BRITISH STANDARD

BS EN 422:2009

Plastics and rubber machines — Blow moulding machines — Safety requirements

ICS 83.200

BSI
British Standards

National foreword

This British Standard is the UK implementation of EN 422:2009. It supersedes BS EN 422:1996 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee MCE/3/2, Rubber and plastics machine - Safety.

A list of organizations represented on this committee can be obtained on request to its secretary.

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This British Standard was published under the authority of the Standards Policy and Strategy Committee on 30 June 2009.

ISBN 978 0 580 60789 9

Amendments/corrigenda issued since publication

Date	Comments

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 422

June 2009

ICS 83.200

Supersedes EN 422:1995

English Version

Plastics and rubber machines - Blow moulding machines - Safety requirements

Machines pour les matières plastiques et le caoutchouc - Machines de moulage par soufflage - Prescriptions de sécurité

Kunststoff- und Gummimaschinen - Blasformmaschinen - Sicherheitsanforderungen

This European Standard was approved by CEN on 13 May 2009.

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

Management Centre: Avenue Marnix 17, B-1000 Brussels

Ref. No. EN 422:2009: E

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Foreword

This document (EN 422:2009) has been prepared by Technical Committee CEN/TC 145 “Plastics and rubber machines”, the secretariat of which is held by UNI.

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of an identical text or by endorsement, at the latest by December 2009, and conflicting national standards shall be withdrawn at the latest by December 2009.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 422:1995.

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 EC Directive(s).

For relationship with EC Directive(s), see informative Annexes ZA, and ZB, which are integral parts of this document.

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Introduction

This European Standard is a type C standard as defined in EN ISO 12100-1:2003.

The machinery concerned and the extent to which hazards, hazardous situations and hazardous events are covered are indicated in the scope of this European Standard.

When provisions of this type C standard are different from those which are stated in type A or B standards, the provisions of this type C standard take precedence over the provisions of the other standards for machines that have been designed and built according to the provisions of this type C standard.

1 Scope

This European Standard covers essential health and safety requirements for the design of blow moulding machines for the processing of plastics. The significant hazards inherent in blow moulding machines are listed in Clause 4.

This European Standard does not cover dip blow moulding machines.

This European Standard does not cover hazards due to the use of fluorine or other toxic fluids.

The safety requirements for the interaction between blow moulding machines and ancillary equipment are stipulated. The technical safety requirements for the design of this equipment are not covered.

This European Standard does not cover the requirements for the design of the exhaust system.

The European Standard does not cover noise hazards.

This European Standard is not applicable to blow moulding machines which are manufactured before the date of its publication as an EN. A transition period until 29 December 2009 is foreseen during which the manufacturer may choose to apply either this or the previous version of the standard.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 953, *Safety of machinery — Guards — General requirements for the design and construction of fixed and movable guards*

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*

EN 1760-2:2001, *Safety of machinery — Pressure sensitive protective devices — Part 2: General principles for the design and testing of pressure sensitive edges and pressure sensitive bars*

EN 60204-1:2006, *Safety of machinery — Electrical equipment of machines — Part 1: General requirements (IEC 60204-1:2005, modified)*

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

EN 61000-6-2:2001, *Electromagnetic compatibility (EMC) — Part 6-2: Generic standards; Immunity for industrial environments (IEC 61000-6- 2:1999, modified)*

EN 61000-6-4:2001, *Electromagnetic compatibility (EMC) — Part 6-4: Generic standards; Emission standard for industrial environments (IEC 61000-6-4:1997, modified)*

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

EN 61496-3:2001, *Safety of machinery — Electro-sensitive protective equipment — Part 3: Particular requirements for Active Opto-electronic Protective Devices responsive to Diffuse Reflection (AOPDDR) (IEC 61496-3:2001)*

EN ISO 12100-1:2003, *Safety of machinery — Basic concepts, general principles for design — Part 1: Basic terminology, methodology (ISO 12100-1:2003)*

EN ISO 12100-2:2003, *Safety of machinery — Basic concepts, general principles for design — Part 2: Technical principles (ISO 12100-2:2003)*

EN ISO 13732-1:2008, *Ergonomics of the thermal environment — Methods for the assessment of human responses to contact with surfaces — Part 1: Hot surfaces (ISO 13732-1:2006)*

EN ISO 13732-3:2008, *Ergonomics of the thermal environment — Methods for the assessment of human responses to contact with surfaces — Part 3: Cold surfaces (ISO 13732-3:2005)*

