United States Coast Guard

Machinery Inspector (MI)
Job Aid

Name of Vessel	
Official Number	**Activity Number**
Date Completed	**Class**
Location	
Vessel Built in Compliance with SOLAS: **60** **74** **74/78** **NA**	

Route

❑ Oceans ❑ Limited Coastwise ❑ Lakes / Bays / Sounds

❑ Coastwise ❑ Great Lakes ❑ Rivers

Inspection Type

❑ Inspection for Certification (COI) ❑ Annual

❑ Periodic ❑ Drydocking

Inspectors

1. _____ **3.** _____

2. _____ **4.** _____

Use of Machinery Inspector (MI) Job Aid:

This Job Aid is intended for use by qualified Coast Guard MI Marine Inspectors for use on U.S. flagged vessels during hull exams on vessels regulated under Subchapters D, H and I.

The tasks contained within this Job Aid are not intended to limit the scope or depth of inspection. A checked box should be a running record of what has been inspected and does not imply that the entire system has been inspected or that all or any items are in full compliance. This Job Aid does not constitute part of the official inspection record.

Inspection items marked with an asterisk (*) reflect tasks that originate from pre-requisite PQS (Core), are utilized during a Machinery Inspection, however do not correspond to a MI PQS task.

This document does not establish or change federal laws or regulations and references given are only general guidance to the Marine Inspector. The Marine Inspector will need to refer to other publications such as the International Maritime Organization (IMO) resolutions, U.S. Codes of Federal Regulation (CFR), USCG Navigation and Vessel Inspection Circulars (NVIC) or locally produced guidance during the course of inspection for specific regulatory references. Not all items in this Job Aid are applicable to all vessels.

NOTE: *Guidance on how to conduct inspections of U.S. flagged deep draft vessels can be found in MSM Volume II, Section B: Domestic Inspection Programs.*

Pre-inspection Items

- Review MISLE records
- Obtain copies of forms to be issued

Post-inspection Items

- Issue letters/certificates to vessel
- Complete MISLE entries within 48 hours

Table of Contents:

Section 1: Administrative Items

IMO Applicability Dates:

Reference	Dates
1974 SOLAS (2020 Consolidated)	
Chapter (I)	All Ships
Chapter (II-1)	01 JAN 09
Chapter (II-2)	01 JUL 02
Chapter (III)	01 JUL 98
Chapters (IV-XII)	All Ships
1974 SOLAS (2009 Consolidated)	
Chapter (II-1)	01 JAN 09
Chapter (II-2)	01 JUL 02
Chapter (III)	01JUL 98
1974 SOLAS (2004 Consolidated)	
Chapter (II-1)	01 JUL 86
Chapter (II-2)	01 JUL 02
Chapter (III)	01 JUL 98
1974 SOLAS (2001 Consolidated)	
Chapter (II-1)	01 JUL 86
Chapter (II-2, III)	01 JUL 98
1974 SOLAS (1997 Consolidated)	
Chapters (II-1, II-2 Part A,C,D, III)	01 JUL 86
Chapter (II-2 Part B)	01 OCT 94
1974 SOLAS (1981 Amendments)	
Chapters (II-1, II-2, III)	01 SEP 84
1974 SOLAS (Unamended)	25 MAY 80
1960 SOLAS	Prior to 25 MAY 80

74 SOLAS 2020 Consolidated contains all amendments entered into force up-to 01 Jan 2020. The following Amendments (resolutions) have entered into force since it was published. www.imo.org	
MSC 365(93)	01 JUL 15
MSC 366(93)	01 JUL 15
FSS CODE (2015 edition)	
LSA Code (2017 edition)	
ITC 1969	18 JUL 82
Load Line 1966	21 JUL 68
Load Line 88 Protocol	03 FEB 00
Load Line (2005 edition) contains all amendments entered into force up-to 2003 Amendments. The following Amendments (resolutions) have entered into force since it was published. www.imo.org	
MSC 172(79)	01 JUL 06
MSC 223(82)	01 JUL 08
MSC 270(85)	01 JUL 10
MSC 329(90)	01 JAN 14
MSC 356(92)	01 JAN 15
MSC 375(93)	01 JAN 16
MARPOL 2017 Consolidated contains all amendments entered into force up-to 01 JAN 2017 Amendments. The following Amendments (resolutions) have entered into force since it was published. www.imo.org	

STCW (2017 edition) contains all amendments entered into force up-to 2017 Amendments. The following Amendments (resolutions) have entered into force since it was published. www.imo.org	28 APR 84

Involved Parties & General Information:

Vessel's Representative: _____ _____
Phone Numbers:

Owner
❑ No Change

Operator – Listed on DOC (if applicable) or COFR
❑ No Change

Vessel Information:

Classification Society	
ISM Issuer: Same as above? ❑Yes ❑ No If not the same, which Recognized Organization? _____ ***NOTE:*** *The period of validity for ISM documents should correspond to the following list. If they do NOT, ISM documents should be further investigated.* ☐ *5 years = Full term (SMS and DOC)* ☐ *12 months = Interim (DOC)* ☐ *6 months = Interim (SMC)* ☐ *5 months = Short term (SMC)*	
Last Drydocking Date	Next Drydocking Date
Location of Last Drydocking	
Call Sign	❑ No Change
Gross Tons	❑ No Change
Built Date (use delivery date)	❑ No Change
Overall Length (in feet)	❑ No Change

Certificates and Documents

Name of Certificate	Issuing Agency	ID #	Port Issued/ Country	Issue Date	Exp. Date	Endors. Date
Certificate of Documentation ☐ No Change	USCG					
Classification Document ☐ No Change						
Certificate of Financial Responsibility (COFR) ☐ No Change	USCG					
FCC Station License ☐ No Change	FCC					
FCC Safety Certificate ☐ No Change	FCC					
FCC Marine Operator's Permit ☐ No Change	FCC					

Name of Certificate	Issuing Agency	ID #	Port Issued/ Country	Issue Date	Exp. Date	Endors. Date
Cargo Ship Safety Construction ☐ No Change						
Cargo Ship Safety Equipment ☐ No Change	USCG					
Cargo Ship Safety Radio ☐ No Change	USCG					
International Load Line (ILLC) ☐ No Change						
International Tonnage (ITC) ☐ No Change						
ISM Document of Compliance (DOC) ☐ No Change						
ISM Safety Management (SMC) ☐ No Change						

Name of Certificate	Issuing Agency	ID #	Port Issued/ Country	Issue Date	Exp. Date	Endors. Date
International Oil Pollution Prevention (IOPP) ☐ No Change						
International Sewage Pollution Prevention (ISPP) ☐ No Change						
International Air Pollution Prevention (IAPP) ☐ No Change						

Section 2: Inspection Items

Pre-Inspection

☐ 1. Research vessel details in MISLE (Marine Information for Safety and Law Enforcement) database

• Determine authority, jurisdiction, applicable regulations and enrollment in alternate inspection programs (ACP, SIP, MSP, etc.)	46 USC 3301 46 CFR 30.01-5,71.15 & 91-15-5 MSM II/B.9 & B 10
• Locate vessel in MISLE	MSM I/12.G.5
• Verify documents are current in MISLE	MISLE User Guide MSM II/B.1.C.2
• Review history (narratives, deficiencies & special notes)	MSM II/B.1.C.2
• Verify status of user fees	MSM II/B.1.C.2
• Enter title and point(s) of contact	MSM II/B.1.C.2
• Verify status of Certificate of Financial Responsibility (e-COFR)	33 CFR 138.15 & .30(c) 33 CFR 138.65 33 CFR 138.90(a)
• Generate new activity	MSM I/12.G
• Prepare folder and required documents	MPS-PR-SEC-04 & 05
• Hydrostatic inspection dates (boilers/main steam piping)	46 CFR 61.05-10(a) 46 CFR 61.15-5
• Fireside/waterside inspection dates	46 CFR 61.05-10(a)
• Safety valves setting(s) and inspection dates	46 CFR 61.05-10(a)
• Mount inspection dates	46 CFR 61.05-10(a)
• Valve inspection dates	46 CFR 61.05-10(a)
• Stud/bolt inspection dates	46 CFR 61.05-10(a)
• Gauge calibration dates	46 CFR 61.05-10(a)
• Pressure vessel(s)	46 CFR 61.10-5(b)
• Safety relief valve(s)	46 CFR 61.10-5(i)
• Non-metallic expansion joint(s)	46 CFR 61.15-12(b)

☐ 2. Coordinate inspection with vessel's representative

• Verify vessel's representative	MPS-PR-SEC-01
• Determine location and time of inspection	MPS-PR-SEC-01
• Discuss inspection expectations	46 CFR 31.10 & 71.20 & 25 46 CFR 91.25 & .27 MSM II/B.1.D.1 & B.2.A.1
• Verify vessel's owner/operator information	MPS-PR-SEC-04
• Verify vessel's classification society information	MPS-PR-SEC-04
• Review outstanding conditions from third party reports and/or CG-835s	MPS-PR-SEC-04
• Review repairs and alterations	46 CFR 31.10-22 & -25 46 CFR 71.55 46 CFR 91.45

☐ 3. Mitigate potential hazards encountered during an inspection

• Recognize potential hazards encountered during inspection	NFPA 306 NFPA 350
• Determine confined spaces	MSM I/10 App.A NFPA 350
• Determine if exam scope will require a Marine Chemist certification for space entry	29 CFR 1915, Subpart B MSM II/A.5.H
• Verify Marine Chemist has been scheduled for exam	MSM I/10 App. A
• Prepare necessary personal protective equipment for exam	MSM I/10 App. A MSM I/8.A.3. Operator's Manual
• Review CG policy for when to leave a space due to hazardous condition	MSM I/10 App. A

Certificates and Documents

☐ 4. Review Certificate of Inspection (COI)

• Verify presence of original	46 CFR 31.05-5 46 CFR 71.01-5 46 CFR 91.01-5
• Validate manning	46 USC 81, 83 & 87 46 CFR 15.501 46 CFR 15.525
• Validate route(s) and service	46 CFR 31.05-1(b) 46 CFR 71.20-15 46 CFR 91.20-15
• Validate fire fighting and lifesaving equipment	46 CFR 31.10-15(b)
• Validate cargo carriage (D & I only)	46 CFR 31.05-1(b) 46 CFR 90.05-35
• Review amendment(s)	MSM II/A.3.J
• Verify pressure vessel date(s)	46 CFR 31.30-1, 70.20-1 46 CFR 91.25-35 46 CFR 61.10-5(b)

☐ 5. Review Certificate of Documentation (COD)

• Verify presence of original	46 CFR 67.313
• Verify contact information is correct	46 CFR 67.321
• Verify endorsement(s) for current service(s)	46 CFR 67.17 & .19
• Verify validity	46 CFR 67.7 & .9 46 CFR 67.161
• Confirm renewal of endorsement	46 CFR 67.163

☐ 6. Review Merchant Mariner Credentials (MMCs), medical certificates & TWIC

• Verify presence of original credentials	46 CFR 10.203(c)
• Verify validity of credentials	46 CFR 10.205
• Ensure credentials, including STCW endorsements, meet COI manning requirements	46 CFR 15.515 & 31.05-1(b) 46 CFR 71.01-2 & 91.01-2 STCW I/2.6
• Verify number of GMDSS Operators	47 CFR 80.1073 SOLAS 20 IV/16 & STCW IV/2 46 CFR 15.817 & NVIC 03-99
• Verify Radar Operator endorsement	46 CFR 15.815 46 CFR 11.480
• Verify Tankerman endorsement(s)	46 CFR 15.860
• Verify Vessel Security Officer (VSO) endorsement	33 CFR 104.215(c) STCW VI/5
• Examine medical certificates	46 CFR 10.301 STCW I/9 ILO-147 pp. 19-22
• Verify Transportation Worker Identification Credential (TWIC)	46 CFR 10.203(b) & (d)

☐ 7. Examine maintenance and service records (lifesaving & fire fighting)

• Review fire fighting service report(s)	46 CFR 31.10-18(a) & 78.17-80 46 CFR 97.15-60(b) SOLAS 20 II-2/14.2.2
• Review lifesaving service report(s)	46 CFR 31.36-1 & 70.28-1 46 CFR 90.27-1 & 199.190 SOLAS 20 III/20.8.1

☐ 8. Examine muster lists and emergency instructions

• Parent cites	46 CFR 31.36-1 46 CFR 70.28-1 46 CFR 90.27-1
• Verify muster lists and emergency instructions are posted	46 CFR 199.80 SOLAS 20 III/8
• Verify information on muster lists and emergency instructions	46 CFR 199.80 SOLAS 20 III/37 3-6

☐ 9. Examine stability letter and booklet

• Parent cites	46 CFR 31.10-30 & 72.30-1 46 CFR 91.55-5(c) 46 CFR 170.001(a)
• Verify stability letter posted	46 CFR 170.120 46 CFR 35.08-1 & 78.12-1 46 CFR 97.11-1
• Verify stability requirements are documented	46 CFR 170.110

☐ 10. Review certificates under International Convention for Safety of Life at Sea, 1974

• Parent cites	46 CFR 31.40 46 CFR 71.75 46 CFR 91.60
• Verify validity	SOLAS 20 I/6 NVIC 02-95 Encl. 1/G & 3/F NVIC 10-82
• Verify endorsements (notations)	SOLAS 20 I/6 NVIC 02-95 Encl. 1/G & 3/F NVIC 10-82

☐ 11. Review International Safety Management Document of Compliance (DOC) and Safety Management Certificate (SMC)

• Verify presence of DOC (copy)	33 CFR 96.330(a) & (d) SOLAS 20 IX/4.2 ISM Code B/13.6
• Verify DOC identifies company and vessel type	33 CFR 96.330(e) ISM Code B/13.3 IMO Res A.1071(28)
• Verify DOC validity with annual verifications	33 CFR 96.330(f) ISM Code B/13.4
• Verify presence of SMC	33 CFR 96.340(d) SOLAS 20 IX/4.3 & ISM Code B/13.7 IMO Res A.1071(28)
• Verify vessel particulars listed on SMC match DOC	ISM Code Appendix
• Verify intermediate verification or additional verifications are complete	33 CFR 96.340(e)(2) IMO Res A.1071(28) ISM Code B/13.8
• Verify extension or renewal endorsements	33 CFR 96.340(f) IMO Res A.1071(28) ISM Code B/13.13

☐ 12. Review International Ships Security Certificate (ISSC) & Continuous Synopsis Record (CSR)

• Verify vessel particulars	SOLAS 20 XI-1/5
• Verify Company name and address match International Safety Management documents	SOLAS 20 XI-1/5.3
• Verify ISSC verification type with date	ISPS Code A/19
• Verify ISSC endorsement (Intermediate or additional)	ISPS Code A/19.1.1
• Verify additional ISSC verifications, extensions, renewals or expiry advancements are completed	ISPS Code A/19.1.1 ISPS Code A/19.3.4
• Verify CSR is present and valid	SOLAS 20 XI-1/5
• Verify CSR information matches ISSC	SOLAS 20 XI-1/5

☐ 13. Review International Oil Pollution Prevention Certificate (IOPP) & Form A

• Verify vessel particulars	MARPOL I/9 MARPOL I/Appendix II
• Verify vessel type is accurate	MARPOL I/2 MARPOL I/9
• Verify annual, intermediate, extension renewal, or change in anniversary date	33 CFR 151.17 MARPOL I/6
• Verify record of construction and equipment	33 CFR 151.23 MARPOL I/9
• Verify control requirements for machinery bilge and fuel oil tanks identified	MARPOL I/14 MARPOL I/16
• Verify retention and disposal requirements for oily bilge water holding tanks	33 CFR 151.25 MARPOL I/12
• Verify standard discharge connection requirement	33 CFR 155.420 & .430 MARPOL I/13

☐ 14. Review International Air Pollution Prevention Certificate (IAPP) and Supplement Record of Construction and Equipment

• Verify vessel particulars on the Record of Construction and Equipment	MARPOL VI/8 MARPOL VI/Appendix I
• Verify annual, intermediate, renewal, repair and extension endorsements and/or change in anniversary date	MARPOL VI/5 MARPOL VI/8
• Verify ozone depleting substances identified	MARPOL VI/12
• Verify Nitrogen Oxide emission sources identified	MARPOL VI/13
• Verify Sulphur Oxide (fuel oil) requirements identified	MARPOL VI/14 CG-CVC Policy Ltr 12-04
• Verify incinerator installation identified	MARPOL VI/16
• Verify validity of alternatives or equivalents	MARPOL VI/4

☐ 15. Review Engine International Air Pollution Prevention Certificate (EIAPP) and Supplement Record of Construction and Equipment

• Verify presence of EIAPP Certificate	MARPOL VI/13.8 NOx Code 2.1.1.1
• Verify validity	MARPOL VI/8 & 9
• Verify details & review engine technical files	CG-543 Policy Ltr 09-01 Encl. 1
• Verify presence of engines identified	MARPOL VI/13.1.1
• Verify Statement of Compliance is accompanied by EPA issued EIAPP	CG-543 Policy Ltr 09-01 Encl 1

☐ 16. Review Statement of Voluntary Compliance, MARPOL Annex IV (Sewage)

• Verify vessel particulars	NVIC 01-09 Ch-1
• Verify compliance type	33 CFR 159.51-131 NVIC 01-09 Ch-1 IMO Res MEPC.227(64)
• Verify discharge rate (draft & speed chart) identified	33 CFR 159.57 NVIC 01-09 Ch-1
• Verify endorsements	NVIC 01-09 Ch-1

☐ 17. Review International Energy Efficiency Certificate and Record of Construction

• Verify presence	MARPOL Reg I/6
• Verify validity	MARPOL Reg I/8
• Verify proper form	MARPOL Reg I/9
• Verify vessel particulars	MARPOL VI/Appendix I
• Verify Energy Efficiency Design Index requirement	CG-CVC Policy Ltr 13-02 7.a IMO Res MEPC.203(62) 20.1 IMO Res MEPC 278 (70)
• Verify Ship Energy Efficiency Management Plan is identified (Parts 1 & 2)	CG-CVC Policy Ltr 13-02 7.b IMO Res MEPC.203(62) 22 IMO Res MEPC 278 (70)
• Verify Technical File requirements are met (Parts 1 & 2)	CG-543 Policy Ltr 09-01 IMO Res MEPC.203(62) 20.1 IMO Res MEPC 278 (70)

☐ 18. Verify compliance with Vessel General Permit (VGP)

• Verify Notice of Intent (NOI) has been submitted	VGP 1.5.1.1 & 10 VGP Table 1 CG-543 Policy Ltr 11-01
• Verify compliance with ballast water record keeping requirements	33 CFR 151.2070 VGP 4.3 CG-543 Policy Ltr 11-01
• Verify noncompliance & reportable quantity reports have been submitted	VGP 4.4.1 VGP 4.4.2 CG-543 Policy Ltr 11-01
• Verify inspections, monitoring & record keeping	VGP 4.1, 4.2 & 4.3 CG-543 Policy Ltr 11-01

Logs and Manuals

☐ 19. Review compliance with STCW watchkeeping standards

• Review watchstanding schedules	46 CFR 15.1111 STCW A-VIII/1 & 2
• Verify compliance with standing orders and other special instructions	STCW A-VIII/2

☐ 20. Review Shipboard Oil Pollution Emergency Plan (SOPEP)

• Verify contents	33 CFR 151.26(a) & (b)
• Verify approval	33 CFR 151.27 MARPOL I/37.1
• Verify annual review	33 CFR 151.28(a) & (d)
• Verify combination plan	MARPOL I/37.3

☐ 21. Review vessel's auxiliary boiler manual

• Verify MAWP/design pressure	46 CFR 61.01-1(b) 46 CFR 54.10-20(a)(4) Boiler Manual
• Verify safety valve setting	46 CFR 61.01-1 46 CFR 61.05-20 Boiler Manual
• Verify maximum steam produced	46 CFR 61.01-1(b) Boiler Manual

☐ 22. Review Oil Record Book Part I (ORB)

• Verify presence	33 CFR 151.25(a),(j) & (k)
• Verify edition of ORB	33 CFR 151.25(b) IMO MEPC.187(59) CG-CVC Letter
• Verify signatures	33 CFR 151.25(h) & (j)
• Verify entries	33 CFR 151.25(d), (e) & (f) 33 CFR 151.25(h) MARPOL I/17 Appendix III
• Compare overboard discharge rate entries with filtering equipment data plate or supplement to IOPP certificate	33CFR 151.25 (d) & (e) MARPOL I/17 & 36 MARPOL I/Appendix III

☐ 23. Review Automation Test Procedures and Operations Manual

• Verify approval	46 CFR 62.20-1, -3 & -5
• Witness tests	46 CFR 61.20-3 46 CFR 61.40-6
• Verify accuracy	46 CFR 61-40, 62.30-10 46 CFR 62.35-50 ABS 4-9
• Verify manning	MSM III/B.6.A.3 SOLAS 20 II-I/31.3

Security

☐ 24. Review Vessel Security Plan (VSP) or Alternate Security Plan (ASP)

• Verify presence of approval letter for plan type	33 CFR 104.105, .120 & .140 33 CFR 101.120(b) & (c) SOLAS 20 XI-2/4.2 & ISPS Code A/9.1
• Verify participation with sponsoring organizations	NVIC 04-03 Ch1 Encl (6), 5, C.
• Verify plan is secured	33 CFR 104.400(c) ISPS Code A/9.7 NVIC 04-03 Ch 1 Encl (4)
• Examine contents	33 CFR 104.405
• Verify amendment(s)	33 CFR 104.415(a)
• Verify implementation	33 CFR 101.120(b)(2) 33 CFR 104.140(c) & 400(a)
• Verify security inspection/deficiency documentation	NVIC 10-04 Part 1 MSM II/A.2.C

☐ 25. Examine security records

• Verify record(s) of security training	33 CFR 104.235(b)(1) SOLAS 20 XI-2/4.2 ISPS Code A/10.1.1
• Verify presence of Declarations of Security (DoS)	33 CFR 104.255 & .235(b)(7) ISPS Code A/5.7 NVIC 04-03
• Verify record(s) of security drills	33 CFR 104.235(b)(2) ISPS Code A/10.1.1
• Verify annual exercise has been conducted	33 CFR 104.235(b)(2) ISPS Code A/10.1.1
• Verify record(s) of annual audit	33 CFR 104.235(b)(8) ISPS Code A/10.1.6
• Verify VSA/SSA is reviewed and revalidated when VSP is submitted for reapproval or revisions	33 CFR 104.310 (c) NVIC 04-03 Encl (2), 2.C & 2.D

☐ 26. Examine security equipment

• Verify location of Ship Security Alert System	33 CFR 101.310 & 104.297 SOLAS 20 XI-2/6 ISPS Code A/9.4.17
• Verify maintenance records	33 CFR 104.235(b)(5) & 260 (b) ISPS Code A/17 NVIC 04-03 Encl. 3 Section 10
• Verify operation	33 CFR 104.260(a) ISPS Code A/9.4.15 & 18 NVIC 04-03 Ch 2, Encl 5, Sec 14.

