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PRODUCT STANDARDS

Machinery

GUIDANCE NOTES ON THE UK REGULATIONS

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Contents

This guide is intended to assist suppliers of machinery and safety components to understand the effect of the Regulations. It is not an authoritative interpretation of the Regulations, which is a matter for the Courts.

The guide seeks to explain the requirements of the Regulations in general terms and does not attempt to address detailed issues. You should refer to the Regulations themselves for a full statement of the requirements.

Machinery - the new law in brief

The Supply of Machinery (Safety) Regulations 1992 entered into force on 1 January 1993 although there was a transitional period to 31 December 1994 during which the manufacturer or importer into the European Community was able to choose between **either** the Community regime described below or complying with the health and safety legislation in force on 31 December 1992.

The Supply of Machinery (Safety) (Amendment) Regulations 1994 made a number of changes to the 1992 Regulations, in particular, to widen the scope to include machinery for lifting persons and safety components for machinery. The main provisions of the amending Regulations entered into force on 1 January 1995.

Therefore from **1 January 1995:**

- most machinery supplied in the United Kingdom, including imports, must:
  - satisfy wide-ranging health and safety requirements, for example on construction, moving parts and stability; and
  - in some cases, have been subjected to type-examination by an approved body; and
  - carry CE marking and other information.
- the manufacturer or the importer will generally have to be able to assemble a file containing technical information relating to the machine.

Special transitional arrangements remain for products covered by existing Directives on roll-over and falling-object protective structures and industrial trucks and for safety components and machinery for lifting persons.

Failure to comply with these requirements:

- **will mean that the machinery cannot legally be supplied in the United Kingdom;**
- **could result in prosecution and penalties, on conviction, of a fine up to £5,000 or, in some cases, of imprisonment for up to three months, or of both.**

The same rules apply everywhere in the European Economic Area (EEA), so machinery complying with the Community regime may be supplied in any EEA State.

Free movement of goods

Achieving the free movement of goods lies at the heart of achieving an open market for business in Europe.

In May 1985, European Community Ministers agreed on a 'New Approach to Technical Harmonisation and Standards' in order to fulfil this objective.

'New Approach' Directives (that is Community laws) set out 'essential requirements' (for safety, for example), written in general terms, which must be met before products may be supplied in the United Kingdom or anywhere else in the Community. European standards fill in the detail and are the main way for businesses to meet the 'essential requirements'. The Directives also say how manufacturers are to show that products meet the 'essential requirements'. Products meeting the requirements are to carry CE marking, which should mean that they can be supplied anywhere in the Community.

The Machinery Directive 89/392/EEC, as amended by Directives 91/368/EEC, 93/44/EEC and 93/68/EEC is such a Directive. It has been implemented in the United Kingdom by the Supply of Machinery (Safety) Regulations 1992 and the Supply of Machinery (Safety) (Amendment) Regulations 1994. This booklet describes those Regulations.

The Machinery Directive has also been extended by the European Economic Area Agreement which came into force on 1 January 1994. Under the Agreement the provisions of the Directive now apply across the fifteen Member States of the European Community and three states of the European Free Trade Association: Norway, Iceland and, from 1 May 1995, Liechtenstein.

The Supply of Machinery (Safety) Regulations 1992 (S.I. 1992/3073) as amended (S.I. 1994/2063)

Entry into force: 1 January 1993.

Primary legislation: the European Communities Act 1972.

Coverage: **machinery, described as:**

- ❑ an assembly of linked parts or components, at least one of which moves, with the appropriate actuators, control and power circuits, joined together for a specific application, in particular for the processing, treatment, moving or packaging of a material;

- ❑ an assembly of machines which, in order to achieve the same end, are arranged and controlled so that they function as an integral whole; and

- ❑ interchangeable equipment modifying the function of a machine which is supplied for the purpose of being assembled with a machine (or a series of different machines or with a tractor) by the operator himself in so far as this equipment is not a spare part or a tool; and

safety components for machinery, described as:

- ❑ components which are supplied separately to fulfil a safety function when in use and the failure or malfunctioning of which endangers the safety or health of exposed persons.

Exceptions: the Regulations do **not** apply to machinery or safety components:

- ❑ listed in Annex A;

- ❑ previously used in the European Community or, since 1 January 1994 the European Economic Area (e.g. second-hand);

- ❑ for use outside the European Economic Area which does not carry CE marking;

- ❑ where the risks are mainly of electrical origin (such machinery is covered by the Electrical Equipment (Safety) Regulations 1994[1]);

- ❑ to the extent that the risks are wholly or partly covered by other Directives, from the date those other Directives are implemented into United Kingdom law;

- ❑ machinery first supplied in the European Community before 1 January 1993;

- ❑ safety components or machinery for lifting persons first supplied in the European Economic Area before 1 January 1995.

1 S.I. 1994/3260

Transitional arrangements: the Regulations do not apply to machinery first supplied (e.g. in stock) in the European Economic Area before 1 January 1995 which complies with United Kingdom health and safety legislation in force on 31 December 1992, the main legislation being the Health and Safety at Work etc. Act 1974, the Health and Safety at Work (Northern Ireland) Order 1978 and the Consumer Protection Act 1987.

The Regulations do not apply to products covered by the following specific Regulations which are first supplied in the European Economic Area before 1 July 1995:

- the Roll-over Protective Structures for Construction Plant (EEC Requirements) Regulations 1988[1];
- the Falling-object Protective Structures for Construction Plant (EEC Requirements) Regulations 1988[2];
- the Self-Propelled Industrial Trucks (EEC Requirements) Regulations 1988[3], as amended[4];
- the Self-Propelled Industrial Trucks (EEC Requirements) Regulations (Northern Ireland) 1990[5].

Products covered by these specific Regulations first supplied on or after 1 July 1995 must comply **either** with the requirements of the specific Regulations **or** with the requirements of the Supply of Machinery (Safety) Regulations. All such products first supplied on or after 1 January 1996 must comply with the Supply of Machinery (Safety) Regulations.

The Regulations do not apply to safety components and machinery for lifting persons first supplied in the European Economic Area before 1 January 1995. Such products first supplied on or after 1 January 1995 must comply either with the Supply of Machinery (Safety) Regulations or the United Kingdom health and safety legislation in force relating to these items on 14 June 1993. All such products first supplied after 1 January 1997 must comply with the Supply of Machinery (Safety) Regulations.

General requirements: subject to the exceptions and transitional arrangements described above, the Regulations make it an offence for a 'responsible person' to supply machinery or a safety component unless:

- it satisfies the essential health and safety requirements;
- the appropriate conformity assessment procedure has been carried out;
- an EC declaration of conformity or declaration of incorporation has been issued;

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1 S.I. 1988/363
2 S.I. 1988/362
3 S.I. 1988/1736
4 By the Self-Propelled Industrial Trucks (EEC Requirements) (Amendment) Regulations 1989 (S.I. 1989/1035)
5 S.R. 1990 No 172

- CE marking has been properly affixed (unless a declaration of incorporation has been issued); and

- it is in fact safe.

The Regulations also make it an offence for any supplier to supply machinery or a safety component **unless it is safe.**

- The **'responsible person'**, according to the Regulations, is the manufacturer or the importer into the European Economic Area (EEA). The 'responsible person' can be a manufacturer outside the EEA but in this case the importer into the EEA will need to ensure that the machinery or safety component complies. If it does not, the importer will be responsible for bringing it into conformity.

- The meaning of **'supply'** is as defined by Section 46 of the Consumer Protection Act 1987. It also includes offering to supply, agreeing to supply, exposing for supply and possessing for supply but is restricted to supply in the course of business.

- 'Supply' also includes first putting into service in the course of business by the manufacturer or the importer into the United Kingdom from outside the EEA.

- 'Supply' does **not** include the exhibition at trade fairs and exhibitions of machinery or a safety component which does not comply, provided that a visible sign clearly indicates that it does not comply and that it is not for supply until it has been brought into conformity.

- **'Safe'** means that, when the machinery or safety component is properly installed and maintained and used for the purposes for which it is intended, there is no risk (apart from one reduced to a minimum) of its endangering the health of or of its being the cause or occasion of death or injury to persons or, where appropriate, to domestic animals or damage to property.

- The practicability, at the time of manufacture, of reducing the risk may be taken into account when considering whether or not the risk has been reduced to a minimum.

Essential health and safety requirements: to comply with the Regulations, machinery and safety components must satisfy the essential health and safety requirements (set out in Annex B) which apply to it. The requirements are wide-ranging, and take into account potential dangers to operators and other exposed persons within a 'danger zone'. Aspects covered in Part 1 include: the materials used in the construction of the machinery; lighting; controls; stability; fire; noise; vibration; radiation; emission of dust, gases etc; and maintenance. Part 2 has additional requirements for agri-foodstuffs machinery, portable hand-held machinery, and machinery for working wood and analogous materials. Part 3 deals with particular hazards associated with mobility, Part 4 with those associated with

lifting, Part 5 those with underground working and Part 6 those with the lifting or moving of persons. The requirements also comment on instructions (including translation requirements) and marking.

When applying the essential health and safety requirements, technical and economic limitations at the time of construction may be taken into account.

Standards: machinery and safety components manufactured in conformity with specified, published European standards which have also been published as identically worded national standards ('transposed harmonised standards'), will be presumed to comply with the essential health and safety requirements covered by those standards.

The European Committee for Standardisation (CEN) is working to produce a complex of European standards at three levels in support of the Machinery Directive. The first (A) level comprises general principles for the design of machinery. The second (B) level covers specific safety devices and ergonomic aspects. The third (C) level deals with specific classes of machinery by calling up the appropriate standards from the first two levels and addressing requirements specific to the class.

Enquiries on the progress of these standards should be addressed to the BSI Information Centre (see page 13).

The reference numbers of the specified European standards are published in the *Official Journal of the European Communities*. The reference numbers of the British Standards which are transposed harmonised standards are published in *Business Briefing*, published by the Association of British Chamber of Commerce. A consolidated list - Machinery Directive: Transposed harmonised standards - is available from the DTI's Business in Europe Hotline on 0117 944 4888.

HOW TO COMPLY

Step 1 - Conformity assessment ('attestation')

The responsibility for demonstrating that the machinery or safety component satisfies the essential health and safety requirements rests on the 'responsible person' (see page 7).

For most machinery or safety components (other than that listed in Annex D): the 'responsible person', must be able to assemble the technical file described in Annex E.

For machinery or safety components listed in Annex D: the 'responsible person' must follow the special procedures described below.

For machinery or safety components listed in Annex D and manufactured in conformity with transposed harmonised standards: the 'responsible person' may choose between:

- drawing up and forwarding the technical file described in Annex E to a body approved by a Member State for the purposes of the conformity assessment procedures (an 'approved body'). The approved body will acknowledge receipt of the file as soon as possible and keep it; or

- submitting the technical file described in Annex E to an approved body. The approved body will simply verify that the transposed harmonised standards have been correctly applied and draw up a certificate of adequacy for the file, sending a copy to the 'responsible person'; or

- submitting to an approved body an example of the machinery or safety component for EC type-examination.

For machinery or safety components listed in Annex D but not manufactured in conformity with transposed harmonised standards: the 'responsible person' must first submit an example of the machinery or safety component for EC type-examination.

EC type-examination is a procedure, carried out by an approved body, to ascertain and certify that an example of machinery or safety component satisfies the relevant provisions of the Directive (details on EC type-examination are set out in Annex F).

In the United Kingdom, the Secretary of State for Trade and Industry is responsible for appointing approved bodies. The European Commission publishes EEA-wide lists of such bodies in the *Official Journal of the European Communities* (see page 13). A list - Machinery Directive: UK Approved Bodies - is available from DTI's Business in Europe Hotline on 0117 944 4888.

The United Kingdom Accreditation Service (UKAS) assesses applications for approved body status from United Kingdom organisations. Further information is available from UKAS, Audley House, 13 Palace Street, London SW1E 5HS (Tel: 0171-233 7111).

Step 2 - Declaration procedure

Declaration of conformity: the 'responsible person' must then draw up an EC declaration of conformity, described in Annex G, for each machine or safety component supplied. This declaration is intended to be issued with the machine or safety component and declares that it complies with the relevant essential health and safety requirements or with the example that underwent type-examination.

Declaration of incorporation: alternatively, where the machinery is intended for incorporation into other machinery or assembly with other machinery to constitute machinery covered by the Regulations, the 'responsible person' may draw up a declaration of incorporation, described in Annex H, for each machine.

This option is not available for interchangeable equipment modifying the function of the machine or machinery which can function independently.

Step 3 - Marking

Once a declaration of conformity has been issued, the 'responsible person' must affix the CE marking to the machinery.

The marking is as illustrated in diagram 1, below. Except for small-scale machinery, the marking may not be smaller than 5mm in its vertical height, and the proportions in diagram 2, below, must be maintained whatever its size. The grid does not form part of the marking and is for information only.

CE

Diagram 1

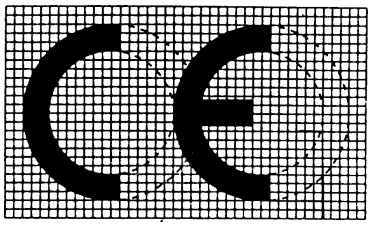

Diagram 2

CE marking must be affixed in a distinct, visible, legible and indelible manner.

