360 Quality Code
Guidance notes for inspections of ships
March 2017

Preface

The members of the 360 Quality Association have developed the Code for handling of Reefer cargoes in Specialized Reefer Ships and Ports, hereinafter called – the Code. The aim of the Code is not only to prevent damage to cargo during physical handling but also to prevent contamination of the cargo and to ensure that the reefer installation and power generation plant are of adequate capacity and maintained in good condition.

The Code lays down requirements for ships and terminals, which must be followed in order to eliminate handling damage in the part of the supply chain, which is under direct control of the Shipping Lines and their service providers. The Code ensures that damage caused to any unit of cargo shipped on a specialized reefer ship can be accounted for at any point in the supply chain with the common goal to improve the supply chain.

These Guidance notes relate to the 360 Quality Code prepared and published by the 360 Quality Association. They provide more detailed information on selected items of part 6 to the Code in order to harmonize possible variations in interpretations by inspectors. Furthermore the Guidance notes inform the ship Owners/managers about the Code requirements. Members of the 360 Quality Association, Classification Societies and approved Organisations for Inspection have jointly prepared these guidance notes.

The inspector is guided with background information on each subject. Per subject the required 'verifications' are described in detail for each question.

Conduct of Inspections

Specialized reefer ships may be engaged in cargo handling operations and handling of reefer containers during 360 Quality inspections. As a rule, at least 50% of the cargo spaces need to be accessible to ensure minimum scope of inspection carried out by the inspector. If the condition of the cargo holds in 50% of the holds is found to be in such a state that the inspector cannot, without doubts, judge the condition of the cargo spaces, he may at his discretion complete the inspection after having inspected all the cargo spaces.

Fresh damages: if the extent of the fresh damages is such that consideration needs to be given by the inspector, he should take into account the extent of the damage and the availability of spares. Damages that are repaired during the inspection, shall not be marked as a non-conformity.

The inspector must specify the findings on the questions of the checklist in the comments column, e.g. the location of damage, excessive wear and tear, improper repairs, leakages etc.

If the ship's design is such that a certain question is not applicable, this will be indicated in the column "Not applicable (N.A.)" unless otherwise stated in the guidance notes.

The inspector should complete the entire checklist. At the end of the inspection, all observations must be discussed with the Master, C/O and superintendent (if present).

Re-Inspections

In accordance with the code, re-inspections on failed sections are allowed to be conducted within 3 months from the initial survey date. During such re-inspection the complete failing section(s) is (are) to be re-inspected but particular focus is to be given to the items or locations were deficiencies were identified.

Professional Judgement

The inspector should always use his professional judgement to complement the guidelines given in this document. Whenever the inspector uses his professional judgement to complement the guidelines he should make an appropriate entry in the inspection report.

Scoring System

The inspector shall use the Inspection checklist for Ships and Containers published by the 360 Quality Association. The subjects for the inspection are divided into 14 groups. Each group has a weight depending upon its importance in preventing damage. To qualify for the 360 Quality Certificate the ship must score as follows:

- a minimum of 60% of the points in each of the groups for weather tightness, hydraulic system, gratings, side shorings, cleaning, cargo holds & cooler spaces, reefer equipment, power generation, temperature management and containers.

- a minimum of 75% of the points in total.

Interpretations applicable to the questions on the Inspection checklist for Specialized Reefer Ships

6.1 Quality policy and awareness

The crew on board must be aware of their responsibilities in the supply chain. The vessel checklist, the Zero Damage Computer Based Training (CBT) module and the cargo care manual are training tools to increase the knowledge and awareness of the crew. Hygiene and glass signs must be posted near the gangway to inform stevedores and crew. Walking boards must be used when handling the pre-slung cargo in the hatch square. All pallet obstructions in cargo holds shall be properly fenced off and if required squared off to permit proper stowage and avoid damage to cargo during handling.

Food safety has become increasingly important in the recent years due to food crises such as BSE and bird 'flu'. Contamination sources can be from biological, physical or chemical origin. Contamination of cargo, such as contamination with hydraulic oil, grease, seawater, glass and debris (nails, wood, splinters) must always be avoided.

Qpa01 Is the Zero Damage Computer Based Training CD available on board and used for training?

The inspector checks if the Zero Damage CBT is available on board and installed on a designated computer. The inspector also checks the training records. In case no training records are available, the rating will be "No".

Qpa02 Is a vessel checklist used and filed for each stage of the voyage?

The inspector checks if a vessel checklist is used FOR EACH STAGE of the voyage; pre-loading stage, loading stage, sea voyage and unloading stage. If the checklist is not filled in truthfully and completely, the rating will be "No".

Qpa03 Are walking boards used by crew and stevedores during loading and discharging of fruit cargoes?

The inspector checks visually if walking boards are used by crew and stevedores during the handling of fruit cargoes. If walking boards are not used during handling of fruit cargoes, the rating will be "No". When no cargo operations are witnessed, this question must be marked "N.A.".

Qpa04 Are "Use walking boards" and "No smoking" signs painted in the hatch coamings?

The inspector verifies if the signs 'Use walking boards' and 'No smoking' are present on the inner hatch coamings. If the signs are not painted in the hatch coamings, the rating will be "No".

Qpa05 Are all pallet obstructions removed, fenced off or marked?

The inspector checks the presence of pallet obstructions, such as lashing points on the pillars. The inspector verifies if pallet obstructions, if present, are fenced off or marked. If pallet obstructions that can be removed are found present, the rating will be "No". If pallet obstructions that cannot be removed are found not fenced off or not marked, the rating will be "No".

Qpa06 Is a sign with the glass rules posted near the gangway?

The inspector verifies if a sign with the glass rules is posted near the gangway, prohibiting persons to carry fragile items such as glass into cargo spaces. If the glass sign is not present near the gangway, the rating will be "No".

Qpa07 Is a sign with the hygiene rules posted near the gangway?

The inspector verifies if the hygiene sign is present near the gangway. If the hygiene sign is not present near the gangway, the rating will be "No".

Qpa08 Is a risk assessment plan available on board which shows the food safety hazards and control measures?

The inspector verifies if a risk assessment plan is available on board. As a minimum every shipping line defines control measures on: Hygiene & Glass rules, Inspection of cargo (Accept/Reject), Temperature management (incl. calibration sensors), Cleaning (incl. 'Food grade' detergents), Maintenance of cargo holds, Cargo stowage and securing, Weather routing assistance, Pest control & garbage management, Rain directives, Weather protective directives and Reefer plant. If a risk assessment plan is not available on board, the rating will be "No".

Qpa09 Are the vessel's staff members aware of their responsibilities in respect of 360 Quality?

The inspector verifies if the staff members responsible for cargo care such as the Master and Chief Engineer are aware of their responsibilities in respect of 360 Quality. This involves amongst others awareness of food safety hazards, measures to control cargo quality, avoiding handling damage and the functioning of the reefer plant. If the vessel's staff members are not aware of their responsibilities in this respect, the rating will be "No".

6.2 Weather tightness

Ships shall be equipped with weather tight hatch covers. Regular inspections shall be made by the ship's crew to ensure that all methods to maintain weather tightness are in satisfactory condition.
Furthermore the ship shall maintain sufficient spare parts to enable it to ensure the proper function and weather tightness of the hatch covers.

The weather tightness of the hatches depends to a large extent on the condition of the sealing rubbers, the compression bars, the side cleats and the landing pads. In case weather deck hatches are not weather tight, traces of leakage can usually be observed on the hatch coamings. In case signs of leaks are found, the surrounding area needs to be further investigated.

The permanent compression of the hatch seals must not exceed 25% of the original thickness of the seals. The sealing rubbers must be kept in flexible condition, without any gaps. To correct small deviations spare hatch seals must be present on board. The absolute minimum length of any insert should be 50 cm.

The compression bar is in direct contact with the rubber hatch seal. Compression bars can be made from different materials. Some compression bars are made of ordinary and some of stainless steel. Preferably, compression bars are made of stainless steel for the reason that no rust build-up can take place.

In general weather deck hatches are resting on so-called landing pads or on the rim of the hatch cover skirt. In case the hatch seal exceeds the required 25 % impression limit the landing pads or hatch skirts are often wasted as well. Steel block shape landing pads are sometimes located in the hatch coamings. On other vessels the hatch coamings are used as landing pad.

The quick acting cleats and top wedges keep the hatch in position when the vessel is pitching and rolling during the sea voyage.

Wtt01 Is the permanent compression of the sealing rubbers of weather deck hatches less than 25%?

Gasket materials in the periphery of the covers and cross-joints need to be checked for deformation due to excessive compression. The inspector verifies if compression of the sealing rubbers exceeds 25%, based on the thickness of the spare hatch seal. To determine if the impression exceeds this limit, the inspector first has to measure the thickness of the spare sealing rubber. If no spare sealing rubbers are available, the maximum compression is set at 1 cm as a rule of thumb in which case the inspector should add this in his comments. If the permanent compression of the sealing rubbers is more than 25%, the rating will be "No".

Wtt02 Are the hatch cover landing pads without excessive wear?

Steel to steel contact between hatch cover side plate and the landing pads is essential for exact compression set of the gasket. If the hatch cover is not resting on the landing pads, gaps will be present between landing pads and hatch cover brackets. Over compression of the gasket can lead to a permanent set. The inspector checks the compression of the sealing rubbers and the wear of the landing pads and establishes the maximum allowed wear on that basis. If the original thickness of the landing pads is reduced with more than the manufacturer's recommendation, the rating will be "No".

