Amendments to the “Guide for Ship Condition Assessment Program (CAP)”

Effective from 1/1/2025

List of the amendments:

Paragraph amended	Reason
[7.2.4], [7.3.8]	to modify the requirements on fatigue analysis so that the hot spot items identified with the fatigue calculations must be inspected by a close-up survey at the time of the CAP survey, but are no longer included in the list of items to be closely inspected at every renewal and intermediate class survey; and to clarify special considerations to wave functional tests of cargo and ballast systems (Prop 271)

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g) Hull Survey Programme;
h) Class Status Report (Historical with previous and present Conditions of Class Memos to Owner, Memo to Surveyor and Hull Damage Records).

7 CAP PROCEDURE

7.1 General

The procedure for carrying out the CAP survey hereinafter detailed is applicable to both ships classed with Tasneef and not.
Possible specific requirements and criteria may be addressed by the Interested Parties (e.g. for charter purpose, underwriters' clause, oil majors) and applied in addition or as partial modification of the Tasneef procedure.
In case, such requirements and criteria are to be timely declared by the Interested Party to allow proper planning and arrangement for the CAP survey and relevant reporting.
Historical record review and fatigue study are to be available before the Surveyor attends the ship.

7.2 Hull structures

7.2.1 Check of ship's damage, repair and classification records

The check of the ship's records relevant to classification, damage and repair, steel renewals and UTM reports is to be carried out in order to address the following close-up surveys, taking into account possible suspect areas, areas with substantial corrosion, items identified by preliminary strength calculations and hot spot items arising from the fatigue analysis.

7.2.2 Critical Structural Areas

"Critical Structural Areas" are locations which have been identified from calculations or from the service history of the subject ship or from similar or sister ships as being sensitive to cracking, buckling or corrosion which would impair the structural integrity of the ship.

Such areas require special monitoring and are to be specially considered during the CAP survey.

In particular, meaningful photos of such areas are to be included in the report.

7.2.3 Preliminary strength assessment (based on as-built scantlings)

The preliminary hull girder and local strength assessment is carried out on the basis of the as-built scantlings and compared with respect to the Rule requirements for new buildings, by using the Tasneef LEONARDO HULL program.

7.2.4 Fatigue analysis

The fatigue analysis of structural details is carried out according to the procedure specified in Part B, Ch 7, Sec 4 of the Rules.

This procedure is based on the calculation of the fatigue damage originated by the fluctuating stresses induced in the detail by the hull girder and local wave loads, combined with the ballast and full load cargo conditions. The fatigue life of the detail is calculated from the fatigue damage.

The fatigue analysis is based on the following assumptions.

a) Cyclic wave loads are calculated considering the ship engaged in typical worldwide navigation, represented by the North Atlantic scatter diagrams provided by Global Wave Statistics. In this case, the coefficient ξ defined in Pt B, Ch 7, Sec 4 of the Rules is used.

   If the ship is engaged in trade voyages within specific geographic areas, the above coefficient ξ is calculated by means of the formula:

$$\xi = \frac{0,47}{\ln \frac{\sigma_8}{\sigma_5}}$$

   The long-term stresses σ_8 and σ_5, at a probability level of 10^{-8} and 10^{-5}, respectively, are obtained by means of seakeeping analyses based on the scatter diagrams representative of the relevant areas.

   In this case, the navigation areas are to be specified by the Owner and are indicated on the ship's Certificate of Classification.

b) The fluctuating stress ranges are calculated in the examined details as being originated by the hull girder and local wave loads in load cases "a", "b", "c" and "d", defined in the Rules, considering the ship in full load and ballast conditions.

   For the detail connections between longitudinal ordinary stiffeners and transverse primary supporting members (transverse bulkheads and web frames), the following contributions to the fluctuating stresses in the stiffeners are accounted for:

   - axial stresses due to the wave hull girder bending moments, vertical and horizontal,
   - bending stresses induced by the local wave loads supported by the stiffener,
   - for the connections with transverse bulkheads, additional bending stresses due to the relative deflections between the transverse bulkheads and the adjacent web frames (see Fig 1).

c) All the wave loads applied to the structural elements are multiplied by the relevant Partial Safety Factors defined in the Rules.

d) The stress ranges for the fatigue checks are calculated considering the structures with their net scantlings, explicitly to take into account the effects of corrosion.

e) The fatigue analysis is based on the notch stress ranges, i.e. the peak stress ranges in the root of the weld (see Fig 2). These peak stresses take into account the stress concentrations due to the presence of welds.

