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Thorough examination and inspection of particular items of lifting equipment

Prepared by
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for the Health and Safety Executive

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Health & Safety Executive

Thorough examination and inspection of particular items of lifting equipment

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As a result of the introduction of the Lifting Operations and Lifting Equipment Regulations 1998 many items of lifting equipment and lifting machinery that had not in the past been subject to specific regulatory requirements were now required to be thoroughly examined by a competent person and inspected. Not only did these regulations embrace more types of lifting equipment but they also introduced a new concept "the scheme of thorough examination". Health and Safety Executive (HSE) recognised that there was a need to provide specific information to assist owners, users and competent persons on what persons well versed in the safe use and thorough examination of lifting machinery might consider appropriate to meet these new requirements.

HSE therefore set up a research project on the thorough examination and inspection of specific types of equipment. The resulting report has a general section that can be applied to most types of equipment supplemented by annexes that provide extra information on specific equipment. It is hoped that in time further annexes can be added to cover more types of equipment.

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1. INTRODUCTION

The Lifting Operations Lifting Equipment Regulations (LOLER) and the Provision and Use of Work Equipment Regulations (PUWER) came into force on the 5th December 1998. Details of the Regulations plus an Approved Code of Practice plus HSE guidance can be found in the HSE books “Safe use of lifting equipment” reference number ISBN 0-7176-1628-2 and “Safe use of work equipment” reference number ISBN 0-7176-1626-6 both of which can be obtained from the HSE.

The Regulations replace most of the old sectorial law relating to the use of lifting equipment and amend certain other Regulations. The new regulations are "goal setting" and their potential scope is extremely wide. However, they are risk based Regulations so the extent of the risk will determine the measures needed to eliminate or control it. This means that just because equipment can be defined as lifting equipment it does not necessarily mean that it has to be thoroughly examined. For example, the risks associated with a pedestrian controlled pallet truck are relatively low and servicing/maintenance requirements are likely to be adequate to ensure the safety of such equipment. Nevertheless, the lessons learnt when developing requirements in old regulations can provide useful information for developing guidance on thorough examination of equipment, which traditionally has not required thorough examination.

This document is intended to provide an insight into:

- why legal requirements were developed for thorough examination of different types of lifting equipment;
- the existing requirements for thorough examination of that equipment the authors opinions on what needs to be taken into account when deciding whether or not lifting equipment needs to be thoroughly examined;
- what needs to be taken into account in any scheme of thorough examination.

The requirement to thoroughly examine equipment dates back to the introduction of steam power into factories. There were a large number of explosions of steam boilers and it was found that a legal requirement to have the boilers regularly examined by a competent person did dramatically reduce the number of these accidents. The examination of the boilers meant that the factory had to be closed down whilst this work was carried out and this normally only occurred during the Easter holidays. Because Easter was a moveable feast the maximum time set for the intervals between thorough examinations was chosen as 14 months to accommodate the holiday period. It was then recognised that there were also a large number of accidents on cranes and other defined types of lifting machines and so a similar requirement was introduced with a similar time scale and again the number of accidents was dramatically reduced. The most noteworthy of the old regulations being the Construction (Lifting Operations) Regulations 1961 which have now been revoked.

It was not until the introduction of the Lifting Operations and Lifting Equipment Regulations (LOLER) in December 1998 that it was acknowledged that the time constraints in factories no longer applied and a more logical period of 12 months could be set as the maximum time between thorough examinations. Because ropes and slings were found to deteriorate more rapidly than the machines on which they were used and they could be thoroughly examined without bringing the factory to a halt, the maximum time between thorough examinations for this type of equipment had already been set at 6 months.

This history had shown that the risk of accidents can be reduced by the thorough examination of lifting equipment and it was therefore logical that the principals should be expanded to cover machines that fell outside of the scope of the original legislation. LOLER sets out to achieve this but at the same time it had to be recognised that not all types of lifting machines pose the same risks nor will require the same degree of thorough examination. For this reason many important decisions have to be taken by the competent person on the basis of their risk assessment for the particular machine when deciding what is necessary. This guidance has been written to assist the competent person in this decision making for particular types of lifting machines for which there is no clear guidance from the previous legislation.

2. SCOPE

This document is intended to give practical guidance to assist in the formulation of thorough examination procedures for the following:

- **ANNEX 1** Patient hoist e.g. bath hoist;
- **ANNEX 2** Motor vehicle lifting tables;
- **ANNEX 3** Rope climbing/absailing/steeple jack - Personal suspension and access systems;
- **ANNEX 4** Suspended cradles and platforms - window cleaning;
- **ANNEX 5** Mobile elevating work platform;
- **ANNEX 6** Multipurpose machine - telehandler/crane/mewp;
- **ANNEX 7** Vehicle recovery - spectacle lift;
- **ANNEX 8** Escalator;
- **ANNEX 9** Stairlift;
- **ANNEX 10** Order pickers (automated and manual operation) used for storage and retrieval;
- **ANNEX 11** Paper reel handling equipment, i.e. reel hoist and stand;
- **ANNEX 12** Lorry tail lift;
- **ANNEX 13** Lorry mounted loader crane;
- **ANNEX 14** Excavator - used for excavation/object handling;
- **ANNEX 15** Mast climbing work platform;
- **ANNEX 16** Vacuum lifting machine;
- **ANNEX 17** Fore-end loader and 3-point linkage fitted to agricultural tractor;
- **ANNEX 18** Materials feed tipping bin as used in the food industry for mixing;
- **ANNEX 19** Wheeled loading shovel - as used in quarrying;
- **ANNEX 20** Chain block suspended from a roof joist;
- **ANNEX 21** Entertainment flying equipment;
- **ANNEX 22** Temporary lifting Equipment - for scaffolding and similar components.

The advice is intended to be common for all industries in which the equipment is used. General advice will be given in this document but individual items of lifting equipment will be covered in the annex that deals specifically with that item.

3. PERSONNEL CARRYING OUT INSPECTIONS AND THOROUGH EXAMINATIONS

3.1 INSPECTIONS

Inspections shall be carried out by a person who has been trained and assessed to inspect that appliance (BS EN 45004 Type C). Drivers/operators of the appliance may perform this task provided that they meet the above criteria.

3.2 THOROUGH EXAMINATIONS

Thorough examinations shall be carried out by a competent person. The competent person should be aware of the relevant requirements of LOLER, The Supply of Machinery (Safety) Regulations and be fully conversant with the manufacturers' instructions and the relevant Standards for that equipment. Competent persons should be trained, assessed, and certified as competent for the work that they are to undertake. It is essential that the competent person is sufficiently independent and impartial to allow objective decisions to be made. This does not mean that competent persons must necessarily be employed from an external company. If employers and others within their own organisations have the necessary competence then they can use it. However, if they do, they must ensure that they also have the genuine authority and independence to ensure that examinations are properly carried out and that the necessary recommendations arising from them are made without fear or favour.

The user of the equipment shall ensure that the equipment is taken out of use for the period of time required by the competent person to carrying out the thorough examination. The user shall also ensure that a safe system of work is in place to prevent the competent person from being exposed to danger by inadvertent operation of the equipment.

The employer of the user of the equipment shall ensure that facilities or services that may be required by the competent person to carry out the thorough examination are provided. These could include the following:

- Driver/operator for the appliance;
- Person/s to remove covers or open up parts of the appliance;
- Preparation of parts or areas of the appliance for NDT.

The competent person may wish to employ specialists to carry out specific parts of the thorough examination that the competent person may consider necessary e.g. NDT. It will be the responsibility of the competent person to specify precisely what is required and to ensure that such work is effectively managed and that the results of such work is assessed accurately in relation to its significance for the appliance.

Where the competent person identifies defects affecting the continued safe use of the appliance, or specifies a timed replacement of components etc., the responsibility for the rectification of these defects or the replacement rests with the employer of the person using the appliance (See LOLER Guidance paragraphs 38 - 43).

Where equipment is hired the user has the duty to ensure that the periodic thorough examinations are undertaken at the frequencies laid down in LOLER or the examination scheme if there is one. The user may well come to an arrangement with the hirer under which the hirer carries out the thorough examinations but that does not alter the user's duty to make sure they are done.

4. PERIODIC INSPECTIONS (PRE-USE AND WEEKLY)

4.1 GENERAL

The person planning the lifting operation should ensure that the appropriate inspections have been carried out and that there is a system in place to rectify any defects disclosed by the inspections.

NOTE. The driver/operator may be authorised to carry out periodic inspections to the extent that he is considered to be competent.

The Annex dealing with the particular item of lifting equipment will advise what and when inspections will be required.

4.2 EQUIPMENT NOT IN REGULAR USE

In cases where equipment is, not in regular use, it may be necessary to carry out a special programme of inspection before it is used. The extent and thoroughness of this programme will depend not only on the length of the period that the equipment was out of use but also on the location of the equipment during this period. Equipment standing under cover or inside a workshop may require very little extra inspection. Equipment that has been out of use in the open and therefore exposed to the weather and atmospheric pollution, etc. may require an extensive appraisal to ensure its fitness for work.

The appraisal should include at least the following:

- Any checks that may be recommended by the manufacturer.
- Examination of all ropes for signs of corrosion/degradation and damage and ensuring that where applicable there is thorough lubrication.
- Examination of all control linkage for evidence of seizure or partial seizure and ensuring that there is correct lubrication.
- Testing of every motion for several minutes without load, each motion individually at first then by combination of two or more motions simultaneously as appropriate, and then repeating the test with a load.
- Checking the correct functioning of all the safety devices.
- Checking of hoses, seals or other components for evidence of deterioration.

5. THOROUGH EXAMINATION OR SCHEME OF THOROUGH EXAMINATION

The implementation of LOLER provides the opportunity for competent persons to specify either a "specified period" or an "examination scheme" approach to thorough examination, both of which can include testing.

5.1 SPECIFIED PERIOD

5.1.1 Six Monthly Thorough Examination

Equipment used to lift persons must undergo a thorough examination by a competent person at least once every six months unless the competent person has imposed a shorter interval.

5.1.2 Twelve Monthly Thorough Examination

Lifting equipment shall be subject to a thorough examination by a competent person at least once in every twelve months. After carrying out the thorough examination the competent person will specify when the next thorough examination is to be carried out, which may be less than but not more than twelve months.

5.2 SCHEME OF THOROUGH EXAMINATION

A scheme of thorough examination includes a written schedule of the steps to be taken so that the condition of the equipment is periodically assessed (e.g. condition monitoring). It is intended to ensure that the equipment remains safe to use and would include information on the required frequency of examinations.

Before thoroughly examining equipment subject to a written scheme the competent person should take into account the age, loading, environmental and duty cycle history of the equipment, any examination intervals which have traditionally been accepted as appropriate for that or similar equipment (see 6.1) . Equipment that does not have a complete record of past usage will probably need to be subject to periodic thorough examination in accordance with clause 6.1.

The competent person shall prepare the scheme and it is likely that it will require the co-operation of the equipment supplier/manufacturer and user (owner). [For example the supplier provides limiting criteria based on the equipment design e.g. number of load cycles, load spectrum, critical parts, exceptional circumstances (e.g. shock loading)].

6. TESTING

Thorough examination may include testing. This can take many forms including; functional testing, performance testing, non-destructive testing (NDT), overload testing, etc. The competent person should decide whether a test is necessary and determine the most appropriate method of carrying it out. It is important therefore that the competent person takes account of the instructions and other relevant information provided by the manufacturer or other appropriate specialist.

6.1 AS PART OF EXAMINATION

If lifting equipment has been overload tested at the time of initial supply the competent person will need to consider whether overload testing is necessary to prove the continued integrity of the equipment. The manufacturer's advice should be sought prior to the application of overloads to the equipment. Equipment subject to an examination scheme will only need to be overload tested when such testing forms part of the scheme.

6.2 MAJOR REPAIR OR MODIFICATION

Equipment should be thoroughly examined and where necessary tested in accordance with the manufacturer's written instructions (e.g. the manufacturer's original test criteria/certificate) after every major repair or modification.

6.3 TESTING OF LOADING CONTROL

At least every twelve months the calibration of any Loading Control device by the suspension of calibrated weights shall be verified.

7. DETAILS OF WRITTEN SCHEME OF THOROUGH EXAMINATION

The written scheme of thorough examination for a should, as a minimum, contain the following information:

- The name and address of the owner.
- The name, qualifications and address of the person drawing up the scheme and certifying that it is suitable and sufficient. If the competent person is not working on their own account, the name of their employing organisation and their position in that organisation should be given.
- The make, model and unique identification number of the equipment.
- Any information references used in drawing up the scheme. This may include the manufacturers manual, or specific information from the designer on the design life of the structure and mechanisms.
- Details of any data logging system fitted, including a listing of the parameters monitored and the means by which data retrieval, monitoring and storage is achieved.
- Details of the environment in which the equipment will be used during the period covered by the scheme.
- Identification of those parts of the equipment requiring thorough examination and the probable methods of deterioration e.g. wear, corrosion etc.
- Frequency of thorough examination for those identified parts which may include time or loading or duty cycle limits and vary for different parts of the equipment.
- Method of thorough examination of those identified parts requiring thorough examination which may include the degree of dismantling required, any preparation to be carried out by the user prior to the examination, NDT techniques, timed replacement etc.
- An indication of the resources required to carry out the inspection. This may include qualified personnel, workshop facilities, specialist NDT and metallurgical facilities etc.
- Any changes to equipment condition, operational or environmental parameters that would require a review of the scheme by the competent person. These may include damage to the structure, change of use from general use to heavy duty work, or moving from an inland location to a marine environment.
- The date of drawing up the scheme and the date at which any routine review will be required.

7.1 RECORDS

Records of all inspections, thorough examinations and tests shall be kept. (See regulation 11 of LOLER). Schedule 1 of LOLER gives details of the information to be contained in a report of a thorough examination and for ease of reference this is given at Annex 1. Any test certificates and/or other reports such as NDT, shall be appended to the report of thorough examination.

8. NON-DESTRUCTIVE TESTING (NDT) TECHNIQUES

During thorough examination of the equipment either at a specified period or in accordance with a written scheme of examination it may be appropriate to use certain NDT techniques to assess the integrity of components. These techniques can assist in the detection of any material cracks or defects that might grow in service and ultimately lead to failure. NDT techniques should only be carried out by adequately trained and experienced personnel who should be briefed on the extent of the NDT examination required in accordance the written scheme of examination. BS EN 473:1993 gives guidance on qualification and certification of NDT personnel and, unless the operator is working to a detailed written procedure, they should be qualified to level two.

The three most common types of NDT used are:

- Magnetic Particle Examination;
- Dye Penetrant;
- Ultrasonic Examination.

8.1 MAGNETIC PARTICLE EXAMINATION

In this technique a magnetic field is induced in the area under examination whilst the surface is flooded with ferrous particles suspended in a liquid. Any cracks or defects will cause a discontinuity in the magnetic field which will in turn cause the ferrous particles to cluster over the defect indicating it as a dark line. This technique is only suitable for magnetic materials (most structural steels and some stainless steels) and will only detect surface defects and large defects just below the material surface.

Further guidance is given in BS 6072 :1981, PD 6513 and prEN 10228 - 1

8.2 DYE PENETRANT

In this technique the surface of the material to be examined is flooded with a liquid dye which penetrates into any surface cracks or defects. After a suitable period the dye is cleaned off and the surface sprayed with an absorbent "developer" which draws the dye from any defects indicating the presence of the defect. The technique is often employed on non ferrous materials such as aluminium alloys, but can only locate surface defects.

Further guidance is given in BS EN 571-1:1997 and prEN 10228 - 2

8.3 ULTRASONIC EXAMINATION

In this technique pulses of high frequency sound waves are transmitted from the surface of the material into its interior. Any defects or discontinuities cause the sound waves to be reflected back to the surface where they can be detected and, by measuring the time delay from the time of transmission, an estimate of the defects depth below the surface can be made. The technique can be used for a wide range of materials and will detect both surface and subsurface defects. However it requires both a skilled operator and specialist equipment and would normally be carried out by hiring in a specialist firm.

Further guidance is given in BS EN 583-3: 1997.

9. DATA LOGGING

Data logging may be available for some types of lifting equipment and this can provide a valuable aid to the competent person. There are several suppliers of software packages available for introducing data logging and condition monitoring. These address the various levels of complexity at which condition monitoring is undertaken. Systems range from simple storage of results and the generation of "trends" from those records, to the most sophisticated which can process data and generate reports and warnings to assist the "competent person" with the decision making.

The following are some examples of the information that data loggers can record:

- Time, Date, Duration of lift;
- Configuration;
- Details of average and maximum load;
- Radius, Angle, Boom length;
- Number of lifts carried out;
- S.W.L. exceeded and percentage;
- The number of times that manufacturer's set limits are exceeded;
- Reeving changes;
- Operating Mode;
- Road travel or on-site working;
- Distances travelled;
- Start & Stop times in real time;
- Driver Identification;
- Over speeding;
- Harsh braking;
- Idling time.

10. REFERENCES

“Safe use of lifting equipment” HSE publication ISBN 0-7176-1628-2.

BS EN 45004 1995 “General criteria for the operation of various types of bodies performing inspection.”

Supply of Machinery (Safety) Regulations 1992 (plus amendments).

The Construction (Lifting Operations) Regulations 1961 (which were revoked when LOLER came into force).

BS EN 571-1:1981

PD 6513

prEN 10228-1&2

BS EN 571-1:1997

BS EN 583-3:1997

11. DEFINITIONS

11.1 A THOROUGH EXAMINATION

An examination by a competent person in such depth and detail as the competent person considers necessary to enable them to confirm or otherwise that the equipment being examined is safe to continue in use. The thorough examination is not part of the maintenance regime for the equipment but will be instrumental in determining whether the regime is being effective.

11.2 COMPETENT PERSON

A person who has such appropriate practical and theoretical knowledge and experience of the lifting equipment to be thoroughly examined as will enable them to detect defects or weaknesses and to assess their importance in relation to the safety and continued use of the lifting equipment.

11.3 INSPECTION BODY

An inspection body is the employer of the competent person(s) who provide examination and testing services.

11.3.1 Type A Inspection Body

The inspection body providing 'third party' services shall meet the criteria of annex A (normative) of BS EN 450004: 1995.

11.3.2 Type B Inspection Body

The inspection body which forms a separate and identifiable part of an organisation involved in the design, manufacture, supply, installation, use or maintenance of the items it inspects and has been established to supply inspection services to its parent organisation shall meet the criteria of annex B (normative) of BS EN 450004: 1995.

11.3.3 Type C Inspection Body

The inspection body which is involved in the design, manufacture, supply, installation, use or maintenance of the items it inspects or of similar competitive items and may supply inspection services to other parties not being its parent organisation shall meet the criteria of annex C (normative) of BS EN 450004: 1995.

11.4 TESTING

11.4.1 Functional Testing

Operation of each motion of the appliance without load.

11.4.2 Performance Testing

Operation of each motion of the appliance with the rated load.

11.4.3 Overload Testing (Static)

Applying a load to the appliance which exceeds the rated load but without operating the full range of motions of the appliance.

11.4.4 Overload Testing (Dynamic)

Operation of each motion of the appliance with a load on the hook which exceeds the rated load.

11.4.5 Non-Destructive Testing (NDT)

Tests carried out on the structure of the appliance to establish the presence, location and extent of any defects that may affect the integrity of that structure. The techniques employed are such that they do not damage or alter the material under test.

11.4.6 User

“User” means the employer or the person who has control of the operation of work equipment. The user has legal duties to ensure that work equipment is properly maintained and that lifting equipment is thoroughly examined by a competent person.

11.4.7 Loading Control

A device that prevents the equipment from being overloaded as described in the Supply of Machinery (Safety) Regulations Schedule 3 EHSR 4.2.1.4. Sometimes referred to as an automatic safe load indicator, rated capacity indicator/limiter, overload protection.

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Thorough examination and inspection of particular items of lifting equipment

Annex 1: Thorough examination of patient hoist/bath hoist

This Annex gives the particular requirements for the thorough examination of a Patient hoist/Bath hoist over and above the general requirements given in the first part of this report.

Patient/Bath hoists can be constructed from standard lifting equipment e.g. a manual or electric hoist block mounted on a runway track with special lifting accessories designed for carrying a person or they can be specifically designed equipment as a whole e.g. similar to a hydraulic portable jib crane.

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1. SIX MONTHLY THOROUGH EXAMINATION

Patient/Bath hoists are suitable for the lifting of persons so normally they would require a six monthly thorough examination. However in those circumstances where there is a high intensity of use more frequent thorough examinations may be necessary.

The patient/bath hoist and any adjacent equipment likely to present a hazard to those involved in the thorough examinations shall be taken out of service for the duration of the examination. The patient/bath hoist shall only be operated during that time under the direction and control of the competent person carrying out the examination. The examination shall be carried out in a logical sequence to ensure that nothing is overlooked.

The critical areas requiring particular attention are:

- Visually check any supporting structure.
- Visually check all bolted connections to ensure that they have not worked loose.
- Ensure, where fitted, that all travel limit switches are functioning correctly and/or buffers are in place and free from damage or wear.
- Visually check the travel mechanism and wheels, where fitted, to ensure that they are free from damage or wear.
- Ensure that the hoisting medium (wire rope or chain) is of the size and type as specified in the hoist manufacturer's instructions and is reeved in accordance with those instructions. Pay particular attention to the end terminations. Guidance on "Wedge and socket anchorages for ropes" can be found in HSE Guidance Note PM46.
- Visually check all pulleys/sheeves and drums to ensure that they are free from damage or wear and that the hoist rope or chain fits correctly on them and that they are appropriately lubricated. Check that all idler pulleys/sheeves turn freely. Ensure that all appropriate guards are undamaged and are in place.
- Thoroughly examine the whole length of the hoist rope or chain for signs of wear, damage, broken wires and corrosion. Particular attention should be paid to those portions that regularly pass around pulleys/sheeves.
- Visually inspect the upper and lower, where fitted, hoist limits to ensure that they are in place and free from damage or excessive wear.
- Visually inspect the braking mechanism for wear, damage and adjustment in accordance with manufacturer's instructions.
- Where the hoist is controlled by hydraulics then all flexible hoses should be checked for damage and leakage.
- Hydraulic cylinders should be visually examined for leakage, corrosion on rods and alignment. Visually check end fixings for wear, security and lubrication.
- Boom arms and supports should be checked for damage, distortion and corrosion.
- Pivoting joints on boom arms and supports should be checked for wear, corrosion, security and evidence of lubrication.

- The controls should be visually checked for damage ensuring that all controls are marked to show their function and direction of movement.
- Pendant control cable, where fitted, should be visually checked for wear and damage and ensuring that any supporting wire rope is in good condition.
- The electrical power supply system to the hoist should be visually checked for damage and wear ensuring there is no access to live conductors.
- Carry out a functional test on the hoist ensuring that:
    (a) all movements operate freely;
    (b) the hoist rope or chain moves freely round the pulley/sheeves and winds correctly and evenly onto the drum or into the bucket as appropriate;
    (c) The hydraulic ram, boom and supports move freely without any erratic movement;
    (d) all limiting devices operate correctly.
- A visual check shall be made to ensure that the hoist and any supporting runway is marked with its safe working load.
- The means of attachment for any patient lifting accessories to the hoist should be visually examined for damage and wear and the swivel shall be moved to check that it moves freely.
- Where the patient lifting accessories are permanently attached to the hoist these accessories shall be considered as an integral part of the hoist. However if these accessories hang on a hook then they should be treated as a separate item and examined as an accessory for lifting and subjected to at least six monthly thorough examinations. In such circumstances the hook and swivel should be visually examined for damage, wear and distortion, that the swivel rotates freely and that the hook should be fitted with a safety catch that is in good working order.
- The permanently attached accessories shall be visually examined for damage, wear and corrosion, paying particular attention to the attachment areas and ensuring that the accessories are marked with the safe working load.
- Ensure that warning signs and other important manufacturer's instructions are present and readable e.g. rating plate.