☐ 27. Evaluate crew's knowledge of security plan

• Identify Company Security Officer (CSO)	33 CFR 104.200(b)(2) SOLAS 20 XI-2/4.2 ISPS Code A/11.1
• Identify Vessel/Ship Security Officer (VSO/SSO)	33 CFR 104.200(b)(2) ISPS Code A/12.1
• Verify VSO's knowledge regarding his/her responsibilities	33 CFR 104.215(e) ISPS Code A/12.2 NVIC 04-03 Encl. 3 Section 9
• Verify crew's level of knowledge regarding his/her security responsibilities	33 CFR 104.220 ISPS Code A/13.3 NVIC 04-03 Encl. 3 Section 10
• Verify compliance with current Maritime Security (MARSEC) level	33 CFR 104.215(e)(9) 33 CFR 104.240 ISPS Code A/7

General Health & Safety

☐ 28. Examine security training & records

• Verify all access points are monitored	33 CFR 104.265(a)(3) & (b)(1) ISPS A/7.2.2
• Observe gangway watch control of embarkation of persons and effects	33 CFR 104.265(a) & b(1) ISPS A/7.2.3
• Verify security communications	33 CFR 104.245 ISPS A/7.2.7
• Verify security level	33 CFR 104.240 ISPS A/7.1
• Verify gangway watch is familiar with their responsibilities as per security plan	ISPS A/13.2 & .3
• Verify signage	33 CFR 104.265(f)(3)

☐ 29. Inspect means of escape from accommodation, machinery and other spaces

• Parent cites	46 CFR 31.35-1 46 CFR 77.05-1
	46 CFR 96.05-1
• Verify means of escape	46 CFR 32.02-1, 72.10 46 CFR 92.10
	SOLAS 20 II-2/13
• Verify routes are accessible	46 CFR 32.02-1, 72.10-20 & -30 46 CFR 92.10-20 & -30
	SOLAS 20 II-2/13
• Verify location and operation of emergency lighting	46 CFR 111.75-15(c)(2) SOLAS 20 III/11.5
• Verify emergency lighting markings	46 CFR 35.40-6, 78.47-33 46 CFR 97.37-25
	46 CFR 111.75-15(e)
• Verify location of exit signs	46 CFR 35.40-6 & 78.47-40 46 CFR 97.37-3, 111.75-15, 112.15-1(d)
	SOLAS 20 III/11.5
• Verify emergency escape markings	SOLAS 20 III/11.5

☐ 30. Inspect paint locker(s)

• Verify installation of fixed fire protection system	46 CFR 34.05-5(a),76.05-20,.15-5(d) 46 CFR 95.05-10,.15-5(d) SOLAS 20 II-2/10.6.3
• Verify location of portable/semi portable fire extinguishers	46 CFR 34.50-10a 46 CFR 76.50-10(a) 46 CFR 95.50-10
• Verify installation of smoke detector	46 CFR 76.27-80 46 CFR 95.05-(1)(a)
• Examine space construction material	46 CFR 32.85-1, .57-10(b) 46 CFR 72.03-15 & 92.05-10, .07-10(b) SOLAS 20 II-2/9.2.3.3.2
• Verify electrical installations	46 CFR 32.45-1 & 77.05-1 46 CFR 96.05-1 & 111.105-43 SOLAS 20 II-1/45.10
• Verify means to secure ventilation	46 CFR 34.15-35 & 72.15-15, 76.15-35 46 CFR 92.15-10 & 111.103-7 SOLAS 20 II-2/9.7

☐ 31. Inspect general emergency alarm system

• Verify location and operation of contact makers	46 CFR 32.25-1 & 77.05-1 46 CFR 96.05-1 & 113.25-5 & -11 SOLAS 20 III/6.4.2
• Verify location and operation of audible signals	46 CFR 32.25-1 & 77.05-1 46 CFR 96.05-1 & 113.25-9 SOLAS 20 III/6.4.3
• Verify location and operation of emergency red-flashing lights (if needed)	46 CFR 32.25-1 & 77.05-1 46 CFR 96.05-1 46 CFR 113.25-10
• Verify markings	46 CFR 35.40-1 & -5, 78.47-5 & -7 46 CFR 97.37-5 & -7 46 CFR 113.25-20
• Verify location and operation of public address system	46 CFR 32.25-1 & 77.05-1 46 CFR 96.05-1 & 113.50-5 & 10 SOLAS 20 III/6.4.2 & 5
• Verify operation of loud speakers	46 CFR 32.25-1, 77.05-1, 46 CFR 96.05-1, 113.50-15 SOLAS 20 III/4.2
• Verify operations with emergency power source	46 CFR 32.25-1 & 77.05-1 46 CFR 96.05-1 & 113.25-6 SOLAS 20 III/6.4.2

Lifesaving Equipment

☐ 32. Inspect work vests

• Verify type approval	46 CFR 35.03-5 46 CFR 78.36-5 46 CFR 97.34-5
• Verify stowage	46 CFR 35.03-15 46 CFR 78.36-15 46 CFR 97.34-15
• Examine condition and serviceability	46 CFR 35.03-20 46 CFR 78.36-20 46 CFR 97.34-20
• Examine hybrid work vests	46 CFR 35.03-25 46 CFR 78.36-25 46 CFR 97.34-25

☐ 33. Inspect life jackets

• Parent cites	46 CFR 31.36-1 46 CFR 71.25-15 46 CFR 91.25-15
• Verify type approval	46 CFR 199.70(b), .620a NVIC 08-04 Ch 1 SOLAS 20 III/4
• Verify quantity	46 CFR 199.70(b)(1), .212(a) Table 199.610 a & b SOLAS 20 III/7.2.1, 22.2 & 26.5
• Verify stowage	46 CFR 199.03(b)(2), .70(b)(2) 46 CFR 199.212(b) SOLAS 20 III/7.2.2
• Verify stowage markings	46 CFR 199.70(b)(2)(iii) SOLAS 20 III/20.10
• Verify operation of lights and whistles	46 CFR 199.70(b)(4) Tables 199.610a, 620a SOLAS 20 III/7.2.1, 22.3 & 32.2
• Verify location and information for donning instructions	46 CFR 199.80(c) SOLAS 20 III/35.2.1 SOLAS 20 III/8.4.3
• Examine condition and suitability	46 CFR 199.45(b)(3) 46 CFR 199.190(a)(b)& (g)(2) 46 CFR 160.006-2

☐ 34. Inspect immersion suits

• Parent cites	46 CFR 31.36-1 46 CFR 71.25-15 46 CFR 91.25-15
• Verify type approval	46 CFR 199.273(a) SOLAS 20 III/4 NVIC 08-04 Ch 1
• Verify quantity and size	46 CFR 199.03(b)(13), .70(c), .214 46 CFR 199.273(a)(b), Table .610(b)(c) SOLAS 20 III/32.3.2, 7.3
• Verify stowage	46 CFR 199.03(b)(2), .70(c)(2) 46 CFR 199.273(b) SOLAS 20 III/32.3.4, 22.4
• Verify stowage location markings	46 CFR 199.70(c) & (d) SOLAS 20 III/20.10
• Examine lights	46 CFR 199.70(c)(4)(i), Table 610(a) SOLAS 20 III/7.3, 32.3.2 SOLAS 20 III/22.4
• Examine whistle	46 CFR 199.70(c)(4)(ii), Table .610(a) SOLAS 20 III/7.3, 22.4 SOLAS 20 III/32.3
• Examine condition and suitability	46 CFR 199.45(b)(3) 46 CFR 199.180(a)(2) NVIC 01-08
• Verify location and information for donning instructions	46 CFR 199.180(a) (1) & (2) SOLAS 20 III/35.3.2

Firefighting Systems

☐ 35. Review approved Safety Plan (Fire-Control Plan)

• Parent cites	46 CFR 35.10-3(a) 46 CFR 78.45-1(a)(1) 46 CFR 91.55(d)
• Verify location and approval	46 CFR 31.10-5(a), 71.65-5(d) 46 CFR 91.55-5(d) SOLAS 20 II-2/15.2.4
• Verify equipment installation to approved plan	SOLAS 20 II-2/15.2.4.1
• Verify use of international symbols	SOLAS 20 II-2/15.2.4 IMO Res A.952(23)
• Verify structural fire protection is identified	SOLAS 20 II-2/15.2.4.1

☐ 36. Inspect areas for compliance with Structural Fire Protection (SFP) requirements

• Verify installation in accordance with approved Fire Safety Plan	46 CFR 35.10-3(a) & 78.45-1(a)(1) 46 CFR 97.36-1(a) & NVIC 09-97 Ch-1 SOLAS 20 II-2/15.2.4
• Verify equivalencies and design assumptions	46 CFR 30.15, 70.15 & 90.15, SOLAS 20 I/5 & II-2/17 NVIC 09-97 Para 1.2
• Verify type approval categories	NVIC 09-97 Para 1.3
• Verify approvals of structural fire protection materials	NVIC 09-97 Chap 2
• Verify bulkhead and deck classifications	46 CFR 32.57-10, 72.05-10 & 92.07-10 SOLAS 20 II-2/9.2.2, 2.3, 2.4 & 3 NVIC 09-97 Chap 3
• Verify condition of draft stops	46 CFR 32.56-45, 72-05-10 (h), SOLAS 20 II-2/8.4
• Verify configuration of atriums, balconies and multiple level spaces	46 CFR 72.05-5 (m) & 92.07-10 NVIC 09-97 para 3.8 SOLAS 20 II-2/9.2.2.6 & .7
• Verify boundaries are maintained	46 CFR 32.56, .57 & 72.05 46 CFR 92.07-10 SOLAS 20 II-2/9.1.3
• Verify no unapproved modifications	46 CFR 32.56 & .57 46 CFR 72.05 & 92.07-10 MSM II/7(2)(c)(2)

☐ 37. Inspect fire boundary closures

• Parent cites	46 CFR 31.30-1, 35-1 46 CFR 70.20-1, 25-1 46 CFR 90.20-1, 25-1
• Verify display of general arrangement plans	46 CFR 35.10-3(a) 46 CFR 78.45-1(a)(1) 46 CFR 97.36-1(a)
• Witness operation of local and remote controls of fire doors as listed on the approved Fire Safety Plan	46 CFR 32.56-35, 71.25-25(a)(3), 72.05-25(b)(9) 46 CFR 92.07-10 (d)(4), 111.99-5 & 61.40-6, -10 SOLAS 20 II-2/14.2.2
• Witness operation of local and remote controls of fire damper as listed on the approved Fire Safety Plan	46 CFR 32.56-60 & 72.15-15(a) 46 CFR 92.15-10(a) & 61.40-6, -10 SOLAS 20 II-2/14.2.2
• Verify dampers and fire doors close during power ventilation shutdowns as listed on the approved Fire Safety Plan	46 CFR 32.56-60(b), 72.15-15)(b) 46 CFR 92.15-10(b) 46 CFR 111.99-5, 103-1 & -3
• Verify operation of closures for spaces protected by carbon dioxide or clean agent extinguishing system	46 CFR 34.15-35 46 CFR 76.15-35 46 CFR 95.15-35, .16-30
• Verify remote controls and fire dampers are marked	46 CFR 78.47-53 46 CFR 111.103-1(b)(2), -7

☐ 38. Inspect primary fire main and pump(s)

• Verify number	46 CFR 34.10-5(a) & 76.10-5(a) 46 CFR 95.10-5(a) SOLAS 20 II-2/10.2.2.2
• Verify capable of providing adequate pressure	46 CFR 34.10-5(b), 76.10-5(c) & 95.10-5(c) SOLAS 20 II-2/10.2.1.6 & 2.2.4 NVIC 06-72 Encl. 1/C.2.1
• Verify fitted with relief valve(s)	46 CFR 34.10-5(d) & 76.10-5(d) 46 CFR 95.10-5(d),NVIC 06-72 Encl 1/I.A.6 & 1/C2.6 SOLAS 20 II-2/10.2.1.4.3
• Verify fitted with gauge	46 CFR 34.10-5(e) 46 CFR 76.10-5(e) & 95.10-5(e) NVIC 06-72 Encl. 1/I.B.9
• Verify distribution valves labeled	46 CFR 34.10-15(c) 46 CFR 76.10-15(b) 46 CFR 95.10-15(b)
• Verify condition of system piping, fittings, valves, flanges	46 CFR 31.10-18(f) & 19, 71.25-20(a) 46 CFR 91.25-20(a) & 56.10 thru .25 NVIC 06-72 Encl 1/I.C.2
• Verify operation of remote control(s)	46 CFR 31.10-18(f), 71.20-20, -25(a)(4), 91.15-1, .25-20(a)(3) 46 CFR 61.40-6 & 62.35-15,.50-20(d) NVIC 06-72 Encl. 1/I.C.2.4

☐ 39. Inspect fire stations

• Verify number of hydrants Y/Wye gates	46 CFR 34.10-10(h) 46 CFR 76.10-10(d) & 95.10-10(d) SOLAS 20 II-2/10.2.1.5
• Verify hoses meet required length, size, markings and quantity	46 CFR 32.05, 76.10-10 46 CFR 95.10-10,SOLAS 14 II-2/10.2.3 MSM II/C.2.I.6
• Verify compliance with periodic hydro testing	46 CFR 31.10-18(f), 71.25-20(a)(4) & 91.25-20(a)(4) SOLAS 20 II-2/14.2.2 NVIC 06-72 Encl. 1/I.C.2
• Verify operation of valves	46 CFR 31.10-18(e), 71.25-20(a)(3) & 91.25-20(a)(3) NVIC 06-72 Encl. 1/I.C.2.3 SOLAS 20 II-2/10.2.1.5
• Verify spanner	46 CFR 34.10-10(d), 76.10-10(g) 46 CFR 95.10-10(g) SOLAS 20 II-2/10.2.3.1.1
• Verify low velocity spray applicator	46 CFR 34.10-10(e)(f) & (o), 34.10-90(a)(11) & (b)(2) 46 CFR 76.10-10(j) & (k), 76.10-90(a) 46 CFR 95.10-10(i), (j), & (k), 95.10-90(a) & €
• Verify markings	46 CFR 35.40-15 46 CFR 78.47-20 46 CFR 97.37-15

☐ 40. Inspect portable fire extinguishers

• Confirm locations with approved safety plan (Fire Control Plan)	46 CFR 35.10-3(a) & 78.45-1(a)(1) 46 CFR 97.36-1(a) SOLAS 20 II-2/15.2.4
• Verify inspection/maintenance compliance	46 CFR 31.10-18(a), 71.25-20(a)(1), 78.17-80 46 CFR 91.25-20(a)(1), NFPA 10 Chap 7 & 8 SOLAS 20 II-2/14.2.2
• Examine condition of cylinders and hoses	46 CFR 31.10-18(a) & 71.25-20(a)(1) 46 CFR 91.25-20(a)(1) NFPA 10 Chapter 7
• Verify type, quantity and locations	46 CFR 34.50-10, 76.50-10, 95.50-10 46 CFR 147.45(i)2, MSM II/C.2.I.3 & .4 SOLAS 20 II-2/10.3.2, 19.3.7 & 20.6.2
• Verify markings	46 CFR 34.05-10(a), .35.40-25 & -40 46 CFR 76.05-25(a), .78.47-30 46 CFR 95.05-15(a), .97.37-23, NVIC 13-86, MSM II/C.2.I.3
• Confirm spare charges	46 CFR Table 34.50-10(a), Table 76.50-10(a) 46 CFR Table 95.50-10(a) SOLAS 20 II-2/10.3.3

☐ 41. Inspect semi-portable fire extinguishers

• Confirm locations with approved safety plan (Fire Control Plan)	46 CFR 35.10-3(a) & 78.45-1(a)(1) 46 CFR 97.36-1(a) SOLAS 20 II-2/15.2.4
• Verify inspection/maintenance compliance	46 CFR 31.10-18(a), 71.25-20(a)(1), .78.17-80 46 CFR 91.25-20(a)(1), NFPA 10 Chap 7 & 8 SOLAS 20 II-2/14.2.2
• Examine stowage, condition of cylinders and hoses	46 CFR 31.10-18(a), 34.50-20 46 CFR 71.25-20(a)(1), 76.50-20 46 CFR 91.25-20(a)(1), 95.50-20, NFPA 10, Chap 7
• Verify type, quantity and locations	46 CFR 34.50-10, 76.50-10 46 CFR 95.50-10 MSM II/C.2.I.4
• Verify markings	46 CFR 34.05-10(a), 35.40-25 & -40 46 CFR 76.05-25(a), 78.47-30 46 CFR 95.05-15(a), 97.37-23

☐ 42. Inspect fireman's outfits

• Verify type approval and quantity	46 CFR 35.30-20 ,77.30-1 & .35-1 46 CFR 96.35-5 SOLAS 20 II-2/10.10 & 18.5.1.6
• Verify stowage and markings	46 CFR 35.30-20 & 40-20 46 CFR 77.30-5, 30-10(a) & .35-5(b) 46 CFR 96.35-5(b), 97.37-20 & 35-15
• Verify locations are marked on safety plan (Fire Control Plan)	46 CFR 35.10-3(a) & 78.45-1(a)(1) 46 CFR 97.36-1(a) SOLAS 20 II-2/15.2.4
• Verify condition	46 CFR 35.30-20, 77.30-5 & 35-1 46 CFR 96.35-5 SOLAS 20 II-2/10.10 & 14.2.2.1
• Verify number of spare bottles	46 CFR 35.30-20(c)(1), 77.30-15 & 35-20 46 CFR 96.30-5 & 35-20 SOLAS 20 II-2/10.10.2.5

☐ 43. Inspect international shore connection

• Verify presence	46 CFR 34.10-15(d) & 76.10-10(c) 46 CFR 95.10-10(c) SOLAS 20 II-2/10.2.1.7
• Verify gaskets and bolts are with the connection	46 CFR 34.10-15(d) & 76.10-10(c) 46 CFR 95.10-10(c), ASTM F 1121 SOLAS 20 II-2/10.2.1.7
• Confirm location with safety plan (Fire Control Plan)	46 CFR 35.10-3(a) & 78.45-1(a)(1) 46 CFR 97.36-1 Fire Control Plan
• Verify symbols for international and domestic routes	46 CFR 35.10-3(a), 78.45-1, & 97.36-1(a) IMO Res A.654(16) & ASTM F 1626 IMO Res A.952(23), Fire Control Plan

☐ 44. Inspect fire and smoke detecting systems

• Parent cites	46 CFR 34.01-5(b)(2) & -10 46 CFR 76.05-1 46 CFR 95.05-1 & 01-5
• Witness system servicing and testing	46 CFR 31.10-15(b) & 71.25-20 46 CFR 91.25-20, 61.40-6 & -10 SOLAS 20 II-2/7.3.2 & 14.2.2.1
• Verify two sources of power	46 CFR 31.35-5, 70.25-1 46 CFR 90.25-1, 113.10-9 SOLAS 20 II-2/7.2.2
• Verify operation of control unit's visual and audible alarms	46 CFR 76.27-1, 95.05-1 46 CFR 161.002-8 SOLAS 20 II-2/7.4.2
• Verify markings	46 CFR 161.002-4(b) FSS Code 9.2.5.1.3 & 4
• Verify alarms sounds in required locations	46 CFR 76.27-5(d),(e) & (f), 95.05-1 46 CFR 161.002-10(b) SOLAS 20 II-2/7.4.2 & 14 .2.2.1

