Inspection Procedure of Winches

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1. YOUR SAFETY IS FIRST:

Your safety wear is mandatory at job sites including in general: suit, shoes, helmet, gloves, ear plugs, glasses, and mask.

2. SCOPE:

This Procedure covers the inspection and testing winches

3. PRODUCT/ MANUFACTURE STANDARDS:

ASME B30.7-2021	*Cranes. Power driven winches and hoists - Power driven winches*
BS EN 14492-1:2006+A1:2009	*winches*

4. DEFINTION:

, the following should be noted:

*** Lifting Application**

A lifting application is any application where, a load is suspended or supported on inclined planes where removal of the lifting force or any failure of the lifting mechanism or lifting medium results in either movement of the load, or a movement that can present a significant hazard.

*** Pulling Application**

A pulling application is any application where, a load supported on level or inclined planes where the removal of the pulling force or a failure of the pulling mechanism or pulling medium results either in no movement of the load, or a movement that cannot result in a significant hazard. Thus, if for example a load were being ‘pulled’ up an incline on wheels it would be regarded for the purpose of this section as a lifting application as, in the event of a failure, the load would descend the incline under gravity.

*** SWL/Capacity**

The maximum load that can be taken at the drum (first wrap of rope) is sometimes referred to as the line pull of the winch. However, the actual line pull will vary with the number of layers of rope wound onto the drum, i.e. as the number of layers increases so the line pull diminishes. For lifting applications, the SWL of a winch should be based on the line pull when the drum is full of rope or has all of the rope for that application fitted.

5. THOROUGH EXAMINATION:

The hoist must regularly be thoroughly examined by a Competent Person to check whether it remains safe to use. This is to be done within a maximum period of 12 months unless a written scheme of

examination (for guidance refer to LEEA 032 Guidance to Written Schemes of Examination), drawn up by a competent person is in place and operating.

Reports of thorough examination should be compliant with the legal requirements or the LEEA template report documents, retained and cross referenced to the hoists historical records for inspection by the Competent Person or the enforcement authority.

Any defects found by the examination should be reported to the owner of the equipment, who must assess the root cause of the defect and implement procedures to prevent reoccurrence, e.g. training of operators, increased inspections, etc., before remedying the equipment and returning it to service.

The competent person may deem it necessary to supplement their examination with testing. Such testing could be NDT, electrical safety testing, functional testing, overload testing, etc. The nature and extent of testing is always at the discretion of the competent person in support of their thorough examination.

Note:

Unless a mandatory requirement of the applicable national legislation or manufacturer, LEEA does not recommend the routine overload testing of hoists, except following an exceptional circumstance such as significant modification or repair. This is because overload testing has few benefits and number of disadvantages;

- Some manufacturers do not recommend overload tests, except in ‘exceptional’ circumstances.
- Repeated overloads can cause deterioration of the equipment over time.
- Most structural failures are the result of fatigue and such defects will not be revealed by an overload test; fatigue cracking can be identified during thorough examination.
- Defects such as fatigue cracking can be made worse by overload testing but may still not be identified by the test.
- If equipment fails during testing it could be dangerous and will certainly be expensive
- Inspection bodies do not recommend it as there is no defined structural or mechanical benefit

6- SAFE USE OF WINCHES

the following recommendations should be followed:

(1) When transporting, handling or lifting a winch, use only the means provided for that purpose. Never attempt to lift by the drum, operating handle or drive shaft, etc.

(2) Ensure the rigging method used is adequate for the load to be lifted so that the winch, its fixings, suspension pulleys and the suspension points of pulley blocks are not overloaded by the imposed loads.

(3) In the case of plate sided winches, never attempt to lift other than light loads in the fast gear as this may place excessive forces on the operating handles and shafts. The higher speed gears should only be used for rope extension/retraction when unloaded. If any doubt exists, use only the slow speed gears.

(4) In the case of dual speed power operated winches, select a speed appropriate to the specific lifting operation in accordance with the manufacturer’s instructions.

