



Condition Assessment Programme for LNG Carriers (LNG CAP)

Annex to NI 465

May 2015

**Guidance Note
NI 623 DT R00 E**

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MARINE & OFFSHORE DIVISION

GENERAL CONDITIONS

ARTICLE 1

1.1. - BUREAU VERITAS is a Society the purpose of whose Marine & Offshore Division (the "Society") is the classification ("Classification") of any ship or vessel or offshore unit or structure of any type or part of it or system therein collectively hereinafter referred to as a "Unit" whether linked to shore, river bed or sea bed or not, whether operated or located at sea or in inland waters or partly on land, including submarines, hovercrafts, drilling rigs, offshore installations of any type and of any purpose, their related and ancillary equipment, subsea or not, such as well head and pipelines, mooring legs and mooring points or otherwise as decided by the Society.

The Society:

- "prepares and publishes Rules for classification, Guidance Notes and other documents ("Rules");
- "issues Certificates, Attestations and Reports following its interventions ("Certificates");
- "publishes Registers.

1.2. - The Society also participates in the application of National and International Regulations or Standards, in particular by delegation from different Governments. Those activities are hereafter collectively referred to as "Certification".

1.3. - The Society can also provide services related to Classification and Certification such as ship and company safety management certification; ship and port security certification, training activities; all activities and duties incidental thereto such as documentation on any supporting means, software, instrumentation, measurements, tests and trials on board.

1.4. - The interventions mentioned in 1.1., 1.2. and 1.3. are referred to as "Services". The party and/or its representative requesting the services is hereinafter referred to as the "Client". The Services are prepared and carried out on the assumption that the Clients are aware of the International Maritime and/or Offshore Industry (the "Industry") practices.

1.5. - The Society is neither and may not be considered as an Underwriter, Broker in ship's sale or chartering, Expert in Unit's valuation, Consulting Engineer, Controller, Naval Architect, Manufacturer, Ship-builder, Repair yard, Charterer or Shipowner who are not relieved of any of their expressed or implied obligations by the interventions of the Society.

ARTICLE 2

2.1. - Classification is the appraisal given by the Society for its Client, at a certain date, following surveys by its Surveyors along the lines specified in Articles 3 and 4 hereafter on the level of compliance of a Unit to its Rules or part of them. This appraisal is represented by a class entered on the Certificates and periodically transcribed in the Society's Register.

2.2. - Certification is carried out by the Society along the same lines as set out in Articles 3 and 4 hereafter and with reference to the applicable National and International Regulations or Standards.

2.3. - It is incumbent upon the Client to maintain the condition of the Unit after surveys, to present the Unit for surveys and to inform the Society without delay of circumstances which may affect the given appraisal or cause to modify its scope.

2.4. - The Client is to give to the Society all access and information necessary for the safe and efficient performance of the requested Services. The Client is the sole responsible for the conditions of presentation of the Unit for tests, trials and surveys and the conditions under which tests and trials are carried out.

ARTICLE 3

3.1. - The Rules, procedures and instructions of the Society take into account at the date of their preparation the state of currently available and proven technical knowledge of the Industry. They are a collection of minimum requirements but not a standard or a code of construction neither a guide for maintenance, a safety handbook or a guide of professional practices, all of which are assumed to be known in detail and carefully followed at all times by the Client.

Committees consisting of personalities from the Industry contribute to the development of those documents.

3.2. - The Society only is qualified to apply its Rules and to interpret them. Any reference to them has no effect unless it involves the Society's intervention.

3.3. - The Services of the Society are carried out by professional Surveyors according to the applicable Rules and to the Code of Ethics of the Society. Surveyors have authority to decide locally on matters related to classification and certification of the Units, unless the Rules provide otherwise.

3.4. - The operations of the Society in providing its Services are exclusively conducted by way of random inspections and do not in any circumstances involve monitoring or exhaustive verification.

