

Z18 Survey of Machinery

(Nov 2001)

(Rev.1

Jan 2006)

(Rev.2

Oct 2006)

(Rev.3

Apr 2013)

(Rev.4

Sept 2014)

(Rev.5

Apr 2015)

(Rev.6

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(Rev.7

June 2017)

(Rev.8

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(Rev.9

Apr 2020)

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Note:

1. Ex-M20 was re-categorized as Z18 in November 2001, excluding section M20.2 "Surveys of Propeller Shafts and Tube Shafts" which was separately relocated to Z21.
2. The changes introduced in Rev.1 are to be uniformly applied by IACS Societies on surveys commenced on or after 1 January 2007.
3. The changes introduced in Rev.2 are to be uniformly applied by IACS Societies on surveys commenced on or after 1 January 2008.
4. The change introduced in Rev.3 is to be uniformly applied by IACS Societies on surveys commenced on or after 1 January 2014.
5. The change introduced in Rev.4 is to be uniformly applied by IACS Societies on surveys commenced on or after 1 July 2015.
6. The change introduced in Rev.5 is to be uniformly applied by IACS Societies on surveys commenced on or after 1 July 2016.
7. The change introduced in Rev.6 is to be uniformly applied by IACS Societies on surveys commenced on or after 1 July 2017.
8. The change introduced in Rev.7 is to be uniformly applied by IACS Societies on surveys commenced on or after 1 July 2018.
9. The change introduced in Rev.8 is to be uniformly applied by IACS Societies on surveys commenced on or after 1 July 2019.
10. The change introduced in Rev.9 is to be uniformly applied by IACS Societies on surveys commenced on or after 1 July 2021.

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(cont)**1. General Requirements****1.1 Special Surveys¹**

1.1.1 Special Surveys are to be carried out at 5 years intervals to renew the Class Certificate.

1.1.2 The first Special Survey is to be completed within 5 years from the date of the initial classification survey and thereafter 5 years from the credited date of the previous Special Survey. However, an extension of class of 3 months maximum beyond the 5th year can be granted in exceptional circumstances. In this case, the next period of class will start from the expiry date of the Special Survey before the extension was granted.

1.1.3 For surveys completed within 3 months before the expiry date of the Special Survey, the next period of class will start from the expiry date of the Special Survey. For surveys completed more than 3 months before the expiry date of the Special Survey, the period of class will start from the survey completion date. In cases where the vessel has been laid up or has been out of service for a considerable period because of a major repair or modification and the owner elects to only carry out the overdue surveys, the next period of class will start from the expiry date of the special survey. If the owner elects to carry out the next due special survey, the period of class will start from the survey completion date.

1.1.4 The Special Survey may be commenced at the 4th Annual Survey and be progressed with a view to completion by the 5th anniversary date. When the Special Survey is commenced prior to the 4th Annual Survey, the entire survey is to be completed within 15 months if such work is to be credited to the Special Survey.

1.2 Annual Surveys

Annual Surveys are to be held within 3 months before or after each anniversary date of the date of the initial classification survey or the completion of the last Special Survey. They will normally be performed at the same time as an Annual Hull or Load Line survey.

1.3 Continuous Surveys

Special Surveys of machinery may be carried out on a continuous survey basis. In this case, the interval between consecutive examinations of each item is not to exceed five (5) years.

1.4 Surveys of Commercial Vessels Supporting Military Use

Special consideration may be given in application of relevant sections of this Unified Requirement to commercial vessels owned or chartered by Governments, which are utilized in support of military operations or service.

1.5 Planned Maintenance Scheme (PMS)

Surveys of machinery may be carried out on a PMS basis (Reference to the UR Z20).

1.6 Condition Monitoring (CM) and Condition Based Maintenance (CBM)

Surveys of machinery may be carried out on a CM / CBM basis (Reference to the UR Z27).

¹ Some Member Societies use the term "Special Periodical Survey", others the term "Class Renewal Survey" instead of the terms "Special Survey".

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(cont)**2. Survey of Steam Boilers**

2.1 Water tube boilers used for main propulsion, including reheat boilers, all other boilers of essential service, and boilers of non-essential service having working pressure exceeding 0.35 N/mm² (3.5 bar) and a heating surface exceeding 4.5 m², are to be surveyed internally. There is to be a minimum of two internal examinations during each 5-year special survey period. In all cases the interval between any two such examinations is not to exceed 36 months. An extension of examination of the boiler of up to 3 months beyond the due date can be granted in exceptional circumstances². (See 2.3)

At each survey, the boilers, superheaters, and economizers are to be examined internally **on water-steam side and fire side**. Boiler mountings and safety valves are to be examined at each survey and opened out as considered necessary by the Classification Society.