☐ 45. Inspect high pressure CO2 system

• Parent SOLAS cite for steps 3-7	SOLAS 20 II-2/14.2.2.1
• Review safety precautions prior to servicing system	MSM II/C.2.I.5
• Verify servicing	46 CFR 31.10-17(a),.10-18(d) &-19 46 CFR 71.25-20(a)(2)&(3), 91.25-20(a)(2) & (3) NVIC 06-72 Encl. 1/II.D.2
• Verify cylinder stowage/condition	46 CFR 34.15-20, 76.15-20 46 CFR 95.15-20 46 CFR 147.60(b) &.65(b)
• Examine material condition of system components	46 CFR 34.15-15 & -20 46 CFR 76.15-15,& -20 46 CFR 95.15-15 & -20
• Verify piping & nozzles clear	46 CFR 34.15-15 & -25 46 CFR 76.15-15 & -25, 95.15-15 & -25 NVIC 06-72 Encl. 1/II.D.2
• Witness operational test of time delays & alarms	46 CFR 31.10-19, 76.25-20(a),(2) & (3) 46 CFR 91.25-20(a),(2) & (3) SOLAS 20 II-2/10.9.1.1.1
• Verify markings & warning signs posted	46 CFR 35.40-7, -8 & -10 46 CFR 78.47-9,-11,-15, -17 & -18, 97-37-9,-10,-11,-13 SOLAS 20 II-2/10.4.1.1.1 & .9.1.1.2
• Verify operating instructions posted	46 CFR 34.15-10(h), 76.15-10(h) 46 CFR 97.37-13 NVIC 06-72 Encl. 1/II.D.2.4
• Verify access to locked supply valves/controls	46 CFR 34.15-10(i), 76.15-10(i) 46 CFR 95.15-10(i),.16-40
• Verify ventilation enclosure operation	46 CFR 34.15-35, 76.15-35 46 CFR 95.15-35, 61.40-6 & -10 NVIC 06-72 Encl. 1/II.D.2
• Verify lockout valve	46 CFR 34.15-50 46 CFR 76.15-50 46 CFR 95.15-50
• Verify presence of odorizing unit	46 CFR 34.15-60 46 CFR 76.15-60 46 CFR 95.15-60

☐ 46. Inspect low pressure CO2 system

• Examine system plan approval	46 CFR 34.15-1(b) 46 CFR 76.15-1(b) 46 CFR 95.15-1(b)
• Verify servicing	DIOM Manual 46 CFR 61.40-6 & -10 SOLAS 20 II-2/14.2.2.1
• Examine pressure gauge	DIOM Manual
• Verify no unapproved modifications or parts (DIOM & Approved Piping Plan)	DIOM Manual Piping Plan
• Examine refrigeration plant	DIOM Manual
• Inspect visual and audible alarms	DIOM Manual
• Verify CO2 Level and indicator	DIOM Manual
• Conduct visual inspection of external tank	46 CFR 61.10-5(g)
• Witness hydrostatic test and internal	46 CFR 61.10-5(g) & (h)
• Witness test of safety relief valves	46 CFR 61.10-5(i)
• Witness functional test of time delays, alarms & shutdowns	DIOM Manual
• Verify warning signs, markings & operating instructions are posted	DIOM Manual

☐ 47. Inspect automatic sprinkler system

• Parent cites	46 CFR 34.30-1, 46 CFR 76.25-1 46 CFR 95.30-1
• Verify amount and type of spare sprinklers	NFPA 13/25.2.2
• Verify type of pipe, fittings and pipe supports	NFPA 13/25.2.4 & 25.2.5
• Verify type location and markings of control valves	NFPA 13/25.2.6 46 CFR 56.20
• Verify installation of fire department and international shore connections	NFPA 13/25.2.7
• Verify relief valves for wet systems	NFPA 13/25.3.1
• Verify spare detection devices	NFPA 13/25.3.2
• Verify drain line connections	NFPA 13/25.4.11
• Verify installation of alarm signals and devices	NFPA 13/25.4.12
• Verify location of test connections	NFPA 13/25.13
• Verify water supplies	NFPA 13/25.7.1
• Verify pressure tank components	NFPA 13/25.7.2
• Verify fire pump operation	NFPA 13/25.7.3
• Verify water supply configuration	NFPA 13/25.7.4
• Verify operation test of system	NFPA 13/25.8.3
• Verify system instructions records of inspection are presence	NFPA 13/25.9

☐ 48. Inspect fixed foam firefighting systems

• Review SOLAS requirements	SOLAS 20 II-2/10.4.1.1.2 SOLAS 20 II-2/20.6.1.3
• Verify required foam quantity	46 CFR 34.17-5, 76.17-5 46 CFR 95.17-5 SOLAS 20 II-2/10.9.2
• Verify approval of foam agents, containers, measuring devices, etc.	46 CFR 34.17-10(a), 76.17-10(a) 46 CFR 95.17.10(a) SOLAS 20/II-2/10.4.1.1.2
• Verify all controls, valve locations and markings	46 CFR 34.17-10(b) & (d), 35.40-17 46 CFR 76.17-10(b) & (d) 46 CFR 95.17.10(b) & (d)
• Verify pump start locations	46 CFR 34.17-10(b) & 76.17-10(b) 46 CFR 95.17.10(b)
• Review instructions and verify locations	46 CFR 34.17-10(c) & 76.17-10(c) 46 CFR 95.17.10(c)
• Examine maintenance plan, materiel condition of piping and discharge outlets	46 CFR 34.17-15 & -20, 76.17-15 & -20 46 CFR 95.17-15 & -20 SOLAS 20 II-2/14.4.2
• Verify additional requirements for machinery spaces	46 CFR 34.17-25, 76.17-25 46 CFR 95.17-25 SOLAS 20 II-2/10.5.1.2.1 & .2
• Verify system operation	46 CFR 31.10-18 (c) & (d) 46 CFR 71.25-20(a)(2) 46 CFR 91.25-20(a)(2)
• Review deck foam system details, controls, operation, testing and liquid certificate (D only)	46 CFR 31.10-18(d) & 34.20 SOLAS 20 II-2/10.7.1.1, 8.1.1.2 & 9.1.2,

☐ 49. Inspect fire axes

• Confirm locations with approved Safety Plan (Fire Control Plan)	46 CFR 34.60-10 46 CFR 76.60-10 46 CFR 95.60-10
• Verify quantity and condition	46 CFR 34.60-5(a) 46 CFR 76.60-5(a) 46 CFR 95.60-5(a)

Machinery Equipment

☐ 50. Inspect steering gear system

• Verify operation of main and auxiliary steering systems	46 CFR 58.25-10 MSM II/C.4.B
• Verify operation of communications between bridge and steering gear space	46 CFR 58.25-15 SOLAS 20 II-1/29.10
• Examine pumps and piping associated with hydraulic system	46 CFR 58.25-20 MSM II/C.4.B
• Witness operational test of alarms	46 CFR 58.25-25 SOLAS 20 II-1/29.8.4 SOLAS 20 II-1/29.12.2
• Verify automatic restart of powered equipment	46 CFR 58.25-30
• Verify accuracy of rudder angle repeaters	46 CFR 58.25-25(a) & 35 46 CFR 78.47-55 SOLAS 20 II-1/29.11 & MSM II/C.4.C.4
• Examine steering gear compartment arrangement	46 CFR 58.25-40 SOLAS 20 II-1/29.13
• Witness operational test of systems in all modes from main and emergency steering station(s)	46 CFR 61.20-1 & 58.25-70 SOLAS 20 II-1/29.3.2 & 4.2 MSM II/C.4.C.4
• Verify availability to switch from automatic pilot to manual control	46 CFR 58.25-80
• Verify special requirements for tankships	46 CFR 58.25-85
• Verify markings and operating instructions	46 CFR 35.40-30 & 78.47-55 46 CFR 97.37-33 SOLAS 14 V/26.3.1

☐ 51. Inspect fuel oil service systems

• Examine piping arrangements	46 CFR 56.50-60(a)
• Examine piping heating coil arrangement	46 CFR 56.50-60(b)
• Examine filling piping arrangements	46 CFR 56.50-60(c)
• Verify valve arrangement inside and outside fuel oil tank	46 CFR 56.50-60(d)(1) & (2)
• Verify power operated valves configurations, instructions & operations	46 CFR 56.50-60(d)(3), (4)
• Verify tanks/piping/valves not located in prohibited locations	46 CFR 56.50-60(e)-(h)
• Verify flange or mechanical joints fitted with suitable shield	46 CFR 56.50-60(j) SOLAS 20 II-2/4.2.2.5 & .6
• Verify drip pan installation	46 CFR 56.50-60(k)
• Verify storage, distribution and use of oil in systems	46 CFR 56.50-60(m) & (n)
• Examine nonmetallic flexible hoses and fittings	46 CFR 56.50-60(n)(2)
• Verify locations, markings and operation of transfer/service pump shutdowns	46 CFR 58.01-25

☐ 52. Inspect main and auxiliary machinery and related systems

• Examine condition, installation and arrangements of system components	46 CFR 58.05-1 & 61.20-3(a) SOLAS 20 II-1 26, 27 & 28 MSM II/B.1.F.4
• Verify installation of protective covers or guards	46 CFR 58.01-20 SOLAS 20 II-1/26.1 SOLAS 20 II-2/4.2.2.6.1
• Verify means of stopping machinery	46 CFR 58.01-25 46 CFR 61.20-3(b)
• Examine inlet and discharge piping	46 CFR 56.50-95(d)(1) & (2) SOLAS 20 II-1/26.3.6
• Verify machinery space ventilation	46 CFR 58.01-45 SOLAS 20 II-1/35

☐ 53. Inspect non-metallic expansion joints

• Examine condition	46 CFR 61.15-12(a) SOLAS 20 II-1/26.9
• Verify compliance with 10 year "in-service" requirement	46 CFR 61.15-12(b) MSM II/B.3.F.3

☐ 54. Witness operational test of main propulsion automation

• Witness operation of alarms, shutdowns, controls & internal communications (engineer assistance), IAW approved test procedure	46 CFR 62.30-10 46 CFR 61.40-3
• Verify bridge controls/alarms function in sync with engineroom control panel	46 CFR 61.40-3

☐ 55. Inspect Unfired Pressure Vessels (UPVs)

• Verify if exempt from shop inspection and plan approval	46 CFR 54.01-15
• Verify data plate(s) are legible	46 CFR 54.10-20
• Verify external and/or an internal exam and/or hydrostatic test needs	46 CFR 61.10-5(b), (d) & (e)
• Examine externally	46 CFR 61.10-5(b)(1)
• Examine internally (when accessible)	46 CFR 54.10-1 & 01-35 46 CFR 61.10-5(b)(2) MSM II/B.1.O
• Witness hydrostatic test	46 CFR 61.10-5(d), (e)(4) MSM II/B.1.O
• Verify installation and operation of pressure gauges	46 CFR 54.15-5(f)
• Verify installation and operation of pressure-relieving devices	46 CFR 54.15-5 46 CFR 54.15-10(a) & (g) 46 CFR 61.10-5(i)

☐ 56. Inspect refrigeration/air conditioning fixed system(s)

• Verify plan approval and design	46 CFR 56.01-10 46 CFR 58.20-5
• Verify and examine pressure relieving devices	46 CFR 58.20-10
• Examine installation location and ventilation	46 CFR 58.20-15
• Examine refrigeration/air conditioning piping	46 CFR 58.20-20
• Verify testing of system repairs	46 CFR 58.20-25
• Verify compliance with MARPOL Annex VI	40 CFR 1043.10 MARPOL VI/12 Appx I

☐ 57. Inspect bilge system(s)

• Verify pumping capabilities & piping arrangements	46 CFR 56.50-50(a) & (h) SOLAS 20 II-1/35-1
• Verify location of manifolds & installation of non-return valves	46 CFR 56.50-50(b) & (c)
• Verify size of piping, locations of strainers & suction points	46 CFR 56.50-50(d) & (g)
• Examine independent & emergency suction capabilities	46 CFR 56.50-50(e) & (f)
• Verify number of pumps	46 CFR 56.50-55(a)
• Verify location and operation of pumps	46 CFR 56.50-55
• Verify capabilities of other pumps used as bilge pumps	46 CFR 56.50-55(f)
• Verify pollution placard is posted	46 CFR 56-50-50(n) 33 CFR 155.450
• Verify operation and labeling of remotely operated valve controls	46 CFR 56.50-1(g)(2)(ii)

☐ 58. Inspect ballast water system

• Verify ballast piping, valve and pumping arrangements	46 CFR 56.50-50(h)-(k)
• Verify remote valve controls are fitted with nameplates	46 CFR 56.50-1(g)(2)(iii)
• Verify compliance for Ballast Water Management	33 CFR 151.2000-.2075

☐ 59. Inspect gasoline fuel systems

• Verify valves/piping/fitting arrangements	46 CFR 56.50-70
• Verify nonmetallic flexible hoses and fittings installation	46 CFR 56.50-70(b)(2)
• Verify location of shutoff valves	46 CFR 56.50-70(c)
• Verify location and configuration of strainers	46 CFR 56.50-70(d)
• Verify locations, markings and operation of transfer/service pump shutdowns	46 CFR 56.50-70(j) 46 CFR 58.01-25

☐ 60. Inspect diesel fuel oil systems

• Examine piping arrangements	46 CFR 56.50-75(a)(1)
• Examine piping heating coil arrangement	46 CFR 56.50-75(a)(1)
• Examine fill piping arrangements	46 CFR 56.50-75(a), (b)(6)
• Verify manual control valves arrangements	46 CFR 56.50-75(a)(2) & (4)
• Verify power operated valve configurations, instructions and operations	46 CFR 56.50-75(a)(1) SOLAS 20 II-2/4.2.2.3 IMO MSC Circ. 1321
• Verify tanks/piping/valves not located in prohibited locations	46 CFR 56.50-75(a)
• Verify flange/mechanical joints fitted with suitable shield	46 CFR 56.50-75(a)(1) SOLAS 20 II-2/4.2.2.5 &.6
• Verify drip pan installation	46 CFR 56.50-75(a)(1)
• Verify oil storage, distribution and use in systems	46 CFR 56.50-75(a)(1)
• Examine nonmetallic flexible hoses and fittings	46 CFR 56.50-75(a)(1)
• Verify locations, markings and operation of transfer/service pump shutdowns	46 CFR 56.50-75(a)(1) SOLAS 20 II-2/4.2.2.3.4

☐ 61. Inspect lubricating oil systems

• Verify components on internal combustion engine	46 CFR 56.50-80(d)
• Verify bypass on oil heaters	46 CFR 56.50-80(e)
• Verify sight-flow glass approval	46 CFR 56.50-80(h)

☐ 62. Inspect fuel tank components

• Verify number of vents	46 CFR 56.50-85(a)(2)
• Verify vent height from weather deck and their locations	46 CFR 56.50-85(a)(4) & (b)
• Verify operation of vent valve(s)	46 CFR 56.50-85(a)(7)
• Verify presence, location and type of flame screen material	46 CFR 56.50-85(a)(8) & (9)
• Verify location of sounding tube closing devices	46 CFR 56.50-90(a)-(e)

☐ 63. Inspect boiler valves for auxiliary boilers (5 year)

• Identify valves subject to inspection	46 CFR 63.15-9 & 61.05-15 MSM II/B.1.G.7 & Table B1-1 JA 1.5; pgs. 1-5-2 & 1-5-3
• Examine seats	46 CFR 61.05-15 MSM II/B.1.G.7 JA 1.5; pg. 1-5-3
• Examine valve assembly	46 CFR 61.05-15 MSM II/B.1.G.7 JA 1.5; pg. 1-5-3
• Examine stem	46 CFR 61.05-15 MSM II/B.1.G.7 JA 1.5; pg. 1-5-3
• Verify material used for replacement valves	46 CFR 56.60-1
• Verify repair methods for discrepancies found	JA 1.5; pg. 1-5-4

☐ 64. Inspect boiler mounts for auxiliary boilers (10 year)

• Identify mounts to be removed for inspection	46 CFR 63.15-9 & 61.05-15 MSM II/B.1.G.7, Table B1-1 JA 1.6; pgs.1-6-2 & 1-6-3
• Examine spool piece(s)	46 CFR 61.05-15 MSM II/B.1.G.7 JA 1.6; pgs. 1-6-3 & 1-6-4
• Examine flanges	46 CFR 61.05-15 MSM II/B.1.G.7 JA 1.6; pgs. 1-6-3 & 1-6-4
• Examine piping	46 CFR 61.05-15 MSM II/B.1.G.7 JA 1.6; pgs. 1-6-3 & 1-6-4
• Verify repair methods for discrepancies found	46 CFR 56, 57 & 59 JA 1.6; pg. 1-6-5

☐ 65. Inspect studs, bolts & nuts for auxiliary boilers (10 year)

• Verify correct material used	46 CFR 63.15-9 & 61.05-15 46 CFR 56.01-2 MSM II/B.1.G.7 / JA 1.6; pg. 1-6-4
• Examine material condition	46 CFR 61.05-15 MSM II/B.1.G.7 JA 1.6; pg. 1-6-4
• Verify repair methods for discrepancies found	JA 1.6; pg. 1-6-5

☐ 66. Witness hydrostatic test of auxiliary boilers

• Verify Max Allowable Working Pressure (MAWP)	46 CFR 63.15-9 JA 1.4; pg. 1-4-2 Boiler manual
• Verify testing pressure	46 CFR 61.05-10(c) MSM II/B.1.G.2 &.3, JA 1.4; p. 1-4-3 Boiler Dataplate
• Verify water temperature	46 CFR 61.05-5(b) JA 1.4; pg. 1-4-4
• Verify safety valves are gagged	46 CFR 61.05-5(b) JA 1.4; pg. 1-4-4
• Verify that there is no steam on the back side of stop valves	46 CFR 61.05-10(d) JA 1.4, pg. 1-4-4
• Examine internally (furnace/vestibules) for watertube boilers	46 CFR 61.05-10(a) JA 1.4; pg. 1-4-6
• Examine internally (furnace) for firetube boilers	46 CFR 61.05-10(a) JA 1.4; pg. 1-4-6
• Examine externally (drums/headers/vestibules) for watertube boilers	46 CFR 61.05-10(a) JA1.4; pg.1-4-6
• Examine externally (shell) for firetube boilers	46 CFR 61.05-10(a) JA1.4; pg.1-4-6
• Verify repair methods for discrepancies found	46 CFR 56, 57 & 58 JA1.4; pg.1-4-7

☐ 67. Inspect boiler fireside for auxiliary boilers

• Verify ready for inspection	46 CFR 63.15-9 46 CFR 61.05-15(f) JA 1.3; pg. 1-3-2
• Examine tubes (watertube)	46 CFR 61.05-10 MSM II/B.1.G.3 JA 1.3; pgs. 1-3-4, 1-3-5
• Examine uptake and flue pipe	46 CFR 61.05-10 MSM II/B.1.G.4.c.(2) JA 1.3; pg.1-3-8
• Examine refractory/corbel (water tube)	46 CFR 61.05-10 MSM II/B.1.G.2.c, 3.4 & .4 JA 1.3; pg. 1-3-6
• Examine furnace and tube sheets (fire tube)	46 CFR 61.05-10 MSM II/B.1.G.2.c, 3.4 & .4 JA 1.3; pg. 1-3-6
• Examine material condition of wind box compartment (water tube)	46 CFR 61.05-10 JA 1.3; pg. 1-3-3
• Examine fusible plug (fire tube)	46 CFR 61.05-15(g)

☐ 68. Inspect boiler waterside for auxiliary boilers

• Verify ready for inspection	46 CFR 63.15-9 & 61.05-5 JA 1.2; pg. 1-2-2
• Examine external casing/doors	46 CFR 61.05-10 MSM II/B.1.G.2.e, .3.c & .4.c JA 1.1; pgs. 1-1-2 & 1-1-3
• Examine shell/heads (firetube)	46 CFR 61.05-10 MSM II/B.1.G.2.e, .3.c & .4.c JA 1.1; pg. 1-1-2 & 1-1-3
• Examine drum/header internals (watertube)	46 CFR 61.05-10 MSM II/B.1.G.2.f & g, .3.d - .f & .4.c JA 1.2; pgs. 1-2-3 & 1-2-4
• Examine shell/head internals upper/lower (firetube)	46 CFR 61.05-10 MSM II/B.1.G.2.f & g, .3.d - .f & .4.c JA 1.2; pgs. 1-2-2 thru 1-2-4
• Examine blowoff valves/piping	46 CFR 56.50-40 JA 1.1; pg. 1-1-2
• Examine lagging/insulation on piping	46 CFR 56.50-1(k) & -15(h)(3) JA 1.1; p. 1-1-3
• Examine safety relief valve escape piping	46 CFR 56.50-25 MSM II/B.1.G.7.d(2) JA 3.3; pgs. 3-3-2 & 3-3-3
• Verify independent means for checking water level	46 CFR 52.01-110 JA 1.1; pg. 1-1-6
• Examine condition of foundations/sliding feet	46 CFR 52.10-130(a)(2) JA 1.1; pg. 1-1-3
• Verify repair methods for discrepancies found	JA 1.2; pg. 1-2-6