ARTICLE 4

4.1. - The Society, acting by reference to its Rules:

- "reviews the construction arrangements of the Units as shown on the documents presented by the Client;
- "conducts surveys at the place of their construction;
- "classes Units and enters their class in its Register;
- "surveys periodically the Units in service to note that the requirements for the maintenance of class are met.

The Client is to inform the Society without delay of circumstances which may cause the date or the extent of the surveys to be changed.

ARTICLE 5

5.1. - The Society acts as a provider of services. This cannot be construed as an obligation bearing on the Society to obtain a result or as a warranty.

5.2. - The certificates issued by the Society pursuant to 5.1. here above are a statement on the level of compliance of the Unit to its Rules or to the documents of reference for the Services provided for. In particular, the Society does not engage in any work relating to the design, building, production or repair checks, neither in the operation of the Units or in their trade, neither in any advisory services, and cannot be held liable on those accounts. Its certificates cannot be construed as an implied or express warranty of safety, fitness for the purpose, seaworthiness of the Unit or of its value for sale, insurance or chartering.

5.3. - The Society does not declare the acceptance or commissioning of a Unit, nor of its construction in conformity with its design, that being the exclusive responsibility of its owner or builder.

5.4. - The Services of the Society cannot create any obligation bearing on the Society or constitute any warranty of proper operation, beyond any representation set forth in the Rules, of any Unit, equipment or machinery, computer software of any sort or other comparable concepts that has been subject to any survey by the Society.

ARTICLE 6

6.1. - The Society accepts no responsibility for the use of information related to its Services which was not provided for the purpose by the Society or with its assistance.

6.2. - If the Services of the Society or their omission cause to the Client a damage which is proved to be the direct and reasonably foreseeable consequence of an error or omission of the Society, its liability towards the Client is limited to ten times the amount of fee paid for the Service having caused the damage, provided however that this limit shall be subject to a minimum of eight thousand (8,000) Euro, and to a maximum which is the greater of eight hundred thousand (800,000) Euro and one and a half times the above mentioned fee. These limits apply regardless of fault including breach of contract, breach of warranty, tort, strict liability, breach of statute, etc.

The Society bears no liability for indirect or consequential loss whether arising naturally or not as a consequence of the Services or their omission such as loss of revenue, loss of profit, loss of production, loss relative to other contracts and indemnities for termination of other agreements.

6.3. - All claims are to be presented to the Society in writing within three months of the date when the Services were supplied or (if later) the date when the events which are relied on were first known to the Client, and any claim which is not so presented shall be deemed waived and absolutely barred. Time is to be interrupted thereafter with the same periodicity.

ARTICLE 7

7.1. - Requests for Services are to be in writing.

7.2. - Either the Client or the Society can terminate as of right the requested Services after giving the other party thirty days' written notice, for convenience, and without prejudice to the provisions in Article 8 hereunder.

7.3. - The class granted to the concerned Units and the previously issued certificates remain valid until the date of effect of the notice issued according to 7.2. here above subject to compliance with 2.3. here above and Article 8 hereunder.

7.4. - The contract for classification and/or certification of a Unit cannot be transferred neither assigned.

ARTICLE 8

8.1. - The Services of the Society, whether completed or not, involve, for the part carried out, the payment of fee upon receipt of the invoice and the reimbursement of the expenses incurred.

8.2. - Overdue amounts are increased as of right by interest in accordance with the applicable legislation.

8.3. - The class of a Unit may be suspended in the event of non-payment of fee after a first unfruitful notification to pay.

ARTICLE 9

9.1. - The documents and data provided to or prepared by the Society for its Services, and the information available to the Society, are treated as confidential. However:

- "Clients have access to the data they have provided to the Society and, during the period of classification of the Unit for them, to the classification file consisting of survey reports and certificates which have been prepared at any time by the Society for the classification of the Unit ;
- "copy of the documents made available for the classification of the Unit and of available survey reports can be handed over to another Classification Society, where appropriate, in case of the Unit's transfer of class;
- "the data relative to the evolution of the Register, to the class suspension and to the survey status of the Units, as well as general technical information related to hull and equipment damages, may be passed on to IACS (International Association of Classification Societies) according to the association working rules;
- "the certificates, documents and information relative to the Units classed with the Society may be reviewed during certifying bodies audits and are disclosed upon order of the concerned governmental or inter-governmental authorities or of a Court having jurisdiction.

