

Guidelines on
**Continuous Surveys of
Machinery**

March 2022



IRCLASS
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Guidelines

Continuous Surveys of Machinery

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Section 1

General

1.1 Scope

1.1.1 These guidelines have been developed in order to provide greater clarity to stakeholders (Owners, Ship Operators, etc.) on the Continuous Surveys of Machinery (CSM) scheme of IRS.

1.1.2 Part 1, Chapter 2, Section 8.2 of the *Rules and Regulations for the Construction and Classification of Steel Ships* (hereinafter referred to as the Main Rules) specifies following :

(a) At the request of the Owners and upon approval of the proposed arrangement a system of continuous Surveys of Machinery (CSM) may be undertaken whereby the requirements of Special Survey of machinery are completed within a 5 year period.

(b) The Survey cycle should be such as would ensure that the interval between consecutive examinations of each item does not exceed five years and it is expected that approximately an equal proportion of the machinery would be subjected for Survey each year.

1.1.3 Further, Part 1, Chapter 2, Section 1.4 of the Main Rules permits Continuous Surveys of few machinery items to be carried out under the supervision of the Chief Engineer of the ship subject to certain conditions, and confirmatory survey by IRS Surveyors.

1.1.4 These guidelines are intended to provide better clarity on the CSM scheme and the conditions where certain Surveys (as part of the CSM) may be carried out under the supervision of the Chief Engineer. The guidelines also provide clarity on machinery items that are not acceptable for survey by Chief Engineers and which have to be necessarily surveyed by IRS Surveyors.

1.1.5 Requirements for Planned Maintenance Scheme (PMS) and the Condition Monitoring (CM)/ Condition Based Monitoring (CBM) schemes are specified in Section 14 and Section 21 respectively, of Part 1, Chapter 2 of the Main Rules.

Section 2

Application

2.1 Application

2.1 These guidelines are applicable to the Continuous Surveys of Machinery (CSM) Scheme of IRS.

2.2 General Requirements

2.2.1 In general, SSM (Special Survey Machinery) class survey notation is assigned on completion of construction of a vessel. Subsequently, approval for complete Survey of the machinery to be carried out on a Continuous Survey basis may be obtained on request.

2.2.2 Machinery items are to be offered for survey in rotation, as far as practicable, to ensure that the interval between consecutive examinations of each machinery item will not exceed five years. In general, approximately one-fifth of the machinery items are to be examined each year.

2.2.3 The Chief Engineer or Operator should arrange for IRS Surveyors to carry out the machinery surveys at ports where IRS is represented.

(a) Machinery items are to be opened out for inspection, for a meaningful examination by the attending Surveyor, so as to know the condition of parts and components.

(b) The Chief Engineer's maintenance and monitoring records are to be made available.

(c) The Surveyor will credit relevant items, subject to satisfactory examination and testing.

2.2.4 However certain machinery items may be surveyed by the Chief Engineer as permitted by the Rules subject to confirmatory survey by IRS. Typical list of machinery items that are acceptable for Survey by Chief Engineers are indicated in Section 3. Typical list of machinery items that are not acceptable for Survey by Chief Engineers, and are to be surveyed by IRS Surveyors; are indicated in Section 4.

2.2.5 Following procedure is to be applied by the Owner/ Company in case of any proposal for survey of machinery items by the Chief Engineer:

(a) Owner/ Company has to inform IRS Head Office in writing regarding intention to carry out Surveys by the Chief Engineer and seek advice.

(b) The Chief Engineer may carry out the examination of applicable machinery items, listed in Section 3. Machinery items are to be opened up for a meaningful examination so as to know the condition of parts and components. Deficiencies noted (if any), are to be made good by renewing the defective part or component. Items, if required to be replaced are to be supplied by the OEM/ their authorized suppliers(s). Items which require repair need to be verified by the Surveyor. Machinery items are to be tested under running condition for satisfactory operation. Maintenance instructions for each machinery, as applicable (supplied by the manufacturer or the shipyard) are to be complied with.

