



NATIONAL ARENAS ASSOCIATION

**GUIDANCE FOR
RIGGING
IN UK VENUES**

FOREWORD

This document has been produced with the input of many individuals within the venue operation and rigging industries. Contributors have included house riggers, rigging contractors, health and safety managers and operations managers with responsibility for rigging in their venues. Some of the content is taken or adapted from existing venue rigging codes / rules.

During the many meetings that have taken place, there have been a number of subjects that have created lengthy discussion, however, the one subject that invariably raises emotion in everyone is the need for timely and appropriate information. This is mentioned in Section 11 of the guidance but is also mentioned here because lack of good quality information submitted within a reasonable period before an event is the one complaint that consistently arises from venues. It is the key to forward planning and an efficient and safe operation on site. There are many events for which accurate rigging plots, detailed method statements and risk assessments are forwarded to venues well in advance of an event, however there are also many where inadequate or inaccurate information is produced and is not made available until very close to the event and sometimes on the day of the event. It cannot be over-stressed that accurate, timely information is a major factor in improving safety and reducing conflict on site.

INTRODUCTION

This rigging guidance has been produced by members of the National Arenas Association for use in UK venues.

Its purpose is to provide:

- Guidance to venue operators on a wide range of safety matters relating to rigging, in order to ensure the health, safety and welfare of anyone working in or visiting a UK venue.
- Advice to riggers and rigging companies on general venue requirements relating to rigging and associated activities.
- Advice and guidance on the use of personal protective equipment (PPE) and commonly used rigging equipment.

This document is NOT intended to be a technical manual for riggers, however it should be regarded as setting minimum operational standards expected of riggers.

The guidance is structured such that it can be applied in any venue and it is therefore general in nature. It should be used in conjunction with any venue specific rules and regulations.

DEFINITION

Rigging

For the purpose of this guidance, rigging is defined as *"The temporary suspension or attachment of materials and equipment to a building or structure (including temporary structures built specifically for the purpose) by means of wires, cords, slings, chains or lifting appliances and related equipment."* Theatrical counterbalance flying systems are not included.

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1. LEGISLATION

1.1 Health & Safety legislation, Approved Codes of Practice, guidance and general “good practice” apply to rigging operations as they do to all work activities. The overall aim is to secure the health, safety and welfare at work of employees, the self-employed and all other persons who may be affected by work activities (e.g. audiences). While not an exhaustive list, the main Regulations are:

- The Health and Safety at Work, etc. Act 1974
- The Management of Health & Safety at Work Regulations, 1999
- The Provision and Use of Work Equipment Regulations 1998 (PUWER)
- The Manual Handling Operations Regulations 1992 (2nd edition 1998)
- The Workplace (Health, Safety and Welfare) Regulations 1992
- The Personal Protective Equipment at Work Regulations 1992 (PPE)
- The Lifting Operations and Lifting Equipment Regulations 1998 (LOLER)
- The Work at Height Regulations 2005

Anyone who is involved in or has responsibility for rigging operations should ensure that he / she is familiar with these Regulations.

1.2 A list of relevant codes of practice and guidance is set out in **Appendix 1**.

A list of applicable standards: BS’s, BSEN’s, ISO’s etc. is set out in **Appendix 2**.

In addition, there are requirements under Local Government legislation, Conditions of License etc. that vary from venue to venue. Consultation with the appropriate Local Authority departments is essential.

1.3 Venues should reserve the right to inspect all rigging, working methods and equipment to ensure compliance with relevant legislation, codes of practice etc, and to refuse to permit the use of non-compliant equipment and working methods.

2. RESPONSIBILITIES

In order to ensure compliance with the legislation in Section 1, all parties involved in or controlling rigging operations have responsibilities to themselves and to others. There is a general hierarchy to the process but it is important to note that persons in overall control always retain some degree of liability for activities carried out under that control, even when specialist contractors are hired in to do the work.

2.1 Employer Responsibilities

Venues generally may be considered as shared workplaces where employers responsibilities fall upon the venue and its hirer’s and agents which may include venue management companies, promoters, organising companies, production companies and rigging contractors.

Effective communication between all employers is paramount.

Under health & safety legislation an employer has a duty to ensure, so far as is reasonably practicable, the health, safety and welfare of his employees and that the activities being undertaken do not affect the safety of others, including members of the public.

This duty covers the following areas:

- Provision and maintenance of plant and systems of work so that they are safe and without risk to health.
- Ensuring reasonable arrangements are in place for the safe use, handling, storage and transportation of articles and substances.
- Provision of information, instruction and training to his employees.
- Ensuring the workplace is safe, including safe access and egress, and is without risk to health.
- Provision of adequate facilities to look after the welfare of employees whilst at work.

This duty extends to those who may be contracted to undertake work on behalf of the employer who will, in this case, be acting as a Client. The Client cannot absolve himself of the principle duties outlined above by contractually deferring them to his contractor or sub-contractors. Even though the Client may be contractually two or three times removed from an individual working on a project, he still carries responsibility for that individual's conduct. This duty also applies to the self-employed.

Should an accident occur to a contractor or sub-contractor, the Client will be expected to demonstrate to an enforcement agency that he undertook the appropriate measures to ensure that his contractors were competent and possessed the appropriate skills and resources to safely undertake the project involved.

2.2 Employees / Self-Employed Responsibilities

Under health and safety legislation, employees and the self-employed have a duty to look after their own health and safety and that of others they may affect by their acts or omissions.

These individuals carry a responsibility for ensuring that all equipment being used has been properly maintained and inspected, whether this equipment is owned by the individual or by a third party.

Individuals also carry responsibility for ensuring that they are fit and able to carry out particular tasks, this includes control of working hours and ensuring that appropriate rest periods are taken.

3. COMPETENCY

- 3.1 Rigging operations shall be undertaken by competent persons who are qualified by training and experience. Rigging operations shall be supervised by an individual of equal or greater competency.

