
4 ALBERT EMBANKMENT
LONDON SE1 7SR
Telephone: +44 (0)20 7735 7611 Fax: +44 (0)20 7587 3210

MSC.1/Circ.1663
28 June 2023

GUIDELINES FOR LIFTING APPLIANCES

1 The Maritime Safety Committee, at its 107th session (31 May to 9 June 2023), having considered a proposal by the Sub-Committee on Ship Systems and Equipment (SSE), at its eighth session, with a view to ensuring a uniform approach towards the application of the provisions of SOLAS regulation II-1/3-13, adopted by resolution MSC.532(107), approved the *Guidelines for lifting appliances*, as set out in the annex.

2 Member States are invited to use the annexed Guidelines when applying SOLAS regulation II-1/3-13 and to bring it to the attention of ship designers, shipyards, shipowners, equipment manufacturers, other organizations and parties concerned.

ANNEX

GUIDELINES FOR LIFTING APPLIANCES

1 Application

These Guidelines support the application of SOLAS regulation II-1/3-13 for lifting appliances and loose gear used in association with lifting appliances.

2 Definitions

For the purpose of these Guidelines, the following definitions apply:

- .1 *Competent person* means a person possessing the knowledge and experience required for the performance of duties specified in these Guidelines and acceptable as such to the Administration.
- .2 *Inspection* means an assessment carried out by a responsible person to ascertain if the lifting appliance or loose gear is in good working condition for continued safe use.
- .3 *Responsible person* means a person appointed by the master or company as defined in SOLAS regulation IX/1, as appropriate, possessing the knowledge and experience required for the performance of duties specified in these Guidelines.
- .4 *Thorough examination* means a detailed assessment carried out by a competent person in order to determine whether or not the lifting appliance or loose gear is in compliance with the applicable requirements of the Administration.
- .5 *Certified* means that the lifting appliance or loose gear has been verified and documented as compliant to the satisfaction of the Administration or recognized organization acting on its behalf.
- .6 *Maintenance* means any activity carried out by a responsible person to keep the lifting appliance or loose gear in good working condition for continued safe use.
- .7 *Operational testing* means a test carried out by a responsible person to verify the correct functioning of a component or operation of the lifting appliance and/or associated loose gear.
- .8 *Load test* means a test in excess of the SWL, carried out in the presence of a competent person in order to check the structural integrity of the lifting appliance and its attachment to and adequacy of its supporting structure.
- .9 *Safe working load (SWL)* is the maximum static load at a specified radius which a lifting appliance or item of loose gear is certified to lift for a specified operating condition.
- .10 *Certificate of test and thorough examination* means a certificate issued by a competent person upon satisfactory completion of the test and thorough examination of the lifting appliance and/or loose gear.

3 Lifting appliances

3.1 Design, construction and installation

As required by SOLAS regulation II-1/3-13.2.1.1, lifting appliances installed on or after 1 January 2026 should be designed, constructed and installed in accordance with the requirements of a classification society which is recognized by the Administration in accordance with the provisions of regulation XI-1/1 or standards acceptable to the Administration which provide an equivalent level of safety.

3.2 Load testing and thorough examination

3.2.1 Load test

3.2.1.1 Lifting appliances to which SOLAS regulation II-1/3-13.2.1 applies should be load tested to the satisfaction of the Administration after installation and before being taken into use for the first time and after repairs, modifications or alterations of a major character.

3.2.1.2 Lifting appliances to which SOLAS regulation 3-13.2.4 applies should be load tested to the satisfaction of the Administration no later than the date of the first renewal survey on or after 1 January 2026 or after repairs, modifications or alterations of a major character.

3.2.1.3 Repairs, modifications or alterations of a major character are those which:

- .1 change the safe working load of the lifting appliance; or
- .2 affect the strength, stability or service life of the lifting appliance; or
- .3 affect the primary load bearing structure of the lifting appliance; or
- .4 modify the functionality of the lifting appliance or any part thereof which may affect its strength or safety or structural integrity.

3.2.1.4 Lifting appliances to which SOLAS regulations II-1/3-13.2.1 and 3-13.2.4 apply should be retested at least once in every five years.

3.2.1.5 For load testing of lifting appliances intended for use while the ship is in port or sheltered waters, the test load, as set out in table 1 below, should be established using the SWL. For lifting appliances intended for open-sea operations, the test loads should be to the satisfaction of the Administration or a classification society which is recognized by it, taking into account the applicable dynamic loads.