The CE marking should not be affixed to safety components or for machinery for which a declaration of incorporation has been issued.

- ❑ The Regulations make it an offence to affix a mark to machinery which may be confused with CE marking.
- ❑ At the option of the 'responsible person', machinery first supplied before 1 January 1997 may carry the CE marking as set out in the Supply of Machinery (Safety) Regulations 1992 (i.e. including the last two digits of the year of affixation).
- ❑ Machinery or safety components that comply with the Regulations may also be subject to other Community Directives. For example, an electric machine permanently installed in a building would need to comply with legislation implementing the Construction Products and Electromagnetic Compatibility Directives as well as any other existing relevant legislation. In such cases the CE marking indicates that the requirements of those other Directives have been complied with.
- ❑ Machinery bearing CE marking and accompanied by the EC declaration of conformity can be presumed to satisfy the provisions of the Machinery Directive unless there are reasonable grounds for suspecting otherwise.

- ❑ A person who supplies machinery which does not bear CE marking is required, if requested by an enforcement authority, to provide any available information about why it does not bear CE marking. It is an offence to fail to provide this information if requested.

The conformity assessment and marking requirements are shown in diagrammatic form in Annex J.

Enforcement: in Great Britain the Health and Safety Executive is responsible for enforcing the Regulations in relation to machinery and safety components for use at work; local authority Trading Standards Officers in relation to machinery and safety components for private use.

In Northern Ireland the Department of Economic Development and the Department of Agriculture are responsible for enforcing the Regulations in relation to machinery and safety components for use at work; district councils in relation to machinery and safety components for private use.

- ❑ The enforcement authorities have available to them various powers under the Health and Safety at Work etc Act 1974, the Health and Safety at Work (Northern Ireland) Order 1978 and the Consumer Protection Act 1987, for example, relating to suspension, prohibition and prosecution.

- ❑ Where machinery bearing the CE marking is safe but there are breaches of other obligations, the 'responsible person' will be given the opportunity to correct the breach before further enforcement action is taken.

- ❑ The Machinery Directive, as amended, requires Member States to inform the European Commission of any specific enforcement action taken. The Commission will consider whether the action is justified and advise the parties concerned accordingly.

Penalties: the maximum penalty for contravening the prohibition on supply of non-compliant machinery and safety components is imprisonment for up to three months or a fine of up to £5,000 or both. The penalty for other contraventions of the Regulations is a fine up to the same amounts.

- ❑ It is for the Courts to decide the penalty in any given case, taking into account the severity of the offence.

- ❑ The Regulations provide a defence of due diligence. They also provide for proceedings to be taken against a person other than the principal offender, if it is the other person's fault, and against officers of a company or other body corporate.

Other legislation: the Health and Safety at Work etc Act 1974, the Health and Safety at Work (Northern Ireland) Order 1978 and the Consumer Protection Act 1987 continue to apply.

General Product Safety Regulations (S.I. 1994/2328): these Regulations, which implement the General Product Safety Directive (92/59/EEC), came into force on 3 October 1994. They largely replace section 10 (the general safety requirement) of the Consumer Protection Act 1987. They apply to new and second-hand products supplied by business to consumers for their private use. The Regulations cover a wide range of products but do not apply to products covered by specific Community law which is comprehensive in terms of safety coverage (such as the Machinery Directive). They will therefore be relevant to some machinery which is outside the scope of the Machinery Directive, for example second-hand machinery. Enquiries about the Regulations should be addressed to the Department of Trade and Industry, Consumer Safety Unit, Room 4.H.5, 1 Victoria Street, London SW1H 0ET (Tel: 0171-215 0359).

Provision and Use of Work Equipment Regulations 1992[1]: these Regulations, implementing a complementary Directive on the **use** of machinery entered into force on 1 January 1993. A brief description is set out in Annex K. Corresponding legislation in Northern Ireland (the Provision and Use of Work Equipment Regulations (Northern Ireland) 1993[2]) entered into force on 22 February 1993.

Availability of text of the Regulations: the Supply of Machinery (Safety) Regulations 1992 (S.I. 1992/3073) and the Supply of Machinery (Safety) (Amendment) Regulations 1994 (S.I. 1994/2063) are available from HMSO and its agents (see page 13).

Availability of text of the Directives: the complete texts of Directives 89/392/EEC, 91/368/EEC, 93/44/EEC and 93/68/EEC were published in the *Official Journal of the European Communities* (No L183 of 29.6.89, No L198 of 22.7.91, No L175 of 19.7.93 and No L220 of 30.8.93 respectively). Copies of these texts are available from HMSO (see page 13), European Information Centres and European Documentation Centres located throughout the United Kingdom. To locate your nearest Centre, consult the DTI's booklet *Contacts*, available through the Business in Europe Hotline on 0117 944 4888.

Please note that the DTI does not supply copies of the Regulations, of standards or of Directives.

1 S.I. 1992/2932
2 S.R. 1993 No 19

Further information

Further copies of this booklet are available from the DTI's Business in Europe Hotline on 0117 944 4888. Copies of the Directives or the Regulations are available from: HMSO Publications Centre, P O Box 276, London SW8 5DT. (Tel: 0171 873 9090. Fax: 0171 873 8200).

Where compliant machinery or safety components are denied proper access to the market in other EEA countries, contact: Action Single Market, Department of Trade and Industry, Bay 211, Kingsgate House, 66-74 Victoria Street, London SW1E 6SW. (Tel: 0171 215 4212, Fax: 0171 215 4489).

Enquiries relating to policy issues, particularly those which need to be taken up at the European level should be addressed to: Department of Trade and Industry, Standards & Technical Regulations Directorate, Third Floor Red Zone, 151 Buckingham Palace Road, London SW1W 9SS.

Where further information or guidance is required on specific questions relating to this legislation, enquirers can contact the following:

- **Health and Safety Executive (HSE)** can give advice on enforcement matters, and on technical matters related, for example, to the essential health and safety requirements relating to machinery for use in the workplace in Great Britain. In the first instance, enquirers should contact their local HSE area office (see list at Annex C).

- **Department of Economic Development** can deal with enquiries relating to machinery for use in the workplace in Northern Ireland at the following address: Department of Economic Development, Health and Safety Division, 83 Ladas Drive, Belfast BT6 9FJ. (Tel: 01232 251333. Fax: 01232 546888).

- **Local authority Trading Standards Departments** can deal with enquiries relating to machinery for private use (see local telephone directory for details).

- **Approved Bodies** are appointed to carry out Special Attestation Procedures required for machinery listed under Schedule 4 of the Supply of Machinery Safety Regulations 1992 (as amended). They can also offer wide-ranging advice on the Regulations. A list - Machinery Directive: UK Approved Bodies - is available from the DTI's Business in Europe Hotline on 0117 944 4888. A EEA-wide list of approved bodies is available from HMSO (*Official Journal of the European Communities* No C172 of 15.6.96).

- **BSI's Information Centre** can provide information about the standards which may be used to demonstrate conformity with the essential health and safety requirements. Enquiries should be addressed to: BSI Information Centre, Mechanical Group, 389 Chiswick High Road, Chiswick, London W4 4AL. (Tel: 0181 996 7024. Fax: 0181 996 7048). A consolidated list - Machinery Directive: Transposed harmonised standards - is available from DTI's Business in Europe Hotline on 0117 944 4888.

- **Trade associations** can often provide advice specific to the sectors in which they operate.

- **Independent consultants** may also be able to offer advice on the Regulations. The Department is aware of a number who have indicated that they can do so. The Department, however, has no knowledge of their expertise or status and enquirers should therefore satisfy themselves as to their experience and services when making their enquiry. A list - Machinery Directive: Independent sources of advice - is available from the DTI's Business in Europe Hotline on 0117 944 4888.

ANNEX A

Machinery excluded from the coverage of the Regulations

(a) Machinery whose only power source is directly applied manual effort, unless it is a machine used for lifting or lowering loads.

(b) Machinery for medical use used in direct contact with patients.

(c) Special equipment for use in fairgrounds and/or amusement parks.

(d) Steam boilers, tanks and pressure vessels.

(e) Machinery specially designed or put into service for nuclear purposes which, in the event of failure, may result in an emission of radioactivity.

(f) Radioactive sources forming part of a machine.

(g) Firearms.

(h) Storage tanks and pipelines for petrol, diesel fuel, inflammable liquids and dangerous substances.

(i) Means of transport, that is vehicles and their trailers intended solely for transporting passengers by air or on road, rail or water networks, as well as means of transport in so far as such means are designed for transporting goods by air, on public road or rail networks or on water. Vehicles used in the mineral extraction industry shall not be excluded.

(j) Seagoing vessels and mobile offshore units together with equipment on board such vessels or units.

(k) Cableways, including funicular railways, for the public or private transportation of persons.

(l) Agricultural and forestry tractors, as defined in Article 1(1) of Council Directive 74/150/EEC[1] of 4 March 1974 on the approximation of the laws of Member States relating to type-approval of wheeled agricultural or forestry tractors, as last amended by Directive 88/297/EEC[2].

(m) Machines specially designed and constructed for military or police purposes.

(contd)

1 *Official Journal* No L84 of 28.3.74, p10.
2 *Official Journal* No L126 of 20.5.88, p52.

(n) Lifts which permanently serve specific levels of buildings and constructions, having a car moving between guides which are rigid and inclined at an angle of more than 15 degrees to the horizontal and designed for the transport of:

- persons;
- persons and goods;
- goods alone if the car is accessible, that is to say, a person may enter it without difficulty, and fitted with controls situated inside the car or within reach of a person inside.

(o) Means of transport of persons using rack and pinion rail mounted vehicles.

(p) Mine winding gear.

(q) Theatre elevators.

(r) Construction site hoists intended for lifting persons or persons and goods.

Essential health and safety requirements relating to the design and construction of machinery and safety components

For the purposes of this Annex 'machinery' means either 'machinery' or ' safety component'.

PRELIMINARY OBSERVATIONS

The obligations laid down by the essential health and safety requirements apply only when the corresponding hazard exists for the machinery in question when it is used under the conditions foreseen by the manufacturer. In any event, requirements 1.1.2, 1.7.3 and 1.7.4 apply to all machinery covered by this Directive.

The essential health and safety requirements laid down in this Directive are mandatory. However, taking into account the state of the art, it may not be possible to meet the objectives set by them. In this case, the machinery must as far as possible be designed and constructed with the purpose of approaching those objectives.

The essential health and safety requirements have been grouped according to the hazards which they cover.

Machinery presents a series of hazards which may be indicated under more than one heading in this Annex.

The manufacturer is under an obligation to assess the hazards in order to identify all those which apply to his machine; he must then design and construct it taking account of his assessment.

1 ESSENTIAL HEALTH AND SAFETY REQUIREMENTS

1.1 GENERAL REMARKS

1.1.1 Definitions

For the purpose of this Directive:

1. 'danger zone' means any zone within and/or around machinery in which an exposed person is subject to a risk to his health or safety;

2. 'exposed person' means any person wholly or partially in a danger zone;

3. 'operator' means the person or persons given the task of installing, operating, adjusting, maintaining, cleaning, repairing or transporting machinery.

1.1.2 Principles of safety integration

(a) Machinery must be so constructed that it is fitted for its function, and can be adjusted and maintained without putting persons at risk when these operations are carried out under the conditions foreseen by the manufacturer.

The aim of measures taken must be to eliminate any risk of accident throughout the foreseeable lifetime of the machinery, including the phases of assembly and dismantling, even where risks of accident arise from foreseeable abnormal situations.

(b) In selecting the most appropriate methods, the manufacturer must apply the following principles, in the order given:

- eliminate or reduce risks as far as possible (inherently safe machinery design and construction);
- take the necessary protection measures in relation to risks that cannot be eliminated;
- inform users of the residual risks due to any shortcomings of the protection measures adopted, indicate whether any particular training is required and specify any need to provide personal protection equipment.

(c) When designing and constructing machinery, and when drafting the instructions, the manufacturer must envisage not only the normal use of the machinery but also uses which could reasonably be expected.

The machinery must be designed to prevent abnormal use if such use would engender a risk. In other cases the instructions must draw the user's attention to ways – which experience has shown might occur – in which the machinery should not be used.

(d) Under the intended conditions of use, the discomfort, fatigue and psychological stress faced by the operator must be reduced to the minimum possible taking ergonomic principles into account.

(e) When designing and constructing machinery, the manufacturer must take account of the constraints to which the operator is subject as a result of the necessary or foreseeable use of personal protection equipment (such as footwear, gloves, etc).

(f) Machinery must be supplied with all the essential special equipment and accessories to enable it to be adjusted, maintained and used without risk.

1.1.3 Materials and products

The materials used to construct machinery or products used and created during its use must not endanger exposed persons' safety or health.

In particular, where fluids are used, machinery must be designed and constructed for use without risks due to filling, use, recovery or draining.

1.1.4 Lighting

The manufacturer must supply integral lighting suitable for the operations concerned where its lack is likely to cause a risk despite ambient lighting of normal intensity.

The manufacturer must ensure that there is no area of shadow likely to cause nuisance, that there is no irritating dazzle and that there are no dangerous stroboscopic effects due to the lighting provided by the manufacturer.