EN ISO 13849-1:2006, *Safety of machinery — Safety related parts of control systems — Part 1: General principles for design (ISO 13849-1:2006)*

EN ISO 13857:2008, *Safety of machinery — Safety distances to prevent hazard zones being reached by upper and lower limbs (ISO 13857:2008)*

EN ISO 14122-1:2001, *Safety of machinery — Permanent means of access to machinery — Part 1: Choice of a fixed means of access between two levels (ISO 14122-1:2001)*

EN ISO 14122-2:2001, *Safety of machinery — Permanent means of access to machinery — Part 2: Working platforms and walkways (ISO 14122-2:2001)*

EN ISO 14122-3:2001, *Safety of machinery — Permanent means of access to machinery — Part 3: Stairs, stepladders and guard-rails (ISO 14122-3:2001)*

EN ISO 14122-4:2004, *Safety of machinery — Permanent means of access to machinery — Part 4: Fixed ladders (ISO 14122-4:2004)*

ISO 7010 *Graphical symbols — Safety colours and safety signs — Safety signs used in workplaces and public areas*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
blow moulding machine
machine which expands a parison or preform to make a hollow article using fluid under pressure blown into a fixed or moving blow mould

3.2
area of movement of the moulds
area in which the moulds move, close or open, also including the actuating equipment

3.3
feed area
area of the extrusion head or of the injection nozzle or of the preform feeding device

3.4
cutting device
apparatus which cuts the parison at the exit of the extrusion head

3.5
blowing station
part of the machine in which the hollow articles are blown and stretched as appropriate and where the container aperture may be calibrated

3.6
delivery station
part of the machine in which the blown parts are withdrawn from the blow mould and removed from the machine

3.7
cooling station
part of the machine in which the blown parts are cooled after being withdrawn from the blow mould

3.8
finishing station
part of the machine in which excess material is removed from the blown part

3.9
heating station
part of the machine in which the temperature of the preform is adjusted before blowing

3.10
automatic machine
machine where unloading (and/or loading) is achieved only without manual intervention

3.11
semi automatic machine
machine where unloading (and/or loading) is achieved only with manual intervention or machine with a mode selector switch for selecting automatic or non automatic operation

4 List of significant hazards

4.1 General hazards

Crushing, shearing or impact due to the whiplash of flexible hoses under pressure in normal operation or in case of rupture or disconnection, see 5.1.4.

Injury by impact of ejected fluids or hot plastic materials, see 5.1.5.1.

Injury by injection under the skin of very high pressure cooling fluids, see 5.1.4.

Puncture by the blowing needles, see 5.2.1.

Crushing, shearing or impact due to movements associated with hydraulic and pneumatic accumulators, see 5.1.4.

Crushing, shearing or impact due to movements of power operated guards, see 5.1.5.1 and 5.3.1.

Crushing, shearing or impact due to movements of parts of the machine by gravity, see 5.1.6 and 5.1.12.

Electric shock or burns due to direct or indirect contact with live conductive parts, see 5.1.7.

Malfunction of the control circuits due to electromagnetic interference with the electrical equipment, see 5.1.7.

Burns and/or scalds (see 5.1.8) due to very high or low temperatures of:

— surfaces;

— the connecting hoses of the temperature control unit;

— fluid leakage;

— moulds, heating elements, plasticised material e.g. in injection blow moulding machines if the material is injected into incompletely closed moulds;

— extrusion head or injection nozzle, parison, ejected plastic material or gas (in the case of decomposition);

— cutting device;

— blowing gas, blowing needles or mandrels;

— parts accessible through the delivery aperture;

— hot conditioning fluid blown onto or into the preforms or parisons;

— cooling fluid;

— heating apparatus and surrounding parts;

— preforms or parisons.

Contact with, or inhalation of, harmful substances (see 5.1.9) that may be released from:

— the blowing gas;

— the cooling and conditioning fluids; or

— the processed plastic and the blown part when the mould is not completely closed (before blowing) or when the mould opens (after blowing).

Fire due to ignition of the plastic material when a hot cutting device is used, see 5.1.10.

Impact due to bursting of the blown parts when the moulds open (applicable only when moulded parts with volume greater than 20 litres are blown with pressure greater than 10 bar), see 5.1.11.