- 3.2 A rigging company should have an authorised person to advise on rigging issues. The authorised person should have the practical experience and theoretical knowledge of the use of any equipment to be used to enable faults and weaknesses to be assessed and to determine whether such equipment is able to perform within its design limits.

The authorised person should carry out periodic examinations in line with the approved company examination regime, or at more regular frequencies. The authorised person should decide upon the nature and extent of any examination and carry out such tests as necessary.

The authorised person should have the appropriate authority to reject defective equipment as unsuitable for the purpose intended without concern for company economics or for continuance of employment.

- 3.3 Ground riggers should have a level of knowledge to enable them to undertake the inspection of chains and other equipment to prepare them for lifting and, whilst not necessarily having the experience for working at heights, have the same knowledge as that of a climbing rigger.

- 3.4 It is recommended that training for all riggers should include the following:

- Rope access techniques in line with current standards
- Emergency First Aid
- Manual Handling Techniques
- Mobile Elevated Work Platforms and other similar equipment

In assessing experience, account should be taken of the fact that, in many cases, riggers gain their experience within the industry and that historically there has been a lack of formal training leading to nationally recognised qualifications. However, it is recommended that where possible, riggers should undertake training in relevant areas.

4. GENERAL SAFETY PRECAUTIONS

4.1. Working underneath rigging operations

Where possible, all personnel should be excluded from beneath areas where overhead rigging or lifting operations are taking place.

The exclusion zone should be clearly identified and appropriate signs should be in place. When this is not possible, the area shall be designated a "Hard-Hat" area.

When designating a hard-hat area, this is more easily managed if an entire space, hall or room is designated as such, rather than specific areas within the space. Clear and unambiguous signage must be put in place.

The person or persons responsible for designating exclusion zones, hard-hat areas and for issuing hard-hats must be defined. This person must also determine when the area ceases to be an exclusion zone or hard-hat area.

In practice a space may be designated as a hard-hat area only during specific operations. This requires that clear instructions are given to all personnel likely to be working in the area each and every time that the area is designated a hard-hat area.

All venues should adopt and enforce a clear policy on the use of hard-hats and this should be documented alongside relevant Risk Assessments and Method Statements.

4.2. Working at Height

The Work at Height Regulations 2005 set out a simple hierarchy for managing and selecting equipment for work at height. Duty Holders must:

- Avoid work at height where they can
- Use work equipment or other measures to prevent falls where they cannot avoid working at height
- Where they cannot eliminate the risk of a fall, use work equipment or other to minimise the distance and consequences of a fall should one occur.

Work at height must be properly planned, including written method statements and risk assessments, appropriately supervised and undertaken by competent individuals.

Working at height should not be undertaken by individuals who are suffering from nausea, light-headedness, ear infections or other conditions that are likely to cause balance problems. Other conditions that may result in difficulties when working at height include severe head or chest colds, bronchitis and influenza etc and even just feeling off colour. All such conditions must be reported to the Rigging Manager/Supervisor prior to work commencing. In addition, stress and depression can lead to lack of concentration resulting in increased risk of accidents.

Under no circumstances shall rigging personnel be under the influence of alcohol and/or illegal drugs while carrying out rigging operations.

Any prescribed drugs or other medication being taken by a rigger, must be advised to the Rigging Manager/Supervisor prior to commencing work. Riggers should obtain confirmation from their GP that any prescribed medication will not affect their ability to perform their duties. Any such confirmation must be reported to the Rigging Manager/Supervisor prior to work commencing.

When working at height, riggers will inevitably be working in the vicinity of building services including electrical equipment, cables, gas and water pipes, sprinkler system etc. No load, no matter how small, shall be suspended from any of these services or containment systems carrying such services. Care should be exercised when working or rigging near light fittings or other heat generating equipment. Before carrying out work on, or adjacent to, any electrical equipment, ensure that the necessary electrical isolation has been carried out.

Tools and loose equipment must be secured when working at height.

The Working Load Limit (WLL) or Safe Working Load (SWL) of any item of access or rigging equipment shall not be exceeded.

Walkways must be kept clear of loose rigging equipment at all times. All equipment taken to high level and not used must be removed after work is completed. Tools and equipment should be hoisted to high level by means of rope or similar system rather than being carried by individuals.

Communication devices (e.g. hand portable radios) shall be attached by lanyard to the harness, holster belt or similar.

4.3. Hours of Work

Employers should refer to the Working Time Regulations. It is recognised that long hours of work are often associated with rigging operations particularly in the touring concert business. Riggers have a duty to ensure that their competency is not affected by tiredness. Employers, Promoters, Production Managers and Venue Managers have a duty to ensure that Riggers and Rigging Supervisors get adequate rest periods.

5. PERSONAL PROTECTIVE EQUIPMENT

5.1 General

Personal Protective Equipment (PPE) for working at height must be provided by employers and the self-employed in compliance with the Personal Protective Equipment Regulations 1992. PPE for rigging activities must be suitable for both work positioning and fall arrest.

The users of the PPE must be trained in its use and inspection. Each piece of equipment shall be visually inspected prior to use by the operative. In addition equipment should be inspected by an authorised person at least every six months and after any fall or overload. These inspections should be documented.

The inspection regime is dependant on the usage, it is recommended that a detailed inspection is undertaken every 3 months for heavy usage, and an interim inspection used to highlight any potential problems. PPE examination should not normally include proof loading in relation to textile equipment as the load test may adversely affect the integrity of the equipment.

Guidance on the use of commonly used items of PPE is contained in **Appendix 3**.

5.2 Rescue

In the event of a fall and the successful operation of PPE, a rigger may be left suspended in a precarious position with no immediate means of rescue. It is therefore recommended that venues should have in place a rescue plan.

Within the venue, safe systems will be available such as catenary systems, catch net systems, fall arrest systems or some combination of these. Ideally consideration will be given to self-rescue methods during the design and installation phases of such systems.