Internal parts requiring frequent inspection, and adjustment and maintenance areas, must be provided with appropriate lighting.

1.1.5 Design of machinery to facilitate its handling

Machinery or each component part thereof must:

- be capable of being handled safely;
- be packaged or designed so that it can be stored safely and without damage (eg adequate stability, special supports, etc).

Where the weight, size or shape of machinery or its various component parts prevents them from being moved by hand, the machinery or each component part must:

- either be fitted with attachments for lifting gear; or
- be designed so that it can be fitted with such attachments (eg threaded holes); or
- be shaped in such a way that standard lifting gear can easily be attached.

Where machinery or one of its component parts is to be moved by hand, it must:

- either be easily movable; or
- be equipped for picking up (eg hand-grips etc) and moving in complete safety.

Special arrangements must be made for the handling of tools and/or machinery parts, even if lightweight, which could be dangerous (shape, material, etc).

1.2 CONTROLS

1.2.1 Safety and reliability of control systems

Control systems must be designed and constructed so that they are safe and reliable, in a way that will prevent a dangerous situation arising. Above all they must be designed and constructed in such a way that:

- they can withstand the rigours of normal use and external factors;
- errors in logic do not lead to dangerous situations.

1.2.2 Control devices

Control devices must be:

- clearly visible and identifiable and appropriately marked where necessary;
- positioned for safe operation without hesitation or loss of time, and without ambiguity;
- designed so that the movement of the control is consistent with its effect;
- located outside the danger zones, except for certain controls where necessary, such as emergency stop or a console for training of robots;
- positioned so that their operation cannot cause additional risk;
- designed or protected so that the desired effect, where a risk is involved, cannot occur without an intentional operation;
- made so as to withstand foreseeable strain; particular attention must be paid to emergency stop devices liable to be subjected to considerable strain.

Where a control is designed and constructed to perform several different actions, namely where there is no one-to-one correspondence (eg keyboards, etc), the action to be performed must be clearly displayed and subject to confirmation where necessary.

Controls must be so arranged that their layout, travel and resistance to operation are compatible with the action to be performed, taking account of ergonomic principles. Constraints due to the necessary or foreseeable use of personal protection equipment (such as footwear, gloves, etc) must be taken into account.

Machinery must be fitted with indicators (dials, signals, etc) as required for safe operation. The operator must be able to read them from the control position.

From the main control position the operator must be able to ensure that there are no exposed persons in the danger zones.

If this is impossible, the control system must be designed and constructed so that an acoustic and/or visual warning signal is given whenever the machinery is about to start. The exposed person must have the time and the means to take rapid action to prevent the machinery starting up.

1.2.3 Starting

It must be possible to start machinery only by voluntary actuation of a control provided for the purpose.

The same requirement applies:

- when restarting the machinery after a stoppage, whatever the cause;
- when effecting a significant change in the operating conditions (eg speed, pressure, etc);

unless such restarting or speed-change is without risk to exposed persons.

This essential requirement does not apply to the restarting of the machinery or to the change in operating conditions resulting from the normal sequence of an automatic cycle.

Where machinery has several starting controls and the operators can therefore put each other in danger, additional devices (eg enabling devices or selectors allowing only one part of the starting mechanism to be actuated at any one time) must be fitted to rule out such risks.

It must be possible for automated plant functioning in automatic mode to be restarted easily after a stoppage once the safety conditions have been fulfilled.

1.2.4 Stopping device

Normal stopping

Each machine must be fitted with a control whereby the machine can be brought safely to a complete stop.

Each workstation must be fitted with a control to stop some or all of the moving parts of the machinery, depending on the type of hazard, so that the machinery is rendered safe. The machinery's stop control must have priority over the start controls.

Once the machinery or its dangerous parts have stopped, the energy supply to the actuators concerned must be cut off.

Emergency stop

Each machine must be fitted with one or more emergency stop devices to enable actual or impending danger to be averted. The following exceptions apply:

- machines in which an emergency stop device would not lessen the risk, either because it would not reduce the stopping time or because it would not enable the special measures required to deal with the risk to be taken;
- hand-held portable machines and hand-guided machines.

This device must:

- have clearly identifiable, clearly visible and quickly accessible controls;
- stop the dangerous process as quickly as possible, without creating additional hazards;
- where necessary, trigger or permit the triggering of certain safeguard movements.

Once active operation of the emergency stop control has ceased following a stop command, that command must be sustained by engagement of the emergency stop device until that engagement is specifically overridden; it must not be possible to engage the device without triggering a stop command; it must be possible to disengage the device only by an appropriate operation, and disengaging the device must not restart the machinery but only permit restarting.

Complex installations

In the case of machinery or parts of machinery designed to work together, the manufacturer must so design and construct the machinery that the stop controls, including the emergency stop, can stop not only the machinery itself but also all equipment upstream and/or downstream if its continued operation can be dangerous.

1.2.5 Mode selection

The control mode selected must override all other control systems with the exception of the emergency stop.

If machinery has been designed and built to allow for its use in several control or operating modes presenting different safety levels (eg to allow for adjustment, maintenance, inspection etc), it must be fitted with a mode selector which can be locked in each position. Each position of the selector must correspond to a single operating or control mode.

The selector may be replaced by another selection method which restricts the use of certain functions of the machinery to certain categories of operator (eg access codes for certain numerically controlled functions, etc).

If, for certain operations, the machinery must be able to operate with its protection devices neutralised, the mode selector must simultaneously:

- disable the automatic control mode;
- permit movements only by controls requiring sustained action;
- permit the operation of dangerous moving parts only in enhanced safety conditions (eg reduced speed, reduced power, step-by-step, or other adequate provision) while preventing hazards from linked sequences;
- prevent any movement liable to pose a danger by acting voluntarily or involuntarily on the machine's internal sensors.

In addition, the operator must be able to control operation of the parts he is working on at the adjustment point.

1.2.6 Failure of the power-supply

The interruption, re-establishment after an interruption or fluctuation in whatever manner of the power supply to the machinery must not lead to a dangerous situation.

In particular:

- the machinery must not start unexpectedly;
- the machinery must not be prevented from stopping if the command has already been given;
- no moving part of the machinery or piece held by the machinery must fall or be ejected;
- automatic or manual stopping of the moving parts whatever they may be must be unimpeded;
- the protection devices must remain fully effective.

1.2.7 Failure of the control circuit

A fault in the control circuit logic, or failure of or damage to the control circuit, must not lead to dangerous situations.

In particular:

- the machinery must not start unexpectedly;
- the machinery must not be prevented from stopping if the command has already been given;
- no moving part of the machinery or piece held by the machinery must fall or be ejected;

- automatic or manual stopping of the moving parts whatever they may be must be unimpeded;

- the protection devices must remain fully effective.

1.2.8 Software

Interactive software between the operator and the command or control system of a machine must be user-friendly.

1.3 PROTECTION AGAINST MECHANICAL HAZARDS

1.3.1 Stability

Machinery, components and fittings thereof must be so designed and constructed that they are stable enough, under the foreseen operating conditions (if necessary taking climatic conditions into account) for use without risk of overturning, falling or unexpected movement.

If the shape of the machinery itself or its intended installation does not offer sufficient stability, appropriate means of anchorage must be incorporated and indicated in the instructions.

1.3.2 Risk of break-up during operation

The various parts of machinery and their linkages must be able to withstand the stresses to which they are subject when used as foreseen by the manufacturer. The durability of the materials used must be adequate for the nature of the workplace foreseen by the manufacturer, in particular as regards the phenomena of fatigue, ageing, corrosion and abrasion.

The manufacturer must indicate in the instructions the type and frequency of inspection and maintenance required for safety reasons. He must, where appropriate, indicate the parts subject to wear and the criteria for replacement.

Where a risk of rupture or disintegration remains despite the measures taken (eg as with grinding wheels) the moving parts must be mounted and positioned in such a way that in case of rupture their fragments will be contained.

Both rigid and flexible pipes carrying fluids, particularly those under high pressure, must be able to withstand the foreseen internal and external stresses and must be firmly attached and/or protected against all manner of external stresses and strains; precautions must be taken to ensure that no risk is posed by a rupture (sudden movement, high-pressure jets, etc).

Where the material to be processed is fed to the tool automatically, the following conditions must be fulfilled to avoid risks to the persons exposed (eg tool breakage):

- when the workpiece comes into contact with the tool the latter must have attained its normal working conditions;

- when the tool starts and/or stops (intentionally or accidentally) the feed movement and the tool movement must be co-ordinated.

1.3.3 Risks due to falling or ejected objects

Precautions must be taken to prevent risks from falling or ejected objects (eg workpieces, tools, cuttings, fragments, waste, etc).

1.3.4 Risks due to surfaces, edges or angles

In so far as their purpose allows, accessible parts of the machinery must have no sharp edges, no sharp angles and no rough surfaces likely to cause injury.

1.3.5 Risks related to combined machinery

Where the machinery is intended to carry out several different operations with the manual removal of the piece between each operation (combined machinery), it must be designed and constructed in such a way as to enable each element to be used separately without the other elements constituting a danger or risk for the exposed person.

For this purpose, it must be possible to start and stop separately any elements that are not protected.

1.3.6 Risks relating to variations in the rotational speed of tools

When the machine is designed to perform operations under different conditions of use (eg different speeds or energy supply), it must be designed and constructed in such a way that selection and adjustment of these conditions can be carried out safely and reliably.

1.3.7 Prevention of risks related to moving parts

The moving parts of machinery must be designed, built and laid out to avoid hazards or, where hazards persist, fixed with guards or protective devices in such a way as to prevent all risk of contact which could lead to accidents. All necessary steps must be taken to prevent accidental blockage of moving parts involved in the work. In cases where, despite the precautions taken, a blockage is likely to occur, specific protection devices or tools, the instruction handbook and possibly a sign on the machinery should be provided by the manufacturer to enable the equipment to be safely unblocked.

1.3.8 Choice of protection against risks related to moving parts

Guards or protection devices used to protect against the risks related to moving parts must be selected on the basis of the type of risk. The following guidelines must be used to help make the choice.

A. Moving transmission parts

Guards designed to protect exposed persons against the risks associated with moving transmission parts (such as pulleys, belts, gears, rack and pinions, shafts, etc) must be:

- either fixed, complying with requirements 1.4.1 and 1.4.2.1; or
- movable, complying with requirements 1.4.1 and 1.4.2.2.A.

Movable guards should be used where frequent access is foreseen.

B. Moving parts directly involved in the process

Guards or protection devices designed to protect exposed persons against the risks associated with moving parts contributing to the work (such as cutting tools, moving parts of presses, cylinders, parts in the process of being machined, etc) must be:

- wherever possible fixed guards complying with requirements 1.4.1 and 1.4.2.1;
- otherwise, movable guards complying with requirements 1.4.1 and 1.4.2.2.B or protection devices such as sensing devices (eg non-material barriers, sensor mats), remote-hold protection devices (eg two-hand controls), or protection devices intended automatically to prevent all or part of the operator's body from encroaching on the danger zone in accordance with requirements 1.4.1 and 1.4.3.

However, when certain moving parts directly involved in the process cannot be made completely or partially inaccessible during operation, owing to operations requiring nearby operator intervention, where technically possible such parts must be fitted with:

- fixed guards, complying with requirements 1.4.1 and 1.4.2.1 preventing access to those sections of the parts that are not used in the work;
- adjustable guards, complying with requirements 1.4.1 and 1.4.2.3 restricting access to those sections of the moving parts that are strictly for the work.

1.4 REQUIRED CHARACTERISTICS OF GUARDS AND PROTECTION DEVICES

1.4.1 General requirement

Guards and protection devices must:

- be of robust construction;
- not give rise to any additional risk;
- not be easy to bypass or render non-operational;
- be located at an adequate distance from the danger zone;
- cause minimum obstruction to the view of the production process;
- enable essential work to be carried out on installation and/or replacement of tools and also for maintenance by restricting access only to the area where the work has to be done, if possible without the guard or protection device having to be dismantled.

1.4.2 Special requirements for guards

1.4.21 Fixed guards

Fixed guards must be securely held in place.

They must be fixed by systems that can be opened only with tools.

Where possible, guards must be unable to remain in place without their fixings.

1.4.2.2 Movable guards

A. Type A movable guards must:

- as far as possible remain fixed to the machinery when open;
- be associated with a locking device to prevent moving parts starting up as long as these parts can be accessed and to give a stop command whenever they are no longer closed.

B. Type B movable guards must be designed and incorporated into the control system so that:

- moving parts cannot start up while they are within the operator's reach;
- the exposed person cannot reach moving parts once they have started up;
- they can be adjusted only by means of an intentional action, such as the use of a tool, key etc;

- the absence or failure of one of their components prevents starting or stops the moving parts;

- protection against any risk of ejection is provided by means of an appropriate barrier.

1.4.2.3 Adjustable guards restricting access

Adjustable guards restricting access to those areas of the moving parts strictly necessary for the work must:

- be adjustable manually or automatically according to the type of work involved;

- be readily adjustable without the use of tools;

- reduce as far as possible the risk of ejection.

