



Guidance For Classification And Construction

Part 1 Seagoing Ship

Volume B

GUIDANCE FOR SEA TRIALS OF MOTOR VESSELS

2019

Biro Klasifikasi Indonesia



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The following Guidance come into force on 1st July 2019

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Foreword

Guidance for Sea Trials of Motor Vessels 2019 edition supersedes 2002 edition. In this 2019 edition, major changes have been made which include explanatory notes for the test of ship manoeuvrability. This Guidance consists of one section and two annexes.

Section 1 consist of Scope and Application of the Guidance, sea trial condition and list of trial/measurements which carried out during sea trial.

Annex A consist of Example forms

Annex B consist of Explanatory notes of the test of ship manoeuvrability.

The reference sources of the Guidance are mainly derived from IACS documents, including Unified Requirements for Survey, Unified Interpretation, Recommendation, SOLAS, IMO resolution and inputs from internal BKI.

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Guidance Amendment Notice

These pages contain amendments within the following section of the Guidance for Sea Trial of Motor Vessels, 2019 Edition.

These amendments will come into force on 1st July 2019

Paragraph	Title/Subject	Status/Remark
Section 1 - General		
A	General	
1	Scope of the Guidance, national and international regulations, technical standards and relevant recommendations from competent bodies have been taken into consideration. structure of the guidance and Sea trial program	To add description related the scope of Guidance
2	Application of the guidance	To add requirement for application of the Guidance
3	Sea Trial Condition	To add requirement for The condition of the ship before the official sea trial
B	List of Trial/ Measurements	
1	Measurement Program The form "List of Trials/Measurements" gives an overview on the typical trials and measurements conducted during the sea trials of a motor ship.	To add description related the subject and give new format of table
Annex A	Example Form	To add example forms for Sea trial and clearly description
Annex B	Explanatory Notes	To add explanatory notes for requirement of Ship Manouverability

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Section 1 General

A.	Introduction	1-1
B.	List Of Trials / Measurements	1-2

A. Introduction

1. Scope

Before being commissioned, each vessel classified by BKI has to undergo sea trials in the presence of a competent Surveyor of BKI. Main objective of this guidance is to give all parties involved, like ship owners, shipyards, design offices and their subcontractors an overview of the scope of trials/measurements in order to fulfil the sea trials requirements of BKI and the SOLAS Convention.

Besides the BKI Rules and the relevant SOLAS Convention requirements further national and international regulations, technical standards and relevant recommendations from competent bodies have been taken into consideration.

The structure of these guidance is based on typical, up-to-date trial programs for motor ships performed by major shipyards and shipping companies.

The final scope of trials and measurements should be laid down in each case individually, considering the building contracts and the flag state requirements.

A sea trial program in written form with all required tests has to be issued by the shipyard. That sea trial program has to be submitted to BKI Head Office for review and handed over to the BKI- Surveyor in charge.

The sea trial report issued by the shipyard and signed by the BKI Surveyor in charge and the owner's representative, it has to be submitted to BKI Head Office for review and then used as an attachment to surveyor report.

2. Application

This guidance apply for :

- Class admission for new building
- Class admission for existing ships (Non-TOC)
- Ships in major modification (change main engine, change propulsion, change main dimension and other modification affect to characteristic of ship)

Note: For sea trial of existing ships (TOC) are followed the previous class sea trial report. If sea trial report not available from previous class, requirement for Class admission for existing ships (Non-TOC) applied.

3. Sea Trial Condition

3.1 A sea trial is to be carried out after conducting a dock trial by the owner or representative in which all items of sea trial to be tested & examined have been entirely completed.

3.2 In the classification survey of all ships, sea trials specified in following are to be carried out in full load condition. In the calmest possible sea and weather condition and in deep unrestricted water. However, where sea trials cannot be carried out in full load condition, sea trials may be carried out in an appropriate loaded condition.

- Speed test
- Astern test
- Steering test and the change-over test from main to auxiliary steering gears
- Turning test. (the turning test of an individual ship may dispensed with, provided that sufficient data is available from the turning test of a sister ship and subject to special approval by BKI).
- Performance test of windlasses
- Performance test of automatic and remote control systems for main propulsion machinery, controllable pitch propellers, boilers, and electrical generating sets.
- Accumulation tests of boilers.
- Measurement of torsional vibration and noise for the shafting system in engine room.
- If the vessel cannot be tested at the deepest draught, steering gear trials shall be conducted at a displacement as close as reasonably possible to full-load displacement accordance to [Rules for Machinery Installation \(Pt.1 Vol. III\) Sect. 14 A. 6.](#)
- Other tests where deemed necessary by BKI.

3.3 The results of the tests specified in [3.2](#) are to be submitted to BKI as sea trial records.

3.4 in the case of classification survey of ships not built under supervision by BKI, the above tests may be dispensed with, provided that sufficient data on the previous tests are available and no alteration affecting the tests specified in [3.2](#) and BKI deems it appropriate.

B. List Of Trials / Measurements

1. Measurement Program

The following form "List of Trials/Measurements" gives an overview on the typical trials and measurements conducted during the sea trials of a motor ship including :

- cross references to the forms in Annex A (Column "Form")
- information, where the requirement for the particular test comes from (Column "Required by")

The form is subdivided into the following 6 groups :

- general data
- hull equipment
- navigation equipment and radio communication equipment
- nautical trials
- machinery and electrical installations
- inspection after sea trial

Table 1. List of Trials/ Measurements

No	Item	Satutory	Class	Recommended	Required By	Application
0	General Data					
1	Hull Equipment					
1.1	Anchor/Anchor windlass		X		Pt.1 Vol.III Sect.14, D .6	NB, ES, MM
1.2	Steering Gear	X	X		Pt.1 Vol.III Sect.14, A 3.2 & 3.3 and A.6, SOLAS Ch.II,Reg.29	NB, ES, MM
1.3	Bow/ Stern Thruster Unit (if any)	X	X		Pt.1 Vol.III Sect.14, C.5	NB, ES, MM
1.4	Waterjets (if any)	X	X		Pt.1 Vol.III Sect.14, A	NB, ES, MM
2	Navigational Equipment and Radio Communication	X		X	SOLAS Ch.IV & SOLAS Ch. V	NB, ES, MM
3	Nautical Trials					
3.1	General Data Sheet					
3.2	Speed trial			X	In accordance with IMO Res. 601(15), MSC 137(76) and the regulations of the National Ship Safety Authority	NB, ES, MM
3.3	Turning Circles	X				NB, ES, MM
3.4	Z-Manoeuvre	X				NB, ES, MM
3.5	Spiral Manoeuvre			X		NB, ES, MM
3.6	Pull-Out manoeuvre			X		NB, ES, MM
3.7	Williamson Turn	X				NB, ES, MM
3.8	Stopping Manoeuvre(crash stop)	X	X		Pt.1 Vol.III Sect.2 E.6.4.3, SOLAS Ch.II,Reg.28	NB, ES, MM
4	Mach. & Elect. Inst.					
4.1	Combinator curves (if applicable)		X	X	Pt.1 Vol.III Sect.2 E.6.4.4	NB, ES, MM
4.2	Starting systems					
4.2.1	Starting/reversing manoeuvre		X		Pt.1 Vol.III Sect.2 H.2 / IACS UR M51	NB
4.2.2	Starting air capacity		X		Pt.1 Vol.III Sect.2 H.2	NB
4.3	Torsional/Axial Vibrations		X	X	Pt.1 Vol.III Sect.16	NB, MM
4.4	Safety System					
4.4.1	Standby operations and Sequential starts at full ahead		X		SOLAS II-1,Reg.53.3	NB
4.4.2	Automatic slow down & shut down criteria		X		SOLAS II-1, Reg. 31 and Reg. 52	NB
4.4.3	Black-Out Test	X	X		Pt. I, Vol. IV Sect. 3 B.5.2.4, SOLAS Ch.II, Reg.42	NB, ES, MM
4.4.4	Dead Ship recovery test	X	X		Pt.1 Vol.III Sect. 1 D.6, SOLAS Ch.II, Reg.42	NB, ES
4.4.5	Function test – control stations/ AUT-Manouvre		X		Pt.1 Vol.III Sect.2	NB, ES
4.5	Endurance Trial		X		Pt.1 Vol.III Sect.2 E.5.3	NB, ES, MM
4.5.1	Operational data recording		X			NB, ES, MM
4.5.2	Propulsion plant-fuel consumption measurements			X	Pt.1 Vol.III Sect.1 D.8	NB, MM
4.5.3	Exhaust gas boiler (steam heating)-performance test (If applicable)		X		Pt.1 Vol.III Sect.7I, A.6	NB, ES
4.5.4	Exhaust gas heater, thermal oil heating performance test (If applicable)		X		Pt.1 Vol.III Sect.7I, A.5	NB, ES

Table 1. List of Trials/ Measurements (*continued*)

No	Item	Satutory	Class	Recommended	Required By	Application
4.5.5	Evaporator performance test			X		NB
4.5.6	Alarm in machinery spaces-performance test		X		Pt.1 Vol.III Sect.2 J & Pt.1 Vol.III Sect 12 G.7	NB, ES
4.5.7	Fire pumps-function test full ahead test		X		Pt.1 Vol.III Sect.12 & Pt.1 Vol.III Sect E.1.2	NB, ES
4.5.8	Noise level measurements	X			Pt.1 Vol.II Sect.1 F & IMO Res. MSC.337(91) Ch.4 ("Attention to regulations of the flag administration")	NB
4.5.9	M.E and A.E Vibration measurement		X		Pt.1 Vol.II Sect.1 F & Part 1 Vol.III Sect.1 C.2	NB, MM
4.5.10	Air flow - capacity measurement			X	Pt.1 Vol.II Sect.22.B.9 & Pt.1 Vol.III Sect.2.A.2	NB, MM
4.5.11	Propeller shaft/hull - eelectric potential measurement (If applicable)		X		Pt.1 Vol.III Sect.2.E.6.6	NB, ES, MM
4.6	Astern speed trial		X		Part 1 Vol.III Sect.2.E.5.3 IACS UR M25 and M51 with at least 0.7 x n ₀ for at least 10 min.	NB, MM
4.7	Redundant propulsion systems		X		Pt.1 Vol. XIII	NB
4.8	Dynamic Positioning Systems (If applicable)		X		Part. 4 Vol. II Sect.3	NB, ES
5	Inspection After Trial					
5.1	Propulsion plant		X		To be decided to surveyor’s satisfaction	NB, ES, MM
5,2	Auxiliaries		X			NB, ES, MM
Note : NB = New Building . ES = Admission of Existing Ship. MM = Ship in Major Modification						

Annex A Example Forms

The following example forms can be used during preparation and conducting of the sea trials of motor ships. The numbering follows the item as given in the form "List of Trials/Measurements" in [Table 1](#).