When direct visual internal inspection is not feasible due to the limited size of the internal spaces, such as for small boilers and/or narrow internal spaces, this may be replaced by a hydrostatic pressure test or by alternative verifications as determined by the Classification Society.

The adjustment of the safety valves is to be verified during each boiler internal survey. Boiler safety valve and its relieving gear are to be examined and tested to verify satisfactory operation. However, for exhaust gas heated economizers, if steam cannot be raised at port, the safety valves may be set by the Chief Engineer at sea, and the results recorded in the log book for review by the Classification Society.

Review of the following records since the last Boiler Survey is to be carried out as part of the survey:

- Operation
- Maintenance
- Repair history
- Feedwater chemistry

2.2 External survey of boilers including test of safety and protective devices, and test of safety valve using its relieving gear, is to be carried out annually, within the window of the Annual Survey of a ship. For exhaust gas heated economizers, the safety valves are to be tested by the Chief Engineer at sea within the annual survey window. This test is to be recorded in the log book for review by the attending Surveyor prior to crediting the Annual Survey of Machinery.

2.3 An extension may be granted by the Classification Society, on the basis of Para. 2.1, after the following is satisfactorily carried out:

- i) External examination of the boiler
- ii) Boiler safety valve relieving gear (easing gear) is to be examined and operationally tested

² "Exceptional circumstances" means unavailability of repair facilities, unavailability of essential materials, equipment or spare parts, or delays incurred by action taken to avoid severe weather conditions.

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- iii) Boiler protective devices operationally tested
- iv) Review of the following records since the last Boiler Survey:
 - Operation
 - Maintenance
 - Repair history
 - Feedwater chemistry

2.4 Exhaust Gas Heated Economizers

In addition to the other requirements of 2.1 (*internal examination*) in exhaust gas heated economizers of the shell type, *all* accessible welded joints are to be subjected to a *visual* examination for cracking. Nondestructive Testing may be required for this purpose.

3. Propulsion Steam Turbines: Modification of First Special Survey

3.1 Where the propulsion steam turbines are of a well known type, and fitted with rotor position indicators and vibration indicators of an approved type, as well as measuring equipment of steam pressure at proper locations along the steam flow, and the arrangements for change over in case of emergency operation of the plant are readily operable, the first Special Survey may be limited to the examination of rotor bearings, thrust bearings and flexible couplings, provided the surveyor has been satisfied from operation service records and power trials subsequent to the survey, that the turbine plant is in good working condition.

3.2 Turbine casings should be opened at the next Special Survey and subsequent Special Surveys.

4. Machinery Verification Runs

4.1 As part of the Special Survey of Machinery, a dock trial is to be carried out to attending Surveyors' satisfaction to confirm satisfactory operation of main and auxiliary machinery. If significant repairs are carried out to main or auxiliary machinery or steering gear, consideration should be given to a sea trial to attending Surveyors' satisfaction.

4.2 If the significant repairs as stated in 4.1, is considered by classification society to have any impact on response characteristics of the propulsion systems, then the scope of sea trial shall also include a test plan for astern response characteristics based on those required for such an equipment or systems when fitted to the new ship. Refer to UR M25 for astern testing requirements.

The tests are to demonstrate the satisfactory operation of the equipment or system under realistic service conditions at least over the manoeuvring range of the propulsion plant, for both ahead and astern directions.

Depending on the actual extent of the repair, the Society may accept a reduction of the test plan.

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(cont)**5. Survey of towing winch emergency release systems subject to UR M79****5.1 Annual Survey**

5.1.1 Operation of the towing winch emergency release system is to be confirmed with the reference to the documented instructions for surveys provided by the manufacturer. Operation of the winch emergency release system under no load condition is to be verified. Where practical, activation of the emergency release system may be confirmed by observation of the winch brake.

5.1.2 The function of the alarms associated with the emergency release system is to be verified, as far as practicable and reasonable.

5.1.3 The condition of the emergency release system is to be visually examined to confirm it remains in satisfactory condition.

5.1.4 The means of emergency release of the towline in the event of a blackout is to be examined, and where additional sources of energy are arranged for this purpose, the sources of energy are to be visually inspected and operationally tested.

5.1.5 It is to be verified that the performance capabilities and operating instructions of the emergency release system are documented and made available on board the ship on which the winch has been installed.

5.2 Special survey

5.2.1 The Annual Survey requirements are to be carried out, with the additional instructions for special survey provided by the manufacturer, as appropriate, being followed.

5.2.2 The full functionality of the emergency release system is to be tested to the satisfaction of the surveyor. Testing may be conducted either during a bollard pull test or by applying the load against a strong point on the deck of the tug or the shore that is certified to the appropriate load.

5.2.3 The emergency release system is to be tested at a towline load that is equal to the lesser of 30% of the maximum design load or 80% of vessel bollard pull in both a normal power condition and power blackout condition to the satisfaction of the surveyor.

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