1.4.3 Special requirements for protection devices

Protection devices must be designed and incorporated into the control system so that:

- moving parts cannot start up while they are within the operator's reach;

- the exposed person cannot reach moving parts once they have started up;

- they can be adjusted only by means of an intentional action such as the use of a tool, key, etc;

- the absence or failure of one of their components prevents starting or stops the moving parts.

1.5 PROTECTION AGAINST OTHER HAZARDS

1.5.1 Electricity supply

Where machinery has an electricity supply it must be designed, constructed and equipped so that all hazards of an electrical nature are or can be prevented.

The specific rules in force relating to electrical equipment designed for use within certain voltage limits must apply to machinery which is subject to those limits.

1.5.2 Static electricity

Machinery must be so designed and constructed as to prevent or limit the build-up of potentially dangerous electrostatic charges and/or be fitted with a discharging system.

1.5.3 Energy supply other than electricity

Where machinery is powered by an energy other than electricity (eg hydraulic, pneumatic or thermal energy, etc), it must be so designed, constructed and equipped as to avoid all potential hazards associated with these types of energy.

1.5.4 Errors of fitting

Errors likely to be made when fitting or refitting certain parts which could be a source of risk must be made impossible by the design of such parts or, failing this, by information given on the parts themselves and/or the housings. The same information must be given on moving parts and/or their housings where the direction of movement must be known to avoid a risk. Any further information that may be necessary must be given in the instructions.

Where a faulty connection can be the source of risk, incorrect fluid connections, including electrical conductors, must be made impossible by the design or, failing this, by information given on the pipes, cables, etc and/or connector blocks.

1.5.5 Extreme temperatures

Steps must be taken to eliminate any risk of injury caused by contact with or proximity to machinery parts or materials at high or very low temperatures.

The risk of hot or very cold material being ejected should be assessed. Where this risk exists, the necessary steps must be taken to prevent it or, if this is not technically possible, to render it non-dangerous.

1.5.6 Fire

Machinery must be designed and constructed to avoid all risk of fire or overheating posed by the machinery itself or by gases, liquids, dusts, vapours or other substances produced or used by the machinery.

1.5.7 Explosion

Machinery must be designed and constructed to avoid any risk of explosion posed by the machinery itself or by gases, liquids, dusts, vapours or other substances produced or used by the machinery.

To that end the manufacturer must take steps to:

- avoid a dangerous concentration of products;
- prevent combustion of the potentially explosive atmosphere;
- minimise any explosion which may occur so that it does not endanger the surroundings.

The same precautions must be taken if the manufacturer foresees the use of the machinery in a potentially explosive atmosphere.

Electrical equipment forming part of the machinery must conform, as far as the risk from explosion is concerned, to the provisions of the specific Directives in force.

1.5.8 Noise

Machinery must be so designed and constructed that risks resulting from the emission of airborne noise are reduced to the lowest level, taking account of technical progress and the availability of means of reducing noise, in particular at source.

1.5.9 Vibration

Machinery must be so designed and constructed that risks resulting from vibrations produced by the machinery are reduced to the lowest level, taking account of technical progress and the availability of means of reducing vibration, in particular at source.

1.5.10 Radiation

Machinery must be so designed and constructed that any emission of radiation is limited to the extent necessary for its operation and that the effects on exposed persons are non-existent or reduced to non-dangerous proportions.

1.5.11 External radiation

Machinery must be so designed and constructed that external radiation does not interfere with its operation.

1.5.12 Laser equipment

Where laser equipment is used, the following provisions should be taken into account:

- laser equipment on machinery must be designed and constructed so as to prevent any accidental radiation;
- laser equipment on machinery must be protected so that effective radiation, radiation produced by reflection or diffusion and secondary radiation do not damage health;
- optical equipment for the observation or adjustment of laser equipment on machinery must be such that no health risk is created by the laser rays.

1.5.13 Emissions of dust, gases, etc

Machinery must be so designed, constructed and/or equipped that risks due to gases, liquids, dust, vapours and other waste materials which it produces can be avoided.

Where a hazard exists, the machinery must be so equipped that the said substances can be contained and/or evacuated.

Where machinery is not enclosed during normal operation, the devices for containment and/or evacuation must be situated as close as possible to the source of the emission.

1.5.14. Risk of being trapped in a machine

Machinery must be designed, constructed or fitted with a means of preventing an exposed person from being enclosed within it or, if that is impossible, with a means of summoning help.

1.5.15. Risk of slipping, tripping or falling

Parts of the machinery where persons are liable to move about or stand must be designed and constructed to prevent persons slipping, tripping or falling on or off these parts.

1.6 MAINTENANCE

1.6.1 Machinery maintenance

Adjustment, lubrication and maintenance points must be located outside danger zones. It must be possible to carry out adjustment, maintenance, repair, cleaning and servicing operations while machinery is at a standstill. If one or more of the above conditions cannot be satisfied for technical reasons, these operations must be possible without risk (see 1.2.5).

In the case of automated machinery and, where necessary, other machinery, the manufacturer must make provision for a connecting device for mounting diagnostic fault-finding equipment.

Automated machine components which have to be changed frequently, in particular for a change in manufacture or where they are liable to wear or likely to deteriorate following an accident, must be capable of being removed and replaced easily and in safety. Access to the components must enable these tasks to be carried out with the necessary technical means (tools, measuring instruments, etc) in accordance with an operating method specified by the manufacturer.

1.6.2 Access to operating position and servicing points

The manufacturer must provide means of access (stairs, ladders, catwalks, etc) to allow access in safety to all areas used for production, adjustment and maintenance operations.

1.6.3 Isolation of energy sources

All machinery must be fitted with means to isolate it from all energy sources. Such isolators must be clearly identified. They must be capable of being locked if reconnection could endanger exposed persons. In the case of machinery supplied with electricity through a plug capable of being plugged into a circuit, separation of the plug is sufficient.

The isolator must be capable of being locked also where an operator is unable, from any of the points to which he has access, to check that the energy is still cut off.

After the energy is cut off, it must be possible to dissipate normally any energy remaining or stored in the circuits of the machinery without risk to exposed persons.

As an exception to the above requirements, certain circuits may remain connected to their energy sources in order, for example, to hold parts, protect information, light interiors, etc. In this case, special steps must be taken to ensure operator safety.

1.6.4 Operator intervention

Machinery must be so designed, constructed and equipped that the need for operator intervention is limited.

If operator intervention cannot be avoided, it must be possible to carry it out easily and in safety.

1.6.5 Cleaning of internal parts

The machinery must be designed and constructed in such a way that it is possible to clean internal parts which have contained dangerous substances or preparations without entering them; any necessary unblocking must also be possible from the outside. If it is absolutely impossible to avoid entering the machinery, the manufacturer must take steps during its construction to allow cleaning to take place with the minimum of danger.

1.7 INDICATORS

1.7.0 Information devices

The information needed to control machinery must be unambiguous and easily understood.

It must not be excessive to the extent of overloading the operator.

Where the health and safety of exposed persons may be endangered by a fault in the operation of unsupervised machinery, the machinery must be equipped to give an appropriate acoustic or light signal as a warning.

1.7.1 Warning devices

Where machinery is equipped with warning devices (such as signals, etc), these must be unambiguous and easily perceived.

The operator must have facilities to check the operation of such warning devices at all times.

The requirements of the specific Directives[1] concerning colours and safety signals must be complied with.

1.7.2 Warning of residual risks

Where risks remain despite all the measures adopted or in the case of potential risks which are not evident (eg electrical cabinets, radioactive sources, bleeding of a hydraulic circuit, hazard in an unseen area, etc), the manufacturer must provide warnings.

Such warnings should preferably use readily understandable pictograms and/or be drawn up in one of the languages of the country in which the machinery is to be used, accompanied, on request, by the languages understood by the operators.

1.7.3 Marking

All machinery must be marked legibly and indelibly with the following minimum particulars:

- name and address of the manufacturer;
- CE marking;
- designation of series or type;
- serial number, if any;
- year of construction.

Furthermore, where the manufacturer constructs machinery intended for use in a potentially explosive atmosphere, this must be indicated on the machinery.

Machinery must also bear full information relevant to its type and essential to its safe use (eg maximum speed of certain rotating parts, maximum diameter of tools to be fitted, mass, etc).

Where a machine part must be handled during use with lifting equipment, its mass must be indicated legibly, indelibly and unambiguously.

Interchangeable equipment must bear the same information.

1.7.4 Instructions

(a) All machinery must be accompanied by instructions including at least the following:

- a repeat of the information with which the machinery is marked, except the serial number (see 1.7.3), together with any appropriate additional information to facilitate maintenance (eg addresses of the importer, repairers, etc);
- foreseen use of the machinery within the meaning of 1.1.2(c);

1 Directive 77/576/EEC: *Official Journal* No L229 of 7.9.77.

- workstation(s) likely to be occupied by operators;
- instructions for safe:
  - putting into service;
  - use;
  - handling, giving the mass of the machinery and its various parts where they are regularly to be transported separately;
  - installation;
  - assembly, dismantling;
  - adjustment;
  - maintenance (servicing and repair);
  - where necessary, training instructions;
- where necessary, the essential characteristics of tools which may be fitted to the machinery.

Where necessary, the instructions should draw attention to ways in which the machinery should not be used.

(b) The instructions must be drawn up in one of the European Economic Area (EEA) languages by the manufacturer or his authorized representative established in the EEA. On being put into service, all machinery must be accompanied by a translation of the instructions in the language or languages of the country in which the machinery is to be used and by the instructions in the original language. This translation must be done either by the manufacturer or his authorized representative established in the EEA or by the person introducing the machinery into the language area in question. By way of derogation from this requirements, the maintenance instructions for use by specialized personnel employed by the manufacturer or his authorised representative established in the EEA may be drawn up in only one of the EEA languages understood by that personnel.

(c) The instructions must contain the drawings and diagrams necessary for putting into service, maintenance, inspection, checking of correct operation and, where appropriate, repair of the machinery, and all useful instructions in particular with regard to safety.

(d) Any literature describing the machinery must not contradict the instructions as regards safety aspects. The technical documentation describing the machinery must give information regarding the airborne noise emissions referred to in (f) and, in the case of hand-held and/or hand-guided machinery, information regarding vibration as referred to in 2.2.

(e) Where necessary, the instructions must give the requirements relating to installation and assembly for reducing noise or vibration (eg use of dampers, type and mass of foundation block, etc).

(f) The instructions must give the following information concerning airborne noise emissions by the machinery, either the actual value or a value established on the basis of measurements made on identical machinery:

- equivalent continuous A-weighted sound pressure level at workstations, where this exceeds 70dB(A); where this level does not exceed 70dB(A), this fact must be indicated;
- peak C-weighted instantaneous sound pressure value at workstations, where this exceeds 63Pa (130dB in relation to 20μPa);
- sound power level emitted by the machinery where the equivalent continuous A-weighted sound pressure level at workstations exceeds 85dB(A).

In the case of very large machinery, instead of the sound power level, the equivalent continuous sound pressure levels at specified positions around the machinery may be indicated.

Where the harmonised standards are not applied, sound levels must be measured using the most appropriate method for the machinery.

The manufacturer must indicate the operating conditions of the machinery during measurement and what methods have been used for the measurement.

Where the workstation(s) are undefined or cannot be defined, sound pressure levels must be measured at a distance of 1 metre from the surface of the machinery and at a height of 1.6 metres from the floor or access platform. The position and value of the maximum sound pressure must be indicated.

(g) If the manufacturer foresees that the machinery will be used in a potentially explosive atmosphere, the instructions must give all the necessary information.

(h) In the case of machinery which may also be intended for use by non-professional operators, the working and layout of the instructions for use, whilst respecting the other essential requirements mentioned above, must take into account the level of general education and acumen that can reasonably be expected from such operators.

2 ESSENTIAL HEALTH AND SAFETY REQUIREMENTS FOR CERTAIN CATEGORIES OF MACHINERY

2.1 AGRI-FOODSTUFFS MACHINERY

Where machinery is intended to prepare and process foodstuffs (eg cooking, refrigeration, thawing, washing, handling, packaging, storage, transport or distribution), it must be so designed and constructed as to avoid any risk of infection, sickness or contagion, and the following hygiene rules must be observed:

(a) materials in contact, or intended to come into contact, with the foodstuffs must satisfy the conditions set down in the relevant Directives[1]. The machinery must be so designed and constructed that these materials can be cleaned before each use;

(b) all surfaces including their joinings must be smooth, and must have neither ridges nor crevices which could harbour organic materials;

(c) assemblies must be designed in such a way as to reduce projections, edges and recesses to a minimum. They should preferably be made by welding or continuous bonding. Screws, screwheads and rivets may not be used except where technically unavoidable;

(d) all surfaces in contact with the foodstuffs must be easily cleaned and disinfected, where possible after removing easily dismantled parts. The inside surfaces must have curves of a radius sufficient to allow thorough cleaning;

(e) liquid deriving from foodstuffs as well as cleaning, disinfecting and rinsing fluids should be able to be discharged from the machine without impediment (possibly in a 'clean' position);

(f) machinery must be so designed and constructed as to prevent any liquids or living creatures, in particular insects, entering, or any organic matter accumulating in areas that cannot be cleaned (eg for machinery not mounted on feet or castors, by placing a seal between the machinery and its base, by the use of sealed units, etc);

(g) machinery must be so designed and constructed that no ancillary substances (eg lubricants, etc) can come into contact with foodstuffs. Where necessary, machinery must be designed and constructed so that continuing compliance with this requirement can be checked.