The documents and data are subject to a file management plan.

ARTICLE 10

10.1. - Any delay or shortcoming in the performance of its Services by the Society arising from an event not reasonably foreseeable by or beyond the control of the Society shall be deemed not to be a breach of contract.

ARTICLE 11

11.1. - In case of diverging opinions during surveys between the Client and the Society's surveyor, the Society may designate another of its surveyors at the request of the Client.

11.2. - Disagreements of a technical nature between the Client and the Society can be submitted by the Society to the advice of its Marine Advisory Committee.

ARTICLE 12

12.1. - Disputes over the Services carried out by delegation of Governments are assessed within the framework of the applicable agreements with the States, international Conventions and national rules.

12.2. - Disputes arising out of the payment of the Society's invoices by the Client are submitted to the Court of Nanterre, France, or to another Court as deemed fit by the Society.

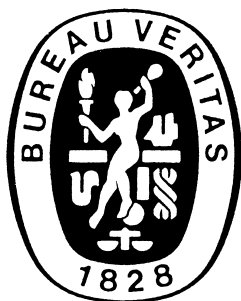
12.3. - Other disputes over the present General Conditions or over the Services of the Society are exclusively submitted to arbitration, by three arbitrators, in London according to the Arbitration Act 1996 or any statutory modification or re-enactment thereof. The contract between the Society and the Client shall be governed by English law.

ARTICLE 13

13.1. - These General Conditions constitute the sole contractual obligations binding together the Society and the Client, to the exclusion of all other representation, statements, terms, conditions whether express or implied. They may be varied in writing by mutual agreement. They are not varied by any purchase order or other document of the Client serving similar purpose.

13.2. - The invalidity of one or more stipulations of the present General Conditions does not affect the validity of the remaining provisions.

13.3. - The definitions herein take precedence over any definitions serving the same purpose which may appear in other documents issued by the Society.



GUIDANCE NOTE NI 623

Condition Assessment Programme for LNG Carriers (LNG CAP)

Annex to NI 465

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SECTION 1

GENERAL

1 General

1.1 Scope

1.1.1 The Condition Assessment Programme (CAP) is a voluntary scheme, independent from classification, aimed at assigning a rating for the condition of defined areas, such as the Hull, Hull Fittings and Machinery.

1.1.2 The Owner's representative defines those areas that he wishes assessed, taking into consideration the type of vessel and his particular requirements, however the Hull must be assessed, as a minimum requirement for Condition Assessment.

1.1.3 Complimentary studies may be undertaken; this would include the Fatigue Analysis of the Hull and which must be clearly defined in the contract. Where the Fatigue Analysis may highlight potential 'Hot Spot' areas then sufficient time should normally be allowed for the Analysis to be completed before surveys commence as these areas would be subject to close up survey.

1.1.4 This Guidance Note has been developed specifically for Membrane and Moss type LNG Carriers and is aimed at vessels of 15 years age and above, it must be read in conjunction with the latest edition of NI465 Condition Assessment Programme (CAP), which forms the basis of the CAP surveys.

The scope of the LNG-CAP is in addition to the items listed in NI465 unless indicated otherwise and includes the Fatigue Analysis.

1.2 Merging survey

1.2.1 The LNG CAP may be spread over the period between the 2nd and 3rd Annual Surveys in line with the intermediate survey. When this is done the survey plan is to clearly indicate the method for verifying the ratings assigned to those items surveyed at the commencement of the LNG CAP Survey.

SECTION 2

HULL

1 General

1.1

1.1.1 Experience has identified specific areas within the hull where cracking could occur and are well known to the industry. With the increasing age, fatigue becomes another factor in the condition of the vessel. The LNG - CAP should take these factors into account in the survey requirements for the Hull. Similarly, the history of defects and repairs must also be considered.

