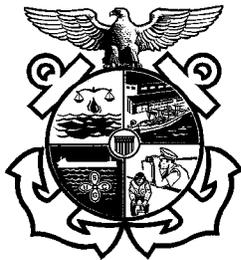


United States Coast Guard



**MACHINERY
INSPECTION BOOK**

Name of Vessel	
Official Number	Class
Date Completed	
Location	
Vessel Built in Compliance with SOLAS: 60 74 74/78 NA	
Inspection Type	
Inspection for Certification (COI)	Reinspection
	<input type="radio"/> Mid-Period
	<input type="radio"/> Other
	<input type="radio"/> First
	<input type="radio"/> Second } Passenger vessels only
	<input type="radio"/> Third }
Inspectors	
1. _____	3. _____
2. _____	4. _____

Total Time Spent Per Activity:

Regular Personnel (Active Duty)			
ACTIVITY TYPE	ACTIVITY	TRAINING	(PERS) MI

TOTAL ADMIN HOURS	TOTAL TRAVEL HOURS
-------------------	--------------------

Reserve Personnel			
ACTIVITY TYPE	ACTIVITY	TRAINING	(PERS) MI

TOTAL ADMIN HOURS	TOTAL TRAVEL HOURS
-------------------	--------------------

Auxiliary Resources	
TOTAL BOAT HOURS	TOTAL AIRCRAFT HOURS

Use of Machinery Inspection Book:

This inspection book is intended to be used as a job aid by Coast Guard marine inspectors during machinery inspections of U.S. flagged vessels. The lists contained within this book are not intended to limit the inspection. Each marine inspector should determine the depth of inspection necessary. A checked box should be a running record of what has been inspected. It 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.

This document does not establish or change Federal laws or regulations. References given are only general guides. Refer to IMO publications, CFR's, NVIC's, or any locally produced cite guides for specific regulatory references. Not all items in this book are applicable to all vessels or types of propulsion systems.

NOTE: *Guidance on how to conduct machinery inspections of U.S. flagged vessels can be found in Marine Safety Manual (MSM) Volume II, Chapter B1: Inspection of Vessels for Certification. All MSM cites listed in this book refer to MSM Volume II unless otherwise indicated.*

Pre-inspection Items:

- Review MSIS records.
 - MIPIP
 - MICOI
- Obtain copies of forms to be issued.

Post-inspection Items:

- Issue letters/certificates to vessel.
- Complete MSIS entries.
 - MIAR
 - MSDS
 - MIDR
 - VFLD
 - VFID
- Initiate Report of Violation (ROV) if necessary.

Table of Contents:

Section 1: Inspection Items

Boilers 1
Diesels 6
Pressure Vessels..... 7
Auxiliary Machinery 7
Electrical Systems 8
Firefighting Equipment..... 11
Watertight Integrity 12
Pollution Prevention..... 13
Marine Sanitation Devices 13
Miscellaneous..... 14

Section 2: Appendices

Recommended US Vessel Deficiency Procedures 15
Deficiency Summary Worksheet 16
Notes 18
Conversions 19

Section 1: Inspection Items

Boilers:

- Propulsion machinery 46 CFR 58.05
SOLAS 74/78 II-1/27
 - Safety devices
 - Foundations
 - Guards
 - Controls
- Propulsion and auxiliary boilers 46 CFR 52.01-2
46 CFR 52.01-35
SOLAS 74/78 II-1/32
MSM Ch. B1.H
46 CFR 52.15-5
46 CFR 56.50-40
 - Shells or drums
 - Headers
 - Superheater
 - Blow off piping and valves
 - Tubes or flues
 - Furnaces
 - Soot blowers
 - Economizers
 - Combustion chambers
 - Refractory
 - Casing and insulation
 - Uptakes
 - Air preheaters
 - Forced draft blowers
 - Foundations
 - Gauges
 - Water level indicators 46 CFR 52.01-110

- Periodic test and inspection of boilers in accordance with 46 CFR Table 61.05-10

Boiler ID Number	Date Hydrostatically Tested	Date Mountings Opened	Date Mountings Removed and Studs Examined	<i>Fireside</i>	<i>Waterside</i>	<i>External</i>