Wtt03 Are the joints of sealing rubbers of weather deck hatches without gaps and inserts with a minimum length of 50 cm?

The inspector verifies if gaps are present between the joints of the sealing rubbers. If gaps are present or inserts of less than 50 cm length, the rating will be "No".

Wtt04 Are the sealing rubbers of weather deck hatches flexible?

The inspector looks for signs, which show that the gasket material has lost its elasticity and may require renewal. If the sealing rubbers are not flexible anymore, the rating will be "No".

Wtt05 Are the sealing rubbers of weather deck hatches without cracks?

Gasket materials in the periphery of the covers and cross-joints need to be checked for ageing and damage. In case the hatch seal is subjected to ageing, cracks will appear in the hatch seal. If the sealing rubbers have cracks, the rating will be "No".

Wtt06 Are the hatch cover packing retaining channels without excessive corrosion?

In the retainer channel, rust build-up can develop. This rust build up can squeeze or twist the hatch seal in the retaining channel. The corrosion shall not affect the sealing function of the rubbers. The inspector verifies if the retaining channels are without excessive corrosion and that the rubber seals are not squeezed or twisted. If excessive corrosion is present, the rating will be "No".

Wtt07 Are the compression bars without deformation and free of excessive wear or corrosion?

The inspector verifies if deformation or damage of compression bars (including the cross joints) may be cause for leakage. Rust flakes indicate the presence of excessive corrosion. The inspector verifies if wear or corrosion of compression bars (including the cross joints) may be cause for leakage. It may be observed that rusty parts of the compression bars are broken out. Through these small gaps ingress of water can take place and contaminate the cargo. If deformation or damage is present, the rating will be "No". If excessive wear or corrosion is present, the rating will be "No".

Wtt08 Are the side cleats and top wedges without deformation and free of excessive wear or corrosion?

All peripheral and cross-joint cleats and top wedges need to be checked for deformation, excessive wear or excessive corrosion. If deformation is present or a reduction of the rod diameter due to wear or corrosion is visible, the rating will be "No".

Wtt09 Are the rubbers of the side cleats flexible and unpainted?

The inspector verifies if the rubbers of the side cleats are still flexible and unpainted. If the rubbers are not flexible anymore or painted, the rating should be "No".

Wtt10 Are other hold accesses such as stevedore entrances weather tight?

The inspector verifies the condition of the sealing rubbers of other hold accesses. If the other hold accesses are not weather tight, the rating will be "No".

Wt11 Are the hatch coaming drains free flowing?

The draining arrangement in the periphery of the hatch covers and at the cross joints needs to be checked to ensure that water which enters is drained away to the deck. If a visual inspection is not sufficient, the inspector should pour water into the drains. Rust flakes near the drains can possibly block the drain hole. Ingress of green water through the drain system should be avoided and non-return valves, if fitted, must be working properly. If the hatch coaming drains are not free flowing, the rating will be "No". If CA service is in progress, the rating will be "N.A.".

Wtt12 Are quarterly hose tests and log entries done?

To test the weather tightness, the crew must regularly execute a hose test on all weather deck hatches and stevedore entrances. The inspector verifies if the hose test is executed in the last quarter. Log entries can be made in the deck logbook or other appropriate document. If the inspector has doubts about the execution, a hose test can be requested during the inspection. The water should be sprayed on the hatches/stevedore entrances from the top and from the sides. The hose test is executed at normal operating pressure (5 bar) at a distance of 1 meter from the hatches. During the hose test, the coamings should be inspected for water leakages and the results must be recorded in the deck logbook. If the hose test has not been executed and logged in the last quarter, the rating will be "No".

Wtt13 Are sufficient replacement parts for the hatch covers available?

The Inspector determines if the vessel maintains enough spare parts in the way of sealing rubbers and special moulds to enable it to renew such fittings. In general, spares to replace all weather deck hatch cover sealing rubbers and moulds of one hatch are considered sufficient. The ship shall also maintain a small amount of cleats and wedges. If sufficient spare parts are not available on board, the rating will be "No".

6.3 Hydraulic system

To prevent hydraulic leakages a maintenance program on the hydraulic system should be in place.
All hydraulic piping in the cargo spaces and outside such spaces shall be checked for condition and signs of leakage before the commencement of every loaded voyage. Contamination of cargo with hydraulic oil will always lead to claims and in most cases cargo will have to be destroyed!

Depending on the vessel configuration weather deck hatches and/or tween deck hatches can be operated with hydraulic cylinders or chains/cables. Hydraulic cylinders, piping, flexible hoses and connections can leak if not properly maintained. The hydraulic piping and connections must be without excessive rust. Excessive rust is present on pipes in case rust flakes can be observed on the pipes.

The inspection on the cargo gear is limited to those parts of the hydraulic system that may contaminate the cargo. In principle, the same verifications will take place as described above.

Flexible hydraulic hoses are connected to the tween deck and weather deck cylinders. The hoses must be of proper length (not too short and not too long) to prevent that the hoses are squeezed, stretched or chafed against other surfaces during opening and closing of the tween decks. To check the behaviour of these hoses an annual pressure test must be executed. During this test, the tween deck and weather deck hatches are opened and closed at relief valve pressure while the crew checks for leakage and verifies the behaviour of these flexible hoses. The result of this test must be recorded in the Engine logbook.

Hydraulic hoses have a limited life time and are not allowed to be painted. The paint will increase the ageing process and this will finally result in cracks in the rubber hose. Spare hydraulic hoses must be present on board.

A cylinder with a continuous flow or dripping of hydraulic oil is a sign that the cylinder is starting to leak. Most often leakage is found to hydraulic tween deck cylinders that are located above tween deck drain wells. Any leakage will then accumulate into the drain well areas. Nonetheless, the capacity of drain wells is restricted and if leakage is not remedied, they can overflow and contaminate the cargo.

For ships without hydraulically operated hatches and without hydraulic cargo gear all questions should be answered with "N.A.".

Hyd01 Are the hydraulic piping and hydraulic connections without excessive corrosion?

The inspector checks the actual condition of the hydraulic piping, connections, pipe mounting and brackets with respect to excessive corrosion. Rust flakes indicate the presence of excessive corrosion. If excessive corrosion is present, the rating will be “No”.

Hyd02 Are the hydraulic hoses and joints without signs of excessive wear and/or ageing?

Hydraulic hoses have a limited lifetime. The inspector checks the actual condition of the flexible hoses and joints with respect to excessive wear and/or ageing. Bulging may occur if the steel mantle under the rubber protection of the hose starts to corrode. The presence of bulging or cracks is a clear sign of ageing. If bulging or cracks are present, the rating will be “No”.

Hyd03 Are the hydraulic hoses correctly installed, such as proper length, free of twists and chafing hazards?

The inspector verifies if the hydraulic hoses are correctly installed (proper length, type, fittings), correctly positioned, free of any twists and safe from physical damage hazards, such as chafing. If the hydraulic hoses are not correctly installed, the rating will be “No”.

Hyd04 Are the hydraulic hoses unpainted?

The inspector verifies the presence of paint on rubber hydraulic hoses. If the hydraulic hoses are painted, the rating will be “No”.

Hyd05 Is the system to operate the hatch covers without any signs of leakage of hydraulic oil?

The inspector verifies the presence of leaking hydraulic cylinders or hoses on tween deck hatches and weather deck hatches. Leakage of hydraulic cylinders is indicated by signs of a continuous flow or dripping of hydraulic oil or accumulation of oil in the drain wells. Any buckets, tins or rags placed in the immediate vicinity of hydraulic piping system may also point to leakages. If leakage is present, the rating will be "No".

Hyd06 Is the cargo gear without any signs of leakage of hydraulic oil?

The inspector should limit his inspection to those parts of the hydraulic system that may actually contaminate the cargo. The inspector verifies the presence of leakages on external hydraulic hoses/piping. If leakage is present, the rating will be "No".

Hyd07 If hydraulic oil leakage is present, is it certain that this leakage cannot contaminate the cargo?

Leakages and oil accumulations that can contaminate the cargo are never acceptable. If hydraulic oil leakage is present, which can contaminate the cargo, the rating will be "No".

Hyd08 Has an annual pressure test of the hydraulic system been performed (at relief valve pressure)?

All piping and hoses should be tested annually by the ship's crew to relief valve pressure by opening and closing each main- and tween deck hatch cover completely, ensuring pressure rises to lift the system relief valves at each extremity (open and close).The ship's crew checks for leakage and verifies the behaviour of the hydraulic hoses. Proof shall be furnished by an entry in the Engine logbook (or similar record) and signed by the chief engineer. If such proof is not available, the rating will be "No".

Note: This should test every piece of piping/hoses to the maximum pressure it can be subjected to without undue additional work. In normal operation, the relief valves should not lift if the operator stops when the hatch is open or closed. In that respect this test can be considered as a test above normal working pressure.

Hyd09 Are sufficient spare hydraulic hoses available?

The inspector has to assess if the quantity of available spares is sufficient. Spares need to be available on board to allow replacement of any type of hydraulic hose on board. If sufficient spare hydraulic hoses are not available, the rating will be "No".