This may be divided into three parts:

- Critical Areas Map
- Fatigue Analysis
- Surveys.

1.2 Critical areas map

1.2.1 The critical areas map is to be developed on the basis of:

- Typical defects for that design of vessel
- The history of defects of the individual vessel in service.

1.3 Fatigue analysis

1.3.1 If a 3D FEM analysis is to be carried out this should normally be completed prior to commencing the surveys such that potential fatigue 'hot spots' are close up surveyed and U/T gauged as necessary.

A Repair Procedure is to be defined for those 'hot spots' found with cracks or defects affecting their efficiency.

1.4 Survey

1.4.1 General

The LNG - CAP is attached to the Guidance Note NI 465 which provides further details on the Hull Survey, Ultra-Sonic Gauging Analysis and the Hull Ratings.

A Survey Plan is to be developed before commencement of the surveys. The plan is to define the scope of the survey, identify the areas for additional survey together with the means for access, lighting and safety requirements.

The CAP survey should take into account that this type of vessel could be in active service well into its thirties, i.e. the ship could be more than 30 years old. In addition, the condition of the coating could have deteriorated permitting the corrosion rate to increase.

1.4.2 Survey scope

Ships Over 15 years of age

3rd Renewal Survey + additional 30% for Close-up Survey and U/T Gauging.

Where the coating in the ballast tanks is fair or poor, the close-up survey is to be extended. Steel work renewals are to be suitably coated after repair to minimise corrosion from occurring.

Close up survey of the potential fatigue 'hot spots' and the critical areas identified in the Critical Area Maps.

Hydrostatic testing of ballast tanks is to be conducted, when these are due for the classification

1.4.3 Suspect areas

Suspect areas cannot be accepted, they are to be investigated to ascertain their extent and cropped out and renewed.

1.4.4 Photographs

A library of photographs taken during the CAP survey is to be established. Photographs are to be taken in the tanks to show the general condition of that tank. Where repairs are conducted, before and after shots should be taken. Defective fatigue hot spot areas and critical areas are to be photographed as well, if no defects are found in these areas, sample photographs are to be taken. Photographs are to be identified in the report.

SECTION 3CONTAINMENT SYSTEMS

1 General

1.1

1.1.1 In general the containment system will need to be examined in service in loaded condition, in heel condition and also with the vessel gas free with cargo tanks open and in dry air.

2 Rating criteria

2.1

2.1.1 Rating Criteria are given within various sections of this document. The Criteria are to be used in conjunction with operational testing and taking into consideration the results of non destructive tests. They are broadly defined in NI465, Sec 1, [1.6], and are given below for convenient reference. (See Tab 1)., For Membrane type containment systems the rating criteria is given in Tab 2. and for Moss Type systems the rating criteria is given in Tab 3.

3 Membrane type containment systems

3.1 Tank covers external examination

3.1.1 Surveyor to examine the upper surface of the tank cover for cracking and signs of temporary repair especially under the flange drip pans, suspect areas should be subject

to hammer test and NDT. Visually inspect the membrane inter-barrier space safety valves for condition and leakage. Examine the vapour and pump dome covers for leakage. Condition of the safety rails around the tank cover to be examined. The external condition of the cargo tank safety valves should be checked. Foundation of the vent mast to be examined and connection to the riser examined for corrosion. The connection of the tank cover to the main deck is to be checked for cracking and suspect areas should be subject to NDT.

3.2 Cofferdam internal examination

3.2.1 The cofferdams should be internally examined for structural condition, coatings and corrosion. Internal equipment, heating coils, purge pipes, bilge arrangements, etc., should be inspected and where possible functionally tested

3.3 Cargo tank internal examination

3.3.1 The records of existing dents at bottom should be reviewed and compared with earlier records.

When accessing the tank some pump masts are designed with the ladder going directly to the bottom; make sure harness is available. The tank should be provided with powerful lighting and necessary safety and escape equipment. Whilst descending make a visual check of the pump mast structure, temperature sensors and their attachments and the cargo lines. Special protection is to be worn at the tank bottom, to prevent damage to the membrane.