5.2.1 In any rescue plan, some of the areas to consider are:

- Correct P.P.E. i.e. compliant with the recommendations in Section 5 of this guidance.
- Avoidance of lone working
- A person falling in a full body harness may very quickly experience circulatory problems and there is a risk of cardiac arrest from the shock.
- A second person that should ideally be a competent climbing rigger will be able to react immediately to a situation.
- Communication
- Location of access equipment
- Location of medical facilities
- Liaison with the Fire & Rescue Emergency Services to ascertain means of access when working at heights.

6. LIFTING EQUIPMENT

6.1 Definition

For the purposes of this guidance, lifting equipment / lifting tackle shall be defined as *'any item used to raise, lower or suspend a load'*. This includes both lifting appliances and lifting accessories.

6.2 Legislation

All lifting equipment / lifting tackle used shall comply with all current relevant legislation (See 1.1 of this Guidance.)

6.3 General

All lifting equipment shall be of sound material and construction, free from defects and fit for the purpose for which it is to be used.

SWL or WLL shall be clearly marked on all items.

The SWL / WLL of any item of lifting equipment must never be exceeded.

No item of lifting equipment shall be used for any purpose for which it is not intended.

Where reasonably practicable all rigging equipment must be inspected prior to use.

Rigging equipment must not be dropped from height and must be treated with reasonable care.

Each item of rigging equipment is required to carry an individual distinguishing mark, serial number or batch mark and be traceable from its manufacture.

Each item of rigging equipment shall be used in accordance with the manufacturers guidelines.

It is a requirement that current valid records and/or certificates of test/inspection are available for all lifting equipment used.

Rigging equipment should only be used by trained competent individuals, or under the supervision of such individuals.

6.4 Guidance

Guidance on the use of commonly used equipment and systems is contained in **Appendix 4**.

7. EXAMINATION AND INSPECTION OF EQUIPMENT

Examination and inspection of lifting equipment is covered under Lifting Operations and Lifting Equipment Regulations 1998 (LOLER) and Provision and Use of Work Equipment Regulations 1998 (PUWER) and is fundamental to safety in rigging operations.

7.1 The nature, type and frequency of examinations

All equipment used in rigging should be subject to an examination scheme that is compliant with Regulations 9 and 10 of LOLER. In summary, as an employer or self-employed person "you must ensure that:

- Where appropriate, before lifting equipment (including accessories) is used for the first time, it is **thoroughly examined**.
 - Lifting equipment may need to be thoroughly examined in use at periods specified in the Regulations (i.e. at least six-monthly for accessories and equipment used for lifting people and, at a minimum, annually for all other equipment), or
 - At intervals laid down in an examination scheme drawn up by a competent person.
 - All examination work should be performed by a competent person and following a thorough examination or inspection of any lifting equipment a report is submitted by the competent person to the employer to take the appropriate action."
- (Reproduced from the HSE Simple Guide to LOLER 1998 – INDG 290)

An examination scheme should also consider manufacturer's recommendations.

If any equipment suffers damage **it should be withdrawn immediately until it is re-examined, re-tested and documented**. If found to be beyond repair, it should be marked as unusable and destroyed.

Electrical portable appliance testing records should be available and the equipment suitably marked and documented.

8. WORKING PRACTICES

8.1 General Conditions

A competent rigger shall undertake all rigging work in a responsible manner and consideration shall be given to the safety of all persons who may be affected by such works. A Rigging Supervisor should be nominated for all rigging operations.

8.2 Suspension Points

All venues shall have venue specific requirements / regulations regarding suspension points and the loading capacity of different elements of the building structure. Riggers must ensure that they comply with these requirements and if there is any doubt, there must be consultation with the venue management.

When the suspension point has been installed and the operative responsible for the installation is completely satisfied it is safe, secure and capable of supporting the load to be applied and within the SWL of all components used, the hook will be attached to the master link or shackle.

8.3 Method of Attachment

Venues will have venue specific policies on methods of attachment but general care should be taken to protect building steelwork from steel to steel contact that can cause wear and damage.

This can be achieved by the use of soft webbing or round slings or steel wraps covered by a PVC sleeve or by the steel work being protected by softeners. Whenever possible the practice of 'choke hitch' wrapping of slings is to be avoided. Where this is not possible the SWL of such slings shall be reduced to 75% of the WLL.

8.4 Bridles

When bridles are installed to provide suspension points, particular attention will be paid to the included angle created between the individual legs of bridles. This angle will at all times be the minimum possible to keep the horizontal load to each leg as low as possible.

As a general rule, no bridle with an included angle of more than 90-degrees shall be permitted. If it is necessary to exceed the 90-degree angle, then suitable calculations should be carried out to ensure that the installation is safe in respect of both the equipment being used and the building structure.

Only riggers trained in the proper use of such equipment shall carry out the assembly of bridles. All equipment used shall have its WLL clearly marked and shall be suitable for the load to be applied.

Particular attention should be paid to ensuring the correct seating of shackles and other link items.

The master link or ring forming the suspension for the load shall have a WLL equal to the suspended load weight multiplied by the number of legs used for the construction of the bridle. For example, to suspend a 2 tonne load on a three-legged bridle the SWL on the master link ring would need to be 6 tonnes. This allows for angles up to 120-degrees to be used. Angles of less than this allow lower capacity master links to be used.

Before undertaking any rigging operation, all point loads, distributed loads and bridle angles should be assessed in relation to the venue attachment points to ensure that all loads can be safely applied. Applied loads should take account of the safe weight of the rigging and hoisting equipment.

Where more than one bridle leg terminates at the single attachment point, the resultant effects of all loads should be considered.

When bridling, great care shall be taken where attachments are to beams or trusses in the same plane as the bridle, to ensure that they are fixed by positive means to stop the natural tendency to slip together. In general it is preferable that bridles are attached to beams at 90-degrees to the plane of the bridle.

8.5 Load Spreader Beams

In situations where bridling is unsuitable, e.g. if the attachment points are unsuitable for application of a horizontal load then the use of spreader beams should be considered.