Notch stress ranges are obtained from the hot spot stress ranges (which account for the detail geometry, but not for the presence of welds) through coefficients defined in the Rules depending on the type of welding adopted.

Hot spot stresses are obtained from the nominal stresses by applying the Stress Concentration Factors (SCFs) defined in the Rules for the specific geometry of the connection.

Where no appropriate SCF values are available, the Rule specifies the procedure for calculating the hot spot stresses through a finite element analysis.

f) The notch stress ranges are multiplied by other coefficients that accounts for the following effects:

- reduction of the fatigue strength for thicknesses greater than 16 mm,
- increase of the stress range due to possible misalignment,
- in the case of ordinary stiffener connections, increase of the stress range because of the warping stresses that originate in the flange of unsymmetrical profiles.

g) The fatigue damage and the fatigue life are calculated taking into account the Partial Safety Factors on material and resistance, defined in the Rules.

Based on the above procedure, the fatigue life of the examined detail, in years, is obtained from the following formula:

$$f_L = \frac{20}{\gamma_R}\left(\frac{\Delta\sigma_{p0}}{\Delta\sigma_{N,eq}}\right)^3$$

(A) If the calculated fatigue life is between 17 years and 23 years, the item is identified as a “hot spot item” to be subjected to a close-up survey as part of the CAP survey

(B) If:

- the fatigue life is less than 17 years, or
- the calculated fatigue life is less than the actual ship life + 3, in years

the item is identified as a “hot spot item” to be inspected by a close-up survey at the time of the CAP survey ~~and, in addition, it is to be included in the list of items to be closely inspected at every renewal and intermediate class survey, both if fitted in ballast spaces and if located in cargo spaces, with the purpose of detecting any fatigue related problem~~.

When deemed necessary, a non-destructive examination, such as the dye penetrant test, may be required to be carried out during the close-up survey.

Figure 1: Additional bending stresses due to the relative deflections between transverse bulkheads and adjacent web frames

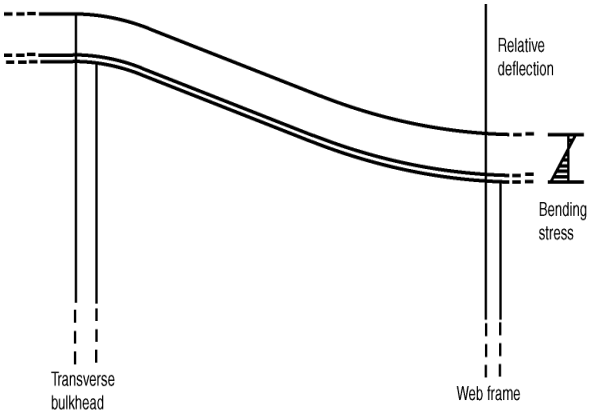
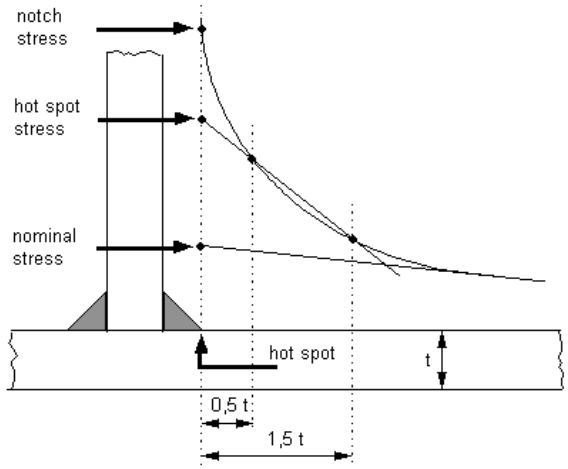


Figure 2: Types of stresses for the fatigue analyses



Fatigue analysis report will be prepared and released upon request only.
For ship not classed by Tasneef, the owner is in charge to inform the ship’s Classification Society about the outcome of the fatigue analysis. The matter will be evaluated by the ship’s Classification Society according to its own Rules.