Overload testing should be carried out in accordance with the manufacturer's instructions. Guidance on overload testing will be found in British Standard 7121.

Non-destructive testing may be considered necessary particularly when there is a suspicion of cracks or other damage being present in the structural parts e.g. the runway, the boom or supports.

2. PERIODIC INSPECTIONS (PRE-USE AND WEEKLY)

2.1 DAILY PRE-USE INSPECTION

At the beginning of each working day or shift when the equipment is in use the following routine inspections, as appropriate for the type of equipment, should be carried out:

- Checks as required by the manufacturer's handbook.
- Visually check that no electrical equipment is exposed to contamination by oil, grease, water or dirt.
- Visually check to ensure that the hoist rope or chain is correctly located on drum, sheeves or pulleys.
- Visually check that there are no leaks in the hydraulic ram.
- Check correct function of all controls without load.

2.2 WEEKLY INSPECTIONS

Once a week, when the equipment is in use, in addition to the checks recommended in 2.1 above, the following checks as appropriate for the type of equipment should be carried out:

- Checks as required by the manufacturer's handbook.
- Inspect the structure for damage, e.g. bulges, indentations and any unusual rubbing marks, visible cracks in welds and loose bolts or other fasteners.
- Check hook(s) and other load lifting attachments, safety catch(es) and swivels for damage, wear or free movement.
- Check operation and adjustment of controllers.
- Check effectiveness of brakes and clutches.
- Enter results of checks in records of inspection.

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Annex 2: Thorough examination of motor vehicle lifting tables

This annex gives the particular requirements for the thorough examination of motor vehicle lifting tables over and above the general requirements given in the first part of this report.

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1. SIX-MONTHLY THOROUGH EXAMINATION

Whilst the primary function of a vehicle lift is not to lift persons, personnel using a vehicle lift are at risk from inadvertent descent of the lift (loaded/unloaded) or the vehicle being lifted. A six-monthly thorough examination of a vehicle lift is therefore normally required. Prior to thorough examination, the vehicle lift should be cleaned to remove any deposits which would otherwise conceal the structure or mechanisms and prevent an effective examination. The examination should be carried out in a logical sequence to ensure that nothing is overlooked, and the examination should include checks with the vehicle lift in operation and whilst it is stationary.

1.1 GENERAL

Detailed checks should be made of:

- correct operation of upper and lower limit switches and terminal limit switches;
- obstacle detection devices;
- safety devices (e.g. catching devices) protecting against failure of suspension or support equipment;
- undue vibration of support columns, runways, lifting arms;
- efficient braking;
- synchronisation of movement of lifting carriages, lifting arms, runways;
- correct operation of wheel-free locking mechanisms;
- correct operation of hold-to-run controls, stop-buttons;
- the signage necessary for safe use of the lift, including information provided by the manufacturer;
- adequate safety clearances between fixed and moving parts, including fixed and automatic chocks;
- electrical wiring, connections and drive-motors;
- condition of structure, load-bearing components, pivoting and telescoping components and synchronisation equipment;
- condition of welds, bolts and nuts, guide-rollers, ratchet mechanisms (self-locking of load carrying devices);
- safety catches designed to prevent inadvertent descent of load-carrying devices caused by rupture of chains, ropes, carrying nuts or gear;
- stability of lifts which are not anchored to the ground;
- security of bolts, etc. holding down columns;
- suspension ropes, rope terminations, associated pulleys, pins and rope retainers;
- suspension chains, chain terminations and attachments;
- hydraulic jacks, including associated valves, pipework, tanks, pumps and oil seals, with particular attention being paid to buried jacks (cylinders);
- leadscrew bearings, load-nuts, safety-nuts and load-nut monitoring switches;
- scissor-mechanisms.

Overload or full-load testing of a vehicle lift is customarily only undertaken at installation or in the event of replacement or major repair to load-carrying or structural components of the lift, or a change to its rated capacity.

Non-destructive testing may be considered necessary, particularly when there is a suspicion of cracks or other damage existing in structural or load-bearing parts, e.g. tracks, carrying arms.

2. PERIODIC INSPECTIONS

Routine visual inspections and checks should be effected by suitable personnel a to ensure that each vehicle lift is capable of operating satisfactorily, and such inspections and checks should encompass:

- Component parts of the prime means of suspension or support for the lift, e.g. ropes, chains, hydraulic or pneumatic equipment, drive-screws/nuts.
- Component parts of the ancillary means of direct support for the vehicle, e.g. runways, support pads, support arms.
- Safety devices e.g. locking of support arms, wheel-free systems, automatic chocks.
- Control devices, e.g. start/stop buttons, emergency-stop buttons, limit switches.

Each vehicle lift should undergo such checks **before** being taken into use each day.

Regular preventative maintenance by suitably-qualified personnel should be undertaken, which should include closer inspections of the aforementioned items, and adherence to the manufacturers' instructions whenever possible.

Use may be made of specialised vehicle-lift maintenance companies, who may be the manufacturers of the lift.

3. STANDARDS AND GUIDANCE

British Standard BS AU 161 (Vehicle Lifts) was first published in 1973, and in 1983 and 1989 the Standard was republished in two parts; Part 1 (fixed vehicle lifts) and Part 2 (mobile vehicle lifts).

BS AU 161 was superseded in 1999 by BS EN 1433: 1999 which applies to 'stationary, mobile and movable vehicle lifts, which are not intended to lift persons, but which are designed to raise vehicles totally, for the purpose of examining and working on or under the vehicles whilst in a raised position.'

BS EN 1433: 1999 is a 'harmonised' Standard, clauses of which address essential safety requirements of relevant EU Directives. Compliance with the Standard provides one means of conforming with the specific essential safety requirements of the Machinery Directive.

A BS Code of practice for the installation, maintenance, examination and safe use of vehicle lifts has been under preparation for some time. The Code of Practice has made use of the relevant appendices of BS AU 161.

Relevant guidance has been issued from time to time by the Health and Safety Executive (HSE) and the Garage Equipment Industry, with both parties playing an active part in the formulation of British Standards for vehicle lifts.

4. DEFINITIONS

4.1 VEHICLE LIFT

Lifting device with guided load carrying device for lifting land based means of transport such as cars, motorcycles, lorries, buses, trams, rail vehicles, industrial trucks and similar, and designed for working on or under the load. The guidance of the load-carrying device is given by the supporting structure.

There are many different types of vehicle lifts incorporating different means of hoisting, which can be mechanical screw or hydraulic operation often incorporating suspension ropes or chains. The most common vehicle lifts have 2 or 4 posts, but others are in service, which include;

- Single, 3 or 6 post.
- Single and multiple hydraulic cylinders.
- Movable and multiple mobile column lifts.
- Scissor, inflatable and parallelogram lifts.
- Short stroke lifts that support vehicle wheels, chassis or other designated lifting points.
  NB Short stroke lifts are floor mounted vehicle lifts with a maximum vertical travel of not more than 500mm, which are not designed for working under the raised load.

Vehicle lifts are normally power driven but some types are available which are manually driven such as some motorcycle lifts. A vehicle lift may have the ability to tilt the load carrying device about a horizontal axis parallel to or perpendicular to the main axis of the lifted vehicle.

4.2 MANUALLY DRIVEN VEHICLE LIFT

Vehicle lift where the carrying device is driven by manual effort.

4.3 POWER DRIVEN VEHICLE LIFT

Vehicle lift where the carrying device is not driven by manual effort.

4.4 FIXED VEHICLE LIFT

Vehicle lift fixed permanently to its location.

4.5 MOVABLE VEHICLE LIFT

Vehicle lift that can fulfil its function without being fixed to the floor and may be designed to be transportable.

4.6 MOBILE VEHICLE LIFT

Movable vehicle lift equipped with wheels, rollers, etc. such that it can be moved from one place to another with or without load.

4.6.1 Manually Mobile Vehicle Lift

Mobile vehicle lift which is moved by manual effort alone.

4.6.2 Vehicle Lift With Powered Mobility

Mobile vehicle lift which is not moved by manual effort alone.

4.7 RATED CAPACITY
Maximum load that a lift has been designed to carry.
NB Generally known as safe working load (SWL).

4.8 LOAD CARRYING DEVICE
Part(s) of the vehicle lift that support the load either by direct contact with the vehicle or through contact with pick-up plates or pads. Load carrying devices include tracks, carrying arms or other mechanical devices designed to raise and support a vehicle by designated lifting points.

4.9 CARRYING ARM
Load carrying device attached at one end, directly or indirectly to the lifting element and supporting the load at its other end. Carrying arms are usually used on two column lifts.

4.10 PICK-UP PLATE
Part of the load carrying device, e.g. on two column lifts with carrying arms, which has direct contact to the vehicle and which has an assigned position on the load carrying device.

4.11 PICK-UP PAD
Vehicle supporting pad which has direct contact with the vehicle but which does not have an assigned position, e.g. pads used on wheel free systems with platforms.

4.12 LIFTING EQUIPMENT
Medium through which the force is transmitted from the power source to the load carrying device. Lifting elements include hydraulic and pneumatic cylinders, lead screws and nut systems as well as any flexible connections such as steel wire ropes and chains.

4.13 CATCHING DEVICE
Device which holds the load carrying device in case of failure of the lifting element.

4.14 SAFETY SWITCH
Switch in which the opening contacts are directly connected to the control mechanism without springs or flexible elements. The whole of the specified opening of the contacts shall be achieved by operation of the control mechanism through its intended travel using the force stated by the manufacturer of the switch (see EN 60947-5-1:1991.2.1).

4.15 WHEEL TRACK
Distance between the centre lines of the wheels on one axle or between centre lines of wheel pairs on twin wheel axles.

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Thorough examination and inspection of particular items of lifting equipment

Annex 3: Thorough examination of rope climbing/absailing/steeplejack - personal suspension and access systems

This annex gives the particular requirements for the thorough examination of personal suspension and access systems over and above the general requirements given in the first part of this report.

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1. INTRODUCTION

This annex deals with personal lifting equipment and systems, which are used to support the weight (or arrest the fall) of individuals, or in special circumstances, up to two individuals, carrying a limited amount of tools etc. The lifting equipment is formed from an assembly of separate items, which are linked together for use as a lifting assembly. It consists of various types of body harness attached by a rope or webbing, via a variety of devices to textile or wire rope lines, supported by an anchorage. While there is no overall standard for this type of equipment there are standards for all or most of the various components. It is important that only quality assured items of equipment are used for this type of work and where possible they should be to an appropriate standard. A person is therefore carried or supported by the equipment by being attached in it as against being something that a person can stand on or in. In some cases the anchorage and perhaps part of the line is fixed permanently in place while in others the complete system must be rigged from the constituent parts for each application.

This annex does not apply to the type of equipment designed for fall arrest situations, where the person wears a harness attached to an anchor or safety line via lanyards and shock absorbers but is not carried by the equipment and works or stands on other structures.

When used properly this type of equipment is fairly lightweight, relatively simple to assemble and subject to a reasonably predictable range of loads. In most cases the various parts of the lifting assembly are readily visible and can be easily handled and examined.

The arrangement of this type of lifting equipment should be such that if one item failed then there would always be a secondary safety item to prevent collapse.

Variations occur in this type of lifting equipment depending on the nature of the trades using it. Typically these trades could include steeplejacks, the rescue services, arborculturalists, for persons undertaking lightweight inspection or maintenance activities, as well as a means of protecting persons from falling from a height.

In many cases the equipment is issued on a personal basis and will be installed and checked by the user or someone in his work team. This person must therefore be suitably competent in being able to check for faults by carrying out a thorough inspection of the equipment as well as being able to safely rig and use it.

2. GENERAL

2.1 MARKING AND IDENTIFICATION

It is not normal for any of the items of lifting equipment to be marked with their SWL or WLL. Therefore all items should have some means of either individual or group marking that can then be related to batch or individual test certificates and ongoing maintenance examinations and tests. These marks should also enable the item to be related to the manufacturers test certificates and quality documents. The method of identification is to enable the accurate identification any equipment commented on as suffering undue deterioration or as being no longer fit for service. The marks should not therefore be easily removed or defaced through normal use. This marking should also be such that any related items from the same supply can be also identified and checked, as well as giving a greater assurance that each item has been inspected and removed from service if necessary.

2.2 STORAGE

When not in use all lifting equipment should be stored in an orderly manner and so that it will not undergo any significant deterioration through excessive bending, damp or from being too hot or too cold. Textile materials should be stored in the dark normally in a bag or container. Items of significantly different performance abilities or size should not be stored at the same position but should be kept in clearly labelled racks or bins to avoid incorrect items being used.

2.3 RECORDS

Records concerning the original performance specification and ongoing maintenance examination or testing should be kept. Comprehensive records of all thorough examinations shall be kept showing when and who carried out the examination. The information gained from inspections should be monitored either periodically or when the equipment is modified, to note the rate of deterioration and to help predict when the equipment should be taken out of use.

A range of substances and effects can quickly adversely affect textiles. It is therefore important that the history of use of such equipment should be kept to help identify the reasons for any areas of discolouration or deterioration.

Records for each item or batch of lifting equipment must be kept for the time that they are in the owner’s possession and linked to the original manufacturer’s certification and warranty and to any previous significant modifications.

2.4 DISPOSAL

Equipment should be disposed of before its rate of deterioration reaches a point where it will not remain fit for use over the following 6 months. All equipment disposed as being no longer fit for purpose must be cut in pieces or otherwise made incapable of reuse by other persons. This should not simply be done by painting marks on it.

3. INITIAL EXAMINATIONS

3.1 THOROUGH EXAMINATION BEFORE DISPATCH

Frequently the user keeps some of this equipment on a personal basis and only the more expensive, heavy and less frequently used items are issued when required on a particular job. In such cases the user must be trained to thoroughly examine his equipment on a regular basis. That equipment kept in store should be thoroughly examined, by someone who is suitably technically qualified and has sufficient training and experience of the equipment and its intended use, before dispatch to ensure it has not suffered any deterioration, interference or damage while in store, which could make it unfit for use. The examination shall be carried out in a logical sequence to ensure that nothing is overlooked.

3.1.1 Main and Safety Suspension Ropes or Lanyards

Carry out a visual and tactile inspection as follows:

- Visually check that the ropes are undamaged and not significantly contaminated.
- Check that sheaths are intact and that the core is firm and consistent along the rope length.
- Check that the ends of ropes are properly spliced.
- Check that the life of the rope, where given, has not been exceeded.

3.1.2 Karabiners, Shackles, or Other Linking Devices

Carry out a visual and mechanical inspection and random testing as follows:

- Check that these can be properly fastened and have not suffered abrasions or deformation.
- Random test load an occasional item and check the result against the original certificate.

3.1.3 Descenders, Ascenders and Shunts etc.

Carry out a visual and mechanical inspection as follows:

- Check that all moving parts are free to operate and that all rivets and bolts are in good condition and securely in place.
- Check for cracks and deformations.

3.2 PRE-INSTALLATION CHECKS

As this equipment is often attached to other temporary structures the loads that will be applied by the lifting equipment must be carefully assessed. The support points which are also included in the definition of 'lifting equipment' must be certified or carefully checked as being capable of carrying those loads. This may require anchorages to be either test loaded or to be certified as to their load carrying capabilities. In calculating the loads full consideration should be given to all possible environmental loads, e.g. wind, snow, standing rain water etc, together with any dynamic and impact loads. The load assumed to be on the lifting points must also include the self-weight of the equipment. The assessment should be carried out by a person with structural design ability and experienced knowledge of the loads which will be created. By calculation and/or test, asses the maximum loads that will be placed on the support points and check that it will be capable of safely carrying these.

3.3 POST-INSTALLATION CHECKS

Once installed the lifting equipment should be finally inspected, by checking that all the items are in place, including any stop knots, and that all fixings are properly secured. Where necessary this could include using a torque spanner to test the fixings on any cables etc., or load cell to check the support points. It should then be tested by hauling on both of the descent lines and checking for any undue movement.

4. SIX-MONTHLY THOROUGH EXAMINATION

Normally the daily and pre dispatch examinations would ensure the quality and suitability of the various items of lifting equipment. Therefore where the person carrying out such examinations is suitably competent and full records of these are kept, then there is no need for additional periodic examinations. However where any of the equipment has not been in regular use for some time, or where the qualifications and experience of the inspector carrying out the examinations is not fully adequate, then additional 6 monthly thorough examinations and certification should be undertaken by someone who is suitably technically qualified and has sufficient training and experience of the type of equipment being examined. The examination shall be carried out in a logical sequence to ensure that nothing is overlooked.

4.1 MAIN AND SAFETY SUSPENSION ROPES OR LANYARDS

Carry out a visual and tactile inspection as follows:

- Visually check that the ropes are undamaged and not significantly contaminated.
- Check that sheaths are intact and that the core is firm and consistent along the rope length.
- Check that the ends of ropes are properly spliced.
- Check that the life of the rope, where given, has not been exceeded.

4.2 KARABINERS, SHACKLES, OR OTHER LINKING DEVICES

Carry out a visual inspection and random testing as follows:

- Check that these can be properly fastened and have not suffered abrasions or deformation.
- Random test load an occasional item and check the result against the original certificate.

4.3 DESCENDERS, ASCENDERS AND SHUNTS ETC.

Carry out a visual and mechanical inspection follows:

- Check that all moving parts are free to operate and that all rivets and bolts are in good condition and securely in place.
- Check for cracks and deformations.

4.4 SHOCK ABSORBERS, COWSTAILS AND HARNESSES

Carry out a visual and tactile inspection as follows:

- Check that the stitching is unbroken and that webbing and ropes are undamaged.
- Check that all buckles are securely in place and are correctly orientated to carry loads.
- Check that the life of the equipment, where given, has not been exceeded.

5. DAILY PRE-USE INSPECTION

The regulations require all equipment used to lift or carry persons to be thoroughly examined at least every 6 months. However, as this type of equipment is generally also used by the rigger and because most items could be relatively easily damaged during use, a full examination should be done each time the equipment is rigged. This means that the rigger or his immediate on site supervisor must be fully competent to both understand the function of each piece of equipment and properly judge the significance of any wear or damage to carry out this examination. Their competency should be assessed to ensure this.

Any items, which appear to be less than satisfactory should not be used and either its performance capability should be confirmed by additional testing or it should be destroyed.

5.1 SUPPORT POINTS

Carry out a visual and tactile inspection to check that ropes are correctly fixed at the defined support points.

5.2 MAIN SUSPENSION ROPE, LANYARD AND SAFETY ROPE

Carry out a visual and tactile inspection as follows:

- Check that all ropes and lines are free to run through descenders etc.
- Where appropriate check that all stop knots are in position to prevent the rope ends running through the descent devices etc.
- Check that the ends of ropes are properly spliced or secured.

5.3 KARABINERS, SHACKLES OR OTHER LINKING DEVICES

Carry out a visual and tactile inspection to check that these are properly fastened and will be loaded in the most efficient manner.

5.4 DESCENDERS, ASCENDERS AND SHUNTS ETC.

Carry out a visual and tactile inspection follows:

- Check that all moving parts are free to operate and that all rivets and bolts are in good condition and securely in place.
- Check for cracks and deformations.

5.5 SHOCK ABSORBERS, COWSTAILS AND HARNESSES

Carry out a visual and tactile inspection as follows:

- Check that the stitching is unbroken and that webbing and ropes are undamaged.
- Check that all buckles are securely in place and are correctly orientated to carry loads.

6. DEFINITIONS

6.1 LIFTING ASSEMBLY
The combination of various items or parts linked together in order to carry out a lift.

6.2 LIFTING EQUIPMENT
The total assembly of the various parts or components used to lift a load.

6.3 SUPPORT POINT
The point or position at height on an associated structure from which the lifting equipment is carried, supported, hung or anchored.

6.4 ASCENDER, DESCENDER AND SHUNT
Device used to climb or descend the main and safety support ropes by varying the frictional resistance of the ropes passing through them.

6.5 MAIN AND SECONDARY ROPES
The main rope being used to descend down or climb up while the secondary rope is used as a safety back up.

6.6 COWSTAILS
Lengths of rope or webbing used to attach descent or ascent devices to the persons harness.

6.7 KARABINERS
A closed metal loop with a secured entry gate used to connect various items together.

6.8 SHOCK ABSORBER
A mechanism made of either textiles or metal, designed to progressively extend under shock load to limit such load to a predetermined limit.

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Thorough examination and inspection of particular items of lifting equipment

Annex 4: Thorough examination of suspended cradles and platforms - window cleaning

This annex gives the particular requirements for the thorough examination of suspended cradles and platforms over and above the general requirements given in the first part of this report.

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1. INTRODUCTION

This annex deals with lifting equipment used to provide a suspended working platform or position for persons in which they are contained. Normally they are free to move within the contained area although they could be contained in a type of chair. This equipment is either permanently left in position, temporarily installed for a limited period of time, or is a mixture of both. It can also be operated by one, two or a multiple of powered winches or occasionally be manually operated for limited loads and lift heights. The winches will usually be located at or on the suspended, platform, cradle or chair, or at the anchorage so that the loads on the supporting anchorages and rigs will be the actual loads carried plus the self-weight of the lifting equipment. The definition of lifting equipment in this case includes the platform or similar, the supporting rigs as well as the suspension system and all should be examined accordingly. The term 'suspended cradles and platforms' does not include platforms that are slung, i.e. simply hung and not equipped with winches or pulleys with which to vary their height.

Suspended platforms are defined as lifting equipment and as scaffolding platforms. They should therefore comply with the legal requirements for both cases.

Temporarily installed equipment is usually built at each site from a variety of components and the user must choose that equipment which will carry the loads and enable the functions which will be undertaken from it. It is probable that these components will not be kept together in a standard kit and that items will be interchanged with similar ones at different sites. Therefore the stability of each lifting assembly must be verified by thorough examination each time it is erected. In some cases it is possible to modify the equipment for special loads and duties, but this must be done in arrangement with the manufacturer/supplier.

Permanently installed equipment may be designed to the clients actual specification and it is therefore important that the client, or his representative, is clear about the possible range of duties or functions the equipment will be used for. As this equipment remains in place on site it will be thoroughly examined at regular intervals of not more than 6 months.

Both types of equipment should either have each main lifting rope paired with a secondary safety rope or in the case of lightweight manually operated equipment, have the occupiers tied back to a secure anchorage point in the cradle or chair via a harness and lanyard. Therefore in this latter case, should one line fail, the occupants would be suspended from the cradle until rescued even though the cradle was hanging vertically. This equipment is usually installed by a specialist contractor for use by others after that contractor has left the site, who are frequently none specialist operators. It is therefore important that these receive the necessary training to be able to use it safely and to carry out limited daily checking. In some instances the user will be expected to move temporarily installed equipment to other positions and in which case they must also be suitably trained so as to clearly understand the factors which can effect the overall stability of the equipment.

It is also very important that the installers of this type of equipment are suitably competent, trained and experienced in knowing how the specific operators taking charge of the equipment are likely to behave. This is to ensure that not only will the equipment be properly installed and be fit for its purpose, but that they can also properly communicate its safe use and care to the operators.

It is probable that persons of a wide range of competence will carry out the various inspections undertaken during servicing, lifting and daily while the equipment is carrying loads. However provided that the nature or detail expected of the inspection is not outside the abilities of the inspector, this should not cause undue risks. All the various inspections described are important in ensuring that the lifting equipment is always fully serviceable.