Notes: _____

Testing of Boiler Safety Valve

46 CFR 52.01-120

Step	Action	D/S	S/S	S/P
1	Determine MAWP of boiler. _____ psi			
2	Record pressure setting stamped on each valve.	_____ psi	_____ psi	_____ psi
3	Observe opening and closing of valves and record lift and seating pressures of each valve. 3a. Lift pressure 3b. Seating pressure	_____ psi _____ psi	_____ psi _____ psi	_____ psi _____ psi
<p>WARNING: NEVER allow test pressure to be greater than MAWP during test. If lift pressure is above MAWP, the valve must be adjusted or replaced before test continues.</p> <p>NOTE: Safety valves must be tested in highest-to-lowest pressure order; typically D/S-S/S-S/P. This avoids the risk of damaging a valve or changing its setting by placing a gag on it after it has been tested.</p>				
4	Ensure Step 3 pressures are within acceptable limits ($\pm 5\%$) of stamped pressure. Use the following calculations. 4a. Step 2 (stamped pressure) x .05 4b. Step 2 (stamped pressure) – 4a (-5%) 4c. Step 2 (stamped pressure) + 4a (+5%)	_____ psi _____ psi _____ psi	_____ psi _____ psi _____ psi	_____ psi _____ psi _____ psi
<p>IMPORTANT: Step 3 (lift pressure) must be between pressures recorded in 4b and 4c. If NOT, safety valve lift pressure MUST be adjusted within specified limits.</p>				
5	Record superheater pressure drop value from boiler manual.		_____ psi	_____ psi
6	Ensure S/S and S/P lift pressures (from Step 3) are \leq pressures recorded in 6b . 6a. Step 5 (superheater pressure drop) + 5 psi 6b. Step 3a (D/S pressure) – 6a pressure		_____ psi _____ psi	_____ psi _____ psi
<p>IMPORTANT: If Step 3a (S/S and S/P) is NOT \leq 6b, S/S and S/P lift pressures MUST be adjusted.</p>				
7	Determine blowdown and ensure it is between 2% and 4% of lift pressure for each valve. Use the following calculations. 7a. 3a pressure – 3b pressure = blowdown 7b. 3a pressure x .02 (2%) 7c. 3a pressure x .04 (4%)	_____ psi _____ psi _____ psi	_____ psi _____ psi _____ psi	_____ psi _____ psi _____ psi
<p>IMPORTANT: If 7a (blowdown) is not between 7b and 7c, blowdown setting MUST be adjusted within specified limits.</p>				
8	After hand-relieving gear is reinstalled, observe each valve as it is hand-relieved from the fireroom or engineroom floor (46 CFR 52.01-120(d)(2)).			

D/S = Drum Safety Valve **S/S** = Superheater Safety Valve **S/P** = Superheater Pilot Valve

Safety valves

46 CFR 52.01-120
MSM Vol. IV Ch. 3.I.2.c

- Relieving gear
- Escape pipes
- Drains

46 CFR 56.50-25

Boiler	Date Set and Sealed	Pressure Setting

Superheater safety valves

46 CFR 52.01-120

Boiler	Date Set and Sealed	Pressure Setting

Automation

- Reduced manning
 - Yes
 - No
- Approved test procedure
- Satisfactory test
- Reviewed logs/records
- Interviewed personnel

46 CFR Part 62
SOLAS 74/78 II-1/46-54
MSM Vol. IV Ch. 3.L
NVIC 1-69
NVIC 7-73
NVIC 6-84
46 CFR 62.50
46 CFR 62.30-10

Notes: _____

- | | | |
|--------------------------|--|---|
| <input type="checkbox"/> | Fusible plugs | 46 CFR 52.01-50
46 CFR Table 61.05-10
MSM Vol. IV Ch. 3.I.3.b |
| | Examined | |
| | Renewed at this inspection | |
| <input type="checkbox"/> | High pressure steam piping | 46 CFR 52.01-105
46 CFR 56.50-15
SOLAS 74/78 II-1/33 |
| | <ul style="list-style-type: none"> • Steam piping > 3 inches subject to boiler pressure hydrostatically tested (46 CFR 61.05-10) • Lagging or insulation • Hangers or supports | |
| <input type="checkbox"/> | Fuel systems | 46 CFR 56.50-65 |
| | <ul style="list-style-type: none"> • Service and transfer pumps • Remote shutoff valves • Remote cutouts • Reliefs and bypass valves • Strainers • Drip pans • Torch pots • Piping • Heaters | |
| <input type="checkbox"/> | Feedwater system (including condensate) | 46 CFR 52.01-115 |
| | <ul style="list-style-type: none"> • Pumps • Injectors • Valves and controls • Water heaters (including deaerator) • Water regulators • Water level indicators • Grease extractors • Piping • Gauges and thermometers • Air ejectors • Condensers | 46 CFR 56.50-35
46 CFR 56.50-45

