

Rubber and plastics Machines — Safety — Blow moulding machines intended for the production of hollow articles — Requirements for the design and construction

The European Standard EN 422:1995 has the status of a
British Standard

ICS 83.200

UDC 678.057.73.001.6:614.8

NO COPYING WITHOUT BSI PERMISSION EXCEPT AS PERMITTED BY COPYRIGHT LAW



Document Sharing Hub

Committees responsible for this British Standard

The preparation of this British Standard was entrusted to Technical Committee MCE/3, Safeguarding of machinery, upon which the following bodies were represented:

- Advanced Manufacturing Technology Research Institute
- British Cable Makers Confederation
- British Compressed Air Society
- British Federation of Printing Machinery and Supplies Ltd.
- British Rubber Manufacturers' Association Ltd.
- British Textile Machinery Association
- Consumer Policy Committee of BSI
- Engineering Employers' Federation
- Engineering Equipment and Materials Users' Association
- Federation of Bakers
- Health and Safety Executive
- Institute of Materials Management
- Institute of Occupational Safety and Health
- Loss Prevention Council
- Machine Tool Technologies Association
- Machinery Safety Equipment Manufacturers' Association
- Society of Laundry Engineers and Allied Trades Limited
- Trades Union Congress

The following bodies were also represented in the drafting of the standard, through subcommittees and panels:

- British Footwear Manufacturers' Federation
- British Plastics Federation
- Packaging and Industrial Films Association
- Plastics Machinery Distribution

This British Standard, having been prepared under the direction of the Engineering Sector Board, was published under the authority of the Standards Board and comes into effect on 15 February 1996

© BSI 01-1999

The following BSI references relate to the work on this standard:
Committee reference MCE/3
Draft for comment 91/70505 DC

ISBN 0 580 24770 8

Amendments issued since publication

Amd. No.	Date	Comments

Contents

	Page
Committees responsible	Inside front cover
National foreword	ii
Foreword	2
Text of EN 422	3
List of references	Inside back cover

National foreword

This British Standard has been prepared by Technical Committee MCE/3 and is the English language version of EN 422:1995, *Rubber and plastics machines — Safety — Blow moulding machines intended for the production of hollow articles — Requirements for the design and construction*, published by the European Committee for Standardization (CEN).

Cross-references

Publication referred to	Corresponding British Standard
	BS EN 292 <i>Safety of machinery. Basic concepts, general principles for design</i>
EN 292-1:1991	Part 1:1991 <i>Basic terminology, methodology</i>
EN 292-2:1991	Part 2:1991 <i>Technical principles and specifications</i>
EN 294:1992	BS EN 294:1992 <i>Safety of machinery — Safety devices distances to prevent danger zones being reached by the upper limbs</i>
EN 414:1992	BS EN 414:1992 <i>Safety of machinery — Rules for the drafting and presentation of safety standards — Emergency stop equipment — Functional aspects — Principles for design</i>
EN 563	BS EN 563:1994 <i>Safety of machinery — Temperatures of touchable surfaces — Ergonomics data to establish temperature limit values for hot surfaces</i>
EN 60204-1:1985	BS 2771 <i>Electrical equipment of industrial machines</i> Part 1:1986 <i>Specification for general requirements</i>
ISO 3744:1981	BS 4196 <i>Sound power levels of noise sources</i> Part 4:1981 <i>Engineering methods for determination of sound power levels for sources in free-field conditions over a reflecting plane</i>

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the EN title page, pages 2 to 20, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

ICS 83.200

Descriptors: Safety of machines, dangerous machines, moulding equipment, plastic moulding, blowing, hollow bodies, accident prevention, hazards, safety devices, safety measures, design

English version

Rubber and plastics machines — Safety — Blow moulding machines intended for the production of hollow articles — Requirements for the design and construction

Machines pour le caoutchouc et les matières plastiques — Sécurité — Machines de moulage par soufflage pour la fabrication des corps creux — Prescriptions pour la conception et la construction

Gummi- und Kunststoffmaschinen — Sicherheit — Blasformmaschinen zur Herstellung von Hohlkörpern — Anforderungen für Konzipierung und Bau

This European Standard was approved by CEN on 1994-08-31. 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 Central Secretariat 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 Central Secretariat has the same status as the official versions.

CEN members are the national bodies of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart 36, B-1050 Brussels

© 1995 All rights of reproduction and communication in any form and by any means reserved in all countries to CEN and its members

 **Documents**
Ref. No. EN 422:1995 E
Document Sharing Hub

Foreword

This European Standard has been prepared by CEN Technical Committee CEN/TC145, Rubber and plastics machines — safety, the secretariat of which is held by DIN.

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).