☐ 69. Inspect boiler gauges for auxiliary boilers

• Verify operation	46 CFR 63.15-9 & 61.05-15(f) MSM II/B.1.G.7.e(4) JA 3.2; pg. 3-2-2
• Verify accuracy	46 CFR 61.05-15(f) MSM II/B.1.G.7.e(4) JA 3.2; pg. 3-2-2

☐ 70. Inspect feedwater system for auxiliary boilers

• Examine feedwater pump/piping	46 CFR 56.50-30(a) 46 CFR 56.01-5 & .50-30 MSM II/B.1.H.1 & H.3 / JA 2.3; pgs. 2-3-3 & 2-3-4
• Verify operation of feed/relief valves	46 CFR 56.50-30(b) & (c) MSM II/B.1.I.3 JA 2.3; p. 2-3-3, 2-3-5
• Witness operation of feedwater regulators	46 CFR 56.50-30(c) JA 2.3; pg. 2-3-5
• Examine water columns, gage glasses and gage cocks	46 CFR 52.01.110 & 61.05-15(e) MSM II/B.1.G.7 JA 2.3; pg. 2-3-5
• Verify presence and operation of gauges	46 CFR 56.50-10
• Examine make up feed evaporator	JA 2.3; pg. 2-3-6

☐ 71. Inspect lifting and reseating of safety valves for auxiliary boilers

• Record data from safety relief valves data plate/MISLE	46 CFR 52.01-120(a) ASME Code UG-129 46 CFR 162.018-6 / JA 3.3; pg. 3-3-2
• Verify presence of gags	46 CFR 52.01-120(a)(9) JA 3.3; pg. 3-3-3
• Witness lifting and setting of valve	46 CFR 52.01-120(c) 46 CFR 61.01-1, 05-20 MSM II/B.1.G.7(d) / JA 3.3; pg.3-3-4
• Record lifting and setting pressures	46 CFR 52.01-120(d)(1) ASME Code PG72.3 JA 3.3; pg.3-3-4
• Verify lifting and setting are within range	46 CFR 52.01-120(d)(1) ASME Code PG72.3 JA 3.3; pg.3-3-4
• Witness test of hand relieving gear	46 CFR 52.01-120(d)(2) JA 3.3; pg. 3-3-5
• Verify third party repair facility certificate	NVIC 01-71

☐ 72. Verify operation of automatic auxiliary boiler controls and safety devices

• Verify MSC submission/approval of detailed instructions for operational testing and certification reports	46 CFR 63.10-1(a) & (b)
• Verify operation of safety controls	46 CFR 61.35-3(a)(1) 46 CFR 63.15-7(a)
• Verify operation of flame safeguard	46 CFR 61.35-3(a)(2) 46 CFR 63.15-7(a)
• Verify operation of fuel supply controls	46 CFR 61.35-3(a)(3) 46 CFR 63.15-7(a)
• Verify operation of fuel oil pressure limit switch	46 CFR 61.35-3(a)(4) 46 CFR 63.15-7(a) & (d)
• Verify operation of fuel temperature limit control	46 CFR 61.35-3(a)(5) 46 CFR 63.15-7(a) & (d)
• Verify combustion controls	46 CFR 61.35-3(a)(6) 46 CFR 63.15-7(a)
• Verify draft limit controls	46 CFR 61.35-3(a)(7) 46 CFR 63.15-7(a)
• Verify water level controls	46 CFR 61.35-3(a)(9) & (10) 46 CFR 63.15-7(b) & (c)
• Verify low voltage test	46 CFR 61.35-3(a)(11)
• Verify operation of visible shutdown indicator	46 CFR 61.35-3(a)(12) 46 CFR 63.15-7(a) & (b)
• Verify periodically unattended alarm requirements	46 CFR 63.15-7(d)

☐ 73. Inspect fuel oil service system for auxiliary boilers

• Verify operation of service pumps	46 CFR 56.50-65(b)(2) MSM II/B.1.H.3 JA 2.4; pp. 2-4-2
• Verify service pump relief valves location and 5 year test	46 CFR 61.20-3(a) & 56.50-65(c) MSM II/B.1.I.3 JA 2.4; pp. 2-4-2
• Witness remote shutdown of service pumps	46 CFR 58.01-25 JA 2.4; pp. 2-4-2
• Verify location and markings at remote shutdown station	46 CFR 58.01-25 JA 2.4; pp. 2-4-2
• Verify no non-metallic material installed	46 CFR 56.50-65(a) JA 2.4; p. 2-4-3
• Verify presence and condition of wrap around deflector for fuel piping on burner assembly	46 CFR 56.50-65(c) MSM II/B.1.I.6 JA 2.4; p.2-4-3
• Examine drip pans	46 CFR 56.50-60(k), -65(b)(3) JA 2.4; p. 2-4-5
• Verify repair methods for discrepancies found	JA 2.4; p. 2-4-6

☐ 74. Witness testing of Periodic Safety Test Procedures (PSTP)

• Verify PSTP is approved and "hard copy" presence	46 CFR 61.40-1(a) 46 CFR 62.25-25 JA 3.4; pg. 3-4-2
• Verify PSTP match equipment installed	46 CFR 61.40-3 JA 3.4; pg.3-4-3
• Verify no manual override devices not approved in test procedures	46 CFR 61.40-6 JA 3.4; pg.3-4-3
• Verify operation of alarms, shutdowns and controls	46 CFR 61.40-6(b) JA 3.4; pg. 3-4-4
• Verify corrections are completed	46 CFR 61.40-10

☐ 75. Inspect safeties on specific types of small automatic auxiliary boilers

• Verify boiler ratings	46 CFR 63.25-1
• Verify operation of low water indicators	46 CFR 63.25-1(a)
• Verify prepurge operations	46 CFR 63.25-1(b)

☐ 76. Inspect electric hotwater heater(s)

• Verify pressure and temperature relief valve standards for heater with 120 gallons or less capacity	46 CFR 63.25-3(a)
• Examine heating element regulating device	46 CFR 63.25-3(f)
• Verify independent temperature limiting device	46 CFR 63.25-3(g)
• Verify pressure and temperature relief valve settings	46 CFR 63.25-3(h)
• Examine markings on boiler	46 CFR 63.25-3(i)
• Witness testing of relief valves	46 CFR 63.25-3(j)
• Witness testing of other boiler components if necessary	46 CFR 63.25-3(j)

☐ 77. Inspect fired thermal fluid heaters

• Verify ready for inspection	46 CFR 61.30-5 Operations Manual
• Witness hydrostatic test	46 CFR 61.30-10 Operations Manual
• Examine visually	46 CFR 61.30-15 Operations Manual
• Verify prepurge and burner ignition sequence	46 CFR 61.30-20 Operations Manual
• Verify operation of combustion controls	46 CFR 61.30-20 Operations Manual
• Verify operation of limits, flow and fluid controls	46 CFR 61.30-20 Operations Manual
• Verify operation of high temperature control	46 CFR 61.30-20 Operations Manual
• Verify operation of postpurge control	46 CFR 61.30-20 Operations Manual
• Verify operation of flame safe-guard	46 CFR 61.30-20 Operations Manual

☐ 78. Inspect exhaust gas boilers

• Verify operation of feedwater control system	46 CFR 63.25-7(b) Operations Manual
• Verify operation of alarms	46 CFR 63.25-7(c) Operations Manual

Electrical Systems

☐ 79. Inspect battery installation

• Parent cites	46 CFR 31.35-1 46 CFR 70.25-1 46 CFR 90.25-1
• Determine categories	46 CFR 111.15-3
• Verify installation	46 CFR 111.15-5(a)-(d)
• Verify nameplates	46 CFR 111.15-5(e)
• Verify liner spacing	46 CFR 111.15-5-(f) & (g)
• Verify ventilation	46 CFR 111.15-10
• Verify operation of power ventilation interlock with charger	46 CFR 111.15-10(b)(4)
• Verify connections	46 CFR 111.15-20
• Verify presence of overload and reverse current protective device	46 CFR 111.15-25
• Verify means of charging	46 CFR 111.15-30

☐ 80. Inspect motor controllers

• Parent cities	46 CFR 31.35-1 46 CFR 70.25-1 46 CFR 90.25-1
• Verify installation	46 CFR 111.70-3(a)
• Verify marking(s)	46 CFR 111.70-3(d)(1)
• Verify wiring diagram in enclosure	46 CFR 111.70-3(d)(2)
• Verify interlocks	46 CFR 111.70.7(d)
• Verify drip-proof/watertight	46 CFR 111.01-3(a) 46 CFR 111.01-9(a)
• Verify low voltage release motor controller for vital systems	46 CFR 111.70-3(b)

☐ 81. Inspect lighting systems/fixtures

• Parent cites	46 CFR 31.35-1 46 CFR 70.25-1 46 CFR 90.25-1
• Verify lighting	46 CFR 111.75-15 SOLAS 20 II-2/41
• Examine condition and installation of fixtures	46 CFR 111.75-20
• Verify lighting branch circuits	46 CFR 111.75-5

☐ 82. Inspect emergency lighting

• Parent cites	46 CFR 31.35-1 46 CFR 70.25-1 46 CFR 90.25-1
• Verify location	46 CFR 112.05-5, .15-1 & .43 46 CFR 111.75-15(c)(2) SOLAS 20 II-1/43.2.1/2.2
• Verify operation	46 CFR 111.75-15(c)(2) SOLAS 20 II-1/43
• Verify operation of embarkation station lighting	46 CFR 111.75-16 SOLAS 20 II-1/43
• Verify markings	46 CFR 35.40-6 46 CFR 78.47-33 46 CFR 97.37-25

☐ 83. Inspect panelboards (distribution panels)

• Parent cites	46 CFR 31.35-1 46 CFR 70.25-1 46 CFR 90.25-1
• Verify presence of dead front (blanks),panel construction and rating	46 CFR 111.40-1, -5 & -13
• Verify accessibility	46 CFR 111.40-7
• Verify operation of locking device	46 CFR 111.40-9
• Review breaker numbering and information on directory card	46 CFR 111.40-11

☐ 84. Inspect electrical cables and fixtures

• Parent cites	46 CFR 31.35-1 46 CFR 70.25-1 46 CFR 90.25-1
• Verify supports for vertical and horizontal installations	46 CFR 111.60-5 IEEE 45-2002 25.5
• Verify radius of bends	IEEE 45-2002 25.6
• Verify no hazardous conditions exist	46 CFR 111.60-17 & -19
• Verify condition of outlets	46 CFR 111.79-1 46 CFR 111.81-1
• Verify use of flexible cords	46 CFR 111.60-13 IEEE 45-2002 24.6.1
• Verify material condition/installation of fixtures	46 CFR 111.75-20
• Verify wire type and conductor size	46 CFR 111.60-1 thru -4 & -11

☐ 85. Inspect components installed in designated hazardous locations

• Parent cites	46 CFR 31.35-1 46 CFR 70.25-1 46 CFR 90.25-1
• Verify hazardous areas	46 CFR 111.105-1 & -3 46 CFR 111.105-9 & -11 46 CFR 111.105-41
• Verify equipment for hazardous locations	46 CFR 111.105-7 & -19
• Verify equipment integrity	46 CFR 111.105-5 & -15
• Verify wiring methods	46 CFR 111.105-17
• Verify ventilation fan non-sparking	46 CFR 111.105-21

☐ 86. Inspect switchboard(s)

• Verify presence of dead front (blanks), accessibility and construction	46 CFR 111.30-1 thru -5 IEEE 45-2002 8.3
• Verify and non-conductive handrail(s), matting or deck grating	46 CFR 111.30-11
• Review information on nameplates	46 CFR 111.30-15
• Verify operation of alternating current service switchboard components	46 CFR 111.30-25
• Verify operation of direct current service switchboard components	46 CFR 111.30-27
• Verify operation of emergency switchboard components	46 CFR 111.30-29

☐ 87. Inspect main service and propulsion generator(s) and prime mover(s)

• Examine condition of components	46 CFR 61.20-3(a)
• Verify installation of machinery covers and guards	46 CFR 58.01-20 SOLAS 20 II-1/26.1 SOLAS 20 II-2/4.2.2.6.1
• Verify generator(s) nameplates are attached	46 CFR 111.12-5 ABS 4-2-1/1.1 ABS 4-8-3/3.11.8
• Verify set point and operation of prime mover over speed shut-down	46 CFR 111.12-1(b) ABS 4-2-1/7.5.3
• Verify set point and operation of prime mover lube oil shut-down	46 CFR 111.12-1(c)
• Verify power source requirements	46 CFR 111.10 SOLAS 20 II-1/41
• Examine generator protections	46 CFR 111.12-11
• Verify operation of reverse power relays	46 CFR 111.12-11(f)

☐ 88. Inspect emergency generator(s) and prime mover(s)

• Verify power source requirement	46 CFR 112.05-05 SOLAS 20 II-1/43.3
• Verify prime mover requirement	46 CFR 58.10-10 & 01-5 46 CFR 111.12-1 46 CFR 112.50-1
• Verify starting requirements	46 CFR 112.50-1(d) SOLAS 20 II-1/44
• Examine starting systems	46 CFR 112.50-1(e) & (k) SOLAS 20 II-1/44.3
• Verify operation of auto-start function	SOLAS 20 II-1/43.3 46 CFR 112.50-1(d) MSM II/B.1.L.2
• Examine condition	46 CFR 61.20-3(a)
• Verify installation of machinery covers and guards	46 CFR 58.01-20
• Verify operation of alarms	46 CFR 112.50-1(h) or (i)
• Verify gauges	ABS 4-2-1/7.17
• Verify marking and operation of remote fuel shutoff valves	46 CFR 56.50-60(c) & (d) SOLAS 20 II-2/4.2.2.3.4
• Verify set point and operation of over speed shut-down	46 CFR 111.12-1(b) & .50-1(g) ABS 4-2-1/7.5.3
• Verify set point and operation of lube oil shut-down	46 CFR 111.12-1(c) 46 CFR 112.50-1(g)
• Verify generator nameplates attached	46 CFR 111.12-5 ABS 4-2-1/1.1 ABS 4-8-3/3.11.8

Structural/Watertight Integrity

☐ 89. Inspect hatches and Class-1 watertight doors

• Parent cites	46 CFR 31.10-30 46 CFR 72.30-1 46 CFR 93.01-1
• Verify condition of knife edges	MSM II/B.1.E.5
• Verify condition of gasket material	MSM II/B.1.E.5
• Verify watertight integrity between gasket and knife edge	46 CFR 170.270(a) &(b) MSM II/B.1.E.5
• Verify location, condition and operation of hinges and dogging devices	46 CFR 170.255(a) MSM II/B.1.E.5
• Verify design ,operation, installation and testing of quick-acting closing-device	46 CFR 170.270 46 CFR 170.255(d)
• Verify operation of indicator lights at the control station	46 CFR 170.255(e) 46 CFR 170.270(e)
• Verify doors are installed in permissible locations	46 CFR 170.255
• Verify markings (H & I only)	46 CFR 78.47-37 (a)& (b) 46 CFR 97.37-60

☐ 90. Inspect Class 2 & 3 watertight doors

• Parent cites	46 CFR 31.10-30 46 CFR 72.30-1 46 CFR 93.01-1
• Verify operation of remote/local controls	46 CFR 170.270(c)(2) ASTM F1197/7.1
• Verify design ,operation, installation and testing of quick-acting closing-device	46 CFR 170.270(c)(1) ASTM F1196/6.3 MSM II/B.1.E.5
• Verify operation of alarms	46 CFR 170.270(c)(1) & (2) ASTM F1197/11.5
• Verify closing times are in compliance	46 CFR 170.270(c)(1) & (2) ASTM F1197/11.2 & 11.4
• Verify markings	46 CFR 170.270(c)(1) & (2) 46 CFR 78.47-37(a) ASTM F1196/11.1
• Verify watertight integrity	46 CFR 170.270(c)(1) & (2) ASTM F1196/S1 MSM II/B.1.E.5
• Verify operation of doors under reserve power	46 CFR 170.270(c)(3) 46 CFR 170.015 ASTM F1197/S3
• Verify watertight doors are installed in permissible locations	46 CFR 170.260 & .265 SOLAS 20 II-2/13-1

☐ 91. Inspect watertight bulkhead penetrations

• Parent cites	46 CFR 31.10-30 46 CFR 71.25-35 46 CFR 91.25-35
• Verify locations	46 CFR 171.111(g)
• Verify ability to seal	46 CFR 56.50-1 MSM II/B.1.B.5
• Verify sealing material approvals	46 CFR 56.50-1 SOLAS 20 II-2/11

☐ 92. Inspect hull structure

• Examine for damage, wastage and fractures	46 CFR 32.60-1 & 72.01-15 & 46 CFR 92.01-10 MSM II/B.1.B.1
• Verify no unauthorized repairs	46 CFR 31.10-25 46 CFR 71.55-5 46 CFR 91.45-5

Pollution Prevention

☐ 93. Inspect pollution prevention equipment

• Verify communication between participants in transfer operations	33 CFR 155.785
• Verify transfer hoses tested and marked	33 CFR 155.800 33 CFR 154.500 MSM II/B.6.E.8
• Verify locations of pollution/MARPOL placards	33 CFR 155.450
• Verify condition of hose and manifold connections	33 CFR 156.130 & 170(1)
• Verify condition and size of containment	33 CFR 155.320 MSM II/B.6.D.6
• Verify containment closures	33 CFR 156.120(n) 33 CFR 156.120(o)
• Verify sufficient lighting	33 CFR 155.790
• Verify signed copies of Declaration of Inspection are present	33 CFR 156.150(f) MSM II/B.6.E.6

☐ 94. Inspect Oily Water Separator (OWS)

• Verify approval	33 CFR 155.380(a & (b) MARPOL I/14
• Verify overboard discharge valve is closed	33 CFR 151.10(c) MARPOL I/15
• Witness operation	33 CFR 155.380(e) MARPOL I/14 Operations Manual
• Verify means to retain oily waste	33 CFR 155.330-.370 MARPOL I/14.3-.5 & IMO Res A.1076(28) MARPOL I/12
• Verify operation of oil content monitor and performed maintenance	33 CFR 155.380 (f) IMO Res MEPC.60(33) IMO Res MEPC.107(49)

☐ 95. Inspect sewage system

• Verify presence of manufacturer's instructions	33 CFR 159.57
• Verify operation	33 CFR 159.57 Operations Manual
• Verify Marine Sanitation Device (MSD) approval	33 CFR 159.2 ,.7 & .12 MSM II/B.6.F.4
• Verify capacity	33 CFR 159.57(b)(8)
• Verify piping and wiring	33 CFR 159.97
• Verify instructions and warning placard posted	33 CFR 159.59

☐ 96. Review fuel oil transfer procedures

• Verify contents of PIC designation letter	33 CFR 155.700 & 715
• Verify procedure are posted or available	33 CFR 155.720 33 CFR 155.740(c) MSM II B.6.D.16
• Verify contents of procedures	33 CFR 155.750
• Verify amendments to procedures	33 CFR 155.760

☐ 97. Inspect incinerator(s)

• Verify system approvals	46 CFR 63.25-9(a)
• Verify presence of operation manual	46 CFR 63.25-9(d)
• Verify training	46 CFR 63.25-9(e)

☐ 98. Conduct an IOPP (MARPOL Annex I) survey

• Verify standard discharge connection(s)	33 CFR 155.430 MARPOL I/13
• Verify oil record book entries	33 CFR 151.25/MSM /II E1-1 Checklist MARPOL I/17 IMO MEPC.1/Circ. 736/Rev.2
• Witness operational test of equipment	33 CFR 155.330-.380 MARPOL I/14 IMO Res A.1120(30)
• Verify piping and tank configuration	33 CFR 155.330 - .430 MARPOL I/12
• Confirm equipment installation matches international certificate	IMO Res A.1120(30) IOPP Certificate Supplement

☐ 99. Conduct an international air pollution prevention (MARPOL Annex VI) survey

• Verify equipment/systems containing chlorofluorocarbons (CFCs), hydro CFCs and volatile organic compounds (VOCs) are on certificate	MARPOL VI/12
• Verify presence of equipment on certificate, approvals and equivalencies	MARPOL VI/4 IMO Res A.1076(28)
• Verify compliance with Emission Control Area (ECA)	MARPOL VI/13 & 14 Appendix Vll CG-543 Policy Ltr 09-01
• Review exhaust cleaning systems equivalency documentation	MARPOL VI/4
• Review delivery notes	MARPOL VI/18.5 Appendix V
• Verify samples	MARPOL VI/18.8.1
• Verify compliance with NOx and SOx	MARPOL VI/13 & 14 40 CFR 1043.30 CG-543 Policy Ltr 09-01
• Review notification(s) of fuel oil availability and quality	MARPOL VI/18.2.4