Crushing, shearing or impact during setting (see 5.1.12) due to movement of:

— the blowing mould and its parts;

— the blowing needles or mandrels;

— the stretch rods;

— the individual blowing stations (multistation machines);

— the rotary table;

— the injection unit;

— the insert loading system.

4.2 Mechanical hazards related to power operated movements during production

NOTE In subclauses 4.2 to 4.4, the sequence of hazards corresponds with the sequence of the safety requirements and/or protective measures specified in subclauses 5.2 to 5.4.

Injuries due to dangerous movements or parts as listed in Table 1 (see 5.2.1).

4.3 Additional hazards associated with machines of specific design

4.3.1 Machines allowing whole body access

Crushing, shearing, impact and entanglement by moving parts when operators have whole body access:

— in the area of movement of the moulds;

— between the guard or safety device and dangerous moving parts;

— through the discharge aperture.

4.3.2 Rotary machines

Crushing, shearing, drawing-in or impact due to movements of the rotating table.

Crushing, shearing, drawing-in or impact due to movements of the rotating table because of imbalance during mould changing (only in the case of a horizontal axis of rotation).

4.4 Additional hazards when using ancillary equipment

Hazards are dependent on the type of ancillary equipment.

5 Safety requirements and/or protective measures

5.1 General

5.1.1 Basic requirements

Blow moulding machines shall comply with the safety requirements and/or protective measures of this clause. In addition, the machine shall be designed in accordance with the principles of EN ISO 12100 for relevant but not significant hazards which are not dealt with in this document.

The safety related parts of the control system shall be designed in accordance with EN ISO 13849-1:2006. The required performance level (PL_r) for each safety function is specified below. See also 7.1.2.

Adjustment elements which must be adjusted during production shall be accessible from outside the danger zone. When these adjustment elements are higher than 2 m above floor level, permanent means of access according to EN ISO 14122 series shall be provided. Where a special tool is necessary for adjustment such a tool shall be supplied by the machine manufacturer.

5.1.2 Safety distances

For fixed guards or machine parts preventing access to the moving moulds (closing and transfer movements), EN ISO 13857:2008 Tables 2 and 4 shall be used. Tables 1 and 4 shall be used in all other cases.

Electro-sensitive protective equipment (ESPE) shall be positioned in accordance with EN 999:1998.

5.1.3 Emergency stop

The emergency stop shall stop all movement but not necessarily the heating. The stop category shall be 0 or 1 according to EN 60204-1:2006 whichever provides the shorter rundown time. See 7.1.3.

5.1.4 Fluid systems

Hydraulic and pneumatic systems shall be designed in accordance with respectively EN 982:1996 and EN 983:1996.

The flexible hoses for hydraulic fluids under a pressure of more than 50 bar and for pneumatic fluids of more than 10 bar shall be secured to the machine by additional fastenings (for example chains) limiting the whiplash. On machines equipped with guards, this requirement does not apply to flexible hoses situated inside the guards.

However, additional fastenings for flexible hoses for blowing fluids are also required inside the machine, except if the machine is safeguarded by interlocking guards with guard locking and the pressure in the pneumatic hoses is reduced to under 10 bar before the guard lock can be released. The PL_r for this safety function shall be c.

To avoid injury by ejected fluids accessible hoses and connections shall be covered by guards.

For hydraulic or pneumatic accumulators the following shall apply.

— The operation of a protective device shall interrupt all power from accumulators for the blowing fluid or which are associated with dangerous movements.

— Actuation of the emergency stopping devices or disconnection of power to the machine shall isolate all power from accumulators for the blowing fluid or which are associated with dangerous movements. Where accumulators are integrated parts of the machine, unloading shall be initiated automatically.

— Visual indication of accumulator pressure shall be provided. Where hydraulic accumulators are integrated parts of the machine, the isolating valve or valves shall be position monitored. When the position monitoring system detects the valve or valves failing to isolate the accumulators, then:

  — an optical or audible signal shall be given; and

  — all accumulators connected with the failed valve or valves shall be automatically unloaded.

Machines with hydraulic or pneumatic supply from an external source shall be provided with a manual isolation valve lockable by key.

5.1.5 Safeguards

5.1.5.1 Guards

Guards shall be in accordance with EN 953.

Guards located in areas where ejection of hot plastic can take place shall also contain the ejected material.

