



Controlling the risk of steel-framed farm buildings collapsing during erection

Agriculture Information Sheet No 18

Introduction

This sheet provides information on how to prevent or reduce the risk of steel-framed farm buildings collapsing during erection. Following the guidance will help farmers to meet their duties under the:

- Health and Safety at Work etc Act 1974;
- Management of Health and Safety at Work Regulations 1992;
- Construction (Design and Management) Regulations 1994 (CDM).

Whenever a steelwork structure is being erected, there is a risk of collapse, unless proper precautions are taken. There have been a number of incidents on farms involving such collapses, some of which resulted in serious injuries or fatalities due to the sudden nature of the collapse and weight of steel involved. Farmers and their workers should not erect steelwork structures unless they are competent to do so.

This information sheet will help farmers and appointed competent persons to check that the contractors they engage to do such work are competent and work safely. It does not address other risks which may arise during erection, nor does it cover the detailed requirements for methods of construction, aspects of sheeting, demolition or foundations.

Hazards

Temporary instability of the structure during erection results in a high risk to those carrying out the construction work and to others in the area. Typical incidents on farms include the following:

- Three men were erecting a 64 m x 24 m x 4 m portal frame building when it collapsed. They had provided only 16 guy ropes (eight in each direction) to resist collapse. The pins securing the guy ropes pulled out of the ground when the stanchions were being moved into position. The two purlins connecting each portal frame did not provide stability.
- Two people were concreting stanchion foundations within a partly erected portal frame building when it collapsed. No effective temporary or permanent support had been provided to hold the stanchion bases in position. Four frames had been erected,

temporarily supported at roof level only by two rope ties tensioned against timber struts.

- Seven frames of a portal frame building had been erected - one was held in position by guy ropes, while some were attached to trees. The first and second frames were connected with timber purlins bolted in position. Purlins between the remaining frames were not secured and the building collapsed as three men were working on it.

Planning the work

If the work involves five or more people or more than 30 working days, CDM applies. This means that farmers should formally appoint a person or people who are competent (a 'competent person' or CP) to plan and oversee the work for health and safety long before it starts. Reputable contractors should be familiar with the requirements of CDM.

CDM may not apply for smaller projects. If it does not, farmers should still make sure that the contractors are competent to carry out the work they are engaged to do. Steel erection, however extensive, is high risk work and requires specialised skills which most farmers are unlikely to have themselves.

In all cases, site procedures should be properly planned before work starts, and should include checking that:

- a straightforward and detailed step-by-step construction guide is available as early as possible, that it is adequate and is understood before work starts. It should include drawings/sketches including boldly presented stability/safety points;
- foundations have been cast and cured in accordance with the specification;
- temporary stability requirements are fully understood and necessary materials are available on site before the work starts (see next page);
- all construction workers are trained, experienced and capable.

The CP may need to amend or amplify the supplier's written details of methods of construction to meet on-site requirements as the work progresses. Any revisions to the method of construction should be checked with the steel supplier before starting the work.

Temporary stability of the structure

Structures can only be safely erected if the first bay (known as the stable end core) is fully stabilised before the remaining steel bays are erected.

The preferred system of erection, using temporary or permanent bracings, is shown in Figure 1. Until the stable end core is in position, effective props and/or supports need to be in place to stabilise the incomplete structure. A stable end core for the preferred system in Figure 1 will only be achieved when the following elements are fixed into position:

- two mainframes fully connected;
- diagonal bracings;
- roof plan bracings;
- a minimum of three purlins securely connected on each roof pitch.

An alternative system using cast-in concrete foundation bases is shown in Figure 2. In this case the stable end core will only be achieved when:

- two mainframes are fully connected;
- stanchions to mainframes are bolted onto cured concrete foundation bases or cast into cured concrete pocket bases; and
- a minimum of three purlins are securely connected on each roof pitch.

In both cases, all temporary bracings should remain in position until the structure is complete; remember that roof plan bracings, purlins or eaves beams by themselves will not provide adequate stability.

Further advice

Further advice and information is available from local offices of the Health and Safety Executive.

HSE priced and free publications are available by mail order from:

HSE Books, PO Box 1999, Sudbury, Suffolk CO10 6FS
Tel: 01787 881165; Fax: 01787 313995.

HSE priced publications are available from good booksellers.

For other enquiries ring HSE's Infoline, tel: 0541 545500, or write to HSE's Information Centre, Broad Lane, Sheffield S3 7HQ.

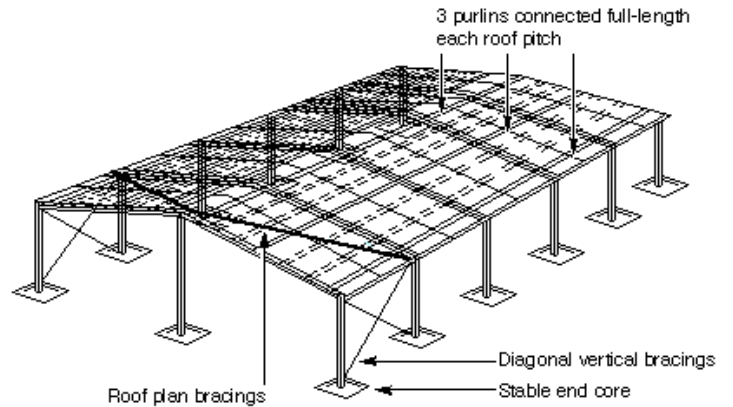


Fig 1 Typical steel-framed agricultural building showing preferred minimum erected elements to ensure temporary stability (stable end core)

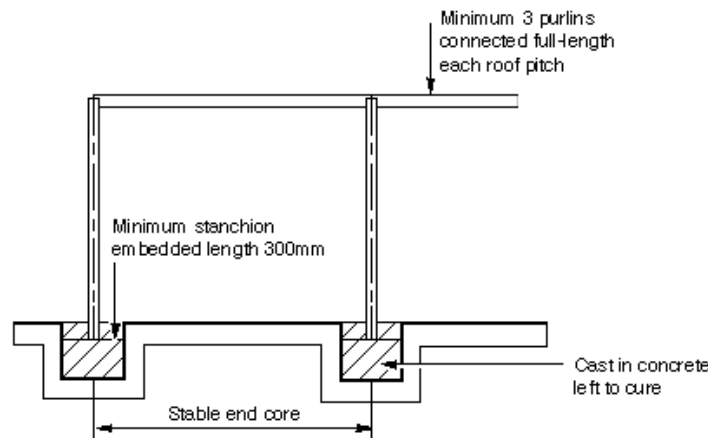


Fig 2 Alternative cast-in bases to achieve temporary stability

Concrete bases left a minimum curing period of 24 hours before releasing temporary props and continuing erection sequence along length of building

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This leaflet contains notes on good practice which are not compulsory but which you may find helpful in considering what you need to do.