Emergency Drills

☐ 100. Evaluate fire drill

• Parent cites	46 CFR 31.36-1 46 CFR 71.25-15 46 CFR 91.25-15
• Witness drill	46 CFR 199.250 SOLAS 20 III/19.2.1 MSM II/B.1.P.3.v
• Verify crew's ability to organize	46 CFR 199.180(f) SOLAS 20 III/19.3.4.2.1 ISM Code A/8
• Verify crew's familiarity with their duties and use of equipment	46 CFR 199.180(f) SOLAS 20 III/19.3.4.2.1
• Verify firefighting gear is compatible and complete	46 CFR 199.180(f)(3) SOLAS 20 III/19.3.4.2.3
• Verify operation of alarms	46 CFR 199.180(f)(3) SOLAS 20 III/19.3.4.2.1- .6
• Verify effective communication with master	46 CFR 199.180(f)(2)(iv) SOLAS 20 III/19.3.4.2.4

☐ 101. Evaluate abandon ship drill

• Parent cites	46 CFR 31.36-1 46 CFR 71.25-15 46 CFR 91.25-15
• Witness drill	46 CFR 199.180(d) SOLAS 20 III/19.3.3
• Verify general alarm and public address announcements	46 CFR 199.180(d) SOLAS 20 III/19.3.3.1.1
• Verify crew's familiarity with assigned duties	46 CFR 199.180(b) SOLAS 20 III/19.3.3.1.2 STCW A-VI/1-1
• Evaluate crew are suitably dressed and proficient in donning lifejackets and/or immersion suits	46 CFR 199.180(d) SOLAS 20 III/19.3.3.1.3 & .4 STCW A-VI/1-1
• Witness operation of davit launching lifeboat or rescue boat	46 CFR 199.180(d) SOLAS 20 III/19.3.3.1.5
• Witness operation of lifeboat or rescue boat engine	46 CFR 199.180(d) SOLAS 20 III/19.3.3.1.6
• Witness operation of davit launching liferafts	46 CFR 199.180(d) SOLAS 20 III/19.3.3.1.7

☐ 102. Evaluate security drill

• Review procedures contained in security plan	33 CFR 104.230(b)(2) ISPS Code A/9.4.4 NVIC 04-03 Encl. 3/12.B
• Witness drill	33 CFR 104.230(a) SOLAS 20 XI-2/4.2 ISPS Code A/13.4
• Evaluate crew's response	33 CFR 104.220 ISPS Code A/13.3 STCW A-VI/6
• Verify control and communication	33 CFR 104.245 ISPS Code A/7.2.7
• Verify implementation of plan procedures	33 CFR 104.230(a) ISPS Code A/9.4

Internal Structural Examination

☐ 103. Verify confined spaces are safe for entry

• Review Marine Chemist Certificate	29 CFR 1915.12(f) CIM 5100.47C 13.B.3 NFPA 306/4.3
• Verify Competent Person has maintained Marine Chemist Certificate	29 CFR 1915.15 CIM 5100.47C 13.B.8 NFPA 306/4.6.2
• Verify no changes to vessel's condition	29 CFR 1915.15(b)
• Verify forced ventilation is provided	29 CFR 1915.13(b)(3)
• Verify condition of space access point	29 CFR 1915.76
• Verify compliance with competent person program	MSM II/A.5.H.6

☐ 104. Inspect internal structures

• Parent cites	46 CFR 31.10-1 & -25-1 46 CFR 70.35-1 & & 71.15-1 46 CFR 90.35-1 & 91,15-1
• Examine internal structures	46 CFR 31.10-20(b) & -21(c) 46 CFR 71.50-3(d) & 91.40-3(c) 46 CFR 42.03-5(a)(1) & ABS 7-3-1/1
• Examine coamings, closures and other fittings	46 CFR 42.09-25(b)(2) MSM II/B.3.B
• Verify wastage discovered is within acceptable limits	ABS 7-A-4/27 NVIC 07-68 III(C) NVIC 07-68 III(H)-(N)
• Verify unsatisfactory condition(s) are resolved	46 CFR 42.09-45

Welding Repair

☐ 105. Evaluate structural repair proposals

• Parent cites	46 CFR 31.10-1 & 32.60-1 46 CFR 70.35-1 46 CFR 90.35-1
• Evaluate extent of damage and/or wastage/corrosion	46 CFR 42.09-50 ABS 7-A-4/17 NVIC 07-68 IV
• Review repair proposal	46 CFR 42.09-50 & ABS 7-A-4/29 MSM II/A.1.F.2.a NVIC 07-68 IV
• Verify repair materials	46 CFR 42.09-50(c) ABS 7-A-4/29 ABS 2-1-1/7
• Verify welding procedures	46 CFR 42.09-50(c) 46 CFR 2.75-70 ABS 2-4-1/1.3

☐ 106. Verify welding Procedure Qualification Records (PQR)

• Parent cites	46 CFR 31.10-1, .30-1 & 32.60-1 46 CFR 70.20-1 & .35-1 46 CFR 90.20-1 & .35-1
• Confirm need for qualified welding procedure	46 CFR 2.75-70 46 CFR 57.02-2(a)(1)
• Verify variables on PQRs to the Welding Procedure Specification (WPS)	ASME IX/QW-200.1(b) ASME IX/QW-483
• Verify tests and results	ASME IX/QW-200.2(b)

☐ 107. Verify welder is qualified to perform repair work

• Parent cites	46 CFR 31.10-1, .30-1 & 32.60-1 46 CFR 70.20-1 & .35-1 46 CFR 90.20-1 & .35-1
• Confirm need for qualified welding procedure	46 CFR 2.75-70 46 CFR 57.02-2(a)(1)
• Verify Welder Performance Qualification (WPQ) is valid	46 CFR 57.02-3 ASME IX/QW-322.1
• Verify variables on WPQ(s)	ASME IX/QW-301.2 ASME IX/QW-301.4 ASME IX/QW-484(a)
• Verify tests are satisfactory	ASME IX/QW-302.1 ASME IX/QW-484(a)

☐ 108. Inspect fit-up

• Parent cites	46 CFR 31.10-1 & 32.60-1 46 CFR 70.35-1 46 CFR 90.35-1
• Examine material and verify it is fitted to approved joint detail	46 CFR 42.09-50 ANSI/AWS D3.5-93 NVIC 07-68 IV & V
• Verify materials (base, filler, gas)	46 CFR 57.02-5 ABS 2-1-1/1.1
• Verify welding processes	ABS 2-4-1/1.7

☐ 109. Inspect back gouge

• Parent cites	46 CFR 31.10-1 & 32.60-1 46 CFR 70.35-1 46 CFR 90.35-1
• Examine welds for defects (discontinuity)	ABS 2-4-1/5.9 NVIC 07-68 V(G)(2)
• Verify weld sequencing	ANSI/AWS D3.5-93 NVIC 07-68 V(F)
• Verify joints are cleaned interpasses	ABS 2-4-1/3.5 NVIC 07-68 V(H)

☐ 110. Inspect welds

• Parent cites	46 CFR 31.10-1 & 32.60-1 46 CFR 70.35-1 46 CFR 90.35-1
• Examine welds for uniformity and reinforcement	ABS 2-4-1/5.15.1 NVIC 07-68 V
• Examine welds for defects (discontinuity)	ABS 2-4-1/5.15.1 NVIC 07-68 V(H)
• Examine adjacent base metal for injurious arc strikes, spatter, undercut, overlap, slag and irregular and/or sharp edges	ABS 2-4-1/5.15.1
• Verify workmanship through an nondestructive test	ABS 2-4-1/5.15.2 ABS NDT Guide

☐ 111. Verify welding Procedure Qualification Record(s) (PQR)

• Parent cites	46 CFR 31.10-1 & 32.60-1 46 CFR 70.35-1 46 CFR 90.35-1
• Confirm need for qualified welding procedure	46 CFR 2.75-70 NVIC 07-68
• Verify variables on PQR(s) to the Welding Procedure Specification (WPS(s))	46 CFR 2.75-70
• Verify tests and results	46 CFR 2.75-70

☐ 112. Verify welder is qualified to perform repair work

• Parent cites	46 CFR 31.10-1 & 32.60-1 46 CFR 70.35-1 46 CFR 90.35-1
• Confirm need for qualified welding procedure	46 CFR 2.75-70
• Verify Welder Performance Qualification (WPQ) is valid	46 CFR 2.75-70
• Verify variables on WPQs	46 CFR 2.75-70
• Verify tests are satisfactory	46 CFR 2.75-70

☐ 113. Review structural repair proposal for boilers

• Evaluate repairs, replacements, or alterations	46 CFR 59.01-5(a) & (e)
• Evaluate repair proposal	46 CFR 59.01-5(c)
• Verify repair materials	46 CFR 59.01-5(c) & (e) 46 CFR 59.10-1
• Verify welding procedures	46 CFR 59.01-5(e)
• Evaluate alternative repair methods for equivalency	46 CFR 59.10-1(d)

☐ 114. Review welding Procedure Qualification Records (PQR) for boilers

• Confirm need for qualified welding procedure	46 CFR 2.75-70 46 CFR 57.02-2(a)(1) 46 CFR 59.10-1
• Verify variables on PQRs to the Welding Procedure Specification (WPSs)	ASME IX/QW-200.1(b) ASME IX/QW-483
• Verify tests and results	ASME IX/QW-200.2(b)

☐ 115. Verify welder is qualified to perform repair work on boilers

• Evaluate welder proficiency	46 CFR 59.10-1(a) ABS 2-4-3/11 ASME IX QW-304
• Review qualified welding procedure	46 CFR 57.03-1(a)(1) 46 CFR 57.02-2(a)(1) 46 CFR 59.10-1(a)
• Verify Welder Performance Qualification (WPQ) is valid	ASME IX/QW-322.1
• Verify variables on WPQs	ASME IX/QW-301.4 ASME IX/QW-484(a)
• Verify tests are satisfactory	ASME IX/QW-302.1 ASME IX/QW-484(a)

☐ 116. Inspect fit-up on boilers

• Examine material and fitted to approved joint detail	46 CFR 59.01-5(a) & (d)
• Verify materials (base, filler, gas)	46 CFR 59.01-5(a)
• Verify welding processes	46 CFR 59.01-5(a) 46 CFR 59.10-1(b)

☐ 117. Inspect welds on boilers

• Verify weld deposit workmanship	46 CFR 59.01-5 46 CFR 59.10 46 CFR 59.15 & .20
• Examine welds for defects (discontinuity)	46 CFR 59.10-1(a)
• Verify weld acceptance criteria (w/NDT)	46 CFR 59.01-5(e) 46 CFR 59.10-5(k) 46 CFR 59.10-10(f)

Nondestructive Testing

☐ 118. Inspect nondestructive testing (NDT) using the liquid (dye) penetrant method

• Parent cites	46 CFR 31.10-1 & 32.60-1 46 CFR 70.35-1 46 CFR 90.35-1
• Verify technician's qualification and certification	ABS 2-4-1/5.17 NDT Guide 4/5.3
• Verify application technique	NDT Guide 4/5.5
• Witness application procedures	ABS NDT Guide 4/5.7
• Witness visible penetrant examination	ABS NDT Guide 4/7.5
• Witness fluorescent penetrant examination	ABS NDT Guide 4/7.7
• Evaluate test results or technician's report	ABS NDT Guide 4/9 & 11

☐ 119. Inspect nondestructive testing (NDT) using the magnetic particle method

• Parent cites	46 CFR 31.10-1 & 32.60-1 46 CFR 70.35-1 46 CFR 90.35-1
• Verify technician's qualification and certification	ABS 2-4-1/5.17 NDT Guide 7/5.3
• Verify inspection technique	ABS NDT Guide 7/5.5
• Verify equipment and magnetic field strength	ABS NDT Guide 7/5.7.1 & .2
• Witness application of visible magnetic particles	ABS NDT Guide 7/5.7.3
• Witness application of fluorescent particles	ABS NDT Guide 7/5.7.4
• Witness technician examine/interpret readings	ABS NDT Guide 5/5.7 & 9
• Evaluate test results or review technician's report	ABS NDT Guide 5/5.7 & 9

☐ 120. Verify nondestructive testing (NDT) using the radiography (gamma rays or x-rays) method

• Parent cites	46 CFR 31.10-1 & 32.60-1 46 CFR 70.35-1 46 CFR 90.35-1
• Verify technician's qualification and certification	ABS 2-4-1/5.17 NDT Guide 2/5.1
• Verify inspection technique	ABS NDT Guide 2/5.3
• Verify film identification markings	ABS NDT Guide 2/5.5
• Verify radiography quality level	ABS NDT Guide 2/5.7
• Verify Image Quality Indicator (IQI)	ABS NDT Guide 2/5.9
• Witness technician examine/interpret readings	ABS NDT Guide 2/5.15
• Review technician's report	ABS NDT Guide 2/9 & 11

☐ 121. Verify nondestructive testing (NDT) using the ultrasonic method

• Parent cites	46 CFR 31.10-1 & 32.60-1 46 CFR 70.35-1 46 CFR 90.35-1
• Verify technician's qualification, certification and techniques	ABS 2-4-1/5.17 ABS NDT Guide 3/3
• Verify calibrate block's material and thickness	ABS NDT Guide 3/3.5
• Verify type of equipment/instrument used	ABS NDT Guide 3/3.7
• Verify equipment is calibrated	ABS NDT Guide 3/3.9
• Witness technician examine/interpret readings	ABS NDT Guide 3/3.11
• Evaluate test results or review technician's report	ABS NDT Guide 3/3.13

☐ 122. Inspect nondestructive testing (NDT) using the hydro-static method (Pressure Vessels)

• Parent cites	46 CFR 31.10-1, .30-1 & 32.60 46 CFR 70.20-1 46 CFR 90.20-1
• Verify requirement for test	46 CFR 54.10-10(a)
• Verify ready for testing	46 CFR 54.10-10(b)
• Verify air has been purged	46 CFR 54.10-10(b)
• Verify piping components are isolated	46 CFR 54.10-10(b)
• Verify test pressure	46 CFR 54.10-10(b) 46 CFR 54.10-20
• Verify test pressure is attained and maintained	46 CFR 54.10-10(c)
• Witness test	46 CFR 54.10-10(c)

☐ 123. Inspect nondestructive testing (NDT) using the hydro-static method (Piping Systems)

• Parent cites	46 CFR 31.10-1, .30-1 & 32.60 46 CFR 70.20-1 46 CFR 90.20-1
• Verify test pressure of nonstandard piping components	46 CFR 56.97-5
• Verify system is ready for testing	46 CFR 56.97-25
• Verify air has been purged	46 CFR 56.97-30(a)
• Verify test medium	46 CFR 56.97-30(b)
• Verify piping components are isolated	46 CFR 56.97-30(c)
• Verify test pressure	46 CFR 56.97-30(e) & (f)
• Witness test	46 CFR 56.97-30(d)
• Verify test pressure is attained and maintained	46 CFR 56.97-30(g)
• Verify pressures for Installation tests	46 CFR 56.97-40

☐ 124. Inspect nondestructive testing (NDT) using the hydro-static method (Tanks and Bulkheads)

• Parent cites	46 CFR 31.10-1, .30-1 & 32.60 46 CFR 70.20-1 46 CFR 90.20-1
• Verify tanks/space is ready for testing	ABS 3-7-1/3.5.4(a) & (b)
• Verify test medium being used	ABS 3-7-1/3.5.4(a) & (b)
• Verify piping components are isolated	ABS 3-7-1/3.5.4(a) & (b)
• Verify test pressure	ABS 3-7-1/3.5.4(a) & (b)
• Witness test	ABS 3-7-1/3.5.4(a) & (b)

☐ 125. Inspect nondestructive testing (NDT) using the pneumatic method (Pressure Vessels)

• Parent cites	46 CFR 31.10-1, .30-1 & 32.60 46 CFR 70.20-1 46 CFR 90.20-1
• Determine suitability for test	46 CFR 54.10-15(a) & (b)
• Ensure all safety precaution are taken	46 CFR 54.10-15(g)
• Verify test pressure	46 CFR 54.10-15(c)
• Witness gradual pressure increase	46 CFR 54.10-15(d)
• Witness test	46 CFR 54.10-15(e)

☐ 126. Inspect nondestructive testing (NDT) using the pneumatic method (Piping Systems)

• Parent cites	46 CFR 31.10-1, .30-1 & 32.60 46 CFR 70.20-1 46 CFR 90.20-1
• Verify test medium and temperature	46 CFR 56.97-35(b)
• Verify piping components are isolated	46 CFR 56.97-35(c)
• Verify test pressure	46 CFR 56.97-35(f) & (g)
• Witness gradual pressure increase	46 CFR 56.97-35(d)
• Verify test pressure is attained and maintained	46 CFR 56.97-35(h)
• Witness test	46 CFR 56.97-35(e)

☐ 127. Inspect nondestructive testing (NDT) using the tank air test (pneumatic) method (Tanks and Bulkheads)

• Parent cites	46 CFR 31.10-1, .30-1 & 32.60 46 CFR 70.20-1 46 CFR 90.20-1
• Verify tanks/space is ready for testing	ABS 3-7-1/3.5.4(d)
• Verify piping components are isolated	ABS 3-7-1/3.5.4(d)
• Verify test pressure	ABS 3-7-1/3.5.4(d)
• Verify presence of leak indicating solution	ABS 3-7-1/3.5.4(d)
• Verify calibration of means to measure pressure	ABS 3-7-1/3.5.4(d)
• Witness initial test	ABS 3-7-1/3.5.4(d)
• Witness secondary test	ABS 3-7-1/3.5.4(d)

☐ 128. Inspect nondestructive testing (NDT) using the hose test method (Tanks and Bulkheads)

• Parent cites	46 CFR 31.10-1, .30-1 & 32.60 46 CFR 70.20-1 46 CFR 90.20-1
• Verify tanks/space is ready for testing	ABS 3-7-1/3.5.4(c)
• Verify nozzle size	ABS 3-7-1/3.5.4(c)
• Verify water pressure	ABS 3-7-1/3.5.4(c)
• Verify nozzle distance from joints/seams during test	ABS 3-7-1/3.5.4(c)
• Witness test	ABS 3-7-1/3.5.4(c)

☐ 129. Inspect nondestructive testing (NDT) using the vacuum box method (Tanks and Bulkheads)

• Parent cites	46 CFR 31.10-1, .30-1 & 32.60 46 CFR 70.20-1 46 CFR 90.20-1
• Verify tanks/space is ready for testing	ABS 3-7-1/3.5.4(f)
• Verify condition of gauge and injector	ABS 3-7-1/3.5.4(f)
• Verify presence of leak indicating solution	ABS 3-7-1/3.5.4(f)
• Verify test gauge pressure	ABS 3-7-1/3.5.4(f)
• Witness test	ABS 3-7-1/3.5.4(f)

Follow Up

☐ 130. Verify vessel compliance with the International Safety Management (ISM) Code

• Verify master's oversight	33 CFR 96.250 SOLAS 20 IX/3.2 ISM Code A/5
• Verify maintenance program for vital equipment	33 CFR 96.250 ISM Code A/10.4
• Verify compliance of Safety and Environmental Policy	33 CFR 96.250 ISM Code A/2
• Verify record keeping compliance	33 CFR 96.220(a)(3) ISM Code A/10.2.4
• Verify company responsibilities and authority are defined	33 CFR 96.250 ISM Code A/3
• Verify crew can identify and contact information of designated person(s) ashore	33 CFR 96.250 ISM Code A/4
• Review audit documentation and ensure follow-up actions	33 CFR 96.250 ISM Code A1.4.6, A/9 & 12

☐ 131. Issue control action(s)

• Determine control action(s)	46 USC 3313(b)
• Conduct reports and notifications (when applicable)	MMS CVC-PR-001(2)
• Issue control action(s)	MMS CVC-PR-001(2) CG-835V
• Explain control action(s) to responsible parties/stakeholders	MMS CVC-PR-001(2) CG-835V MSMII/A.1.F.3

☐ 132. Issue deficiencies

• Determine when worklists may be used	MMS CVC-PR-001(2)
• Document "self reported" deficiencies	MMS CVC-PR-001(2)
• Determine deficiency's reference cite	46 USC 3313(b) MSM II/A.2.C.4
• Discuss deficiencies and corrective measures/timeframe with vessel's master or representative	MSM II/A.2.C.2
• Issue signed CG-835V to vessel's master or representative	46 CFR 2.01-10(a) MSM II/A.2.C MMS CVC-PR-001(2)

☐ 133. Issue/Endorse vessel's certificates

• Issue/Endorse certificates, as applicable	46 CFR 31.40-1 & 71.75-1 46 CFR 91.60-1 SOLAS 20 I/14(i)(ii)/IMO Res A.1076(28)
• Obtain a copy of all endorsed certificates for the unit's vessel file	MSM I/12.E.7

☐ 134. Complete Maritime Information for Safety and Law Enforcement (MISLE) Activity