Instructions

In addition to the information required in section 1, the instructions must indicate recommended products and methods for cleaning, disinfecting and rinsing (not only for easily accessible areas but also where areas to which access is impossible or inadvisable, such as piping, have to be cleaned in situ).

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1 Directive 89/109/EEC: *Official Journal* Nos L40 of 11.2.89 and L347 of 28.11.89.

2.2 PORTABLE HAND-HELD AND/OR HAND-GUIDED MACHINERY

Portable hand-held and/or hand-guided machinery must conform to the following essential health and safety requirements:

- according to the type of machinery, it must have a supporting surface of sufficient size and have a sufficient number of handles and supports of an appropriate size and arranged to ensure the stability of the machinery under the operating conditions foreseen by the manufacturer;

- except where technically impossible or where there is an independent control, in the case of handles which cannot be released in complete safety, it must be fitted with start and stop controls arranged in such a way that the operator can operate them without releasing the handles;

- it must be designed, constructed or equipped to eliminate the risks of accidental starting and/or continued operation after the operator has released the handles. Equivalent steps must be taken if this requirement is not technically feasible;

- portable hand-held machinery must be designed and constructed to allow, where necessary, a visual check of the contact of the tool with the material being processed.

Instructions

The instructions must give the following information concerning vibrations transmitted by hand-held and hand-guided machinery:

- the weighted root mean square acceleration value to which the arms are subjected, if it exceeds 2.5m/s^2 as determined by the appropriate test code. Where the acceleration does not exceed 2.5m/s^2, this must be mentioned.

If there is no applicable test code, the manufacturer must indicate the measurement methods and conditions under which measurements were made.

2.3 MACHINERY FOR WORKING WOOD AND ANALOGOUS MATERIALS

Machinery for working wood and machinery for working materials with physical and technological characteristics similar to those of wood, such as cork, bone, hardened rubber, hardened plastic material and other similar stiff material must conform to the following essential health and safety requirements:

(a) the machinery must be designed, constructed or equipped so that the piece being machined can be placed and guided in safety; where the piece is hand-held on a work-bench the latter must be sufficiently stable during the work and must not impede the movement of the piece;

(b) where the machinery is likely to be used in conditions involving the risk of ejection of pieces of wood, it must be designed, constructed or equipped to eliminate this ejection or, if this is not the case, so that the ejection does not engender risks for the operator and/or exposed persons;

(c) the machinery must be equipped with an automatic brake that stops the tool in a sufficiently short time if there is a risk of contact with the tool whilst it runs down;

(d) where the tool is incorporated into a non-fully automated machine, the latter must be so designed and constructed as to eliminate or reduce the risk of serious accidental injury, for example by using cylindrical cutter blocks, restricting depth of cut, etc.

3 ESSENTIAL HEALTH AND SAFETY REQUIREMENTS TO OFFSET THE PARTICULAR HAZARDS DUE TO THE MOBILITY OF MACHINERY

Machinery presenting hazards due to mobility must be designed and constructed to meet the requirements set out below.

Risks due to mobility always exist in the case of machinery which is self-propelled, towed or pushed or carried by other machinery or tractors, is operated in working areas and whose operation requires either mobility while working, be it continuous or semi-continuous movement, between a succession of fixed working positions.

Risks due to mobility may also exist in the case of machinery operated without being moved, but equipped in such a way as to enable it to be moved more easily from one place to another (machinery fitted with wheels, rollers, runners, etc or placed on gantries, trolleys, etc).

In order to verify that rotary cultivators and power harrows do not present unacceptable risks to the exposed persons, the manufacturer or his authorised representative established within the Community must, for each type of machinery concerned, perform the appropriate tests or have such tests performed.

3.1 GENERAL

3.1.1 Definition

'Driver' means an operator responsible for the movement of machinery. The driver may be transported by the machinery or may be on foot, accompanying the machinery, or may be guiding the machinery by remote control (cables, radio, etc).

3.1.2 Lighting

If intended by the manufacturer to be used in dark places, self-propelled machinery must be fitted with a lighting device appropriate to the work to be carried out, without prejudice to any other regulations applicable (road traffic regulations, navigation rules, etc).

3.1.3 Design of machinery to facilitate its handling

During the handling of the machine and/or its parts, there must be no possibility of sudden movements or of hazards due to instability as long as the machine and/or its parts are handled in accordance with the manufacturer's instructions.

3.2 WORK STATIONS

3.2.1 Driving position

The driving position must be designed with due regard to ergonomic principles. There may be two or more driving positions and, in such cases, each driving position must be provided with all the requisite controls. Where there is more than one driving position, the machinery must be designed so that the use of one of them precludes the use of the others, except in emergency stops. Visibility from the driving position must be such that the driver can in complete safety for himself and the exposed persons, operate the machinery and its tools in their intended conditions of use. Where necessary, appropriate devices must be provided to remedy hazards due to inadequate direct vision.
Machinery must be so designed and constructed that, from the driving position, there can be no risk to the driver and operators on board from inadvertent contact with the wheels or tracks.

The driving position must be designed and constructed so as to avoid any health risk due to exhaust gases and/or lack of oxygen.

The driving position of ride-on drivers must be so designed and constructed that a driver's cab may be fitted as long as there is room. In that case, the cab must incorporate a place for the instructions needed for the driver and/or operators. The driving position must be fitted with an adequate cab where there is a hazard due to a dangerous environment.

Where the machinery is fitted with a cab, this must be designed, constructed and/or equipped to ensure that the driver has good operating conditions and is protected against any hazards that might exist (for instance: inadequate heating and ventilation, inadequate visibility, excessive noise and vibration, falling objects, penetration by objects, rolling over, etc). The exit must allow rapid evacuation. Moreover, an emergency exit must be provided in a direction which is different from the usual exit.

The materials used for the cab and its fittings must be fire-resistant.

3.2.2 Seating

The driving seat of any machinery must enable the driver to maintain a stable position and be designed with due regard to ergonomic principles.

The seat must be designed to reduce vibrations transmitted to the driver to the lowest level that can be reasonably achieved. The seat mountings must withstand all stresses to which they can be subjected, notably in the

event of rollover. Where there is no floor beneath the driver's feet, the driver must have footrests covered with a slip-resistant material.

Where machinery is fitted with provision for a rollover protection structure, the seat must be equipped with a safety belt or equivalent device which keeps the driver in his seat without restricting any movements necessary for driving or any movements caused by the suspension.

3.2.3 Other places

If the conditions of use provide that operators other than the driver are occasionally or regularly transported by the machinery, or work on it, appropriate places must be provided which enable them to be transported or to work on it without risk, particularly the risk of falling.

Where the working conditions so permit, these work places must be equipped with seats.

Should the driving position have to be fitted with a cab, the other places must also be protected against the hazards which justified the protection of the driving position.

3.3 CONTROLS

3.3.1 Control devices

The driver must be able to actuate all control devices required to operate the machinery from the driving position, except for functions which can be safely activated only by using control devices located away from the driving position. This refers in particular to working positions other than the driving position, for which operators other than the driver are responsible or for which the driver has to leave his driving position in order to carry out the manoeuvre in safety.

Where there are pedals they must be so designed, constructed and fitted to allow operation by the driver in safety with the minimum risk of confusion; they must have a slip-resistant surface and be easy to clean.

Where their operation can lead to hazards, notably dangerous movements, the machinery's controls, except for those with preset positions, must return to the neutral position as soon as they are released by the operator.

In the case of wheeled machinery, the steering system must be designed and constructed to reduce the force of sudden movements of the steering wheel or steering lever caused by shocks to the guide wheels.

Any control that locks the differential must be so designed and arranged that it allows the differential to be unlocked when the machinery is moving.

The last sentence of section 1.2.2 does not apply to the mobility function.

3.3.2 Starting/moving

Self-propelled machinery with a ride-on driver must be so equipped as to deter unauthorised persons from starting the engine.

Travel movements of self-propelled machinery with a ride-on driver must be possible only if the driver is at the controls.

Where, for operating purposes, machinery must be fitted with devices which exceed its normal clearance zone (eg stabilizers, jib, etc), the driver must be provided with the means of checking easily, before moving the machinery, that such devices are in a particular position which allows safe movement.

This also applies to all other parts which, to allow safe movement, have to be in particular positions, locked if necessary.

Where it is technically and economically feasible, movement of the machinery must depend on safe positioning of the aforementioned parts.

It must not be possible for movement of the machinery to occur while the engine is being started.

3.3.3 Travelling function

Without prejudice to the provisions of road traffic regulations, self-propelled machinery and its trailers must meet the requirements for slowing down, stopping, braking and immobilization so as to ensure safety under all the operating, loading, speed, ground and gradient conditions allowed for by the manufacturer and corresponding to conditions encountered in normal use.

The driver must be able to slow down and stop self-propelled machinery by means of a main device. Where safety so requires in the event of a failure of the main device, or in the absence of the energy supply to actuate the main device, an emergency device with fully independent and easily accessible controls must be provided for slowing down and stopping.

Where safety so requires, a parking device must be provided to render stationary machinery immobile. This device may be combined with one of the devices referred to in the second paragraph, provided that it is purely mechanical.

Remote-controlled machinery must be designed and constructed to stop automatically if the driver loses control.

Section 1.2.4 does not apply to the travelling function.

3.3.4 Movement of pedestrian-controlled machinery

Movement of pedestrian-controlled self-propelled machinery must be possible only through sustained action on the relevant control by the driver. In particular, it must not be possible for movement to occur while the engine is being started.

The control systems for pedestrian-controlled machinery must be designed to minimise the hazards arising from inadvertent movement of the machine towards the driver. In particular:

(a) crushing;

(b) injury from rotating tools.

Also, the speed or normal travel of the machine must be compatible with the pace of a driver on foot.

In the case of machinery on which a rotary tool may be fitted, it must not be possible to actuate that tool when the reversing control is engaged, except where movement of the machinery results from movement of the tool. In the latter case, the reversing speed must be such that it does not endanger the driver.

3.3.5 Control circuit failure

A failure in the power supply to the power-assisted steering, where fitted, must not prevent machinery from being steered during the time required to stop it.

3.4 PROTECTION AGAINST MECHANICAL HAZARDS

3.4.1 Uncontrolled movements

When a part of a machine has been stopped, any drift away from the stopping position, for whatever reason other than action at the controls, must be such that it is not a hazard to exposed persons.

Machinery must be so designed, constructed and where appropriate placed on its mobile support as to ensure that when moved the uncontrolled oscillations of its centre of gravity do not effect its stability or exert excessive strain on its structure.

3.4.2 Risk of break-up during operation

Parts of machinery rotating at high speed which, despite the measures taken, may break up or disintegrate, must be mounted and guarded in such a way that, in case of breakage, their fragments will be contained or, if that is not possible, cannot be projected towards the driving and/or operating positions.

3.4.3 Rollover

Where, in the case of self-propelled machinery with a ride-on driver and possibly ride-on operators, there is a risk of rolling over, the machinery must be designed for and be fitted with anchorage points allowing it to be equipped with a rollover protective structure (ROPS).

This structure must be such that in case of rolling over it affords the ride-on driver and where appropriate the ride-on operators an adequate deflection-limiting volume (DLV).

In order to verify that the structure complies with the requirement laid down in the second paragraph, the manufacturer or his authorised representative established within the Community must, for each type of structure concerned, perform appropriate tests or have such tests performed.

In addition, the earth-moving machinery listed below with a capacity exceeding 15kW must be fitted with a rollover protective structure:

- crawler loaders or wheel loaders;
- backhoe loaders;
- crawler tractors or wheel tractors;
- scrapers, self-loading or not;
- graders;
- articulated steer dumpers.

3.4.4 Falling objects

Where, in the case of machinery with a ride-on driver and possibly ride-on operators, there is a risk due to falling objects or material, the machinery should be designed for, and fitted with, if its size allows, anchorage points allowing it to be equipped with a falling-object protective structure (FOPS).

This structure must be such that in the case of falling objects or material, it guarantees the ride-on operators an adequate deflection-limiting volume (DLV).

In order to verify that the structure complies with the requirement laid down in the second paragraph, the manufacturer or his authorised representative established within the Community must, for each type of structure concerned, perform appropriate tests or have such tests performed.

3.4.5 Means of access

Handholds and steps must be designed, constructed and arranged in such a way that the operators use them instinctively and do not use the controls for that purpose.

3.4.6 Towing devices

All machinery used to tow or to be towed must be fitted with towing or coupling devices designed, constructed and arranged to ensure easy and safe connection and disconnection, and to prevent accidental disconnection during use.

In so far as the towbar load requires, such machinery must be equipped with a support with a bearing surface suited to the load and the ground.

3.4.7 Transmission of power between self-propelled machinery (or tractor) and recipient machinery

Transmission shafts with universal joints linking self-propelled machinery (or tractor) to the first fixed bearing of recipient machinery must be guarded on the self-propelled machinery side and the recipient machinery side over the whole length of the shaft and associated universal joints.

On the side of the self-propelled machinery (or tractor), the power take-off to which the transmission shaft is attached must be guarded either by a screen fixed to the self-propelled machinery (or tractor) or by any other device offering equivalent protection.