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 1995, and conflicting national standards shall be withdrawn at the latest by October 1995.

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

Contents

	Page
Foreword	2
0 Introduction	3
1 Scope	3
2 Normative references	3
3 Definitions	3
4 List of significant hazards	10
5 Safety requirements and/or measures	11
6 Verification of the safety requirements and/or measures	17
7 Information for use	17
Annex A (informative) Examples of ancillary equipment	19
Annex B (normative) Photoelectric safety systems	19
Annex C (informative) Prevention of mechanical hazards in the area of the delivery station	19
Figure 1 — Extrusion blow moulding machine	5
Figure 2 — Injection blow moulding machine	6
Figure 3 — Injection stretch blow moulding machine — second heat	7
Figure 4 — Large extrusion blow moulding machine	9
Figure 5 — Types of protection I, II and III	14
Table 1 — Verification method	18

0 Introduction

The extent to which hazards are covered is indicated in the scope of this standard. In addition, machinery shall comply as appropriate with EN 292 for hazards which are not covered by this standard.

1 Scope

This 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 machines¹⁾ are listed in clause 4.

Health and safety requirements for extruders, or injection moulding machines which may be a part of blow moulding machines are not covered by this standard. For these machines see prEN 1114-1 and EN 201.

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.

The standard does not cover the requirements for the design of the exhaust system.

This standard applies primarily to blow moulding machines manufactured after the date of publication 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 below. For dated references, subsequent amendments or revisions 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.

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.*

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

EN 414:1992, *Safety of machinery — Rules for the drafting and presentation of safety standards.*

EN 418:1992, *Safety of machinery — Emergency stop equipment — Functional aspects.*

EN 563, *Safety of machinery — Temperatures of touchable surfaces — Ergonomic data to establish limit values for hot surfaces.*

prEN 982, *Safety requirements for fluid power systems and components — hydraulics.*

prEN 983, *Safety requirements for fluid power systems and components — pneumatics.*

EN 60204-1, *Electrical equipment of machines — Part 1: General requirements.*

IEC 801-2, *Electromagnetic compatibility for industrial process measurement and control equipment — Part 2: Electrostatic discharge requirements.*

ISO 3744, *Acoustics — Determination of sound power levels of noise sources; Engineering method employing an enveloping measurement surface in an essentially free field over a reflecting plane.*

ISO 11201, *Acoustics — Noise emitted by machinery and equipment — Engineering method for the measurement of emission sound pressure levels at the work station and at other specified positions.*

3 Definitions

For the purposes of this standard the following definitions apply.

3.1 blow moulding machine

A machine which expands a preform to make a hollow article using gas under pressure blown into a fixed or moving blow mould. The preform may be produced by extrusion or by injection moulding.

3.1.1

extrusion blow moulding machine

a machine in which a hot tube produced by an extruder is introduced into a mould and blown (Figure 1)

3.1.2

extrusion stretch blow moulding machine

a machine in which a preform is produced as in 3.1.1

The preform is then:

- either directly transferred into a second mould, stretched and blown to obtain the final hollow article (first heat);
- or retained, reheated and then introduced into a second mould, stretched and blown to obtain the final hollow article (second heat).

the stretching consists of lengthening the preform inside the mould by means of an elongation rod

¹⁾ The standard cannot be applied to lines blowing films.

3.1.3

injection blow moulding machine

a machine in which a preform is produced by injection and then transferred into (the interior of) a mould where it is blown (Figure 2)

3.1.4

injection stretch blow moulding machine

a machine in which a preform is produced by injection. The preform is then:

- either transferred into the mould, stretched and blown (first heat);
- or retained, reheated, then introduced into the mould, stretched and blown (second heat) — (Figure 3).

3.2

area of movement of the moulds

the area in which the moulds move, close or open. All equipment which moves, closes, locks and opens the moulds is included

3.3

feed area

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

3.4

cutting device

the apparatus which cuts the parison at the exit of the extrusion head

3.5

blowing station

the part of the machine in which the hollow articles are blown and where the container aperture may be calibrated

3.6

delivery station

the part of the machine in which the hollow articles are withdrawn from the blow mould and removed from the machine

3.7

cooling station

the part of the machine in which the hollow articles are cooled after being withdrawn from the blow mould

3.8

finishing station

the part of the machine in which excess material is removed from the hollow article

3.9

heating station

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

3.10

rotary machines

a machine in which the moulds move on a circular or similar path

3.11

large machines

machines into which whole body access to the danger areas is possible (including access via the discharge aperture) or where persons may stand behind the guards (Figure 4)

3.12

ancillary equipment

equipment which forms a complex installation with the blow moulding machine and which is connected with the machine control circuit by the machine manufacturer