Hyd10 Is a maintenance program available for the hydraulic system and hydraulic hoses?

Hydraulic hoses have a limited lifetime. The inspector verifies if a maintenance program for the hydraulic system and hydraulic hoses is present on board. If a maintenance program is not present, the rating will be "No".

6.4 Cargo gear

The Master shall ensure that the cargo gear and interchangeable components are kept in full working order and act to overcome any problems with same that may result in damage to the cargo. The cargo gear must be regularly maintained to ensure proper working during loading and discharge operations.

Cgg01 Is the cargo gear maintained in accordance with a planned maintenance system and without overdue items (>3 months)?

The inspector verifies if a planned maintenance system is in place for the cargo gear and interchangeable components. Maintenance items, which are more than 3 months overdue, are not allowed. If no planned maintenance system is in place or maintenance is overdue, the rating will be "No".

Cgg02 Is all cargo gear operational (smooth operation) and in apparent good order and condition?

The inspector makes a visual inspection of the cargo gear. If the cargo gear is in operation, the inspector monitors its performance. Planned maintenance of one crane or derrick is allowed. If part of the cargo gear for other reasons is not operational or not in apparent good order and condition, the rating will be "No".

Cgg03 Is the cargo gear register up to date with valid endorsement?

The inspector makes sure that the cargo gear book is updated and the cargo gear and interchangeable components have been regularly inspected and load tested. If the cargo gear register is not up to date, the rating will be "No".

6.5 Gratings

Gratings are placed in decks with the purpose to distribute the refrigerated air from the cooler battery spaces to the cargo.

For design criteria of the gratings, see attachment 1. Gratings can be made of different materials, e.g. plywood, aluminium and solid wooden planks.

Gratings or grating systems not being in order, damaged, mis-aligned, tilting or sliding or incorrectly repaired will give risk to physical damage to cargo and persons or give risk to temperature abuse of the cargo.

In general, plywood and aluminium gratings are arranged with grooves on the top structure to enable air to flow when cargo with flat bottom surface is placed there. Plywood gratings have plywood striping attached to form the grooves. Aluminium gratings have the grooves as an integral part of the structure. Wooden planks are installed with space between to achieve the same result.

Wooden gratings, made of plywood or solid planks, are exposed to abrasive wear from forklifts and pallet-jacks. Gratings made of aluminium may be damaged by excessive loads and flattening from solid plastic wheels on pallet-jacks.

Plywood gratings are placed on wooden or steel supports to create a horizontal air duct between the ship's deck and the sheet of plywood. Improper repairs and lack of maintenance can lead to blockage and/or leakage of air causing improper distribution of air.
Solid wooden planks are normally placed directly on steel beams forming part of the ships structure. Wooden planks are frequently used in the upper deck of a two deck configuration with plywood gratings in the lower deck. Aluminium gratings are constructed with the supports as an integral unit creating the air duct.

It is recommended that gratings are fixed to supports to prevent movement during operation with cargo. Sliding and tilting of gratings are dangerous and will cause damage to gratings and supports.

At all times should gratings and planks be flush with a difference in height of less than 1 cm.

Plywood and aluminium gratings should be repaired by replacing the complete damaged grating. Planks are repaired by cropping out the damaged piece as long as support is reached for the inserted piece. A stock of spare gratings should be kept on board.

The inspector carries out a condition survey of gratings including documentation of findings. For ships that because of their design don't require gratings all questions concerning gratings should be answered with "N.A.". For ships that because of their design don't require planks all questions concerning planks should be answered with "N.A.".

Grt01 Are the wooden or aluminium gratings without visual damage (1% tolerance)?

As a general rule it is tolerated that 1% of the area of the gratings may be broken or cracked. If the extent of fresh damages is such that consideration needs to be given by the inspector, he should take into account the extent of the damage and the availability of spares. If the area with broken or cracked gratings in average exceeds 1% the rating is "No". If fresh broken or cracked gratings exceeds 50% of the amount of spare gratings the rating is "No".

Grt02 Are the wooden gratings without excessive wear or aluminium gratings without deformation (1% tolerance)?

As a general rule it is tolerated that 1% of the area of the gratings may show excessive wear. Gratings have excessive wear if the thickness of the striping profile (usually abt 9mm) is reduced with more than 50%. Small dents to aluminium gratings, less than 10 mm deep can be tolerated. If wear or deformation exceeds these criteria the rating is "No".

Grt03 Are the gratings properly positioned on the support beams and the grating supports properly fixed?

The inspector verifies by random checks if wooden gratings are properly positioned on the support beams and if support beams are properly fixed on the deck and/or to the grating boards, depending on the design (see attachment 1).If support beams are loose, tilting, out of position or misaligned the rating is "No". For aluminium gratings the rating is always "Yes".

Grt04 Are the gratings without large gaps and their supports properly aligned to avoid leakage or blockage of the airflow?

The inspector verifies by random checks if the gratings are without large gaps and if joining support beams are properly aligned for airflow. Misalignment of supports or improper repair by adding timber (cross-wise or parallel) to worn out supports will lead to blockage of the airflow. Large gaps may be found around the hatch-cover gratings and between gratings of hatch-cover panels. If large gaps are present in the gratings or if there are supports disturbing the flow of air the rating is "No".

Grt05 Are the grating supports without visual damage and excessive wear?

The inspector verifies by random checks if the edges of the support beams are damaged or torn. Damage to the support beams or excessive wear will give the rating "No".

Grt06 Are the wooden planks without visual damage (1% tolerance)?

Not more than 1% damaged wooden planks is tolerated. The inspector checks by random the condition of the wooden planks. If more than 1% of wooden planks are damaged the rating is "No".

Grt07 Are the wooden planks without excessive wear (1% tolerance)?

Not more than 1% excessively worn wooden planks is tolerated. The inspector verifies by random checks if wooden planks are splintering and corners are rounded off. If wooden planks are splintering and/or have corners rounded off the rating is "No".

Grt08 Are the gratings free of movement such as tilting or sliding?

The inspector verifies if the gratings are not tilting or sliding, preferably when it can be observed that a forklift or a pallet jack is used to handle cargo. If more than one piece of grating, plywood or aluminium, tilts or slides more than 1 cm the rating is "No".

Grt09 Are the grating decks flush?

The inspector verifies if the difference in height on the grating boards is less than 1 cm. If the height difference exceeds 1 cm the rating is "No".

Grt10 Are the plank decks flush?

The inspector verifies if the difference in height on wooden planks is less than 1 cm. If the height difference exceeds 1 cm the rating is "No".

Grt11 Have grating repairs been done properly i.e. no patchwork?

Damaged gratings need to be replaced in full. Patchwork within any one grating board is not considered acceptable unless it is considered fresh and temporary. Any patchwork, unless considered temporary, will give the rating "No".

Grt12 Is information available about the strength of the gratings?

Proof of sufficient strength of gratings shall be available on board e.g. by respective information from grating manufacturer, from managers or from shipyard. If documentation is not available the rating is "No".

Grt13 Is the strength of the gratings in line with the Code, minimum 5 tons forklift including cargo?

The inspector verifies the strength of the gratings based on information given in attachment 1. If gratings do not meet criteria in attachment 1 the rating is "No". This question should be given the rating "N.A." if the information under Gr12 gives the rating "No".

Grt14 Are sufficient spare gratings (wooden 2%, aluminium 10 m2), planks (2%) and supports (60 mtr) available?

The inspector shall determine if the vessel maintains enough spares. In general, in case of wooden gratings and planks, at least 2 % of the total area shall be kept available as spare. In general, in case of supports, at least 60 mtr shall be kept available as spare. In general, in case of aluminium gratings, at least 10 m2 shall be kept available as spare. Where several types of gratings or planks are fitted on board, spares of each type shall be kept available on board. If the state of the gratings, planks or supports implies that the vessel has difficulties in maintaining the gratings in a good condition, more spare gratings may be required than the quantities mentioned above. If the amount of plywood gratings and planks is less than 2% or the amount of supports is less than 60 mtr or the amount of aluminium gratings is less than 10 m2 the rating is "No".

6.6 Side shorings

Flared areas must be provided with side shorings to support the cargo during the sea voyage. The side shorings should be able to withstand the forces acting on it due to the combined weight of cargo and ship accelerations that can be expected during a voyage in any weather condition. In attachments 2 and 3 the design criteria and three standard designs of side shorings are listed, which can withstand these forces.

Ships that are laid out for break bulk cargoes only and therefore not equipped with vertical bulkheads or adequate side shorings by design should have question Ss00 answered with "No". These ships should be certified with the notation „Not certified for palletised cargoes“.

For ships with vertical bulkheads that do not require side shorings all questions concerning side shorings should be answered with "N.A." (except for question Ssh00 which should be "Yes").

The side shoring consists of a plywood or aluminium plate, support battens, support stays and fastening arrangements. To prove that side shorings have enough strength a calculation has to be made. This calculation must be on board.

Side shorings made of only steel pipes, bars or similar are not considered adequate. Pipe shoring covered with additional plywood or aluminium plates and battens are acceptable.

Most damages on side shorings can be observed just above the grating surface (at the height of the forklift prongs). To increase the stiffness of the side shorings, support battens are placed behind or on the face of the boards. In case these battens are cracked, the complete batten must be renewed. Temporary repair by assembling battens next to the crack (patchwork) is not allowed.