On the towed machinery side, the input shaft must be enclosed in a protective casing fixed to the machinery.

Torque limiters or freewheels may be fitted to universal joint transmissions only on the side adjoining the driven machine. The universal-joint transmission shaft must be marked accordingly.

All towed machinery whose operation requires a transmission shaft to connect it to self-propelled machinery or a tractor must have a system for attaching the transmission shaft so that when the machinery is uncoupled the transmission shaft and its guard are not damaged by contact with the ground or part of the machinery.

The outside parts of the guard must be so designed, constructed and arranged that they cannot turn with the transmission shaft. The guard must cover the transmission shaft to the ends of the inner jaws in the case of simple universal joints and at least to the centre of the outer joint or joints in the case of 'wide-angle' universal joints.

Manufacturers providing means of access to working positions near to the universal joint transmission shaft must ensure that shaft guards as described in the sixth paragraph cannot be used as steps unless designed and constructed for that purpose.

3.4.8 Moving transmission parts

By way of derogation from section 1.3.8A, in the case of internal combustion engines, removable guards preventing access to the moving parts in the engine compartment need not have locking devices if they have to be opened either by the use of a tool or key or by a control located in the driving position if the latter is in a fully enclosed cab with a lock to prevent unauthorised access.

3.5 PROTECTION AGAINST OTHER HAZARDS

3.5.1 Batteries

The battery housing must be constructed and located and the battery installed so as to avoid as far as possible the chance of electrolyte being ejected on to the operator in the event of rollover and/or to avoid the accumulation of vapours in places occupied by operators.

Machinery must be so designed and constructed that the battery can be disconnected with the aid of an easily accessible device provided for that purpose.

3.5.2 Fire

Depending on the hazards anticipated by the manufacturer when in use, machinery must, where its size permits:

- either allow easily accessible fire extinguishers to be fitted;
- or be provided with built-in extinguisher systems.

3.5.3 Emissions of dust, gases, etc.

Where such hazards exist, the containment equipment provided for in Section 1.5.13 may be replaced by other means, for example, precipitation by water spraying.

The second and third paragraphs of section 1.5.13 do not apply where the main function of the machinery is the spraying of products.

3.6 INDICATIONS

3.6.1 Signs and warnings

Machinery must have means of signalling and/or instruction plates concerning use, adjustment and maintenance, wherever necessary, to ensure the health and safety of exposed persons. They must be chosen, designed and constructed in such a way as to be clearly visible and indelible.

Without prejudice to the requirements to be observed for travelling on the public highway, machinery with a ride-on driver must have the following equipment:

- an acoustic warning device to alert exposed persons;
- a system of light signals relevant to the intended conditions of use such as stop lamps, reversing lamps and rotating beacons. The latter requirement does not apply to machinery intended solely for underground working and having no electrical power.

Remote-controlled machinery which under normal conditions of use exposes persons to the hazards of impact or crushing must be fitted with appropriate means to signal its movements or with means to protect exposed persons against such hazards. The same applies to machinery which involves, when in use, the constant repetition of a forward and backward movement on a single axis where the back of the machine is not directly visible to the driver.

Machinery must be so constructed that the warning and signalling devices cannot all be disabled unintentionally. Where this is essential for safety, such devices must be provided with the means to check that they are in good working order and their failure must be made apparent to the operator.

Where the movement of machinery or its tools is particularly hazardous, signs on the machinery must be provided to warn against approaching the machinery while it is working; the signs must be legible at a sufficient distance to ensure the safety of persons who have to be in the vicinity.

3.6.2 Marking

The minimum requirements set out in 1.7.3 must be supplemented by the following:

- nominal power expressed in kW;
- mass in kg of the most usual configuration and, where appropriate:
  - maximum drawbar pull provided for by the manufacturer at the coupling hook, in N;
  - maximum vertical load provided for by the manufacturer on the coupling hook, in N.

3.6.3 Instruction handbook

Apart from the minimum requirements set out in 1.7.4, the instruction handbook must contain the following information:

(a) regarding the vibrations emitted by the machinery, either the actual value or a figure calculated from measurements performed on identical machinery:

- the weighted root mean square acceleration value to which the arms are subjected, if it exceeds 2.5 m/s^2, should it not exceed 2.5 m/s^2, this must be mentioned;
- the weighted root mean square acceleration value to which the body (feet or posterior) is subjected, if it exceeds 0.5 m/s^2, should it not exceed 0.5 m/s^2, this must be mentioned.

Where the harmonised standards are not applied, the vibration must be measured using the most appropriate method for the machinery concerned.

The manufacturer must indicate the operating conditions of the machinery during measurement and which methods were used for taking the measurements;

(b) in the case of machinery allowing several uses depending on the equipment used, manufacturers of basic machinery to which interchangeable equipment may be attached and manufacturers of the interchangeable equipment must provide the necessary information to enable the equipment to be fitted and used safely.

4 ESSENTIAL HEALTH AND SAFETY REQUIREMENTS TO OFFSET THE PARTICULAR HAZARDS DUE TO A LIFTING OPERATION

Machinery presenting hazards due to lifting operations - mainly hazards of load falls and collisions or hazards of tipping caused by a lifting operation - must be designed and constructed to meet the requirements set out below.

Risks due to a lifting operation exist particularly in the case of machinery designed to move a unit load involving a change in level during the movement. The load may consist of objects, materials or goods.

4.1 GENERAL REMARKS

4.1.1 Definitions

(a) **lifting accessories:** 'lifting accessories' means components or equipment not attached to the machine and placed between the machinery and the load or on the load in order to attach it;

(b) **separate lifting accessories:** 'separate lifting accessories' means accessories which help to make up or use a slinging device such as eyehooks, shackles, rings, eyebolts, etc;

(c) **guided load:** 'guided load' means the load where the total movement is made along rigid or flexible guides, whose position is determined by fixed points;

(d) **working coefficient:** 'working coefficient' means the arithmetic ratio between the load guaranteed by the manufacturer up to which a piece of equipment, an accessory or machinery is able to hold it and the maximum working load marked on the equipment, accessory or machinery respectively;

(e) **test coefficient:** 'test coefficient' means the arithmetic ratio between the load used to carry out the static or dynamic tests on a piece of equipment, an accessory or machinery and the maximum working load marked on the piece of equipment, accessory or machinery;

(f) **static test:** 'static test' means the test during which the machinery or the lifting accessory is first inspected and then subjected to a force corresponding to the maximum working load multiplied by the appropriate static test coefficient and then re-inspected once the said load has been released to ensure no damage has occurred;

(g) **dynamic test:** 'dynamic test' means the test during which the machinery is operated in all its possible configurations at maximum working load with account being taken of the dynamic behaviour of the machinery in order to check the machinery and safety features are functioning properly.

4.1.2 Protection against mechanical hazards

4.1.2.1 Risks due to lack of stability

Machinery must be so designed and constructed that the stability required in 1.3.1 is maintained both in service and out of service, including all stages of transportation, assembly and dismantling, during foreseeable component failures and also during the tests carried out in accordance with the instruction handbook.

To that end, the manufacturer or his authorised representative established within the Community must use the appropriate verification methods; in particular, for self-propelled industrial trucks with lift exceeding 1.80m, the manufacturer or his authorised representative established within the Community must, for each type of industrial truck concerned, perform a platform stability test or similar test, or have such tests performed.

4.1.2.2 Guide rails and rail tracks

Machinery must be provided with devices which act on the guide rails or tracks to prevent derailment.

However, if derailment occurs despite such devices, or if there is a failure of a rail or of a running component, devices must be provided which prevent the equipment, component or load from falling or the machine overturning.

4.1.2.3 Mechanical strength

Machinery, lifting accessories and removable components must be capable of withstanding the stresses to which they are subjected, both in and, where applicable, out of use, under the installation and operating conditions provided for by the manufacturer, and in all relevant configurations, with due regard, where appropriate, to the effects of atmospheric factors and forces exerted by persons. This requirement must also be satisfied during transport, assembly and dismantling.

Machinery and lifting accessories must be designed and constructed so as to prevent failure from fatigue or wear, taking due account of their intended use.

The materials used must be chosen on the basis of the working environments provided for by the manufacturer, with special reference to corrosion, abrasion, impacts, cold brittleness and ageing.

The machinery and the lifting accessories must be designed and constructed to withstand the overload in the static tests without permanent deformation or patent defect. The calculation must take account of the values of the static test coefficient chosen to guarantee an adequate level of safety; that coefficient has, as a general rule, the following values:

(a) manually-operated machinery and lifting accessories:1.5;

(b) other machinery: 1.25.

Machinery must be designed and constructed to undergo, without failure, the dynamic tests carried out using the maximum working load multiplied by the dynamic test coefficient. This dynamic test coefficient is chosen so as to guarantee an adequate level of safety: the coefficient is, as a general rule, equal to 1.1.

The dynamic tests must be performed on machinery ready to be put into service under normal conditions of use. As a general rule, the tests will be performed at the nominal speeds laid down by the manufacturer. Should the control circuit of the machinery allow for a number of simultaneous movements (for example, rotation and displacement of the load), the tests must be carried out under the least favourable conditions, ie as a general rule, by combining the movements concerned.

4.1.2.4 Pulleys, drums, chains or ropes

Pulleys, drums and wheels must have a diameter commensurate with the size of rope or chains with which they can be fitted.

Drums and wheels must be so designed, constructed and installed that the ropes or chains with which they are equipped can wind round without falling off.

Ropes used directly for lifting or supporting the load must not include any splicing other than at their ends (splicings are tolerated in installations which are intended from their design to be modified regularly according to needs for use). Complete ropes and their endings have a working coefficient chosen so as to guarantee an adequate level of safety; as a general rule, this coefficient is equal to five.

Lifting chains have a working coefficient chosen so as to guarantee an adequate level of safety; as a general rule, this coefficient is equal to four.

In order to verify that an adequate working coefficient has been attained, the manufacturer or his authorised representative established within the Community must, for each type of chain and rope used directly for lifting the load, and for the rope ends, perform the appropriate tests or have such tests performed.

4.1.2.5 Separate lifting accessories

Lifting accessories must be sized with due regard to fatigue and ageing processes for a number of operating cycles consistent with their expected life-span as specified in the operating conditions for a given application.

Moreover:

(a) the working coefficient of the metallic rope/rope-end combination is chosen so as to guarantee an adequate level of safety; this coefficient is, as a general rule, equal to five. Ropes must not comprise any splices or loops other than at their ends;

(b) where chains with welded links are used, they must be of the short-link type. The working coefficient of chains of any type is chosen so as to guarantee an adequate level of safety; this coefficient is, as a general rule, equal to four;

(c) the working coefficient for textile ropes or slings is dependent on the material, method of manufacture, dimensions and use. This coefficient is chosen so as to guarantee an adequate level of safety; it is, as a general rule, equal to seven, provided the materials used are shown to be of very good quality and the method of manufacture is appropriate to the intended use. Should this not be the case, the coefficient is, as a general rule, set at a higher level in order to secure an equivalent level of safety.

Textile ropes and slings must not include any knots, connections or splicing other than at the ends of the sling, except in the case of an endless sling;

(d) all metallic components making up, or used with, a sling must have a working coefficient chosen so as to guarantee an adequate level of safety; this coefficient is, as a general rule, equal to four;

(e) the maximum working capacity of a multi-legged sling is determined on the basis of the safety coefficient of the weakest leg, the number of legs and a reduction factor which depends on the slinging configuration;

(f) in order to verify that an adequate working coefficient has been attained, the manufacturer or his authorised representative established within the Community must, for type of component referred to in (a), (b), (c) and (d), perform the appropriate tests or have such tests performed.

4.1.2.6 Control of movements

Devices for controlling movements must act in such a way that the machinery on which they are installed is kept safe:

(a) machinery must be so designed or fitted with devices that the amplitude of movement of its components is kept within the specified limits. The operation of such devices must, where appropriate, be preceded by a warning;

(b) where several fixed or rail-mounted machines can be manoeuvred simultaneously in the same space, with risks of collision, such machines must be so designed and constructed as to make it possible to fit systems enabling these risks to be avoided;

(c) the mechanisms of machinery must be so designed and constructed that the loads cannot creep dangerously or fall freely and unexpectedly, even in the event of partial or total failure of the power supply or when the operator stops operating the machine;

(d) it must not be possible, under normal operating conditions, to lower the load solely by friction brake, except in the case of machinery whose function requires it to operate in that way;

(e) holding devices must be so designed and constructed that inadvertent dropping of the loads is avoided.

4.1.2.7 Handling of loads

The driving position of machinery must be located in such a way as to ensure the widest possible view of trajectories of the moving parts, in order to avoid possible collisions with persons or equipment or other machinery which might be manoeuvring at the same time and liable to constitute a hazard.

Machinery with guided loads fixed in one place must be designed and constructed so as to prevent exposed persons from being hit by the load or the counter-weights.

4.1.2.8 Lightning

Machinery in need of protection against the effects of lightning while being used must be fitted with a system for conducting the resultant electrical charges to earth.

4.2 SPECIAL REQUIREMENTS FOR MACHINERY WHOSE POWER SOURCE IS OTHER THAN MANUAL EFFORT

4.2.1 Controls

4.2.1.1 Driving position

The requirements laid down in section 3.2.1 also apply to non-mobile machinery.