Generally BS EN 1808 covers most of this type of equipment.

2. GENERAL

2.1 MARKING AND IDENTIFICATION

All items used in lifting operations must be identifiable by some form of marking either as individual items or, for small items, as batch items. These marks should enable any item to be traced back to the manufacturers test certificates and quality documents. It should also be clear from their marking whether there is a current certificate of thorough examination. The intention of such marks should be to clearly identify any item commented on during an inspection and any similar related items whose performance might be suspect. The marking should also give a greater assurance that defective items have been removed from service and either isolated in a 'sterile' area to be repaired, or destroyed.

The platform or cradle itself should be marked with its SWL or WLL as should the roof rig and the winches.

2.2 STORAGE

When not in use all lifting equipment should be stored in an orderly manner and so that it will not undergo any significant deterioration through excessive bending, damp or temperature. Items of significantly different performance abilities or size, should not be stored at the same position but should be kept in clearly labelled racks or bins to avoid incorrect items being used.

2.3 RECORDS

Records concerning the original performance specifications, significant modifications and ongoing maintenance examinations or tests of all lifting equipment must be kept. Comprehensive records of the thorough examinations detailing any defects and remedial action must be kept for the time that it is in the owner's possession. Records of any previous modifications should be kept with the original manufacturer's certification and warranty. Records and certificates issued concerning the performance capabilities of any item of lifting equipment should be signed and dated by the person making the inspection.

The information gained from the inspections should be monitored either periodically or when the equipment is modified, to note the rate of deterioration and to help predict when the equipment should be taken out of use. The documentation as to the load carrying characteristics, modifications and inspections of the lifting equipment should be kept either with it or be readily available. Where any item is sold on for further use the records or copies of the records, relating to that item must accompany it.

2.4 DISPOSAL

Equipment should be disposed of before its rate of deterioration reaches a point where it will not remain fit for use over the next 6 months. All equipment disposed as being no longer fit for purpose should be cut in pieces or otherwise made incapable of reuse by other persons. This should not simply be done by painting marks on it.

3. INITIAL EXAMINATIONS

3.1 THOROUGH EXAMINATION BEFORE DISPATCH

All lifting equipment used to carry persons must be thoroughly examined at least every 6 months. However in the case of temporary access equipment, as the suppliers of such equipment are not generally on site while it is being used and there is a possibility of misuse or damage, then it should be thoroughly examined at more frequent intervals. This is best done each time it is either returned from site or preferably when delivered to a new site. A fully competent person who is suitably technically qualified, has sufficient training and experience to understand the function of each piece of equipment and can properly judge the significance of any wear or damage, should carry out these examinations. Where there is a significant time interval after inspection before dispatch to another site, then the inspected equipment should be stored away from any other items that have not been so inspected.

3.1.1 Roof Rig

Carry out a visual and mechanical inspection as follows:

- Inspect all moving parts and electrical controls.
- Check that all bolts and other fixings are in a good condition and are securely in place.

3.1.2 Suspension Ropes

Carry out a visual inspection as follows:

- Check that the ropes are undamaged and have no broken strands, flattened sections or kinks.
- Check that the rope ends are properly spliced or secured and that that there is no sign of rust in the ropes.

3.1.3 Brakes etc.

Carry out a visual and mechanical test to check that brakes etc. operate properly when triggered and can support the design loads.

3.1.4 Warning Devices

Carry out a visual and electrical test to check that all electrical switches and proximity devices work correctly and that all electrical cables are undamaged.

3.1.5 Platform or Cradle

Carry out a visual inspection as follows:

- Check for fractures, bent or flattened sections.
- Check that all components, including all bolts, are present.

3.2 PRE-INSTALLATION CHECKS

As this equipment is attached to or rests on other structures the loads that will be applied by the lifting equipment must be carefully assessed and the parts of these structures being used to carry the suspended platforms etc, must be certified as being capable of supporting those loads. In calculating the loads full consideration should be given to all possible environmental loads, e.g. wind, snow, standing rain water etc, together with any dynamic and impact loads. The loads assumed on the supporting structure should include adequate provision for the self-weight of the suspended equipment and an appropriate factor if this is to be hauled from elsewhere other than the platform or cradle itself.

The person certifying the load bearing capacity of the anchorages or parts of the supporting structure should have sufficient information as to how the supporting structure has been constructed and have structural design ability and experienced knowledge of the loads that will be created and suitable qualifications to make the necessary calculations e.g. being a chartered structural engineer. In some cases where the total weight of the suspended equipment is high the deflection of the supporting structure may be a significant factor in determining the satisfactory performance of both the equipment and the serviceability of the supporting structure.

Inspect and prepare calculations to check that the support points and supporting structure may safely carry the loads that will be applied to it. Where there may be doubt about the strength of the support points it should be verified by load testing.

3.3 INSPECTION AFTER ERECTION BUT BEFORE USE

The lifting equipment should be fully examined and tested before hand over by the installer's supervisor/charge hand. Where appropriate this could include using a torque spanner ensuring that the reading from this has not been influenced by the deflection of any cables or other flexible items. The installation should be test loaded as appropriate by lifting a test weight no more than 150mm off the ground while the lifting assembly is visually checked to see that there is no undue movement or deflection etc. Once this has been completed satisfactorily then a hand over certificate should be issued confirming the performance capabilities. This certificate should be signed by the person who has checked the equipment and by the person accepting it on behalf of the user confirming that he understands all the limitations on the use of the equipment and understands how it should be cared for and maintained.

3.3.1 Support Points and/or Suspension rig

Carry out a visual inspection as follows:

- Check that all holding down bolts are in place and are secure.
- Check that all counterweights that might be required are of the correct mass and are properly secured.
- Check that electrical controls are working and any trailing cables will not snag while the lifting equipment is in use.

3.3.2 Suspension Ropes

Carry out a visual inspection as follows:

- Check that the ropes can run properly through winches, pulley blocks etc.
- Check that free ends have suitable stops which are properly secured in place.
- Check that the ropes have not been damaged and are without any broken strands, flattened sections or contaminated areas.

3.3.3 Brakes etc.

Carry out a visual and mechanical inspection to check that these operate properly.

3.3.4 Warning Devices

Carry out a visual and electrical test to check that all electrical switches and proximity devices work when triggered.

3.3.5 Platform or Cradle

Carry out a visual inspection as follows:

- Check that all fixings are correctly and securely in place.
- Check for any damage to the various members and that the various sections are firmly locked in place.

3.3.6 Total Assembly

Carry out a visual inspection and test load by applying a test load. Gently lift the loaded platform etc, approx 150mm off the ground and check that that the lifting equipment suffers no undue movement.

4. SIX-MONTHLY THOROUGH EXAMINATION

The quality of the various items of lifting equipment would normally be covered by pre dispatch inspections. Therefore where the person carrying out such inspections is suitably competent and full records of these are kept, then there is no need for additional inspections. However where any of the equipment has not been in regular use for some time, or where the qualifications and experience of the inspector is not fully adequate, then a periodic 6 monthly thorough examinations and re-certification should be undertaken. The person undertaking this examination should be suitably technically qualified and have sufficient training and experience of the type of equipment being inspected. The examination shall be carried out in a logical sequence to ensure that nothing is overlooked.

4.1 SUPPORT POINTS AND/OR SUSPENSION RIG

Carry out a visual and mechanical inspection as follows:

- Check that all holding down bolts are in place and are secure.
- Check that all counterweights that might be required are of the correct mass and are properly secured.
- Check that electrical controls are working and any trailing cables will not snag while the lifting equipment is in use.

4.2 SUSPENSION ROPES

Carry out a visual inspection as follows:

- Check that the ropes are undamaged and have no broken strands, flattened sections or kinks.
- Check that the rope ends are properly spliced or secured and that that there is no sign of rust in the ropes.

4.3 BRAKES ETC.

Carry out a visual and mechanical inspection to check that brakes etc. operate properly when triggered and can support the design loads.

4.4 WARNING DEVICES

Carry out a visual and electrical test to check that all electrical switches and proximity devices work correctly and that all electrical cables are undamaged.

4.5 PLATFORM OR CRADLE

Carry out a visual inspection as follows:

- Check that all fixings are correctly and securely in place.
- Check for any damage to the various members and that the various sections are firmly locked in place.

4.6 TOTAL ASSEMBLY

Carry out a visual inspection and test load by applying a test load. Gently lift the loaded platform etc, approx 150mm off the ground and check that that the lifting equipment suffers no undue movement.

5. DAILY PRE-USE INSPECTION

Once installed and provided with a hand over certificate, the suspended equipment should remain safe for use until it is removed or until its next thorough examination. However as it could be subject to unauthorised interference or damage during use, it is also important that those using it are capable of visually inspecting the outer appearance for signs of any significant defects. This means that at least one person who will be using the equipment should be trained to at least an appropriate standard by the installer to be able to recognise any defects and carry out all daily routine maintenance. Any defects should be reported to whoever erected the equipment. These inspections should also be sufficient to replace the weekly inspections required of scaffold platforms.

5.1 SUPPORT POINTS AND/OR SUSPENSION RIG

Carry out a visual inspection as follows:

- Check that all holding down bolts are secure and have not been damaged or corroded.
- Check that all necessary counterweights are properly in position.

5.2 SUSPENSION ROPES

Carry out a visual inspection as follows:

- Check that the ropes are correctly seated in the winches etc, and that any free ends have suitable stops secured in place.
- Check that the ropes remain undamaged.

5.3 BRAKES ETC.

Carry out a visual and mechanical inspection to check that these will operate when required.

5.4 WARNING DEVICES

Carry out a visual and electrical test to check that all switches and proximity devices are working.

5.5 PLATFORM OR CRADLE

Carry out a visual inspection as follows:

- Check that all fixings are correctly and securely in place.
- Check for any damage to the various members and that the various sections are firmly locked in place.

6. DEFINITIONS

6.1 LIFTING ASSEMBLY
The combination of various items or parts linked together in order to carry out a lift.

6.2 LIFTING EQUIPMENT
The total assembly of the various parts or components used to lift a load.

6.3 SUPPORT POINT
The point or position at height on an associated structure from which the lifting equipment is carried, supported, hung or anchored.

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Thorough examination and inspection of particular items of lifting equipment

Annex 5: Thorough examination of mobile elevating work platform

This annex gives the particular requirements for the thorough examination of mobile elevating work platforms (MEWP'S) over and above the general requirements given in the first part of this report.

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1. SIX-MONTHLY THOROUGH EXAMINATION

The prime function of a MEWP is to lift persons, so a six-monthly thorough examination would normally be required. Prior to thorough examination the MEWP should be washed and cleaned to remove any deposits, e.g. spoil, dirt, which would otherwise conceal the structure or mechanisms and prevent an effective examination. The examination should be carried out in a logical sequence to ensure that nothing is overlooked.

1.1 GENERAL

Detailed checks should be made of:

- supporting and elevating/lowering/extending structures, e.g. deformation, damage, cracks, corrosion, welding;
- work platform, e.g. floor, guardrails, toeboards, gates and safety-harness attachments, levelling and restraint mechanism;
- fixings e.g. screws, bolts/nuts, bearings; hydraulics, electrics, suspension elements (ropes/chains), steering, brakes;
- safety systems and control systems, e.g. anemometers, load/moment limiting (sensing) devices, communication systems, emergency-lowering system and stop-buttons;
- guards;
- power units and pumps;
- hydraulics/electrics;
- suspension elements, e.g. ropes/chains;
- brakes;
- steering;
- slewing/rotating mechanisms;
- chassis, including stabilisers.

[**Note**: If extension/ retraction mechanisms within telescopic booms of a MEWP are not able to be examined via removable covers, etc. then some dismantling will be required to check chain/rope wear, wear pads, hydraulic cylinders.]

The thorough examination should include a test to establish that the MEWP, with rated load (safe working load) being carried, is capable of performing satisfactorily throughout the full range of movement.

Overload testing during thorough examination is not normally carried out, and it should only be considered after major repair or modification. In such instances, the manufacturer's advice should be sought.

Non-destructive testing may be considered necessary, particularly when there is a suspicion of cracks or other damage existing in structural or load-bearing parts, e.g. pin-bearings connecting scissor-arms, knuckle-joints.

2. PERIODIC INSPECTIONS

Routine visual inspections and checks should be effected by suitable personnel before a MEWP is taken into use on any day. The aim is to ensure that a MEWP is capable of operating satisfactorily and safely, and such inspections and checks should encompass:

- cleanliness and general signs of damage;
- efficiency of brakes;
- tyre pressures and lights (when fitted);
- engine cooling-water and lubricating oil;
- component parts of the prime means of support for the work platform/extending structure;
- hydraulic leaks, including operation of stabilisers;
- functioning of controls, safety devices (anemometers, load/moment limiters/sensors,
  2-way communications systems);
- chassis, stabilisers.

Regular preventative maintenance by suitably-qualified personnel should be undertaken, which should include closer inspections of the aforementioned items, and adherence to manufacturer's instructions whenever possible. Plant-hire companies will often include periodic maintenance checking in their hire agreements with customers.

3. STANDARDS AND GUIDANCE

The term ‘mobile elevating work platform’ (MEWP) was adopted by the European Committee for Standardisation (CEN) when work began on drafting a CEN Standard for such machines. The CEN Standard (EN 280) has been finalised, and will be accorded ‘harmonised’ status (by the EU) relative to the EU Machinery Directive.

A British Standard for mobile elevating work platforms (BS 7171) was published in 1989 and it will be superseded eventually by BS EN 280. (A British Standard Code of Practice for mobile scissor operated work platforms was published in 1982).

Guidance entitled ‘Safety in working with power-operated mobile work platforms’ was first issued by the Health and Safety Executive (HSE) in 1982, and other guidance was subsequently issued by the International Powered Access Federation (IPAF) and the Construction Plant-Hire Association (CPA).

4. DEFINITIONS

4.1 MOBILE ELEVATING WORK PLATFORM (MEWP)
A mobile machine that is intended to move persons to working positions where they carry out work from the work platform with the intention that persons are getting on and off the work platform at one defined access position and which consists as a minimum of a work platform with controls, an extending structure and a chassis.

4.2 WORK PLATFORM
A fenced platform or cage which can be moved under load to the required working position and from which erection, repair, inspection or similar work can be carried out. A work platform may be capable of rotating about a vertical axis.

4.3 EXTENDING STRUCTURE
The structure which is connected to the chassis and supports the work platform. It allows movement of the work platform to its required position. It may, for example, be a single or a telescoping or articulating boom or ladder, or a scissors mechanism or any combination of them, and may or may not slew on the base.

4.4 CHASSIS
The base of the MEWP. It may be pulled, pushed, self propelled, etc.

4.5 STABILISERS
All devices and systems used to stabilise MEWPs by supporting and/or levelling the complete MEWP or the extending structure, e.g. jacks, suspension locking devices, extending axles.

4.6 VEHICLE MOUNTED MEWP
A MEWP that has travelling controls located within the cab of the vehicle.

4.7 PEDESTRIAN CONTROLLED MEWP
A MEWP that has the controls for powered transport located so that they are capable of being operated by a person walking close to the MEWP.

4.8 SELF PROPELLED MEWP
A MEWP that has the travelling controls located at the work platform.

4.9 RATED LOAD
The load for which the MEWP has been designed for normal operation. The rated load is composed of persons, tools and material acting vertically on the work platform.
NOTE: A MEWP can have more than one rated load.

4.10 LOAD SENSING SYSTEM
The system of monitoring the vertical load and vertical forces on the work platform.
NOTE: The system includes the measuring device(s), the method of mounting the measuring device and the signal processing system.

4.11 MOMENT SENSING SYSTEM

The system of monitoring the moment acting about the tipping line tending to overturn the MEWP.

NOTE: The system includes the measuring device(s), the method of mounting the measuring devices and the signal processing system.

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Thorough examination and inspection of particular items of lifting equipment

Annex 6: Thorough examination of multipurpose machine (telehandler/ crane/mobile elevating work platform)

This Annex gives the particular requirements for the thorough examination of a combined, telehandler, crane, and mobile elevating work platform, (multipurpose machine) over and above the general requirements given in the first part of this report.

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1. SIX MONTHLY THOROUGH EXAMINATION

Multipurpose machines are used for the lifting of persons and would normally require thorough examination at least every six months. In those situations where a multipurpose machine is subjected to arduous use (long periods of repeated usage with loads close to the rated capacity) more frequent examination will be required.

Prior to thorough examination the multipurpose machine shall be pressure washed or cleaned by some other effective measure to remove all spoil/dirt that would otherwise conceal the structure or mechanisms and prevent an effective examination. The examination shall be carried out in a logical sequence to ensure that nothing is overlooked.

1.1 THE CRITICAL AREAS REQUIRING PARTICULAR ATTENTION

1.1.1 Basic Machine

- Visually examine the chassis of the vehicle for signs of damage, distortion cracking and corrosion etc.
- Carry out a visual examination and a functional check on the axle locking system ensuring correct operation, freedom from leaks damage corrosion, distortion and correct operation of all indicators.
- Visually inspect all bolts and fastenings ensuring that they are not coming loose.
- The slewing mechanism should be visually examined for security and wear during operation of the slew motion throughout its full range of movement and with the machine at maximum reach.
- Visually examine all pipe work on the machine for corrosion, damage, leakage, security, and fretting.
- All hydraulic cylinders should be visually examined for leakage, corrosion on the rods and alignment. Visually check end fixings for wear, security and lubrication.
- Visually inspect the super structure and jib of the machine for corrosion, damage, cracks and distortion.
- All pivoting joints on the jib and attachments of the machine should be visually checked for wear, corrosion, security, and evidence of lubrication.
- Telescoping extensions on the machine should be operated and visually examined for wear and security.
- Ensure by visual examination that all ropes are of the size and type as specified in the manufacturer’s instructions and reeved in accordance with those instructions. Pay particular attention to the end terminations. Guidance on “Wedge and socket anchorages for wire ropes” can be found in HSE Guidance note PM 46.
- Visually check all pulleys/sheeves and drums to ensure that they are free from damage and wear and that the rope fits correctly on them and that they are appropriately lubricated. Check that all idler pulleys/sheeves turn freely and ensure that all appropriate guards are undamaged and are in place.

- Thoroughly examine the whole length of the ropes for signs of wear damage broken wires and corrosion. The use of vernier callipers and a watchmaker's eyeglass will greatly assist this examination. Particular attention should be paid to those portions that regularly pass around pulleys/sheaves.
- Visually inspect the braking mechanism for wear damage and adjustment and ensure that it is in accordance with the manufacturer's instructions.
- Any means of access should be checked to ensure that ladders walkways and hand rails/hand holds are complete and secure.
- The outrigger jacks and beams should be visually examined for wear, security, freedom of movement, and markings to show the correct extension for the beams. The jacks should be extended and visually checked to ensure that they move freely and smoothly and that when left supporting the machine that they do not creep.
- Oil and other fluid levels should be checked ensuring the condition (e.g. by debris monitoring) and level of the fluid.
- Visually check to ensure that the fixings for the driver's seat (where fitted) and restraint are all in place and secure.
- Ensure that all control levers are marked with their function and mode of operation.

1.1.2 Crane Attachment

- Visually inspect the upper and lower hoist limit switches to ensure that they are in place and free from damage or excessive wear.
- Visually examine the hook, its attachment and its safety catch for wear, fretting, distortion, corrosion and security.
- Visually examine the cushion wheels and their attachment to ensure freedom from damage, wear, corrosion and distortion.
- Visually examine the fly jib and mounting attachment for corrosion, cracking, distortion and wear. Ensure that the hoist limit switch is in good working order.
- Ensure that there is a table in the drivers cabin showing the safe working loads for the machine for all crane operating conditions (free on wheels, free on cushion wheels, all permitted outrigger positions etc.)

1.1.3 Fork Attachment

- Visually examine the attachment points and fastenings both on the machine and on the fork attachment to ensure that they are free from wear, cracking, distortion, damage and corrosion.
- Visually examine the forks and the fork mounting frame for wear, cracking, distortion, damage and corrosion.
- Visually examine the fork tilting mechanism for wear, cracking, distortion, damage and corrosion.

1.1.4 Personnel carrying attachment

- Check to ensure that the machine is equipped with a motion control system that brings motion to rest automatically when the controls are released.
- Check to ensure that load bearing hydraulic cylinders are fitted with a device to stop movement in case of hose rupture or pipe fracture.
- Carry out a functional check to ensure that the machine control system is able to provide a smooth transition of the carrier. The working speed of the carrier should be limited to a maximum of 0.5 m/s on all motions.
- Check to ensure that means is provided so that if the power supply or control system fails, the carrier can be positioned to enable access/egress without risk.
- Visually check to ensure that storage accommodation for equipment, including any emergency egress equipment (e.g. safety harness, lanyard) is provided in the carrier.
- Visually check to ensure that the carrier is marked to show the number of persons that can be carried and the maximum load that can be carried.
- Check to ensure that any door in the carrier does not open outwards and that the door can be securely fastened.
- Visually check to ensure that the carrier has adequate handrails that are mounted in a position that will prevent trapping of hands.
- Visually check the carrier to ensure that the sides are adequate to prevent persons or materials falling from the carrier.
- Visually examine the structure of the carrier to ensure that it is free from damage, corrosion, cracks and other imperfections.
- Visually check any mechanism provided to ensure that the floor of the carrier remains horizontal. Ensure that it is free from damage, leaks, corrosion and wear.

1.1.5 General

- Functional test of all controls should be carried out to ensure smoothness of operation and freedom from wear and other damage.
- Ensure that warning signs and other important manufacturer’s instructions are present and readable e.g. rating plate for load lifting.
- After carrying out all necessary examinations the machine should be seen in operation to ensure that all motions operate smoothly and effectively without excessive play. Checks should be made to ensure that the load lifting attachment does not drop excessively after the motion has been stopped and that all limiters and safety devices operate correctly.

- The rated capacity indicator/limiter (automatic safe load indicator) should be examined to ensure that it is in good working order in all working modes. The accuracy should be checked using a known weight. The known weight should be attached to the machine at a point where the weight is less than the safe working load. The machine should then be moved towards the point where the weight would be 10 % in excess of the lift capacity. NB no attempt should be made to move the crane beyond the 10% overload position. The rated capacity indicator should operate before the weight arrives at the designated position.

Guidance on overload testing will be found in British Standard 7121. Non-destructive testing may be considered necessary particularly when there is a suspicion of cracks or other damage being present in structural parts.

It is possible to fit data logging to the machine and so condition monitoring can be carried out on the machine from new. When new, an effective "scheme of thorough examination" can be drawn up by the manufacturer for those machines fitted with data loggers.

2. PERIODIC INSPECTIONS (PRE-USE AND WEEKLY)

2.1 DAILY PRE-USE INSPECTION

At the beginning of each shift or working day that the equipment is in use the following routine inspections, as appropriate for the type of equipment, should be carried out:

- Checks as required by the manufacturer's handbook.
- Visually check that no electrical equipment is exposed to contamination by oil, grease, water or dirt.
- Visually check, by inspecting relevant levels and/or components, that no loss of fluids such as lubricating/hydraulic oil and coolant is apparent.
- Check that the rated capacity indicator (previously known as the automatic safe load indicator) is set for its correct duty and that the manufacturer's daily test is carried out.
- Check that the correct air pressure is maintained in any pneumatic control system, e.g. brakes.
- Check correct function of all controls without load.
- Check satisfactory operation of all audible warning devices.
- Check that the equipment is in a tidy condition and free from tins of oil, rags, tools or materials other than those for which storage provision is made.
- Check that access and egress are adequate and that appropriate safety and fire fighting equipment is readily available.
- Check that there are no obstructions in the path of travel of the equipment.
- A functional check should be made on all limit switches to ensure that they operate correctly.
- The machine, load lifting attachments and personnel carrier should be visually inspected.
- Ensure that any tools/materials in the personnel carrier are secured to prevent displacement, tipping and/or falling out.