The inspector carries out a condition survey of side shorings including documentation of findings.

Ssh00 Is the ship laid out for palletised cargoes and equipped with vertical bulkheads or adequate side shorings by design?

The inspector verifies if the ship is laid out for break bulk cargoes only and therefore not equipped with vertical bulkheads or adequate side shorings by design. Side shorings made of steel pipes, bars or similar which are not covered by plywood boards are not considered adequate. Temporary, removable side shoring constructions are also not considered adequate. If the ship is not equipped with vertical bulkheads or adequate side shorings by design, the rating will be “No”.

Ssh01 Are the side shorings (boards and support battens) free of visible damage (1% tolerance)?

The inspector verifies damages on the plywood or aluminium boards. If all side shorings are collapsed, the inspector will ask the crew to erect at least 10 boards for a random check. The inspector checks if cracks are present in the battens of the side shoring and if patchwork is present. The inspector will report per inspected compartment the damaged side shorings that have been established. As a general rule, not more than 1% damaged side shorings are tolerated. If more than 1% damaged side shorings are present, the rating will be “No”.

Ssh02 Are the support stays between the side shorings and the ship's side free of visible damage (1% tolerance)?

The inspector verifies that support stays are not damaged (cracked or delaminated in the case of plywood). If more than 1% damaged support stays are present, the rating will be “No”.

Ssh03 Are the fastening arrangements of side shorings and support stays intact and properly fixed (1% tolerance)?

The inspector verifies if the fastening arrangements of side shoring boards and support stays are intact (not deformed or damaged) and properly fixed (no nails). The inspector also verifies if the horizontal support stays are actually placed horizontally and not under an angle that will affect the strength. If more than 1% of the fastening arrangements are deformed, damaged, not properly fixed or the support stays not horizontal, the rating will be "No".

Ssh04 Are the bottom supports of the side shorings free of cracks, deformation and visible damage (1% tolerance)?

The inspector verifies if the bottom supports of the side shorings, including the connection to the vessel's bulkheads and bulkhead plating, are not cracked or rotten. If more than 1% cracked or rotten bottom supports are present, the rating will be "No".

Ssh05 Is the surface of the side shorings such that it will not damage the cargo (e.g. no pipe shorings)?

Side shorings made of steel pipes, bars or similar which are not covered by boards are not considered adequate. The intention is to have side shorings that will not give marks or damage to the cargo. If the construction is not adequate, the rating will be "No".

Ssh06 Have side shorings repairs been done properly and in line with the original design?

Damaged side shorings need to be repaired properly, with proper materials and in line with the original design. Improper repairs will give the rating "No".

Ssh07 Are all flared areas provided with side shorings?

Exceptions can be made for small distances of abt 10 cm between the top of pallets and the ship's side over a distance of abt 5 mtrs longitudinal in lower decks. If not all flared areas are provided with side shoring, taking into account the exceptions, the rating will be "No".

Ssh08 Is documentation available to show that the side shorings have sufficient strength?

Please refer to attachments 2 and 3 for the design criteria and design suggestions. For the purpose of calculation acceleration values of 1,0 g vertical and 0,8 g horizontal are recommended but as a minimum the requirements from the Code of Safe Practice for Cargo Stowage and Securing, Appendix 13 shall be taken into account .The calculations shall be initiated by the respective ship owner and be carried out by the classification society or engineering consultants and be an integral part of the Cargo Securing Manual. If the documentation is not available or shows that the strength is insufficient without modification, the rating will be "No".

Ssh09 Is the construction of the side shorings in line with the documentation?

The inspector verifies that the construction of the side shorings is in line with the documentation under Ssh08. If the construction of the side shorings is not in line with the documentation, the rating is "No". This question should be given the rating "N.A." if the documentation under Ssh08 gives the rating "No".

6.7 Lighting in holds

Forklifts handling cargo can easily damage cargo hold lights. In case protection covers and grids are not present on the hold lights then there is a realistic risk that glass debris can contaminate the cargo.

The hold lights should preferably be flush with the ceiling or bulkheads and protected with a metal grid or fitted between deck girders. Cargo hold lights are flush when the light is assembled in the ceiling.

Hold lights assembled on ceilings are also considered flush, if the available deck height between the hold light cover and the deck is more than 2.20 m.

Lih01 Are cargo hold light covers present?

The inspector verifies if plastic or glass covers are present on cargo hold lights and gives an indication of the amount of missing covers. If cargo hold light covers are not present, the rating will be "No".

Lih02 Are the cargo hold lights properly protected against handling damage?

Lights fitted in cargo compartments shall preferably be flush with the panel surface of hold insulation or fitted in between (and protected by) deck girders as to prevent damage during cargo handling. Lights which are exposed on the panel surface and which are well protected by a metal grid are also acceptable. If cargo hold lights are not well protected, the rating will be "No".

Lih03 Are the cargo hold lights installed flush with the surface?

All lights fitted in cargo compartments shall preferably be flush with the panel surface of hold insulation or fitted in between (and protected by) deck girders as to prevent damage during cargo handling. Cargo hold lights are flush, when the light is assembled in the ceiling. Hold lights assembled on ceilings are also considered flush, if the available deck height between the hold light cover and the deck is more than 2.20 m. If cargo hold lights are not installed flush, the rating will be "No".

Lih04 Are the cargo hold lights properly fixed?

The inspector verifies if hold lights are rigidly assembled. If cargo hold lights are not properly fixed, the rating will be "No".

Lih05 Are cargo gear mast-and jib lights covers present and undamaged?

The inspector verifies if plastic or glass covers of the mast-and jib lights are present and undamaged. If covers are damaged or not present, the rating will be "No".

Lih06 Are cargo hold light covers undamaged?

The inspector verifies if plastic or glass covers are undamaged on cargo hold lights and gives an indication of the amount of damaged covers. Only fresh damages are allowed. If cargo hold light covers are damaged, the rating will be "No".

Lih07 Are cargo holds lights in working condition?

The inspector verifies if cargo hold lights are in working condition. If lights are not in working condition, the rating will be "No".

6.8 Drains

An operational condition of the drain system is essential to prevent contamination of the cargo with sea water or fresh water. Drains are located under tween decks, under gratings (cargo hold drains) and in drip trays under air coolers (scupper drains).

Tween deck drains must be free flowing to ensure that accumulated water can drain away. Tween deck drain pipes can be present in the hold ceilings but it is also possible that plastic drain pipes are present on lower decks, which leads to the cargo hold drains, drip trays or bilge wells.
In the corners of the holds, cargo hold drains are located under the gratings. These drains collect the water under the gratings.

The drip trays must be well maintained. Wooden drip trays are mostly provided with a protective layer in order to prevent that the plywood is starting to swell/rot or delaminate. It is not allowed that this layer is damaged or cracked. Steel drip trays have the disadvantage that over time rust flakes are produced, which can block the scupper drain.

Drn01 Are the cargo hold drain collecting points clean and clear?

The inspector verifies if the cargo hold drains under gratings are clean and unblocked. If the drain collecting points are not clean and clear, the rating will be "No".

Drn02 Is a drain system of the tween deck hatch coamings installed, including drain pipes to collecting points?

The inspector verifies if a tween deck drain system is present and working to avoid the risk of water dripping on the cargo. If a proper drain system is not present, the rating will be "No".

Drn03 Are the tween deck hatch coaming drains clean and clear?

The inspector verifies if the tween deck hatch coaming drains are clean and unblocked. If the hatch coaming drains are not clean and clear, the rating will be "No". If no drain system is fitted, the rating will be N.A.".

Drn04 Are the cooler drip trays clean and clear?

The inspector verifies if cooler drip trays are clean (no debris, no rust flakes). The inspector verifies if the scupper drains of the drip trays are unblocked and records any blocked drains. If the cooler drip trays are not clean and clear, the rating will be "No".

Drn05 Are the cooler drip trays in an intact condition?

The inspector verifies if plywood in wooden drip trays and the surrounding area is not delaminated and if the top layer is undamaged. Steel drip trays must be without wasted spots. If the cooler drip trays are not intact, the rating will be "No".

6.9 Cleaning

Most refrigerated cargoes transported by shipping lines are intended for human consumption. Therefore much attention must be given to the cleanliness of the holds. Cargo holds including cooler battery spaces must be clean, dry and odour free. The methods and intensity of cleaning depends on the previous cargo, the next cargo and spillages.

Cln01 Are proper cleaning records filed on board and available for inspection?

Proper records shall be made available to inspectors, which will enable them to verify if:

1. *There is a cleaning plan for refrigerated cargo spaces*
2. *It is easy to follow the cleaning of cargo spaces by records kept on board*

If proper cleaning records are not available, the rating will be "No".

Cln02 Is a working High Pressure cleaning machine available on board?

The inspector verifies the presence of a working High Pressure cleaning machine. If a High Pressure cleaning machine is not present, the rating will be "No".

Cln03 Have the holds been washed in the past 6 months?

The inspector verifies if washing has been executed in the past 6 months. If the holds have not been washed in the past 6 months, the rating will be "No".

Cln04 Is at least 100 ltr of suitable detergent on board for washing of the holds?

The inspector verifies the presence of suitable detergents (such as Teepol or Reefer Cleaner) on board. At least 100 ltr detergent should be onboard at all times, which should be sufficient for one cleaning. If less than 100 ltr detergent is on board, the rating will be "No".

