



## Cast iron columns in buildings: the dangers of collapses from powered vehicle collisions

MISC157

### Introduction

Hollow cast iron columns are notoriously brittle and the majority are prone to failure with the slightest impact from a powered vehicle, eg a fork-lift truck (FLT).

Numerous examples of roof collapse have been recorded where a rider-operated FLT has struck a column that had a cross-sectional area of actual cast iron material of less than 180 cm<sup>2</sup>. A column with a diameter of less than 110 mm has also been known to collapse after being struck by a pedestrian-operated powered vehicle.

Between March 1997 and January 1999, in the north-west of England alone, there have been at least seven roof collapses resulting from FLT collisions with cast iron columns.



Figure 1

Figures 1 and 2 show the devastation which can result and the potential for people to be killed in such incidents.

### Elimination of risk

If you have hollow cast iron columns with:

- o cross-sectional areas of actual metal of less than 180 cm<sup>2</sup> (and rider-operated vehicles turn and reverse around them);
- o overall diameter of less than 110 mm (and which pedestrian-operated powered vehicles turn and reverse around them);

they are vulnerable to collapse on collision so you will need to eliminate this risk as soon as possible.

One solution is to use pedestrian-operated non-powered vehicles around vulnerable columns with diameters of less than 110 mm, and to substitute pedestrian-operated powered vehicles for rider-operated vehicles around vulnerable columns of larger diameters.

Alternatively, you may employ the services of a competent person (eg a chartered structural engineer) to design protection for vulnerable columns or for their replacement with steel stanchions.

Column protection needs to be properly designed. The use of brickwork, car tyres or oil drums filled with concrete or hard core around columns, is unlikely to be suitable as these will transfer the impact loads directly onto the columns.

For guidance on an appropriate design of column protection, read the latest edition of British Standard BS 6180:1995. Note: while this code currently only applies to vehicles up to 2500 kg in weight moving at a maximum speed of 10 mph, the design method embodied in Appendix B of the code is still applicable to barrier designs in this situation. You should specify this to your competent person so that any barrier solution must at least meet this standard.

### Reduction of risk

In the interim period, before the risk is eliminated, you will need to reduce the risk as much as possible (Note: the following measures are NOT substitutes for those described in 'Elimination of risk.')

For the rest of this information sheet, rider and pedestrian-operated powered vehicles will be referred to as powered vehicles (PVs).



Figure 2

Initially you should review your storage arrangements with the aim of temporarily preventing the need for PVs to be turning and reversing around **vulnerable** columns. Consider whether materials can be stored elsewhere and brought onto your premises when required.

Where it is not possible to arrange for temporary alternative storage, you should ensure strict control and supervision of PV movements. For example:

- all areas with columns should be well lit and all columns painted in equal yellow/black or red/white stripes (approximately 45");
- floor markings should dictate the travel route around all columns. To help with this, an area of striped floor markings (as above), on which PVs should not travel, should be painted around the base of columns. This area should be as large as possible, but should not be less than 400 mm all around the column;
- where space permits, temporary fences or kerbs (painted as above) which do not contact the column, could be securely fixed around **vulnerable** columns. Where space does not permit the use of temporary fences or kerbs and the movement of the PV or its load encroaches within the above clearance distance, named banksmen should be used to supervise PV movements. If necessary, there should be two banksmen, one on either side of the PV;
- plan the method of working to reduce the quantity of stored material between columns. This will allow PVs to reverse well clear of the columns on either side;
- place speed restrictions (as low as possible) on all PV movements;
- minimise PV reversing;

- repair pot-holed, rough or uneven floor surfaces; and
- provide your employees with written safe working instructions which explain the danger, PV movements and precautionary measures. Accompany this with verbal training and workplace signs.

**Provide an appropriate selection of these 'reducing the risk' measures for the long-term protection of all columns around which PVs pass by but do not turn or reverse.**

### Legal requirements

An understanding of this information will help you to undertake a risk assessment in line with the Management of Health and Safety at Work Regulations 1992. Application of its contents will help you to ensure safety, according to the Health and Safety at Work etc Act 1974 and the Workplace (Health, Safety and Welfare) Regulations 1992. The Health and Safety (Safety Signs and Signals) Regulations 1996 indicate the required hazard marking style of cast iron columns.

### Reference

*Code of Practice for barriers in and around buildings*  
BS 6180:1995

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