2.2 WEEKLY INSPECTIONS

Once a week, when the equipment is in use, in addition to the checks recommended in 2.1 above, the following checks as appropriate for the type of equipment should be carried out:

- Checks as required by the manufacturer's handbook.
- Check the rated capacity indicator in accordance with the operating instructions.
- Inspect the structure for damage, e.g. bulges, indentations and unusual rubbing marks, cracked welds and loose bolts and other fasteners.
- Inspect hook(s) and other load lifting attachments, safety catch(es) and swivel(s) for damage, free movement or wear.
- Check operation and adjustment of controls.
- Check for creep of hydraulic rams.
- Check effectiveness of brakes and clutches.
- Check tyres for pressure as well as damage and wear on walls and tread. Also check wheel nuts for tightness.
- Check steering, brakes (both foot and parking), lights, indicators, horn, windscreen wipers and washers.
- Check slew lock if fitted.
- Enter results of checks in the records of inspections.

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Thorough examination and inspection of particular items of lifting equipment

Annex 7: Thorough examination of vehicle recovery - spectacle lift

This Annex gives the particular requirements for the thorough examination of a vehicle recovery spectacle lift mounted on recovery vehicle over and above the general requirements given in the first part of this report.

Vehicles that are used on public roads will be subject to an annual road test carried at a Ministry of Transport approved testing stations (MOT). This report is in no way related to this thorough examination and testing. Vehicle recovery spectacle lifts can be fitted to different vehicles and the rated capacity (safe working load) is dependant not only on the spectacle lift but the vehicle to which it has been fitted and the manner in which that fitting has been carried out. Before carrying out the examination or operation on a recovery vehicle spectacle lift it is important to ensure that the combination has been tested as a whole and that the safe working load given by the person carrying out the test was for that spectacle lift to that vehicle.

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1. TWELVE-MONTHLY THOROUGH EXAMINATION

Vehicle recovery spectacle lifts are not suitable for the lifting of persons so normally they would only require a twelve monthly thorough examination. However in those circumstances where there is a high intensity of use (i.e. the hoist is used many times in a working shift).

Prior to thorough examination the vehicle recovery spectacle lift shall be pressure washed or cleaned by some other effective measure to remove all spoil/dirt that would otherwise conceal the structure or mechanisms and prevent an effective examination. The examination shall be carried out in a logical sequence to ensure that nothing is overlooked.

The critical areas requiring particular attention are:

- Visually check the sub frame attached to the vehicle for the spectacle lift mounting and the vehicle chassis for damage, distortion, signs of cracking and corrosion etc.
- Visually inspect all bolts and fastenings used to attach the spectacle lift to the sub frame and the sub frame to the vehicle to ensure they are coming loose.
- Visually examine, where applicable and possible, the power take off drive and pump on the vehicle ensuring it is secure and free from damage, excessive wear and leakage.
- Where applicable, ensure that the control for the power take off moves freely, but does not have excessive play and is properly labelled to identify its function and mode of operation.
- For vehicles that travel on public roads carry out a functional check on the handbrake interlock that disengages the power take off when the hand brake is released.
- Visually inspect the pipe connections between the pump and spectacle lift, spectacle lift and oil tank and oil tank and pump for corrosion, damage, leakage, security and fretting.
- Visually examine the valve block for the spectacle lift for damage, leakage and security.
- Visually inspect all hydraulic pipes and hoses on the spectacle lift for corrosion, damage, leakage, security and fretting.
- Hydraulic cylinders should be visually examined for leakage, corrosion on the rods and alignment. Visually check end fixings for wear, security and lubrication.
- Visually inspect the structure of the spectacle lift for corrosion, damage, cracks and distortion.
- All pivoting joints on the vehicle lift should be checked for wear, corrosion, security and evidence of lubrication.
- Any telescoping extensions on the spectacle lift should be operated and examined for wear and security.
- Oil and other fluid levels should be checked ensuring the condition (e.g. by debris monitoring) and level of fluid.
- Ensure that all control levers are marked with their function and mode of operation.

- Functional test of all controls (levers, buttons etc.) should be carried out to ensure smoothness of operation and freedom from wear and other damage to any linkage. Ensure all levers return to the neutral position when released.
- Ensure that warning signs and other important manufacturer's instructions are present and readable e.g. rating plate for load lifting.
- After carrying out all necessary examinations the machine should be seen in operation to ensure that all motions operate smoothly and effectively without excessive play and that the load would be sustained when in the raised position.

Guidance on the overload testing of cranes will be found in British Standard 7121. Non-destructive testing may be considered necessary particularly when there is a suspicion of cracks or other damage being present in structural parts. Condition monitoring is not normally applied to spectacle lifts. As complete condition monitoring is not normally available on spectacle lifts it is unlikely that an effective 'scheme of thorough examination' can be drawn up for these machines.

2. PERIODIC INSPECTIONS (PRE-USE AND WEEKLY)

2.1 DAILY PRE-USE INSPECTION

At the beginning of each shift or working day that the equipment is in use the following routine inspections, as appropriate for the type of equipment, should be carried out:

- Checks as required by the manufacturer's handbook.
- Visually check, by inspecting relevant levels and /or components, that no loss of fluids such as lubricating, hydraulic oil is apparent.
- Check correct function of all controls without load.
- Check that the equipment is in a tidy condition and free from any debris which would affect the safe working of the machine.

2.2 WEEKLY INSPECTIONS

Once a week, when the equipment is in use, in addition to the checks recommended in 2.1 the following checks as appropriate for the type of equipment should be carried out:

- Checks as required by the manufacturer's handbook.
- Check the loading control in accordance with the operating instructions.
- Inspect structure for damage e.g. bulges, indentations, unusual rubbing marks, cracked welds and loose bolts and other fasteners.
- Check operation and adjustment of control levers, buttons etc.
- Check for creep of hydraulic rams.
- Enter results of checks in the records of inspections.

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Thorough examination and inspection of particular items of lifting equipment

Annex 8: Thorough examination of escalator

This annex gives the particular requirements for the thorough examination of escalators over and above the general requirements given in the first part of this report.

[Note: Escalators are not covered by LOLER.]

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1. SIX-MONTHLY THOROUGH EXAMINATION

Escalators should be thoroughly examined at least once every six months, or at some shorter interval determined by the competent person at the conclusion of the last thorough examination. Passengers on escalators are continually exposed to particular features which need to be closely checked and monitored consistently if a satisfactory degree of safety is to be achieved. The examination should be carried out in a logical sequence to ensure that nothing is overlooked.

1.1 GENERAL

It should be recognised that escalators may be available for unsupervised, unrestricted continuous use by persons of all ages and physical/mental abilities.

It is important that the thorough examination should include the 'running clearance' between adjacent parts of the treadway; between steps and balustrade skirtings, and between treadway and comb-plate. Such clearances should be maintained within the tolerances specified in the relevant manufacturing standards or to a safer standard specified by the manufacturer.

The design and construction of escalators will usually necessitate removal of decking and panels and may sometimes require dismantling of components to facilitate examination.

A thorough examination should include checks with the escalator running and stationary. Before detailed dimensional checks are made, the competent person may gain useful information by making an initial assessment of the escalator as it completes several round trips. For example, if an escalator normally runs in one direction, the majority of passengers will have boarded and stood at one side of the treadway. Such biased loading may cause steps to 'lay' towards one balustrade and away from the other. Listening carefully for unusual noises may also indicate the need to pay particular attention to certain components or areas.

1.2 TREADWAY

A visual check should indicate the consistency of clearances between moving steps and balustrade skirting, and whether the steps remain parallel with each other and with the comb-plates. At the same time, each step tread, riser and comb-plate should be inspected for damage, e.g. broken cleats or teeth, indentations in risers.

Templates or gap gauges should be used to check the clearances. This check should usually be made with steps unloaded. In addition, it should be determined whether side clearances are maintained within the tolerances specified in the relevant manufacturing standards when an attempt is made to move the steps towards the skirting at either side, e.g. by pushing on a step with both feet whilst leaning with the back hard against a balustrade.

A record of clearances measured should be entered on the report and compared with measurements at subsequent examinations; this should also be of assistance to the employer or person responsible for the maintenance of the escalator.

Guidance arrangements for step rollers should be inspected, particularly for sideways restraint. A thorough examination may necessitate the removal of one or more steps.

Meshing of step tread ends with adjacent step riser cleats and meshing of comb-teeth with step tread grooves should be checked carefully. Whilst measurement of British Standard recommended clearances is advisable where applicable, it is more important to ascertain, for example, that the ends of the comb-teeth are always lying below the upper surfaces of the step treads, and at approximately the mid-point between adjacent tread cleats.

Clearances between smooth (uncleated) risers and step treads should be checked very carefully so that gaps are maintained at a minimum practicable level, and any damage to smooth risers should be carefully investigated. Excessive and fluctuating variations in these gaps may be detected when the weight of a standing person is purposely shifted from the front to the back and vice versa.

A check should be made for signs of contamination of treads with low-friction skirting coating which may cause a slipping hazard for passengers.

1.3 SKIRTING

Particular attention should be paid to the balustrade skirting, and scuff marks, scratching, indentations, permanent deflections etc. should be closely investigated. A check should be made that the skirting is vertical and smooth, and that butt joints do not present sharp edges or create trapping hazards. Visual examination should check total coverage of low-friction coatings, and skirtings coated in this way should also be free from contamination with yellow lining paint.

1.4 HANDRAILS

A check should be made that the speed of each handrail does not deviate from the speed of the steps by more than the tolerance specified in the relevant manufacturing standards and that the handrail is so tensioned as to prevent hand traps being created. It should not be possible to cause a handrail to ‘slip’ on its balustrade without exerting a high degree of force on the handrail in either direction. Smoothness and effectiveness of joints should be checked.

1.5 STEP CHAINS

Chains should be examined carefully for signs of wear at links, bearing pins, step roller connections etc. and the adequacy of chain lubrication should be verified. Worn step chains may be indicated by checking for excessive clearances between step treads at horizontal sections.

Chain wheel positions should be checked, and any indication of chain stretch or wear should be closely investigated. It is particularly important that stretching of one chain relative to its counterpart chain should be detected and closely investigated. 'Crabbing' of moving steps may give early indication of such stretching and static measurement of the distance between each side of the leading edge of a comb and the nose of a step some way down the treadway may also provide evidence. Stretching or wear may occur over short sections of chain, and may be discerned by checking whether the gap between a step riser and adjacent step tread remains parallel (or within 1mm). [1.2, sixth paragraph is relevant.]

At 10-yearly intervals short lengths of the chains should be removed, thoroughly cleaned, examined, and, if satisfactory, re-installed. Only if defects are found should consideration be given to removing the whole chain for examination.

1.6 MAIN DRIVE SYSTEM COMPONENTS

Unless there is evidence to indicate that attention is required at more frequent intervals, it is recommended that when shafts and plain bearings are not readily accessible, they should be exposed for examination at intervals not exceeding ten years and also when re-chaining is being carried out. Particular attention should be given to shouldered shafts which are likely to have points of high stress concentration where the change of diameter occurs.

Exposure of roller, ball and needle bearings for examination should be undertaken only when evidence obtained from other methods of examination indicates that a more detailed assessment is required.

1.7 WORM AND OTHER GEARING

These mechanisms should be checked for backlash, endfloat, gear noise etc. and it may be possible to do this without dismantling. If there is evidence of excessive wear it may be necessary to remove gearcase covers or otherwise expose the working parts to permit further examination. In any case these working parts should be exposed for examination at intervals not exceeding 10 years and perhaps most conveniently when re-chaining is being carried out. Unless it is essential, more frequent dismantling should be avoided.

1.8 SAFETY DEVICES

Devices provided to stop an escalator automatically in an emergency should be checked and where practicable each device should be checked in operation. These devices include power failure switches, earth fault switches, overload cutouts, chain breakage/elongation cutouts, comb switches, handrail entry guards and switches, step-sagging cutouts, non-reversal devices, overspeed governors.

Emergency stop devices which do not operate automatically, e.g. stop button at each landing, should be tested. This test should be used to check the efficiency of the braking system by comparing the actual stopping distance with the distance(s) specified in the relevant manufacturing standards, or to a safer standard specified by the manufacturer.
Deflector devices fitted at the balustrade skirting should be checked.

1.9 LIGHTING

The lighting for the escalator and its surrounds should be checked to see that it is in working order. (Reference to levels and types of lighting can be found in the relevant manufacturing standards).

1.10 WARNING NOTICES

Checks should be made to see that the required warning notices for persons using the escalator are fixed permanently in conspicuous positions and are adequately illuminated.

1.11 OVERLOAD TESTING

Overload testing of escalators is not normally carried out, and it should only be considered after major repair or modification. In such instances, the manufacturer’s advice should be sought.

1.12 NON-DESTRUCTIVE TESTING

Non-destructive testing may be considered necessary, particularly when there is a suspicion of cracks or other damage existing in load-bearing components, e.g. steps, chain link-pins.

2. PERIODIC INSPECTIONS (PRE-USE AND MONTHLY)

2.1 DAILY PRE-USE INSPECTION

Routine visual inspections and checks should be effected by authorised personnel before an escalator is taken into use each day. It should be ensured that each escalator is operating satisfactorily, and such inspections and checks should encompass:

- those required by the manufacturer's handbook;
- cleanliness;
- scuff-marks, dents and any other obvious damage to skirtings;
- damage to combs, comb-plates, step risers, and step treads;
- condition and speed of handrails;
- correct operation of emergency stops;
- condition of advisory/warning signs.

2.2 MONTHLY INSPECTION

This inspection should form an integral part of scheduled monthly maintenance by suitably-qualified technicians. Commonly, this work is contracted-out to specialised escalator-maintenance companies, and very often it is undertaken by the escalator manufacturer. Escalators need to be taken out of service to facilitate effective inspection/maintenance, and arrangements may have to be made for technicians to visit premises outside normal working hours.

3. STANDARDS AND GUIDANCE

Although specific UK legislation for escalators did not exist before 1992 [see Regulation 19 of the Workplace (Health, Safety and Welfare) Regulations (WPR)], the Health and Safety Executive (HSE) had issued relevant guidance in 1983 (Guidance Note PM 34 – Safety in use) and 1984 (Guidance Note PM 45 – Periodic thorough inspections).

A British Standard for escalators (BS 5656) was published in 1983 (since superseded by BS EN 115), and references to the Guidance Notes and British Standards are included in the Health and Safety Commission (HSC) Approved Code of Practice (ACOP) on the WPR.

Although specific mention of periodic 'thorough examination and inspection' of escalators is not made in Reg 19 of the WPR, such activities are considered necessary to ensure that continuing compliance with the requirements of the WPR and other UK legislation is achieved.

4. DEFINITIONS

4.1 ESCALATOR
Power-driven installation with endless moving stairway for the conveyance of passengers in the upward or downward direction.

4.2 HANDRAIL
Moving part intended to serve as a handhold for the passengers.

4.3 COMB
Parts which, at both landings, mesh with the steps in order to facilitate the transition of passengers.

4.4 DEFLECTOR DEVICE
An additional device to minimise the risk of trapping between the step and skirting.

4.5 BALUSTRADE
Installed on each side of an escalator, which provides support for the handrail.

4.6 SKIRTING
Position of the balustrade adjacent to the outer edges of the steps.

4.7 NEWEL
End of the balustrade on the landings, where the handrails change their direction of movement.

4.8 TREADWAY
The exposed portion of the moving stairway upon which passengers stand.

4.9 STEP CHAIN
The steel link chain, located on each side of each step, which drives the steps along their prescribed path.

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Thorough examination and inspection of particular items of lifting equipment

Annex 9: Thorough examination of stairlift

This annex gives the particular requirements for the thorough examination of powered stairlifts over and above the general requirements given in the first part of this report.

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1. SIX-MONTHLY THOROUGH EXAMINATION

The prime function of a stairlift is to lift persons, so a six-monthly thorough examination would normally be required. However, an examination may take place at some other interval decreed by the competent person in conjunction with a written scheme of thorough examination agreed between the competent person, the stairlift supplier/manufacturer and the user/owner.

The thorough examination should include checks with the stairlift in operation and whilst it is stationary. Before detailed visual, dimensional and any non-destructive checks are made, useful information may be gained via an initial assessment of the stairlift as it travels between its upper and lower limits. The examination should be carried out in a logical sequence to ensure that nothing is overlooked.

1.1 GENERAL

Detailed checks should be made of:

- Guide/support rail(s), e.g. deformation, cracks welding, (including connection of fixings between rail(s) and structure of stairway), guide-rollers.
- Carriage, including chair or platform, and connections to the drive unit.
- Safety devices e.g. back-up nut, slack-rope/chain switch, sensitive edges and associated switches, overspeed governor and safety gear, swivel seat interlock switch, hinged rail interlock switch, alarm bell or other warning device.
- Brake, e.g. checking carriage stopping distance in both directions of travel.
- Correct functioning of upper and lower control/final limit switches.
- Correct functioning of carriage on/off/stop switches and landing controls.
- Electrical equipment, including trailing cable(s), overload cut-out(s), wiring and fuses, battery charging equipment, residual current device(s) and circuit-breaker(s).
- Carriage drive equipment, e.g. wire-ropes, winding-drums, pulleys, racks and pinions, chains and chainwheels, screws and nuts, hydraulic jacks, ropes/chains, rope/chain terminations, etc.
- Hand-winding mechanism or stand-by power system for emergency operation.
- Warning labels and operating instructions.
- Guards.

Overload testing during thorough examination is not normally carried out, and it should only be considered after major repair or modification. In such instances the manufacturer’s advice should be sought.

Non-destructive testing may be considered necessary, particularly when there is a suspicion of cracks or other damage existing in structural or load-bearing parts, e.g. carriage/driving equipment connections.

2. PERIODIC INSPECTIONS

Routine visual inspections and checks should be effected by suitable personnel before a stairlift is taken into use on any day. The aim is to ensure that a stairlift is capable of operating satisfactorily and safely and such inspections and checks should include:

- Ensuring that means are in place to prevent unauthorised usage of the stairlift.
- Monitoring the complete travel-path of the stairlift to ensure that it is unobstructed.
- Adequacy of illumination of the stairway(s) and landings.
- Condition of warning/instruction signs, ensuring that they are fully visible and legible.
- Checking condition of chair/platform including passenger-restraint devices, wheel chair-restraint devices, swivelled seating and associated interlocks.
- Ascertaining that sensitive edges/surfaces function satisfactorily.
- Monitoring effectiveness of controls, alarms, stop buttons/ switches.
- Operation of the stairlift over the full extent of its travel, to check the effectiveness of upper and lower control switches.

Regular preventative maintenance by suitably-qualified personnel should be undertaken, which should include closer inspections of the aforementioned equipment and adherence to manufacturers' instructions whenever possible. Use may be made of specialised stairlift maintenance companies, who may be the manufacturers of the lift.

3. STANDARDS AND GUIDANCE

British Standard 5776 (Powered stairlifts) was published in 1979. The Foreword of that Standard made it clear that a powered stairlift was intended ‘for use on a stairway within, or an internal stairway giving access to, a private dwelling’. The latter term was defined as ‘A house, flat or maisonette occupied by one or more households’. It was also stated that in suitable circumstances, a powered stairlift may be used in a residential home or similar establishment.

In 1990, BS 5776: 1979 was amended to include an Appendix entitled ‘Guidelines for the installation of stairlifts in public buildings, commercial buildings and residential homes’. The amended Standard was eventually superseded by BS 5776: 1996 which makes it clear in its scope that guidelines are included for stairlifts installed in buildings other than private dwellings.

A European (CEN) Standard for stairlifts is being prepared at present, taking into consideration similar work being done internationally by the International Standards Organisation (ISO).

4. DEFINITIONS

4.1 POWERED STAIRLIFT
An appliance that uses an external source of power for transporting a person or person with a wheelchair between two or more levels by means of a guided carriage/platform moving substantially in the direction of a flight of stairs and travelling in the same path in both upward and downward directions. Movement may be obtained via rack and pinion, suspension rope(s)/chain(s), a driving nut/driving screw combination, toothed belt, hydraulic jacks, guided rope and ball.

4.2 CARRIAGE
That whole moving part of the stairlift designed to carry a passenger or a passenger in a wheelchair.

4.3 PLATFORM
A horizontal structure that is part of the carriage and supports a person standing, sitting or in a wheelchair.

4.4 BRAKE
An electromechanical mechanism employed to bring the stairlift to rest smoothly and hold it in position.

4.5 SAFETY GEAR
A mechanical device attached to the carriage to stop and sustain the carriage on the rails in the event of suspension or support failure.

4.6 OVERSPEED GOVERNOR
A device which, when the lift attains a predetermined speed, causes the lift to stop by application of the safety gear.

4.7 RATED SPEED
The speed of the carriage for which the stairlift has been built, and for which normal operation is guaranteed.

4.8 RATED LOAD
The load for which the equipment has been built, and for which normal operation is guaranteed.

4.9 SENSITIVE EDGE
A safety device attached to any edge of the carriage.

4.10 SENSITIVE SURFACE
A safety device similar in effect to a sensitive edge, but so arranged to protect a whole surface, such as the underside of a platform or other large area.

4.11 DRIVE
A generic term covering the various electromechanical drive unit arrangements that cause the carriage to move under electrical power input.

4.12 DRIVE UNIT

The complete assembly comprising an electric motor, brake and gearing, which supplies the tractive and braking effort controlling the movement of the carriage.

4.13 BACK-UP NUT

An internally threaded annular component, used in conjunction with a screw and nut drive, so arranged that it does not normally carry the load but is capable of doing so in the event of failure of the threads in the main driving nut.

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Thorough examination and inspection of particular items of lifting equipment

Annex 10: Thorough examination of order pickers (automated and manual operation) used for storage and retrieval

This Annex gives the particular requirements for the thorough examination of both automated and manual order pickers over and above the general requirements given in the first part of this report.

There are various types of Order Pickers and these can be as follows:

- Mobile (similar to a fork lift truck).
- Rail Mounted (similar to fork lift truck but travelling movement restricted by ground rails).
- Overhead Travelling (similar to an overhead crane but with a mast suspended from the bridge).

The above types may have the operator position located on the lifting carriage and therefore fall into the category for the lifting of persons. Alternatively, the operator may be located in a position on the machine other than on the lifting carriage (e.g. at ground level) and these are not used for the lifting of persons, or where the operator is remote from the machine and these are usually automated.

The automated order pickers would be placed inside an interlocked enclosure that prevents access to the operating area of the order picker. In these circumstances the risks presented by the operation of the order picker are extremely low provided the interlocks and enclosure are well maintained. These types of machines would require to be assessed for inspection purposes under the Provision and Use of Work Equipment Regulations 1998.

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1. TWELVE-MONTHLY THOROUGH EXAMINATION

1.1 ALL ORDER PICKERS

Order pickers that do not have the operator located on the lifting carriage are not suitable for the lifting of persons so normally they would only require a twelve monthly thorough examination. However in those circumstances where there is a high intensity of use (i.e. the order picker is used many times in a working shift and is used to carry loads close to the safe working load of machine) more frequent thorough examinations may be necessary.

The order picker and any adjacent equipment likely to present a hazard to those involved in the thorough examination shall be taken out of service for the duration of the examination. The order picker shall only be operated during that time under the direction or control of the competent person carrying out the examination. The examination shall be carried out in a logical sequence to ensure that nothing is overlooked.