Cln05 Are the holds mould- and rot free?

The inspector verifies if mould is present in the holds and cooler rooms. If mould or rot is present, the rating will be "No".

Cln06 Are the hinges of tween deck hatches free of excess grease and dirt?

The inspector verifies the presence of excess grease on hinges on the tween decks. If excess grease is present, the rating will be "No".

Cln07 Are the roller guides clean and free of loose rust?

The inspector verifies if roller guides are clean and free of loose rust. If the roller guides are dirty and not free of loose rust, the rating will be "No".

Cln08 Are the holds free of loose paint and rust flakes?

The inspector verifies if the holds are free of loose paint and rust flakes. If loose paint or rust flakes are present in the holds, the rating will be "No".

Cln09 Are the holds free of dirt and debris under the gratings?

The inspector lifts at least 3 gratings in different compartments and verifies if holds are free of dirt and debris under gratings. If dirt and debris is found under the gratings, the rating will be "No".

Cln10 Is debris removed from folding tween deck hatches prior to opening?

If feasible, the inspector verifies if debris is removed before folding tween deck hatches are opened during discharge operations. If debris is not removed, the rating will be "No". When no opening of hatches is witnessed, this question must be marked "N.A.".

Cln11 Are the holds free of residues from previous cargo?

The inspector verifies if cargo holds and cooler rooms are free of residues from previous cargo. If residues from previous cargo are present, the rating will be "No".

Cln12 Are the hold structures free from dirt deposits?

The inspector verifies if the hold structures, such as ceiling panels, hold side panelling, top of flanges of deck girders and topside of the grating boards are free from dirt deposits or blackening. In case the hold is found with dirt on the structures, the rating will be "No".

6.10 Cargo holds & cooler spaces

This section should be referred to in conjunction with sections 6.2.4 - Gratings and 6.2.5 - Side shorings to assess the suitability of the cargo holds to properly accommodate perishable cargo in good condition.

The different equipment to distribute the cold air to the cargo and the fresh air system, which is required to exchange the air in the cargo holds, is dealt with under this heading. The inspector should assess the condition of equipment preferably in working condition.

Cooler battery spaces shall not be used for storage of material.

Chc01 Are the bulkhead insulation panels in a sound condition?

The inspector verifies the bulkhead insulation panels for holes or other damages. Fresh damages should be taken into consideration and old damages should have been repaired. In case of visible holes the rating will be "No".

Chc02 Are the deck head panels under insulated decks in a sound condition?

The inspector verifies the deck head panels for holes or other damages. Fresh damages should be taken into consideration and old damages should have been repaired. In case of visible holes the rating will be "No".

Chc03 Are return air screen openings intact and clear?

The inspector verifies that the return air screens are present, intact and unobstructed. In case of deviations the rating will be "No".

Chc04 Are the circulation fans operational?

The inspector makes a request to randomly run at least two sets of air circulation fans. Two sets mean all fans in two different decks, preferably in two different holds, at the choice of the inspector. In the rare occasion a ship has fans forward and aft, port and starboard, all such fans should be run. The inspector checks the conditions of fans at all designed speeds for correct rotation and unusual noises or vibrations. The inspector checks the inlet vanes are smooth and, if fitted, fan boxes are without leakage. Should any of the items fall outside of acceptable levels, additional sets of fans should be surveyed. Should then items fall outside of acceptable levels the rating will be "No".

Chc05 Are the fresh air fans operational?

The inspector makes a request to randomly run at least two sets of fresh air fans. Two sets mean fans serving two different decks, preferably in two different holds, at the choice of the inspector. The inspector checks the conditions of fans at all designed speeds for correct rotation and unusual noises or vibrations. Should any of the items fall outside of acceptable levels, additional sets of fans should be surveyed. Should then items fall outside of acceptable levels the rating will be "No".

Chc06 Are the fresh air ducts unobstructed and in a sound condition?

The inspector checks air is flowing from ducts connected to fans running according to item Ch05. The inspector checks the ducting is tight. The inspector checks the drains from the fresh air ducting is in place, free for water to flow and ends in an area that is drained to bilge wells. Should any deviations be present, the rating will be "No".

Chc07 Are the fresh air flaps or valves free to move?

The inspector checks the dampers in the fresh air system are free to move. The inspector also checks whether the dampers are able to close the airflow with fans running. Should any of the items fall outside of stated conditions, the rating will be "No".

Chc08 Are the air coolers in a sound condition?

The inspector verifies at random that the air coolers are free of dirt and debris and that coils (pipes and fins) are free of corrosion and/or damage. The inspector also verifies that fan boxes and protective grids, if fitted, are intact and that pipes and fittings connected are secured in a seaworthy manner. Any item not fulfilled will give a rating "No".

Chc09 Are air seals of weather deck hatch covers in a sound condition?

The inspector verifies that the air seals of the hatch covers are intact and without gaps. In case of deviations the rating will be "No".

Chc10 Are air seals of tween deck hatch covers in a sound condition?

The inspector verifies that the air seals of tween deck hatch covers are intact and without gaps. In case of deviations the rating will be "No".

Chc11 Are all the bulkheads free of deformation that could influence the airflow?

The inspector verifies if bulkheads are not damaged or deformed to the extent that the air flow is negatively influenced. Bulkheads being deformed over a longer length may result in large gaps between the cargo and that bulkhead, resulting in a possible short circuit of air. In case bulkheads are deformed, the rating should be "No'.

6.11 Reefer equipment

Prime condition of refrigerating equipment is paramount for successful results of transporting cargo under refrigeration. The term refrigerating equipment relates not only to compressors and connected mechanical equipment but just as much to the different media used in the process and equipment to distribute the cold air to the cargo.
The inspector should assess the condition of equipment preferably in working condition.
Inspection of condition of pipes for refrigerant and brine can be carried out only in areas where insulation is not fitted. Hence, in order to make an assessment of the risk of refrigerant leakage, the condition of the system pipe work must be accurately assessed. Records of re-charging or purchase orders of refrigerant should be asked for.
The inspector needs to evaluate the competence of the crew, company policy for spares and planned maintenance in order to get an overall understanding of the ability to successfully carry refrigerated goods.

Rfr01 Is a valid Class certificate for the reefer installation available?

The inspector checks the Class certificate is on board and valid. If not, the rating is "No".

Rfr02 Is the refrigeration system free of apparent refrigerant leakage?

The inspector checks for apparent leaks of refrigerant, which can be indicated by signs of oil on external parts of equipment. Leakage of ammonia is apparent from the smell. The inspector checks the reefer logbook or similar written or digital records to see if re-charging is done frequently or whether records show regular and/or larger order or purchase of refrigerants. The inspector checks for empty cylinders of refrigerant in store or in the process of being replaced by re-charged cylinders. The inspector shall ask for the cause in case a lot of empty cylinders are present. If apparent leakage is present and/or if the crew cannot justify the large number of empty cylinders, the rating is "No".

Rfr03 Is sufficient spare refrigerant available for a 50% charge of the largest fitted system?

The inspector evaluates the amount of cylinders and size of these in relation to the charge of the reefer system. If more than one system is fitted, the largest single system should be evaluated. The charge may be found in the Manual for the system(s), or estimated from the volume (90%) of the operating refrigerant receivers (usually indicated on the maker's plate). If the charge of the system(s) is not known or the spare quantity is less than 50%, the rating will be "No".

Rfr04 Are reefer compressors in an apparent good order and condition?

The inspector checks visually the external condition of the compressors. The inspector checks available records to see all compressors have been put into operation. If, based on the records, one or more compressors are deemed to have been out of operation for more than two months without a valid explanation, the rating will be "No".

Rfr05 Are oil analyses available, not older than 1 year and recommendations followed up?

The inspector checks documentation from oil analyses to see the age of the most recent analysis made and investigates how recommendations from the analysis centre is attended to. If oil is not annually analysed or a recommendation to replace the oil is not attended to, the rating will be "No".

Rfr06 Is the refrigeration system free of brine leakage?

In case of indirect systems using brine as a cooling medium, the inspector makes a random visual check to look for leakage of brine in the brine room, in air cooler spaces and other accessible areas. If visual signs indicate leakage, the rating will be "No". If the ship does not have a brine system, the rating will be "N.A.".

Rfr07 Is at least 1000 kg spare Calcium Chloride on board for a complete charge of brine?

The inspector makes a superficial estimate of amount of Calcium Chloride available on board. It is expected at least 1000 kg of salt is on board if the brine density is at a level which allows running the system to its minimum designed temperature. If this is not fulfilled the rating will be "No". If the ship does not have a brine system, the rating will be "N.A.".

Rfr08 Is measuring equipment available on board to measure the density of brine?

The inspector verifies if a density meter is available on board and measurement records available. If a density meter is not available, the rating will be "No". If the ship does not have a brine system, the rating will be "N.A.".

Rfr09 Is other reefer machinery, the reefer compressors excluded, in an operational condition?

The inspector makes a visual check to see that machinery related to the operation of the reefer plant, such as condensers, pumps etc. are in apparent good order and condition and can be run at any

time. If, based on the records, one or more components are deemed to have been out of operation for more than two months without a valid explanation, the rating will be "No".