- F.0 : General Data
- F.1 : Hull Equipment
- F.2 : Navigation Equipment
- F.3 : Nautical Trials
- F.4 : Machinery and Electrical Installation
- F.5 : Inspection after sea trial

Copying of the forms contained in these Guidance and serving as samples is permissible and does not require the explicit permission of BKI.

F.0 General Data

Shipyard :		Newbuilding No. :	
Ships Name :		Contract No. :	
Owner :		Classification :	
Flag :		Character of Class :	
Call Sign :		Hull :	
Port of Registry :		Machinery :	
		Refrig. Inst. :	
Descriptions		Unit	Data
1	Ship Data		
	Ship Type		
	Length over all (LOA)	m	
	Length of perpendicular (LPP)	m	
	Moulded breadth	m	
	Depth	m	
	Gross Tonnage	GT	
	Deadweight	DWT	
	Draught (max) :		
	fore	m	
	after	m	
	midship	m	
2	Sea Trial Area		
	Depth of Water	m	
	Direction/ state of wind	[°; Bf]	
	Direction/ wave height H 1/3	[°; m]	
	Direction/ state of current	[°; m/s (knot)]	
Shipyard		Owner	Surveyor
(Name)		(Name)	(Name)

Annex A Example Forms

Shipyard : _____		Newbuilding No. : _____	
Ships Name : _____		Contract No. : _____	
Descriptions		Unit	Data
3	Propulsion Plant		
3.1	Main Engine (s)		
	Manufacturer		
	Number/ type		
	Serial number		
	Rated output	kW	
	Nominal revolution	rpm	
3.2	Gearing		
	Design		
	Manufacturer		
	Number/ type		
	Gear ration		
3.3	Propeller		
	Design		
	Manufacturer		
	Number of Blade		
	Diameter/ pitch	mm	
4	Main electric power supply		
4.1	Diesel prime mover		
	Design		
	Number/ type		
	Rated output		
	Nominal revolutions		
4.2	Generator		
	Manufacturer/ type		
	Frequency		
	Voltage/ power		
4.3	Shaft Generator		
	Number/voltage/power		
Shipyard (Name)		Owner (Name)	Surveyor (Name)

Annex A Example Forms

F.1 Hull Equipment

1.1 Anchor Equipment

Water depth : _____ m Draught : _____ m fore : _____ m after : _____ m midship : _____ m Chain length each : _____ m		Minimum requirements - 3 shackles to water - Hoisting speed 9 m/min		
Anchor/ anchor windlass	Port	Starboard	Port+stbd	stern
Criteria				
Shackles to water				
Measurements				
- Electric current (A)				
- Hydraulic pressure (bar)				
- Shackle sequence (No.)				
- Time from to (min/ s)				
Hoisting speed				
Function test				
- Remote anchor drop SOC/BR				
- Brakes				
- Chain Stopper				
- Miscellaneous				
Remarks BR : Bridge SOC : Ship Operation Centre				
Shipyard	Owner	Surveyor		
(Name)	(Name)	(Name)		

Annex A Example Forms

1.2 Steering Gear

Water depth : _____ m Draught : _____ m fore : _____ m after : _____ m midship : _____ m		Minimum requirements Time limit to rudder "hand over" - only main steering gear running 28 s with contractual speed from 35 ° P (S) to 30 ° S(P) - emergency rudder 60 s at 50 % ships speed, min.7 knot from 15 ° P (S) to 15 ° S (P) Passengers vessels: 28 s with contractual speed from 35 ° P (S) to 30 ° S(P) - emergency rudder		
Criteria Pump/unit	Shift the helm From-to	Time [s]	Max.hydrolic pressure [bar]	Max.elecric current [A]
Ship speed [knot]	Propeller revolutions [rpm]	Pitch [mm]		
I				
Ship speed [knot]	Propeller revolutions [rpm]	Pitch [mm]		
I + II				
Ship speed [knot]	Propeller revolutions [rpm]	Pitch [mm]		
II				
Ship speed [knot]	Propeller revolutions [rpm]	Pitch [mm]		
Emerg.rudder				
Remarks: P (Port) S (Starboard)				
Shipyard	Owner	Surveyor		
(Name)	(Name)	(Name)		

Annex A Example Forms

1.3 Bow/ stern thruster unit

Water depth : _____ m Draught : _____ fore : _____ m after : _____ m midship : _____ m State of wind: _____ [°;Bf] direction/force : _____ Wave height : _____ m	Initial course : _____ [°] If possible in head wind : _____ Course deviation (reference) : _____ [°] Data log acc to gen. data sheet : _____
---	---

Measurement	No.	1	2	3	Remarks
Ship's speed (reference) [knot]					
Max. thrust attained after [min;s]					
Defined course deviation attained, reversing to opposite direction [min;s]					
Max.back-thrust attained after [min;s]					
Ship on initial course [min;s]					
Defined course deviation attained, reversing [min;s]					
Electric current					
I. Step [A]					
II. Step [A]					
III. Step [A]					
Hydraulic pressure [bar]					
Shipyard	Owner			Surveyor	
(Name)	(Name)			(Name)	

Annex A Example Forms

F.2. Nautical Equipment

2.1 Navigation Equipment

	Installed	Tested by	Remarks
Gyro Compass master	<input type="checkbox"/>		
- Repeater	<input type="checkbox"/>		
- Heading repeater	<input type="checkbox"/>		
- Bearing repeater	<input type="checkbox"/>		
Magnetic compass	<input type="checkbox"/>		
- Emergency compass	<input type="checkbox"/>		
- compass bearing device	<input type="checkbox"/>		
- means of correcting heading and bearings	<input type="checkbox"/>		
Heading indicator at emergency steering position	<input type="checkbox"/>		
Radar units	<input type="checkbox"/>		
3 GHz radar	<input type="checkbox"/>		
9 GHz radar	<input type="checkbox"/>		
- ARPA (automatic radar plotting aid)	<input type="checkbox"/>		
- ATA (automatic tracking aid)	<input type="checkbox"/>		
- EPA (electronic plotting aid)	<input type="checkbox"/>		
Echo sounder	<input type="checkbox"/>		
Speed log (SME)	<input type="checkbox"/>		
Rudder indicator	<input type="checkbox"/>		
Rudder indicator in steering gear room	<input type="checkbox"/>		
Operation indicator for propulsion plant	<input type="checkbox"/>		
- Engine speed, direction rotation engine/propeller	<input type="checkbox"/>		
- CPP pitch/ thrust direction	<input type="checkbox"/>		
Bow/stern thrusters operation indicator	<input type="checkbox"/>		
- Load step/pitch/thrust direction	<input type="checkbox"/>		
Turning indicator	<input type="checkbox"/>		
Radio direction finder	<input type="checkbox"/>		
Radio telephone distress frequency	<input type="checkbox"/>		
Auto pilot	<input type="checkbox"/>		
Adaptive automation steering/ integrated course control	<input type="checkbox"/>		
Automation plotting table	<input type="checkbox"/>		
Positioning	<input type="checkbox"/>		
Shipyard	Owner	Surveyor	
(Name)	(Name)	(Name)	

Annex A Example Forms

	Installed	Tested by	Remarks
Positioning	<input type="checkbox"/>		
- Decca	<input type="checkbox"/>		
- Loran C	<input type="checkbox"/>		
- Satellite Navigation (GPS, Transit)	<input type="checkbox"/>		
Communication/information	<input type="checkbox"/>		
- telephone	<input type="checkbox"/>		
- telex	<input type="checkbox"/>		
- telefax	<input type="checkbox"/>		
- weatherfax and Navtex	<input type="checkbox"/>		
- ATA (automatic tracking aid)	<input type="checkbox"/>		
- ECDIS (Electronic chart display and information system)	<input type="checkbox"/>		
- VHF sets (fixed)	<input type="checkbox"/>		
- VHF sets (portable)	<input type="checkbox"/>		
- course recorder	<input type="checkbox"/>		
- ship's clock	<input type="checkbox"/>		
- alarm generation	<input type="checkbox"/>		
- manouver recorder	<input type="checkbox"/>		
- radio station	<input type="checkbox"/>		
- nautical information system	<input type="checkbox"/>		
- navigation planning system - NPS	<input type="checkbox"/>		
Shipyard	Owner	Surveyor	
(Name)	(Name)	(Name)	