7.2.5 Inspection

In general, all inspections are to be carried out within a period of not more than six months.

Different period may be agreed on a case-by-case basis.

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Figure 5: Corrosion diminution C_d

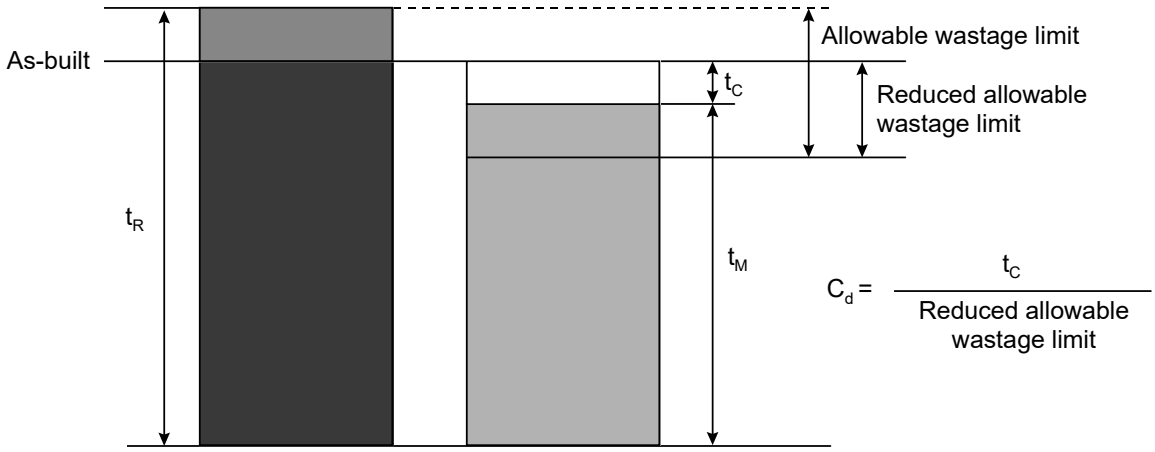
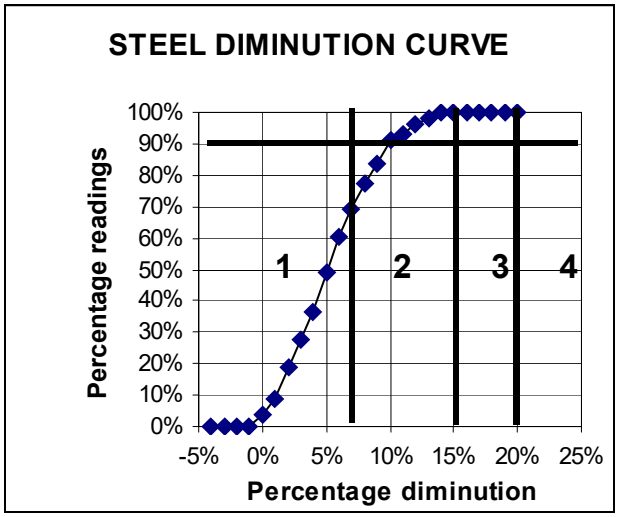


Figure 6: Cumulative steel diminution distribution curve



7.3 Machinery and systems

7.3.1 General

A general examination of machinery and systems, without requesting the opening of components unless deemed necessary on a case-by-case basis, is carried out as part of the CAP survey, paying attention to their overall condition and records of defects and functional tests.

The rating of each item inspected is attributed according to the criteria indicated in [4.2].

The overall machinery rating is assigned as the average of the ratings attributed to the different parts surveyed.

7.3.2 Machinery

The CAP survey of machinery includes:

a) general examination, including functional tests, of the main propulsion plant;

b) internal inspection of items opened for maintenance:
- for diesel engines, assessment of items such as crankcase, scavenge spaces, piston rings, bearing clearance, cylinder heads;
- the bearing clearance and gearing condition of steam turbines;
- boilers and economisers, where possible including the internal examination of water and gas spaces, and external examination of casing, burner equipment, blowers and safety valves;

c) oil sample of oil systems such as gearing, crankcase, sterntube, to be taken for analysis;

d) assessment of record of maintenance for items under PMS/CBM, when applicable.