Rfr10 Are the refrigerant and brine pipes in sound condition, where visible?
The inspector makes a visual check of refrigerant and brine pipes in areas where these are visible. Heavily corroded pipes where there is a risk of leakage will give the rating "No".

Rfr11 Are the refrigerant and brine pipes and valves properly insulated?
The inspector verifies if the designed insulation is in good condition, still intact without missing sections. Insulation found wet, damaged or missing in areas of cold piping systems will give the rating "No".

Rfr12 Is the defrosting system for air coolers operable and in sound condition?
The inspector verifies that records are available that show that existing defrosting systems are operable and in sound condition. Missing records, corroded pipes, stuck valves or mal-functioning electrical heating devices will give the rating "No".

Rfr13 Is a planned maintenance system available on board for the reefer system?
The inspector asks for the documentation for the planned maintenance system and briefly verifies if this system appears organized and in use. If such is not available or not attended to, the rating will be "No".

6.12 Power generation

Refrigerated ships require a reliable, high and continuous supply of electrical power for propulsion, domestic requirements and refrigeration of cargo. If, in addition, containers are carried there are even higher demands to ensure the required generating capacity is available.
It is the general opinion that generator sets (auxiliary engine and generator) should be continuously operated at or above 85% Maximum Rated Output of the generator in order to maintain the auxiliary engines in optimum condition.

For items Pge01, Pge02 and Pge03 the inspector studies the engine room log book to determine if all available power sources, such as the ship's generator sets, shaft generators and any Class approved deck generators, have been in operation and at which capacity they operate. On basis of these data, the inspector assesses what seems to be maximum available capacity compared to the Maximum Rated Output of the generators.

Not more than one generator set may be out of service due to maintenance work or repairs at the time of the inspection. The inspector will perform a visual inspection of the auxiliary engine and/or generator to verify that this generator set is actually under maintenance or repairs.

Pge01 Is each generator set able to generate electrical power of at least 65% Maximum Rated Output of the generator?
The inspector checks engine room records to see all generator sets have been put into operations and can achieve at least 65% Maximum Rated Output. In addition the inspector asks the Chief Engineer to run at least one generator set at maximum achievable power. The chosen generator set should be the generator set that has achieved the least power according to the records. Alternatively

it should be the generator set, which has had the longest running time since previous overhaul. Running should be for minimum 15 minutes. Exhaust temperatures and boost air pressures are studied in accordance with the load testing guidance (see attachment 4) and the power generated is compared to Maximum Rated Output. If the output of any of the generator sets is less than 65%, the rating will be "No".

Pge02 Are the generator sets able to generate an average electrical power of at least 75% Maximum Rated Output of the generators?

The inspector checks engine room records to see all engines have been put into operations and that the plant can be operated to supply power to all users. The above described load test can verify what power output can be achieved. If the average output of the generator sets is less than 75%, the rating will be "No".

Pge03 Are the generator sets able to generate an average electrical power of at least 85% Maximum Rated Output of the generators?

The inspector checks engine room records to see all engines have been put into operations and that the plant can be operated to supply power to all users. The above described load test can verify what power output can be achieved. If the average capacity of the auxiliary engines is less than 85%, the rating will be "No".

Pge04 Are the auxiliary engines that are not under maintenance or repairs in an apparent good order and condition?

The inspector checks visually the external condition of auxiliary engines not under maintenance or repairs. There should be no excessive leakage of lubrication oil, fuel oil, cooling water or exhaust gases. If one or more engines are not in apparent good order and condition, the rating will be "No".

Pge05 Is a planned maintenance system available on board for the auxiliary engines?

The inspector asks for the documentation for the planned maintenance system and briefly verifies if this system appears organized and in use. If such is not available the rating will be "No".

6.13 Temperature management

This section deals with the quality of temperature control, monitoring of temperature and CO_2 in cargo holds and presenting these data. All of these parameters are essential to be able to present in good, trustworthy and legible order to make sure the ship actually performs as expected.
Availability of general carrying instructions and information about proper care of perishable cargo will show the inspector the awareness of the Owner and crew on how to handle refrigerated cargo.

Tmp01 If an automatic data logger is fitted, is it working properly?

The inspector ensures the printing by data loggers, such as printers or strip chart recorders, is clear, forwarding of paper is proper and data is printed in lines and columns as expected. If any of the parameters are not fulfilled the rating will be "No".

Tmp02 If an automatic data logger is fitted, is spare paper and ink on board?

The inspector verifies the ship carries at least one roll or box of spare printer paper and that at least one cartridge of spare ink is on board. If not, the inspector should ask for the latest order of this

material to verify spare material will be delivered before taking the next load of refrigerated cargo. If spares will not be available at this time, the rating will be "No".

Tmp03 Are delivery and return air temperature records available of the reefer plant?

The inspector asks for records of at least one year of delivery and return air temperatures, automatically or manually recorded. If these records are not available, the rating is "No".

Tmp04 Are operational parameters (machinery data) of the reefer plant available?

The inspector asks for records of at least one year of reefer machinery operational parameters such as evaporating temperatures and pressures, condensing temperatures and pressures, brine temperatures, power draw of compressors etc. If these records are not available in any form the rating will be "No".

Tmp05 Does the vessel keep records of pulp temperatures during loading?

The inspector asks for records of at least one year of pulp temperatures from the time of loading of refrigerated cargoes. If these records are not available the rating is "No".

Tmp06 Have the delivery and return air sensors been ice-tested in the past 3 months?

The inspector asks for the record of calibration of delivery and return air sensors. If this is not available or older than three months the rating is "No". If sensors which read a variance greater than +/-0.3^{o}C after calibration have not been replaced, the rating is "No".

Tmp07 Have the USDA air and pulp temperature sensors been ice tested in the past 6 months?

The inspector asks for the record of calibration of USDA sensors. If this is not available or older than six months the rating is "No". If sensors which read a variance greater than +/-0.3^{o}C after calibration have not been replaced, the rating is "No".

Tmp08 Are sufficient spare temperature sensors available?

The inspector verifies that 5 portable USDA sensors (15 mtr cable) and 2 fixed USDA sensors (5 mtr cable) and at least 6 spare delivery and return air sensors in total (provided these are same type) are kept on board. If any of these statements is not fulfilled the rating is "No".

Tmp09 Are carriage instructions available for the most recent reefer cargo?

The inspector asks for the most recent carrying instructions for refrigerated cargo. If the most recent carrying instructions are not available, the rating is "No".

Tmp10 Do delivery air temperature recordings show consistency in accordance with the carriage instructions?

The inspector verifies if delivery air temperature recordings are in line with the carriage instructions, taking into consideration the calibration corrections. If fluctuations in temperature for fruit cargoes are consistently more than +/- 0.3^{o}C or for frozen cargoes more than +/- 1.0^{o}C, the rating is "No".

Tmp11 Have the CO_2 analysers been calibrated in the past 12 months?

The inspector asks for the record of calibration of CO_2 analysers. Portable analysers must be calibrated according to maker's instructions. In case of deviations, the rating is "No".

Tmp12 Is a handheld thermometer available on board and ice-tested in the past 3 months?

The inspector verifies that a handheld, preferred digital, thermometer with a pulp temperature probe and calibration record younger than three months and variance less than +/-0.3°C is available on board. If not, the rating is "No".

6.14 Reefer container carriage

Many specialized reefer ships are equipped and able to carry containers in holds and on deck. Generally speaking refrigerated containers in operation are carried on deck while palletized refrigerated cargo is carried under deck at the same time. To carry refrigerated cargo in containers on deck safely to the same extent as for cargo under deck this section deals with inspection of the suitability of the ships to carry containers with perishables. It should be noted however that not all ships have equipment or required certificates to carry containers or that Owners have opted not to carry containers. In such case, the question Con00 when replied with "No" will neutralize all the influence from this section in the total evaluation of the ship.

Con00 *Does the ship need to be certified for reefer container carriage?*

The inspector checks that the ship owner or operator has requested that the ship should be certified for reefer container carriage. If this is not requested by the ship owner or operator, the rating will be "No".

Container policy and awareness

The Master is responsible for proper loading, stowage and securing of containers on board in line with international requirements. The vessel's staff members should be aware of their responsibility in the reefer container transport chain. Knowledge should be present in order to be able to solve technical malfunctions of reefer containers in an efficient way. The container checklist is one of the tools to increase the knowledge and awareness of the crew.

Con01 Is a competent person responsible for the operation of the reefer containers?

This observation is based on the inspector's interaction with the responsible person (Chief Engineer, Reefer Engineer or Electrician). The inspector checks if a competent person is designated to deal with reefer containers. If a competent person is not designated the rating will be "No".

Con02 Is one of the vessel's officers trained to solve reefer container technical malfunctions?

The inspector checks that one of the vessel's officers has followed reefer container training and that an evidence of training is present. If an evidence of training is not present the rating will be "No".

Con03 Is a checklist for the carriage of reefer containers used for each stage of the voyage?

The inspector checks if a checklist is available and used for each stage of the voyage when reefer containers are carried on board. As a minimum every shipping line defines control measures on: technical malfunctions, physical damage, proper container settings, lashing equipment and the presence of security seals. If a container checklist does not exist or is not filled in completely, the rating will be "No".