Where standard truss systems are employed for this purpose, they shall be subject to a structural report, certified by a competent independent structural engineer.

Where specifically designed or manufactured beams are employed, a certificate of independent test and examination will be available for inspection and the WLL clearly marked.

8.6 Truss Systems

All suspended truss systems should have independent structural certification and should only be used with certificated design parameters.

Particular attention shall be paid to the assembly of truss sections to ensure that braces are aligned correctly as per manufacturers' recommendations and that all connectors are correctly fitted, tightened and complete with any locking pins in place.

Generally all truss-mounted equipment shall be fitted with a back up safety chain or safety steel having an appropriate WLL.

8.7 Slinging

The slinging of suspended equipment shall be undertaken to manufacturers' recommendations and in accordance with the Code of Practice for the Safe Use of Lifting Equipment issued by the Lifting Equipment Engineers Association.

Prior to final lifting, a check will be made at ground level and any necessary adjustments made.

8.8 Work Areas

Main areas for rigging operations are to be clearly defined and access to such areas shall be restricted to competent personnel directly involved in the operation.

Clear and adequate communication between persons working at high level and ground crew is to be maintained with other operations suspended if necessary until such time as deemed safe to continue.

Ground crew personnel working within such areas are required to ensure that unauthorised personnel remain clear of the works area until operations are complete.

Other personnel working close to or in areas where rigging operations are taking place must be aware of these operations.

This is particularly important when the actions of other personnel could endanger the safety of rigging personnel e.g. sound and lighting crews.

When at the site of rigging operations, an area shall be designated for the temporary storage and assembly of rigging equipment. This area is to be kept clean and tidy at all times with excess equipment collected as soon as operations are complete.

Safety signs provided by the venue shall be positioned at the entrance to all areas of access during build-up and breakdown operations.

8.9 **Suspended Signs**

Any signs supplied for rigging shall be checked to ensure they are fit for suspension.

The suppliers of such signs shall be responsible for the integrity of the sign and its suspension fittings.

Signs of timber or metal framed construction may only be rigged if fitted with fully closed eye lifting rings, bolted preferably through the full depth of the sign, the capacity of which must be sufficient to completely support the load on any individual fitting.

Screw-in eyes are not acceptable for this purpose and the venue will reserve the right to refuse to allow the suspension of any signs where the suspension fitting supplied is inadequate.

Due to the flimsy nature of materials used, paper signs may only be suspended if constructed from 'Tyvec' or a similar approved material.

Drop weighting to the bottom of banners may only take place when the weighting is completely sealed within the banner by positive means, such as stitching or vinyl welding. The provision of bottom drop weight pockets by gluing is not acceptable.

8.10 **Catenaries**

Due to the potential structural damage that can be caused by catenary wire installation, and also the potentially hazardous nature of the installation and removal process, the rules for installation of catenary wires should always be checked with the venue management. Catenaries should never be installed when public are in the halls.

8.11 The Installation of Safeties

Secondary or "Safety" suspensions may be required in certain locations. The requirements for these may vary between venues.

When required, the secondary or safeties will be installed to bypass the mechanical lifting unit, as a minimum, in case of mechanical failure.

Additional mechanical lifting units can be installed as an alternative to safeties, thereby providing redundant capacity equal to 100% of the load.

Alternatively, hoists fitted with a double brake and limits do not require independent safeties.

9. INSURANCE AND PUBLIC LIABILITY

The minimum level of liability cover required by rigging companies working within venues will be set by the venue's insurers and may be increased depending on the nature of the services to be supplied.

10. ACCESS EQUIPMENT

All access equipment shall be used in accordance with manufacturers' instructions and recommendations, including the use of safety harnesses and suitable head protection.

The SWL of access equipment shall be permanently displayed on the equipment. It is the responsibility of the operator of the equipment to ensure that the carried weight does not exceed the SWL.

Special attention should be paid to the correct assembly and stability of ladders and other static forms of access equipment, including the use of outriggers where fitted.

Persons trained in the correct use of such equipment should only carry out assembly of static access equipment. Operators of Mobile Elevated Work Platforms (MEWPS) for use in rigging related operations, are required to be in possession of a current valid certificate of Training Achievement and Competency of Operations, certified by a recognised independent training authority conforming to CITB standards or equivalent.

It is a requirement that such certification is available for inspection at the venue.

The responsibility of carrying out the manufacturers' recommended daily checks, including fuel, will be that of the operator. If different operators use the equipment during the course of the day then all operators should carry out a pre-use check.

Standing directly on forks, attachments or pallets, not intended for such applications, is strictly forbidden. Any accidents involving access equipment used for rigging purposes shall be reported to venue management immediately in addition to any other statutory reporting requirements that may be applicable.

10.1 Truss / Caving Ladders

Truss / caving ladders used to access flown truss structures shall only be used in conjunction with inertia type fall arrestors. Fall arrestors should be rigged independently of the truss structure and positioned above the ladder in such a way as to prevent over-reaching by personnel at height.

10.2 Aerial Platforms

If it is necessary for an operative to leave a MEWP at high level, he / she must identify a secure point of anchorage for the safety harness lanyard. The lanyard shall be secured before leaving the platform.

When returning to the platform, the operative must ensure the lanyard remains in position until the transfer to the carriage has been completed. **At no time should the operative be connected to both the MEWP and the structure.**

11. PLANNING AND PROVISION OF INFORMATION

The key to safe and successful rigging operations – as with most activities – lies in effective forward planning and exchange of information.

The Client or the Client's representative in the form of Designer, Contractor, and Production Manager etc. should ensure that accurate information regarding the loads to be rigged is provided to the venue as soon as possible. This is irrespective of whether the rigging will be carried out by venue riggers, touring riggers or outside contractors. Information should also be provided on any moving loads, loads involving people or anything else out of the ordinary. In turn, the venue should highlight any problems, restrictions, regulations and other requirements.

