they generate.

4.2 The risk assessment assumes foreseeable access from all directions, as well as unexpected and unintended strokes or gravity falls. Risks to both the operators and other persons who can have access to the danger zones are identified, taking into account hazards which can occur under various conditions of intended use (e.g. commissioning, tool setting, production, maintenance, repair, decommissioning, dismantling – see also 3.11 of EN 292–1:1991) during the life of the machine. The assessment includes an analysis of the effect of failure in the control system.

4.3 The user of this standard (i.e. the designer, manufacturer, supplier) shall check that the list of significant hazards in table 1 is complete for the machine under consideration. If the user determines that there are additional hazards then he shall analyse and evaluate the risks associated with these hazards in accordance with EN 1050:1996 with particular attention to the intended use of the machine (e.g. commissioning, tool setting, production, maintenance, repair, decommissioning, dismantling – see also 3.11 of EN 292–1: 1991), and its reasonably foreseeable misuse.

Table 1 - Significant hazards, danger zones, protective measures

No.	Hazards	Danger zone	Relevant clauses in EN 292-2:1991/A1:1995	Relevant clauses in EN 292-1:1991	Protective measures: relevant clauses in this standard
1.0	Mechanical hazards generated by: - machine parts or workpieces	Tools and associated area: - between tools, - between the moving and the fixed parts of the press brake, - moving workpieces	1.3 (except 1.3.6)	4.2	5.1, 5.3 to 5.5
	accumulation of energy inside machinery caused, for example, by: - elastic elements (springs) - liquids and gases under pressure		1.5.3, 1.6.1, 1.6.3	4.2	5.8.3
1.1	Crushing hazard	Outside tools area: - from hazardous situation of falling objects	1.3 (except 1.3.6)	4.2.1	5.3 to 5.6, 7.1.2 i) to l)
1.2	Shearing hazard		1.4 (except 1.4.2.3)		
1.3	Cutting or severing hazard		1.5.14		
1.4	Entanglement hazard				
1.5	Drawing-in or trapping hazard				
1.6	Impact hazard	Moving parts of electrical, hydraulic and pneumatic equipment Motor and drive machinery Mechanical handling device	1.3	4.2.1	5.6
1.9	High pressure fluid injection or ejection hazard	Hydraulic systems	1.3.2	4.2.1	5.2.2.4, 5.8.3
2.0	Electrical hazards due to:				
2.1	Contact of persons with live parts (direct contact)	Electrical equipment	1.5.1, 1.6.3	4.3	5.8.1

(continued)

Table 1 (continued)

No.	Hazards	Danger zone	Relevant clauses in EN 292-2:1991/A1:1995	Relevant clauses in EN 292-1:1991	Protective measures: relevant clauses in this standard	
2.2	Contact of persons with parts which have become live under faulty conditions (indirect contact)	Electrical equipment	1.5.1		5.8.1	
3.0	Thermal hazards					
3.1	Thermal hazards resulting in burns and scalds, by a possible contact of persons	Parts of the hydraulic system	1.5.5, 1.5.6, 1.5.7	4.4	5.8.2	
4.0	Noise hazards					
4.1	Hazards generated by noise resulting in hearing losses (deafness)	Any area at the press brake where there is a risk to hearing	1.5.8	4.5	5.8.5	
6.0	Hazards generated by radiation					
6.5	Lasers	Any area at the press brake where there is a risk due to laser beams	1.5.12	4.7	5.8.6	
8.0	Hazards generated by neglecting ergonomic principles in machinery design , as e.g. from:					
8.1	Unhealthy postures or excessive effort	The working position and any area for controls, setting, maintenance and handling	1.1.2d, 1.1.5, 1.6.2, 1.6.4	4.9	5.8.8	
8.2	Inadequate consideration of hand–arm foot–leg anatomy		1.1.2 d, 2.2			
8.4	Inadequate local lighting		1.1.4		5.8.8.3, 7.2.2 d	
8.6	Human error, human behaviour		1.1.2 d, 1.2.2, 1.2.5, 1.2.8, 1.5.4, 1.7	4.9	5.4.5.1, 5.4.5.4, 5.4.5.5, 5.4.3, 5.4.6	
8.7	Inadequate design, location or identification of manual controls		1.2.2			
8.8	Inadequate design or location of visual display units			1.7.1		5.8.8.2
10	Unexpected start–up, unexpected overrun/ overspeed					
10.1	Failure/disorder of the control system		Tools and associated area: - between tools, - between the moving and the fixed parts of the press brake, - moving workpieces - between deflecting workpieces and other parts, - moving gauges, - moving sheet supports - guards	1.2.7, 1.6.3		5.2 to 5.5
10.2	Restoration of the energy supply after an interruption	1.2.6			5.4.1.1	
10.3	External influences on electrical equipment	1.2.1, 1.5.11			5.4.1	
10.5	Errors in the software	1.2.1			5.4.2, 5.3.12.1f)	
10.6	Errors made by the operator (due to mismatch of machinery with human characteristics and abilities, see 8.6 of table 1)	1.1.2 d, 1.2.2, 1.2.5, 1.2.8, 1.5.4, 1.7		4.9	5.3, 7.2.2	
13	Failure of the power supply	1.2.6				
14	Failure of the control circuit			1.2.1, 1.2.3, 1.2.4, 1.2.5, 1.2.7, 1.6.3		5.2 to 5.5

(continued)