(c) Records are to be maintained related to findings, parts replaced/ renewed, documentation to prove authenticity of parts/ components used, records of calibration/ measurement recorded along with photographs as appropriate. It is recommended that photographs with dates, which enable adequate traceability, are retained on-board for better record keeping. Parts that have been replaced by spares are to be retained and shown to the Surveyor. Maintenance and performance records are to be maintained to evidence that machinery has been functioning

satisfactorily and that the overhaul intervals have been observed. Maintenance instructions of Manufacturer are to be available on board for this purpose to know the recommended maintenance requirements and intervals for reference. Typical format for reporting opening-up inspection by Chief Engineer is placed at Appendix A-2 of these Guidelines.

(d) The Chief Engineer should prepare three signed copies of 'Declaration of Examination of Surveyable Machinery Items' (Refer typical format at Appendix A-1). One copy is to be given to the Surveyor and one copy each is to be retained on ship and at the Company.

(e) The Chief Engineer or Owner is to arrange for the attendance of IRS Surveyor for credit of such items at the next port of call where a Surveyor is available or when the Surveyor boards the vessel. Report of opening-up examination, testing along with records/documents as in 2.2.5 (c) above, are to be made available for review.

(f) The Chief Engineer's report and other records will, subject to confirmatory surveys, be sufficient for the Surveyor to credit the applicable machinery items for survey.

(g) If the Surveyor is not satisfied with the Chief Engineer's report, degree of accuracy as regards the maintenance records and/ or the general operating condition of the machinery, he may request that the relevant items be offered for a detailed examination.

(h) Survey of machinery/ equipment by the Chief Engineer is not permissible where the machinery/ equipment is known to have sustained any kind of damage and/ or is known to have undergone any type of temporary repair.

2.2.6 The Surveyor's confirmatory surveys will include:

(a) Review of maintenance, performance and monitoring records maintained by Chief Engineer as found during examination since the previous survey, and where needed; necessary measures have been taken in response to machinery operating parameters exceeding acceptable limits and, that the stipulated overhaul intervals have been observed. Reports detailing overhaul carried out and spare parts used on machinery / equipment would also be reviewed.

(b) General examination of the machinery, under working conditions where practical and feasible.

(c) Testing of alarms, controls and safeguards, as relevant and applicable.

Section 3

Typical List of Machinery Items acceptable for Survey by Chief Engineers

Note: The list is not comprehensive/ exhaustive and may vary depending on the machinery items on a particular vessel and hence, is subject to IRS approval in each case.

3.1 Machinery Items acceptable for Survey by Chief Engineers

3.1.1 The following machinery items may be surveyed by the Chief Engineer under CSM:

- (a) Main engine cylinder covers
- (b) Main engine valves and valve gears
- (c) Main engine cylinder liners
- (d) Main engine pistons and piston rods
- (e) Main engine connecting rods, crossheads, top end bearings, guides, gudgeon pins and bushes
- (f) Main engine crankshafts and bearings
(Note: Bearings are to be opened up based on engine manufacturer's recommendations. Manufacturers may recommend that bearings are not to be opened unless bearing material fragments fall out or other bearing inspection measures indicate so.)
- (g) Main engine fuel injection pumps and fuel booster pumps
- (h) Main engine scavenge pumps, blowers and air coolers
- (i) Main engine detuners, dampers and balancer units
- (j) Main engine camshaft and camshaft drive
- (k) Main engine thrust bearing
- (l) Turbocharger
- (m) Governor
- (n) Complete auxiliary diesel engines including coolers and pumps
- (o) Complete auxiliary steam turbines including coolers and pumps
- (p) Main engine driven pumps, e.g. bilge, lubricating oil, cooling water
- (q) Independently driven pumps (and associated motors and cables where insulation resistance readings are supplied) e.g. bilge, ballast, fresh water cooling, sea water cooling, lubricating oil, oil fuel transfer.
- (r) Main engine fresh water and lubricating oil coolers