11.1 Lifting Equipment Documentation

Under LOLER, certain information must be kept and made available for inspection by others where relevant. LOLER defines "documentation" as "any retrievable recording system".

Venue owned lifting equipment must have appropriate documentation confirming that it has been inspected / examined in accordance with the provisions of LOLER. The HSE or a delegated Local Authority enforcing department may require seeing documentation at "reasonable notice".

Lifting equipment brought into a venue by a third party, must have accompanying appropriate documentation confirming that it has been inspected/ examined in accordance with the provisions of LOLER. This documentation shall be made available to the venue management if requested.

11.2 Risk Assessment

LOLER refers specifically to the Management of Health and Safety at Work Regulations regarding the requirement to carry out a "suitable and sufficient" Risk Assessment of lifting operations.

Those individuals and / or organisations that are responsible for the lifting operations must carry out the Risk Assessment, or have employees who carry out the operations. The Risk Assessment must be documented and available for examination.

APPENDIX 1

Codes of Practice and Guidance

- Safe Use of Lifting Equipment. Lifting Operations and Lifting Equipment Regulations 1998. Approved Code of Practice and Guidance L113 HSE Books 1998
ISBN 0 7176 1628 2
- Simple Guide to The Lifting Operations and Lifting Equipment Regulations 1998
Leaflet INDG 290 HSE Books 1998
ISBN 0 7176 2430 7
- Safe Use of Work Equipment. Provision and Use of Work Equipment Regulations 1998. Approved Code of Practice and Guidance L22 (2nd Edition) HSE Books 1998
ISBN 0 7176 1626 6
- Simple Guide to the Provision and Use of Work Equipment Regulations 1998
Leaflet INDG 291 HSE Books 1999
ISBN 0 7176 2429 3
- Five Steps to Risk Assessment
Leaflet INDG 163 (Rev 1) HSE Books 1998
ISBN 0 7176 1565 0
- Managing Health and Safety: Five Steps to Success
Leaflet INDG 275 HSE Books 1998
ISBN 0 7176 2170 7
- The Work at Height Regulations 2005 - A Brief Guide
Leaflet INDG 401
ISBN 0 7176 2976 7
- Code of Practice for the Safe use of Lifting Equipment
Published by the Lifting Equipment Engineers Association
- Lifting Equipment – A User’s Pocket Guide
Published by the Lifting Equipment Engineers Association

APPENDIX 2

British Standard, DIN and ISO Standards

BS 302-1/2	Stranded steel wire ropes
BS 463	Specification for sockets for wire ropes
BS 464	Specification for thimbles for wire ropes
BS 1139	Metal scaffolding
BS 1290	Specification for wire rope slings and sling legs for general lifting purposes
BS 2853	Specification for the design and testing of steel overhead runway beams
BS 3032	Specification for high tensile steel shackles
BS 3243	Specification for hand operated chain blocks
BS 3481	Flat lifting slings - Part 2: Specification for flat woven webbing slings made of man-made fibre for general service
BS 3551	Specification for alloy steel shackles
BS 4278	Specification for eyebolts for lifting purposes
BS 4429	Specification for rigging screws and turnbuckles for general engineering, lifting purposes and pipe hanger applications
BS 4898	Specification for chain lever hoists
BS 4942	Short link chain for lifting purposes
BS 5281	Specification for ferrule-secured eye terminations for wire rope
BS 5950	Structural use of steelwork in building
BS 6166	Lifting slings – Part 3: Guide to the selection and safe use of lifting slings for multi-purposes
BS 6399	Loading for buildings
BS 6570	Code of practice for the selection care and maintenance of steel wire ropes
BS 6668–1/2	Textile lifting slings - Part 1: Specification for lifting slings for general service made from certain natural and man-made fibre ropes. Textile lifting slings - Part 2: Specification for round slings made of man-made fibre for general service.
BS 6994	Specification for steel shackles for lifting and general engineering purposes grade 4 (M).
BS 7035	Code of practice for socketing of stranded steel wire rope
BS 7121–1/2	Code of practice for the Safe Use of Cranes
BS EN 292-2	Safety of Machinery; Basic concepts, general principles for design - Part 2: Technical principles and specifications
BS EN 418	Safety of machinery – Emergency stop equipment, functional aspects. Principles for design.
BS EN 698	Fibre ropes for general service - Manila and sisal
BS EN 701	Fibre ropes for general service - General specification
BS EN 795	Protection against falls from a height, anchor devices, requirements and testing.
BS EN 818-2	Short link chain for lifting purposes – Safety - Part 2: Medium tolerance chain for chain slings - Grade 8.
BS EN 1261	Fibre ropes for general service - Hemp
BS EN 1677-1	Components for slings – Safety – Forged steel components - Grade 8.
BS EN 1677-2	Components for slings – Safety – Forged steel lifting hooks with latch - Grade 8

BS EN 1677-4	Components for slings – Safety – Links - Grade 8
BS EN 12275	Mountaineering equipment – Connectors – safety requirements and tests
BS EN 25817	Arc-welded joints in steel – Guidance on quality levels for imperfections
BS EN 30042	Arc-welded joints in aluminium and its weldable alloys. Guidance on quality levels for imperfections
BS EN 60204	Safety of machinery. Electrical equipment of machines - Part 1: Specification for general requirements
DIN 1142	Wire rope grips for rope terminations to meet safety requirements
DIN 15315	Symmetrical wedge sockets for wire ropes
BS 3810 Part 5:	Terms used in connection with lifting tackle
BS 3810 Part 6:	Terms used in connection with pulley block
BS 5950	Structural use of steel
BS 6399	Loadings on buildings
BS 8118	Structural use of aluminium
DIN 1142	Wire rope grips
DIN 15315	Wedge socket (Elevator type, for wire rope termination)