If the movement of power operated guards can cause injury (force > 150 N or pressure > 50 N/cm^2), pressure sensitive edges in accordance with EN 1760-2:2001 shall be provided in order to either arrest or reverse the closing movement of the guard. Actuation of the sensitive edge shall arrest or reverse the closing movement of the guard in accordance with EN ISO 13849-1:2006 PL_r = c. Reversing the movement shall not create further hazards.

5.1.5.2 Electro-sensitive protecting equipment (ESPE)

ESPE may be used if the ejection of hot plastics is prevented by design of the machine. The ESPE shall be in accordance with EN 61496-1:1997 or EN 61496-3:2001 and be positioned according to EN 999:1998.

The ESPE shall become effective as soon as the blow moulding machine is switched on.

It shall not be possible to reach the danger area around, above or beneath the ESPE.

The end of an interruption of the ESPE shall not automatically initiate any further movement. A new start command shall be required.

5.1.6 Movements caused by gravity

Machine parts which can have a dangerous movement under gravity shall be provided with an automatic blocking device which operates as soon as the corresponding movable guard is opened or ESPE is interrupted. The blocking shall remain active until a new start command is given. The required performance level for this safety function shall be PL_r c.

5.1.7 Electrical hazards and hazards due to electromagnetic interference

The electrical equipment shall be in accordance with EN 60204-1:2006.

Protection against direct contact shall be in accordance with 6.2 of EN 60204-1:2006, with minimum degrees of protection in accordance with EN 60529:1991.

Protection against indirect contact shall be in accordance with 6.3 of EN 60204-1:2006.

Electronic control systems shall be designed and installed so as to be protected from electromagnetic interference and be stable when exposed to electrical system operation or failure in accordance with EN 61000-6-2:2001.

Electrical/electronic design shall apply technical information and physical measures to limit electromagnetic emissions in accordance with EN 61000-6-4:2001.

During installation of electrical and electronic components, the machine manufacturer shall follow the information for use provided by the manufacturer of those components.

5.1.8 Thermal hazards

To prevent burns through unintentional contact with hot machine parts, products or conditioning fluids, fixed guards or insulation shall be provided at accessible parts outside of the guarded area where the maximum operating temperature can exceed the limit values given in EN ISO 13732-1:2008. The same requirements apply for very cold parts (EN ISO 13732-3:2008).

Warning signs in accordance with ISO 7010, W017/W010 shall be affixed in the immediate vicinity of the moulds and the heating elements, the feed area, the cutting device, the blowing station, the delivery aperture, the conditioning station and/or on the relevant guards.

See 7.1.4.

5.1.9 Hazards due to harmful substances

The blow moulding machine shall be so designed that an exhaust system can be fitted or positioned without modification of the machine for the extraction of harmful substances from the blowing gas, the cooling and conditioning fluids or the blown article.

See 7.1.5.

This European Standard does not cover the requirements for the design of the exhaust system (see Clause 1).

5.1.10 Fire hazards

When a hot cutting device is used:

— ignition of the plastic material shall be detected automatically; and

— an acoustic or a visible signal shall be given; and

— feeding the parison or preforms shall stop if this does not create further hazards.

The required performance level of this safety function shall be PL_r a.

See 7.1.6.

5.1.11 Hazards due to overpressure

When the burst of a blown part can result in a hazard, the blowing pressure shall be monitored.

Opening the mould shall only be possible when the inside pressure is so reduced that the blown part cannot burst, or a combination of fixed guards and interlocking guards with guard locking may be used provided that these guards have sufficient strength to withstand ejected parts.

The required performance level PL_r of that safety function shall be:

— PL_r b where guards are used;

— PL_r c where ESPE is used.

5.1.12 Mechanical hazards during setting

Blow moulding machines shall preferably be designed to enable setting when the machine is at rest or from outside the safeguards whilst the machine is running.

Where this is not practicable:

— a mode selector switch shall be provided which can be locked in all positions by a removable or coded key, see 7.1.7. The actuation of the selector shall not be possible when the key is removed from the selector or the coded key is deactivated; and

— dangerous movements required for the setting shall only be possible by means of a hold-to-run control device (see EN ISO 12100-1:2003, 3.26.3) meeting the following requirements:

  — the required performance level of the safety-related parts of the control circuit associated with the hold-to-run control device shall be PL_r c;

  — where the hold-to-run control device is fitted on a portable control unit which may be taken into the danger areas, an enabling device and an emergency stop actuator shall be fitted on such a control unit. The emergency stop actuator shall act on all dangerous movements associated with setting;

  — where the hold-to-run control device is not on a portable unit it shall be permanently fixed in such a position that the operator has a clear view of the danger areas;

— the hold-to-run control device shall only be operable if the mode selector switch is in the setting position.