Table 1: Lifting appliances minimum test loads

| SWL of the lifting appliance, in tonnes | Test load, in tonnes |
|---|----------------------|
| SWL ≤ 20 t | 1.25 x SWL |
| 20 t < SWL ≤ 50 t | SWL + 5 t |
| SWL > 50 t | 1.10 x SWL |

3.2.1.6 Where the safe working load of the lifting appliances is undocumented and design information is not available, e.g. for lifting appliances which are installed on board before 1 January 2026 and the manufacturer no longer exists, the test load should be calculated using table 1, based on a safe working load nominated by the company, to the satisfaction of the Administration.

3.2.2 *Thorough examination*

3.2.2.1 Lifting appliances should be subject to thorough examination to **the satisfaction of the Administration**:

- .1 upon completion of any load test; and
- .2 annually.

3.2.2.2 Where thorough examination does not form part of the renewal survey or annual survey, verification that thorough examination of lifting appliances has been conducted/completed **to the satisfaction of the Administration** should take place during the renewal survey under SOLAS regulation I/7 or the annual survey under SOLAS regulation I/10, as applicable.

3.2.2.3 If on completion of a thorough examination, the competent person considers the lifting appliance to be unsafe for operation or not in compliance with **the applicable requirements of the Administration**, then that lifting appliance should be taken out of service until any deficiency is rectified to the satisfaction of a competent person. The lifting appliance should be clearly marked "not to be used" and the status should be recorded in a register of lifting appliances. While out of service, the relevant actions for inoperative lifting appliances as outlined under section 5 of these Guidelines should be followed.

3.2.3 *Records of thorough examination and testing*

3.2.3.1 A record of thorough examination and load testing should be maintained in a register of lifting appliances and should be available on board.

3.2.3.2 Load testing and thorough examination may be documented in any convenient form, provided each entry contains the necessary information, is clearly legible and is authenticated by a competent person. The minimum information to be included in the *Certificate of test and thorough examination*, as set out in the appendix 1, should be used. Alternatively, other formats may be used which are **acceptable to the Administration**, such as those of a classification society recognized by the Administration.

3.3 ***Demonstration of compliance***

3.3.1 Before being put into use for the first time, lifting appliances installed on or after 1 January 2026 should be certified as compliant with SOLAS regulations II-1/3-13.2.1 and II-1/3-13.2.3 with the recommended scope for demonstration of compliance of lifting appliances comprising the following:

- .1 a plan appraisal of the lifting appliance and foundation connections;
- .2 verification of materials;
- .3 survey, testing and examination during fabrication;
- .4 verification of component certificates including its loose gear; and
- .5 testing and thorough examination when installed on board.

3.3.2 Lifting appliances installed before 1 January 2026 should be certified as compliant with SOLAS regulation II-1/3-13.2.4 no later than the date of the first renewal survey on or after 1 January 2026.

3.3.3 Existing lifting appliances with valid certificates of test and thorough examination under **another international instrument acceptable to the Administration** and issued prior to the entry into force of SOLAS regulation II-1/3-13 should be considered compliant with SOLAS regulation II-1/3-13.2.4.

3.3.4 All certified lifting appliances on board a ship should be recorded in the *Register of Ship's Lifting Appliances and Cargo Handling Gear*, as set out in appendix 3, with the *Certificate of test and thorough examination* attached to it (see paragraph 3.2.3.2).

3.3.5 A rigging plan and block list showing the correct reeving and rigging arrangements for the lifting appliance and the associated loose gear positions is to be kept on board, if applicable.

3.4 Marking

3.4.1 The safe working load (SWL) and other information essential for the safe operation of the lifting appliance (e.g. maximum or minimum slewing radius or boom angle) should be permanently and clearly marked in a conspicuous place on the lifting appliance and should be available to the operator.

3.4.2 In all cases where the lifting appliance has a variable load radius rating, the SWLs corresponding to the minimum and maximum radius should be clearly marked in a conspicuous place on the lifting appliance and, in addition, a diagram of the permissible maximum loads over the entire range of use should be displayed in a position clearly visible to the operator.

3.4.3 If the safe working load is established in accordance with paragraph 3.2.1.6, this safe working load should be used for the purpose of compliance with SOLAS regulation II-1/3-13.2.3.