• Open existing activity in MISLE	MSM I/12.G.2.a IMO Res A.1076(28) MISLE User Guide
• Update inspection results	MSM I/12.H.1 / MSM II/A.2.C.2.d MMS PR-009(2) MISLE User Guide
• Update activity narrative special notes	MSM I/12.H.1 MMS PR-009(2) MISLE User Guide
• Update vessel details	MSM I/12.H.1 MMS PR-009(2) MISLE User Guide
• Amend Certificate of Inspection	MSM I/12.H.1 MMS PR-009(2) MISLE User Guide
• Print new or amended Certificate of Inspection and Deficiency Letter	MSM II/A.2.C.6 MMS PR-009(2) MISLE User Guide
• Change activity status to "Open - Submitted for Review"	MSM I/12.H.1 MISLE User Guide

☐ 135. Conduct deficiency check

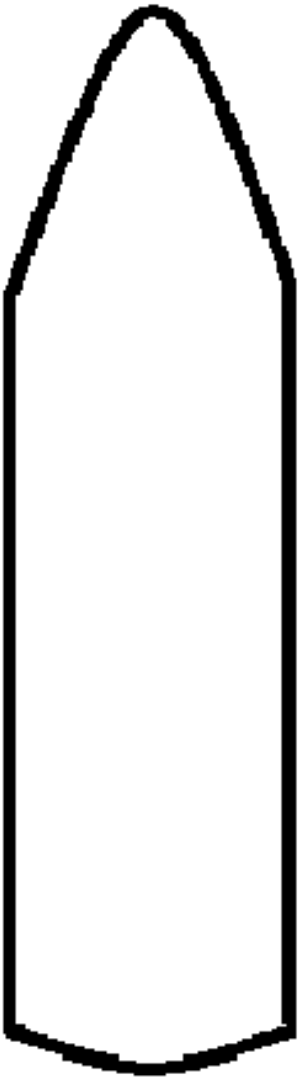
• Determine an appropriate verification method for identified deficiencies	MSM II/A.2.C.4
• Verify corrections meet appropriate regulations	MSM II/A.2.C.4.a
• Clear deficiencies in MISLE activity	MSM II/A.2.C.2.d MISLE User Guide MMS PR-001(2)
• Remove control action(s)	MISLE User Guide

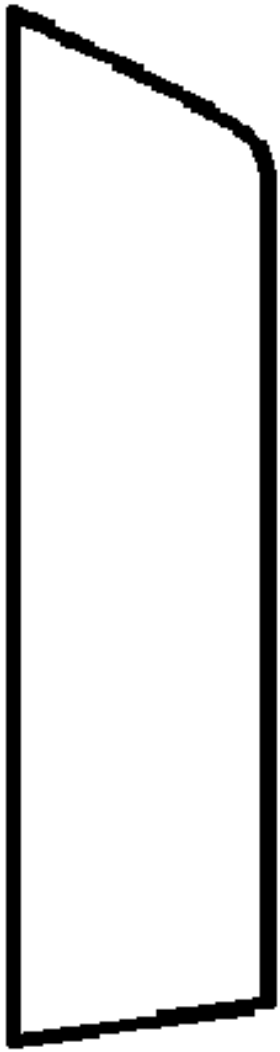
☐ 136. Document boiler inspection information in MISLE

• Document safety valve setting	46 CFR 61.01-20
• Update safety valve inspection interval	46 CFR 61.05-10(a)
• Update fireside inspection intervals	46 CFR 61.05-10(a)
• Update waterside inspection intervals	46 CFR 61.05-10(a)
• Update bolt and stud inspection intervals	46 CFR 61.05-10(a)
• Update mounting inspection intervals	46 CFR 61.05-10(a)
• Update steam gauge inspection intervals	46 CFR 61.05-10(a)

Appendices

Vessel Layout:





Recommended US Vessel Deficiency Procedures:

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>1</td><td>Identify deficiency</td></tr>
<tr><td>2</td><td>Inform vessel representative</td></tr>
<tr><td>3</td><td>Record on the Deficiency Summary Worksheet (next page)</td></tr>
<tr><td>4</td><td>If deficiency is corrected prior to end of inspection, go to step 6</td></tr>
<tr><td>5</td><td>If deficiency is unable to be corrected prior to end of inspection, issue CG-835 in accordance with the table below:
<table>
<tr><th>IF deficiency:</th><th>THEN issue CG-835:</th></tr>
<tr><td>Does NOT immediately impact crew/passenger safety, hull seaworthiness or the environment, e.g.,
Missing placards
Non-metallic expansion joints if more than 10 years in service</td><td>That provides a specific time for correcting deficiency, e.g.,
“X” number of days
At next drydock</td></tr>
<tr><td>Allows Vessel operations to be MODIFIED to meet less stringent requirements, e.g.,
Expired international certificates
Automation defect
Insufficient lifesaving equipment</td><td>That restricts operation of vessel to meet current vessel conditions, e.g.,
Reduced route
Increased crew
Fewer offshore workers</td></tr>
<tr><td>DOES immediately impact crew/passenger safety, hull seaworthiness, or the environment and cannot be modified to meet less stringent requirements, e.g.,
Missing or defective firefighting equipment
Structural defect or damage</td><td>That requires the deficiency to be corrected prior to operating vessel (“NO SAIL” item), e.g.,
Prior to carrying offshore workers
Prior to carrying cargo</td></tr>
</table></td></tr>
<tr><td>6</td><td>Enter CG-835 data in MISLE</td></tr>
</table>

Deficiency Summary Worksheet:

Name of Vessel	
Deficiency	**Req't. Issued/ Date Cleared**

Notes:

Notes:

Conversions:

Distance and Energy

Kilowatts (kW)	X	1.341	=	Horsepower (hp)
Feet (ft)	X	3.281	=	Meters (m)
Long Ton (LT)	X	.98421	=	Metric Ton (t)

Liquid *(**NOTE:** Values are approximate.)*

Liquid	bbl/LT	m^3/t	bbl/m^3	bbl/t
Freshwater	6.40	1.00	6.29	6.29
Saltwater	6.24	.975	6.13	5.98
Heavy Oil	6.77	1.06	6.66	7.06
DFM	6.60	1.19	7.48	8.91
Lube Oil	7.66	1.20	7.54	9.05

Weight

1 Long Ton	=	2240 lbs	1 Metric Ton	=	2204 lbs
1 Short Ton	=	2000 lbs	1 Cubic Foot	=	7.48 gal
1 Barrel (oil)	=	5.61 ft = 42 gal = 6.29 m^3	1 psi	=	.06895 Bar = 2.3106 ft of water

Temperature: Fahrenheit = Celsius (°F = 9/5 °C + 32 and °C = 5/9 (°F – 32))

0	=	-17.8	80	=	26.7	200	=	93.3
32	=	0	90	=	32.2	250	=	121.1
40	=	4.4	100	=	37.8	300	=	148.9
50	=	10.0	110	=	43.3	400	=	204.4
60	=	15.6	120	=	48.9	500	=	260
70	=	21.1	150	=	65.6	1000	=	537.8

Pressure: Bars = Pounds per square inch

1 Bar	=	14.5 psi	5 Bars	=	72.5 psi	9 Bars	=	130.5 psi
2 bars	=	29.0 psi	6 Bars	=	87.0 psi	10 Bars	=	145.0 psi
3 Bars	=	43.5 psi	7 Bars	=	101.5 psi			
4 Bars	=	58.0 psi	8 Bars	=	116.0 psi			

Steam
Job Aids

External Examination of a Watertube Boiler

MI-STEAM

JOB AID 1.1

INSPECT outer casing for bulging, distortion, and gas leaks

Step	Action
1.	**INSPECT** around doors or removable panels for: • Evidence of leakage • Fasteners are intact (studs are in place with proper washer & nut)
2.	**ENSURE** casing is tight without cracks or broken welds.
3.	**ENSURE** the casing below the steam drum is examined. **Note:** Burning or bulging of this casing or distortion of access door frames is usually due to deterioration of brickwork or refractory.
4.	**CHECK** for hotspots on the casing. **Note1:** A hot spot on a casing is an indication of brick failure. **Note2**: Casings are designed to hold about 2psi and maintain an external temperature of at or below 120 Deg F.
5.	**ENSURE** no water vapor is present. **Note:** Water vapor leaking from access doors or the casing is an indication of a hand-hole leak or a tube leak.
6.	**ENSURE** no corrosion is present. **Note:** If corrosion is present determine if leakage is from equipment, pipe, lines, etc
7.	***CAUTION*** ***Never! Hammer test a fitting if under pressure*** **ENSURE** the blow off piping from the boiler to the overboard is examined. **Note 1:** If the piping looks corroded it should be hammer tested from the outlet of the boiler isolation valve to the overboard valve. **Note 2:** Boiler blow off piping is not pressured unless the boiler is being blown down. **Reference**: 46 CFR 56.50-40

ENSURE hot surfaces are properly insulated

Step	Action
1.	**ENSURE** any pipe operating over 150° degrees is insulated

INSPECT tank tops below boilers for general wastage and structural integrity

Step	Action
1	**ENSURE** the foundation of boilers installed directly on the tank tops are checked for wastage. **Note:** The wastage is normally caused by the corrosive action of bilge water.

VERIFY condition of foundation / sliding feet

Step	Action
1	**ENSURE** the sliding feet indicate movement and appear lubricated.
2	**ENSURE** the foundation has no cracks, bends, or broken welds.

INSPECT water level indicators

Step	Action
1	**ENSURE** the boiler has 2 independent means of indicating water level as per 46 CFR 52.01-110. **Note 1:** One shall be a gauge lighted by the emergency electrical system which will ensure illumination of the gauges under all normal and emergency conditions. **Note 2:** The secondary indicator may consist of a gauge glass, or other acceptable device. Where the allowance pressure exceeds 1724 kPa (250 psi), the gage glasses shall be of the flat type instead of the common tubular type.

Waterside Examination of a Watertube Propulsion Boiler

MI-STEAM

JOB AID 1.2

VERIFY the boiler is properly prepared for inspection

Step	Action
	WARNING *Verify confined space is safe for entry.*
	WARNING *Ensure that there is a physical separation between a steaming boiler and one being inspected.* ***Note:*** *For personnel safety, if one boiler is in operation while testing or inspecting the other boiler, and if there is only one valve separating the boilers, there should be a blank between both boilers as well. If there are two valves, the blank is not needed.*
	WARNING *Prior to entering a boiler it should be cooled and ventilated.*
1.	**VERIFY** date of last inspection. **Note:** A water tube boiler requires a waterside exam twice in every five year period with no more than three years elapsing between any two exams.
2.	**ENSURE** the steam drum, water drum and headers are thoroughly cleaned prior to inspection.
3.	**ENSURE** a sufficient number of handhold plates are removed from the headers of superheater, economizer, and waterwall tubes to permit a comprehensive examination of these tubes. **Note1:** Generally, removal of 5% of the handhold plates from each header will suffice; however, if internal pitting or an excessive amount of scale is found, it may be necessary to remove all of the handhold plates for a complete examination. **Note 2:** Leaking handhold plates, indicated by chemical staining, should be removed for inspection and gaskets renewed. The gasket seating surface should be examined with the aid of a mirror; chronic leakage is sometimes due to steam cuts across the seating surface.
	Note: Refer to MSM, Vol. II for guidance on plugging (how many, where, etc) of tubes in various tube sections (screen, wall, etc). Additional guidance on tube plugging should be in accordance with manufacturer recommendations.

INSPECT steam drum internals

Step	Action
	CAUTION *Before entering the steam drum, be sure to empty your pockets of anything small enough to fit down a generating tube that is not needed for the inspection.* **Note:** All that is needed is an inspection mirror, inspection hammer, and a flashlight.
1.	**ENSURE** portions of the steam drum internal platform are removed to permit a close examination of the drum interior, tube ends, and tube internal surfaces. **Note:** Steam drum corrosion is most likely to occur at the normal water level, so check for pitting in this area.
2.	In the steam drum, **ENSURE** the brackets supporting the dry pipe, internal feed lines, and desuperheater are examined to ensure that the securing bolts are tight. **Note:** When the drum is open for inspection, check the condition of the manhole plate and seating surfaces for steam cuts and any other noticeable defects.
3.	**ENSURE** the tubes are inspected from within the steam drum and determine internal tube surface condition. **Note:** may require the aid of a mirror.
4.	**ENSURE** dry pipe drains are clean.
5.	**INSPECT** the outside of the dry pipe is in good condition.
6.	**INSPECT** the holes or slots in the top of the dry pipe for erosion.
7.	**INSPECT** internal feed pipe feedwater distribution opening for deterioration/wastage.
8	**TEST** the flanged piping connections of the desuperheater and internal feed lines with a hammer and listen carefully to the resulting sound. **Note:** Generally, if the connection is in good condition, it will make a ringing sound when struck. A dull sound is indicative of a cracked or otherwise deteriorated connection that produces a dull sound upon testing should be thoroughly inspected for defects.

Step	Action
9.	**CHECK** for cracks in the following areas: • Longitudinal butt welds in wrapper/tube sheet joint • Circumferential butt welds • Drum penetrations • Interior supports (may crack if installed after stress relief) • Tube sheet ligament areas • Bored openings including feedwater inlet • Desuperheater in and out • Dry pipe outlet and Safety valves

INSPECT water drum internals

Step	Action
1.	**ENSURE** the tubes are inspected from within the water drum and determine internal tube surface condition. **Note 1:** May require the aid of a mirror. **Note 2:** If there is a suspicion that deep corrosion-produced scabs exist in waterside pits, or if any other condition prevents minimum thickness determination, it should be cleaned to bare metal. If pitting is more than isolated in a number of tubes, a sample tube should be cut out of the boiler and sectioned with its minimum thickness determined. MSM Vol II.
2.	**ENSURE** the inside surface of the water drum is examined for evidence of pitting. **Note:** This is occasionally seen in boilers that have been out of service for long periods of time.
3.	**CHECK** for plugged tubes in the water drum. **Note:** Generally plugged tubes should not account for more than 10% in any one bank. (Record in MISLE narrative)
4.	**ENSURE** the water drum manhole opening and bottom blow valve connection, are examined **Note:** In this area, leakage and associated wastage are rarely seen.
5.	**TEST** the flanged piping connections of the desuperheater. (If installed)

INSPECT superheater

Step	Action
1	**INSPECT** superheater headers for pitting and grooving. **Note:** This examination should include the use of mirrors and finger touch, as necessary.
2	**ENSURE** the tube joints, handhole plates, and drain nipples of the superheater headers are checked for evidence of leakage and external corrosion.
3	**INSPECT** superheater handhole plates for pitting, cuts at the gasket surface and wastage.
4	**INSPECT** internal surface of the superheater tubes for deposits, erosion and pitting.
5	**INSPECT** superheater baffles for wastage, erosion, and corrosion.

INSPECT economizer header

Step	Action
1	**INSPECT** economizer headers, tubes and handhole plates for waterside deposits, rusting, and corrosion.
2	**INSPECT** internal condition of economizer tubes.

INSPECT waterwall headers

1.	**ENSURE** the tube joints, handhole plates, and drain nipples of the waterwall headers are checked for evidence of leakage (indicated by chemical staining) and external corrosion.
2.	**INSPECT** handhole plates for pitting, cuts at the gasket surface and wastage.
3.	**INSPECT** internal surface of the tubes for deposits, erosion and pitting.
4.	For vessels with sinuous header boilers (often called straight tube or sectional header boilers): **ENSURE** the short nipple connections of the transverse junction header (Mud drum) to the front headers and the bottom blow valve connection to this header is checked for leakage; external corrosion of the nipples is sometimes encountered.

DETERMINE repair methods for discrepancies noted

Step	Action
1	**ENSURE** all repairs comply with the requirements of: • 46 CFR Part 56 • 46 CFR Part 57 • 46 CFR Part 59. Common Repairs: • Handhold seating surfaces may be repaired by grinding, welding, and resurfacing. • Plugging of tubes may be permitted. See the MSM, Vol. 2 and/or seek manufacturer recommendations. • Pressure vessel/piping repairs shall be IAW ASME Code, Section IX as modified by 46 CFR.

Fireside Examination of a Watertube Boiler

MI - STEAM

JOB AID 1.3

VERIFY the boiler is properly prepared for inspection

Step	Action
	WARNING *Verify confined space is safe for entry.*
	WARNING *Ensure that there is a physical separation between a steaming boiler and one being inspected.* *Note: For personnel safety, if one boiler is in operation while testing or inspecting the other boiler, and if there is only one valve separating the boilers, there should be a blank between both boilers as well. If there are two valves, the blank is not needed.*
	WARNING *Prior to entering a boiler it should be cooled and ventilated.*
1	**VERIFY** date of last inspection. **Note:** A water tube boiler requires a fireside exam twice in every five year period with no more than three years elapsing between any two exams.
2	**VERIFY** all access points are open for inspection of firesides.
3	**VERIFY** that the firesides of the boiler are cleaned of soot buildup, scale, and loose slag prior to the inspection. **Note 1:** Properly prepared means clean… all the carbon and scale **MUST** be removed. If not, make them do it the right way. 46 CFR 61.05-5 (a) is the applicable cite to use when encountering a dirty boiler. **Note 2:** There are numerous cleaning methods for boiler preparation including; dry ice blasting, walnut shell blasting and water washing. All methods are acceptable and should be completed prior to inspectors entering the furnace for inspection.

INSPECT inner and outer casing

Step	Action
	Note: Casings are designed to hold about 2psi and maintain an external temperature of at or below 120 Deg F.
1.	**INSPECT** inner and outer casing for: • Broken stays (between inner and outer casing) • Buckling • Tightness • Wastage
2.	**INSPECT** dead air spaces below furnace, if equipped, for: • Accumulation of fuel • Structural defects
3.	**INSPECT** burner throats. **Note 1:** Should not be distorted and should appear square to the front furnace wall. **Note 2:** It is normal to see cracks in the front walls between burner openings in the refractory. Some of the cracks are caused by the expansion of brickwork joints. **Note 3:** If the crack opening is clean, this indicates that it is probably acceptable since it is closing up when firing. If, however, the opening is penetrated with slag, then the cracks should be repaired.

INSPECT gas baffles

Step	Action
1	**VERIFY** gas baffles are intact. **Note:** Particularly where the screen tubes meet the water/steam drums to prevent overheating of the tube sheets.
2	If installed, **INSPECT** baffles above and below the superheater.

INSPECT water wall, screen, superheater, floor and generating tubes

Step	Action
	Note 1: The external surfaces of tubes are exposed to loss of metal from corrosion by sulfur and vanadium in the oil burned, as well as overheating and slag damage. Deterioration of this type may result in abnormal bends, bulges, blisters, ruptures, and mechanical fatigue cracks that are fairly obvious during visual inspection of the firesides. **Note 2:** A minor amount of tube distortion is acceptable if the insides of the tubes are clean. **Note 3**: Severely blistered tubes should be renewed. **Note 4:** If pitting is more than isolated in a number of tubes, a sample tube should be cut out of the boiler and sectioned with its minimum thickness determined. **Note 5:** Water-cooled tubes should be repaired to original wall thickness or replaced if reduced to 70% of original. Steam –cooled tubes should be repaired to original wall thickness or replaced if reduced to 85% of original. (Reference: Steam, Its Generation and Use" Edition 41, Babcock and Wilcox, Co. Page 45-14). **Note 6:** Scale deposits exceeding 1/32" in thickness will seriously impair heat transfer, especially in screen tubes and waterwall tubes, and may result in bulging and distorted tubes. Scale should be removed by mechanical means or by chemical washing. MSM Vol II
1.	**INSPECT** water wall tubes for the following: • Bulges • Blisters • Sagging • Erosion • Corrosion • Pitting • Cracks • Scale • Flame impingement (grooving / bluing) **Note 1:** Refractory behind water wall tubes should not have more than 1/4"gap. **Note 2:** The water wall tubes should be examined with the aid of a spotlight for evidence of blistering, bulging, or distortion. **Note 3:** If there is evidence of tube leakage at the ends of the water wall tubes, sufficient refractory should be removed to expose the waterwall headers so that the leakage can be traced to its source.

	Note 4: Because of the close spacing of the tubes, inspection is usually limited to the outer rows; however, external corrosion of these tubes, due to soot deposits and improper water-washing, is not uncommon.
2	**INSPECT** screen tubes for the following: • Bulges • Blisters • Sagging • Married tubes • Erosion • Corrosion • Flame impingement (grooving / bluing) **Note 1:** The screen tubes should be examined with the aid of a spotlight for evidence of blistering or distortion. **Note 2:** Because of the close spacing of the tubes, inspection is usually limited to the outer rows; however, external corrosion of these tubes, due to soot deposits and improper water-washing, is not uncommon. **Note 3:** Scale deposits exceeding 1/32" in thickness will seriously impair heat transfer, especially in screen tubes and may result in bulging and distorted tubes. Scale should be removed by mechanical means or by chemical washing. **Note 4:** Married tubes should be checked to ensure there is no active rubbing together (shiny areas where the tubes meet). The concern would be loss of material due to rubbing. Check the married tubes during/after a hydro as the pressure may lessen the issue.
3	**INSPECT** superheater tubes for the following: • Bulges • Blisters • Sagging • Erosion • Corrosion

4.	**INSPECT** generating tubes for the following: • Bulges • Blisters • Sagging • Erosion • Corrosion **Note 1:** Because of the close spacing of the tubes, inspection is usually limited to the outer rows; however, external corrosion of these tubes, due to soot deposits and improper water-washing, is not uncommon.
5.	**INSPECT** the tube sheet ligaments, if accessible, for cracks, especially near the furnace area.
6.	**INSPECT** floor tubes for defects, if accessible. **Note 1:** Some boilers of this type are fitted with feeder tubes in the furnace floor, which can be examined only when the brickwork is removed. **Note 2:** The furnace floor should be disturbed only when leakage is suspected or for refractory repairs. Defects in these tubes are rarely encountered.