Fall Arrest Equipment Standards

EN 361	Harness for fall arrest
EN 355	Energy (shock) absorbers for industrial use
EN 360	Retractable line fall arrestors
EN 362	Connectors (karabiners) for industrial use
EN 354	Lanyards
EN 363	Complete fall arrest systems
EN 353-1	Fall arrestors on a rigid anchorage line/rail
EN 353-2	Fall arrestors on a flexible rigid anchorage line/rope
EN 795	Anchors for fall arrest, Types A,B,C,D

Work Positioning Equipment

EN 358	Sit harnesses
EN 358	Lanyards for work positioning (pole straps, etc)
EN 341	Descenders
EN 567	Rope clamps (ascenders, etc)
EN 12278	Pulleys
EN 1891	Ropes for “industrial” rope access and climbing

Helmets

EN 397	Construction industry safety helmets
EN 12492	Mountaineering helmets

Other Standards

	Temporary Demountable Structures (ISE)
	Specification for the Design and Manufacture of Lifting Equipment for Performance, etc.
BS 7905 PT1	Specification for the Design and Manufacture of Trusses and Towers for Performance, etc
BS 7906 PT1	Code of Practice for use of Lifting Equipment for Performance etc
BS 7905 PT2	Code of Practice for the use of Trusses and Towers for Performance, etc
BS 7906 PT2	Lifting Equipment Engineers’ Association Code of Practice for Safe Use Of Lifting Equipment (C.O.P.S.U.L.E)

ESTA (US) Truss Standard, Wire Ripe Ladders, Manual and Powered Flying Systems
ABTT (UK) Code of Practice for Flying
The Event Safety Guide HSG 195 (The Pop Code, 1999)

APPENDIX 3

Guidance on the use of Personal Protective Equipment (PPE)

Harnesses

The safety harness forms the ergonomic link or interface between the human body and the attachment system. Most rigging work involves both work positioning or fall arrest applications; it is therefore essential that a suitable harness be worn. A multi-application harness is most suitable as it provides the sternal/dorsal attachments for fall arrest and the lateral/central waist attachments for work positioning.

For most rigging applications the harness must comply with EN 361 and be designed to spread the force of a fall over the structure of the body and give optimal conditions for a suspended human. It is strongly recommended that a multi-application harness be used for all high level working in the industry.

Harnesses used for fall arrest applications must be used in-conjunction with a shock-absorbing device that reduces the fall resultant load to 6kN for the anchorage point and the body. These must be attached to the sternal or dorsal anchorage point.

Harnesses used for work positioning should have a central/lateral work positioning attachment point and be comfortable (padded).

Harnesses should be free from any defects, mechanical action, "working" of the webbing, acids, solvents, alkalis and UV degradation. They should be stored in a bag, away from sunlight, heat and chemicals. They must be inspected with a regularly maintained inspection log. Any harness that appears to be defective should be referred to an authorised person for inspection. Any harness that is found to be defective or has been subject to a fall should be removed from use and disposed of in a manner that prevents future use.

Lanyards

Lanyards are the flexible connection element between the harness and the anchorage point. Lanyards should only be used by competent persons, as it is essential that they are used and inspected correctly.

Lanyards used for fall arrest applications must have an in-line shock absorber that complies with EN 355. Shock absorbing lanyards must comply with EN 365. The shock absorbing lanyards are designed with tear out stitching that releases when the lanyard is loaded above 2 kN.

This reduces the resultant loads to a body or the anchorage point to below 6kN. It is therefore essential any anchorage point, to which the lanyard is connected, is capable of taking a 6kN (600kg) load. A lanyard length must not exceed 2m, and must never be extended beyond this.

- **Types - "Y" Lanyard with shock absorber**

This device ensures continuous attachment by using each "leg" alternately. The "free" leg must never be attached to the harness when the anchorage leg is applied. It must either be hanging free or clipped next to its partner on the dorsal or sternal attachment of the harness.

- **Types - "I" Lanyard with shock absorber**

This device has a single leg for attaching to a structure or mobile anchorage point. It is essential that these are used singularly; two "I" lanyards must never be used for double lanyarding techniques or connected simultaneously. It must be connected to the dorsal or sternal attachment point.

- **Work positioning lanyards**

These are never to be used in fall arrest applications and are suitable only for positions where the maximum fall does not exceed 0.5m.

It is essential that lanyards be used correctly by operatives who have been trained in both work positioning and fall arrest applications. Consideration must also be given to the "payout" of a lanyard. For work taking place above obstructions or between 2m and 3m high, a suitable lanyard that can be shortened in accordance with the manufactures guidelines must be used.

Damaged or worn lanyards or lanyards that have been subjected to a free fall must be removed from service and destroyed.

Helmets

Head protection that prevents the head from vertical and side impact must be worn. As a minimum, helmets must comply with EN 12492 if used solely for working at height. If the helmet is to be worn for groundwork it must also comply with EN 397. Note that helmets with a chinstrap, compliant with EN 397 but not with EN 12492 are not suitable for working at height, as the strap will not fail, which could result in strangulation. Ideally helmets should comply with both EN 12492 and EN 397.

Ropes

Ropes used for access purposes must NEVER be used to haul equipment.

Only ropes made from man-made synthetic fibres such as polyamide (nylon) or polyester are suitable as PPE.

Only competent persons should use them and they should be inspected prior to commencing work. They must be stored hung up, dry, clean and away from contaminants and direct sunlight.

There are two basic types of rope suitable for PPE:

- **Low-stretch (semi-static) rope**

These are suitable for safety lines and rescue work. They should not be used where high impact forces are possible. This type of rope must comply with EN 1891.

- **Dynamic Rope**

These ropes will extend typically up to 12% over its length when subject to a fall of 150kgs. This makes them suitable for use where high impact forces are possible. Particular attention should be given to obstruction or working height when using these ropes, as the elasticity of the rope might result in impact with the floor or obstruction. This type of rope must comply with EN 892.

Connectors

- **Karabiners & Scaffold Hooks**

Karabiners & scaffold hooks are used for fall arrest or work positioning and must comply with EN 362. Steel karabiners are preferable to aluminium because they last longer and are more robust. They must be self-closing and self or manual locking.