The critical areas requiring particular attention are:

- Visually check the structure for damage or signs of cracking and corrosion etc.
- Visually check all bolted or other fastenings connections to ensure they have not worked loose.
- Visually check the travel mechanism and wheels to ensure that they are free from damage or wear.
- Visually check the mast structure for damage or signs of cracking, corrosion and the roller guides for wear and lubrication, that the mast rollers are free from damage and wear, that they turn freely and are lubricated.
- Mast extensions should be operated and examined for wear and security. The extension stops should be checked that they are in place and secure.
- Flexible hydraulic hoses should be checked for damage and leakage.
- Hydraulic cylinders should be visually examined for leakage, corrosion on the rods and alignment. Visually check end fixings for wear, security and lubrication.
- Ensure that the hoisting medium (wire ropes or chains) are of the size and type as specified in the order picker manufacturer's instructions and are reeved in accordance with those instructions. Pay particular attention to the end terminations.
- Visually check all sheeves/pulleys to ensure that they are free from damage, wear, that they turn freely, that the rope or chain fits correctly on them and that they are appropriately lubricated.
- Where wire hoist ropes are fitted thoroughly examine the whole length of the hoist ropes for signs of wear, damage, broken wires and corrosion. The use of vernier callipers and watch maker's eyeglass will greatly assist in this examination. Particular attention should be paid to those portions that regularly pass around pulleys/sheeves.

- Where plate link type hoist chains are fitted thoroughly examine the whole length of the hoist chains for signs of damage, wear, cracks, stretch and corrosion. Particular attention should be paid to those portions that regularly pass around pulleys/sheeves.
- Oil and other fluid levels should be checked ensuring condition (e.g. by debris monitoring) and level of fluid.
- Visual examination for leakage and damage should be made on actuators, control valves, pipe work etc.
- Functionally test control levers for excessive wear, smoothness of operation, and visually check for identification and means to prevent inadvertent operation.
- Ensure that warning signs and other important manufacturer's instructions are present and readable e.g. rating plate for load lifting.
- After carrying out all necessary examinations the machine should be seen in operation to ensure that all motions operate smoothly and effectively without excessive play. Checks should be made to ensure the fork carriage etc. does not drop excessively after motion has been stopped.

Non-destructive testing may be considered necessary particularly when there is a suspicion of cracks or other damage being present in the structure. Condition monitoring is not normally applied to order pickers. As complete condition monitoring is not normally available on order pickers it is unlikely that an effective 'scheme of thorough examination' can be drawn up for these machines.

1.2 AUTOMATED ORDER PICKERS

In addition to those critical areas identified in 1.1 above, the following additional areas requiring particular attention apply to automated order pickers:

- Ensure, where appropriate, all travel limit switches and/or buffers are in place and are free from damage or wear.
- Visually examine fork carriage structure for damage, signs of cracking and corrosion etc.
- Visually examine fork carriage extension mechanism linkages, their pivoting joints and fixings for wear, corrosion, security and evidence of lubrication.
- Visually examine, where fitted, fork side shift cylinders for leakage, corrosion on the rods and alignment. Visually check end fixings and associated mechanisms for damage, wear, security and lubrication.
- Visually examine forks for damage, cracking, heel wear, distortion and corrosion. Check that the fork to carriage fixings are not damaged and fork locks are in place and operational.
- Steering mechanisms on mobile machines should be visually checked for evidence of appropriate lubrication, security, damage and wear by visual examination during operation.
- Braking mechanisms should be visually checked for wear, adjustment, security, damage and functionally checked during operation.
- Engine or drive covers and guards should be checked to ensure that access to trapping points is prevented in accordance with BS EN 294.
- Visually check the drivers cab and overhead protection guard, where fitted, for damage, security.
- Visually check to ensure that the fixings for the driver's seat and restraint (where fitted) are all in place.
- Visually examine windscreen and other windows for damage etc. which inhibits visibility.

1.3 MANUAL ORDER PICKERS

- Visually examine platform/fork carriage structure for damage, signs of cracking, and corrosion etc.
- Visually examine platform for damage, cracking, distortion and corrosion or forks for damage, cracking, heel wear, distortion and corrosion. Check that the platform/fork to carriage fixings are not damaged and fork locks are in place and operational.

2. SIX-MONTHLY THOROUGH EXAMINATION

Order pickers that are used to lift persons, e.g. will have the operator located in a cabin on the lift carriage, should be thoroughly examined at least every six months. In those situations where an order picker is subjected to arduous use (long periods of repeated usage with loads close to the rated capacity for the order picker) more frequent examinations will be required.

The order picker and any adjacent equipment likely to present a hazard to those involved in the thorough examination shall be taken out of service for the duration of the examination. The order picker shall only be operated during that time under the direction or control of the competent person carrying out the examination. The examination shall be carried out in a logical sequence to ensure that nothing is overlooked.

The thorough examination should cover all the points listed in section 1 above, with following additions:

- Check to ensure that the order picker is equipped with motion control systems that bring motions to rest automatically when the controls are released.
- Check to ensure that load bearing hydraulic cylinders are fitted with load hold valves (over centre valves) to stop movement in case of hose rupture or pipe fracture.
- Check to ensure that means is provided so that if the power supply or control system fails, the carrier can be positioned to enable access/egress without risk.
- Where the order picker is fitted with ropes for hoisting and lowering the carrier, measure the ropes to ensure that they each have a diameter of at least 8mm.
- Ensure that the carrier is fitted with suitable devices or other effective measures (e.g. additional ropes or chains independently anchored from that of the main hoist ropes or chains) to prevent the risk of the carrier falling in the event of rope or chain failure.
- Visually examine these devices to ensure that they are not damaged and will functioning correctly in the event of rope or chain failure.
- Check to ensure, where appropriate, that the devices, fitted to carrier to stop the descent of the carrier to prevent crushing of persons underneath the carrier, are functioning correctly.
- Visually check to ensure that the storage accommodation for equipment, including any emergency egress equipment (e.g. safety harness, lanyard etc.), is provided in the carrier.
- Ensure the order picker is fitted with a rated capacity indicator/limiter.
- Visually check to ensure that the carrier is marked to show the number of persons that can be carried and the maximum load that can be carried.
- Check to ensure that any door/gate in the carrier does not open outwards and that the door/gate can be securely fastened.
- Visually check to ensure that the carrier has adequate handrails and guards that are mounted in a position that will prevent trapping points.

- Visually check the carrier to ensure the sides are adequate to prevent persons or materials falling from the carrier.
- Visually examine the structure of the carrier to ensure that it is free from damage, corrosion, cracks and other imperfections.
- Ensure the platform of the carrier is provided with a slip-resistant surface and that it is free from damage, leaks, corrosion and wear.

Non-destructive testing may be considered necessary particularly when there is a suspicion of cracks or other damage being present in the structure. Condition monitoring is not normally applied to order pickers. As complete condition monitoring is not normally available on order pickers it is unlikely that an effective ‘scheme of thorough examination’ can be drawn up for these machines.

3. PERIODIC INSPECTIONS (PRE-USE AND WEEKLY) FOR ALL ORDER PICKERS

3.1 DAILY PRE-USE INSPECTION

At the beginning of each shift or working day that the equipment is in use the following routine inspections, as appropriate for the type of equipment, should be carried out:

- Checks as required by the manufacturer's handbook.
- Visually check that no electrical equipment is exposed to contamination by oil, grease, water or dirt.
- Visually check, by inspecting relevant levels and/or components, that no loss of fluids such as lubricating/hydraulic oil and coolant is apparent.
- Check correct function of all controls without load.
- Check satisfactory operation of all audible-warning devices.
- Check that appropriate safety and fire-fighting equipment is readily available.
- Check that there are no obstructions in the path of travel of the equipment.
- For order pickers that are to be used for the lifting of persons the following additional checks should be made:
    - (a) A functional check should be made on all limit switches to ensure that they operate correctly.
    - (b) The order picker platform and carrier should be visually inspected.

3.2 WEEKLY INSPECTION

Once a week, when the equipment is in use, in addition to the checks recommended in 3.1 the following checks as appropriate for the type of equipment should be carried out:

- Checks as required by the manufacturer's handbook.
- Check the loading control in accordance with the operating instructions.
- Inspect the structure for damage, e.g. bulges, indentations and unusual rubbing marks, cracked welds and loose bolts and other fasteners.
- Check operation and adjustment of control levers, buttons etc.
- Check for creep of hydraulic rams.
- Enter results of checks in the records of inspections.

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Thorough examination and inspection of particular items of lifting equipment

Annex 11: Thorough examination of paper reel handling equipment ie reel, hoist and stand

This Annex gives the particular requirements for the thorough examination of paper reel handling equipment (paper manufacture or printing machine reel hoist and stand) over and above the general requirements given in the first part of this report.

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1. TWELVE-MONTHLY THOROUGH EXAMINATION

Paper reel hoists are not suitable for the lifting of persons so normally they would only require a twelve monthly thorough examination. However in those circumstances where there is a high intensity of use (i.e. the hoist is used many times in a working shift and is used to carrying loads close to the safe working load of the hoist) more frequent thorough examination may be necessary.

The paper reel hoist and any adjacent equipment likely to present a hazard to those involved in the thorough examination shall be taken out of service for the duration of the examination. The paper reel hoist shall only be operated during that time under the direction or control of the competent person carrying out the examination. The examination shall be carried out in a logical sequence to ensure that nothing is overlooked.

The critical areas requiring particular attention are:

- Visually check the structure supporting the runway and the runway for damage or signs of cracking, distortion and corrosion etc.
- Visually check all bolted connections to ensure that they have not worked loose.
- Ensure that all travel limit switches and/or buffers are in place and are free from damage or wear.
- Visually check the travel mechanism and wheels to ensure that they are free from damage or wear.
- Ensure that the hoisting medium (wire rope or chain) is of the size and type as specified in the hoist manufacturer's instructions and is reeved in accordance with those instructions. Pay particular attention to the end terminations. Guidance on "Wedge and socket anchorages for wire ropes" can be found in HSE Guidance note PM 46.
- Visually check all pulleys/sheeves and drums to ensure that they are free from damage and wear and that the rope or chain fits correctly on them and that they are appropriately lubricated. Check that all idler pulleys/sheeves turn freely. Ensure that all appropriate guards are undamaged and are in place.
- Thoroughly examine the whole length of the hoist rope or chain for signs of wear damage broken wires and corrosion. The use of vernier callipers and a watchmaker's eyeglass will greatly assist this examination. Particular attention should be paid to those portions that regularly pass around pulleys/sheaves.
- Visually inspect the upper and lower hoist limit switches to ensure that they are in place and free from damage or excessive wear.
- Visually inspect the braking mechanism for wear damage and adjustment and ensure that it is in accordance with the manufacturer's instructions.
- The cable to the pendant control should be visually checked for wear and damage and ensuring that any supporting wire rope is in good condition.

- The pendant control should be visually checked for damage ensuring that all controls are marked to show function and direction of movement.
- The electrical power supply system to the hoist should be visually checked for damage and wear ensuring that there is no access to live conductors.
- Carry out a functional test on the hoist ensuring that:
    (a) all movements operate freely;
    (b) the hoist rope or chain moves freely round the sheeves/pulleys and winds correctly and evenly onto the drum or into and out of the bucket;
    (c) that all limiting devices operate correctly;
    (d) when the hoist reaches its upper limit visually check to ensure that the rope or chain does not bear heavily on the side of the sheave or pulley or other part of the structure.
- A visual check shall be made to ensure that the hoist and any supporting runway is marked with its safe working load.
- The means of attachment for the spreader beam to the block of the hoist shall be visually examined for damage and wear and the swivel shall be moved to check for freedom of movement.
- When the spreader beam is permanently attached to the hoist (i.e. does not hang on a hook) the beam shall be considered as an integral part of the hoist. Where the spreader beam hangs on a hook, the spreader beam should be treated as an accessory for lifting and subjected to a six monthly thorough examination. In such circumstances the hook and swivel should be visually examined for wear, damage, the hook should be fitted with a safety catch that should be in good working order.
- The spreader beam shall be visually examined for damage or corrosion, paying particular attention to the attachment areas and ensuring that the safe working load is marked on the spreader beam.
- Ensure that warning signs and other important manufacturer's instructions are present and readable e.g. rating plate.

It is not normal to carry out overload testing on paper reel hoists and should only be considered after major repair or modification. The manufacturer's advice should be sought before carrying out such testing. Guidance on testing will be found in British Standard 7121 Part 2.

Non destructive testing may be considered necessary particularly when there is a suspicion of cracks or other damage being present in structural parts e.g. the runway. Condition monitoring is not normally applied to paper reel hoists. As complete condition monitoring is not normally available on paper reel hoists it is unlikely that an effective 'scheme of thorough examination' can be drawn up for these machines.

At appropriate intervals (e.g. once every four years) it may be appropriate to dismantle the hoist and examine visually, and where appropriate by measurement, all components for wear, damage and corrosion.

2. SIX MONTHLY THOROUGH EXAMINATION OF ACCESSORIES FOR LIFTING

It is normal to use lifting accessories with a paper reel hoist and these should be thoroughly examined at least every six months. If there is a high intensity of usage then a shorter time between thorough examinations may be appropriate. The accessories for lifting would normally include:

- the spreader beam (if it is not an integral part of the hoist);
- the shackle and any other item that attaches the spreader beam to the hook on the hoist (if it is not an integral part of the hoist);
- the shackles and any other item that is used to attach the slings to the spreader beam;
- the slings;
- the mandrels onto which the paper is wound;
- the stands onto which the mandrels are lowered before the paper is wound on, or off.

The accessories for lifting shall be taken out of service to a place where persons are not endangered by adjacent work activities and visually examined for signs of wear damage distortion or corrosion. Care shall be taken to ensure that all shackles are fitted with the correct screw pins and that no unauthorised screws have been fitted. The safe working loads for all the accessories shall be checked to ensure that they are appropriate for the weights being lifted.

It may well be appropriate to subject the mandrels to non-destructive testing at intervals throughout their life. Fatigue cracks could develop in the areas of high stress concentration i.e. where the edge of the paper normally comes and the point where the slings are attached and the point where they rest on the stands.

3. PERIODIC INSPECTIONS (PRE-USE AND WEEKLY)

3.1 DAILY PRE-USE INSPECTION

At the beginning of each shift or working day that the equipment is in use the following routine inspections, as appropriate for the type of equipment, should be carried out:

- Checks as required by the manufacturer's handbook.
- Visually check that no electrical equipment is exposed to contamination by oil, grease, water or dirt.
- Visually check to ensure that the rope/chain is correctly located on the drum, sheeves and pulleys.
- Check correct function of all controls without load.
- Check that there are no obstructions in the path of travel of the equipment.

3.2 WEEKLY INSPECTIONS

Once a week, when the equipment is in use, in addition to the checks recommended in 3.1 above, the following checks as appropriate for the type of equipment should be carried out:

- Checks as required by the manufacturer's handbook.
- Inspect the structure for damage, e.g. bulges, indentations and unusual rubbing marks cracked welds and loose bolts and other fasteners.
- Check hook(s) and other load lifting attachments, safety catch(es) and swivel(s) for damage, free movement or wear.
- Check operation and adjustment of controllers.
- Check effectiveness of brakes and clutches.
- Enter results of checks in the records of inspections.

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Thorough examination and inspection of particular items of lifting equipment

Annex 12: Thorough examination of lorry tail lift

This Annex gives the particular requirements for the thorough examination of lorry (vehicle) tail lifts over and above the general requirements given in the first part of this report.

Vehicles that are used on public roads will be subject to an annual road test carried out at a Ministry of Transport approved testing station (MOT). This report is in no way related to this thorough examination and testing.

Vehicle tail lifts can be fitted to different vehicles and the rated capacity (safe working load) is dependant not only on the crane but the vehicle to which it has been fitted and the manner in which that fitting has been carried out. Before carrying out any examination or operation on a vehicle tail lift it is important to ensure that the combination has been tested as a whole and that the safe working load given by the person carrying out the test was for that tail lift fitted to that vehicle.

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1. TWELVE-MONTHLY THOROUGH EXAMINATION

Tail lifts that are not used for the lifting of persons would normally require thorough examination at least every twelve months. In those situations where a tail lift is subjected to arduous use (long periods of repeated usage with loads close to the rated capacity for the tail lift.) will require more frequent examination.

Prior to thorough examination the tail lift shall be thoroughly cleaned to remove all spoil/dirt that would otherwise conceal the structure or mechanisms and prevent an effective examination. The examination shall be carried out in a logical sequence to ensure that nothing is overlooked.

The critical areas requiring particular attention are:

- Visually check the sub frame attached to the vehicle for the tail lift mounting and the vehicle chassis for damage or signs of cracking and corrosion etc.
- Visually inspect all bolts and fastenings used to attach the tail lift to the sub frame and the sub frame to the vehicle to ensure that they are not coming loose.
- Visually examine, where possible, the linkage to the power take off drive and pump on the vehicle ensuring that it is secure and free from damage, excessive wear and leakage.
- Where applicable, ensure that the control for the power take off moves freely but does not have excessive play and is properly labelled to identify its function and mode of operation.
- For vehicles that travel on public roads the following additional checks should be made:
    (a) Carry out a functional check on the hand brake interlock that disengages the power take off when the hand brake is released.
    (b) Visually check that there is a label in the vehicle cab showing the travelling height of the vehicle in accordance with road traffic regulations.
- Visually inspect the pipe connections between the pump and tail lift, tail lift and oil tank and oil tank and pump for corrosion, damage, leakage, security, and fretting.
- Visually examine the valve block on the tail lift for damage, leakage and security.
- Visually inspect all pipe work on the tail lift for corrosion, damage, leakage, security, and fretting.
- Hydraulic cylinders should be visually examined for leakage, corrosion on the rods and alignment. Visually check end fixings for wear, security and lubrication.

- For tail lifts fitted with hoist ropes the following additional checks should be made:
    (a) Ensure that the hoist ropes are of the size and type as specified in the tail lift manufacturer's instructions and that the end terminations are in order.
    (b) Visually check all pulleys/sheaves to ensure that they are free from damage, wear and that the ropes fit correctly on them and that they are appropriately lubricated. Check that they turn freely and ensure all appropriate guards are in place and undamaged.
    (c) Thoroughly examine the whole length of the hoist ropes for signs of wear, damage, broken wires and corrosion. The use of vernier callipers and a watchmaker's eyeglass will greatly assist this examination. Particular attention should be paid to those portions that regularly pass around pulleys/sheaves.
- For tail lifts fitted with hoist chains the following additional checks should be made:
    (a) Ensure that the hoist chains are of the size and type as specified in the tail lift manufacturer's instructions and that the end terminations are in order.
    (b) Visually check all pulleys/sheaves to ensure that they move freely, are free from damage and wear, that the chains fit correctly on them and that they are appropriately lubricated. Ensure that all appropriate guards are in place and undamaged.
    (c) Thoroughly examine the whole length of the hoist chains for signs of damage, wear, cracks, stretch and corrosion. Particular attention should be paid to those portions that regularly pass around pulleys/sheeves.
- Visually inspect the structure of the tail lift for corrosion, damage, cracks and distortion.
- All pivoting joints on the tail lift should be checked for wear, corrosion, security, and evidence of lubrication.
- Any means of access should be checked to ensure that ladders walkways and hand rails/hand holds are complete and secure.
- Oil and other fluid levels should be checked ensuring the condition (e.g. by debris monitoring) and level of the fluid.
- Ensure that all control levers are marked with their function and mode of operation.
- Functional test of all controls (levers buttons etc.) should be carried out to ensure smoothness of operation and freedom from wear and other damage to any linkage. Ensure that all levers return to the neutral position when released.
- Ensure that warning signs and other important manufacturer's instructions are present and readable e.g. rating plate for load lifting.

- After carrying out all necessary examinations the machine should be seen in operation to ensure that all motions operate smoothly and effectively without excessive play. Checks should be made to ensure that the platform does not drop excessively after the motion has been stopped.

Non-destructive testing may be considered necessary particularly when there is a suspicion of cracks or other damage being present in structural parts. Condition monitoring is not normally applied to tail lifts. As complete condition monitoring is not normally available on tail lifts it is unlikely that an effective ‘scheme of thorough examination’ can be drawn up for these machines.

2. SIX-MONTHLY THOROUGH EXAMINATION

Vehicle tail lifts that are used to lift persons should be thoroughly examined at least every six months. In those situations where a tail lift is subjected to arduous use (long periods of repeated usage with loads close to the rated capacity for the tail lift) will require more frequent examination.

Prior to thorough examination the tail lift shall be thoroughly cleaned to remove all spoil/dirt that would otherwise conceal the structure or mechanisms and prevent an effective examination. The examination shall be carried out in a logical sequence to ensure that nothing is overlooked.

The thorough examination should cover all the points listed in part 1 above with the following additions:

- Check to ensure that the tail lift is equipped with a motion control system that brings motion to rest automatically when the controls are released.
- Check to ensure that load bearing hydraulic cylinders are fitted with load hold valves (over centre valves) to stop movement in case of hose rupture or pipe fracture.
- Check to ensure that means is provided so that if the power supply or control system fails, the carrier can be positioned to enable access/egress without risk.
- Where the tail lift has ropes used for hoisting and lowering the carrier measure the ropes to ensure that each rope has a diameter of at least 8mm.
- Ensure that the carrier is fitted with suitable devices or other effective measures (e.g. additional ropes or chains independently anchored from the main hoist ropes or chains) to prevent the risk of the carrier falling in the event of main rope or chain failure.
- Visually examine these devices to ensure that they are not damaged and will function correctly.
- Visually check to ensure that the carrier is marked to show the number of persons that can be carried and the maximum load that can be carried.
- Check to ensure that any door/gate, where fitted, in the carrier does not open outwards and that the door/gate can be securely fastened.
- Visually check to ensure that the carrier has adequate handrails that are mounted in a position that will prevent trapping of hands.
- Visually check the carrier to ensure that the sides are adequate to prevent persons or materials falling from the carrier.
- Visually examine the structure of the carrier to ensure that it is free from damage, corrosion, cracks and other imperfections.
- Ensure that the carrier platform is provided with a slip-resistant surface and that it is free from damage, corrosion and wear.

Non-destructive testing may be considered necessary particularly when there is a suspicion of cracks or other damage being present in structural parts. Condition monitoring is not normally applied to tail lifts. As complete condition monitoring is not normally available on tail lifts it is unlikely that an effective ‘scheme of thorough examination’ can be drawn up for these machines.

3. PERIODIC INSPECTIONS (PRE-USE AND WEEKLY)

3.1 DAILY PRE-USE INSPECTION

At the beginning of each shift or working day that the equipment is in use the following routine inspections, as appropriate for the type of equipment, should be carried out:

- Checks as required by the manufacturer's handbook.
- Visually check that no electrical equipment is exposed to contamination by oil, grease, water or dirt.
- Visually check, by inspecting relevant levels and/or components, that no loss of fluids such as lubricating/hydraulic oil and coolant is apparent.
- Check that the correct air pressure is maintained in any pneumatic control system, e.g. brakes.
- Check correct function of all controls without load.
- Check satisfactory operation of all audible-warning devices.
- Check that appropriate safety and fire-fighting equipment is readily available.
- Check that there are no obstructions in the path of travel of the equipment.
- For tail lifts that are to be used for the lifting of persons the following additional checks should be made:
    (a) A functional check should be made on all limit switches to ensure that they operate correctly.
    (b) The tail lift platform and carrier should be visually inspected.
- Ensure that any tools/materials in the carrier are secured to prevent displacement, tipping and/or falling out.