INSPECT refractory for spalling, sagging or cracking

Step	Action
	Note 1: The furnace refractory is subject to damage from erosion due to direct flame impingement, fusion occurring at high rates of combustion, and destruction of refractory due to improper drainage during water-washing operations. **Note 2:** The refractory behind plugged waterwall tubes should be carefully examined for further deterioration.
1	**INSPECT** refractory for spalling, slagging, sagging and cracking to include the following: • Corbel is intact and allowing for expansion • Brickwork and mortar is intact • Burner opening is true and in good condition • Bulging of refractory (appears to be pulling away from the casing) • Baffles are intact and in good repair with special attention to superheater support bracketing baffles **Note 1:** Always investigate the cause of the refractory bulging to ensure that it is not affecting the casing. If the brick work collapses they lose the boiler.

	Note 2: If any brickwork and the mortar are dislodged, loose pieces must be renewed; otherwise they may cause other components to overheat. **Note 3:** Brickwork should be repaired if deteriorated by more than 1 inch - 1.5 inches. **Note 4:** Slagging on brickwork should be left alone, as its removal causes more harm. **Note 5:** Any refractory that is excessively spalled, should be replaced. **Note 6:** Surface cracks should be patched and any loose pieces should be removed and patched. **Note 7:** Refractory should be renewed to manufacturer's drawings.

INSPECT superheater support system

Step	Action
	Note: The superheater and part of its support structure can generally be seen from inside the furnace.
1	**INSPECT** the superheater headers.
2	**INSPECT** the superheater element support brackets for erosion or cracking. **Note 1:** In this area, burned support brackets and badly warped superheater elements are common defects. **Note 2:** If the brackets are defective, they must be renewed.

INSPECT soot blowers

Step	Action
	Note: Failure of soot blower piping could cause harm to operating personnel.
1	**INSPECT** condition.
2	**INSPECT** areas where erosion or corrosion is likely to occur in soot blower piping. **Note 1:** The most likely area for erosion and corrosion to occur is in the lower areas and elbows. **Note 2:** Ensure soot blower header drain valves appear to be in good condition.
3	**INSPECT** each soot blower to ensure that it operates freely.

4	**VERIFY** alignment. **Note:** Soot blower element nozzles should not be impinging on the tubes.
5	**VERIFY** each soot blower's steam connections and packing glands are tight.
6	**INSPECT** soot blower header piping to see if it is insulated.

INSPECT uptakes (stacks)

Step	Action
1	**INSPECT** uptakes for: • Holes and cracks • Combustion gas leaks • Accumulation of stored combustible material
2	**INSPECT** air pre-heater tubes. **Note:** Located inside the uptakes (stacks).
3	**VERIFY** stacks are insulated.

INSPECT economizers

Step	Action
	Note: A clogged economizer may cause a stack fire.
1	**ENSURE** the vestibule below the economizer is opened and cleaned. **Note:** In this area, the generating tubes, at the connections to the bottom of the steam drum, can be seen.
2	**INSPECT** the tubes and headers of economizers for: • external corrosion due to condensation • support plates for excessive soot deposits and corrosion **Note**: Economizer tubes are susceptible to thin-lipped ruptures, heat blisters, and sagging. In addition, economizer tubes are susceptible to melting, which can result from a serious low-water casualty. If the tube temperature rises high enough, the tubes and fins may actually burn away or melt.

DETERMINE repair methods for discrepancies noted

Step	Action
1	**ENSURE** all repairs comply with the requirements of: • 46 CFR Part 56 • 46 CFR Part 57 • 46 CFR Part 59 **Note:** In watertube boilers, tube replacement is one of the most frequently encountered repair procedures. Boiler tube life is influenced by such factors as original wall thickness, thermal stresses (due to location within the boiler), waterside corrosion, fireside damage, and service history of the boiler.

Hydrostatic Test of the Boiler

MI - STEAM

JOB AID 1.4

IDENTIFY the maximum allowable working pressure (MAWP) aka design pressure.

Step	Action
	WARNING *Verify confined space safe for entry.*
	WARNING *Ensure that there is a physical separation between a steaming boiler and one being inspected.* ***Note:*** *For personnel safety, if one boiler is in operation while testing or inspecting the other boiler, and if there is only one valve separating the boilers, there should be a blank between both boilers as well. If there are two valves, the blank is not needed.*
	WARNING *Prior to entering a boiler it should be cooled and ventilated.*
1	**VERIFY** date of last hydrostatic test. **Note:** • On a passenger vessel, a water tube boiler requires a hydrostatic test twice in every five year period with no more than three years elapsing between any two exams. • On all other vessels, a water tube boiler requires a hydrostatic test once every 5 years. • The Main Steam piping from the steam drum to the throttle valve and all piping subject to main boiler pressure over 3 inch nominal size is subject to hydrostatic test at the same interval as the boiler.
2	**LOCATE** the MAWP of a boiler in one of the following locations: • Certificate of Inspection • Boiler nameplate • Boiler instruction manual

IDENTIFY the maximum allowable working pressure (MAWP) aka design pressure.

Step	Action
3	**CALCULATE** the test pressure. (**46 CFR 61.05-10**) / MSM Vol. II) **Note 1:** • For routine hydrostatic testing, watertube boilers are subjected to a test pressure of 1-1/4 times the MAWP of the boiler. • Following substantial repairs, or if the strength of the boiler is questioned, the test pressure is 1-1/2 times the MAWP (**46 CFR 61.05-10c**). **Note 2:** "Maximum Allowable Working Pressure" and "Design Pressure" are interchangeable. **Note 3:** "Maximum Allowable Working Pressure" IS NOT "Operating Pressure."

ENSURE furnace thoroughly cooled and cleaned

Step	Action
1.	**ENSURE** the furnace is open and clean. **Note:** There are numerous cleaning methods for boiler preparation including; dry ice blasting, walnut shell blasting and water washing. All methods are acceptable and should be completed prior to inspectors entering the furnace for inspection.
2.	**ENSURE** boiler is cooled.

ENSURE firesides accessible

Step	Action
1	**ENSURE** all the following are visible when hydrostatic test pressure is applied: • casing access points for all boiler tube banks • headers • vestibules • economizers • access to riser tubes, if installed

VERIFY water temperature

Step	Action
1	**ENSURE** the temperature range of the test water is between 70° and 160° degrees F. **Note:** Above 70° (prevents damage) and below 160° (prevents flash-off, lower risk to personnel).

VERIFY that safeties are properly gagged

Step	Action
1	***CAUTION*** *Boiler Safety valves must NEVER, under any circumstances, be lifted by a hydrostatic test.*
2	**ENSURE** boiler safety valves are gagged. **Note 1**: Prevents a valve from lifting under pressure of the hydrostatic test. **Note 2:** Vessels are required to have safety valve gags on board, see 46 CFR 52.01-120.

VERIFY that there is no steam on back side of stop valves

Step	Action
1.	**VERIFY** that there is a physical separation between a steaming boiler and one being inspected. ***WARNING*** *For personnel safety, if one boiler is in operation while testing or inspecting the other boiler, and if there is only one valve separating the boilers, there should be a blank between both boilers as well. If there are two valves, the blank is not needed.* **Note:** When conducting a hydrostatic test, avoid simultaneously applying hydrostatic pressure on one side and steam on the other side of the main and auxiliary steam stop valves.

VERIFY main steam piping from boiler to throttle valve is tested

Step	Action
1.	**VERIFY** that the hydrostatic test is applied from the boiler drum to the throttle valve. **Reference:** 46 CFR 61.15-5a
2.	**INSPECT** lagging around main steam piping for moisture. **Note:** If covering of the piping is not removed the test pressure shall be maintained for a period of 10 minutes. **Reference:** 46 CFR 61.15-5a

VERIFY all piping > 3 inches subject to boiler pressure is hydrostatically tested

Step	Action
1	**IDENTIFY** all steam piping over 3-inches in diameter subject to boiler pressure.
2	**VERIFY** hydrostatic test of all steam piping over 3-inches.
3	**CONDUCT** a visual inspection of piping under hydrostatic test pressure.

VERIFY test pressure

Step	Action
1	**VERIFY** the test pressure is based on the MAWP and **NOT** the operating pressure. **Note 1:** Remember, a hydro test based on 1-1/4 times the MAWP is intended to prove that the boiler is safe for its intended purpose while being operated at its normal operating pressure. **Note 2:** Sufficient time should be allowed before entering the furnace to see leaks soaking thru the refractory.

INSPECT in furnace for leakage in water wall header, and waterwall tubes, and signs of leakage in tube areas

Step	Action
1	**CHECK** the area behind the header where the tubes enter the header. **Note:** Superheater tubes rolled into the header may weep under hydro test pressure-they seal when operating under heat.
2	**INSPECT** where tubes enter both drums (steam and water).
3	**INSPECT** all upper and lower walls and corners for moisture in the corbel.
4	**CHECK** floor, ceilings and walls for moisture.
5	**CHECK** inside the vestibules where the tubes enter both drums.

INSPECT valve flanges, headers, safety valve drain lines, and piping systems for leaks

Step	Action
1	**LISTEN** for leaks out of safety valves (confirm by checking drain lines).
2	**CHECK** for water leaking out of lagging around valves and flanges.
3	**CHECK** drain lines where they enter the bilge area.
4	**CHECK** below the boiler for leaks from lower headers.
5	**CHECK** packing on valves for excessive leakage.
6.	**CHECK** the steam drum and its accessories. **Note:** If a hydrostatic pressure test is applied, the nozzles, gaskets, and welded pipe connections should be searched for leakage. MSM VOL II

DETERMINE repair methods for discrepancies noted during a hydrostatic test inspection

Step	Action
1	**ENSURE** all repairs comply with the requirements of: • 46 CFR Part 56 • 46 CFR Part 57 • 46 CFR Part 59
2	**Note:** • Following repairs, watertube boilers should always be hydrostatically tested to 1-1/4 times the MAWP per **46 CFR 61.05-10**. • If substantial modifications or repairs have been made, or if the marine inspector has reason to question the strength of the boiler, a watertube boiler should be hydrostatically tested to 1-1/2 times the MAWP. • Substantial repairs are: o Welding on a header or a drum; o Tubes that are welded rather than expanded into headers should be considered substantial repairs; o New piping or welded repairs on piping attached to the boiler; or o Waterwall or superheater headers newly fabricated and installed would be substantial repairs. • Replacing or plugging tubes is not a substantial repair. • Boiler tubes that have been replaced should be hydrostatically tested to 1-1/4 times the MAWP. • Tubes that have been plugged may be hydrostatically tested to operating pressure. • Questionable boiler strength would be: o The existence of widespread pitting; o Header grooving; o A recent history of tube failures; or o Sitting idle for a long period of time. • An inspector should have a reasonable level of confidence that the boiler will steam at normal operating pressure without leaking.

Required Valves

MI - STEAM

JOB AID 1.5

VERIFY 5-year valves (mountings) opened and examined

Step	Action
1	**VERIFY** date of last valves inspection. **Note 1:** 5-Year "Valves Inspection" is to the boiler mounting valves. The inspection includes removal of the bonnet, inspection of all moving parts, the condition of the valve seating surfaces and body. Commonly referred to as "Mountings Open." **Note 2:** The inspector should recognize the importance of all connections and piping to the first isolation valve. It should not be necessary to require removal of all first isolation valves to comply with the "mounting" inspection intent. All major valves, which are the first isolation or control of steam or feedwater, should be treated as "mountings" for inspection of the valve and piping toward the boiler. (MSM Vol II) **Reference:** 46 CFR 61.05-15

IDENTIFY the valves subject to inspection

Step	Action
1.	**IDENTIFY** to vessel personnel minimum valves required to be inspected.
2.	**Note:** at a minimum, the following valves are subject to valve and mounting inspection requirements: • main steam stop • generator steam stop • auxiliary steam stop • main and auxiliary feed stop • blowdown (surface and bottom) • superheater vent • superheater drain • soot blower stop **Note:** Most vessels will open all valves that are the first isolation valve from the boiler. **Reference:** MSM Vol. II

IDENTIFY additional valves to be opened at MI discretion

Step	Action
1.	**IDENTIFY** to vessel personnel discretionary valves to be inspected. **Note 1:** May include: • Gauge Glass isolation valves • Drum Vent line • Gauge isolation valves • Chemical feed lines • Header blowdowns **Note 2:** If the valve bonnet is welded, it should not be opened for inspection unless sign/symptoms are present of valve deterioration.

INSPECT valves

Step	Action
1	**INSPECT** each valve stem for: • Deterioration • Corrosion • Defects
2	**INSPECT** packing gland for: • Serviced/repacked • Bolts suitable for continued service
3	**INSPECT** each valve bonnet and valve body for: • Pitting • Corrosion • Bolts/gaskets suitable for continued service
4	**INSPECT** gate valve (if installed) guides for damage and disc and seats for pitting, steam cuts and erosion.
5	**INPECT** globe valve seats and discs for pitting, cuts and erosion.

VERIFY replacement valves

Step	Action
1	**ENSURE** replacement valves are of proper materials grade for the given application. **Note 1:** For valve construction and replacement requirements see **46 CFR 56.60-1** which refers to **ASME/ANSI B16.34** **Note 2:** It is the vessel representative's responsibility to prove a replacement part is acceptable.

DETERMINE repair methods for discrepancies noted during a 5 YEAR valves (mountings) open inspection

Step	Action
1	**EVALUATE** repair proposal. **Note 1:** Very often it is more economical to replace the valve rather than repair it. **Note 2:** Valves and their components can and often are repaired. • Valve stems can be machined • Packing glands can be machined; Packing gland bolts can be replaced. • Seats and discs can be replaced. • Pitting on the valve body and bonnet can often be welded. **Note 3:** If the integrity of the valve seating surface is in question, the valve may be checked by applying bluing to the seat and if necessary, lapping the disc to the seat.
2	**ACCEPT/REJECT** repair proposal
3	**WITNESS** tests following repairs, if required
4	**DOCUMENT** repairs/replacements.

Required Mountings and Studs/Bolts and Nuts

MI - STEAM

JOB AID 1.6

VERIFY 10-year mounting inspection

Step	Action
1	**VERIFY** date of last mountings inspection. **Note 1:** 10-year mounting inspection is the inspection of the attachment of all isolation valves to the boiler. In modern construction, that is the welded spool piece between the boiler and first bolted flange of each isolation valve. **Note 2:** All major valves, which are the first isolation or control of steam or feedwater, should be treated as "mountings" for inspection of the valve and piping toward the boiler. **Note 3:** Valves should be required to be removed if internal piping and valve conditions cannot be adequately examined from inside the steam drum or other open connections. In most cases, mountings will be removed. **Reference:** 46 CFR 61.05-15
2	**VERIFY** 5-year valve (mountings) inspection. **Note:** The valves are considered as part of the mounting but have a 5-year “open” inspection requirement. See job aid 1-5 for valve inspection.
3	**VERIFY** date of last studs and bolts inspection. **Note**: Studs and bolts inspection: Every 10 years. **Reference:** 46 CFR 61.05-15

IDENTIFY the mountings to be removed for inspection

Step	Action
1	**IDENTIFY** to vessel personnel, the minimum mountings required to be inspected. **Note 1:** Valves should be required to be removed if internal piping and valve conditions cannot be adequately examined from inside the steam drum or other open connections. In most cases, mountings valves will be removed. **Note2:** At a minimum mountings associated with the following valves are subject to inspection: • Main steam stop • Generator steam stop • Auxiliary steam stop • Main and auxiliary feed stop • Blowdown (surface and bottom)

	• Superheater vent • Superheater drain • Soot blower stop **Note 3:** While it is usual for the above valves to be removed for 10-year mounting inspection, if a mounting is difficult to access or remove, and its internal piping and mounting studs and bolts can be adequately inspected without removal, the mounting may be left in place. **Reference:** MSM Vol. II

IDENTIFY additional mountings to be inspected at MI discretion

Step	Action
1	**IDENTIFY** to vessel personnel discretionary valves to be inspected. **Note:** May include: • Gauge Glass isolation valves • Drum Vent line • Gauge isolation valves • Chemical feed lines • Header blowdowns

INSPECT Mountings

Step	Action
1	**INSPECT** spool piece for: • Erosion • Corrosion
2	**INSPECT** flanges for: • Steam cutting on faces • Deterioration of the welds connecting the flange to the pipe
3	**INPECT** piping from flange to boiler and downstream for: • Pitting • Corrosion • Erosion • Evidence of leakage/fractures if it's a welded joint **Note:** Pitting is most common.

4	If welded in place: • Use mirror and light, **INSPECT** as much of the interior as possible inside the mounting. • If possible, **EXAMINE** from inside the drum.
	Note 1: When one or more flanged joints intervene between a stop valve and the boiler drum or superheater outlet, such flanged joints need not be opened at the time the valve is removed from its flanged joint. However, studs/bolts in the intervening flanged joints up to and including the first isolation valve do need to be inspected. **Note 2:** Ensure when flanged valves are removed from the boiler pads for any reason, the condition of the studs or bolts that connect the valves to the pads are determined.

INSPECT Studs/Bolts and Nuts

Step	Action
1.	**VERIFY** correct studs/bolts & nuts. • Manufacturer and markings • Manufactured in accordance with ASME Standard 193 / 194 • Marked on one end with grade and manufacturer's symbol • Proper heat number **Note:** Common markings: • Studs/Bolts: B7 or B16 • Nuts: 2H
2.	**INSPECT** studs/bolts and nuts for: • Cracks • Necking-down • Deterioration • Indications of overheating • Stretching **Note 1:** If there are signs of overheating, may be indication of an incorrect stud/bolt. **Note 2:** Not every bolt or stud in a flange needs to be removed in order to determine the condition of the fasteners for that flange. Most flanged connections are of the raised-face type, which allow for adequate examination of most of the fasteners between the flanges. Removal of a representative sample of the fasteners is acceptable.

DETERMINE repair methods for discrepancies noted during a 10-year mounting inspection

Step	Action
1	**ENSURE** all repairs comply with the requirements of: • 46 CFR Part 56 • 46 CFR Part 57 • 46 CFR Part 59 Common Repairs are: • Replacement of flanges and/or piping. • Replacement of studs/bolts and nuts • Repair of pressure piping. • Testing following repairs.

Main Steam Turbine

MI - STEAM

JOB AID 2.1

DETERMINE condition of foundations

Step	Action
1	**INSPECT** main turbine foundation bolts for corrosion and deterioration.
2	**INSPECT** foundations for indication of movement in the foundation (i.e. elongated bolt holes).
3	**INSPECT** spring bearing foundation bolts for excessive rust.

OBSERVE governor (overspeed) function

Step	Action
	Note 1: All turbines are equipped with a speed limiting governor which is not a positive shutdown device. A speed limiting governor keeps the turbine speed between 110% and 115% of normal RPMs when an overspeed condition exists. **Note 2:** Some installations have a positive latching mechanism that shuts down steam to the turbine. If the speed exceeds 115% of normal RPM, a reset is required after it is tripped. **Note 3:** Dockside testing of main turbine governors may not be possible. If this is the case, a CG-835 should be issued to the Chief Engineer to test the governor at sea and log the tests and results.
1.	If equipped, **VERIFY** the latching mechanism on the governor will positively secure steam to the turbine when RPMs exceed 115% normal operating speed. **Note:** Once the latch activates the only way to re-admit steam to the turbine is to manually release the latching mechanism.
2.	**VERIFY** the operation of the speed-limiting governor.

VERIFY operation of turbine lube oil service pumps

Step	Action
	CAUTION *As per the MSM, Volume II: Any operational tests of lube oil shutdown controls should not risk shutting off the oil supply to the bearings.*
	Note 1: 46 CFR 61.20-3(a) states "at each inspection for certification and periodic inspection, the marine inspector shall conduct such tests and inspections of the main propulsion and auxiliary machinery and of its associated equipment, including fluid control systems, as he feels necessary to check safe operation." **Note 2**: Procedures for conducting tests of turbine controls and devices are listed in the main steam turbine instruction book.
1	**VERIFY** automatic start of both main lube oil service pumps.
2	**VERIFY** operation of both main lube oil service pumps.
3	**VERIFY** operation of low lube oil pressure shutdown. **References:** 46 CFR 56.50-80(g) / 46 CFR 62.35-50, Note 4
4	**VERIFY** operation low lube oil pressure alarm. **Reference:** ABS Rules Part 4-9-4/Table 8 **Note:** Some vessels may be additionally equipped with gravity tank - low level alarms or low lube oil sump-level alarms.