— the setting speeds shall not exceed 25 mm/s. This requirement does not apply to the setting speed of a more than 3-axis robot integrated into the machine, nor to rotary machines;

NOTE This indent is not relevant for mould changing or similar operations on rotary machines, which are carried out when the machine is at rest, see 5.3.2.

— pneumatic drive for the setting movement is not permitted;

— valves through which dangerous movements can be initiated and which can be activated by hand or by means of a tool shall be made inaccessible to unauthorised persons, e.g. by fixed guards;

— for machine parts which can move under the influence of gravity a mechanical restraint device shall be provided, see 7.1.7.

5.2 Mechanical hazards related to power operated movements during production

5.2.1 Basic requirements

Access to power operated movements during production shall be prevented by safety distances (see 5.1.2) or by interlocking guards, where necessary completed by fixed guards.

Where frequent access is necessary to the area of movement of the moulds (see 3.2), e.g. for semi-automatic operation, the interlocking guards may be replaced by light curtains in accordance with type 4 of EN 61496-1:1997.

The required performance level of the safety-related parts of the control circuit associated with each protective device is specified in Table 1 for each dangerous movement or part to which access is possible from any normal working position. The required performance level is specified for:

— automatic or semi-automatic machines; and

— machines with interlocking guards, ESPE or other safeguards.

Table 1 — Required performance levels PLr

Dangerous movement or part	**Automatic machines**	**Semi-automatic machines**	**Interlocking guards**	**ESPE**	**Other safeguards**	**PL_r**	**See also**
Blowing mould closing (including drive mechanisms)	X		X	X*		d	
		X	X	X*		e	
Other movements of the blowing mould	X	X	X	X*		c	
Parison transfer; injection	X		X	X		b	5.2.2.1
		X	X	X		c	
Devices to take off or reject the parison	X	X	X			d	
Nozzle of injection unit	X	X	X			d	
Preform feeding device	X		X			d	
Cutting device	X	X	X	X		c	5.2.2.2

Table 1 *(continued)*

Dangerous movement or part	**Automatic machines**	**Semi-automatic machines**	**Interlocking guards**	**ESPE**	**Other safeguards**	**PL_r**	**See also**
Blowing needles, mandrels, stretch rods	X		X			b	
		X	X	X		c	
	X			X		c	
Withdrawal apparatus or transfer device for the blown parts	X		X	X		b	
		X	X	X		c	
Cooling mould closing (including drive mechanisms)	X	X	X			d	
Cooling mandrels	X	X	X			b	
Finishing equipment	X		X			b	
		X	X	X		c	
	X			X		c	
Preform handling device at the heating station	X	X	X		X	d	
Blowing (maximum pressure ≤ 15 bar)	X	X	X	X	X	b	5.1.4
Blowing (maximum pressure > 15 bar)	X	X	X	X	X	d	
* Light curtains only, see 2nd paragraph of this subclause							

5.2.2 Additional requirements

5.2.2.1 Opening the interlocking guard or interrupting the light curtain for the movements of the moulds shall:

— stop the transfer movement of the parison according to 5.2.1 or take the parison out of reach without generating other hazards;

— stop all injection movements according to 5.2.1 unless the moulds are fully closed.

5.2.2.2 Unintentional contact with the stationary cutting device should be prevented as much as possible by design.

5.3 Additional hazards associated with machines of specific design

5.3.1 Machines allowing whole body access

Control guards (see EN ISO 12100-1:2003, 3.25.6) are not allowed on these machines.

Additional safety devices shall be provided to detect the presence of persons or to prevent restarting when a person may be present inside the protected area. These additional devices shall be one of the following types:

— ESPE, which, when interrupted, prevents any movement inside the safeguarded area;

— a mechanical latch which operates with each opening movement of the movable guard and prevents an involuntary return of the guard to the closed position;

— single/double acknowledgement systems in accordance with Annex A.

The required performance level for the safety-related parts of the control system of the ESPE or acknowledgement system shall be PL_r b.

Before another cycle can be initiated, it shall be necessary to reset those additional safety devices, to close the guards or reset each ESPE preventing access to the protected area that has been interrupted and then actuate an enabling device to confirm that the danger area has been vacated. There shall be a clear view of the danger area from the position where the safety devices are reset and also the enabling device is actuated using, if necessary, aids to vision. It shall not be possible to actuate these devices from the danger area. For acknowledgement systems Annex A applies.