Annex A Example Forms

F.3. Nautical Trials

3.1 General Data Sheet

Water depth : _____ m Draught : _____ fore : _____ m after : _____ m midship : _____ m State of wind : _____ [°;Bf] direction/force : _____ Wave height : _____ m	Output (P/S) : _____ kW Propeller Revolution (P/S) : _____ Min ⁻¹ Propeller pitch (P/S) : _____ Ship's main Electronic power supply : - Shaft gen. operation : <input type="checkbox"/> _____ Load[Kw] - A.E. Operation : <input type="checkbox"/> _____ Load[Kw]
--	---

No.	Time [min;s]	Position		Distance [sm;m]	True course [°]	Turning speed [°/min]	Rudder angle [°]	Remarks
		Longitude L	Longitude B					
1	0 - 00							
2	20							
3	40							
4	1 - 00							
5	20							
6	40							
7	2 - 00							
8	20							
9	40							
10	3 - 00							
11	20							
12	40							
13	4 - 00							
14	20							
15	40							
16	5 - 00							
17	20							
18	40							
19	6 - 00							
20	20							
21	40							
22	7 - 00							
23	20							
24	40							
25	8 - 00							
26	20							
27	40							
28	9 - 00							
29	20							
30	40							
31	10 - 00							

Shipyard (Name)	Owner (Name)	Surveyor (Name)
----------------------------	-------------------------	----------------------------

Annex A Example Forms

3.2 Speed Trial

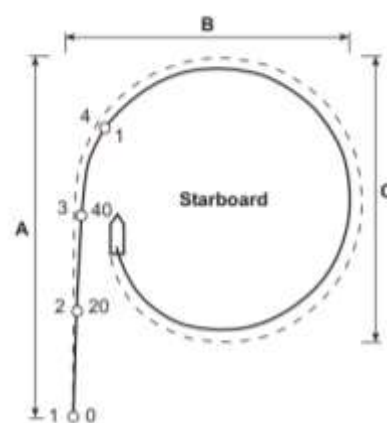
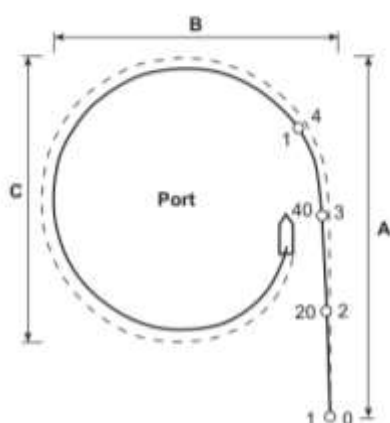
Water depth : _____ m Draught : _____ fore : _____ m after : _____ m midship : _____ m	Max.rudder angle : \pm _____ kW Data log acc. to general data sheet F 3.0
--	--

Criteria \ Run	1	2	average	3	4	average
Rated output (acc.to contact) Kw			/			/
Output P Kw						
S Kw						
Propeller revolution P rpm						
S rpm						
Propeller pitch P mm						
S mm						
State of wind - direction [°]	➡	➡	/	➡	➡	/
- force Bf	➡	➡		➡	➡	
State of sea - direction [°]						
Water						
- height H						
1/3						
Approach run sm						
course [°]						
Test run sm						
Time Min;s						
Ship speed knot						
Remarks :						
Shipyard	Owner		Surveyor			
(Name)	(Name)		(Name)			

Annex A Example Forms

3.3 Turning Circle

Water depth : _____ m	Initial course : _____ [°]
Draught : _____	If possible in head wind : _____
fore : _____ m	Course deviation (reference) : _____ [°]
after : _____ m	Data log acc to gen. data sheet : _____
midship : _____ m	
State of wind: [°;Bf]	
direction/force : _____	
Wave height : _____ m	



Parameter	Turning Circle		Starboard		Port	
	1	2	1	2	1	2
Initial course [°]						
Ship's speed (initial/final) [kn]						
Final rudder engine attained after [°;min,s]						
Output P/S [kW]						
Propeller revolutions P/S [kW]						
Propeller pitch P/S						
Turning time to 90° [min; s]						
180°						
270°						
360°						
Way ahead incl. stern-/bow-track A [m]						
Tactical diameter B [m]						
Turning circle diameter C [m]						
Remarks :						
Turning Circle to be carried out in P and S direction and vice versa, At contractual speed of the ship						
Shipyard (Name)	Owner (Name)				Surveyor (Name)	

Annex A Example Forms

3.4 Z-Manouvere

Water depth : [m] Draught fore : [m] aft : [m] midship : [m] State of wind: direction/force : [°; Bf] State of sea: direction/ wave height H $\frac{1}{3}$: [°, m]	Output P/S : [kW] Propeller revolutions P/S : [min ⁻¹] Propeller pitch P/S : Ship's speed (reference) : [kn] Initial course : [°] Characteristic: Rudder angle/course deviation : [°/°]
---	---

Action time (rudder)		Course					Reaction time (ship)			
		Deviation		True	Deviation		Deviation		on	Deviation
P	S	max. °	P °		S °	max. °	Deviation Port	course	Stbd.	max. yaw

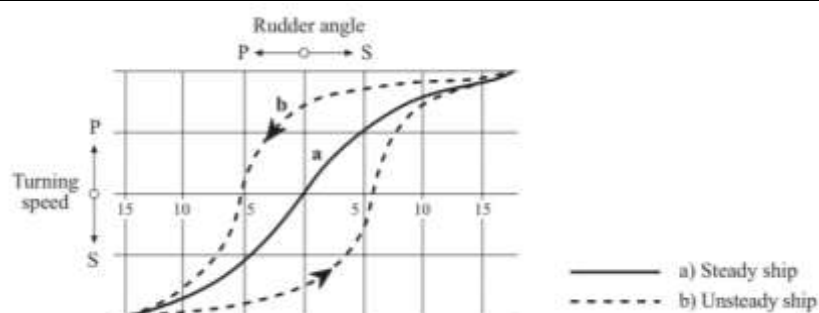
Remarks :

Shipyard	Owner	Surveyor
(Name)	(Name)	(Name)

Annex A Example Forms

3.5 Spiral Manoeuvre

Water depth	:	[m]	Output	P/S :	[kW]
Draught	fore	:	[m]	Propeller revolutions	P/S : [min ⁻¹]
	aft	:	[m]	Propeller pitch	P/S : [-]
	midship	:	[m]	Ship's speed (reference)	: [kn]
State of wind:	direction/force	:	[°; Bf]		
State of sea:	direction/ wave height H ⅓	:	[°,m]		



Readings	Rudder angle P / S [°]		Constant turning speed [°/s]	Clock [h, min., s]	Elapsed time [min., s]
1	15	S			
2	10	S			
3	5	S			
4	3	S			
5	1	S			
6	0				
7	1	P			
8	3	P			
9	5	P			
10	10	P			
11	15	P			
12	10	P			
13	5	P			
14	3	P			
15	1	P			
16	0				
17	1	S			
18	3	S			
19	5	S			
20	10	S			
21	15	S			

Remarks:

Shipyard	Owner	Surveyor
(Name)	(Name)	(Name)

Annex A Example Forms

3.6 Pull Out Manoeuvre

<p>Water depth : [m]</p> <p>Draught fore : [m]</p> <p style="padding-left: 40px;">aft : [m]</p> <p style="padding-left: 40px;">midship : [m]</p> <p>State of wind: direction/force : [°; Bf]</p> <p>State of sea: direction/ wave height H $\frac{1}{3}$: [°;m]</p>	<p>Data log acc. to general data sheet F 3.1</p>		
Run No.	1	2	3
Output P/S [kW]			
Propeller revolutions P/S [min ⁻¹]			
Propeller pitch P/S			
Ship speed (defined) [kn]			
Rudder angle (defined) [°]			
Resulting turning speed [°/min]			
Start of pull-out manoeuvre by rudder helm to midship			
Steady course attained after [min; s]			
Remaining turning speed [°/min]			
– attained after [min; s]			
<p>Remarks:</p>			
Shipyard	Owner	Surveyor	
(Name)	(Name)	(Name)	

Water depth	:	[m]	Data log acc. to general data sheet F 3.1
Draught	fore	: [m]	
	aft	: [m]	
	midship	: [m]	
State of wind:	direction/force	: [°; Bf]	
State of sea:	direction/ wave height H 1/3	: [°; m]	

Criterion	Run No. 1	Run No. 2 Course deviation:
Initial course [°]		
Ship's speed (initial/final) [kn]		
Output P/S [kW]		
Propeller revolutions P/S [min ⁻¹]		
Propeller pitch P/S		
Def. course deviation attained after [min; s]		
Rudder at "hard over" after [min; s]		
Ship on opposite course, engine stopped [min; s]		
Way ahead incl. stern track A [m]		
Traverse drift incl. stern track B [m]		
Pass-by-distance incl. stern track C [m]		

Shipyard

Owner

Surveyor

(Name)

(Name)

(Name)

Annex A Example Forms

3.8 Stopping Manoeuvre

Water depth : [m] Draught fore : [m] aft : [m] midship : [m] State of wind: direction/force : [°; Bf] State of sea: direction/ wave height H $\frac{1}{3}$: [°; m]	Data log acc. to general data sheet F 3.1
---	---

Manoeuvre Course

Criterion	Run 1	Run 2	Run down trial
Output P/S [kW]/[%]			
Propeller revolutions P/S [min ⁻¹]			
Propeller pitch P/S			
Initial ship's speed [kn]			
Rudder angle [°]			
Initial course [°]			
Control console			
Defined manoeuvre	Full AH –	Full AH – full AS	Full AH – Stop
Reversal initiated after [s]			
Engine starts to run on reverse direction after [s]			
Revolution at full AS [min ⁻¹]			
– attained after [s]			
Pitch at full AS			
– attained after [s]			
Ship is insteerable after [min; s]			
Final course [°]			
Stopping time [min; s]			
Stopping distance [m]			

