



Retrofitting of roll-over protective structures, restraining systems and their attachment points to mobile work equipment

HSE Information Sheet MISC 175

Introduction

This publication has been produced by HSE to give information on the technical and legal requirements for the design and fitting of roll-over protective structures (ROPS), restraining systems (eg seat restraints, seat belts, etc) and associated attachment points to existing mobile work equipment. It provides information on how to demonstrate compliance with regulations 26 and 27 of the Provision and Use of Work Equipment Regulations 1998 (PUWER). It also supplements and should be read with Information Sheet MISC156 *Hiring and leasing out of plant: Application of PUWER 98 regulations 26 and 27*.

Who should read this?

This information is aimed at:

- manufacturers and suppliers who supply ROPS, restraining systems and/or attachment points; or
- users and hirers who intend to retrofit ROPS, operator and passenger restraining systems (referred to afterwards as 'restraining systems') and/or attachment points to existing mobile work equipment.

What classes of equipment will need retrofitting?

Accident statistics indicate that the following classes of machines are most at risk of roll-over and therefore require priority attention:

- compact dumpers;*
- agricultural tractors; and
- variable reach rough terrain trucks (telehandlers).

On these machines the fitting of ROPS and restraining systems will satisfy the requirements of regulations 26 and 27.

***Note:** Risks exist with four wheel drive compact dumpers. In addition, risks occur when two wheel drive compact dumpers are used on gradients exceeding the manufacturer's recommendations or on gradients approaching 25% (whichever is the least).

To deal with the overturning risks from some masted fork-lift trucks of less than 10 tonnes capacity (specifically centre-control, seated, counterbalanced fork-lift trucks) the fitting of operator restraining systems will satisfy the requirements of regulation 27.

There may also be situations where other items of equipment will need to be fitted with a ROPS and/or a restraining system because of the conditions in which they are to be used.*

***Note:** There is a reasonably foreseeable risk when the conditions in which the equipment is being used are likely to cause roll-over and people carried may suffer injury.

What does the law require?

The Supply of Machinery (Safety) Regulations 1992 apply to the supply of new ROPS and restraining systems supplied for existing equipment of the classes identified above (except for agricultural and forestry tractors). ROPS and restraining systems covered by these Regulations are safety components and should meet the relevant essential health and safety requirements of the Regulations and be safe, but they are not themselves required to have CE marking.

New ROPS must be type-examined by an approved body before they are supplied, if they are not manufactured to a harmonised European standard.

Restraining systems must meet the relevant essential health and safety requirements but do **not** have to be type-examined by an approved body.

Technical requirements for ROPS and seat restraints

Factors which contribute to the likelihood of roll-over are working on gradients, poor ground conditions and manoeuvring at speed. Any of these factors or a combination of them can contribute to roll-over.

International standards and codes give guidance on the construction and testing of ROPS, seat belts and their anchorages for different machines. These standards and codes, or their equivalent, can provide guidance on how the essential health and safety requirements may be met.

When retro-fitting ROPS, restraining systems or attachment points, the parts of the mobile work equipment to which they are fitted need to be checked to ensure that they have sufficient strength. The machine manufacturer may need to be consulted.

ROPS

Earth moving machinery

ROPS and their anchorages on earth moving machinery, such as dumpers, are covered by International Standard ISO 3471:1994.*

***Note:** Tip-over protection structures (TOPS) to ISO 12117:1997 are used to protect against roll-over on compact excavators. However, current accident statistics do not indicate the need for retro-fitting TOPS to this type of machine.

Agricultural tractors

ROPS for wheeled, agricultural and forestry tractors over 560 kg should meet the requirements of the Agriculture (Tractor Cabs) Regulations 1974 and be approved and marked accordingly. To satisfy these Regulations they should be constructed and tested in accordance with an appropriate European Council Directive or an equivalent test.

Council Directive 77/536/EEC or 79/622/EEC give appropriate tests for ROPS on tractors of nominally 600 kg unladen weight or more. OECD Code III or IV, respectively, gives equivalent test codes.