4.2.1.2 Seating

The requirements laid down in section 3.2.2 first and second paragraphs, and those laid down in section 3.2.3 also apply to non-mobile machinery.

4.2.1.3 Control devices

The devices controlling movements of the machinery or its equipment must return to their neutral position as soon as they are released by the operator. However, for partial or complete movements in which there is no risk of the load or the machinery colliding, the said devices may be replaced by controls authorising automatic stops at preselected levels without holding a hold-to-run control device.

4.2.1.4 Loading control

Machinery with a maximum working load of not less than 1,000kg or an overturning moment of not less than 40,000Nm must be fitted with devices to warn the driver and prevent dangerous movements of the load in the event of:

- overloading the machinery:
  - either as a result of maximum working loads being exceeded; or
  - as a result of the moments due to the loads being exceeded;
- the moments conducive to overturning being exceeded as a result of the load being lifted.

4.2.2 Installation guided by cables

Cable carriers, tractors or tractor carriers must be held by counter-weights or by a device allowing permanent control of the tension.

4.2.3 Risks to exposed persons. Means of access to driving position and intervention points

Machinery with guided loads and machinery whose load supports follow a clearly defined path must be equipped with devices to prevent any risks to exposed persons.

Machinery serving specific levels at which operators can gain access to the load platform in order to stack or secure the load must be designed and constructed to prevent uncontrolled movement of the load platform, in particular while being loaded or unloaded.

4.2.4 Fitness for purpose

When machinery is placed on the market or is first put into service, the manufacturer or his authorised representative established within the Community must ensure, by taking appropriate measures or having them taken, that lifting accessories and machinery which are ready for use – whether manually or power-operated – can fulfil their specified functions safely. The said measures must take into account the static and dynamic aspects of the machinery.

Where the machinery cannot be assembled in the manufacturer's premises, or in the premises of his authorised representative established within the Community, appropriate measures must be taken at the place of use. Otherwise, the measures may be taken either in the manufacturer's premises or at the place of use.

4.3 MARKING

4.3.1 Chains and ropes

Each length of lifting chain, rope or webbing not forming part of an assembly must bear a mark or, where this is not possible, a plate or immovable ring bearing the name and address of the manufacturer or his authorised representative established in the Community and the identifying reference of the relevant certificate.

The certificate should show the information required by the harmonised standards or, should those not exist, at least the following information:

- the name of the manufacturer or his authorised representative established within the Community;
- the address within the Community of the manufacturer or his authorised representative, as appropriate;
- a description of the chain or rope which includes:
  - its nominal size;
  - its construction;
  - the material from which it is made; and
  - any special metallurgical treatment applied to the material;
- if tested, the standard used;
- a maximum load to which the chain or rope should be subjected in service. A range of values may be given for specific applications.

4.3.2 Lifting accessories

All lifting accessories must show the following particulars:

- identification of the manufacturer;
- identification of the material (eg international classification) where this information is needed for dimensional compatibility;
- identification of the maximum working load;
- CE marking.

In the case of accessories including components such as cables or ropes, on which marking is physically impossible, the particulars referred to in the first paragraph must be displayed on a plate or by some other means and securely affixed to the accessory.

The particulars must be legible and located in a place where they are not liable to disappear as a result of machining, wear, etc, or jeopardise the strength of the accessory.

4.3.3 Machinery

In addition to the minimum information provided for in 1.7.3, each machine must bear, legibly and indelibly, information concerning the nominal load:

(i) displayed in uncoded form and prominently on the equipment in the case of equipment which has only one possible value;

(ii) where the nominal load depends on the configuration of the machine, each driving position must be provided with a load plate indicating, preferably in diagrammatic form or by means of tables, the nominal loads for each configuration.

Machinery equipped with a load support which allows access to persons and involves a risk of falling must bear a clear and indelible warning prohibiting the lifting of persons. This warning must be visible at each place where access is possible.

4.4 INSTRUCTION HANDBOOK

4.4.1 Lifting accessories

Each lifting accessory or each commercially indivisible batch of lifting accessories must be accompanied with an instruction handbook setting out at least the following particulars:

- normal conditions of use;
- instructions for use, assembly and maintenance;
- the limits of use (particularly for the accessories which cannot comply with 4.1.2.6(e)).

4.4.2 Machinery

In addition to section 1.7.4, the instruction handbook must include the following information:

(a) the technical characteristics of the machinery, and in particular:

- where appropriate, a copy of the load table described in section 4.3.3(ii);

- the reactions at the supports or anchors and characteristics of the tracks;

- where appropriate, the definition and the means of installation of the ballast;

(b) the contents of the logbook, if the latter is not supplied with the machinery;

(c) advice for use, particularly to offset the lack of direct sight of the load by the operator;

(d) the necessary instructions for performing the tests before first putting into service machinery which is not assembled on the manufacturer's premises in the form in which it is to be used.

5 ESSENTIAL HEALTH AND SAFETY REQUIREMENTS FOR MACHINERY INTENDED FOR UNDERGROUND WORK

Machinery intended for underground work must be designed and constructed to meet the requirements set out below.

5.1 Risks due to lack of stability

Powered roof supports must be so designed and constructed as to maintain a given direction when moving and not slip before and while they come under load and after the load has been removed. They must be equipped with anchorages for the top plates of the individual hydraulic props.

5.2 Movement

Powered roof supports must allow for unhindered movement of exposed persons.

5.3 Lighting

The requirements laid down in the third paragraph of section 1.1.4 do not apply.

5.4 Control devices

The accelerator and brake controls for the movement of machinery running on rails must be manual. The deadman's control may be foot-operated, however.

The control devices of powered roof supports must be designed and laid out so that, during displacement operations, operators are sheltered by a support in place. The control devices must be protected against any accidental release.

5.5 Stopping

Self-propelled machinery running on rails for use in underground work must be equipped with a deadman's control acting on the circuit controlling the movement of the machinery.

5.6 Fire

The second indent of 3.5.2 is mandatory in respect of machinery which comprises highly flammable parts.

The braking system of machinery meant for use in underground working must be designed and constructed so as not to produce sparks or cause fires.

Machinery with heat engines for use in underground working must be fitted only with internal combustion engines using fuel with a low vapourising pressure and which exclude any spark of electrical origin.

5.7 Emissions of dust, gases etc

Exhaust gases from internal combustion engines must not be discharged upwards.

6. ESSENTIAL HEALTH AND SAFETY REQUIREMENTS TO OFFSET THE PARTICULAR HAZARDS DUE TO THE LIFTING OR MOVING OF PERSONS

Machinery presenting hazards due to the lifting or moving of persons must be designed and constructed to meet the requirements set out below.

6.1 General

6.1.1 Definition

For the purposes of this Chapter, 'carrier' means the device by which persons are supported in order to be lifted, lowered or moved.

6.1.2 Mechanical strength

The working coefficients defined in heading 4 are inadequate for machinery intended for the lifting or moving of persons and must, as a general rule, be doubled. The floor of the carrier must be designed and constructed to offer the space and strength corresponding to the maximum number of persons and the maximum working load set by the manufacturer.

6.1.3 Loading control for types of device moved by power other than human strength

The requirements of 4.2.1.4 apply regardless of the maximum working load figure. This requirement does not apply to machinery in respect of which the manufacturer can demonstrate that there is no risk of overloading and/or overturning.

6.2 Controls

6.2.1 Where safety requirements do not impose other solutions:

The carrier must, as a general rule, be designed and constructed so that persons inside have means of controlling movements upwards and downwards and, if appropriate, of moving the carrier horizontally in relation to the machinery.

In operation, those controls must override the other devices controlling the same movement, with the exception of the emergency stop devices.

The controls for these movements must be of the maintained command type, except in the case of machinery serving specific levels.

6.2.2 If machinery for the lifting or moving of persons can be moved with the carrier in a position other than the rest position, it must be designed and constructed so that the person or persons in the carrier have the means of preventing hazards produced by the movement of the machinery.

6.2.3 Machinery for the lifting or moving of persons must be designed, constructed or equipped so that excess speeds of the carrier do not cause hazards.

6.3 Risks of persons falling from the carrier

6.3.1 If the measures referred to in 1.5.15 are not adequate, carriers must be fitted with a sufficient number of anchorage points for the number of persons possibly using the carrier, strong enough for the attachment of personal protective equipment against the danger of falling.

6.3.2 Any trapdoors in floors or ceilings or side doors must open in a direction which obviates any risk of falling should they open unexpectedly.

6.3.3 Machinery for lifting or moving must be designed and constructed to ensure that the floor of the carrier does not tilt to an extent which creates a risk of the occupants falling, including when moving.

The floor of the carrier must be slip-resistant.

6.4 Risks of the carrier falling or overturning

6.4.1 Machinery for the lifting or moving of persons must be designed and constructed to prevent the carrier falling or overturning.

6.4.2 Acceleration and braking of the carrier or carrying vehicle, under the control of the operator or triggered by a safety device and under the maximum load and speed conditions laid down by the manufacturer, must not cause any danger to exposed persons.

6.5 Markings

Where necessary to ensure safety, the carrier must bear the relevant essential information.

HSE AREA OFFICES

AREA OFFICES

Bristol	0117 988 6000
Basingstoke	01256 404000
East Grinstead	01342 334200
Neasden (London)	0181 459 8855
Barking (London)	0181 235 8000
Long Lane (London)	0171 556 2100
Chelmsford	01245 706200
Luton	01582 444200
Northampton	01604 738300
Birmingham	0121 609 5200
Cardiff	01222 263000
Marches (Stoke)	01782 602300
Nottingham	0115 971 2800
Sheffield	0114 291 2300
Leeds	0113 283 4200
Manchester	0161 952 8200
The Triad, Bootle	0151 479 2200
Preston	01772 836200
Newcastle-Upon-Tyne	0191 202 6200
Edinburgh	0131 247 2000
Glasgow	0141 275 3000

HEADQUARTERS

Rose Court, London	0171 717 6000
Bootle H/Q	0151 951 4000
HSL (Sheffield/Buxton)	0114 289 2000

LOCAL OFFICES

Poole	01202 667219
Plymouth	01752 668481
Ashford	01233 624658
Norwich (FOD)	01603 615711
Norwich (OSD)	01603 275000
Wrexham	01978 290500
Carmarthen	01267 232823
Worcester	01905 723406
Hull	01482 223487
Carlisle	01228 39321
Aberdeen	01224 252500
Northallerton	01609 779111
Inverness	01463 718101
Stoneleigh	01203 696518
Lincoln	01522 510770
Doncaster	01302 368 165
Taunton	01823 253 171

ANNEX D

Types of machinery and safety components subject to special attestation procedures (see page 9)

A. Machinery

1 Circular saws (single or multi-blade) for working with wood and analogous materials and meat and analogous materials:

1.1 Sawing machines with fixed tool during operation, having a fixed bed with manual feed of the workpiece or with a demountable power feed;

1.2 Sawing machines with fixed tool during operation, having a manually operated reciprocating saw-bench or carriage;

1.3 Sawing machines with fixed tool during operation, having a built-in mechanical feed device for the workpieces, with manual loading and/or unloading;

1.4 Sawing machines with movable tool during operation, with a mechanical feed device and manual loading and/or unloading.

2 Hand-fed surface planing machines for woodworking.

3 Thicknessers for one-side dressing with manual loading and/or unloading for woodworking.

4 Band-saws with a fixed or mobile bed and band-saws with a mobile carriage, with manual loading and/or unloading, for working with wood and analogous materials and for working with meat and analogous materials.

5 Combined machines of the types referred to in 1 to 4 and 7 for working with wood and analogous materials.

6 Hand-fed tenoning machines with several tool holders for woodworking.

7 Hand-fed vertical spindle moulding machines for working with wood and analogous materials.

8 Portable chain saws for woodworking.

9 Presses, including press-brakes, for the cold working of metals, with manual loading and/or unloading, whose movable working parts may have a travel exceeding 6mm and a speed exceeding 30 mm/s.

10 Injection or compression plastics-moulding machines with manual loading or unloading.

(Contd)

11 Injection or compression rubber-moulding machines with manual loading or unloading.

12 Machinery for underground working of the following types:

- machinery on rails: locomotives and brake-vans;
- hydraulic-powered roof supports;
- internal combustion engines to be fitted to machinery for underground working.

13 Manually-loaded trucks for the collection of household refuse incorporating a compression mechanism.

14 Guards and detachable transmission shafts with universal joints as described in section 3.4.7 of Annex B.

15 Vehicles servicing lifts.

16 Devices for the lifting of persons involving a risk of falling from a vertical height of more than three metres.

17 Machines for the manufacture of pyrotechnics.

B. Safety components

1 Electro-sensitive devices designed specifically to detect persons in order to ensure their safety (non-material barriers, sensor mats, electromagnetic detectors, etc.).