3.5 Maintenance, inspection and operational testing

3.5.1 General

3.5.1.1 Maintenance, inspection, operational testing and their respective intervals should be in accordance with the manufacturer's recommendations, industry standards and guidelines or classification society requirements and **recommendations acceptable to the Administration**, considering factors such as the operational profile of the ship and the lifting appliance.

3.5.1.2 All lifting appliances should be considered vulnerable to marine environmental conditions which may lead to significant and accelerated deterioration and corrosion, and the inspection and maintenance regime should be implemented accordingly.

3.5.1.3 The inspection and maintenance of lifting appliances may involve working at height, enclosed space entry and other hazards. These hazards should be considered when developing the relevant procedures for undertaking such tasks, including safe access.

3.5.1.4 Examples of items requiring particular attention may include:

- .1 corrosion and damage of primary structural members, including crane jibs, crane housings (slewing column), pedestals and foundations/foundation connections, including welds and bolts;
- .2 wear, corrosion and damage of mechanical components including winches, hydraulic cylinders, slew bearings, sheaves and pins;
- .3 correct setting and functioning of safety, protection and limitation devices;

- .4 condition and correct functioning of the lifting appliance as a whole and, in particular, hydraulic or pneumatic arrangements, hydraulic/pneumatic cylinders, motors, hoses, piping, winches, brakes and drums;
- .5 corrosion and damage to all means of safe access to the lifting appliances including attached maintenance platforms and extensions, with particular attention to support brackets and welds; and
- .6 certification and identification of ropes.

3.5.1.5 Damaged, broken, worn or corroded ropes, including their terminations, should be inspected and discarded according to manufacturers' recommendations, relevant industry standards, international standards (e.g. ISO 4309:2017 on Cranes – Wire ropes – Care and maintenance, inspection and discard) or requirements of classification societies **acceptable to the Administration**.

3.5.1.6 If, on completion of an inspection, the responsible person considers the lifting appliance to be unsafe for operation or not in compliance with **the applicable requirements of the Administration**, then that lifting appliance should be taken out of service until any deficiency is rectified to the satisfaction of a competent person. The lifting appliance should be clearly marked "not to be used" and the status should be recorded in a register of lifting appliances. While out of service, the relevant actions for inoperative lifting appliances as outlined under section 5 of these Guidelines should be followed.

3.5.2 *Maintenance manual*

3.5.2.1 A maintenance manual for a lifting appliance should be provided by the manufacturer. Where maintenance manuals for existing lifting appliances are not available from the manufacturer, these may be provided by competent third parties.

3.5.2.2 The maintenance manual should, as a minimum, include the following for each lifting appliance:

- .1 description of the required inspection regime and maintenance schedules specific to the lifting appliance, checklists and a list of key tools or other items for use when carrying out inspections and maintenance;
- .2 instructions for routine repairs/maintenance;
- .3 technical maintenance information;
- .4 information on recommended lubricants, oil and filter change;
- .5 information on slewing bearing maintenance, if applicable;
- .6 lists of replaceable parts/components, as well as the inspection/maintenance/replacement procedures for these parts/components;
- .7 lists of sources of spare parts;
- .8 model forms for records of inspections and maintenance;
- .9 operational test procedures, as well as the pre/post-operational test inspection procedures;

- .10 list of components requiring particular attention during inspections, as well as the inspection/maintenance procedures for these components;
- .11 recommended intervals for replacement and overhaul of components and equipment;
- .12 information on the preservation of the coating and corrosion protection system; and
- .13 information regarding special inspection and maintenance in cases where the lifting appliance is not operated for long periods of time.

3.5.3 *Records of inspections and maintenance*

3.5.3.1 Records of the routine inspection and maintenance of lifting appliances or their components or parts should be maintained and kept on board.

3.5.3.2 The records and particulars of inspection and maintenance may be documented in any convenient form, provided each entry contains the necessary information, is clearly legible and is authenticated by a responsible person. Any recommendations of the manufacturer for such inspection and maintenance records should be used.

3.6 Operations

3.6.1 *General*

3.6.1.1 Personnel operating lifting appliances should be qualified, familiarized with the equipment and be authorized by the master.

3.6.1.2 All personnel involved in a lifting operation should understand their role during the operation and, in particular, the signals that may be required to commence, coordinate or stop the operation.