(5) Ensure that steps are taken to prevent water, oil or other foreign matter coming into contact with lined brakes. Where contamination has occurred, do not use the winch as the brake may have lost its effectiveness.
(6) Where the direction of rotation is indicated on the operating handle, ensure the winch lifts the load when the handle is turned in that direction.
(7) In the case of manually operated winches, ensure that operating handles are correctly fitted and secure before attempting to use the winch.
(8) If the winch is fitted with sliding gears, ensure the gears are correctly in place and that the locking device is correctly applied to prevent the gears disengaging whilst in use.
(9) In the case of winches with a manual gravity pawl, ensure that the pawl is engaged with the ratchet wheel when lifting. It must be out of engagement when lowering and the load controlled by the winding handles and brake. Never try to stop a falling load with the pawl.
(10) Check the integrity of the brake or sustaining mechanism before making the lift. Raise the load just clear of the ground and halt the lift. Ensure the load is sustained with no downward movement before proceeding with the lift.
(11) Prior to operating the winch, ensure the wire rope is not twisted, is correctly positioned in pulleys, etc. and that it is able to move freely between pulleys. Where ropes are in positions which may be dangerous when movement takes place, ensure that they are guarded or that adequate steps are taken to protect personnel or property against any hazard which may arise.
(12) Keep hands, feet, etc. away from ropes, winch drums, pulleys and similar danger areas so as to avoid trapping, laceration or similar injuries when the winch is operated. Remember even slow moving ropes can be dangerous. Stand in a safe place and be sure to keep out of the bight. Beware of flying equipment, particularly the rope, in the event of a failure.
(13) Steps must be taken to ensure inadvertent or accidental operation of the winch cannot occur. Whilst in use, winches should always be attended.
(14) For people carrying applications, use only winches specifically designed and intended for that purpose. Strictly follow the manufacturer's instructions with regard to both the rigging and operation.
(15) Care must be taken to ensure that too much rope is not wound onto or off the winch drum. Where limits or stops are fitted, they are a safety device intended for this purpose and should not be used as working stops for load positioning. It is more often the case that no such limits are fitted and that the overwind/underwind is controlled by the skill of the operative. In such cases, steps must be taken to ensure the operative is able to assess the rope position, such as color markings on the rope to indicate when its fully extended or retracted positions are reached.

7- IN-SERVICE INSPECTION AND MAINTENANCE

The following components shall be checked according during thorough examination:
(1) Winch mounting insecure. missing, loose, damaged or corroded fixing bolts, cracking or crumbling foundation/wall, etc.
(2) Winch frame is corroded, damaged or distorted, guards missing or damaged.
(3) Rope drum damaged, particularly if flanges are chipped or cracked.

(4) Rope anchorages damaged or loose. If rope shows signs of having pulled or slipped in the anchorage or if anchorage bolts are loose, corroded, damaged or missing.

(5) Wire rope does not feed onto the drum correctly and in the case of power operated winches, the rope feeds onto the drum in the wrong direction. The rope should feed onto the drum with each turn sitting comfortably beside the previous turn with no bunching or crossing of turns.

(6) In the case of manually operated winches, the winding handle is bent, damaged or does not fit positively onto the shaft. The handle jams or jumps when turned or the winding gears are damaged, worn or distorted.

(7) In the case of power operated winches, the control lever, push buttons or valves are damaged or do not operate.

(8) The winch distorts under load.

(9) Ratchet teeth and/or pawl are damaged, worn or distorted.

(10) Brake lining worn, impregnated with oil or grease, contaminated with dirt or other particles. If the brake lining is torn, pitted or cracked, also if the brake face of the drum, etc. is damaged, pitted or corroded.

(11) Winch does not hold under load, load slips when lifting or load will not lift.

(12) Winch stops midway through a lifting cycle. (Immediate action will be necessary to secure or lower the load, depending on the winch design. In some cases, it will be possible to lower the load in a controlled manner using the winches' own mechanism. In other cases, it may be necessary to use a second winch to recover the load. This will call for great care and steps must be taken to ensure no shock loads are imposed to either of the winches or to any slinging arrangements used. Steps should also be taken to prevent access until the load has been safely recovered.)