WITNESS additional safety/limit controls

Step	Action
	Note: Vessels may be equipped with additional safety limits, controls and alarms depending upon the level of automation. **Reference:** 46 CFR 62.35-50 refers to ABS Rules Part 4-9-4/Table 8 for the minimum safety trip controls required for specific types of automated vital systems.
1.	**VERIFY** condition of low pressure turbine sentinel valve. **Note:** Valve should be tested at yard periods.
2.	**VERIFY** additional safety/limit controls as detailed in the vessels Periodic Safety Test Procedures.

WITNESS Jacking gear

Step	Action
1	**VERIFY** the jacking gear indicator lights indicate when the jacking gear is engaged.
2	**VERIFY** operation of jacking gear interlock. **Note:** Some installations are designed to prevent the throttle valves from opening while the jacking gear is engaged.

OBSERVE operation of throttles

Step	Action
	Note: Where possible the inspector shall require operational tests to check these devices or mechanisms.
1	**VERIFY** astern and ahead throttle valves work.
2	**VERIFY** the linkages move freely and are in proper operating condition.

Main / Auxiliary Condensate and Sea Water Circulating Systems

MI - STEAM

JOB AID 2.2

VERIFY condition of seawater piping, valves, and expansion joints

Step	Action
1	**INSPECT** the sea water piping from sea-suctions to the condenser and from the condenser to the overboard discharge. Inspect for: • Secured to prevent vibration and stresses • Leaks • Excessively rusted/corroded bolting • Temporary repairs (patches) • Excessive pitted pipe surface • Sea valves condition, in place
2	**EXAMINE <u>non-metallic</u>** expansion joints for. • Installation date • Leaks at the flange • Cracks at base of arch or flange • Ballooned or otherwise deformed arches • Loose outer body fabric • Spongy feeling of the joint body • Hardness and cracking of the cover • Cuts and grooves in the cover **<u>Note</u>: Non-metallic** expansion joint replacement 10 years after installation. **Reference:** 46 CFR 61.15-12

WITNESS operation of both required means of circulating seawater

Step	Action
	Note: Two main seawater pumps are required.
1	**VERIFY** operation of both seawater pumps. • No leaks
2	**VERIFY** operation of the emergency bilge suction valve (bilge injection).

VERIFY condition of main and auxiliary condensers

Step	Action
1.	**INSPECT** condenser water boxes externally for: • Patches • Temporary repairs • Defects • Bolting for excessive rust/corrosion **Note:** When water box is open and available, internally inspect to verify satisfactory condition.
2.	**EXAMINE** tube sheets for evidence of: • Plugged tubes • Cracks • Tube failure **Note:** The main condenser may contain between 2,000 and 10,000 tubes. While plugging of some tubes is acceptable, the manufacturer's manual should be referenced for the maximum amount of tubes allowed to be plugged.

WITNESS operation of both required main condensate pumps

Step	Action
1	**VERIFY** operation of main condensate pumps. **Note:** Two required.
2	**INSPECT** main condensate pump suction piping to main condenser hotwell.
3	**VERIFY** main condenser hotwell gauge glass functions and sight glass guards are in place.

WITNESS operation of both required auxiliary condensate pumps

Step	Action
1	**VERIFY** operation of auxiliary condensate pumps. **Note:** Two required.
2	**INSPECT** auxiliary condensate pump suction piping to main condenser hotwell.
3	**VERIFY** auxiliary condenser hotwell gauge glasses function and sight glass guards are in place.

INSPECT condensate piping

Step	Action
1	**INSPECT** piping for the following: • Leaks/drips/weeps • Rust indicative of past leaking • Secure/hangers

WITNESS operation of main and auxiliary air ejectors

Step	Action
1	**VERIFY** relief valves on each nozzle. **Note:** Not all air ejectors are fitted with relief valves, check vendors manual for the air ejector to verify size and location of relief valves.
2	**VERIFY** operation of relief valve located at the outlet of the reducing station supplying the steam to the air ejector.
3	**OBSERVE** the main and auxiliary air ejectors for condensate and steam leaks.

VERIFY condition of condensate heaters

Step	Action
	Note 1: Condensate heaters are pressure vessels exempt from internal inspection, but are fitted with relief valves. **Note 2:** Gland exhaust condensers will have only one relief valve on the water side, since the steam side is open to the atmosphere via either a fan or small ejector. **Note 3:** All other heaters will have relief valves on both the steam and water sides.
1	**INSPECT** condensate heat exchangers (heaters), including: • Pressure vessel externals • Relief valves (condensate side & steam side) **Note:** Hand lifting of relief valves is acceptable. Testing of relief valves is normally conducted when plant is secured.

Feedwater Systems

MI - STEAM

JOB AID 2.3

ENSURE De-Aerating Feed Tank (DA) / Direct Contact (DC) Heater is listed on COI as Unfired Pressure Vessel

Step	Action
	Note 1: De-Aerating feed tanks and DC Heaters are both considered unfired pressure vessels. They are required to have relief valves and should be listed on the COI. **Note 2**: A DC heater heats feedwater, a DA does **NOT**.

VERIFY condition of DA Feed Tank / DC Heater

Step	Action
	Reference: 46 CFR 61.10-5 (Tests and Inspections of Pressure Vessels)
1.	**INSPECT** the exterior of the DA Feed Tank/DC Heater.
2.	At each Inspection for Certification, **VERIFY** operation of relief valve. **Note:** Valves may be tested in place, may be bench tested, or at a minimum by operating the hand lifting gear.
3.	At each Inspection for Certification, **CONDUCT** an internal inspection of the DA Feed Tank/DC Heater. (5 year interval). **Note 1**: Confined space. **Note 2**: The DA Feed Tank / DC Heater internal inspection is normally conducted in conjunction with the boiler fireside/waterside inspections.
4.	**UPDATE** MISLE.

VERIFY condition of piping and valves

Step	Action
1	**INSPECT** feedwater piping for: • Leaks • Adequate support (**46 CFR 56.01-5**) • Insulation

VERIFY condition of feed pumps

Step	Action
	Reference: 46 CFR 56.50-30 Boiler Feed Piping
	Note: There are at least two required, potentially a third depending on configuration. They can be steam driven, electrically driven or a combination of both.
1	**VERIFY** number of feed pumps.

VERIFY all required pumps operate

Step	Action
1	**VERIFY** operation of discharge relief valves, if equipped. **Note 1:** Feed pumps may or may not be fitted with a relief valve, depending upon the shut off head-pressure of the pump. **Note 2:** Relief valves may be tested in place, may be bench tested, or at a minimum by operating the hand lifting gear. **Reference:** 46 CFR 56.50-30(a)(3)
2	**VERIFY** operation of all feed pumps.
3	**VERIFY** operation of low-lube oil shutdown, if installed.

VERIFY overspeed trips function on turbine driven pumps

Step	Action
1	**VERIFY** operation of overspeed trip on steam-driven feed pumps. **Note 1:** Annually, hand-tripped. **Reference:** MSM VOL II **Note 2:** At Inspection for Certification: • May be verified by the manufacturer who can certify the tripping mechanism is set to overspeed at the proper tripping RPM. (This typically requires bench testing of the mechanism which can cause lengthy delays due to removal of the tripping mechanism from the ship.) • May be tested by a manufacture's representative on board, providing tripping RPM is known. • May be tested by the ship's crew, if the marine inspector is satisfied that the crew is capable of conducting the test. Tripping RPM must be known. **Reference:** 46 CFR 61.20-3(a) "at each inspection for certification and periodic inspection, the marine inspector shall conduct tests and inspections of main propulsion and auxiliary machinery and its associated equipment including fluid control systems as he feels necessary to check safe operation."

VERIFY condition of third stage heater

Step	Action
	Note 1: Not found on all vessels. **Note 2:** The third stage heater is a tubular heat exchanger. As such, it is exempt from internal inspection. **Reference:** 46 CFR 61.10-5
1	**INSPECT** third stage heater under operating conditions.
2	At each Inspection for Certification, **VERIFY** operation of relief valve. **Note:** Valves may be tested in place, may be bench tested, or at a minimum by operating the hand lifting gear.

VERIFY condition of grease extractors (if installed)

Step	Action
1	**OBSERVE** operation of grease extractors (if installed).
2	**VERIFY** bypass is installed.

WITNESS operation of feedwater regulators

Step	Action
	Note: May be included in Periodic Safety Test Procedures if automated.
1	**WITNESS** manual or automatic water regulators in operation.

VERIFY operation of feed stop check valve

Step	Action
	Note: Required valves. **Reference:** 46 CFR 56.50-30(b)
1	**VERIFY** reach rods operate main and auxiliary feed stop check valves.

ENSURE that two independent means of determining boiler water levels are operable

Step	Action
1	**VERIFY** two independent means of indicating boiler water level. **Reference:** 46 CFR 52.01-110
2	**VERIFY** the water in the gauge glasses should be "lively" indicating there's free communication between the boiler water and the gauges. (A dead water level indicates a valve or valves are closed or connections are plugged.)
3	**VERIFY** gauge glass lighting is operating.

4	**VERIFY** one gauge glass light is powered by the emergency buss.
5	**INSPECT** gauge glasses for leaks.

EXAMINE make up feed evaporator

Step	Action
	Reference: 46 CFR 61.10-5 (Tests and Inspections of Pressure Vessels)
1	Annually, **INSPECT** the exterior of the evaporator.
2	At each Inspection for Certification, **VERIFY** operation of relief valve. **Note:** Valves may be tested in place, may be bench tested, or at a minimum by operating the hand lifting gear.
3	At each Inspection for Certification, **CONDUCT** an internal inspection of the evaporator. **Reference:** 46 CFR 54.01-10 **Note:** Confined space.

Boiler Fuel Oil Service and Transfer System

MI - STEAM

JOB AID 2.4

INSPECT required fuel oil service pumps

Step	Action
	References: 46 CFR 56.50-65 and 46 CFR 58.01-25
1	**INSPECT** foundations.
2	**INSPECT** for fuel leaks.
3	**VERIFY** equipped with relief valves.
4	**VERIFY** service pump relief valves tested every 5 years. **References:** MSM VOL II and 46 CFR 61.20-3(a)
5	**VERIFY** operation of both service pumps.
6	**VERIFY** remote shutdown protected against accidental operation.
7	**VERIFY** remote shutdowns suitably marked.
8	**VERIFY** remote shutdowns function as intended.

INSPECT fuel oil service piping

Step	Action
	Reference: 46 CFR 56.50-65
1.	**VERIFY** location so as to be readily observable.
2.	**VERIFY** service pump suction and discharge strainers are installed.
3.	**VERIFY** no non-metallic materials (hose) installed.
4.	**VERIFY** all bolted flanges between service pumps and burners are equipped with shielding.
5.	**INSPECT** for: • Leaks • Condition • Insulation • Hangers

INSPECT fuel oil heaters for boilers (if applicable)

Step	Action
	Reference: 46 CFR 56.50-65
1	**VERIFY** at least two fuel oil heaters.
2	**VERIFY** operation of fuel oil heaters.
3	**VERIFY** fuel oil heater relief valves are tested every 5 years. **Note:** One on oil side / one on steam side. **References:** MSM VOL II and 46 CFR 61.20-3(a)
4	**VIEW** inspection tank through sight glass for oil contamination.

INSPECT fuel oil transfer system pump(s)

Step	Action
	Reference: 46 CFR 56.50-65
1	**INSPECT** foundations.
2	**INSPECT** for fuel leaks.
3	**VERIFY** transfer pumps are equipped with relief valves.
4	**VERIFY** relief valves are tested every 5 years. **References:** MSM VOL II and 46 CFR 61.20-3(a)
5	**VERIFY** operation of all fuel oil transfer pumps.
6	**VERIFY** remote shutdowns are suitably marked.
7	**VERIFY** remote shutdowns are protected against accidental operation.

INSPECT remote fuel tank shutoff valves

Step	Action
	Reference: 46 CFR 56.50-1
1	**VERIFY** remote shutoffs function locally and remotely.
2	If electrically, hydraulically, or pneumatically actuated; **VERIFY** shutoff valves are labeled and indicate open or closed.
3	If operated by manual reach rod; **VERIFY** reach rods are adequately protected, if vulnerable to damage.

INSPECT drip pans

Step	Action
	Reference: 46 CFR 56.50-65
1	**VERIFY** drip pans are installed in required locations, including: • Boiler front • Fuel oil service pumps • Fuel oil transfer pumps • Fuel oil heaters
2	**VERIFY** drip pans are clean (fire hazard).

INSPECT torch pots

Step	Action
	Reference: MSM VOL II.
1	**VERIFY** permanently mounted in vertical position.
2	**VERIFY** no low flashpoint fuels are used. **Note:** Normally #2 diesel is used.

DETERMINE repair methods for fuel oil service piping discrepancies

Step	Action
1	**VERIFY** repairs in accordance with references: 46 CFR 56.50-65 46 CFR 56.97-40
Notes:	1. Fuel oil service piping is class 1 2. Piping thickness must be greater than schedule 80 3. Piping must be seamless 4. If valves are replaced and they have threaded bonnets, they must be of the union bonnet type and they must be able to allow re-packing under pressure 5. Pipe unions are not allowed in pipe sizes one inch or greater 6. Bushings and street ells cannot be used 7 Piping from the fuel oil burner front header manifold to the oil gun maybe short lengths of steel, annealed copper nickel, nickel copper or copper pipe and tubing may be used. The wall thickness can't be less than .35" and non metallic materials also can't be used. 8. Flexible metallic tubing may be used when approved by MSC. 9. If weld repairs are done to fuel oil service piping, it must be hydro tested to 1.5 MAWP but not less than 500 psi.

Operational Test of Forced Draft Fans and Shutdowns

MI - STEAM

JOB AID 3.1

INSPECT components of the forced draft fan

Step	Action
1	**ENSURE** the linkage and louvers are in good condition.
2	**INSPECT** motor and fan foundation bolts for: • Cracks • Broken welds • Excessive rust • Indication of movement
3	**VERIFY** coupling guards are installed and in good working condition.

VERIFY operation of local control for forced draft fans

Step	Action
1.	**WITNESS** hand operation of the forced draft fan louvers while the boiler is operating.

VERIFY operation of remote shut down controls for forced draft fans

Step	Action
1	**WITNESS** operation of remote shut down of forced draft fans.

VERIFY forced draft fan shutdowns are protected against accidental operation

Step	Action
1	**ENSURE** the forced draft fans stop station is suitability protected from accidental operation. **Reference:** 46 CFR 58.01-25

VERIFY forced draft fan shutdowns are suitably marked

Step	Action
1	**ENSURE** remote shutdowns are suitably marked. **Reference:** 46 CFR 58.01-25

Steam Gauges

MI - STEAM

JOB AID 3.2

VERIFY operation of steam pressure gauge

Step	Action
1	**VERIFY** operation of each steam gauge for a boiler or a main steam line gauge.

VERIFY the accuracy for steam gauges attached to boilers or main steam lines with a gauge

Step	Action
1.	**IDENTIFY** a gauge of known accuracy. **Note:** Alternatives: • Digital readout from the burner management system • Calibrated spare gauge • Gauge tagged as being tested in shore side facility **Reference:** 46 CFR 61.05-15(f)
2.	**VERIFY** gauge of known accuracy matches readings of installed boiler or main steam line pressure gauge.

Lifting and Reseating of Safety Valves

MI - STEAM

JOB AID 3.3

RETRIEVE from MISLE

Step	Action
1	**RETRIEVE** boiler safety valve data from MISLE prior to going on inspection to include the following: • Manufacturer • Serial Number • Location • Pressure Setting as stamped on each valve • Date of last boiler safety valve test

IDENTIFY the Maximum Allowable Working Pressure (MAWP)

Step	Action
1.	**DETERMINE** MAWP of the Boiler. **Note:** This data is located on the boiler name plate, in the boiler book, on the end of the boiler drum head, and on the COI. **Reference:** 46 CFR 52.01-140(c)

INSPECT boiler safety valves

Step	Action
	Warning *High heat area with potential for release of high temperature steam under pressure.*
1	**INSPECT** each safety valve. **Reference:** 46 CFR 61.05-10.
2	**ENSURE** the valve is stamped per Section I of ASME Code. (46 CFR 52.01-120)
3	**VERIFY** information on the safety valve data plate is consistent with Information retrieved from MISLE.
4	**ENSURE** the relieving capacity of the valve is shown on the name plate. **Note:** If there is evidence of a valve replacement, ensure total relieving capacity of all safety valves is equal to or greater than the generating capacity of the boiler.

5	**INSPECT** escape piping. • Not resting on safety valve • Hangers are tight and intact
6	**VERIFY** drains are installed and tight: **Note 1:** Safety valves can be checked for leaks by finding the end of the drain pipe. The drain pipes almost always go to the bilge and vapor, or a combination of vapor and water, can be seen going into the bilge

OBSERVE opening and closing of boiler safety valves

Step	Action
	Note: Drum safety valves shall be set to relieve at a pressure not in excess of that allowed by the Certificate of Inspection (MAWP). **Reference**: 46 CFR 52.01-120(a)(6)
	Note: Boiler safety valve test interval is 2.5 years. **Reference:** 46 CFR Table 61.05-10
1	**ENSURE** proper gags are being used. **Note:** Gag should be installed hand tight as over tightening can distort the valve stem
2	**VERIFY** pressure at which valve should lift. **Note:** If necessary the safety valve set pressure information can be found in the boiler book.
3	**WITNESS** operation of each safety valve. **Note:** Valves should lift with a distinct pop and reseat with a minimum of simmer, no chatter, and smooth operation while relieving. ***Caution*** *MAWP must not be exceeded during the test*

VERIFY boiler safety valve lift and seating pressures observed during test

Step	Action
1.	**RECORD** lift and seating pressure of each valve. **Note:** Guidance on in-service setting of safety valves is in NVIC 1-71 Para. 5.c. and 5.d., ASME Section 1 PG-72.3 and MSM Vol. IV Ch 3.E.2.c. Para. (2) are applicable.
2.	**VERIFY** the valve lifts within 5% up or down of set pressure stamped on the valve name plate (10% for pressures below 250psi). **Note:** The spring installed by the manufacturer is designed to allow a given volume of steam (capacity) to pass at a given pressure. If the valve is set outside this + or - 5% range the capacity of the valve changes.
3.	**VERIFY** all valves operate with the appropriate blowdown between 2% and 4%. **Note 1:** Blowdown is a required function of boiler safety valves. The minimum 2% is to prevent chattering and the maximum of 4% is to reduce steam loss. **Note 2:** The 4% blow-down maximum tolerance is optimal; however, this may be exceeded by 1% or 2%. In some cases, efforts to meet the 4% tolerance may be very difficult. However, the 2% minimum blow-down tolerance is not flexible. **Note 3:** Blowdown should never be allowed to encroach on the plant's operating pressure range.

IDENTIFY the approximate normal load pressure drop across the superheater

Step	Action
	To prevent damage to the superheater, the drum safety valve SHALL be set at a pressure not less than that of the superheater safety valve setting, plus 5psi minimum, plus approximately the normal load pressure drop through the superheater. **Note:** The normal load pressure drop across the superheater can be found in the vessel's Boiler Book. **Reference:** 46 CFR 52.01-120(b)(2)

VERIFY superheater safety valve lift pressure

Step	Action
1	**WITNESS** test of superheater safety valve lift. **Note 1:** The Boiler Book will list the safety valve lifting pressures at original installation. **Note 2:** Drum pilot operated superheater safety valves, if fitted, should be set to open before the drum safeties. **Reference:** 46 CFR 52.01-120(b) (2)

OBSERVE test of hand relieving gear

Step	Action
1.	**WITNESS** test of safety valve hand relieving gear from the fire room or engineroom floor. **Reference:** 46 CFR 52.01-120(d)(2)

Operational Test of Periodic Safety Test Procedures (PSTP) of Steam Propulsion Automation

MI - STEAM

JOB AID 3.4

VERIFY vessel has current / approved periodic safety test procedures

Step	Action
1.	**VERIFY** PSTP status including OCMI approval. **Note 1:** PSTP require verification during annual inspections unless otherwise prescribed by the OCMI 46 CFR 61.40-6
2	**IDENTIFY** most current version of the PSTP.

DETERMINE installed system matches approved procedures

Step	Action
1.	**ENSURE** that the system has not been modified or altered and matches the approved procedures currently in place.
2.	**VERIFY** that automatic systems have not been bypassed or overridden by manual devices except as noted in the approved test procedures.
3.	**VERIFY** the automation system using the methods specified by the approved procedures.

VERIFY the automation system function against the approved procedures

Step	Action
	Note: Periodic Safety tests must demonstrate the proper operation of the: • primary and alternate controls • alarms • power sources • transfer override arrangements • interlocks • safety controls **Reference:** 46 CFR 61.40-6
1	**VERIFY** proper operation of all required alarms, shutdowns, controls, and internal communications in accordance with the approved test procedures.

ASSESS if vessel manning remains consistent with regulation / policies

Step	Action
1	**VERIFY** that the required manning remains consistent with regulations and policies.
2	If there are discrepancies noted, **DETERMINE** if reduced manning remains valid. **Note:** If vessel has reduced manning and deemed necessary, increase engineroom manning as required.