



The Ladder Safety Devices
Ladder Stabilising System

*A New Perspective on
Portable Ladder Stability*

How Ladders Fail

Understanding how portable ladders can fail is crucial to the decision as to which is the best method of prevention.

There are four modes of potential failure:

Base Slip

Loss of Top Contact

Top Slip

Flip

Research and Testing

In the year 2000, the Health and Safety Executive commissioned Loughborough University to undertake detailed research into portable ladders, how they are used and why they fail, to develop a workshop procedure to test all four of the identified potential failure modes.¹

As part of the regime, Loughborough examined and tested current methods, such as 'footing' and existing stability devices for their effectiveness in preventing ladder failure. Following initial research and to simulate usage in a workshop test, they specified an *Applied Load Point* - ALP, a *Standard Load Vector* - SLV (direction in which loads were applied) and the actual *Loads* to be applied. The purpose was to represent the centre of gravity of a user standing on a ladder and leaning out to one side.

The Requirement

For any ladder to be claimed *effective* it must be prevented from falling over when subjected to all the loadings in all of the tests. The use of the word 'effective' is deliberate and taken from the WAHR 2005 regulations:

The Law - Slip Prevention²

A portable ladder shall be prevented from slipping during use by -

- securing the stiles at or near their upper or lower ends
- an effective anti-slip or other effective stability device or;
- any other arrangement of equal effectiveness.

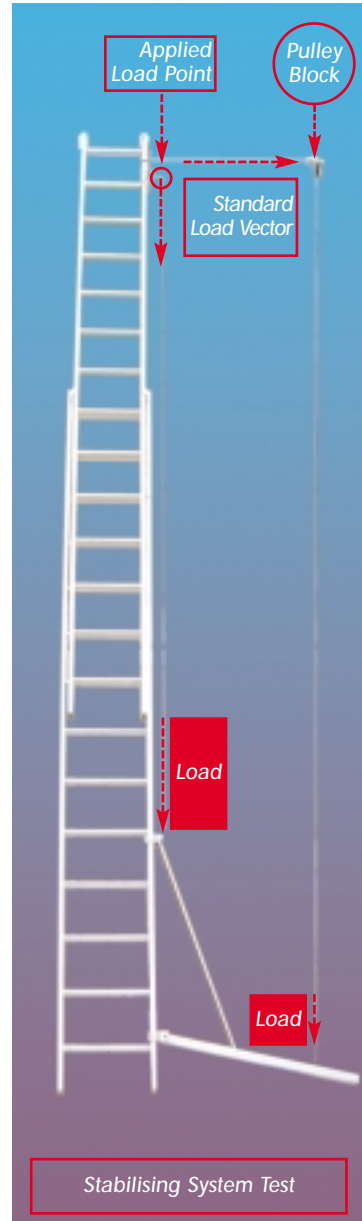
The Current Position

The HSE has confirmed that for a stability device to be proved 'effective', it must meet the requirements of the Loughborough Test procedures. This is the only way to comply with the WAHR 2005 (see b above).

Ladder Safety Devices have carried out extensive empirical tests of their new stabilising system using the test procedures recommended by Loughborough University and the results establish that it does indeed prevent failure in all four modes on ladders up to 7.5 metres in length and thus meets HSE requirements as a valid means of compliance.



Detail of ALP and methodology



The Failure Modes and Relevant Test Procedures

Base Slip

The horizontal forces applied to the ladder feet exceed the grip available and as a consequence the ladder slides down the wall.

Loss of Top Contact

The top of the ladder loses contact with the vertical surface against which the ladder is leaning due to excessive horizontal pressure being applied by the user.

The test for these two failure modes is combined into one test. A vertical load of 60kg and a 13kg load away from the wall is applied through the ALP.

Top Slip

The grip at the top of the ladder stiles is overcome by the horizontal forces created by the user over-reaching, causing the ladder to slip sideways and the user to fall to the ground.

The test procedure is for a vertical load of 60kg and a horizontal load of 23kg parallel to the wall and away from the ladder to be applied through the ALP.

Flip

The ladder rotates around one stile due to the user pulling on one stile whilst simultaneously reaching out sideways on the opposite side. The rotation causes the user to be thrown to the ground. This happens very suddenly and is usually identified, incorrectly, as top slip.