Remarks:
 AH – ahead, AS – astern

Shipyard (Name)	Owner (Name)	Surveyor (Name)
------------------------	---------------------	------------------------

F.4 Machinery and Electrical Installations

4.1 Combinator Curve

<p>Water depth : [m]</p> <p>Draught fore : [m]</p> <p style="padding-left: 100px;">aft : [m]</p> <p style="padding-left: 100px;">midship : [m]</p> <p>State of wind: direction/force : [°; Bf]</p> <p>State of sea: direction/</p> <p style="padding-left: 100px;">wave height H ½ : [°; m]</p>	<p>Characteristics of Propulsion</p> <ul style="list-style-type: none"> • Idle speed : [min⁻¹] • Nominal speed : [min⁻¹] • Output : [kW] • Propeller diameter : [m]
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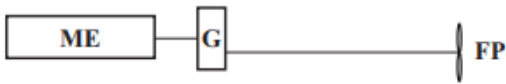

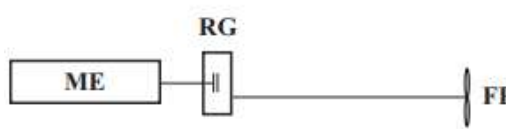
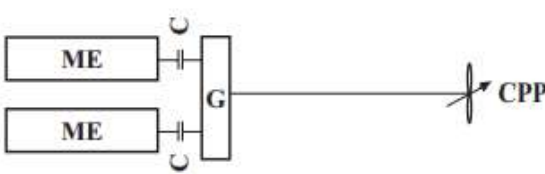
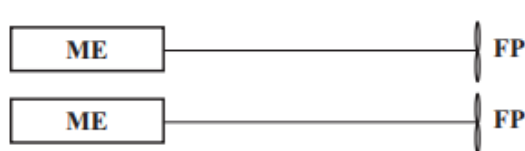
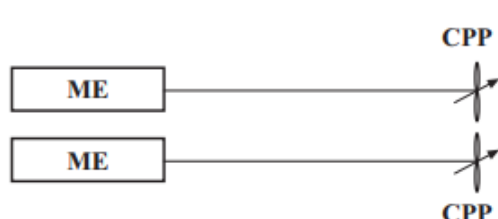
Reading No.	Control lever position	Manoeuvre step	Run 1			Run 2			Remarks
			n [min ⁻¹]	H	P [kW]	n [min ⁻¹]	H	P [kW]	
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									

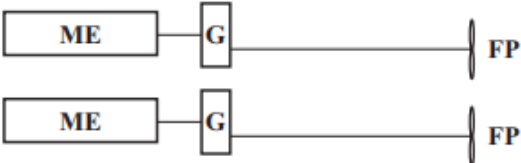
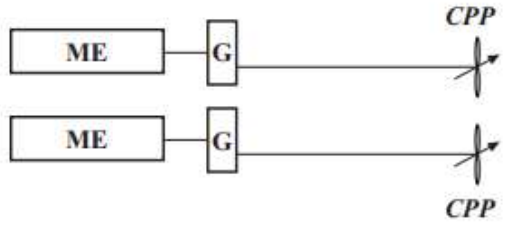
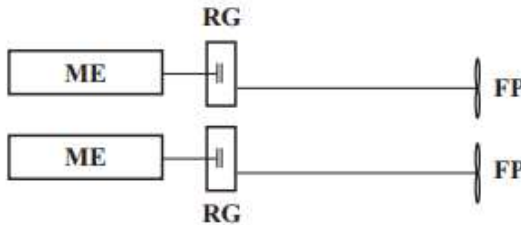
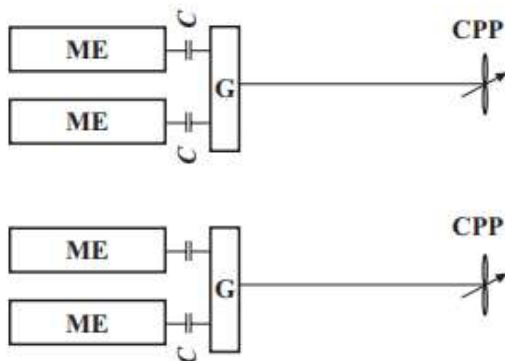
Shipyard	Owner	Surveyor
(Name)	(Name)	(Name)

4.2 Starting/reversing Manoeuvre

Main engine • reversible <input type="checkbox"/> • not reversible <input type="checkbox"/> Main engine • fixed propeller <input type="checkbox"/> • CPP <input type="checkbox"/>		Starting air receiver • Numbers • Volume : [1] • Working pressure : [bar]	
Manoeuvre • starting test <input type="checkbox"/> • comb. revers./starting test <input type="checkbox"/>	Starting air receiver		Remarks
Initial Pressure		Receiver No.:	
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
Safe starting on engine is given with a pressure of _____ bar. A sufficient control air supply from relevant systems is guaranteed <input type="checkbox"/>			
Shipyard	Owner	Surveyor	
(Name)	(Name)	(Name)	

4.3 Starting Air Capacity

No.	Installation Concept	Minimum Start Manoeuvre	Min. Reverse and Start Manoeuvres	Remarks
1		—	12	Legend: ME Main engine G Gear RG Reversing Gear C Clutch FP Fixed Propeller CPP Controllable Pitch Propeller
2		6	—	
3		—	12	
4		6	—	
5		6	—	
6		each 6	—	
7		—	each 12	
8		each 6	—	
Shipyard		Owner		Surveyor
(Name)		(Name)		(Name)

No.	Installation Concept	Minimum Start Manoeuvre	Min. Reverse and Start Manoeuvres	Remarks
9		—	each 12	Legend: ME Main engine G Gear RG Reversing Gear C Clutch FP Fixed Propeller CPP Controllable Pitch Propeller
10		each 6	—	
11		each 6	—	
12		each 6	—	
Shipyard		Owner		Surveyor
(Name)		(Name)		(Name)

4.4 Torsional/Axial Vibrations

1. PROPULSION PLANT			
CHARACTERISTICS/ CONFIGURATION			
Main Engine(s)		Power Turbine	
• Manufacturer		• Manufacturer	
• Number/type		• Type	
• Rated output		• Output delivery to	• PTI → crankshaft
• Nominal speed [min]			• Shaft generator drive
Flexible Coupling			
• Manufacturer / type			
Gearing		PTO	
• Manufacturer		• Shaft generator(s)	
• Number/type		• Number /	
• Ratio		• Type / power	
Propeller			
• Number /			
• Construction			
• Number of blades			
• Diameter/pitch			
2. VIBRATION CALCULATIONS			
• Calculated by			
• Torsional vibr. calc. existing	<input type="checkbox"/>	Approved with Ref.-No.:	
• Axial vibr. calc. existing	<input type="checkbox"/>	Approved with Ref.-No.:	
• Critical speed range(s)			
• evaluated	<input type="checkbox"/>		
• for the operation speed range from ... to			
3. VIBRATION MEASUREMENTS			
• Performed by			
• Arrangement of measuring points			
• Measuring program			
• normal operation			
• ignition failure operation			
4. RESULTS			
• Preliminary evaluation (date)			
• Final evaluation (date)			
• Critical speed range(s)			
• quoted	<input type="checkbox"/>		
• for the operation speed range from ... to			
• critical speed ranges marked permanently			
Shipyard	Owner	Surveyor	
(Name)	(Name)	(Name)	

4.4.1 Standby Operations and Sequential Starts at Full Ahead

Water depth	:	[m]	Legend: LT – Low temperature system HT – High temperature system ME – Main engine AE – Auxiliary engine MG – Main gear CPP – Controllable pitch propeller		
Draught fore	:	[m]			
aft	:	[m]			
midship	:	[m]			
State of wind: direction/force	:	[°; Bf]			
State of sea: direction/ wave height H $\frac{1}{3}$:	[°; m]			
System	Pumps			Standby	Remarks
	Items	Total Numbers	thereof attached		
Seawater cooling	Main pumps				
	Scoop pump				
	Aux. pumps				
Freshwater cooling	Main pumps - LT				
	Aux. pumps - LT				
	Main pumps - HT				
	Aux. pumps - HT				
Piston cooling	ME				
Nozzle cooling	ME				
	AE				
Lub. oil	ME circulating				
	ME crosshead				
	ME camshaft				
	AE pre-lubrication				
	MG Lub. oil				
	CPP control oil				
Fuel oil	ME feeder pumps				
	ME booster pumps				
	AE feeder pumps				
	AE booster pumps				
Thermal oil	Circulating pumps				
Steam	Condensate pumps				
	Feedwater pumps				
	Circulating pumps				
Shipyard		Owner		Surveyor	
(Name)		(Name)		(Name)	