3.2 WEEKLY INSPECTION

Once a week, when the equipment is in use, in addition to the checks recommended in part 3 the following checks as appropriate for the type of equipment should be carried out:

- Checks as required by the manufacturer's handbook.
- Check the loading control in accordance with the operating instructions.
- Inspect the structure for damage, e.g. bulges, indentations and unusual rubbing marks cracked welds and loose bolts and other fasteners.
- Check operation and adjustment of control levers, buttons etc.
- Check for creep of hydraulic rams.
- Enter results of checks in the records of inspections.

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Thorough examination and inspection of particular items of lifting equipment

Annex 13: Thorough examination of lorry mounted loader crane

This Annex gives the particular requirements for the Thorough Examination of Lorry Mounted Loader Cranes (loader cranes) over and above the general requirements given in the first part of this report.

Lorries that are used on public roads will be subject to an annual road test carried out at a Ministry of Transport approved testing station (MOT). This report is in no way related to this thorough examination and testing.

Loader cranes can be fitted to different lorries and the rated capacity (safe working load) is dependant not only on the crane but the lorry to which it has been fitted and the manner in which that fitting has been carried out. Before carrying out any examination or operation on a loader crane it is important to ensure that the combination has been tested as a whole and that the safe working load given by the person carrying out the test was for that crane fitted to that lorry.

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1. TWELVE-MONTHLY THOROUGH EXAMINATION

Loader cranes that are not used for the lifting of persons would normally require thorough examination at least every twelve months. In those situations where a loader crane is subjected to arduous use (long periods of repeated usage with loads close to the rated capacity for the crane, grabbing duties etc.) will require more frequent examination.

Prior to 'Thorough Examination' the loader crane shall be thoroughly cleaned to remove all spoil/dirt that would otherwise conceal the structure or mechanisms and prevent an effective examination. The examination shall be carried out in a logical sequence to ensure that nothing is overlooked.

The critical areas requiring particular attention are:

- Visually check the sub frame attached to the lorry for the crane mounting and the lorry chassis for damage or signs of cracking and corrosion etc.
- Visually inspect all bolts and fastenings used to attach the crane to the sub frame and the sub frame to the lorry to ensure that they are not coming loose.
- Visually examine, where possible, the linkage to the power take off drive and pump, on the lorry ensuring that it is secure and free from damage, excessive wear and leakage.
- Where applicable ensure that the control for the power take off moves freely but does not have excessive play and is properly labelled to identify its function and mode of operation.
- For lorries that travel on public roads:
    (a) Carry out a functional check on the hand brake interlock that disengages the power take off when the hand brake is released.
    (b) Carry out a functional check of the travelling height warning device (prevention of bridge bashing).
    (c) Visually check that there is a label in the lorry cab showing the travelling height of the lorry and crane in accordance with road traffic regulations.
- Visually inspect the pipe connections between the pump and crane, crane and oil tank and oil tank and pump for corrosion, damage, leakage, security, and fretting.
- Visually examine the valve block on the crane for damage, leakage and security.
- Visually inspect all pipe work on the crane for corrosion, damage, leakage, security, and fretting.
- Hydraulic cylinders should be visually examined for leakage, corrosion on the rods and alignment. Visually check end fixings for wear, security and lubrication.
- Visually inspect the structure of the crane for corrosion, damage, cracks and distortion.
- All pivoting joints on the crane should be checked for wear, corrosion, security, and evidence of lubrication.

- Any telescoping extensions on the crane should be operated and examined for wear and security.
- The slewing mechanism should be visually examined for security and wear during operation of the slew motion throughout its full range of movement and with the crane at maximum reach, ensuring that any limiting device operates effectively.
- For loader cranes fitted with winches the following checks should be made:
    (a) Ensure that the hoist rope is of the size and type as specified in the hoist manufacturer's instructions and is reeved in accordance with those instructions. Pay particular attention to the end terminations. Guidance on "Wedge and socket anchorages for wire ropes" can be found in HSE Guidance note PM 46.
    (b) Visually check all pulleys/sheeves and drums to ensure that they are free from damage and wear and that the rope fits correctly on them and that they are appropriately lubricated. Check that all idler pulleys/sheeves turn freely. Ensure that all appropriate guards are undamaged and are in place.
    (c) Thoroughly examine the whole length of the hoist rope for signs of wear damage broken wires and corrosion. The use of vernier callipers and a watchmaker's eyeglass will greatly assist this examination. Particular attention should be paid to those portions that regularly pass around pulleys/sheaves.
    (d) Visually inspect the upper and lower hoist limit switches to ensure that they are in place and free from damage or excessive wear.
    (e) Visually inspect the braking mechanism for wear damage and adjustment and ensure that it is in accordance with the manufacturer's instructions where possible.
- Any means of access should be checked to ensure that ladders walkways and hand rails/hand holds are complete and secure.
- The lifting attachment (hook, bucket, grab etc.) should be visually checked for security, wear, damage and corrosion.
- The stabilisers should be visually examined for wear, security and freedom of movement (for those extended manually). The cam locks and automatic catches on the beams, that prevent inadvertent extension, should be visually examined to ensure that they are secure and free from wear distortion and corrosion. The jacks should be extended and visually checked to ensure that they move smoothly and that when left supporting the crane and lorry that they do not creep.
- Oil and other fluid levels should be checked ensuring the condition (e.g. by debris monitoring) and level of the fluid.
- Visual check to ensure that the fixings for the driver's seat (where fitted) and restraint are all in place and secure.
- Ensure that all control levers are marked with their function and mode of operation.

- Functional test of all controls (levers buttons etc.) should be carried out to ensure smoothness of operation and freedom from wear and other damage to any linkage. Ensure that all levers return to the neutral position when released.
- Ensure that warning signs and other important manufacturer's instructions are present and readable e.g. rating plate for load lifting.
- After carrying out all necessary examinations the machine should be seen in operation to ensure that all motions operate smoothly and effectively without excessive play. Checks should be made to ensure that the load lifting attachment does not drop excessively after the motion has been stopped.
- If the crane has a lift capacity in excess of 1 tonne in any position then it should be fitted with loading control and this should be examined to ensure that it is in good working order. The accuracy of the loading control should be checked using a known weight. The known weight should be attached to the crane at a point where the weight is less than the safe working load. The crane should then be moved towards the point where the weight would be 10 % in excess of the lift capacity. NB no attempt should be made to move the crane beyond the 10% overload position. The loading control should operate as the weight arrives at the designated position.

Guidance on overload testing of loader cranes will be found in British Standard 7121. Non destructive testing may be considered necessary particularly when there is a suspicion of cracks or other damage being present in structural parts. Condition monitoring is not normally applied to loader cranes. As complete condition monitoring is not normally available on loader cranes it is unlikely that an effective 'scheme of thorough examination' can be drawn up for these machines.

2. SIX-MONTHLY THOROUGH EXAMINATION OF LOADER CRANES

Loader cranes that are used to lift persons should be thoroughly examined at least every six months. The thorough examination should cover all the points listed in the twelve-monthly thorough examination (Part 1 above) with the following additions:

- Check to ensure that the loader crane has a rated capacity on the fixed load lifting attachment of at least twice the rated capacity of the personnel carrier.
- Check to ensure that the loader crane is equipped with a motion control system that brings motion to rest automatically when the controls are released.
- Check to ensure that any loader crane equipped with a winch has power lowering. Cranes with free-fall ability should not be used to lower and raise persons unless the free-fall facility is locked out.
- Check to ensure that load bearing hydraulic cylinders are fitted with load hold valves (over centre valves) to stop movement in case of hose rupture or pipe fracture. Cranes only equipped with simple check valves should not be used for lifting of persons.
- Carry out a functional check to ensure that the crane control system is able to provide a smooth transition of the carrier. The working speed of the carrier should be limited to a maximum of 0.5 m/s on all motions.
- Check to ensure that means is provided so that if the power supply or control system fails, the carrier can be positioned to enable access/egress without risk.
- Measure the rope used for hoisting and lowering the carrier to ensure that it has a diameter of at least 8 mm.
- Visually check to ensure that any hook is provided with a safety catch and that it is in good working order.
- Visually check to ensure that storage accommodation for equipment, including any emergency egress equipment (e.g. safety harness, lanyard), is provided in the carrier.
- Ensure that the crane is fitted with a rated capacity indicator/limiter regardless of its rating.
- Visually check to ensure that the carrier is marked to show the number of persons that can be carried and the maximum load that can be carried.
- Check to ensure that any door in the carrier does not open outwards and that the door can be securely fastened.
- Visually check to ensure that the carrier has adequate handrails that are mounted in a position that will prevent trapping of hands.
- Visually check the carrier to ensure that the sides are adequate to prevent persons or materials falling from the carrier.
- Visually examine the structure of the carrier to ensure that it is free from damage, corrosion, cracks and other imperfections.
- Visually check any mechanism provided to ensure that the floor of the carrier remains horizontal. Ensure that it is free from damage, leaks, corrosion and wear.

3. PERIODIC INSPECTIONS (PRE-USE AND WEEKLY)

3.1 DAILY PRE-USE INSPECTION

At the beginning of each shift or working day that the equipment is in use the following routine inspections, as appropriate for the type of equipment, should be carried out:

- Checks as required by the manufacturer's handbook.
- Visually check that no electrical equipment is exposed to contamination by oil, grease, water or dirt.
- Visually check, by inspecting relevant levels and/or components, that no loss of fluids such as lubricating/hydraulic oil and coolant is apparent.
- If fitted, check that the loading control (previously known as the automatic safe load indicator) is set for its correct duty and that the manufacturer's daily test is carried out.
- Check that the correct air pressure is maintained in any pneumatic control system, e.g. brakes.
- Check correct function of all controls without load.
- Check satisfactory operation of all audible warning devices.
- Check that the equipment is in a tidy condition and free from tins of oil, rags, tools or materials other than those for which storage provision is made, that access and egress are adequate.
- Check that appropriate safety and fire fighting equipment is readily available.
- Check that there are no obstructions in the path of travel of the equipment.
- For cranes that are to be used for the lifting of persons the following additional checks should be made:
    - (a) A functional check should be made on all limit switches to ensure that they operate correctly.
    - (b) The crane, load lifting attachments and carrier should be visually inspected.
    - (c) Ensure that any tools/materials in the carrier are secured to prevent displacement, tipping and/or falling out.

3.2 WEEKLY INSPECTIONS

Once a week, when the equipment is in use, in addition to the checks recommended in 3.1 above, the following checks as appropriate for the type of equipment should be carried out:

- Checks as required by the manufacturer's handbook.
- Check the loading control in accordance with the operating instructions.
- Inspect the structure for damage, e.g. bulges, indentations and unusual rubbing marks cracked welds and loose bolts and other fasteners.
- Check hook(s) and other load lifting attachments, safety catch(es) and swivel(s) for damage, free movement or wear.
- Check operation and adjustment of control levers, buttons, etc.
- Check for creep of hydraulic rams.
- Check slew lock if fitted.
- Enter results of checks in the records of inspections.

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Thorough examination and inspection of particular items of lifting equipment

Annex 14: Thorough examination of excavator (used for excavation/object handling)

This Annex gives the particular requirements for the thorough examination of hydraulic excavators over and above the general requirements given in the first part of this report.

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1. TWELVE MONTHLY THOROUGH EXAMINATION

Excavators are not suitable for the lifting of persons so normally they would only require a twelve monthly thorough examination. Prior to thorough examination the excavator shall be pressure washed or cleaned by some other effective measure to remove all spoil/dirt that would otherwise conceal the structure or mechanisms and prevent an effective examination. The examination shall be carried out in a logical sequence to ensure that nothing is overlooked.

1.1 ALL EXCAVATORS

The critical areas requiring particular attention are:

- Visually check the structure for damage or signs of cracking and corrosion etc.
- The attachment for the bucket should be visually checked for security, damage and corrosion.
- The pivoting joints between the bucket and the dipper arm, the dipper arm and boom, the boom and machine. These should be checked for wear, corrosion, security, and evidence of lubrication.
- Any telescoping extensions on the boom and dipper should be operated and examined for wear and security.
- Flexible hydraulic hoses should be checked for damage and leakage.
- Hydraulic cylinders should be visually examined for leakage, corrosion on the rods and alignment. Visually check end fixings for wear, security and lubrication.
- The slewing mechanism should be visually examined for security and wear during operation of the slew motion throughout its full range of movement and during change of reach of the bucket.
- The chassis of the vehicle should be checked for cracks damage and corrosion.
- If the excavator is a 180 degree machine with a loading shovel then similar checks to those carried out on the back actor should be carried out on the shovel.
- Means of access should be checked to ensure that ladders, walkways and hand rails/hand holds, are complete and secure.
- The travel mechanism should be checked (rubber tyres checked for wear, damage, inflation pressure and security of the wheels) (crawler tracks for wear, tension and security on tracks, sprockets and rollers).
- Steering mechanisms should be visually checked for evidence of appropriate lubrication, security, damage and wear by visual examination during operation.
- Braking mechanisms should be visually checked for wear, adjustment, security and damage and functionally checked during operation.
- Engine covers and guards should be checked to ensure that access to trapping points is prevented in accordance with BS EN 294.
- Oil and other fluid levels should be checked ensuring the condition (e.g. by debris monitoring) and level of the fluid.

- Visual examination for leakage, fretting and damage should be made on actuators, control valves, pipe work etc.
- Visually check to ensure that the fixings for the driver's seat and restraint (where fitted) are all in place.
- Functional test of control levers for excessive wear, smoothness of operation, and visual check for identification, and means to prevent inadvertent operation.
- Visual examination of windscreen and other windows for damage etc. which inhibits visibility.
- Check on windscreen wipers and washers to ensure that they function correctly and efficiently.
- Ensure that warning signs and other important manufacturer's instructions are present and readable e.g. rating plate for load lifting.

After carrying out all necessary examinations the machine should be seen in operation to ensure that all motions operate smoothly and effectively without excessive play. Checks should be made to ensure that buckets etc. do not drop excessively after the motion has been stopped.

It is not normal to carry out overload testing on excavators and should only be considered after major repair or modification. The manufacturer's advice should be sought before carrying out such testing. Guidance on testing will be found in ISO 10567 'Earth moving machinery–Hydraulic excavators–Lift capacity'.

Non-destructive testing may be considered necessary particularly when there is a suspicion of cracks or other damage being present in structural parts e.g. the pin housings on the boom.

Condition monitoring is not normally applied to excavators. Some very large machines have a form of condition monitoring in that samples of the engine oil are periodically sent for analysis. Such condition monitoring only deals with the condition of the engine and does not directly relate to the condition of the structure or excavator mechanism.

As complete condition monitoring is not normally available on excavators it is unlikely that an effective 'scheme of thorough examination' can be drawn up for these machines.

1.2 EXCAVATORS USED AS CRANES (OBJECT HANDLING)

In addition to those critical areas identified in 1.1 above the following additional critical areas requiring particular attention apply to those excavators that can be adapted for use as cranes:

- The load attachment point should be visually examined for damage or cracks. If the load attachment point is a hook it should be fitted with a safety catch which should be functionally tested to ensure that it is in efficient working order.
- There should be clear marking on the machine showing the lift capacity (safe working load). If the lift capacity varies according to the position of the machine then there should be a chart or table that clearly shows the position of the machine and the lift capacity for that position.
- If the excavator has a lift capacity in excess of 1 tonne in any position then it should be fitted with loading control and this should be examined to ensure that it is in good working order. The accuracy of the loading control should be checked using a known weight. The known weight should be attached to the excavator at a point where the weight is less than the lift capacity of the excavator. The excavator should then be moved towards the point where the weight would be 10 % in excess of the lift capacity of the excavator. NB no attempt should be made to move the excavator beyond the 10% overload position. The loading control should operate before the weight arrives at the designated position.
- Checks should be made to ensure that provision is made on the excavator to prevent the fall of the load in the event of a rupture of a flexible hose.

The report of thorough examination should be clearly marked to show that the excavator can be used as a crane (object handling) and should specify the lift capacity.

2. PERIODIC INSPECTIONS (PRE-USE AND WEEKLY)

2.1 DAILY PRE-USE INSPECTION

At the beginning of each shift or working day that the equipment is in use the following routine inspections, as appropriate for the type of equipment, should be carried out:

- Checks as required by the manufacturer's handbook.
- Visually check that no electrical equipment is exposed to contamination by oil, grease, water or dirt.
- Visually check, by inspecting relevant levels and/or components, that no loss of fluids such as lubricating/hydraulic oil and coolant is apparent.
- If fitted check that the loading control (previously known as the automatic safe load indicator) is set for its correct duty and that the manufacturer's daily test is carried out.
- Check that the correct air pressure is maintained in any pneumatic control system, e.g. brakes.
- Check that lights, windscreen wiper(s) and washers operate efficiently.
- Visually check the security of wheels and the condition of tyres on wheel mounted equipment.
- Check correct function of all controls without load.
- Check satisfactory operation of all audible warning devices.
- In the interests of safety and fire prevention, check that the equipment is in a tidy condition and free from tins of oil, rags, tools or materials, other than those for which storage provision is made. Check that access and egress are adequate and that appropriate safety and fire fighting equipment is readily available.
- Check that there are no obstructions in the path of travel of the equipment.

2.2 WEEKLY INSPECTION

Once a week, when the equipment is in use, in addition to the checks recommended in 2.1 above, the following checks as appropriate for the type of equipment should be carried out:

- Checks as required by the manufacturer's handbook.
- Check the loading control in accordance with the operating instructions.
- Inspect the structure for damage, e.g. bulges, indentations and unusual rubbing marks cracked welds and loose bolts and other fasteners.
- Check hook(s) and other load lifting attachments, safety catch(es) and swivel(s) for damage, free movement or wear.
- Check operation and adjustment of controllers.
- Check for creep of hydraulic rams.
- Check effectiveness of brakes and clutches.
- On wheel mounted mobile equipment, check tyres for pressure as well as damage and wear on walls and tread. Also check wheel nuts for tightness.
- On wheel mounted mobile equipment, check steering, brakes (both foot and parking), lights, indicators, horn, windscreen wipers and washers.
- Check slew lock if fitted.
- Enter results of checks in the records of inspections.

3. DEFINITIONS

3.1 DIPPER ARM

The part of the articulating arm of an excavator to which the digging bucket is attached.

3.2 BOOM

The part of the articulating arm of an excavator that joins the dipper arm to the machine.

3.3 SLEWING

The rotation of the boom about a vertical axis so that its centre line is at an angle to the line of travel.

3.4 180 DEGREE EXCAVATOR

A combined excavator/loader on which the boom can only slew through aproximately180 degrees.

3.5 BACK ACTOR

On 180 degree machine the excavator arm (boom and dipper etc.) is known as a back actor.

3.6 360 DEGREE EXCAVATOR

An excavator with a superstructure mounted on a bearing so that it can rotate about a vertical axis for 360 degrees or more.

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Thorough examination and inspection of particular items of lifting equipment

Annex 15: Thorough examination of mast climbing work platform

This annex gives the particular requirements for the thorough examination of mast climbing work platforms (MCWP'S) over and above the general requirements given in the first part of this report.

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1. SIX-MONTHLY THOROUGH EXAMINATION

The prime function of a MCWP is to lift persons, so a six-monthly thorough examination would normally be required. Prior to thorough examination the MCWP should be washed and cleaned to remove any deposits, e.g. spoil, dirt, which would otherwise conceal the structure or mechanisms and prevent an effective examination. The examination should be carried out in a logical sequence to ensure that nothing is overlooked.

1.1 GENERAL

Detailed checks should be made of the following:

- Supporting and elevating/lowering structures and mechanisms, e.g. deformation, damage, cracks, corrosion, welding.
- Fixings e.g. screws, bolts/nuts, bearings; ties.
- Work platforms, e.g. floor, guardrails, toeboards, gates, safety-harness attachments, and fixings between modular sections.
- Hydraulics, electrics, suspension elements.
- Chassis or static base, e.g. brakes, tyres, outriggers (stabilisers), packing beneath outriggers (stabilisers), correct levelling.
- Controls and safety devices, e.g. anemometers, 2-way communications, overload/moment detecting and indicating devices, emergency-lowering system and stop-buttons.
- Safety gear and associated overspeed governor.
- Rack-and-pinion drive system.
- Condition of mast(s) and racks, including fixings between mast sections.
- Load information plates and other operating-instruction plates.
- Guards, including ground-level enclosures.
- Work platform levelling systems for multi-mast MCWP.
- Guiding/restraint devices between platform and mast(s).

Succeeding a thorough examination, functional testing of a MCWP should be effected, as follows:

1.2 FREE-STANDING MCWP'S

- With 110% of the rated load evenly distributed on the work platform it should be elevated to a height of at least 3m above ground level. During this time it should be ascertained that the MCWP has functioned satisfactorily, before lowering the work platform to ground level.
- With the work platform unloaded or lightly loaded it should be operated throughout its full range of travel to check that all limit switches are correctly set and working properly.
- With 110% of the rated load evenly distributed on the work platform it should be drop-tested in accordance with the manufacturer's instructions, to ascertain the effectiveness of the safety gear and overspeed governor.

[**NB** The drop-test should not be carried out at an unnecessary height]

- Checks should be made to ensure no damage has been suffered by the mast(s), work platform and fixings.

1.3 MCWP'S THAT ARE TIED TO A BUILDING OR STRUCTURE

- Testing of all ties should be carried out in accordance with the manufacturer's instructions.
- With 110% of the rated load evenly distributed on the work platform it should be elevated to the level of the first tie. During this time it should be ascertained that the MCWP has functioned satisfactorily, before lowering the work platform to ground level.
- With the work platform unloaded or lightly loaded it should be operated throughout its full range of travel to check that all limit switches are correctly set and working properly.
- With 110% of the rated load evenly distributed on the work platform it should be drop-tested in accordance with the manufacturer's instructions, in order to ascertain the effectiveness of the safety gear and overspeed governor.
- Checks should be made to ensure no damage has been suffered by the mast(s), fixings, ties or building/structure.

Non-destructive testing may be considered necessary, particularly when there is a suspicion of cracks or other damage existing in structural or load-bearing parts, e.g. masts, work platform extensions.

2. PERIODIC INSPECTIONS

Routine visual inspections and checks should be effected by suitable personnel before a MCWP is taken into use on any day. The aim is to ensure that a MCWP is capable of operating satisfactorily, and such inspections and checks should encompass:

- cleanliness and general indications of damage;
- efficiency of chassis brakes (when fitted);
- pressures of tyres (when fitted);
- functioning of controls and safety devices (anemometers, 2-way communications systems, overload/moment detecting and indicating devices, if fitted);
- the means for emergency lowering and/or raising the work platform;
- safety gear and associated overspeed governor;
- condition of rack-and-pinion drive system;
- condition of mast(s) and racks, including the presence and effectiveness of the devices used to lock together adjacent mast sections;
- correct functioning of limit switches, and interlocks on work platform gates and outriggers (stabilisers);
- guards;
- ground-support conditions, including packing beneath stabilisers;
- electric (trailing) cables, load information plates;
- work platforms
- guiding/restraint devices between work platform(s) and mast(s).

Regular preventative maintenance by suitably-qualified personnel should be undertaken, which should include closer inspections of the aforementioned items, and adherence to the manufacturer's instructions whenever possible. Plant-hire companies will often include periodic maintenance checking in their hire agreements with customers.

3. STANDARDS AND GUIDANCE

The term ‘mast climbing work platform’ (MCWP) was adopted by the European Committee for Standardisation (CEN) when work began on drafting a CEN Standard for such machines. The Standard was published as BS EN 1495:1998, which has been ‘harmonised’ with the EU Machinery Directive. (A BS Code of Practice for the installation, maintenance, examination and safe use of MCWP’s is currently being drafted).