Scaffold hooks are only suitable for use onto tubes or steel sections at right angles so that the lanyard loads in the plane of the hook. Clipping them to a diagonal member or a small diameter tube will weaken them dramatically in a fall.

- **Fall arrest blocks (inertia reels, retractable fall arrestors or self-retracting lanyards)**

The fall arrest block incorporates a connection point, energy absorption and a lanyard in one unit. It must comply with EN 360 and be regularly inspected (every 3-months for heavy usage). They must only be used in accordance with the manufacturers guidelines, which typically only allow them to be used between 30 to 40 degrees from the vertical.

They must be attached to a suitable anchorage point and care must be taken to ensure that they do not tangle or foul on any obstruction. They should be positioned where practicable directly above the work location and the operative should never work above the device. Fall arrest blocks should have a rated fall distance.

Other PPE for working at height

- **Descenders**

These are friction devices that manually control an operator's descent, incorporating a locking facility (dead mans handle). These must comply with EN 341.

- **Ascenders**

These are devices that slide easily up a rope but lock in a downward position. These must comply with EN 567.

- **Mobile fall arrestors**

These are devices designed to travel freely along a flexible anchorage line. They will lock when the system is subject to a fall. These must comply with EN 353-2.

- **Maillions (quick links)**

These are connectors with a barrel that screw into a locking position. These must comply with EN 12275.

- **Slings (man-made fibre)**

These are multi purpose slings for flexible attachments. These must comply with EN 566 or EN 795B or EN 1492-2 for rigging slings.

- **Pulleys**

These must comply with EN 12278

- **Wire Slings**

These must comply with BS 1290

Other PPE

Other PPE that should be considered includes non-slip footwear in good condition and of such material to enable a rigger to “feel the structure he/she is walking on”. In certain cases there will be a requirement to wear fully protective shoes where heavy/awkward material are being positioned. Snag resistant clothing.

APPENDIX 4

Guidance on the use of rigging equipment

Slinging or Shortening Chains

Only chains designed and approved for load carrying purposes shall be used in rigging operations. All chains should be short link and be side welded Grade 80 steel and conform to BS EN 1677

The lengthening/shortening of chain is only permitted using a certified load bearing link assembly, specifically intended for that function, i.e. no chain will be lengthened/shortened by means of nuts and bolts, steel wire rope lashing or wire rope grips.

Chains must never be knotted, twisted or pass over sharp edges.

The chain must be free from gouges, nicks, corrosion, and worn links; its links must never be twisted or bent. If any of these defects are present the chain should be discarded.

Note It is recognised that there are ongoing efforts within the industry to gain formal approval for the use of long link chains developed specifically for use within the entertainment industry. At the time of publication, no such formal approval has been given.

Electric Chain Hoists

All hoisting equipment shall be marked with SWL or WLL.

Only hoisting equipment covered by a current valid test certificate shall be used.

The suspension point or structure that the chain hoist is attached to must be capable of supporting the SWL or WLL of the hoist plus the induced Dynamic Snatch Magnification Factor (DSMF) of the motor.

All electric chain hoists must be equipped with some form of overload device, which prevents the hoist lifting more than its SWL. This device must be correctly adjusted.

All electric chain hoists must be equipped with an "end of travel" or "limit switch" to prevent damage to the structure or chain hoist.

Chain hoists shall be used in accordance with manufacturer's instruction and guidelines.

Particular attention shall be paid to the following points when using chain hoists:

- * All electrical connections shall be checked for soundness and all electrical cables to be routed to provide suitable relief from strain and abrasion.
- * Cooling fan covers when fitted shall be checked to ensure they are securely fitted.
- * Safety chain stops shall be inspected and secured where necessary.
- * Hooks and their linkage systems shall be inspected prior to each usage to ensure they are properly secured. The load supports for the hook will be from a single source; master link or shackle (not two legs of a bridle). This applies to both top and bottom attachments.

- * Chain bags shall be secured and located in a manner to minimise risk of chain spillage.
- * No item shall be positioned so as to impair the free running of the chain through the hoist either in or out.
- * The chain must be lubricated, free from twists, damaged or deformed links. The chain must be attached using a sling or truss connector, it must never be “back hooked”.
- * Particular care shall be taken when running slack chain through hoisting equipment to ensure that no twists or knots are present in the chain and to ensure that all operation of hoists is smooth and unhindered.
- * The visibility of a chain should be improved by hanging a hazard sign from the hook when the hoist is not in use.

Motorised Lifting

During motorised lifting procedures, all cables shall be routed along trussing and secured, in order to provide adequate relief from strain and abrasion.

A nominated competent person shall be responsible for the set up and operation of the motor control system.

The motor control position should be such that the operator has a clear view of the entire operation. If this is not possible, other competent persons should be located in such a way that all areas of the operation are visible to at least one of the operatives and all operatives should be in audible contact, via radio if necessary.

A clean defined area should be created around the control position.

In the case of multiple chain hoist lifting operations, electrical control cables shall be clearly numbered/ identified and a temporary record of the identification system kept as required.

All electrical control equipment for use with hoisting systems shall be fitted with a quick-acting electrical isolation device, capable of being used in an emergency. Operators will remain in close proximity and have unrestricted access to the electrical emergency cut off facility during all lifting procedures.

Computer controlled 'intelligent' lifting systems will be fitted with a manual override and shutdown facility for use in the case of emergency.

Electrically powered hoists shall be isolated from the power supply once hoisting procedures are completed or during interim periods where other work activities are undertaken.

Motor control distribution systems can be fitted with phase reversal facilities so that all motors run in the same direction. In recognition of this, rigging crews should ‘bump’ every motor prior to lifting to ensure connection and direction of travel.

All electrical systems shall contain devices for the protection of the final circuits against overload, short-circuit and earth fault.

Steel Wire Rope (“SWR”)

SWR is required to be supplied with a certificate of test/examination. This certificate relates specifically to the rope.