7.3.3 Electrical installations

The CAP survey of electrical installations includes:

a) alternators under working conditions, both individually and during load sharing operations;

b) the fittings and equipment of the main and emergency switchboards, section boards and subsidiary distribution boards, including random tests of their safety devices;

c) records of insulation-resistance tests performed on cables, switchgear, generators, motors, heaters and lighting fittings, witnessing sample tests;

d) electrical cables, taking into account the aforementioned insulation resistance tests;

e) the emergency source of power, associated circuits and equipment, including testing under working conditions.

For tankers and in general for ships with dangerous zones and spaces, the integrity of “safe” type electrical equipment is to be assessed.

7.3.4 Auxiliary systems

The CAP survey includes the general examination including functional tests of auxiliary systems for propulsion, power generation, steering, fuel oil, lube oil, cooling water, compressed air, steam, ventilation and accommodation services.

Each system is to be examined having regard to the general condition, leakages, supporting instrumentation, emergency arrangements, etc.

Special consideration is to be given to the conditions of ECGS (Exhaust Gas Cleaning Systems) piping, especially overboard lines.

7.3.5 Safety protection devices

The various safety protection devices fitted to protect machinery and machinery spaces (alarms, shutdowns, standby pumps cut-in, remote stops, remote closing valves, bilge alarms, fire flaps, etc.) are to be assessed in order to verify their correct operation.

7.3.6 Other equipment

Anchor equipment, mooring systems, cargo gear and life-saving appliances are to be assessed by means of functional tests.

7.3.7 Plant performance in terms of environmental impact

Performance tests and assessments are to be carried out for all equipment that has an impact on the environment such as fuel management, lube oil leakages, air emission, bilge cleanness and oily water management.

7.3.8 Cargo and ballast systems

The CAP survey includes the inspection and testing of cargo related equipment and systems, including:

a) for tankers:

cargo pumps and piping with associated installations such as inert gas plant, washing systems, level indication/sounding systems, venting systems, ballast pumps and piping, and remote closing valves;

b) for other types of ships:

cargo equipment and closing devices, bilge, ballast and ventilation systems.

A functional test while the ship is trading (during loading or unloading in the harbour) will be requested depending on operational records, machinery technical conditions, maintenance carried out.

Special considerations to ~~perform~~ waive functional tests~~ by means of remote survey, according to the relevant Tasneef instructions~~, will be given to cargo and ballast systems ~~under~~ PMS or CBM properly managed and ~~documented~~, or PMS for which good functional performance is confirmed by noise and vibration analysis of their main components.

In case of complete main machinery overhauling (e.g. main cargo and ballast pump overhauling), a functional test during loading and unloading operation is to be carried out to confirm the effectiveness of the maintenance carried out.

7.3.9 Specific system for LNG/LPG Carriers

Cargo containment system, cargo refrigeration system including pumps and compressors, blow-off system, venting system are to be examined and functional tested.

8 SURVEY REPORTING

The Surveyor in charge of the CAP survey is responsible for providing in the survey report an indication of the ratings assigned to structures and machinery items, based on his observations and the evaluation criteria provided in [4].

The Surveyor's report is to contain a detailed description of the survey findings, including photographs to show the best, worst and average conditions taken into consideration, and relevant upgrading works agreed with and carried out by the Interested Party.

9 SHIP'S OVERALL RATING

The ship's overall rating is assigned by combining the hull rating (weight 70%) with the machinery and system rating (weight 30%).

10 FINAL CAP REPORT

The results of the CAP Survey are summarised in the CAP report.

In line with the scope of the Condition Assessment Program, this report is to include the following:

a) introduction
b) executive summary
c) ship's description / main data / history
d) ship's structural history, including damages, repairs and steel renewals
e) details of hull surveys in each compartment, including photographs
f) details of machinery surveys for each component and system, including photographs
g) results of strength assessment and fatigue analysis
h) conclusions
i) references
j) Annexes, including the following:
   - ship's survey status
   - output of structural strength assessment and fatigue analysis based on as-built scantlings – with the indication of "hot spots"
   - UTM report (only for ships not classed by Tasneef)

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