(s) Low pressure (less than 6,9 bar (7 kgf/cm²)) heaters used in fuel oil systems of internal combustion engines

(t) Main and auxiliary condensers/ drain coolers

(u) Air compressors including their safety devices

(v) Windlass and windlass machinery

(w) Forced or induced draught fans

(x) Steering gear pumps

(y) Auxiliary oil and steam engines including their coolers and pumps (provided the number of generating sets is such that all services essential to the propulsion and safety of the ship, also the preservation of refrigerated cargo, can be supplied when any two sets are not working. One of these sets can be overhauled while the other remains as "stand-by").

(z) Intermediate shafts

(aa) Adjustment of exhaust gas boiler safety valves under steam

3.1.2 For refrigerated cargo installations

(a) Refrigerant compressors

(b) Brine pumps

(c) Condenser cooling pumps

(d) Liquid refrigerant circulating pumps

3.1.3 Ships for liquefied gases

(a) Refrigerant compressors

(b) Cargo gas compressors

(c) Condenser cooling pumps

(d) Circulating pumps (where fitted)

3.1.4 Ships fitted with approved inert gas systems

(a) Scrubber Units

(b) Blowers

(c) Independent gas generators

Section 4

Typical List of Machinery Items not acceptable for Survey by Chief Engineers

Note: The list is not comprehensive/ exhaustive and may vary depending on the machinery items on a particular vessel and hence, is subject to IRS approval in each case.

4.1 Machinery Items not acceptable for Survey by Chief Engineers

4.1.1 All machinery items not listed in Section 3, including the following items are not acceptable for survey by the Chief Engineers and which are to be surveyed by IRS Surveyors:

- (a) Reduction/ increase gearing, flexible couplings and clutches
- (b) Holding down bolts and chocks
- (c) Crankcase doors, crankcase and scavenge relief devices
- (d) Boilers and all other pressure vessels
- (e) Boiler fuel oil heaters, other than Low Pressure (less than 6.9 bar) fuel oil heaters
- (f) Steam pipes and starting air pipes
- (g) Maneuvering valves and bulkhead stop valves
- (h) Surveyable items of steering machinery other than steering gear pump
- (i) Pumping arrangements for Bilge/ Ballast/ Fuel Oil/ Fresh Water/ Sea water/ Lub-Oil/ Fire - Electrical equipment other than that defined in Section 3.
- (j) Propellers
- (k) Screwshafts (i.e. tailshafts and sternbushes)
- (l) Sea connections
- (m) Main Engine controls, bridge, centralized or automatic and controls in unmanned machinery spaces
- (n) Gas Turbines
- (o) Steam Turbines
- (p) Engine trials
- (q) First start arrangements
- (s) All surveyable items of inert gas systems other than those indicated in Cl. 3.1.4.

Appendix A-1

**Declaration of Examination of Surveyable
Machinery Items (CSM)**

Ship's Name :	IMO No. :	IR No. :
Owner's Name :		
Company Name (If Managed by someone other than Owner)		
Chief Engr's Name :		
Chief Engr's Certificate No. :	Validity of Chief Engr's Certificate :	
Issuing State :	Certificate endorsed by the flag :	

I, the undersigned Chief Engineer of the above ship, have carried out the examination and test of CSM Items mentioned below satisfactorily. Details of Opening-up inspection are also given (Refer Appendix A-2).

Sl. No.	CSM Item	CSM Code	Date of Examination

Signature of Chief Engr :

(Chief Engr's Name:)

Date (dd/mm/yyyy):

Appendix A-2

(Page.../...)

Details of Opening-up Inspection by Chief Engineer

CSM Item & Code No.	Date of inspection:	Place of Inspection:
Condition at the time of inspection, before reassembly and after reassembly :		
Photographs to be attached		
Details of maintenance/repair etc. : Measurement records attached: Yes/ No		
Name of Parts replaced/ repaired:		

End of Guidelines