3.6.1.3 Personnel involved in lifting operations should be equipped with appropriate personal protective equipment for the task.

3.6.1.4 Lifting operations should be planned, supervised and carried out so that any identified risks are minimized.

3.6.1.5 Procedures and instructions should relate to the specific type of lifting appliance and should be provided in the operations manual.

3.6.1.6 Due consideration should be given to any limiting conditions such as ship's motion/inclination, wind speeds including wind gusts, environmental conditions such as ice and snow, limitations of the lifting appliance such as SWL and slew radius, etc. of the lifting appliance.

3.6.1.7 Effective communication should be established between ship's personnel and shore-based personnel involved in the lifting operation.

3.6.1.8 Safe means of access to lifting appliances and loads requiring attachment/detachment should be established. Safe areas for the signaller and slinger should be available.

3.6.1.9 When developing plans and procedures for lifting operations, consideration should be given to avoiding any part of the lifting appliances striking any person or other structures in close proximity.

3.6.1.10 Procedures and measures for the safe operation of lifting appliances should take account of applicable international and national instruments and best practices for occupational safety and health.

3.6.1.11 Lifting appliances should be restrained and stowed in order to avoid uncontrolled movement during sea voyages. The stowage and restraining arrangements should be as required by the manufacturer.

3.6.1.12 Personnel operating the lifting appliance should consult the operations manual for any specific instructions related to the lifting operations.

3.6.2 *Operations manual*

3.6.2.1 An operations manual for a lifting appliance should be provided by the manufacturer. Where operations manuals for existing lifting appliances are not available from the manufacturer, these may be provided by competent third parties.

3.6.2.2 An operations manual should, as a minimum, include the following for each lifting appliance:

- .1 design, operational and environmental limitations;
- .2 compatible loose gear;
- .3 safety instructions; and
- .4 operating procedures, including special procedures, if any.

3.6.2.3 For lifting appliances installed before the date of entry into force of SOLAS regulation II-1/3-13 operation manuals should be developed with original manufacture, design and build data and take into account any modifications since installation. Where original data or modification data is not available, operations manual should be developed on the current operational procedures and practices.

4 Loose gear

4.1 Design and manufacturing

Loose gear utilized with lifting appliances to which SOLAS regulations II-1/3-13.2.1 and II-1/3-13.2.4 apply should be designed and manufactured in accordance with requirements acceptable to the Administration or a classification society which is recognized by the Administration in accordance with the provisions of regulation XI-1/1.

4.2 Proof test and thorough examination

4.2.1 Proof test

All loose gear in use with lifting appliances to which SOLAS regulation II-1/3-13 applies should have documentary evidence of a proof test and be retested after repairs, modifications or alterations of a major character to the satisfaction of the Administration. Where an item of loose gear is tested, minimum test loads should be to the satisfaction of the Administration, based on table 2 below.

Table 2: Loose gear minimum test loads

| Item | Test load, in tonnes |
|---|--|
| Single sheave block | 4 x SWL |
| Multi-sheave blocks and hook blocks: SWL ≤ 25 t 25 t < SWL ≤ 160 t 160 t < SWL | 2 x SWL (0.993 x SWL) + 27 1.1 x SWL |
| Hooks, shackles, chains, rings, swivels, etc.: SWL ≤ 25 t 25 t < SWL | 2 x SWL (1.22 x SWL) + 20 |
| Lifting beams, spreaders, frames, grabs: SWL ≤ 10 t 10 t < SWL ≤ 160 t 160 t < SWL | 2 x SWL (1.04 x SWL) + 9.6 1.1 x SWL |
| <p>Note 1. Sheave blocks that are permanently attached to, or are integral with the hook, are called hook blocks. Hook blocks are to be tested with the load for multi-sheave blocks. The hook of the hook block is to be tested with the loads for hooks.</p> <p>Note 2. The SWL for a single sheave block, including single sheave blocks with becketts, is to be taken as one half of the resultant load on the head fitting.</p> <p>Note 3. The SWL of a multi-sheave block is to be taken as the resultant load on the head fitting.</p> | |

4.2.2 Thorough examination

4.2.2.1 Loose gear should be subject to thorough examination to the satisfaction of the Administration:

- .1 upon completion of any proof test; and
- .2 annually.