46 CFR 56.50-30 |

Notes: _____

- Automatic auxiliary boilers
 - Controls and safety devices 46 CFR 63.15-1
 - Fuel systems 46 CFR 63.20
 - Alarms 46 CFR 63.15-3
 - Inspections / test 46 CFR 63.15-7
46 CFR 63.15-9

Boiler repairs in accordance with 46 CFR Part 59

- Low pressure heating boilers 46 CFR 53.01
 - Safety or relief valves 46 CFR 53.05
 - Gauges
 - Thermometers
 - Automatic controls 46 CFR 53.12
 - Bottom blow off
 - Water level indicator
 - Connections
 - Refractory

Periodic test and inspection of low pressure heating boilers in accordance with 46 CFR Table 61.05-10

Boiler Number	Date Hydrostatically Tested	<i>Fireside</i>	<i>Waterside</i>	<i>External</i>

Notes: _____

Diesels:

- Propulsion machinery 46 CFR 58.05
SOLAS 74/78 II-1/27
 - Safety devices
 - Foundations
 - Guards
 - Controls

- Main propulsion diesels 46 CFR 58.05
46 CFR 58.10
SOLAS 74/78 II-1/27
 - Fuel lines
 - Air starting lines
 - Exhaust system
 - Manifold
 - Exhaust pipe
 - Protective devices
 - Lube oil system
 - Coolers
 - Standby L/O pump
 - Engine protection
 - Remote shutdowns
 - Overspeed protection
 - Low lube oil
 - High temperature
 - Crank case
 - Explosion covers

- Automation 46 CFR Part 62
SOLAS 74/78 II-1/46-54
MSM Vol. IV Ch. 3.L
NVIC 1-69
NVIC 6-84
46 CFR 62.50
 - Reduced manning
 - Yes 46 CFR 62.50
 - No
 - Approved test procedure
 - Satisfactory test 46 CFR 62.30-10
 - Reviewed logs/records
 - Interviewed personnel

Notes: _____

Pressure Vessels:

- Pressure vessels hydrostatically tested or internally examined 46 CFR 61.10
MSM Ch. B1.O
MSM Vol. IV Ch. 3.I.7

Service	MAWP	Date Tested or Examined Internally	Relief Valve Tested

- Relief valves springs set within range 46 CFR 54.15-10(g)

Auxiliary Machinery:

- Bilge and ballast systems 46 CFR 56.50-50
46 CFR 56.50-55
46 CFR 56.50-57
- Pumps
 - Eductors
 - Emergency bilge pump
 - Manifold, valves, and piping
 - Remote controls (hydraulic, pneumatic, manual, electric)
 - Strainers
 - Sounding and vent piping
 - Markings and indicators
- Compressed air system 46 CFR 58.30
- Compressor
 - Controls and gauges
 - Relief valves

Notes: _____

- Lubrication systems 46 CFR 56.50-80
 - Pumps
 - Heat exchangers
 - Valves and controls
 - Piping
 - Gauges, thermometers, and alarms
 - Tanks, vents, and strainers
- Refrigeration and air conditioning systems 46 CFR 58.20
 - Compressors
 - Valves and controls
 - Spare refrigerant stowage
 - Gas mask (ammonia) with spare charges
 - Ventilation
 - Alarms
- Evaporators 46 CFR 54.01-10
 - Pumps
 - Valves and controls
- Freshwater systems (potable and domestic)
 - Pumps
 - Valves and controls
 - Sump tanks
 - Tank pressure
 - Air cushion supply line
- Steering gear systems tested 46 CFR 58.25
 - Motors and pumps 46 CFR 61.20
 - Telemotor or other control 46 CFR 58.25-70
 - Indicators and alarms 46 CFR 58.25-25
 - Instructions and markings 33 CFR 164.34

Electrical Systems:

NOTE: Guidance for inspecting electrical systems is detailed in NVIC 2-89.