Council Directive 87/402/EEC (front mounted ROPS) or 86/298/EEC give appropriate tests for ROPS on narrow track, wheeled tractors having an unladen weight greater than 600 kg but less than 3000 kg. OECD Code VI or VII, respectively, gives equivalent test codes.

Variable reach rough terrain trucks

ROPS and their anchorages on variable reach rough terrain trucks are covered by ISO 3471:1994 and force and energy requirements for test purposes are given in BS EN1459:1999.

Restraining systems

Earth moving machinery

Seat belts and their anchorages are covered by ISO 6683:1981.

Agricultural tractors

Seat belt anchorages are covered by ISO 3776:1989.

Variable reach rough terrain trucks

Seat belts and their anchorages are covered by ISO 6683:1981. Where it is not reasonably practicable to provide anchorages with equivalent characteristics then ISO 3776:1989 gives appropriate guidance. Guidance on appropriate characteristics for seat belts is provided in ISO 6683:1981.

Masted, centre control, seated, counter-balanced fork-lift trucks of less than 10 tonnes capacity

European guidance on technical requirements for restraining systems on this type of truck is in preparation. Until this guidance is available seat belts and anchorages are covered by the standards given above for variable reach rough terrain trucks.

References to standards

ISO 3471:1994 (BS 6912:Part 14:1995) *Earth moving machinery: Roll-over protective structures: Laboratory tests and performance requirements*

ISO 3776:1989 (BS 5453:1992) *Tractors for agriculture: Seat belt anchorages*

ISO 6683:1981 (BS 6218:1981) *Specification for performance requirements for seat belts and seat belt anchorages for earth-moving machinery fitted with roll-over protective structures*

ISO 12117:1997 *Earth moving machinery: Tip-over protection structure (TOPS) for compact excavators: Laboratory tests and performance requirements*

BS EN1459:1999 *Safety of industrial trucks: Self-propelled variable reach trucks*

Further information

The Provision and Use of Work Equipment Regulations 1998 (SI 2306:1998) Stationery Office.

Safe use of work equipment. Provision and Use of Work Equipment Regulations 1998. Approved Code of Practice and Guidance L22 HSE Books 1998 ISBN 0 7176 1626 6

The future availability and accuracy of the references listed in this publication cannot be guaranteed.

British Standards are available from BSI Customer Services, 389 Chiswick High Road, London W4 4AL
Tel: 020 8996 9001 Fax: 020 8996 7001
Website: www.bsi-global.com

The Stationery Office (formerly HMSO) publications are available from The Publications Centre, PO Box 276, London SW8 5DT Tel: 0870 600 5522 Fax: 0870 600 5533 Website: www.clicktso.com (They are also available from bookshops.)

HSE priced and free publications are available by mail order from HSE Books, PO Box 1999, Sudbury, Suffolk CO10 2WA Tel: 01787 881165 Fax: 01787 313995 Website: www.hsebooks.co.uk (HSE priced publications are also available from bookshops.)

For information about health and safety ring HSE's InfoLine Tel: 08701 545500 Fax: 02920 859260 e-mail: hseinformationservices@natbrit.com or write to HSE Information Services, Caerphilly Business Park, Caerphilly CF83 3GG. You can also visit HSE's website: www.hse.gov.uk

This information sheet has been produced by the Health and Safety Executive following discussions with relevant trade associations. They include:

British Industrial Truck Association
Construction Confederation
Construction Plant Hire Association
Federation of Manufacturers of Construction Equipment and Cranes
Fork Truck Association
Hire Association Europe
Site Dumper Association

If you wish to discuss this in more detail, your trade association - shown above - or the HSE or local authority health and safety inspector will be able to help.

This leaflet is a guide addressed principally to manufacturers and suppliers of ROPS and restraining systems and users and hirers of mobile work equipment to assist them in meeting relevant supply and use legislation.

This publication may be freely reproduced, except for advertising, endorsement or commercial purposes. The information is current at 6/99. Please acknowledge the source as HSE.