4.2.2.2 Where thorough examination does not form part of the renewal survey or annual survey, verification that thorough examination of loose gear has been conducted/completed to the satisfaction of the Administration should take place during the renewal survey under SOLAS regulation I/7 or the annual survey under SOLAS regulation I/10, as applicable.

4.2.2.3 If, on completion of a thorough examination, the competent person considers the item(s) of loose gear to be unsafe for operation or not in compliance with the applicable requirements of the Administration, then that loose gear should be taken out of service until any deficiency is rectified to the satisfaction of a competent person. The loose gear should be clearly marked "not to be used" and the status should be recorded in a register of lifting appliances. While out of service, the relevant actions for inoperative loose gear as outlined under section 5 of these Guidelines should be followed.

4.3 Demonstration of compliance

4.3.1 Before being put into use for the first time, loose gear utilized with lifting appliances which comply with SOLAS regulations II-1/3-13.2.1 and 3-13.2.4 should be certified to meet the provisions in section 4.

4.3.2 Certificates of test and thorough examination of certified loose gear should be attached to the *Register of ship's lifting appliances and cargo handling gear* (see paragraph 4.7.1.2).

4.4 Marking

4.4.1 Loose gear should be clearly and permanently marked with its unique identification (serial no.), the SWL and any additional marks required for safe use.

4.4.2 In addition, specific types of loose gear should be marked with the following minimum information:

- .1 ramshorn hooks: range of sling angle;
- .2 block and hook blocks;
 - .1 rope diameter;
 - .2 rigging plan identification mark (for blocks) if any;
- .3 lifting beams, spreaders, frames;
 - .1 tare weight;
 - .2 allowable sling angles;
 - .3 details of the safe application of the SWL in case of complex equipment which can be utilized in different ways;
- .4 grabs;
 - .1 tare weight; and
- .5 other equipment as per the requirements of the classification society or industry standards acceptable to the Administration.

4.4.3 If there is insufficient space for the marking on the loose gear other than the SWL, the omitted information should be included in the certificate or be provided by other suitable means.

4.5 Operation

Personnel involved in lifting operations which utilize loose gear should be qualified, familiarized with the equipment and be authorized by the master.

4.6 Maintenance and inspection

4.6.1 Maintenance and inspections at respective intervals should be in accordance with the manufacturer's recommendations, industry standards and guidelines or classification society requirements and **recommendations acceptable to the Administration** considering factors such as the operational profile of the ship and the loose gear.

4.6.2 All loose gear should be considered vulnerable to marine environmental conditions which may lead to significant and accelerated deterioration and corrosion and the inspection and maintenance regime should be implemented accordingly.

4.6.3 The inspection and maintenance of loose gear may involve working at height, enclosed space entry and other hazards. These hazards should be considered when developing the relevant procedures for undertaking such tasks, including safe access.

4.6.4 Loose gear should be inspected by a responsible person before each use.

4.6.5 Examples of aspects requiring particular attention may include:

- .1 wear, corrosion, damage and correct functioning of the loose gear;
- .2 damaged, worn or corroded chains, including their terminations;
- .3 certification and identification of loose gear; and
- .4 physical or chemical degradation, including degradation due to the exposure to the environment.

4.6.6 If on completion of an inspection the responsible person considers the loose gear to be unsafe for operation or not in compliance with **the applicable requirements of the Administration**, then the loose gear should not be used until any deficiency is rectified to the satisfaction of a competent person. The loose gear should be clearly marked "not to be used" and the status should be recorded in a register of lifting appliances. While out of service, the relevant actions for inoperative loose gear as outlined in section 5 should be followed.

4.7 Records of inspection, maintenance, testing and thorough examination

4.7.1 Records of thorough examination and testing

4.7.1.1 A record of thorough examination and evidence of proof testing of loose gear should be maintained in a register of lifting appliances and kept on board.

4.7.1.2 Records of thorough examination may be documented in any convenient form, provided each entry contains the necessary information, is clearly legible and is authenticated by a competent person. The minimum information to be included in the *Certificate of test and thorough examination of loose gear*, as set out in appendix 2, should be used. Alternatively, other formats may be used which are **acceptable to the Administration**, such as those of a classification society recognized by the Administration.