- Ship's service generators 46 CFR 110.10
 - Protective guards 46 CFR 111.12
 - Reverse power relay SOLAS 74/78 II-1/41
 - Overspeed trip (> 110% < 115%) MSM Ch. B1.J
 - Low oil pressure alarm / shutdown MSM Vol. IV Ch. 3.D.2
 - 46 CFR 111.12-1

Notes: _____

- Switchboards (including emergency)
 - Automatic bus transfer
 - Ground detectors
 - Personnel safeguards (guards, rails, mats, etc.)
 - Drip shields
 - Nameplates
 - Warning notices posted
 - Fuse / circuit breaker ratings

- Panelboards
 - Overcurrent devices
 - Circuit directory
 - Locking device

- Motor controllers
 - Drip shields
 - Disconnect switch
 - Wiring diagram posted
 - Remote shutdowns tested

- Ventilation systems
 - Remote shutdown tested
 - Cargo fans
 - Machinery space fans
 - Accommodation fans

- Ship's service lighting systems
 - Panelboards
 - Circuit directory
 - Fuses
 - Circuit breakers
 - Berth lights
 - Globes and guards
 - Explosion-proof or watertight (where required)

46 CFR 111.30
MSM Ch. B1.J.4.g

MSM Ch. B1.J.5.g

46 CFR 111.40

46 CFR 111.40-11

46 CFR 111.70
MSM Ch. B1.J.4.i

46 CFR 111.103
SOLAS 74/78 II-1/48

46 CFR 111.75
46 CFR 111.40

Notes: _____

- Emergency generator tested
 - Starting system
 - Fuel system
 - Overspeed trip (> 110% < 115%)
 - Low oil pressure alarm / shutdown
 - High jacket water temperature alarm
 - Fixed firefighting system shutdown

- Emergency batteries tested
 - Protection
 - Charger
 - Ventilation

- Adequate emergency power and lighting
 - Protection

- Internal communications and control system
 - General alarms
 - Engine order telegraph
 - Failure alarms
 - Telephones
 - Voice tubes
 - Public address system
 - Pilothouse controls
 - Fire detection and alarm systems
 - Steering gear alarm and indicator

- Lifeboat electrical installation
 - Winches and controls tested
 - Master switch opened
 - Limit switches opened
 - Emergency disconnect switch opened

46 CFR 112.25
 46 CFR 112.50
 SOLAS 74/78 II-1/42-44

46 CFR 112.55

46 CFR 112.43
 MSM Ch. B1.L

46 CFR 113.25
 46 CFR 113.35
 46 CFR 113.30
 46 CFR 113.50
 46 CFR 113.10
 46 CFR 113.43

46 CFR 111.95
 MSM Ch. B1.J.5.d

Notes: _____

- ☐ General electrical installation
 - Jury rigs
 - Connection boxes
 - Dead-end cables
 - Splices
 - Grounding
 - Personnel safeguards (guards, rails, etc.)
 - Hazardous locations
 - Portable electrical equipment

46 CFR 111.01-1
 SOLAS 74/78 II-1/40
 46 CFR 111.60
 MSM Ch. B1.J.5.h
 46 CFR 111.60-17
 46 CFR 111.60-19
 46 CFR 111.05
 46 CFR 111.30-11
 46 CFR 111.105
 MSM Vol. IV Ch. 3.C.2.f
 MSM Ch. B1.J.5.i

Firefighting Equipment:

- ☐ Portable extinguishers (machinery spaces)
 - Required number, type, and class
 - Annually serviced
 - Bottles hydrostatically tested (every 5 years)
 - Markings (weight and hydrostatic test date)
 - Spare charges, spare extinguishers
- ☐ Semiportable extinguishers (machinery spaces)
 - Required number, type, and class
 - Annually serviced
 - Bottles hydrostatically tested (every 12 years)
 - Controls, instructions, markings
 - Hose and diffuser
 - Flexible loops tested or replaced (same as bottle)
- ☐ Sprinkler system tested
 - Type
 - Pumps
 - Manifold
 - Controls
 - System diagram posted

46 CFR 34.50
 46 CFR 76.50
 46 CFR 95.50
 SOLAS 74/78 II-2/6
 SOLAS 74/78 II-2/21
 MSM Ch. C2.I.3
 NVIC 7-70
 NVIC 13-86

46 CFR 34.50
 46 CFR 76.50
 46 CFR 95.50
 SOLAS 74/78 II-2/6
 SOLAS 74/78 II-2/21
 MSM Ch. C2.I.4

46 CFR 34.30
 46 CFR 76.25
 46 CFR 95.30
 MSM Ch. C2.I.9
 NFPA 13-1996

Notes: _____

- Fixed fire extinguishing system (machinery spaces) (System servicing is recorded in Hull Inspection 840 Book.)
 - Piping / flexible loops
 - Heads
 - Alarms
 - Markings