Annex A Example Forms

4.4.2 Automatic Slow Down & Shut Down Criteria

Legend: CS – Cam shaft TC – Turbo charger PTO – Power take off PTI – Power take in CPP – Controllable pitch propeller EG – Exhaust Gas ↑ – High limit ↓ – Low limit × – Fault									
Criteria	Status	Automatic control		Alarm printer	Criteria	Status	Automatic control		Alarm printer
		shut down	slow down				shut down	slow down	
1. Propulsion Unit 1.1 Main Engine(s) <ul style="list-style-type: none"> • Over speed protection ↑ • Oil mist detection ↑ • Circulating oil <ul style="list-style-type: none"> - pressure ↓ - temperature ↑ • Cooling oil system <ul style="list-style-type: none"> - pressure ↓ - temperature ↑ • CS lubrication <ul style="list-style-type: none"> - pressure ↓ - temperature ↑ • Cyl. lubrication <ul style="list-style-type: none"> - flow ↓ - level ↓ • Fuel pressure ↓ • Cyl. cooling <ul style="list-style-type: none"> - pressure ↓ - temperature ↑ • Piston cooling <ul style="list-style-type: none"> - pressure ↓ - temperature ↑ - flow ↓ • Exhaust gas <ul style="list-style-type: none"> - temperature cylinder ↑ ↓ - average deviation ↑ ↓ • TC vibration ↑ • Main bearing temp. ↑ 					1.3 Power Turbine Unit <ul style="list-style-type: none"> • Turbine / gearing <ul style="list-style-type: none"> - lub. oil pressure ↓ - lub. oil temperature ↑ • Turbo coupling <ul style="list-style-type: none"> - temperature ↑ • PTI gearing <ul style="list-style-type: none"> - lub. oil pressure ↓ - lub. oil temperature ↑ 1.4 Main gear <ul style="list-style-type: none"> • Lub. oil pressure ↓ • Lub. oil temperature ↑ • Bearing temperature ↑ 1.5 Shaft Generator <ul style="list-style-type: none"> • Bearing temperature ↑ 1.6 CPP - Unit <ul style="list-style-type: none"> • Servo oil pressure ↓ 1.7 EG Boiler / Heater <ul style="list-style-type: none"> • Steam pressure ↑ • Thermal oil temp. ↑ • Thermal oil leakage ↑ • Fire in EG boiler/heater × 				
1.2 Thrust Bearing Temp. ↑					2. Diesel Generators <ul style="list-style-type: none"> • Over speed ↑ • Oil mist detection ↑ • Main bearing temp. ↑ • Lub. oil pressure ↓ • Cool. water pressure ↓ • Cool. water temp. ↑ • Exh. gas temp. max. ↑ 				
Shipyard		Owner			Surveyor				
(Name)		(Name)			(Name)				

4.4.3 Black-Out Test

Water depth	:	[m]	Legend: ME – Main engine AE – Auxiliary engine DG – Diesel generator SG – Shaft generator SOC/BR – Ship operation centre / bridge BMC/ECR – Board management centre/ Engine control room ER – Engine room				
Draught fore	:	[m]					
aft	:	[m]					
midship	:	[m]					
State of wind: direction/force	:	[°; Bf]					
State of sea: direction/ wave height H $\frac{1}{3}$:	[°; m]					
1. Operation mode before "black-out"			Remarks				
1.1 Propulsion unit ME							
• Power	P/S						
• Revolutions	P/S						
Propeller							
• Revolutions	P/S						
• Pitch	P/S	[
1.2 Ship's mains electric power supply							
• DG in operation (number)							
• SG in operation (number)							
• Ship's main electric load							
2. Black-out							
2.1 Tripping by							
• Emerg. stop ME, SG in operation	[h;						
• AE safety system							
• Gen. overload trip							
2.2 Time sequence (Time)						Sec.	
• Tripping							
• Start of standby DG							
• Standby DG connected							
• Power supply re-established							
3. (Sequential) re-start of main components							
		Sequence					
• Steering gear							
• Pumps							
• Compressors							
• ER fans							
• Miscellaneous							
Shipyard	Owner	Surveyor					
(Name)	(Name)	(Name)					

Annex A Example Forms

4.4.4 Function Test

Activated Control Console: SOC/BR Ship operation centre / bridge BW P Bridge wing P BW S Bridge wing S BMC/ECR Board management centre / Engine control room ECC Emergency control console		Conditions: Final adjustment carried out and accepted Automatic control <input type="checkbox"/> Remote control <input type="checkbox"/> Operation mode: • Sea voyage <input type="checkbox"/> • Manoeuvring <input type="checkbox"/> • Emerg. operation <input type="checkbox"/>	
Code	Activated control station	Manoeuvre	Remarks
0325	SOC/BR	Full AH – Dead slow AS ¹⁾ <input type="checkbox"/>	All manoeuvres to be carried out with automatic control / remote control 1) with rudder hard to P (S) 2) manoeuvres 0319 – 0322 are to be carried out from station (BW P + BW S)
0326	SOC/BR	Dead slow AS – Full AS <input type="checkbox"/>	
0323	SOC/BR	Full AS – Dead slow AH <input type="checkbox"/>	
0324	SOC/BR	Dead slow AH – Full AH <input type="checkbox"/>	
0319 ²⁾	SOC/BR	Full AH – Dead slow AH <input type="checkbox"/>	
0320 ²⁾	SOC/BR	Dead slow AH – Stop <input type="checkbox"/>	
0321 ²⁾	SOC/BR	Stop – Dead slow AH ¹⁾ <input type="checkbox"/>	
0322 ²⁾	SOC/BR	Dead slow AH – Full AS <input type="checkbox"/>	
0327	SOC/BR	Full AS – Full AH <input type="checkbox"/>	
0328	SOC/BR	Full AH – Full AS <input type="checkbox"/>	
0329	SOC/BR	Full AS – Stop <input type="checkbox"/>	
0330	SOC/BR	Stop – Dead slow AS <input type="checkbox"/>	
0331	SOC/BR	Dead slow AS – Stop <input type="checkbox"/>	
0332	SOC/BR	Stop – Full AH <input type="checkbox"/>	
0354	change over: SOC/BR → BMC/ECR <input type="checkbox"/>		
–	BMC/ECR	Full AH – Stop <input type="checkbox"/>	
–	BMC/ECR	Stop – Dead slow AH <input type="checkbox"/>	
–	BMC/ECR	Dead slow AH – Slow AH <input type="checkbox"/>	
–	BMC/ECR	Slow AH – Full AH <input type="checkbox"/>	
–	BMC/ECR	Dead slow AS – Full AS <input type="checkbox"/>	
–	BMC/ECR	Full AS – Dead slow AH <input type="checkbox"/>	
–	BMC/ECR	Dead slow AH – Stop <input type="checkbox"/>	
–	BMC/ECR	Stop – Full AH <input type="checkbox"/>	
			Continuation next pages
Shipyard		Owner	Surveyor
(Name)		(Name)	(Name)

Annex A Example Forms

Activated Control Console: SOC/BR Ship operation centre / bridge BW P Bridge wing P BW S Bridge wing S BMC/ECR Board management centre /Engine control room ECC Emergency control console		Conditions: Final adjustment carried out and accepted Automatic control <input type="checkbox"/> Remote control <input type="checkbox"/> Operation mode: • Sea voyage <input type="checkbox"/> • Manoeuvring <input type="checkbox"/> • Emerg. operation <input type="checkbox"/>	
---	--	---	--

Code	Activated control station	Manoeuvre	Remarks
0353	change over:	Full AH – Dead slow AS ¹⁾ <input type="checkbox"/>	
–	ECC	Dead slow AS – Full AS <input type="checkbox"/>	
–	ECC	Full AS – Dead slow AH <input type="checkbox"/>	
–	ECC	Dead slow AH – Full AH <input type="checkbox"/>	
–	ECC	Full AH – Dead slow AH <input type="checkbox"/>	
–	ECC	Dead slow AH – Stop <input type="checkbox"/>	
0353	change over:	ECC → BMC/ECR <input type="checkbox"/>	
Check of the reliable minimum revolutions			
–	SOC/BR	Full AS – Full AH <input type="checkbox"/>	
–	SOC/BR	Full AH – Full AS <input type="checkbox"/>	
0354	change over:	SOC/BR → BMC/ECR <input type="checkbox"/>	
Starting limitation			
0338	– to 3 start failures <input type="checkbox"/>		
0344	– with control lever kept in start position <input type="checkbox"/>		
0333		Half AH – Half AS <input type="checkbox"/>	Reversing to AS, without starting Reversing to AH, without starting Reversing to AS → starting
0334		Half AS – Half AH <input type="checkbox"/>	Reversing to AH, without starting Reversing to AS, without starting Reversing to AH → starting
Shipyard		Owner	Surveyor
(Name)		(Name)	(Name)