Where these additional devices are fitted in conjunction with power operated movable guards, the closing movement of the guard shall be actuated by means of a hold-to-run control device which is positioned to ensure a clear vision of the danger area. The required performance level for the safety-related parts of the control circuit associated with the hold-to-run control device shall be PL_r a.

At least one emergency stop actuator shall be provided in an accessible position inside the safeguarded areas where whole body access is possible.

5.3.2 Rotary machines

For rotary machines access to the wheel shall be prevented by interlocking guards with guard locking when the access time is shorter than the overall stopping time as defined in EN 999:1998, 3.2.

The maximum speed for indexing the machine to the mould changing position shall not exceed 10% of the nominal production speed.

On machines with horizontal axis of rotation, unintentional movement due to imbalance of the rotating table during mould changing shall be prevented by an automatic mechanical blocking device.

5.4 Additional hazards when using ancillary equipment

The installation/connection of ancillary equipment shall not reduce the level of safety of the blow moulding machine specified in this European Standard. This means:

— the connection of ancillary equipment and any necessary modifications to the protection of the machine shall not afford unprotected access to dangerous movements or parts of the machine;

— if the opening of a movable guard for the ancillary equipment gives access to a dangerous movement or part of the machine, this movable guard shall be a guard for the machine with the same PL_r which is required for that dangerous movement or part of the machine. In the case of whole body access additional safety devices as specified in 5.3.1 shall be provided;

— ancillary equipment the presence of which prevents access to a dangerous movement or part of the machine and which can be removed without the use of a tool shall be interlocked with the control circuit of that dangerous movement or part in the same way as a movable guard for the dangerous movement or part concerned;

— if the opening of a movable guard of the machine gives access to a dangerous movement or part of ancillary equipment this guard shall also meet the safety requirements applicable to that ancillary equipment;

— stopping devices including emergency stopping devices of the machine shall also stop the ancillary equipment if its continued operation creates hazards.

If the machine is intended to be used together with ancillary equipment, it shall be so designed that the machine can function only if the ancillary equipment is connected in accordance with the above listed requirements.

See 7.1.8.

6 Verification of safety requirements and/or protective measures

Type tests shall be used to verify the safety requirements and/or protective measures in accordance with Table 2.

Table 2 — Verification methods

Subclauses	Verification method			
	Visual checking	Functional testing	Measuring / Calculation	Checking of compliance with B-standards
5.1.2	x	x	x	x
5.1.3		x		x
5.1.4	x	x	x	x
5.1.5.1	x	x	x	x

Table 2 *(continued)*

Subclauses	Verification method			
	Visual checking	**Functional testing**	**Measuring / Calculation**	**Checking of compliance with B-standards**
5.1.5.2	x	x	x	x
5.1.6	x	x		
5.1.7		x	x	x
5.1.8	x		x	x
5.1.9	x			
5.1.10	x	x		x
5.1.11	x	x	x	x
5.1.12	x	x	x	x
5.2.1	x	x	x	x
5.2.2.1	x	x	x	
5.2.2.2	x			
5.3.1	x	x	x	x
5.3.2	x	x	x	
5.4	x	x	x	x

Functional testing includes verifying the function and efficiency of the guards and protective devices on the basis of:

— descriptions given in the information for use;

— safety related design documents;

— the requirements given in Clause 5 of this European Standard and other quoted standards.

Functional testing of guards and protective devices on which the safety related parts of the control system are in accordance with PL_r d and e of EN ISO 13849-1:2006 shall also include simulation of faults which are likely to occur.

7 Information for use

7.1 Instruction handbook

7.1.1 General

Each blow moulding machine shall be accompanied by a handbook giving general instructions for use (see 6.5 of EN ISO 12100-2:2003) and the following information.

The manufacturer shall state whether the machine is designed for the use of fluorine or other toxic fluids.

7.1.2 Safety-related components

The manufacturer shall list the safety related components, stating that they should be replaced only by components approved by the machinery manufacturer, or by equivalent components used by other machinery manufacturers for the same function.

7.1.3 Emergency stop

The manufacturer shall inform the user whether the emergency stop also stops the heating.

7.1.4 Thermal hazards

The manufacturer shall state that personal protective equipment should be worn when working in areas with thermal hazards.