Container acceptance & monitoring on board

The availability of clear and unambiguous carriage instructions is the starting point of successful carriage of reefer containers. The units of the container settings (such as degrees Celsius or degrees Fahrenheit, cubic feet per minute or cubic metres per hour of fresh air) must be clearly stated in these instructions.

It is the Master's responsibility to make sure that the containers have no malfunction or physical damage and that containers are rejected for loading in case of malfunctioning or excessive damage.

Con04 Are carriage instructions or load lists available for the current or previous reefer container cargoes?

The inspector checks the presence of carriage instructions or load lists. In case carriage instructions or load lists are not available for the current or previous reefer container cargoes the rating will be "No".

Con05 Are daily temperature records available for the reefer containers?

The inspector verifies the presence of daily temperature records from the current or previous reefer container cargoes. In case of bad weather (unsafe situation) crew should report data are not taken on containers that are difficult to reach. If such records are absent the rating will be "No".

Con06 Are reefer container settings in line with the carriage instructions or load list?

The inspector verifies if the crew checks the container settings [such as temperature setpoint and ventilation settings] against the carriage instructions or load list. If these checks are not done, the rating will be "No".

Con07 Is a procedure in place to report physical damage to containers?

The inspector checks if a written procedure is in place to report physical damage to the body and machinery of containers when received on board. If such a procedure is not in place, the rating will be "No".

Con08 Is adequate equipment available to monitor temperature readings of reefer containers loaded in upper tiers?

The inspector checks if steady and safe platforms, ladders or other adequate equipment is available on board. If adequate equipment is not present, the rating will be "No".

Container malfunctions

In spite of pre-trip inspections technical malfunctions of reefer containers can take place during the sea voyage. In this case the crew is usually supported by a shore based service supplier. The Master is responsible for proper reporting and follow-up in case of reefer container malfunctions.
When reefer containers are carried, an adequate reefer container spare part kit should be on board for the types of containers carried. In case spare parts are used and/or replenished after a malfunction, the stock inventory needs to be updated accordingly.

Con09 Is a procedure in place to deal with technical malfunctions of reefer containers?

The inspector checks if a written procedure to deal with technical malfunctions is present. If such a procedure is not present the rating will be "No".

Con10 Are technical malfunctions of reefer containers properly followed up and reported by the vessel?

The inspector checks the presence of a reefer container technical malfunctions file. Reports need to be filled in completely and show that proper and timely action has been taken. A complete file consists of malfunction reports and corrective action. If proper action has not been taken or filing is absent or incomplete the rating will be "No".

Con11 If a reefer container spare part kit is supplied, is it properly maintained?

The inspector checks stock inventories and packing lists of replenished parts. If a list of inventory does not exist or is incomplete the rating will be "No". If a spare part kit is not supplied, the rating will be "N/A".

Con12 If a reefer container spare part kit is supplied, are the spare parts properly stored?

The inspector checks that the supplied spare parts are stored in a careful and safe manner. Heavy parts must be separated from light fragile parts. If spare parts are not stored properly, the rating will be "No". If a spare part kit is not supplied, the rating will be "N/A".

Container equipment

Lashing systems are designed and tested for bad weather conditions; if they fail during bad weather then containers may be lost overboard. Vessel's staff members need to understand the strengths and weaknesses of container equipment and securing systems. This is essential to be aware of what can be done to prevent loss of containers and loss of cargo.
All container lashing components (fixed and loose fittings) must be checked regularly for wear and defects. Worn or damaged equipment must always be replaced.

Con13 Are fixed container fittings (attached to the vessel) free of apparent excessive corrosion and/or wastage?

The inspector visually checks the condition of container sockets, lashing eyes, lashing D-rings and dovetail foundations on deck to verify their sound condition. If the fixed container fittings are not free of excessive corrosion and/or wastage, the rating will be "No".

Con14 Is the lashing equipment (loose fittings) in operational condition and free of apparent excessive corrosion and/or wastage?

The inspector visually checks the condition of twist locks, turnbuckles, lashing bars and bridge fittings to verify their sound and operational condition. If the vessel's lashing equipment is not in a sound and operational condition, the rating will be "No".

Con15 Is a lashing inventory made regularly to confirm compliance (amount and type) with the Cargo Securing Manual?

The inspector checks the latest inventory of lashing equipment and compares it with the Cargo *Securing Manual to verify that correct amount and type of lashing material is available. The inspector should make random checks on deck to verify the lashing inventory complies with the Cargo Securing Manual (e.g. no mixture of left-hand and right-hand locking twist locks). If compliance with the Cargo Securing Manual cannot be concluded the rating will be "No".*

Con16 Are the electrical reefer container sockets in sound condition?

The inspector randomly checks if the reefer sockets are undamaged, watertight and properly operating (e.g. no burn marks). Damaged or inoperative sockets should be marked as "out of order" (on the socket). Power sharing units are not allowed. If sockets are damaged or inoperative and not marked properly, the rating is "No".

Enclosures:

- Attachment 1: Design criteria of gratings
- Attachment 2: Design criteria of side shorings

- Attachment 3: Side shorings design suggestions
- Attachment 4: Load testing guidance

Attachment 1: Design criteria of gratings

Gratings and spar deck planks are designed to withstand a maximum allowable load. This allowable load is depending on the grating thickness and support beam distance.

Ships shall have gratings of sufficient strength to permit smooth operations in the following configuration:

- Forklift with cargo not to exceed the weight of 5 tonnes on four tires of the resilient/semi pneumatic type not less than 18 inches in diameter for handling of palletized cargoes not exceeding 1.3t/pallet.
- When handling a pallet weighing 1 tonne with a pallet jack, the front axle load shall not exceed 1.0 tonne on two tines each with two solid neoprene wheels arranged in bogey suspension. The maximum weight on the steering wheel of the pallet jack shall not exceed 0.750 tonnes.

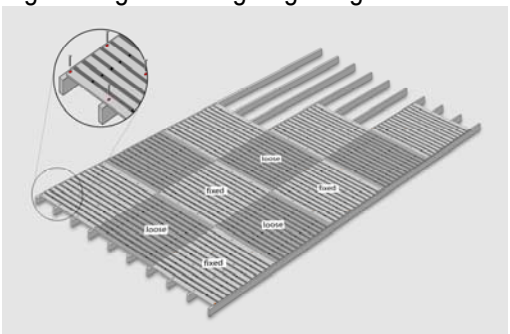
The vessel needs to have a 'Statement' on board about the strength of the grating. The grating manufacturer, ship manager or shipyard can deliver this information. As a general guidance, the minimum plywood thickness should be 30 mm with a support beam distance of 400mm.

Gratings must be correctly positioned on the support beams. When gratings are not properly fixed and/or aligned, they will be free to move when forklifts drive over the gratings. Due to this tilting or sliding the support beams and/or grating boards can be damaged. To recognize this situation one can check the line between two joining gratings. The line should be straight, without any irregularities.

Fig 1: Correct positioning of gratings on support beams

Movement of gratings can be prevented when adjacent gratings are fixed, as shown in Fig 2.

Fig 2: Diagonal fixing of gratings



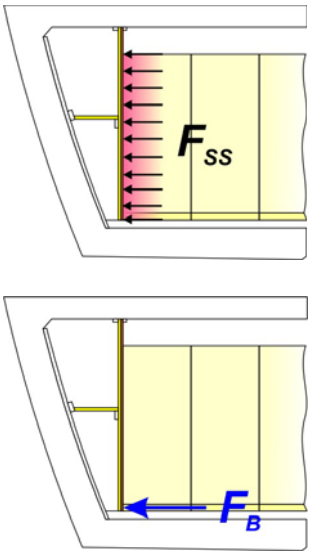
Attachment 2: Design criteria of side shorings

Design criteria:

Generally, side shorings should withstand all forces exerted by palletized cargoes in any weather condition. For the purpose of calculation, acceleration values of 1.0 g vertically and 0.8 g horizontally are recommended but as a minimum the accelerations calculated for the actual vessel in accordance with the *Code of Safe Practice for Cargo Stowage and Securing, Appendix 13*, shall be taken into account. Pallet size 1.2 x 1.0 x 2.10 m weighing 1.3 ton per pallet shall be considered. The later figure is averaged and covers most types of palletised cargoes.

Required strength:

The force exerted by the cargo on the side shoring can be considered to be composed of two components; one uniformly distributed load acting over the full height of the cargo (F_{SS}) and one concentrated force (F_B) acting at the bottom of the cargo.



