

Health and Safety Executive OC 406/5

Field Operations Division

To

FOD Construction Inspectors

FCG Specialist Inspectors (Mechanical and Construction)

Railway Inspectors (for information)

SAFE LIFTING OF SCAFFOLD TUBES USING FIBRE ROPES

This OC, based on THSD Minute THSD A2/INF/3/93, provides a description and critical review of the method taught by the Construction Industry Training Board (CITB) for lifting scaffold tubes using fibre ropes, utilising a rolling hitch knot.

Background

1 It is common practice for scaffolders to lift single or multiple scaffold tubes, using a fibre rope tied onto the tubes.

2 The Construction Industry Training Board (CITB) teach a method which involves the use of a rolling hitch to lift scaffold tubes. Their recommended method is briefly noted in Reference 1; however the details and limitations of the method have not been published. This OC provides readers with a description and review of the CITB method and further related advice.

Specification of scaffold tubes

3 Tubes should be manufactured and tested in accordance with BS 1139. Common lengths are 6.3m (21 ft), 1.5m (5 ft) and 1.8m (6 ft). The 3 main types are: black steel, galvanised steel and aluminium alloy. Black and galvanised steel tubes usually weigh 4.37kg/m (2.9lb/ft), whereas aluminium tubes usually weigh 1.67 kg/m (1.12lb/ft).

Handling of scaffold tubes

4 There are 3 typical methods of raising and lowering scaffold tubes by hand. These are:

(1) Hand balling (or chaining) - The scaffolding materials are raised or lowered between scaffolders by passing from hand to hand.

(2) Hand line (or light line) - May be used to haul up materials hand over hand. Tubes, boards or sacks of fittings are tied to the lower end of a 12mm diameter fibre rope (typically) and hauled up by hand. This method is commonly used during scaffold construction, where a gin wheel has not been provided.

(3) Gin wheel - The gin wheel is fixed to a horizontal cantilevered tube and is used in conjunction with an 18mm diameter fibre rope (typically). Materials are tied to one end of the rope. The load to be lifted must not exceed 50kg if overloading of the cantilevered scaffold tube arrangement is to be avoided.

USE OF FIBRE ROPES - CITB METHODS

General requirements

5 Fibre ropes should comply with the requirements of BS 2052 or BS 4928 and can usefully be marked with an identification tag and the safe working load - Construction (Lifting Operations) 1961, regs. 34(1)(b) and 34(2) apply. The fibre rope should be tied to the scaffold tube(s) using a rolling hitch (see appendix, Fig 1) rather than a clove hitch. The latter is considered less secure and more likely to slacken off if the load on the rope is relieved, however it is quicker to tie and may be erroneously used as a short cut. The procedures outlined below apply to the lifting and lowering of scaffold tubes.

Lifting of single scaffold tubes

6 Single scaffold tubes up to a length of 6.3m (21ft) may be lifted, (a weight of approximately 27.5 kg). The rolling hitch should be tied approximately 1/3 the way down the tube.

7 If the scaffold tube is to be lifted vertically, the rolling hitch should be tied approximately 1/2 way down the tube. The tube should be kept vertical during the lift by tying a half hitch at the top of the tube, (see appendix, Fig 3).

Lifting of multiple scaffold tubes

8 Multiple tubes should be lifted in bundles of 3, so as to maximise the frictional contact between the rope and tubes. The tubes should all be of the same length. Lifting of 2, or 4 or more tubes in a single bundle is not recommended. A maximum of 3 x 2.1m (3 x 7') tubes may be lifted, (a weight of approximately 27.5 kg). Multiple tubes should have a half hitch applied at the top to prevent the load from scissoring. The rolling hitch should be tied approximately 1/2 way down the tubes.

COMMENTS

9 Limitations on the weight of scaffold tube(s) which can safely be raised or lowered will be based on manual handling considerations, rather than the strength of the fibre rope. The rope sizes generally in use (18mm and 12mm diameter) provide a considerable factor of safety on strength, after allowing for the strength reduction arising from the rolling hitch itself.

10 The rolling hitch is designed to tighten down as the load applied to the rope is increased. Thus a rope which is correctly tied to a scaffold tube would be expected to fail at the knot, rather than slip along the scaffold tube. The minimal amount of rope slip and the high factor of safety associated with the method, was demonstrated by the CITB during a series of ad-hoc tests.

11 The rolling hitch grips tightly when a load is applied. However it may slacken and slip along the scaffold tube if the load on the rope is relieved. Hence landing the tube(s) at the end of a lift is a hazardous part of the operation. Care must be taken to ensure the safety of the tubes before the rope is allowed to slacken off. A slack rope will also be caused if the tubes snag whilst being lowered. Operations should therefore be carried out in a place free of obstructions.

12 Man-made fibre ropes are generally replacing natural fibre ropes. They are stronger and less liable to chemical attack and rot. Natural fibre ropes do however have higher frictional properties than man-made ropes. Thus, since lifting using a rolling hitch relies principally on friction, natural fibre ropes are generally preferable, although there is no evidence to suggest that man made fibre ropes are unsuitable. The condition of the scaffold tubes may also affect the security of the lift; varnished or painted tubes having a lower frictional resistance.

CONCLUSION

13 The methods taught by the CITB appear to be safe and practicable, provided that the above mentioned limitations are observed.

REFERENCES

1 *A guide to practical scaffolding*, published by CITB. ISBN 0 902029 91 6.

2 BS 5973: 1990 - *Code of practice for access and working scaffolds and special scaffold structures in steel*.

3 BS 2052: 1989 - *Specification for ropes made from manila, sisal, hemp, cotton and coir*.

4 BS 4928: 1985 - *Specification for man-made fibre ropes*.

5 BS 1139: Part 1: 1989 - *Specification for tubes for use in scaffolding*.

6 BS 6668: Part 1: 1986 - *Specification for lifting slings for general service made from certain natural and man-made fibre ropes*.

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ASI headings

Construction: fibres: gin wheels: lifting: lifting tackle or gear: ropes -use: tube(s): scaffolds.

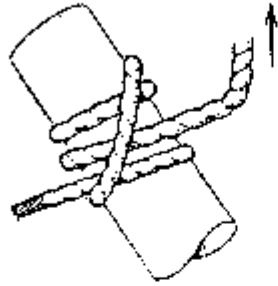


Fig 1 Rolling Hitch

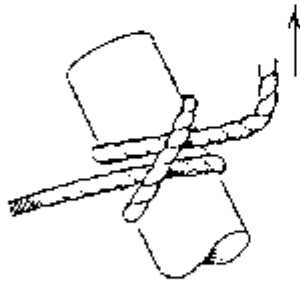


Fig 2 Clove Hitch

NOT RECOMMENDED

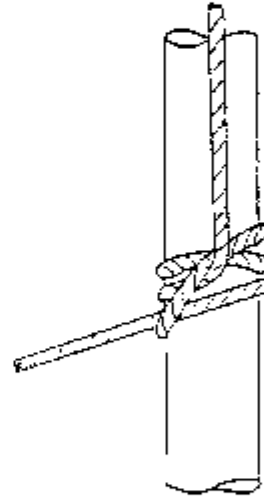
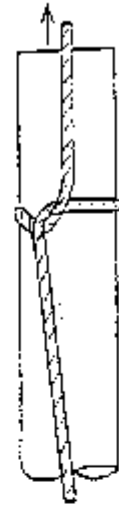


Fig 3 Rolling Hitch + Half Hitch

APPENDIX

(paras 5 and 7)