Once the rope is modified by additions and/or alterations (e.g. ferrules, thimbles, etc.) which are intended to be permanent and the resulting assembly is capable of (or intended for) load suspension, the assembly shall be deemed to be an item of lifting tackle and as such is required to be proof tested and certified in accordance with the appropriate regulations.

All SWR used for load suspension purposes shall comply with current relevant British and European Standards.

End loop terminations for SWR assemblies, shall only be assembled by means of hydraulic swage press ferrules or wire rope grips:

- * Where wire rope grips are used to effect end termination these shall be installed following manufacturer's guidelines and not used on wire ropes above 19mm.
- * Quick-Term or Bullet connectors, Gripples and Wedge-Sockets must be used in lifting operations or in conjunction with PPE and must be CE marked to the appropriate standard.

Wire rope grips shall not be used to join lengths of SWR mid-span.

Only persons properly trained in the use of hydraulic swage presses shall be allowed to make up loop termination.

Knotted, kinked or distorted SWR shall not be used.

Any wire rope shall be deemed unserviceable if 5% or more of the total numbers of wires are broken in any length equal to ten-rope diameters.

Splices shall not be used to attach or join any SWR.

It is a requirement that a current valid certificate of test / inspection is available for all SWR used for load suspension.

When removing SWR from reel:

- * Rope should be laid out from the reel or coil onto a clean, dry surface in a straight line without slack, to prevent kinks and twisting, which would cause a disturbance of the lay.
- * Axle stands or equivalent shall be used on wire rope drums to facilitate unreeling. The cable must never be looped off the drum. This may cause kinks and twists that damage the lay.
- * Check wire rope for kinks or damaged strands. Any length found damaged must be destroyed.

Bulldog grips consisting of a saddle and a 'U' bolt should always be used with the "U" on the short or dead end of wire ropes and the saddle on the long or live side. This is because the saddle applies load with less damage to wire rope construction than the 'U' bolts.

The first grip will be placed as close to the thimble as possible and subsequent grips spaced at 6 times the diameter of the rope in use, i.e. for a 6mm-rope the spacing would be 36mm.

Grips should be tightened in accordance with manufacturer's specification and a minimum of three should be used.

Shackles

When in use shackles are to be correctly seated so as to ensure that the load is always transferred through the pin.

"D" shackles should only be used when connecting items that are in line, with the load bearing on the crown and the centre of the pin.

A bow shackle must be used if a load is applied at an angle, this must not exceed the manufacturers' guideline (usually 45-degrees from the centre line)

The pre-use check should examine for any visible twists, cracks, bent or badly worn pin, badly working thread or other deformation. If any of these defects are found the shackle should be discarded.

Round Slings

Man-made textile round slings and webbing loop slings are to be inspected prior to each usage. Any slings showing signs of damage must be withdrawn from service immediately.

Only 'soft' slings shall be used to wrap beams or nodes of the building fabric to provide primary suspension points for loads. In all other cases steels with softenings must be used.

Knotted slings shall not be used.

Fibre Rope - Natural and Man-made

All fibre rope used for rigging shall comply with current British Standards / ENs.

All knots, bends, splices, wrinkles, etc. used, are to be correctly made and details are required to be available to demonstrate the adequacy of such systems.

Grid and Access Safety Line Systems

Types and varieties of Grid and Access Systems differ in size, design, purpose and the loads they are capable of safely sustaining. The following guidelines are basic general safety requirements for usage:

- Grid Systems

- * Raising and lowering of grid systems should be planned and communicated to all contractors involved in the operation.
- * Prior to movement of the grid areas above and below the grid should be evaluated to ensure there are no obstructions or risk of collision.
- * Only trained and competent riggers and venue Technical staff that are nominated for the task shall be allowed to operate a grid system.
- * A grid must never be raised / lowered when people are beneath it, the footprint below the grid must be cordoned off.
- * Where practicable, any payloads on the grid should be removed prior to movement.
- * The grid should be inspected for loose equipment and that all other equipment is correctly fastened or captive.
- * Correct information of weight loading must be supplied to the venue Technical department. Reference must be made to the Permissible Loading Arrangements.

- * A structural engineer must be consulted if the permissible loading arrangement is to be exceeded.
- * Loads must be applied in accordance with the Operation and Maintenance Manual for the Grid.
- * The truss system must be protected from metal abrasion by the use of burlap, shielded steel or the use of round slings, no metal object should bear on to the truss sections.
- * Statutory and Thorough Examinations must be completed to meet LOLER and PUWER Regulations 1998.

- **Access Safety Line Systems**

- * All attached PPE (e.g. harnesses, lanyards, energy absorbers, helmets) must comply with current National Standards.
- * The system installer or the venue Technical department must approve all equipment, used in conjunction with an installed access safety line system.
- * Prior to commencing work using an access safety line system, a member of the rigging team who has received training in rescue techniques on the system must be present.
- * Compliant full body harness must be worn.
- * Either compliant energy absorbing lanyards or retractable lanyards approved by the installer / venue Technical department must be used.
- * Wires forming part of an access safety line system should not be tugged or loaded unnecessarily. Such action could accelerate wear and possibly deploy the cable shock absorbers.
- * Access safety line systems should never be used for lifting equipment.
- * Component parts must never be stood on or used as anchorage points to gain access.
- * Observe the maximum numbers of operatives allowed to operate on the system at one time.
- * Report to the venue Technical department if tugging is required to pull any mobile anchorage points through the cable supports.
- * Any defects or damage to a system must be reported to the venue Technical department.
- * Any part of a system, which has been subject to a free fall, must immediately be reported to the venue Technical department
- * Each operative using an access safety line system should carry out a visual inspection of the line prior to use. They must ensure that there is no excessive slack in the tension of the system, no undue wear and tear, the warning tags are present and the test date of the system has not been exceeded.
- * The operative must never disconnect from a system prior to connecting to another. One safety attachment must be maintained at all times.