Practical inclination tests have shown that the two components can be calculated by using the following formula:

$$F_{SS} = M \cdot a_t \cdot \left(\frac{4}{b}\right)^{\frac{n-1}{n}} \cdot cs$$

$$F_B = n \cdot M \cdot (a_t - \mu \cdot g_0) \cdot cs - F_{SS}$$

Where:

M	=	*Mass of one pallet*
b	=	*breadth of one pallet*
a_t	=	*Transverse acceleration*
g_0	=	*Gravity acceleration = 9.81 m/s²*
μ	=	*Coefficient of dynamic friction (normally 70% of static friction)*
n	=	*number of pallets abreast in each row*
cs	=	*Safety factor (for taking uneven distribution of cargo forces into account)*

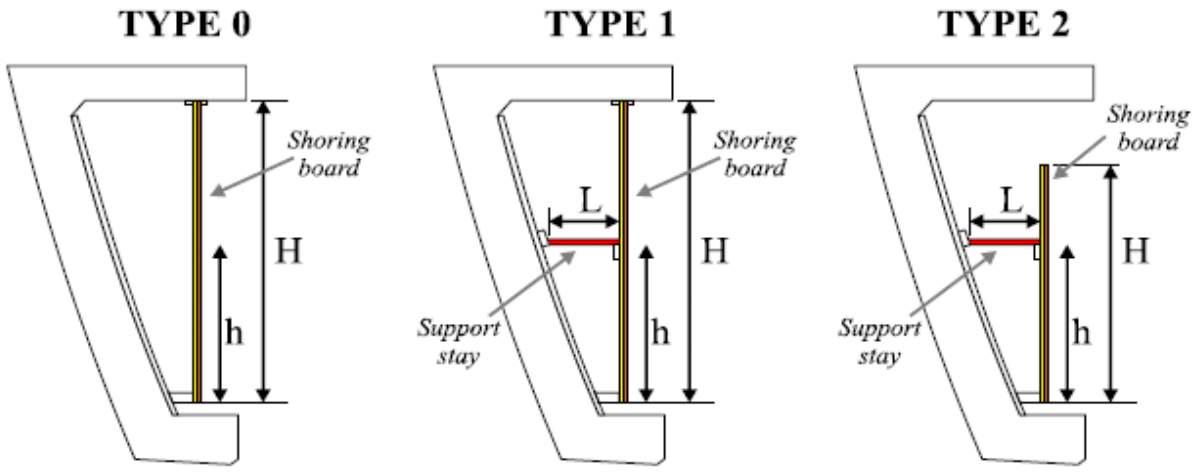
In accordance with Annex 13 of the Code of Safe Practice for Cargo Stowage and Securing, the safety factor should be taken as $cs = 1.35$.

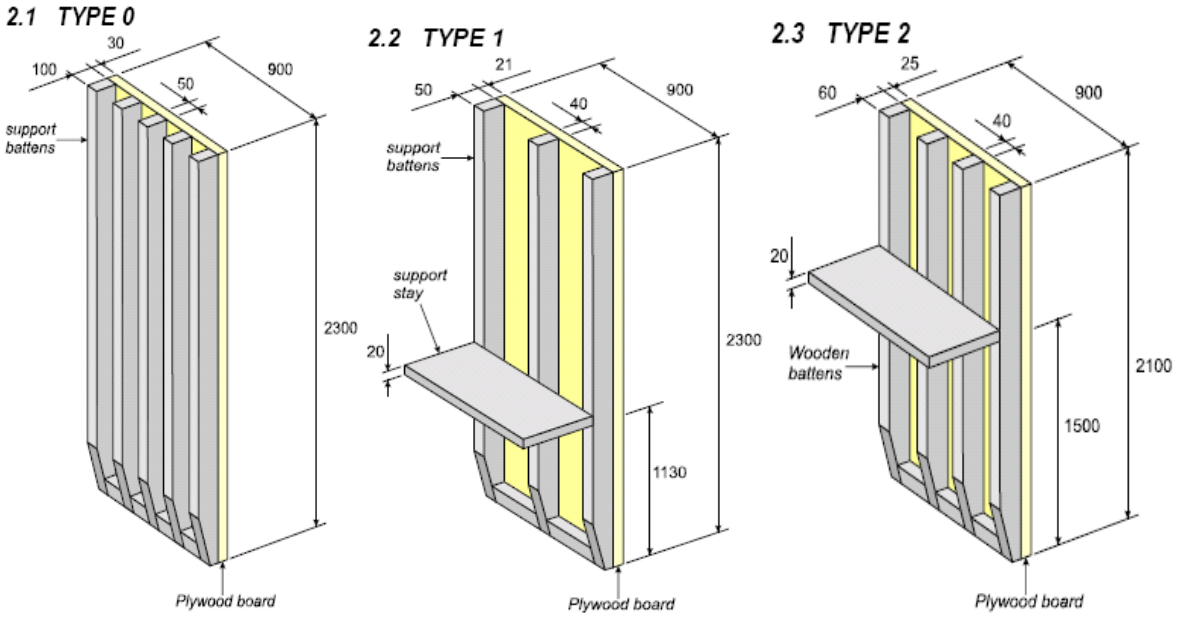
Actual strength:

Additionally, when calculating the actual strength of the side shoring construction, the maximum securing load (MSL) shall be taken as 50% of the minimum break load (MBL) of the construction.

The calculations shall be initiated by the respective ship owner and be carried out by the classification society or engineering consultants and be an integral part of the cargo securing manual.

Attachment 3: Side shoring design suggestions and measurements





Additional rules:

- Support stays with a length L of more than 1000 mm must be reinforced with 2 battens of at least 50 x 50 mm.
- The width of the support stays must be the same as the width of the side shoring boards.
- Support battens must cover the complete height of the side shoring boards.
- Fastening of side shorings and support stays must be of a solid construction (no nails).

Attachment 4: Load testing guidance

Power generation

The purpose of subjecting the generator sets to a load test is to ascertain whether the engines are able to deliver sufficient power to meet the power demand, in particular during cargo cooling. If, in addition, containers are carried there are even higher demands to ensure the required generating capacity is available. In general, the total power plant should be able to deliver 100% of the maximum required electric load with one engine spare to be able to meet load balance demands while in port. Shaft generators are not taken into account.

However, figures of power consumption (the load balance figures) are often not readily available. Therefore the load test aims to have the engines run at the maximum possible loads. For healthy engines 85% should be possible, even when it is of age. As a minimum, engines should be able to produce 65% electrical load.

The ship's staff can only be requested to carry out a load test up to the engine's maximum load, which theoretically should be at least 85%. If the ship's staff does not agree with such a load or with the entire test, the attending surveyor cannot force the test. It should always be clearly stated to the ship's engineers that the entire load test should be up to their agreement and control.

As much as possible power consumers should be put online in order to increase the engine load. Such consumers can be hold circulation fans (high speed), one or more compressors and heavy consumers such as main lubrication oil pumps and a bow thruster running idle.

Engine parameters under these maximum achievable load conditions should then be assessed and preferably be compared against new building conditions ('shop trial data').

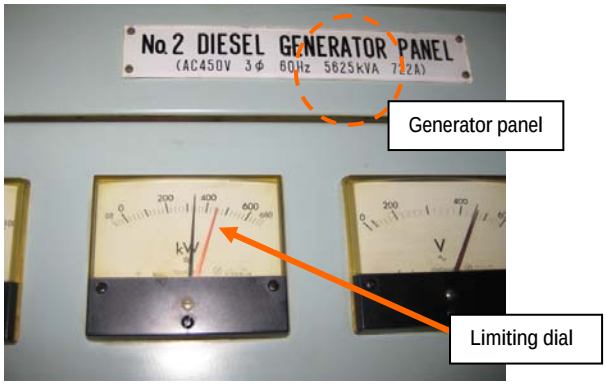
Not more than one auxiliary engine may be out of service due to maintenance work at the time of the inspection. The inspector will perform a visual inspection of that auxiliary engine to verify that this engine is actually under maintenance.

Engine maximum rating

Ideally engines should be tested with their output compared against their original maximum rating (MCR), which is usually found in the commissioning test data for the complete generator set or a makers plate on the switchboard.
Since this information is often not readily available, for the load testing it will be sufficient to compare the actual electrical output on the switchboard during testing against the maximum electrical output of the generator:

$$\text{(electrical) load percentage during the test} = \frac{\text{actual electrical load on the switchboard in kW}}{\text{maximum generator output in kW}}$$

Often, the vessel's engineers consider the limiting dial on the switchboard as being the maximum rate of the generators. One should never solely rely on the limiting dial, as it can often be adjusted. All available figures, such as identification plates and manuals should be considered.



In the above example 562,5 kVA x 0,8 = 450 kW corresponds properly with the limiting dial set also at 450 kW.

Performance assessment

After the engine has been running for approximately 15 minutes at its maximum load, engine parameters must be considered in order to assess the condition of the engine. As a guidance the following figures are deemed normal for most engines producing at least 65% electrical load

Boost air pressure	1,0 bar or more
Cylinder cooling water outlet	pressure: 2-3 bar temperature: 65 - 78 °C
Lubrication oil inlet	pressure:3 - 5 bar temperature: approx 50°C

Charge air pressures below 1,0 bar, often the result of fouling of the turbocharger(s) and air cooler(s), are deemed unsatisfactory and will lead to high exhaust gas temperatures. The pressure drop over the air cooler is indicative for the extent of fouling of this air cooler. The pressure drop is (sometimes) indicated by a U-tube filled with water. A maximum difference in level of 20 cm in height is allowed.

One of the most important performance indications is the measurement of exhaust gas temperatures both from individual cylinders as well as the temperature at the turbo charger inlet.

All temperatures and pressures should be read from local thermometers or gauges. Use of remote gauges and Raytec (infrared) appliances are not considered to be sufficiently accurate.

Temperatures under load can be compared with the shop trials for the engine at the time of new building. If these trials are only available for MGO operation, approximately + 50°C should be added to the exhaust gas temperatures for operation of HFO.

Furthermore, in general, approximately + 50°C tolerance should be added for wear of the engines and ambient differences between shop trials and operational conditions.

Temperature differences between individual cylinders in excess of 50°C are also deemed unsatisfactory.