2 Logic units which ensure the safety functions of bi-manual controls.

3 Automatic movable screens to protect the presses referred to in 9, 10 and 11.

4 Roll-over protection structures (ROPS).

5 Falling-object protective structures (FOPS).

ANNEX E

Technical file (see page 8)

1 The 'responsible person' must ensure that the documentation listed below is available for inspection by the enforcement authorities:

(a) a technical file comprising:

- an overall drawing of the machinery or safety component together with drawings of the control circuits;
- full detailed drawings, accompanied by any calculation notes, test results, etc required to check the conformity of the machinery or safety component with the essential health and safety requirements;
- a list of:

  i the essential health and safety requirements;

  ii transposed harmonised standards;

  iii standards; and

  iv other technical specifications;

  which were used when the machinery or safety component was designed;

- a description of methods adopted to eliminate hazards presented by the machinery or safety component;
- if he so desires, any technical report or certificate obtained from a competent body or laboratory[1];
- if he declares conformity with a transposed harmonised standard which provides therefore, any technical report giving the results of tests carried out at his choice either by himself or by a competent body or laboratory[1];
- a copy of the instructions for the machinery or safety component.

(b) for series manufacture, the internal measures that will be implemented to ensure that the machinery or safety component remains in conformity with the provisions of the Directive.

The manufacturer must carry out necessary research or tests on components, fittings or the completed machinery or safety component to determine whether by its design or construction the machine or safety component is capable of being erected and put into service safely.

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1 A body or laboratory is presumed competent if it meets the assessment criteria laid down in the relevant standards (EN 45000 or BS 75000 series).

Failure to make available the documentation in response to a duly substantiated request by an enforcement authority may constitute sufficient grounds for doubting the presumption of conformity with the requirements of the essential health and safety requirements.

2 (a) The documentation referred to in 1 above need not permanently exist but it must be possible to assemble it and make it available within a period of time commensurate with its importance. It does not have to include detailed plans or any other specific information as regards the sub-assemblies used for the manufacture of the machinery unless a knowledge of them is essential for verification of conformity with the essential health and safety requirements.

(b) The documentation referred to in 1 above shall be retained and kept available for the enforcement authorities for at least 10 years following the date of manufacture of the machinery or safety component or of the last unit produced, in the case of a series manufacture.

(c) If the documentation referred to in 1 above is drawn up in the United Kingdom, it shall be in English unless it is to be submitted to an approved body in another European Economic Area State in which case it shall be in a language acceptable to that approved body. In all cases the instructions for the machinery or safety component shall be in accordance with the language requirements in paragraph 1.7.4(b) of Annex B.

ANNEX F

EC type-examination (see page 9)

EC type-examination is only required for those types of machinery or safety component listed in Annex D not manufactured in conformity with transposed harmonised standards.

Applications for EC type-examination are to be lodged by the 'responsible person' with a single approved body in respect of an example of the machinery or safety component. They are to include:

- the name and address of the manufacturer or his authorised representative established in the European Economic Area and the place of manufacture of the machinery or safety component;

- a technical file as described in paragraph 1 of Annex E.

They are to be accompanied by a machine or safety component representative of the production planned or, where appropriate, a statement of where the machine or safety component may be examined.

The documentation referred to above need not include detailed plans or any other specific information as regards the sub-assemblies used for the manufacture of the machinery or safety component unless a knowledge of them is essential for verification of conformity with the basic safety requirements.

The approved body is to:

- examine the technical file to verify its appropriateness and the machine or safety component supplied or made available to it;

- during the examination of the machine or safety component:

  (a) ensure that it has been manufactured in conformity with the technical file and may safely be used under its intended working conditions;

  (b) check that standards, if used, have been properly applied; and

  (c) perform appropriate examinations and tests to check that the machinery or safety component complies with the essential health and safety requirements applicable to it;

  (d) in the case of a safety component, ensure that it is suitable for fulfilling the safety functions declared by the manufacturer.

If the example complies with the provisions applicable to it, the body is to draw up an EC type-examination certificate which is to be forwarded to the applicant. That certificate is to state the conclusions of the examination, indicate any conditions to which its issue may be subject, and be accompanied by the descriptions and drawings necessary for identification of the approved example. If an approved body is not satisfied that the machinery or safety component complies, it must inform the applicant as to why it proposes to refuse the certificate and give the applicant the opportunity to appeal.

Through the DTI, the European Commission, other European Economic Area States and the other approved bodies may obtain a copy of the certificate and, on a reasoned request, a copy of the technical file and of the reports on the examinations and tests carried out.

The responsible person is to inform the approved body of any modifications, even of a minor nature, which he has made or plans to make to the machinery or safety component, to which the example relates. The approved body is to examine those modifications and inform the responsible person whether the EC type-examination certificate is valid for the modified machinery or safety component.

A body which refuses to issue an EC type-examination certificate is so to inform the other approved bodies.

The files and correspondence referring to the EC type-examination procedures are to be drawn up in an official language of the Member State where the approved body is established or in a language acceptable to it.

ANNEX G

EC declaration of conformity (see page 9)

The precise format of the declaration of conformity is not set down in the legislation. However, the EC declaration of conformity[1] must contain the following particulars:

- business name and full address of the 'responsible person';
- where the 'responsible person' is not the manufacturer, the business name and full address of the manufacturer;
- description of the machinery or safety component, in particular the style and serial number;
- all relevant Directives complied with by the machinery or in the case of a safety component, the safety function fulfilled by the safety component;
- where appropriate[2], name and address of the approved body and number of the EC type-examination certificate;
- where appropriate[2], the name and address of approved body to which the technical file has been forwarded;
- where appropriate[2], the name and address of the approved body which has drawn up a certificate of adequacy;
- where appropriate, the transposed harmonised used;
- where appropriate, the national standards and technical specifications used;
- identification of the person empowered to sign on behalf of the 'responsible person';

and, as appropriate, must state conformity with the essential health and safety requirements or with the example of machinery or safety component that underwent EC type-examination.

1 This declaration must be drawn up in the same language as the instructions (see Annex B, point 1.7.4) and must be either typewritten or handwritten in block capitals.

2 Only appropriate for those types of machinery or safety component listed in Annex D.

Declaration of incorporation (see page 10)

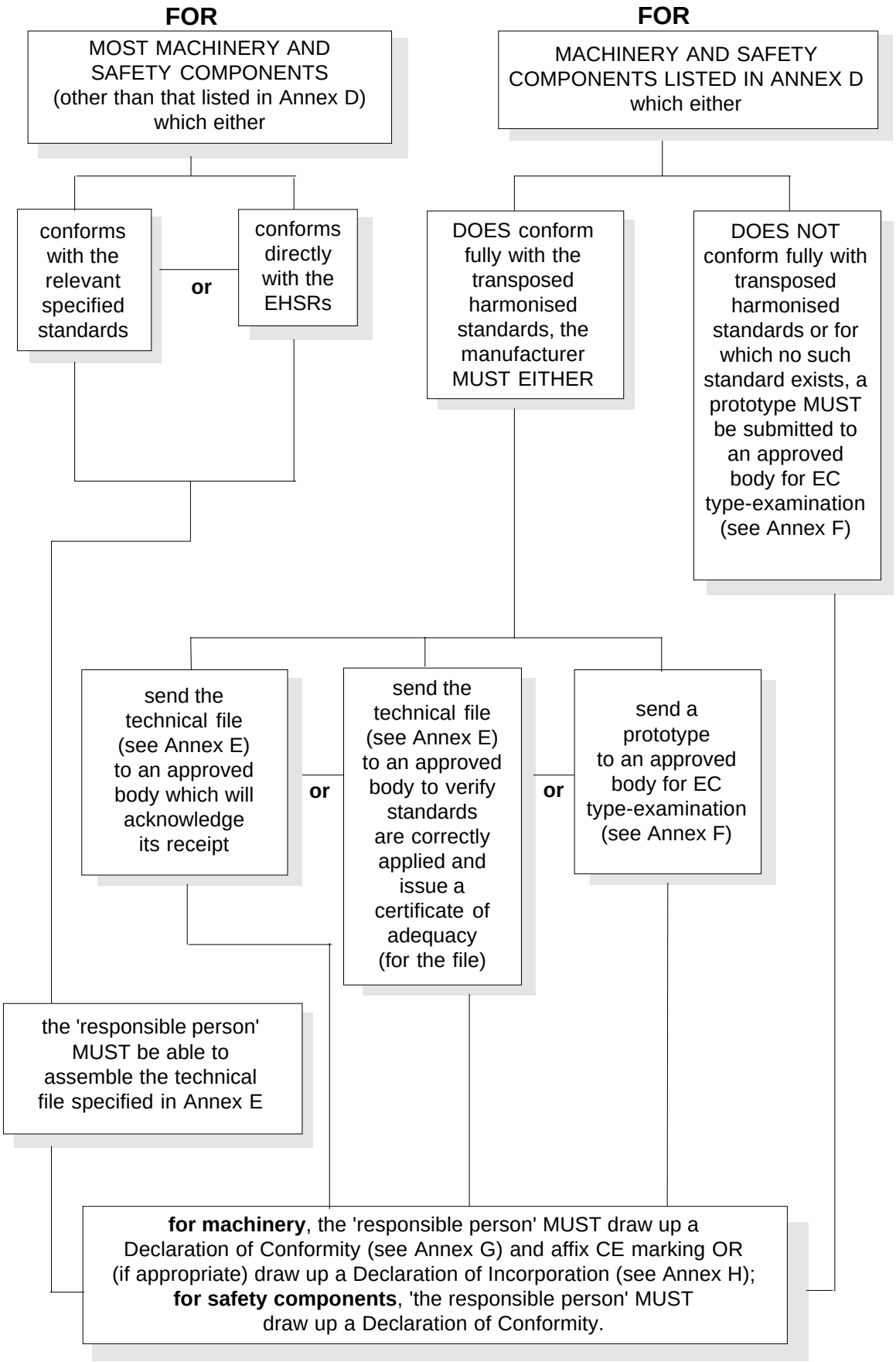
The precise format of the declaration of incorporation is not set down in the legislation. However, the declaration of incorporation must contain the following particulars:

- the name and address of the 'responsible person';
- a description of the machinery or machinery parts;
- where appropriate[1], the name and address of the approved body and the number of the EC type-examination certificate;
- where appropriate[1], the name and address of the approved body to which the technical file has been forwarded;
- where appropriate[1], the name and address of the approved body which has drawn up a certificate of adequacy;
- where appropriate, the transposed harmonised standards used;
- a statement that the machinery must not be put into service until the machinery into which it is to be incorporated has been declared in conformity with the provisions of the Directive;
- the identification of the person signing.

1 Only appropriate for those types of machinery listed in Annex D.

Attestation procedures

All machinery and safety components must satisfy the essential health and safety requirements (EHSRs).



The Provision and Use of Work Equipment Regulations 1992

Introduction: the Provision and Use of Work Equipment Regulations 1992 (SI No 2932) implement in Great Britain the Council Directive of 30 November 1989 concerning the minimum safety and health requirements for the use of work equipment by workers at work (Directive 89/655/EEC). The Provision and Use of Work Equipment Regulations (Northern Ireland) 1993 (SR 1993/19) implement the Directive in Northern Ireland.

Entry into force: 1 January 1993. Work equipment provided before 1 January 1993 must comply with the general requirements but is exempt from the specific requirements (see below) until 1 January 1997.

Coverage: all industrial sectors, service occupations, hospitals, universities etc in Great Britain and also offshore oil and gas installations. The Regulations place general duties on employers and list minimum requirements for work equipment to deal with selected hazards.

Work equipment is broadly defined to include everything from a hand tool, through machines of all kinds, to an integrated assembly such as an assembly line or bottling plant.

Use includes starting, stopping, repairing, modifying, installing, dismantling, programming, setting, transporting, maintaining, servicing and cleaning.

General requirements: employers are required to:

- make sure that equipment is suitable for the job it has to do;
- take into account the working conditions and risks in the workplace when selecting equipment;
- ensure equipment is used only for operations for which, and under conditions for which, it is suitable;
- ensure that equipment is maintained in an efficient state, in efficient working order and in good repair;
- give adequate information, instruction and training; and
- provide equipment that conforms with any legislation implementing relevant EC product directives.

Specific requirements: these apply only to equipment which has not been supplied in compliance with relevant EC product Directives, such as the Machinery Directive. They cover:

- guarding of dangerous parts of machinery (replacing the current law);
- protection against specific hazards, ie falling/ejected articles and substances, rupture/disintegration of work equipment parts, equipment catching fire or overheating, unintended or premature discharge of articles and substances, explosion;
- work equipment parts and substances at high or very low temperatures;
- control systems and control devices;
- isolation of equipment from sources of energy;
- stability of equipment;
- lighting;
- maintenance operations; and
- warnings and markings.

Relationship with the Supply of Machinery (Safety) Regulations 1992: machinery provided for use at work from 1 January 1993 must comply with the Supply of Machinery (Safety) Regulations 1992, as amended, to the extent that these Regulations apply.

Availability of the Regulations: the Provision and Use of Work Equipment Regulations 1992, SI 1992/2932, are available from HMSO (see page 12) and booksellers. *Work equipment - Guidance on Regulations* (L22) is also available from HSE Books, P O Box 1999, Sudbury, Suffolk CO10 6FS. Tel: 01787 881165. Fax: 01787 313995.

Further information: if you have a specific enquiry about the application of the Regulations please contact the HSE Public Enquiry Point on 01742 892345. For information on the corresponding Northern Ireland Regulations, please contact the Department of Economic Development on 01232 251333.