Guidance entitled ‘Safety at power-operated mast work platforms’ was first issued by the Health and Safety Executive (HSE) in 1985 (HS(G)23), and in 1993 the International Powered Access Federation (IPAF) published the IPAF guide to MCWP’s.

4. DEFINITIONS

4.1 MAST CLIMBING WORK PLATFORM (MCWP)
A temporarily installed manually or power operated machine that is designed to be used by one or more persons from which to carry out work. The vertical moving components (work platform) are also used to move those same persons and their equipment and materials to and from a single boarding point. These restrictions differentiate MCWP's from builder's hoists.
[**NB.** A MCWP may be permanently installed]

4.2 RATED LOAD
The loads for which the MCWP has been designed in normal operation as stated in the load diagram.

4.3 LOAD DIAGRAM
A notice displayed on the work platform (see 4.7) showing the permitted number of persons and the weight and distribution of materials for the particular configuration.

4.4 BASE FRAME
The part of the MCWP which provides support for the mast and elevating assembly.

4.5 CHASSIS
The part of the MCWP which provides mobility and support for the mast and elevating assembly.

4.6 OUTRIGGERS (STABILISERS)
Supports at the base frame level used to maintain or increase the stability of the MCWP within specified conditions. They may also be used for levelling.

4.7 WORK PLATFORM
The vertically travelling part of the MCWP installation upon which the persons, equipment and materials are carried and from which work is carried out. This is as opposed to the MCWP which refers to the whole of the installation comprising; work platform, mast(s), mast ties, base and chassis. The work platform includes the main platform and any extension. The work platform is usually elevated and lowered by rack(s) and pinion(s) guided by and working along their supporting masts which may or may not require lateral restraint from separate supporting structures.

4.8 MAST
A structure that supports and guides the work platform. A mast may be:

- of fixed and invariable length, even by the attachment of further mast sections;
- of variable length, via the attachment of successive lengths of prepared mast sections.

4.9 MAST TIE

The anchorage system used to provide lateral restraint to the mast from a building or other supporting structure.

4.10 WORK PLATFORM EXTENSIONS

Those additional parts of the work platform which are built up using secondary structural elements whose support and location are dependent upon the main work platform. They are used to extend the main work platform, usually along its longitudinal working edge. They may form irregular shapes which conform with the work site, and they may also extend at a level just above or below the main work platform level.

4.11 GUIDES

The parts of the mast which provide guidance for the work platform.

4.12 SAFETY GEAR

A mechanical device for stopping and maintaining the work platform stationary on the mast in the event of overspeed (a predetermined speed above rated speed).

4.13 RATED SPEED

The vertical or horizontal speed for which the MCWP has been designed.

4.14 OVERSPEED GOVERNOR

A device which, when the work platform attains a predetermined speed above rated speed, causes the safety gear to be applied.

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Thorough examination and inspection of particular items of lifting equipment

Annex 16: Thorough examination of vacuum lifting machine

This Annex gives the particular requirements for the thorough examination of a vacuum lifting machine over and above the general requirements given in the first part of this report.

Vacuum lifting machines (devices) are normally attached to a crane or other lifting machine. They can be permanently attached to the crane or lifting machine and therefore would be thoroughly examined as an integral part of the crane or lifting machine to which they are attached. There are instances however where the vacuum lifting device is not permanently attached to a crane or lifting machine and would therefore in these instances be regarded as a lifting accessory.

The vacuum function itself does not constitute a lifting function but is a means of attaching the load to the crane or lifting machine. This report only covers the vacuum function and does not cover the thorough examination or inspections of the crane or lifting machine as a whole.

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1. TWELVE-MONTHLY THOROUGH EXAMINATION

Vacuum lifting devices are not suitable for the lifting of persons so normally they would only require a twelve-monthly thorough examination when permanently attached to a crane or lifting machine. However, in those circumstances where there is a high intensity of use, more frequent thorough examinations may be necessary. For example, if the crane, or lifting machine, with the vacuum lifting device as a whole is used many times in a working shift and is used to carrying loads close to the safe working load of the crane or lifting machine and vacuum lifting device.

The crane or lifting machine with the vacuum lifting device and any adjacent equipment likely to present a hazard to those involved in the thorough examination shall be taken out of service for the duration of the examination. The vacuum lifting device shall only be operated during that time under the direction or control of the competent person carrying out the examination. The examination shall be carried out in a logical sequence to ensure nothing is overlooked.

The critical areas of the vacuum lifting device requiring particular attention are:

- Visually check the structure of the vacuum lifting device for damage or signs of cracking, distortion and corrosion etc.
- Visually check all bolted or other fastening connections to ensure they have not worked loose.
- Visually check the attachment point(s) for attaching the vacuum lifting device to the crane or lifting machine for damage, wear, cracking, corrosion and free movement of any swivels etc.
- Visually examine all pipes and flexible hoses for damage and leakage.
- The vacuum motor and pump should be visually examined for damage.
- The vacuum suction pads should be visually examined for security and damage ensuring that there are no cuts, tears or other damage, which would prevent an effective vacuum.
- The electrical power supply to the vacuum system should be visually checked for damage and wear ensuring that there is no access to live conductors.
- Ensure that all controls (levers, buttons etc.) are marked with their function and mode of operation.
- Functional test of all controls (levers, buttons etc.) should be carried out to ensure smoothness of operation and freedom from wear and other damage. Ensure as appropriate that controls return to neutral when released.
- After carrying out all necessary examinations carry out a functional test on the vacuum device ensuring that the vacuum system is effective by attaching a suitable load within the safe working load.
- A visual check shall be made to ensure the vacuum lifting device and the crane or lifting machine is marked with their compatible safe working loads.

- Ensure that warning signs and other important manufacturer's instructions are present and readable e.g. rating plate.

Guidance on overload testing of cranes will be found in British Standard 7121. Non-destructive test may be considered necessary particularly when there is a suspicion of cracks or other damage being present in structural parts. Condition monitoring is not normally applied to vacuum lifting devices. As complete condition monitoring is not normally available on vacuum lifting devices it is unlikely that an effective 'scheme of thorough examination' can be drawn up for these machines.

2. SIX-MONTHLY THOROUGH EXAMINATION

Where the vacuum lifting device is not permanently attached to a crane or lifting machine, it would be considered as an accessory for lifting and as such should be thoroughly examined at least every six months. As stated in part 1 above, if there is a high intensity of usage, then a shorter time between thorough examinations may be appropriate.

The vacuum lifting device shall be taken out of service and the examination carried out where persons are not endangered by adjacent work activities and shall be carried out in a logical sequence to ensure nothing is overlooked.

The critical areas of the vacuum lifting device requiring particular attention are:

- Visually check the structure of the vacuum lifting device for damage or signs of cracking, distortion and corrosion etc.
- Visually check all bolted or other fastening connections to ensure they have not worked loose.
- Visually check the attachment point(s) for attaching the vacuum lifting device to the crane or lifting machine for damage, wear, cracking, corrosion and free movement of any swivels etc.
- Visually examine all pipes and flexible hoses for damage and leakage.
- The vacuum motor and pump should be visually examined for damage.
- The vacuum suction pads should be visually examined for security and damage ensuring that there are no cuts, tears or other damage, which would prevent an effective vacuum.
- The electrical power supply to the vacuum system should be visually checked for damage and wear ensuring that there is no access to live conductors.
- Ensure that all controls (levers, buttons etc.) are marked with their function and mode of operation.
- Functional test of all controls (levers, buttons etc.) should be carried out to ensure smoothness of operation and freedom from wear and other damage. Ensure as appropriate that controls return to neutral when released.
- After carrying out all necessary examinations carry out a functional test on the vacuum device ensuring that the vacuum system is effective by attaching a suitable load within the safe working load.
- A visual check shall be made to ensure the vacuum lifting device and the crane or lifting machine is marked with their compatible safe working loads.
- Ensure that warning signs and other important manufacturer’s instructions are present and readable e.g. rating plate.

Guidance on overload testing of cranes will be found in British Standard 7121. Non-destructive test may be considered necessary particularly when there is a suspicion of cracks or other damage being present in structural parts. Condition monitoring is not normally applied to vacuum lifting devices. As complete condition monitoring is not normally available on vacuum lifting devices it is unlikely that an effective ‘scheme of thorough examination’ can be drawn up for these machines.

3. PERIODIC INSPECTIONS (PRE-USE AND WEEKLY)

3.1 DAILY PRE-USE INSPECTION

At the beginning of each shift or working day that the equipment is in use the following routine inspections, as appropriate for the type of equipment, should be carried out:

- Checks as required by the manufacturer's handbook.
- Visually check that no electrical equipment is exposed to contamination by oil, grease, water or dirt.
- Visually check the vacuum suction pads show no signs of damage.
- Visually check attachment point(s) for attaching vacuum lifting device to crane or lifting machine for signs of damage.
- Check correct function of all controls without load.

3.2 WEEKLY INSPECTION

Once a week, when the equipment is in use, in addition to the checks recommended in 3.1 the following checks, as appropriate for the type of equipment, should be carried out:

- Checks as required by the manufacturer's handbook.
- Inspect the structure for damage, e.g. bulges, indentations and unusual rubbing marks, cracked welds, loose bolts and other fasteners.
- Inspect pipes and flexible hoses for any visible damage.
- Check the attachment point(s), for attaching vacuum lifting device to crane or lifting machine, for damage, wear and free movement.
- Check operation and adjustment of controls.
- Enter results of checks in records of inspections.

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Thorough examination and inspection of particular items of lifting equipment

Annex 17: Thorough examination of fore-end loader and 3-point linkage fitted to an agricultural tractor

This Annex gives the particular requirements for the thorough examination of a fore-end loader and a 3-point linkage fitted to an agricultural tractor over and above the general requirements given in the first part of this report.

The 3-point linkage on an agricultural tractor is excluded from the requirements of LOLER by the ACOP. However under the requirements of the Provision and Use of Equipment Regulations it must be maintained. So whilst no requirements will be given for the thorough examination of the 3-point linkage requirements are included in this document for the inspection of the linkage.

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1. TWELVE-MONTHLY THOROUGH EXAMINATION

Fore-end loaders are not suitable for the lifting of persons so normally they would only require a twelve-monthly thorough examination.

Prior to thorough examination the tractor and fore-end loader shall be pressure washed or cleaned by some other effective measure to remove all spoil/dirt that would otherwise conceal the structure or mechanisms and prevent an effective examination. The examination shall be carried out in a logical sequence to ensure that nothing is overlooked.

The critical areas requiring particular attention are:

- Visually check the structure of the fore-end loader and tractor mounting for damage or signs of cracking or distortion, slack or missing bolts or other fastenings and corrosion etc.
- The quick release attachment for the bucket and tools should be visually checked for security, damage, wear and corrosion.
- The pivoting joints on the loader arm should be visually checked for wear, corrosion, security, and evidence of lubrication.
- Flexible hydraulic hoses should be visually checked for damage.
- Rigid pipes and quick release couplings should be visually checked for fretting, distortion, corrosion, damage and leakage.
- Hydraulic cylinders should be visually examined for leakage, corrosion on the rods and alignment. Visually check end fixings for wear security and lubrication.
- The valve block should be visually examined for leaks and damage.
- Visually check that the seals on the pressure relief valves have not been broken. If the seals have been broken then the setting of the valves will need to be reset to the correct value using a pressure gauge and the seals replaced.
- Steering mechanisms should be visually checked for evidence of appropriate lubrication, security, damage and wear, by visual examination during operation.
- Braking mechanisms should be visually checked for wear, adjustment, security and damage and functionally checked during operation.
- Engine covers and guards should be checked to ensure that access to trapping points is prevented in accordance with BS EN 294.
- Oil and other fluid levels should be checked ensuring the condition (e.g. by debris monitoring) and level of the fluid.
- Functionally test control levers for excessive wear, smoothness of operation, and a visual check for identification.
- Ensure that warning signs and other important manufacturer’s instructions are present and readable e.g. rating plate for load lifting.
- After carrying out all necessary examinations the machine should be seen in operation to ensure that all motions operate smoothly and effectively without excessive play. Checks should be made to ensure that the loader arm or implement does not drop excessively after the motion has been stopped.

It is not normal to carry out overload testing on fore-end loaders. Non-destructive testing would not normally be carried out on a fore-end loader. Condition monitoring is not normally applied to fore-end loaders. Due to the cost it is unlikely that an effective “scheme of thorough examination” would be drawn up for a fore-end loader.

2. PERIODIC INSPECTIONS (PRE-USE AND WEEKLY)

2.1 DAILY PRE-USE INSPECTION

At the beginning of each shift or working day that the equipment is in use the following routine inspections, as appropriate for the type of equipment, should be carried out:

- Checks as required by the manufacturer's handbook.
- Visually check, by inspecting relevant levels and/or components, that no loss of fluids such as lubricating/hydraulic oil and coolant is apparent.
- Visually check the security of wheels and the condition of tyres on wheel mounted equipment.
- Check correct function of all controls without load.
- Check satisfactory operation of all audible warning devices.
- In the interests of safety and fire prevention, check that the equipment is in a tidy condition and free from tins of oil, rags, tools or materials other than those for which storage provision is made.
- Check that access and egress are adequate.
- Check that there are no obstructions in the path of travel of the equipment.

2.2 WEEKLY INSPECTION

Once a week, when the equipment is in use, in addition to the checks recommended in 2.1 the following checks, as appropriate for the type of equipment, should be carried out:

- Checks as required by the manufacturer's handbook.
- Operation and adjustment of controllers.
- Check for creep of hydraulic rams.
- Effectiveness of brakes and clutches.
- On wheel mounted mobile equipment check tyres for pressure, as well as damage and wear, on walls and tread. Also check wheel nuts for tightness.
- On wheel mounted mobile equipment check steering, brakes (both foot and parking), lights, indicators, horn, windscreen wipers and washers.
- Visually check the three point linkage ensuring the following:
    (a) The ball swivels are in place in the ends of the arm and not likely to fall out due to excessive wear.
    (b) The arms are free from damage and cracking.
    (c) The pivots for, and on the arms, are free and not excessively worn and are properly secured.
    (d) The lift rods are correctly secured and any length adjustment is not excessively worn.

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Thorough examination and inspection of particular items of lifting equipment

Annex 18: Thorough examination of materials feed tipping bin as used in the food industry

This Annex gives the particular requirements for the thorough examination of materials feed tipping bin as used in the food industry (dough hoists) over and above the general requirements given in the first part of this report.

Dough hoists are usually placed inside interlocked enclosures that prevent access beneath the hoist whenever the hoist is in an elevated position. In these circumstances the risks presented by the hoist are extremely low provided that the interlocks and enclosure are well maintained. Frequent access is required within the enclosure in order to maintain food hygiene standards.

The dough is normally carried in a separate wheeled skip that can be manually wheeled around the bakery. The skip full of dough is wheeled into the enclosure of the hoist so that the lifting arms of the hoist engage with the underside of the skip. When the door of the enclosure is shut and the hoist operated the lifting arms raise the skip to an elevated position and tip the contents into the machine that is the next stage for the process, normally a dough divider. The lifting arms are normally affixed to a pair of chains that pass over and around sprockets to carry the skip in the desired path and tip out the contents. After the skip is tipped the chains move in the opposite direction to bring the skip back to floor level. The chains can be driven by an electric motor and drive sprocket or by a pneumatic cylinder.

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1. TWELVE-MONTHLY THOROUGH EXAMINATION

Dough hoists should not be used for the lifting of persons so normally they would only require a twelve monthly thorough examination. The examination shall be carried out in a logical sequence to ensure that nothing is overlooked.

The critical areas requiring particular attention are:

- Visually check the enclosure around the hoist to ensure that persons cannot gain access through it to the trapping areas created by the movement of the hoist and skip and that it is in good condition.
- Check that with the skip in place that there is not enough remaining space for persons to stand inside the enclosure when the entrance is closed.
- Functionally check the interlocks on the enclosure to ensure that the hoist cannot be started with the access entrance open and that the access entrance cannot be opened whenever the hoist has moved from the lowered position.
- Visually check the interlocks to ensure that they are of the positive action type in accordance with B.S. PD 5304 and TH 42073 and that they are not damaged or worn and that they are suitable for a wet environment.
- All electrical connections should be visually checked for damage or wear and to ensure that they are suitable for a wet environment.
- Visually examine the lifting arms chains sprockets and drive mechanisms for wear damage, cracking and corrosion and adjustment.
- Any travel limit switches shall be visually examined for wear damage corrosion and setting ensuring that they are suitable for use in a wet environment.
- Visually examine any air supply pipes and cylinders for damage, wear, fretting, corrosion and leakage.
- Visually examine the structure of the hoist for loose connections, cracking, corrosion, abrasions and damage.
- Visually examine the controls for the hoist to ensure that they are not damaged and are clearly marked to show the function of every control.
- Ensure that the hoist is marked with its safe working load.
- Carry out a functional test on the hoist to ensure that it operates freely and smoothly and that all limit switches operate correctly.

It is not normal to carry out overload testing on dough hoists. Only in exceptional circumstances would non-destructive testing be considered necessary on a dough hoist. Condition monitoring would not normally be applied to dough hoists. It is unlikely that the expense of an effective ‘scheme of thorough examination’ would be appropriate for a dough hoist.

2. SIX-MONTHLY THOROUGH EXAMINATION OF ACCESSORIES FOR LIFTING

The skips for the dough hoists are accessories for lifting and should be thoroughly examined at least every six months. The skips should be visually examined for wear, cracking, damage and corrosion.

3. PERIODIC INSPECTIONS (PRE-USE AND WEEKLY)

3.1 DAILY PRE-USE INSPECTION

At the beginning of each shift or working day that the equipment is in use the following routine inspections, as appropriate for the type of equipment, should be carried out:

- Checks as required by the manufacturer's handbook.
- Visually check that the enclosure around the hoist is in good condition.
- Functionally check that the controls and interlocking devices are working correctly.
- Visually check that the skips are free from damage.

3.2 WEEKLY INSPECTION

Once a week, when the equipment is in use, in addition to the checks recommended in 3.1 the following checks should be carried out:

- Checks as required by the manufacturer's handbook.
- Visually inspect the structure for damage, e.g. bulges, indentations and unusual rubbing marks, cracked welds, loose bolts and other fasteners.

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Thorough examination and inspection of particular items of lifting equipment

Annex 19: Thorough examination of wheeled loading shovel (as used in quarrying)

This Annex gives the particular requirements for the thorough examination of wheeled loading shovels over and above the general requirements given in the first part of this report.

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1. TWELVE-MONTHLY THOROUGH EXAMINATION

Wheeled loading shovels are not suitable for the lifting of persons so normally they would only require a twelve monthly thorough examination. In those situations where a wheeled loading shovel is subjected to arduous use (long periods of repeated usage with loads close to the rated capacity for the loading shovel) will require more frequent examination. Prior to thorough examination the wheeled loading shovel shall be pressure washed or cleaned by some other effective measure to remove all spoil/dirt that would otherwise conceal the structure or mechanisms and prevent an effective examination. The examination shall be carried out in a logical sequence to ensure that nothing is overlooked.

The critical areas requiring particular attention are:

- Visually check the structure for damage or signs of cracking and corrosion etc.
- The attachment for the shovel should be visually checked for security, damage and corrosion.
- The pivoting joints between the shovel and the shovel lifting arms, linkages and machine. These should be checked for wear, corrosion, security, and evidence of lubrication.
- Flexible hydraulic hoses should be checked for damage and leakage.
- Hydraulic cylinders should be visually examined for leakage, corrosion on the rods and alignment. Visually check end fixings for wear, security and lubrication.
- The chassis of the vehicle should be checked for cracks damage and corrosion.
- Means of access should be checked to ensure that ladders walkways and hand rails/hand holds are complete and secure.
- The travel mechanism should be checked rubber tyres checked for wear, damage, inflation pressure and security of the wheels.
- Steering mechanisms should be visually checked for evidence of appropriate lubrication, security, damage and wear by visual examination during operation.
- Braking mechanisms should be visually checked for wear, adjustment, security and damage and functionally checked during operation.
- Engine covers and guards should be checked to ensure that access to trapping points is prevented in accordance with BS EN 294.
- Oil and other fluid levels should be checked ensuring the condition (e.g. by debris monitoring) and level of the fluid.
- Visual examination for leakage and damage should be made on actuators, control valves, pipe work etc.
- Visual check to ensure that the fixings for the driver’s seat and restraint (where fitted) are all in place.
- Functional test of control levers for excessive wear, smoothness of operation, and visually check for identification, and means to prevent inadvertent operation.
- Visual examination of windscreen and other windows for damage etc. which inhibits visibility.

- Check on windscreen wipers and washers to ensure that they function correctly and efficiently.
- Ensure that warning signs and other important manufacturer's instructions are present and readable e.g. rating plate for load lifting.
- After carrying out all necessary examinations the machine should be seen in operation to ensure that all motions operate smoothly and effectively without excessive play. Checks should be made to ensure that the shovel does not drop excessively after the motion has been stopped.

It is not normal to carry out overload testing on wheeled loading shovels and should only be considered after major repair or modification. The manufacturer's advice should be sought before carrying out such testing. Non-destructive testing may be considered necessary particularly when there is a suspicion of cracks or other damage being present in structural parts e.g. the pin housings on the shovel lifting arms.

Condition monitoring is not normally applied to loading shovels. Some very large machines have a form of condition monitoring in that samples of the engine oil are periodically sent for analysis. Such condition monitoring only deals with the condition of the engine and does not directly relate to the condition of the structure or loading shovel mechanism. As complete condition monitoring is not normally available on loading shovels it is unlikely to be able to draw up an effective 'scheme of thorough examination' for these machines.

2. PERIODIC INSPECTIONS (PRE-USE AND WEEKLY)

2.1 DAILY PRE-USE INSPECTION

At the beginning of each shift or working day that the equipment is in use the following routine inspections, as appropriate for the type of equipment, should be carried out:

- Checks as required by the manufacturer's handbook.
- Visually check that no electrical equipment is exposed to contamination by oil, grease, water or dirt.
- Visually check, by inspecting relevant levels and/or components, that no loss of fluids such as lubricating/hydraulic oil and coolant is apparent.
- Check that the correct air pressure is maintained in any pneumatic control system, e.g. brakes.
- Check that lights, windscreen wiper(s) and washers operate efficiently.
- Visually check the security of wheels and the condition of tyres on the wheel mounted equipment.
- Check correct function of all controls without load.
- Check satisfactory operation of all audible-warning devices.
- In the interests of safety and fire prevention, check that the equipment is in a tidy condition and free from tins of oil, rags, tools or materials other than those for which storage provision is made.
- Check that access and egress are adequate and that appropriate safety and fire fighting equipment is readily available.

2.2 WEEKLY INSPECTION

Once a week, when the equipment is in use, in addition to the checks recommended in 1.1 above, the following checks as appropriate for the type of equipment should be carried out:

- Checks as required by the manufacturer's handbook.
- Check the loading control in accordance with the operating instructions.
- Inspect the structure for damage, e.g. bulges, indentations and unusual rubbing marks cracked welds and loose bolts and other fasteners.
- Check operation and adjustment of controllers.
- Check for creep of hydraulic rams.
- Check effectiveness of brakes and clutches.
- Check tyres for pressure as well as damage and wear on walls and tread. Also check wheel nuts for tightness.
- Check steering, brakes (both foot and parking), lights, indicators, horn, windscreen wipers and washers.
- Enter results of checks in the records of inspections.

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Thorough examination and inspection of particular items of lifting equipment

Annex 20: Thorough examination of chain block suspended from a roof joist

This Annex gives the particular requirements for the thorough examination of a chain block suspended from a roof joist over and above the general requirements given in the first part of this report.