7.1.5 Exhaust systems

The manufacturer shall indicate that when processing some materials harmful substances can be emitted and that exhaust systems should be fitted or positioned under the responsibility of the user.

The manufacturer shall give information concerning the fitting or positioning of exhaust systems.

The manufacturer shall state that when fitted, exhaust ventilation systems should always be in operation during production and should not be stopped in case of an emergency stop.

7.1.6 Fire hazard

The manufacturer shall describe specific fire extinguishing measures.

7.1.7 Setting

The manufacturer shall indicate that the key of the mode selector switch referred to in 5.1.12 should only be issued to persons trained in setting operations.

The manufacturer shall indicate that for setting operations the mechanical restraint device provided for parts which can move under the influence of gravity should be used.

7.1.8 Ancillary equipment

The manufacturer shall indicate that if ancillary equipment is removed the original guards or safety devices should be replaced.

The manufacturer shall indicate that the manufacturer is responsible for future connection of the machine with ancillary equipment only if the manufacturer has designed such connection.

The manufacturer shall indicate that electrostatic discharge devices that may be dangerous to persons bearing pacemakers should be marked accordingly.

7.2 Marking

The machine shall be marked at least with:

— designation of the machinery;

— name and address of the manufacturer and supplier;

— business name and full address of the authorised representative (where applicable);

— mandatory marking (CE marking);

— year of construction;

— designation of series or type;

— serial number, if any, or machine number;

— electrical connection values.

Annex A
(normative)

Acknowledgement systems

A.1 Single acknowledgement system

A single acknowledgement system shall consist of an acknowledgement switch located outside of the danger area which cannot be actuated from inside the danger area when the movable guards are closed or without interrupting the ESPE.

The acknowledgement switch shall be positioned to afford a clear view of the danger area.

Restart of the dangerous movements shall only be possible after:

— actuation of the acknowledgement switch following interruption of the ESPE; or

— closing the relevant movable guard, followed by actuating the acknowledgement switch.

Actuating the acknowledgement switch shall not initiate a dangerous movement.

The correct functioning of the acknowledgement switch shall be automatically monitored, at least once after each cycle of the movable guard or every time the associated ESPE has been interrupted, so that a fault in the acknowledgement switch is automatically recognized and prevents the initiation of any further dangerous movement.

The acknowledgement system monitoring may be carried out by the programmable controller.

A.2 Double acknowledgement system

A double acknowledgement system shall consist of a push button (1) located inside of the protected area in full view of the mould area and a second push button (2) located outside of the protected area and with a clear view of this area, which cannot be actuated from inside the protected area.

The start of a cycle shall be possible only after the following sequence has been completed within a time interval:

— Push button (1);

— Close operator's gate or exit the protected area interrupting the ESPE;

— Push button (2).

A monitoring circuit shall be provided to check the operation of each push button. If improper operation or sequencing is detected, the cycle of the machine shall be inhibited and an alarm shall be activated.

The acknowledgement system monitoring may be carried out by the programmable controller.

Annex ZA
(informative)

Relationship between this European Standard and the Essential Requirements of EU Directive 98/37/EC

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association to provide a means of conforming to Essential Requirements except those concerning noise of the New Approach Directive.

For Machinery Directive 98/37/EC amended by Directive 98/79/EC.

Once this standard is cited in the Official Journal of the European Communities under that Directive and has been implemented as a national standard in at least one Member State, compliance with the normative clauses of this standard confers, within the limits of the scope of this standard, a presumption of conformity with the relevant Essential Requirements (except Essential Requirements 1.5.8 and 1.7.4 f)) of that Directive and associated EFTA regulations.

WARNING — Other requirements and other EU Directives may be applicable to the product(s) falling within the scope of this standard.

Annex ZB
(informative)

Relationship between this European Standard and the Essential Requirements of EU Directive 2006/42/EC

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association to provide one means of conforming to Essential Requirements of the New Approach Directive 2006/42/EC on machinery except those concerning noise.

Once this standard is cited in the Official Journal of the European Communities under that Directive and has been implemented as a national standard in at least one Member State, compliance with the normative clauses of this standard confers, within the limits of the scope of this standard, a presumption of conformity with the relevant Essential Requirements (except Essential Requirements 1.5.8 and 1.7.4.2 u)) of that Directive and associated EFTA regulations.

WARNING — Other requirements and other EU Directives may be applicable to the product(s) falling within the scope of this standard.

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