Table 1 : CAP Ratings definition

1	Superior condition	Examination and/or measurements carried out with the results showing either minimal or no deterioration from the 'as new' condition. Superior maintenance condition exists. No preventive or corrective maintenance is required.
2	Good condition	Examination and/or measurements carried out with the results showing a level of deterioration from the 'as new' condition. No requirement for preventive or corrective maintenance.
3	Acceptable condition	Examination and/or measurements carried out with the results showing that condition would be acceptable for class rules requirements. No imminent corrective maintenance is required. Preventive maintenance may be required to halt deterioration.
4	Poor condition	Examination and/or measurements carried out with the results showing defects, deficiencies or condition, below what would be acceptable for class rules requirements. Imminent corrective maintenance is required.

Table 2 : General rating criteria

Rating 1	Rating 2	Rating 3	Rating 4
Items and systems examined and function tested, only superficial reductions from as new or current rule scantlings, found with no deficiencies affecting safe operation and/or performance. Documentation and maintenance practices considered good. No maintenance or repairs required.	Items and systems examined and function tested, found with some minor deficiencies which do not affect the safe operation and/or normal performance, thickness' significantly above class limits. Documentation and maintenance practices considered adequate. No immediate maintenance or repair considered necessary.	Items and systems examined and function tested, found with deficiencies not affecting safe operation and/or performance, thickness' whilst generally above class renewal limits found with substantial corrosion. Documentation and maintenance practices considered to be of a minimum standard. Some maintenance and repair may be considered necessary.	Items and systems examined and function tested, found with deficiencies significantly affecting operation and/or performance, thickness' at or below class limits. Documentation and maintenance practices considered inadequate. Maintenance and repair required to re-instate serviceability.

A visual examination should be made of the cargo pumps, the securing of the electric cables, and the non return valves. When possible check the free rotation of the impeller of the cargo pumps. Closely inspect the area at bottom of the mast for dust and local corrosion. Check the expansion arrangements for the mast foot and the connection of the membrane to the mast support plate.

A visual examination of the bottom should be made, existing dents should be already marked with their date of recording nearby. If not, the dent should be recorded and its geometry agreed with the "GTT" representative. This is especially important for the "Gaz transport design" where the longitudinal automatic welds of the Invar strakes can be subject to damage during bottom inspection. New damage should be reported and the data recorded close to the damaged area.

Examine areas at bottom and hoppers side which might be covered by dust coming from the storage tanks ashore (perlite, sand etc,.) Check after smooth cleaning if corrosion remains by magnifying glass, dye check or helium test according the defect.

Check the colour of the membrane. Technigaz stainless corrugated plates might turn dull with the time. Gaz transport invar plate might turn orange brown (general surface corrosion). Check if the membrane is tightly fitted onto the faces of the tank without waves that might indicate insulation problems.

3.4 Membrane tightness

3.4.1 Membrane tightness will be investigated during the last loaded and heel voyages before docking and compared with existing earlier operational records and the records from when the vessel was new. Recordings of N2 daily consumption, gas detection in inter-barrier spaces and possibly temperature sensors will be reviewed and studied to assess the general overall operating condition of the membranes. Note that inter-barrier gas readings should be taken both on the loaded and heel passages.

If nitrogen usage is excessive or if gas in the membrane spaces is high then consideration should be given to carrying out a global vacuum test at the docking period to determine the size of leakage. If necessary a helium test will give the location of the leaks and their seriousness in view of repairs. The ratings assigned are to be according to the rating criteria.

4 MOSS - Type containment system

4.1 Tank void space covers external examination

4.1.1 Surveyor to examine the upper surface of the void space cover for cracking and signs of temporary repair especially under the flange drip pans, suspect areas should be subject to hammer test and NDT. Visually inspect the void space safety valves for condition and leakage. Condition of the safety rails around the dome to be examined. The rubber bellows between the tank dome and the void space cover is to be examined for cracking and for leakage, if necessary sections of the shield are to be removed to make examination easier.