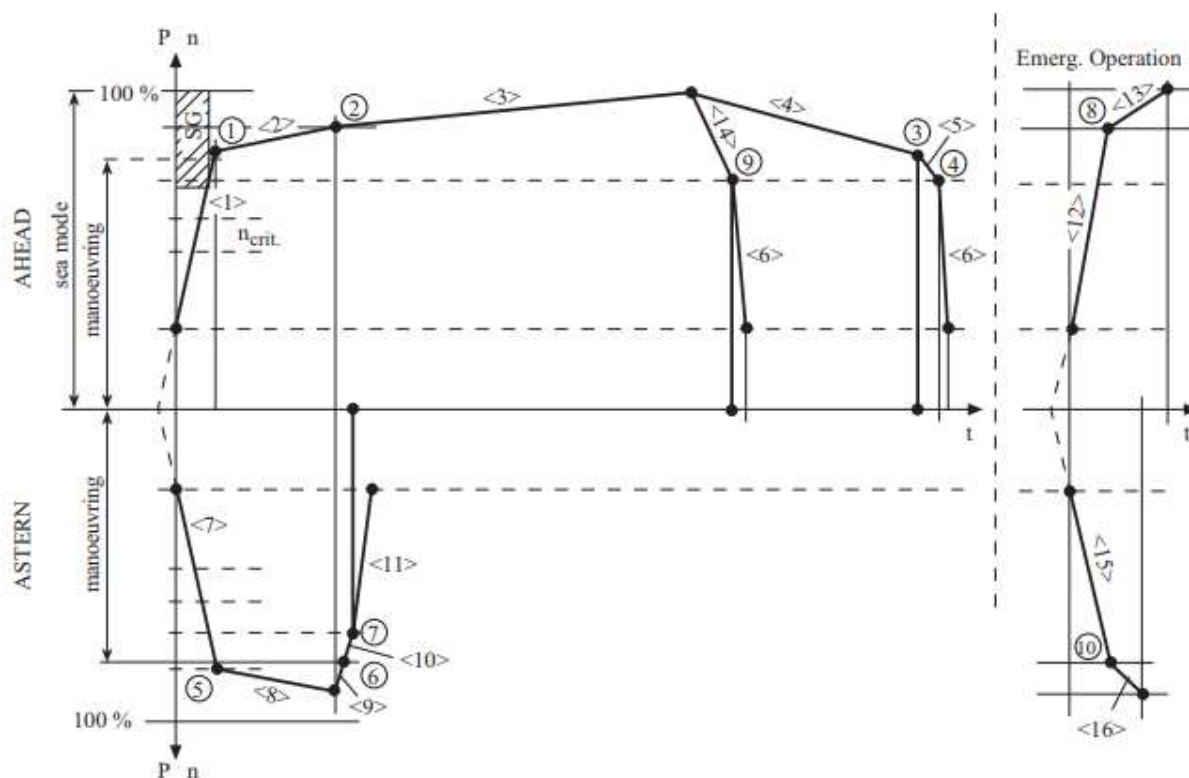
Annex A Example Forms

Legend: ME – Main engine DG – Diesel generator SG – Shaft generator		Conditions: Final adjustment carried out and accepted Automatic control <input type="checkbox"/> Remote control <input type="checkbox"/> Operation mode: • Sea voyage <input type="checkbox"/> • Manoeuvring <input type="checkbox"/> • Emerg. operation <input type="checkbox"/>	
Function test of efficiency booster control			
Set points	Starting	Stopping	
Revolution ME [min ⁻¹]			
ME fuel rack pos. [marks]			
Scav. air pressure [bar]			
Operating time – exhaust flaps • Bypass-flap open [s] closed [s] • Inlet-flap open [s] closed [s]			
Function test of automatic change-over SG – to DG-operation			
Operation mode <div style="display: flex; justify-content: space-between;"> <div> η_{const} <input type="checkbox"/> η_{const} <input type="checkbox"/> $\eta_{changeable}$ <input type="checkbox"/> </div> <div> Speed range : to [min⁻¹] Speed range : to [min⁻¹] </div> </div>			
Manoeuvre order		Time recording	
Minimum revolutions for SG operation [min ⁻¹]		Attained after [s].	
DG Start		Attained after [s].	
DG connected		Attained after [s].	
SG disconnected		Attained after [s].	
ME speed reduced		Attained after [s].	
Ordered manoeuvre		Attained after [s].	
Shipyard	Owner	Surveyor	
(Name)	(Name)	(Name)	

Annex A Example Forms

Manoeuvre rates	Revolutions [min ⁻¹]	Output P [kW]	Conditions:
Dead slow AH / AS			Final adjustment carried out and accepted Automatic control <input type="checkbox"/> Remote control <input type="checkbox"/>
Slow AH / AS			Operation mode: • Sea voyage <input type="checkbox"/> • Manoeuvring <input type="checkbox"/> • Emerg. operation <input type="checkbox"/>
Half AH / AS			
Full man. mode / sea mode	/	/	
Critical speed range [min ⁻¹]	from	to	

ME Automatic control, Speed-up program (sequence)



Set point 0				Time < >							
ahead		astern		ahead				astern			
No.	min ⁻¹ , kW	No.	min ⁻¹ , kW	No.	min ⁻¹ , kW	No.	min ⁻¹ , kW	No.	min ⁻¹ , kW	No.	min ⁻¹ , kW
1		5		<1>		<12>		<7>		<15>	
2		6		<2>		<13>		<8>		<16>	
3		7		<3>		<14>		<9>			
4		10		<4>				<10>			
8				<5>				<11>			
9				<6>							
Shipyard				Owner				Surveyor			
(Name)				(Name)				(Name)			

Annex A Example Forms

4.4.5 Operational Data Recording

Water depth	:	[m]	Legend: ME – Main engine LT – Low temperature system CAC – Charge air cooler MG – Main gearing SS – Suction side DS – Discharge side			
Draught fore	:	[m]				
aft	:	[m]				
midship	:	[m]				
State of wind: direction/force	:	[°; Bf]				
State of sea: direction/ wave height H $\frac{1}{3}$:	[°; m]				
Reading No.						
Date / Time						
Criteria	Dimen- sion	Limit				
Rating						
ME – fuel rack position	marks					
– revolutions	min ⁻¹					
– scav. air/charge air press.	bar					
Propeller – revolutions	min ⁻¹					
– pitch						
0. Sea cooling water						
0.1 Temperature	°C					
1. LT fresh cooling water						
1.1 Press. SS pump	bar					
1.2 Press. DS pump	bar					
1.3 Temp. inlet central cooler	°C					
1.4 Temp. outlet central cooler	°C					
1.5 Temp. inlet lub. oil cooler	°C					
1.6 Temp. outlet lub. oil cooler	°C					
1.7 Temp. inlet CAC-LT	°C					
1.8 Temp. outlet CAC-LT	°C					
1.9 Temp. inlet MG oil cooler	°C					
1.10 Temp. outlet MG oil cooler	°C					
1.11 Temp. SS pump	°C					
Shipyard	Owner		Surveyor			
(Name)	(Name)		(Name)			

Annex A Example Forms

Water depth	:	[m]	Legend: ME – Main engine LT – Low temperature system CAC – Charge air cooler MG – Main gearing SS – Suction side DS – Discharge side			
Draught fore	:	[m]				
aft	:	[m]				
midship	:	[m]				
State of wind: direction/force	:	[°; Bf]				
State of sea: direction/ wave height H $\frac{1}{3}$:	[°; m]				
Reading No.						
Date / Time						
Criteria	Dimen- sion	Limit				
2. HT fresh cooling water						
2.1 Pressure SS pump	bar					
2.2 Pressure DS pump	bar					
2.3 Pressure inlet ME	bar					
2.4 Temp. inlet cooler	°C					
2.5 Temp. outlet cooler	°C					
2.6 Temp. inlet CAC-HT	°C					
2.7 Temp. outlet CAC-HT	°C					
2.8 Temp. inlet ME	°C					
2.9 Temp. outlet ME	°C					
3. Piston cooling						
3.1 Medium / grade	–					
3.2 Pressure SS pump	bar					
3.3 Pressure DS pump	bar					
3.4 Temp. inlet cooler	°C					
3.5 Temp. outlet cooler	°C					
3.6 Temp. inlet pistons	°C					
3.7 Temp. outlet pistons	°C					
Shipyard	Owner		Surveyor			
(Name)	(Name)		(Name)			

Annex A Example Forms

Water depth : [m]			Legend: ME – Main engine LT – Low temperature system CAC – Charge air cooler MG – Main gearing SS – Suction side DS – Discharge side			
Draught fore : [m]						
aft : [m]						
midship : [m]						
State of wind: direction/force : [°; Bf]						
State of sea: direction/wave height H ½: [°; m]						
Reading No.						
Date / Time						
Criteria	Dimen- sion	Limit				
4. Lub. oil / Cooling Oil						
4.1 Grade of oil						
4.2 Circ. tank level	cm					
4.3 Pressure DS pump	bar					
4.4 Temp. inlet oil cooler	bar					
4.5 Temp. outlet oil cooler	bar					
4.6 Temp. inlet auto-filter	bar					
4.7 Temp. outlet auto-filter	bar					
4.8 Temp. inlet indicator	bar					
4.9 Temp. outlet indicator	bar					
4.10 Lub. oil press. inlet ME	bar					
4.11 Press inlet last bearing	bar					
4.12 Cooling oil press. inlet	bar					
4.13 Lub. oil press. inlet TC	bar					
4.14 Temp. inlet cooler	°C					
4.15 Temp. outlet cooler	°C					
4.16 Temp. inlet ME	°C					
4.17 Temp. outlet TC	°C					
4.18 CS press. DS pump	bar					
4.19 CS press. inlet ME	bar					
4.20 CS temp. inlet cooler	°C					
4.21 CS temp. outlet cooler	°C					
Shipyard	Owner			Surveyor		
(Name)	(Name)			(Name)		

Annex A Example Forms

Water depth : [m] Draught fore : [m] aft : [m] midship : [m] State of wind: direction/force : [°; Bf] State of sea: direction/wave height H 1/3: [°; m]			Legend: ME – Main engine LT – Low temperature system CAC – Charge air cooler MG – Main gearing SS – Suction side DS – Discharge			
Reading No.						
Date / Time						
Criteria	Dimen- sion	Limit				
5. Fuel Oil						
5.1 Grade of fuel (ISO 8217)	mm ² / s at 40					
5.2 Sulphur content	% m/m					
5.3 Level service tank	m ³					
5.4 Temp. service tank	°C					
5.5 Press. SS feeder pump	bar					
5.6 Press. DS feeder pump	bar					
5.7 Press. inlet auto-filter	bar					
5.8 Press. outlet auto-filter	bar					
5.9 Press. mixing tank	bar					
5.10 Temp. mixing	°C					
5.11 Press. SS booster pump	bar					
5.12 Press. DS booster pump	bar					
5.13 Temp. outlet endheater	°C					
5.14 Temp. outlet viscosity control unit	°C					
5.15 Viscosity	cSt					
5.16 Temp. inlet ME	°C					
5.17 Pressure inlet ME	bar					
5.18 Temp. outlet ME	°C					
Shipyard			Owner		Surveyor	
(Name)			(Name)		(Name)	