- Fire main systems and stations (machinery spaces)
 - Required number and type, proper threads
 - Nozzles (combination, etc.)
 - Applicators
 - Spanners
 - Markings

- Pumps tested
 - Controls and gauges
 - Relief valves
 - Markings

- Paint locker
 - Markings

46 CFR 34.15
 46 CFR 34.17
 46 CFR 76.15
 46 CFR 76.17
 46 CFR 95.05-10
 SOLAS 74/78 II-2/11

46 CFR 34.10-10
 46 CFR 76.10-10
 46 CFR 95.10-10

46 CFR 34.10-5
 46 CFR 76.10-5
 46 CFR 95.10-5
 SOLAS 74/78 II-2/4

46 CFR 34.05-5
 46 CFR Table 76.05-1(a)
 46 CFR 95.05-10(c)
 SOLAS 74/78 II-2/18.7

Watertight Integrity:

- Watertight integrity of machinery spaces
 - Watertight doors
 - Alarms
 - Controls
 - Bulkheads (penetrations)
 - Markings

46 CFR 170.270
 MSM Ch. B1.J.5.e

Notes: _____

Pollution Prevention:

NOTE: Guidance for inspecting pollution prevention items is detailed in MSM Volume II, Chapter 31.

- | | | |
|--------------------------|---|---|
| <input type="checkbox"/> | Oil record book maintained and submitted | 33 CFR 151.25
MARPOL Ax. I/20 |
| <input type="checkbox"/> | Oily water separating equipment | 33 CFR 155.380
MARPOL Ax. I/6
MSM Vol. IV Ch. 3.K.2
MSM Ch. B6.D.11 |
| | <ul style="list-style-type: none">• Approved equipment• Operationally tested• Alarms• Shutdowns | |
| <input type="checkbox"/> | Ballast discharge | 33 CFR 155.330
33 CFR 155.350
33 CFR 155.360
33 CFR 155.370
MSM Ch. B6.D.10 |
| | <ul style="list-style-type: none">• Piping system• Outlet• Stop valve• Acceptable processing equipment | |
| <input type="checkbox"/> | Pollution placard posted | 33 CFR 155.450
MSM Ch. B6.D.13 |
| <input type="checkbox"/> | Oily waste retention | MSM Ch. B6.D.7 |
| | <ul style="list-style-type: none">• Bilge• Tank | |

Marine Sanitation Devices:

NOTE: Guidance for inspecting marine sanitation devices is detailed in MSM Volume II, Chapter 18.K.

- | | | |
|--------------------------|---------------------------------|-------------------------------|
| <input type="checkbox"/> | Marine sanitation device | 33 CFR 159.55
MSM Ch. B6.F |
| | Type I | |
| | Type II | |
| | Type III | |
| <input type="checkbox"/> | Certified for inspected vessels | MSM Ch. B6.F.4 |
| <input type="checkbox"/> | Capacity satisfactory | MSM Ch. C2.K.7.d |

Notes: _____

- Installation
 - Operation
 - Ventilation
 - Wiring and piping
 - Maintenance
 - Placard posted
 - Safety
 - Accessibility to parts requiring routine servicing
 - Manufacturer's instructions available
- 33 CFR 159.57
MSM Vol. IV Ch. 3.K.1
- 33 CFR 159.59

Miscellaneous:

- Liquefied petroleum gases for cooking and heating
 - Approved type
 - Cylinder
 - Test dates
 - Stowage
 - Safety relief device
 - Regulators
 - Piping and fittings
 - Location
 - Tank tops, bilges, cofferdams, and bilge wells
 - Sea suction and overboard discharges
 - Nonmetallic expansion joints
 - External exam
 - 10-year service replacement
 - Means of escape
 - Accessibility
 - Absence of locks
- 46 CFR 61.15-10
- MSM Ch. B3.F
- 46 CFR 61.15-12
MSM Ch. B3.F.3
- 46 CFR 32.01-1
46 CFR 72.10-5
46 CFR 92.10-5

Notes: _____

Section 2: Appendices

Recommended US Vessel Deficiency Procedures:

Step	Action								
1	Identify deficiency.								
2	Inform vessel representative.								
3	Record on the <i>Deficiency Summary Worksheet</i> (next page).								
4	If deficiency is corrected prior to end of inspection, go to Step 7 .								
5	<p>If deficiency is unable to be corrected prior to end of inspection, issue CG-835 in accordance with table below.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">IF deficiency:</th> <th style="text-align: left;">THEN issue CG-835:</th> </tr> </thead> <tbody> <tr> <td style="padding: 5px;"> <p>Does NOT immediately impact crew/passenger safety, hull seaworthiness, or the environment, e.g.,</p> <ul style="list-style-type: none"> • Missing placards </td> <td style="padding: 5px;"> <p>That provides a specific time for correcting deficiency, e.g.,</p> <ul style="list-style-type: none"> • “X” number of days </td> </tr> <tr> <td style="padding: 5px;"> <p>Allows vessel operations to be MODIFIED to meet less stringent requirements, e.g.,</p> <ul style="list-style-type: none"> • Automation defect </td> <td style="padding: 5px;"> <p>That restricts operation of vessel to meet current vessel conditions, e.g.,</p> <ul style="list-style-type: none"> • Increased crew </td> </tr> <tr> <td style="padding: 5px;"> <p>DOES immediately impact crew/passenger safety, hull seaworthiness, or the environment, and cannot be modified to meet less stringent requirements, e.g.,</p> <ul style="list-style-type: none"> • Missing or defective firefighting equipment </td> <td style="padding: 5px;"> <p>That requires the deficiency to be corrected prior to operating vessel (“NO SAIL” item), e.g.,</p> <ul style="list-style-type: none"> • Prior to carrying passengers • Prior to carrying cargo </td> </tr> </tbody> </table>	IF deficiency:	THEN issue CG-835:	<p>Does NOT immediately impact crew/passenger safety, hull seaworthiness, or the environment, e.g.,</p> <ul style="list-style-type: none"> • Missing placards 	<p>That provides a specific time for correcting deficiency, e.g.,</p> <ul style="list-style-type: none"> • “X” number of days 	<p>Allows vessel operations to be MODIFIED to meet less stringent requirements, e.g.,</p> <ul style="list-style-type: none"> • Automation defect 	<p>That restricts operation of vessel to meet current vessel conditions, e.g.,</p> <ul style="list-style-type: none"> • Increased crew 	<p>DOES immediately impact crew/passenger safety, hull seaworthiness, or the environment, and cannot be modified to meet less stringent requirements, e.g.,</p> <ul style="list-style-type: none"> • Missing or defective firefighting equipment 	<p>That requires the deficiency to be corrected prior to operating vessel (“NO SAIL” item), e.g.,</p> <ul style="list-style-type: none"> • Prior to carrying passengers • Prior to carrying cargo
IF deficiency:	THEN issue CG-835:								
<p>Does NOT immediately impact crew/passenger safety, hull seaworthiness, or the environment, e.g.,</p> <ul style="list-style-type: none"> • Missing placards 	<p>That provides a specific time for correcting deficiency, e.g.,</p> <ul style="list-style-type: none"> • “X” number of days 								
<p>Allows vessel operations to be MODIFIED to meet less stringent requirements, e.g.,</p> <ul style="list-style-type: none"> • Automation defect 	<p>That restricts operation of vessel to meet current vessel conditions, e.g.,</p> <ul style="list-style-type: none"> • Increased crew 								
<p>DOES immediately impact crew/passenger safety, hull seaworthiness, or the environment, and cannot be modified to meet less stringent requirements, e.g.,</p> <ul style="list-style-type: none"> • Missing or defective firefighting equipment 	<p>That requires the deficiency to be corrected prior to operating vessel (“NO SAIL” item), e.g.,</p> <ul style="list-style-type: none"> • Prior to carrying passengers • Prior to carrying cargo 								
6	Enter CG-835 data in MIDR.								
7	Enter deficiency data in MSDS.								
8	Initiate Report of Violation (ROV) if necessary.								

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	bbbl/LT	m ³ /t	bbbl/m ³	bbbl/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 ($^{\circ}\text{F} = 9/5\text{ }^{\circ}\text{C} + 32$ and $^{\circ}\text{C} = 5/9(\text{ }^{\circ}\text{F} - 32)$)				
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	