The external condition of the cargo tank safety valves should be checked. Foundation of the vent mast to be examined and connection to the riser examined for corrosion.

The connection of the void space cover to the main deck is to be checked for cracking and suspect areas should be subject to NDT. Particular attention should be paid to external brackets between the void cover and the main deck, these frequently suffer cracking or detachment but may propagate cracks into the main deck. Void space doors should be checked for air leakage (soap solution) whilst void spaces are pressurised. A visual examination of the nitrogen supply and exhaust piping should be made.

4.2 Void spaces internal examination

4.2.1 Before entry into the void spaces it is essential to ensure that they are properly ventilated with dry air to ensure that build up of nitrogen is reduced to normal atmospheric levels. The necessary safety precautions should be taken for entry into enclosed spaces. Powerful lighting should be available.

The tank insulation can be of two different types, either the spiral wound type, recognized by an unbroken outer surface like duct tape or the panel system where it is easy to identify the mosaic of panels. With the wound system there will be a support structure of straps and springs holding up the system on the southern hemisphere, these should be examined to ensure that they are still providing the necessary support. The insulation should be examined for signs of cold spots (icing) that would indicate moisture in the void atmosphere. It should also be examined for sagging and other forms of damage or detachment from the sphere. Consideration should be given to removing sections of the insulation to examine and test the material and to check the attachment to the sphere.

In particular the wedge space between the skirt and southern hemisphere should be checked to ensure that the insulation is intact. The nitrogen supply and exhaust lines should be checked for security and sealing where they enter and leave the insulation.

The skirt should be visually examined for signs of cracking or buckling especially where it is attached to the sphere and at the foundation deck. On aluminium tanks, the transition joint from the aluminium part of the skirt to the steel part should be especially examined for signs of failure. The connection of the ballast tank bulkheads to the foundation deck should also be examined for signs of cracking and signs of weeping. Inside the skirt, depending upon the age of the vessel, there will be different "secondary barrier" arrangements, these can range from complete insulation and sheathing in stainless steel of the hull double bottom inside the skirt to just a small drip pan underneath the sphere. The secondary barrier should be examined for damage. The pressure relief devices at the lower part of the southern hemisphere should be examined and checked for freedom of operation. The condition of the sump, void space educators and piping should be checked and consideration should be given to blowing through the lines with air. The condition of the blanking devices between cargo and sea water driving medium should be checked.

The general condition of the void space paint work should be examined and assessed as this can give a good indication as to the efficiency of the dry air system.

4.3 Cargo tank internal examination

4.3.1 The cargo tank to be examined should be gas free and safe for entry. The necessary safety precautions should be taken for entry into enclosed spaces. Powerful lighting should be available.

The condition of the upper part of the tower should be checked especially expansion arrangements (sliding shoes). Locking and securing devices for clamps, nuts and bolts, cabling for cargo pumps and measuring systems should be examined. As much as possible the upper part of the sphere and the connection to the dome should be visually examined from the upper gallery for sign of corrosion or fatigue. The spray rails and securing devices should also be examined as far as possible from the upper gallery. The tower should be visually examined for sign of damage, buckling, cracking etc. The mid level gallery should be examined in preparation for the mounting of the tank inspection boom. The base of the tower should be especially examined depending upon type. Those where the expansion takes place at the base by way of diaphragm plates or other arrangements should be specially examined for cracking; those where the aluminium tower rests upon a steel foundation should be examined for failure of the contact points; those where the tower is connected directly to the shell of the sphere should be examined for cracking.

Location of the cargo and spray pumps should be checked for security. Piping should be checked for security of fittings, clamps and locking devices.

If considered necessary and if available the cargo tank inspection boom should be deployed and an examination made of the internal welds of the sphere.

NDT should be carried out on the tower and sphere as considered necessary.