Annex A Example Forms

Water depth : [m] Draught fore : [m] aft : [m] midship : [m] State of wind: direction/force : [°; Bf] State of sea: direction/wave height H 1/3: [°; m]			Legend: ME – Main engine LT – Low temperature system CAC – Charge air cooler MG – Main gearing SS – Suction side DS – Discharge			
Reading No.						
Date / Time						
Criteria	Dimen - sion	Limit				
6. Combustion Air						
6.1 Ambient temperature	°C					
6.2 Barometric press.	hPa					
6.3 Relative humidity	%					
6.4 ER temperature	°C					
6.5 Temp. inlet TC	°C					
6.6 TC revolutions	bar					
6.7 Temp. outlet TC, inlet CAC	°C					
6.8 Temp. outlet CAC	°C					
6.9 Temp. inlet ME	°C					
6.10 Diff. pressure CAC	mm					
6.11 Press. inlet ME	bar					
7. Nozzle Cooling						
7.1 Medium / brand						
7.2 Press. SS pump	bar					
7.3 Press. DS pump	bar					
7.4 Temp. inlet cooler	°C					
7.5 Temp. outlet cooler	°C					
7.6 Temp. inlet ME	°C					
Shipyard	Owner		Surveyor			
(Name)	(Name)		(Name)			

Annex A Example Forms

Water depth : [m] Draught fore : [m] aft : [m] midship : [m] State of wind: direction/force : [°; Bf] State of sea: direction/wave height H $\frac{1}{3}$: [°; m]			Legend: ME – Main engine LT – Low temperature system CAC – Charge air cooler MG – Main gearing SS – Suction side DS – Discharge side			
Reading No.						
Date / Time						
Criteria	Dimen - sion	Limit				
8. Exhaust Gas						
8.1 Cyl. 1 A/B	°C					
8.2 Cyl. 2 A/B	°C					
8.3 Cyl. 3 A/B	°C					
8.4 Cyl. 4 A/B	°C					
8.5 Cyl. 5 A/B	°C					
8.6 Cyl. 6 A/B	°C					
8.7 Cyl. 7 A/B	°C					
8.8 Cyl. 8 A/B	°C					
8.9 Cyl. 9 A/B	°C					
8.10 Cyl. 10 A/B	°C					
8.11 Cyl. 11	°C					
8.12 Cyl. 12	°C					
8.13 Average value	°C					
8.14 Temp. inlet/outlet TC	°C					
8.15 Press. outlet TC	mm WG					
8.16 Soot No.	SN/Bosc					
8.17 Temp. inlet/outlet EGB	°C					
Shipyard		Owner		Surveyor		
(Name)		(Name)		(Name)		

Annex A Example Forms

Water depth : [m]			Legend: ME – Main engine LT – Low temperature system CAC – Charge air cooler MG – Main gearing SS – Suction side DS – Discharge			
Draught fore : [m]						
aft : [m]						
midship : [m]						
State of wind: direction/force : [°; Bf]						
State of sea: direction/wave height H $\frac{1}{3}$: [°; m]						
Reading No.						
Date / Time						
Criteria	Dimen - sion	Limit				
9. Gearing						
9.1 Lub. oil press. inlet MG	bar					
9.2 Lub. oil temp. inlet cooler	°C					
9.3 Lub. oil temp. inlet MG	°C					
10. Shafting / Stern Tube						
10.1 Temp. thrust bearing	°C					
10.2 Temp. interm. bearing	°C					
10.3 Temp. stern tube	°C					
11. Power Turbine Unit, EBS						
Power Turbine						
11.1 Revolutions	min ⁻¹					
11.2 Exhaust gas inlet	°C					
11.3 Exhaust gas outlet	°C					
Planetary Gear						
11.4 Lub. oil pressure	bar					
11.5 Lub. oil temp. inlet gear	°C					
11.6 Lub. oil temp. outlet gear	°C					
PTI-Gear						
11.7 Lub. oil pressure	bar					
11.8 Lub. oil temp. inlet gear	°C					
11.9 Lub. oil temp. outlet gear	°C					
Shipyard	Owner		Surveyor			
(Name)	(Name)		(Name)			

Annex A Example Forms

Water depth : [m]			Legend: ME – Main engine LT – Low temperature system CAC – Charge air cooler MG – Main gearing SS – Suction side DS – Discharge			
Draught fore : [m]						
aft : [m]						
midship : [m]						
State of wind: direction/force : [°; Bf]						
State of sea: direction/wave height H $\frac{1}{3}$: [°; m]						
Reading No.						
Date / Time						
Criteria	Dimen - sion	Limit				
12. Steam System						
Boiler Operation Mode						
• AB						
• EGB						
12.1 Feed water temp.	°C					
12.2 Press. feed wter pump	bar					
12.3 Steam pressure	bar					
13. Thermal Oil System						
Heater Operation Mode						
• AB						
• EGB						
13.1 Press. SS circ. pump	bar					
13.2 Press. DS circ. pump	bar					
13.3 Temp. supply line	°C					
13.4 Temp. return line	°C					
13.5 Temp. expansion tank	°C					
Shipyard		Owner		Surveyor		
(Name)		(Name)		(Name)		

Annex A Example Forms

4.4.6 Propulsion Plant-Fuel Consumption Measurements

Water depth	:	[m]	Legend: EH – End heater ME – Main engine MGO – Marine Gas Oil MDO – Marine Diesel Oil IF – Intermediate Fuel				
Draught fore	:	[m]					
aft	:	[m]					
midship	:	[m]					
State of wind: direction/force	:	[°; Bf]					
State of sea: direction/	:	[°; m]					
wave height H 1/3	:	[°; m]					
Fuel specification <ul style="list-style-type: none"> Fuel brand Density (15 °C) [g/m] Viscosity (50 °C) [cSt] Calorific value [kJ/kg] 			Flow meter <ul style="list-style-type: none"> Maker Type / design Serial No. Accuracy Last calibration 				
Criteria			Reading No.				
			1	2	3	4	5
ME – fuel rack position	marks						
– revolutions	min ⁻¹						
Fuel treatment							
• Temp. viscosimeter / viscosity	°C/cSt						
• Temp. inlet ME	°C						
• Pressure inlet ME	bar						
Fuel consumption measurement							
• Temp. inlet flow meter	°C						
• Time	Min, s						
• Flow meter reading: start							
• Flow meter reading: finish							
• Consumption							
Specific fuel consumption							
• ME output	kW						
• Correction factors							
• Spec. consumption – contractual	g/kWh						
• Spec. consumption – actual	g/kWh						
Shipyard	Owner	Surveyor					
(Name)	(Name)	(Name)					

Annex A Example Forms

4.4.7 Exhaust Gas Boiler (Steam Heating) Performance Test

Water depth	:	[m]	Output	P/S	[kW]
Draught fore	:	[m]	Propeller revolutions	P/S	[min ⁻¹]
Aft	:	[m]	Propeller pitch	P/S	
midship	:	[m]			

1. Boiler data					
Manufacturer		Rating <ul style="list-style-type: none"> • Power • Heating surface • Design pressure • Test pressure • Working pressure 	MJ/h		
Design			[kW]		
Type			m ²		
Serial No.			bar		

2. Operational data					
2.1 Temperature			2.2 Pressures		
• Exhaust gas inlet	°C		• Feed pump's press. head	mWG	
• Exhaust gas outlet	°C		• Circ. pump's press. head	mWG	
• Feedwater inlet	°C		• Steam pressure	bar	

3. Performance Test					
3.1 Flow Meter Characteristics					
• Maker		• Accuracy	± %		
• Design		• Last calibration			
• Serial No.		• Correction factor			
3.2 Measurement No.	Clock	Time	Level boiler	Flow meter	Volume [m³]
0					
1					
2					
3					
3.3 Evaluation					
• Correction factor					
• Capacity (actual)	m ³ /h		• Capacity (nominal)	m ³ /h	
Shipyard		Owner		Surveyor	
(Name)		(Name)		(Name)	

Annex A Example Forms

4.4.8 Exhaust Gas Heater Thermal Oil Heating Performance Test

Water depth	:	[m]	Output	P/S	[kW]
Draught fore	:	[m]	Propeller revolutions	P/S	[min ⁻¹]
Aft	:	[m]	Propeller pitch	P/S	
midship	:	[m]			
1. Heater data					
Manufacturer			Rating • Power • Heating surface • Design pressure • Test pressure • Working pressure	MJ/h	
Design				[kW]	
Type				m ²	
				bar	
Serial No.				bar	
2. Operational data					
2.1 Temperature			2.2 Pressures		
• Exhaust gas inlet	°C		• Feed pump's press.	mWG	
• Exhaust gas outlet	°C		head	mWG	
• Thermal oil supply	°C		• Circ. pump's press.	bar	
• Thermal oil return	°C		Head		
			• Steam pressure		
3. Performance Test					
3.1 Flow Meter Characteristics					
• Maker			• Accuracy	± %	
• Design			• Orifice diameter		
• Serial No.			• Correction factor	mm	
3.2 Measurement No.	1	2	3.3 Evaluation	1	2
Time			Density	kg/m ³	
Diff. pressure	bar		Specific	kJ/kgK	
Oil inlet temp.			heat Flow	kg/m ³	
Oil outlet temp.	°C		(vol.) Flow	kg/h	
	°C		(mass)	MJ/h	
			Power	kW	
			Power		
Shipyard		Owner		Surveyor	
(Name)		(Name)		(Name)	

4.4.9 Evaporator Performance Test

Water depth	:	[m]	Output	P/S	[kW]
Draught fore	:	[m]	Propeller revolutions	P/S	[min ⁻¹]
Aft	:	[m]	Propeller pitch	P/S	
midship	:	[m]			