The test procedure is for a vertical load of 128kg and a horizontal load of 23kg parallel to the wall and away from the ladder to be applied through the ALP.

HSE state that *"An effective stability device is one that will secure the untied (freestanding) leaning ladder on the actual surfaces it is resting on (ground and upper) and prevent it from failing under conditions of normal and foreseeable use - this includes foreseeable misuse."*³

As can be deduced from the above test procedures, the test loadings have been set to include possible misuse through over-reaching and/or overloading.

1 Evaluating the performance and effectiveness of ladder stability devices. RR205 © Crown Copyright 2004. Loughborough University 2004.

2 The Work at Height Regulations 2005. Statutory Instrument 2005 No 735. © Crown Copyright 2005.

3 HSE Operational Circular OC 200/30. 04/11/2005. Securing Leaning Ladders, para 3.



LSD actual Base/Top Contact Test



LSD actual Flip test. Ladder extended to 6.5m. Vertical Load 128kg. Horizontal Load 23kg. Stabiliser and top wheels fitted. (See overleaf).

The Ladder Safety Devices Stabilising System

The system consists of three parts. All parts use clamps to enable rapid and secure attachment to BS/EN 131 ladders. No drilling is required.

1. Stabiliser Arms

A pair of arms attached to the lower part of the ladder, just above the bottom rung and 1 metre above that point. The arm is hinged at the bottom and when released from its catch so that the foot reaches the ground, it is locked into position by a telescopic strut which has locking positions at 12mm intervals. These arms provide the required resistance to Flip and in some part to Top Slip.

2. Wheels

The second part consists of a pair of free-running rubber-tyred wheels attached to the stiles at the top of the ladder. The soft, sticky rubber is made from the same type of compound used for racing car tyres and provides enormous resistance to Top Slip.

3. Levellers or Safety Feet

There is a choice of foot attachments:

The LSD Levellers

The HSE requirement for levelling is clearly stated: "Only use a ladder if the rungs are level. Ladders can be levelled using specially designed devices but NOT by using bits of brick or whatever else is at hand."⁴

The LSD Levellers attach to each stile at the bottom of the ladder and provide swift adjustment for slopes in both directions (left to right or right to left) of up to 75mm in increments of 3mm. This is sufficient adjustment for the maximum recommended slope of 16 degrees.⁴ (See Figure 1). Levellers are fitted with sticky rubber feet at the base to cope with back-slip. (See Figure 2).

This product is available separately.

Safety Feet

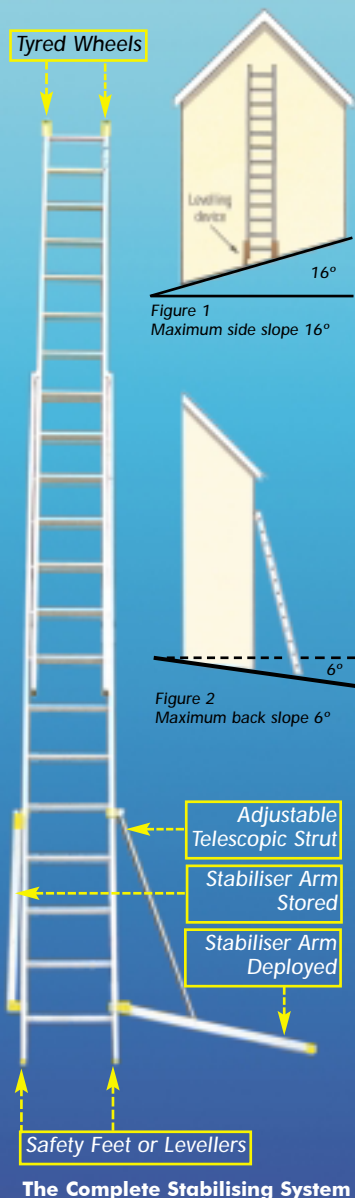
Using the knowledge gained from the manufacture of the rubber for the top wheels, our safety feet give a level of grip which far exceeds the grip levels provided by standard ladder feet and also the requirements of the Loughborough tests.

They attach to both stiles at the bottom of the ladder.

This product is also available separately.

⁴ HSE leaflet 'Safe use of ladders and stepladders - An employers' guide' INDG 402

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The Complete Stabilising System

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