The thorough examination of a chain block is covered in the relevant parts of Annex 11 'Thorough Examination of Paper Reel Handling Equipment' and the extent of this Annex is the thorough examination of the chain block anchorage. This type of anchorage can be a beam clamp or a beam clamp with a chain or wire rope sling. However, a chain or wire rope sling looped over a structural roof member would not be regarded as a suitable anchorage and the thorough examination should reflect this.

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1. TWELVE-MONTHLY THOROUGH EXAMINATION

Chain blocks anchored in this manner are usually located in workshops e.g. garages and are not suitable for the lifting of persons so they would only require a twelve monthly thorough examination. However, in those circumstances where there is a high intensity of use, more frequent thorough examinations may be necessary.

Prior to thorough examination the chain block and its anchorage should be suitably cleaned in order that an effective examination can be carried out. The examination shall be carried out in a logical sequence to ensure that nothing is overlooked.

The critical areas requiring particular attention are:

- Visually check the structure supporting the chain block anchorage.
- Visually examine the anchorage checking for damage or signs of cracking, distortion and corrosion and the security of bolted connections to ensure they have not worked loose.
- Thoroughly examine the whole length of any chain for wear, cracking, damage, distortion and corrosion or any rope for wear, damage, broken wires, kinking and corrosion.
- Check that the safe working load of the anchorage as a whole is at least the same as that of the chain block and that the safe working load is marked.

Guidance on the overload testing of chain blocks will be found in British Standard 7121 Part 2. Non-destructive testing may be considered necessary when there is suspicion of cracks or other damage being present in any part of the anchorage

2. PERIODIC INSPECTIONS (PRE-USE AND WEEKLY)

2.1 DAILY PRE USE INSPECTION

At the beginning of each working day or shift that the equipment is in use the following routine inspections, as appropriate for the type of equipment, should be carried out:

- Checks as required by the manufacturer's handbook.
- Visually check the anchorage for any damage.
- Check that the chain block is functioning correctly.

2.2 WEEKLY INSPECTION

Once a week, when the equipment is in use, in addition to the checks recommended in 2.1 the following checks as appropriate for the type of equipment should be carried out:

- Checks as required by the manufacturer's handbook.
- Check security of the anchorage to the roof joist and chain block.
- Check hook(s) and other load lifting attachments, safety catch(es) and swivel(s) on the chain block for damage, free movement or wear.
- Enter results of checks in the records of inspections.

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Thorough examination and inspection of particular items of lifting equipment

Annex 21: Thorough examination of entertainment flying equipment

This annex gives the particular requirements for the thorough examination of entertainment flying equipment over and above the general requirements given in the first part of this report.

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1. INTRODUCTION

This annex deals with lifting equipment used to lift and then support at height various items associated with both stages etc, and persons in the entertainment industry. These items could include lighting equipment, wings, temporary roofs, booms and gantries. The gantries themselves may also be part of the lifting equipment where they are used to carry other items of equipment. The lifting equipment generally consists of powered winches, slings and suspension ropes and will normally be temporarily assembled at different sites. Generally winches are situated either at ground level, on the load or at support points. In the latter two cases the weight on the support points will be the load being lifted plus the self-weight of the lifting equipment. In the first case the weight on the anchorage point could be twice this.

While there is no overall standard for this type of equipment there are standards for all or most of the various components. As it is important that only quality assured items of equipment are used for this type of work, where possible items should be to an appropriate standard.

In some instances the design safety margins for the equipment may be reduced where it is properly cared for and the variability of use and misuse is limited. For instance it only may be in use for a relatively limited season of approximately 8 – 9 months each year and typically this will be in a less harsh environment than might normally be found in other situations such as on construction sites. Therefore the amount of damage and degree of deterioration could be expected to be less over a set period than in more aggressive situations and its wear should be more predictable. In addition where the equipment is designed to carry specific loads that have been accurately quantified then the safety factor for the variability of load could also be reduced.

The methods used to lift and support stage equipment should be designed so that if there is a failure in any one item then the load will not collapse or overturn catastrophically. This is normally achieved by either ensuring there is at least one redundant lifting rope and winch in the lifting assembly or by using additional static safety lines running through inertia blocks.

This type of equipment is usually installed by a specialist contractor for use by others who are frequently none specialist operators. It is therefore vitally important that these operators receive the required training to be able to both use the equipment safely and be able to carry out the necessary limited daily inspections. It is important that the installers of the lifting equipment are suitably competent, trained and experienced to ensure not only that it will be properly installed and be fit for its purpose, but that they can also properly communicate its safe use and care to the operators. To do this they may need to know how the specific operators taking charge of the lifting equipment are likely to use it.

It is probable that persons of a wide range of competence will carry out the various inspections of the lifting equipment during servicing, lifting and daily while it is supporting the various loads. However provided that the nature or detail expected of the inspection is not outside the abilities of the inspector, this should be satisfactory. All the various inspections described in this annex are important in ensuring that the lifting equipment is always fully serviceable.

2. GENERAL

2.1 MARKING AND IDENTIFICATION

All items used in lifting operations must be identifiable by some form of marking either as individual items or, for small items, as batch items. These marks should enable any item to be traced back to the manufacturers test certificates, quality documents, maintenance certificates and the description of any modifications. Such marks should also clearly identify any other items, perhaps from the same manufacturers batch, whose performance could be similar to it. Some items, such as winches and gantries used to carry other items or persons, should also be either marked with their safe working load or working load limit.

It could also be helpful if the various items have additional means of identifying whether a current certificate of thorough examination covers the item. Effective marking should give a greater assurance that defective items have been identified and removed from service, being either isolated in a 'sterile' area awaiting repair, or destroyed, and facilitate the clear recognition of items of different performance characteristics.

2.2 STORAGE

When not in use all lifting equipment should be stored in an orderly manner and so that it will not undergo any significant deterioration through excessive bending, damp or temperature. Items of significantly different performance abilities or size should not be stored at the same position but should be kept in clearly labelled racks or bins to avoid incorrect items being used. Items that have been inspected should always be stored separately from those that are awaiting inspection.

2.3 RECORDS

Records concerning the original performance specifications and ongoing maintenance examinations or tests should be kept. Comprehensive records of the thorough examination of all lifting equipment detailing any defects and remedial action, must be kept for the time that they are in the owner's possession. Records of any previous modifications should be kept with the original manufacturer's certification and warranty. Records and certificates issued concerning the performance capabilities of any item of lifting equipment should be signed and dated by the person making the inspection.

The information gained from the inspections should be monitored either periodically or when the equipment is modified, to note the rate of deterioration and to help predict when the equipment should be taken out of use. Where any item is sold on for further use the records or copies of the records, relating to that item must accompany it.

2.4 DISPOSAL

Equipment should be disposed of before its rate of deterioration reaches a point where it will not remain fit for use over the next 6 or 12 months. All equipment disposed as being no longer fit for purpose should be cut in pieces or otherwise made incapable of reuse by other persons. This should not simply be done by painting marks on it.

3. INITIAL EXAMINATIONS

3.1 THOROUGH EXAMINATION BEFORE DISPATCH

All items of lifting equipment must be inspected at least every 12 months or 6 months if used to lift persons. However as the suppliers of the lifting equipment are not generally on site while it is being used, each item of the lifting equipment should be thoroughly examined at more frequent intervals either when it is returned from site or, preferably, before it is delivered to another site. Where there is a significant time interval after the examination of the lifting equipment before being loaded for dispatch, then the examined equipment should be stored away from any other items that have not been so examined. Where this period exceeds 12 or 6 months in the case of equipment being used to lift or carry persons, then the thoroughly examined should be repeated to ensure no deterioration, interference or modifications has taken place which could significantly reduce the equipment's capabilities. A fully competent person with experience of the typical use of the equipment and knowledge of the required performance characteristics, who is suitably qualified to understand the function of each piece of equipment and can properly judge the significance of any wear or damage, should carry out this examination.

3.1.1 Winches

Carry out a visual and mechanical inspection as follows:

- Test braking mechanism under load.
- Check that all moving parts can do so freely and that all bolts and rivets are securely in place.
- Check for any signs of cracks.

3.1.2 Rigging Lines, Slings and Safety lines

Carry out a visual, tactile and mechanical inspection as follows:

- Inspect for damage and contamination.
- Look for broken or kinked wires, flattened cross sections and rust areas inside the rope.
- Look for cuts, broken stitching, swellings and powdery areas in textile items.

3.1.3 Shackles etc.

Carry out a visual inspection as follows:

- Inspect for damage, distortion and cracking.
- Look for worn or flattened threads, rusting and freedom of moving parts.
- Check that all rivets etc, are firmly in place.

3.1.4 Inertia Blocks

Carry out a visual and mechanical inspection as follows:

- Test that the block will lock when subject to the designated load.
- Ensure that all moving parts are free and that there is no contamination inside the block.

3.1.5 Gantries

Carry out a visual inspection as follows:

- Inspect for bent or flattened sections, broken welds, and trueness of line and section.
- Check for worn, enlarged or distorted bolt holes.

3.2 PRE-INSTALLATION CHECKS

As this equipment is often attached to other structures the loads that will be applied by the lifting equipment on these must be carefully assessed and it should be confirmed that these lifting points are capable of supporting those loads. In calculating the loads that could be applied full consideration should be given to all possible environmental loads, e.g. wind, snow, standing rain water, etc, together with any dynamic and impact loads. The load used to check the lifting points must include the self-weight of the equipment with due allowance if hauled from the ground via pulleys, and a suitable multiplier to allow for dynamic effects either from the load or from the winches. All support points are included in the definition of ‘lifting equipment’ and must be inspected accordingly.

3.2.1 All Items of Equipment

A person with experience and knowledge of both the equipment and the users needs should carry out a visual verification of the compatibility of each item as follows:

- Check the contract specification or brief.
- Check the performance capabilities of each item of equipment, that those being supplied are compatible with each other, are capable of carrying the load and have a current inspection report certifying they are fit for use.

3.2.2 Support Points

A person with structural design ability and experienced knowledge of the loads that will be created should assess the maximum loads that will be placed on the support points and check that it will be capable of safely carrying these by calculation and/or test.

3.3 INSPECTION BEFORE USE

When installed, the lifting equipment should be finally inspected before hand over by the erection supervisor or other person having a detailed knowledge of the lifting equipment and system and who will sign the hand over certificate, checking that all the items are in place and that all fixings are properly secured. Where necessary this should include using a torque spanner ensuring that the reading from this has not been influenced by any deflection of cables or other flexible members. It should also be fully tested if appropriate by lifting a test weight no more than 150mm off the ground while all the items in the lifting assembly are visually inspected to see that there is no undue movement or deflection.

Safety lines running through inertia blocks could be used during erection and subsequent use to prevent the fall of any item should there be a failure of the primary lifting equipment. While these items are not part of the lifting equipment they are an essential adjunct to these and should be inspected accordingly.

A hand over certificate should be issued confirming the performance capabilities. This certificate should be signed by the person who has checked the equipment and by the person accepting it on behalf of the user confirming that he understands all the limitations on the use of the equipment and understands how it should be cared for and maintained.

3.3.1 Support Points

Carry out a visual inspection to check that ropes and/or winches are correctly fixed at the correct support point.

3.3.2 Winches

Carry out a visual inspection as follows:

- Check that winches are properly secured and can transfer the loads to a suitable support point.
- Check that their records and certification is current.

3.3.3 Rigging Lines and Safety lines

Carry out a visual and tactile inspection as follows:

- Check that all ropes and lines are free to run through winches, inertia blocks and pulleys etc.
- Where appropriate check that all stop blocks and knots are in position to prevent the rope ends running through winches etc.
- Check that the ends of ropes are properly spliced or secured.

3.3.4 Shackles etc.

Carry out a visual inspection as follows:

- Check that all shackles, fittings and hooks are properly closed and secured.
- Check that the load will be applied in the most favourable direction.

3.3.5 Slings

Carry out a visual and tactile inspection as follows:

- Check that slings and cables are properly packed where they cross hard edges and that they have not been kinked or damaged.
- Check that any loose ends are properly secured.

3.3.6 Inertia Blocks

Carry out a visual inspection as follows:

- Check that their records and certification is current.
- Check that they are properly secured and that the safety line can run through them.

3.3.7 Gantries

Carry out a visual inspection and using a torque spanner etc.:

- Check that all bolts and fixings are secure.
- Check that all components are in their correct place.

4. SIX/TWELVE-MONTHLY THOROUGH EXAMINATION

The reliability of the various items of lifting equipment should normally be covered by pre-dispatch examinations as noted in part 3. Where the person carrying out such an examination is suitably competent and full records of these are kept, then there is no need for additional ones. However where any of the lifting equipment has not been in regular use for some time, or where the qualifications and experience of the inspector is not fully adequate, then twelve-monthly (six-monthly if used to lift persons) thorough examinations and re-certification should be undertaken. Someone who is suitably technically qualified and has sufficient training and experience in the type of equipment being inspected should carry out this examination.

4.1 WINCHES

Carry out a visual and mechanical inspection as follows:

- Test braking mechanism under load.
- Check that all moving parts can do so freely and that all bolts and rivets are securely in place.
- Check for any signs of cracks.

4.2 RIGGING LINES, SLINGS AND SAFETY LINES

Carry out a visual, tactile and mechanical inspection as follows:

- Inspect for damage and contamination.
- Look for broken or kinked wires, flattened cross sections and rust areas inside the rope.
- Look for swellings and powdery areas in textile items.

4.3 SHACKLES ETC.

Carry out a visual inspection as follows:

- Inspect for damage, distortion and cracking.
- Look for worn or flattened threads, rusting freedom of moving parts.
- Check that all rivets etc, are firmly in place.

4.4 INERTIA BLOCKS

Carry out a visual and mechanical inspection as follows:

- Test that the block will lock when subject to the designated load.
- Ensure that all moving parts are free and that there is no contamination inside the block.

4.5 GANTRIES

Carry out a visual inspection for bent or flattened sections, broken welds, and trueness of line and section.

5. DAILY PRE-USE INSPECTION

The lifting equipment should be visually inspected before the start of each days work by the person in charge of the operations or by a person delegated to do this having received the appropriate training. This inspection should include looking for evidence of damage, misuse or unauthorised alterations, such as the addition of additional lights or PA systems or alterations to the layout of the rig. Any defects should be reported to whoever erected the equipment.

5.1 SUPPORT POINTS

Carry out a visual inspection to check that the lifting equipment is firmly attached and all fixings are secure.

5.2 WINCHES

Carry out a visual inspection to check that winches are properly secured and are transferring the load to a suitable support point.

5.3 RIGGING LINES AND SAFETY LINES

Carry out a visual inspection as follows:

- Check that all ropes etc. are undamaged and all are free to run through winches, inertia blocks and pulleys etc.
- Where appropriate check that all stop blocks and knots are in position to prevent the rope ends running through winches etc.
- Check that the ends of ropes are properly spliced or secured.

5.4 SHACKLES ETC.

Carry out a visual inspection as follows:

- Check that all shackles, fittings and hooks are properly closed and secured.
- Check that the load will be applied in the most favourable direction.

5.5 SLINGS

Carry out a visual inspection as follows:

- Check that they are properly packed where they cross hard edges and that they have not been kinked or damaged.
- Check that any loose ends are properly secured.

5.6 INERTIA BLOCKS

Carry out a visual inspection to check that they are properly secured and that the safety line can run through them.

5.7 GANTRIES

Carry out a visual inspection as follows:

- Check that all bolts and fixings are secure.
- Check that all components are in their correct place and no unauthorised additional items have been added.
- Check that no additional unauthorised items have been placed on them.

6. DEFINITIONS

6.1 LIFTING ASSEMBLY
The combination of various items or parts linked together in order to carry out a lift.

6.2 LIFTING EQUIPMENT
The total assembly of the various parts or components used to lift a load.

6.3 SUPPORT POINT
The point or position at height on an associated structure from which the lifting equipment is carried, supported, hung or anchored.

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Thorough examination and inspection of particular items of lifting equipment

Annex 22: Thorough examination of temporary lifting equipment for scaffolding and similar components

This annex gives the particular requirements for the thorough examination of temporary lifting equipment over and above the general requirements given in the first part of this report. Such equipment is used to lift scaffolding and similar components in the construction industry by a rope passing through a pulley system. It does not apply to equipment used for lifting persons. Such materials can include scaffold tubes, boards, bagged scaffold fittings, props and floor centres etc. This type of lifting equipment is generally manually operated and is always temporarily assembled. The pulley is normally secured to a scaffold tube at an appropriate height on the scaffold and either hauled from ground level or from a position adjacent to the pulley. The lifting rope is usually lashed to the items being lifted.

There are no specific standards for this type of operation although standards do exist for some of the type of components used. It is therefore important that good quality components which are in a good condition should always be used.

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1. GENERAL

1.1 MARKING AND IDENTIFICATION

All lifting equipment should be individually identifiable in such a way that its history from when manufactured can be clearly followed. It should also be possible to trace and identify on which site each item of equipment is being used, particularly to avoid any equipment continuing in use after it should have been thoroughly examined. While it is not usual to mark a unique identification number on these items, it is possible to use spots of different colours to show the period when they were last examined or to shrink wrap marks onto ropes etc. (Note: care should be exercised to avoid melting the rope when shrink wrapping marks onto it.)

1.2 STORAGE

When not in use all lifting equipment should be stored in an orderly manner and so that it will not undergo any significant deterioration through excessive bending, damp or from being too hot or too cold. Textile materials should be stored in the dark normally in a bag or container. Items of significantly different ages, performance abilities or size, should not be stored at the same place but should be kept in clearly labelled positions to avoid incorrect items being used.

1.3 RECORDS

Records for each item or batch of lifting equipment must be kept for the time that they are in the owner's possession and linked to the original manufacturer's certification and warranty and to any previous significant modifications. Comprehensive records and certificates issued concerning the performance capabilities of any item of lifting equipment shall be kept and should be signed and dated by the person making the inspection. Records of the weekly inspection should be kept as part of the general scaffold inspection. A range of substances and effects can quickly adversely affect textiles. It is therefore important that the history of use of such equipment should be kept to help identify the reasons for any areas of discolouration or deterioration.

The information gained from the inspections should be monitored either periodically or when the equipment is modified, to note the rate of deterioration and to help predict when the equipment should be taken out of use. Where any item is sold on for further use the records or copies of the records, relating to that item must accompany it.

1.4 DISPOSAL

Equipment should be disposed of before its rate of deterioration reaches a point where it will not remain fit for use over the following 12 months. All equipment disposed as being no longer fit for purpose must be cut in pieces or otherwise made incapable of reuse by other persons. This should not simply be done by painting marks on it.

2. INITIAL EXAMINATIONS

2.1 THOROUGH EXAMINATION BEFORE DISPATCH

As most of the various items of lifting equipment can suffer deterioration during storage it should be thoroughly examined, by the yard foreman or other person with the competence to recognise significant faults, before being dispatched to site both to ensure it has adequate strength and is in good order without having suffered undue deterioration or damage. Ropes should be checked to ensure they are of the required length and size, and that the various items are compatible with each other.

2.1.1 Pulleys

Carry out a visual inspection to ensure that the pulley wheels are of the correct size for the ropes.

2.1.2 Ropes

Carry out a visual inspection as follows:

- Check that these are of a suitable size and length.
- Ensure that these have not been significantly damaged or contaminated.

2.1.3 Hooks etc.

Carry out a visual inspection as follows:

- Check that they are not deformed, that the width of the mouth is correct.
- Check for cracks.

2.2 PRE-INSTALLATION CHECKS

As this equipment is supported by being attached to other structures, which are usually of a temporary and lightweight nature, the loads that will be applied by the lifting equipment must be carefully assessed and the support points must be certified as being capable of supporting those loads. In calculating the loads full consideration should be given to all possible environmental loads, e.g. wind, snow, standing rain water etc, together with any dynamic and impact loads. The assessment should be undertaken by the scaffold designer or other person competent to assess the magnitude of the load and the strength of the scaffold.

2.2.1 Support Points

By calculation, ensure that the loads being applied will not cause the failure or unacceptable deflection of the part of the scaffold being attached to or the scaffold as a whole.

2.3 INSPECTION BEFORE USE

The lifting equipment should be finally examined once erected and before hand-over and fully tested as appropriate by the scaffold foreman or other person competent to recognise significant faults in scaffolding. Once this has been completed satisfactorily then a hand over certificate should be issued confirming the performance capabilities of the equipment. This certificate should be signed by the person who has checked it and by the person accepting it on behalf of the user confirming he understands all the limitations on the use of the equipment and how it should be cared for and maintained.

2.3.1 Support Points

Carry out a visual inspection to check that the lifting equipment has been firmly installed at the correct position and that all fittings, ties and anchors on the scaffold required to support the load are in place.

2.3.2 Pulleys

Carry out a visual inspection to ensure that they are securely fixed to the support point and that the lifting rope sits correctly in the pulley wheel.

2.3.3 Ropes

Carry out a visual inspection to check that these:

- Are of a suitable length.
- Are properly seated in the pulley.
- Have not suffered any cuts or abrasions
- Have no areas of significant discolouration.

2.3.4 Hooks etc.

Carry out a visual inspection to check that they are securely tied in position and where necessary they have been properly moused.

3. TWELVE-MONTHLY THOROUGH EXAMINATION

All lifting equipment must be thoroughly examined at least every 12 months. However as it is not closely supervised by a suitably competent person while it is being used on site and there is a possibility of misuse or damage, then the equipment should be carefully inspected each time it is returned from site. Where the equipment remains on site for periods exceeding 12 months, arrangements should be made for it to have a thorough examination on site before the end of the 12 month period.

A fully competent person who has experience of the performance limitations of the various items, understands the function of each piece of equipment, and can properly judge the significance of any wear or damage, should carry out this thorough examination.

3.1 PULLEYS

Carry out a visual inspection to ensure that the pulley wheels are of the correct size for the ropes.

3.2 ROPES

Carry out a visual inspection as follows:

- Check that these have not been significantly damaged or contaminated.
- With cable laid ropes inspect inside them at random points to check for damage or grit.

3.3 HOOKS ETC.

Carry out a visual inspection as follows:

- Check that they are not deformed, that the width of the mouth is correct.
- Check for cracks and any other damage.

4. WEEKLY INSPECTION

All items should be inspected, by the person appointed to inspect the scaffold, at the same time as the weekly inspection of the scaffold. This inspection should include looking for damaged items and to check that they are correctly and securely positioned. The scaffold components carrying the lifting equipment should be checked for any deformation and to ensure that the scaffold fittings, ties and anchors are firmly in place.

Any defects, or suspected defects, should be reported to whoever supplied the equipment.

4.1 SUPPORT POINTS

Carry out a visual inspection and using a scaffold spanner check that all fittings, ties and anchors on the scaffold required to support the load are fully secure.

4.2 PULLEYS

Carry out a visual inspection to ensure that they are securely fixed to the support point and that the lifting rope sits correctly in the pulley wheel.

4.3 ROPES

Carry out a visual inspection to check that these:

- Are of a suitable length.
- Are properly seated in the pulley.
- Have not suffered any cuts or abrasions
- Have no areas of significant discolouration or of localised melting.

4.4 HOOKS ETC.

Carry out a visual inspection to check that they are securely tied in position and where necessary they have been properly moused.

5. DEFINITIONS

5.1 LIFTING ASSEMBLY
The combination of various items or parts linked together in order to carry out a lift.

5.2 LIFTING EQUIPMENT
The total assembly of the various parts or components used to lift a load.

5.3 SUPPORT POINT
The point or position at height on an associated structure from which the lifting equipment is carried, supported, hung or anchored.

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