4.7.2 Records of inspection and maintenance

4.7.2.1 Records of the routine inspection and maintenance of loose gear should be maintained and kept on board.

4.7.2.2 The records and particulars of inspection and maintenance may be documented in any convenient form, provided each entry contains the necessary information, is clearly legible and is authenticated by a responsible person. Any recommendations of the manufacturer for such inspection and maintenance records should be used.

5 Inoperative lifting appliances and loose gear

For the implementation of SOLAS regulation II-1/3-13.4, the following actions should be taken by the master to mitigate risks posed by inoperative lifting appliances:

- .1 take the inoperative lifting appliance into account in planning and executing a safe voyage;
- .2 prevent operation of inoperative lifting appliances;
- .3 prevent uncontrolled movement of inoperative lifting appliances or their components using appropriate restraining and preventing arrangements, if required;
- .4 store inoperative loose gear separately from in-service loose gear and mark it as being inoperative; and
- .5 record a particular lifting appliance or loose gear that is inoperative in the register of ship's lifting appliances until necessary repairs have been completed and it has been load tested or proof tested, as necessary, and thoroughly examined.

APPENDIX 1

**SAMPLE CERTIFICATE
OF TEST AND THOROUGH EXAMINATION OF LIFTING APPLIANCES**

(Official seal)

Certificate No. _____

Name of Ship:

IMO Number:

Call Sign:

Port of Registry:

Name of Owner:

This is to certify that the lifting appliances listed below have been tested and thoroughly examined as required by SOLAS regulation II-1/3-13.

| Situation and description of lifting appliance (with distinguishing number or mark, if any) which has been tested and thoroughly examined | Angle to the horizontal or radius at which test load is applied | | Test load (tonnes) | Safe working load at angle or radius shown (tonnes) |
|---|---|-----------------|--------------------|---|
| | Angle (degrees) | Radius (metres) | | |

This certificate is valid until *(dd/mm/yyyy)*

Completion date of the testing and thorough examination on which this certificate is based:

Issued at *(place of issue of the certificate)*

Date of issue *(dd/mm/yyyy)*

Signature of competent person issuing the certificate

(Seal or stamp of the issuing authority)

APPENDIX 2

**SAMPLE CERTIFICATE
OF TEST AND THOROUGH EXAMINATION OF LOOSE GEAR**

(Official seal)

Certificate No. _____

Name of Ship:

IMO Number:

Call Sign:

Port of Registry:

Name of Owner:

This is to certify that the loose gear listed below have been tested and thoroughly examined as required by SOLAS regulation II-1/3-13.

| Distinguishing number or mark | Description of loose gear | Number tested | Date of test | Test load applied (tonnes) | Safe working load (tonnes) |
|-------------------------------|---------------------------|---------------|--------------|----------------------------|----------------------------|
|-------------------------------|---------------------------|---------------|--------------|----------------------------|----------------------------|

Name and address of makers or suppliers:

Name and address of the company of competent person who witnessed testing and carried out thorough examination:

Name of the competent person and position in public service, association, company:

Completion date of the testing and thorough examination on which this certificate is based:

Issued at (place of issue of the certificate)

Date of issue (dd/mm/yyyy)

Signature of competent person issuing the certificate

(Seal or stamp of the issuing authority)

APPENDIX 3

**SAMPLE FORM
OF REGISTER OF LIFTING APPLIANCES AND CARGO HANDLING GEAR**

Name of Ship

Official Number

Call Sign

Port of Registry

Name of Owner

Thorough examination of lifting appliances and loose gear

| (1) Situation and description of lifting appliances and loose gear (with distinguishing numbers or marks, if any) which have been thoroughly examined (see note 1). | (2) Certificate nos. | (3) I certify that on the date to which I have appended by signature, the gear shown in column (1) was thoroughly examined and no defects affecting its safe working condition were found other than those shown in column (4) date and signature (see note 2). | (4) Remarks |
|--|-------------------------|--|----------------|
| | | | |
| | | | |

Note 1:

If all the lifting appliances are thoroughly examined on the same date it will be sufficient to enter in column (1) 'All lifting appliances and loose gear'. If not, the parts which have been thoroughly examined on the dates stated must be clearly indicated.

Note 2:

The thorough examinations to be indicated in column (3) include:

- (a) Initial
- (b) 12-monthly
- (c) Five-yearly
- (d) Repair/damage
- (e) Other thorough examinations including those associated with heat treatment