(13) If there is unexpected vibration or noise during operation, particularly when load is descending at a controlled speed.

(14) Load continues to travel excessive distance after applying the brake or load falls at a faster than expected controlled speed.

(15) The wire rope is worn or damaged, in particular any increase or decrease in diameter, opening of the strands, kinks, broken wires, in addition to any other signs of mechanical damage such as flattening, cuts or corrosion. Faults are most likely to occur at the terminations and where the rope passes over pulleys and sheaves. (Rope damage can be the result of incorrect handling or coiling, particularly when being wound onto the drum in a no load situation. The inspection must therefore be made carefully to ensure that there is no damage to hidden turns on the rope drum, which in turn may cause further damage to other sections of the rope, and that there is no damage as the result of the rope jumping off the drum into the gears, etc.)

(16) Wear, damage or distortion to wire rope terminal fittings. If a swivel is fitted or forms part of the termination, it must operate freely.
(17) Wear, cracks and chips to pulleys and sheaves. Corrosion, seizing or wear to the axle pins of pulleys and sheaves. Where intended, head fittings must swivel freely.
(18) Sliding gear mechanism is too tight or too loose or does not lock positively into the required position.
(19) In the case of power operated winches, the prime mover (e.g. electric motor) must be inspected for any defects, damage or incorrect operation in accordance with the manufacturer's instructions.

6. Proof Load Testing:

If not mentioned by manufacturer proof load test shall applied as below:

1- A dynamic load test equal to 110% of WLL shall be applied. This test shall be carried out for each lifting equipment movement under the most unfavorable conditions. The tests shall comprise repeated stopping and starting for each machine movement. The test shall be considered satisfactory if the lifting equipment has carried out all its functions, and that when examined after the test, there is no damage to the mechanisms or structural elements, and that the connections have not become loose or damaged.
2- A static test consisting of suspending a load of: 1,25 times the WLL shall be applied

Proof load test is also conducted if a repair is performed using non-certified load bearing components. Following the proof load test, the winch shall be thoroughly examined. The test shall be considered satisfactory if no cracks, permanent deformation or damage that would adversely affect the function or safety of the lifting equipment is visible, and the connections have not become loose or damaged and if the braking device can hold the load without slipping and if it is possible to perform the dynamic test with the same lifting equipment after the static test.

7. MARKING:

In addition to the information required by the standard used and the applicable national legislation, the following information should be permanently and legibly marked on a suitable part or parts of the winch:
(1) Identification mark. (If the manufacturer has not provided a unique serial number then it is the responsibility of the user to add the identification mark to identify the equipment with the inspection and examination reports).
(2) SWL.
(3) Name of manufacturer or supplier.
(4) Rope drum storage capacity. Where a winch must be fitted with a specific size and/or construction of steel wire rope, this should also be clearly marked on the winch.

Further information may also be marked on the winch but in any event should be readily to hand. This will vary with the type of winch but some or all of the following information will be necessary:

(1) Model or type.
(2) Year of manufacture.
(3) Lifting speed(s).
(4) Details of power supply; e.g. voltage, phase and frequency; pressure and delivery rate, etc.
(5) Details of operating handle if this may vary. Number of operatives required for operation at full load.
(6) Direction of rotation of drum when lifting.
(7) The minimum number of dead rope turns which must remain on the drum at all times.

It should be noted that the wire rope fitted to the winch, together with any permanent attachments made to the rope, must be considered as individual items. They must therefore carry their own marking in accordance with the individual requirements applicable. Similarly, any pulley blocks used in association with the winch must also be treated as individual items and marked accordingly.

8. REPORTING AND CERTIFICATION:

A certificate of test and thorough examination will be issued upon the satisfactory completion of the examination, i.e. the lifting equipment is safe to operate

A defect report will be issued if the lifting equipment fails to meet the requirements.