1. Manufacturer					
Design					
Type					
Serial No.					

2. Operational data					
• Seawater – temperature	°C		• Heating water – inlet temperature	°C	
			– outlet temperature	°C	
• Driving water – temperature	°C		– pressure	bar	
– pressure	bar				
• Vacuum	%/bar		• Cooling water – inlet temperature	°C	
			– outlet temperature	°C	
• Feedwater – temperature	°C		– pressure	bar	

3. Measurement of distillate					
• Chloride content	ppm				
• Measurement	No.	Clock	Time	Reading	Quantity [m ³]
	0				
	1				
	2				
	3				

4. Evaluation					
• Correction factor					
• Measured capacity	m ³ /h		m ³ /24		
• Nominal capacity	m ³ /h		m ³ /24		
Shipyard		Owner		Surveyor	
(Name)		(Name)		(Name)	

Annex A Example Forms

4.4.10 Alarm in Machinery Spaces- Performance Test

Manoeuvre step: Full ahead Output P/S [kW]: DG in operation <input type="checkbox"/> DG in operation <input type="checkbox"/>		Legend: a/v – audible / visual ME – Main engine DG – Diesel generator AB – Auxiliary boiler BMC – Board management centre ECR – Engine control room										
Test under seagoing conditions												
		Area / Room										
Kind of Alarm	a/v	ME-Control console	DG-Area	AB-Control console	Purifiers	Pumps	Compressors	Workshop/ Stores	BMC/ECR	Duty mess	Steering gear room	Miscellaneous
General alarm		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fire alarm		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
General machinery alarm		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
CO ₂ -alarm		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Telephone		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Telegraph		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Remarks:												
Shipyard		Owner					Surveyor					
(Name)		(Name)					(Name)					

4.4.11 Fire Pumps Function Test Full Ahead Test

Water depth	:	[m]	Rate of speed: Legend: SOC – Ship operation centre BR – Bridge BMC – Board management centre ECR – Engine control room
Draught fore	:	[m]	
aft	:	[m]	
midship	:	[m]	
State of wind: direction/force	:	[°; Bf]	
State of sea: direction/ wave height H ¼	:	[°; m]	
Fire fighting pump No.	1	2	Emergency fire fighting pump
1. Characteristics			
Manufacturer			
Design			
Type			
Serial No.			
Kind of drive			
Nominal capacity [m ³ /h]			
Pressure head [bar]			
Location			
2. Function test			
Start			
• SOC/BR			
• Safety station			
• BMC/ECR			
• Local			
Measure press. head [bar]			
Remarks:			
Shipyard	Owner	Surveyor	
(Name)	(Name)	(Name)	

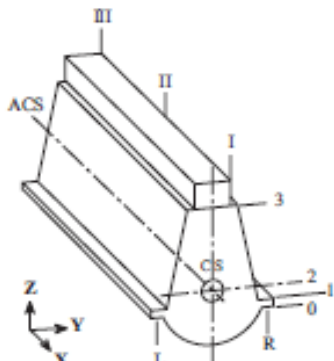
Annex A Example Forms

4.4.12 Noise Level Measurements

Water depth : [m] Draught fore : [m] aft : [m] midship : [m] State of wind: direction/force : [°; Bf] State of sea: direction/ wave height H $\frac{1}{3}$: [°; m]				Limit conditions – Measurement at contractual speed – Doors and windows closed – No avoidable noises Noise meter manufacturer : Type :		
Measuring point				Reading [dB (A)]	Limit [dB (A)]	Remarks
Position	Room	Deck	Room No.			
Shipyard			Owner		Surveyor	
(Name)			(Name)		(Name)	

4.4.13 M.E Vibration Measurement

Water depth : [m] Draught : [m] fore : [m] aft : [m] midship : [m] State of wind: direction/force : [°; Bf] State of sea: direction/ : [°; m] wave height H $\frac{1}{2}$: [°; m]	Particulars for the Trial Propulsion power P/S : [kW] Propeller revolutions P/S : [min ⁻¹] Propeller pitch P/S : Ship's speed P/S : [kn]
---	---



Measuring side L (left) ☐
 R (right) ☐

Measurement

- vertical

V	0	Foundation top plate
	1	Engine base plate
	2	Crank shaft level
	3	Upper edge of frame casing
- longitudinal

L	I	CS (coupling side)
	II	Middle position
	III	ACS (anti coupling side)

Measuring Points		X				Y				Z			
		s [mm]	V [mm/s]	V _{eff} [mm/s]	\hat{a} [9,81/s ²]	s [mm]	V [mm/s]	V _{eff} [mm/s]	\hat{a} [9,81/s ²]	s [mm]	V [mm/s]	V _{eff} [mm/s]	\hat{a} [9,81/s ²]
V	L												
	I												
	II												
0	I												
	II												
	III												
1	I												
	II												
	III												
2	I												
	II												
	III												
3	I												
	II												
	III												

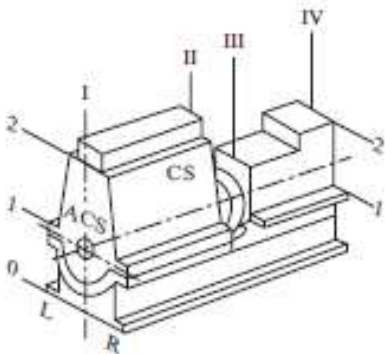
Components												
Turbo-charger												
Governor												
Tacho												
Miscellaneous												

Shipyard	Owner	Surveyor
(Name)	(Name)	(Name)

Annex A Example Forms

4.4.14 A.E Vibration Measurement

Water depth : [m] Draught : [m] fore : [m] aft : [m] midship : [m] State of wind: direction/force : [°; Bf] State of sea: direction/ : [°; m] wave height H ½ : [°; m]	Particulars for the Trial Propulsion power P/S : [kW] Propeller revolutions P/S : [min ⁻¹] Propeller pitch P/S : Ship's speed P/S : [kn]
---	---



Measuring side L (left) ☐
 R (right) ☐

Measurement

- vertical

V	0	Foundation top plate
1		Engine base plate
2		Upper edge of frame casing
- longitudinal L

I		ACS (anti couplingside)
II		CS (coupling side)
III		CS (generator)
IV		ACS (generator)

Measuring Points		X				Y				Z			
		s	V	V _{eff}	â	s	V	V _{eff}	â	s	V	V _{eff}	â
V	L	[mm]	[mm/s]	[mm/s]	[9,81/s ²]	[mm]	[mm/s]	[mm/s]	[9,81/s ²]	[mm]	[mm/s]	[mm/s]	[9,81/s ²]
0	I												
	II												
	III												
	IV												
1	I												
	II												
	III												
	IV												
2	I												
	II												
	III												
	IV												

Components													
Turbo-charger													
Governor													
Tacho													
Miscellaneous													

Shipyard	Owner	Surveyor
(Name)	(Name)	(Name)

4.4.12 Air Flow Capacity Measurement

Ambient conditions: Outside temperature [°C] Barometric press. [hPa] Rel. humidity [%]		Rate of speed: Harbour <input type="checkbox"/> Manoeuvring <input type="checkbox"/> Sea <input type="checkbox"/>			
Rooms:		Room No.:	Room No.:	Room No.:	Room No.:
1. Room data					
• Volume	m ³				
• Temperature	°C				
• Rel. humidity	%				
2. Ventilators					
• Number					
• Design					
• Operation mode					
• Capacity	m ³ /h				
3. Measurements					
• Meter (gauge)					
– Maker					
– Design					
– Calibration					
• Nominal capacity	m ³ /h				
• Measured capacity	m ³ /h				
• Air change ratio	m ³ /h				
Remarks: 					
Shipyard		Owner		Surveyor	
(Name)		(Name)		(Name)	

Annex A Example Forms

4.4.13 Propeller Shaft/Hull Electric Potential Measurement

Water depth	:	[m]	
Draught fore	:	[m]	
aft	:	[m]	
midship	:	[m]	
State of wind: direction/force	:	[°; Bf]	
State of sea: direction/ wave height H ½	:	[°; m]	
1	Earthing device(s) Propeller shafting/hull		
	• Manufacturer		
	• Brush cross - sectional area	[mm ²]	
	• Cable cross - sectional area	[mm ²]	
	• Rating limit (given data)	[mV]	
	• Local indication		<input type="checkbox"/>
	• Limit monitoring		<input type="checkbox"/>
2	Limiting conditions		
	• Sea water		<input type="checkbox"/>
	• Brackish water		<input type="checkbox"/>
	• Fresh water		<input type="checkbox"/>
3	Electric potential measurement		
	• Position of measuring point		
	• Carried out by		
	• Prop. shaft revolutions P/S	[min ⁻¹]	
4	Results		
	• Earthing device(s) engaged	[mV]	
	• Earthing device(s) disengaged	[mV]	
Remarks:			
Shipyard		Owner	Surveyor
(Name)		(Name)	(Name)

Annex A Example Forms

4.5 Astern Speed Trial

Water depth : [m] Draught fore : [m] aft : [m] midship : [m] State of wind: direction/force : [°; Bf] State of sea: direction/ wave height H $\frac{1}{3}$: [°; m]	Minimum Requirements: – Duration 10 min. – Propeller revolutions: 70 % of n_{nominal}									
1. Relevant operational data		Remarks:								
• Output P/S [kW] • Engine revolutions P/S [min ⁻¹] • Propeller revolutions P/S [min ⁻¹]	<table border="1"> <tr><td> </td></tr> <tr><td> </td></tr> <tr><td> </td></tr> <tr><td> </td></tr> <tr><td> </td></tr> </table>									
2. Data recording		Remarks:								
• Main engine(s) – level of exhaust gas temperature [°C] – max. exhaust gas temperature [°C] • Thrust bearing temperature [°C] • Stern tube temperature [°C]	<table border="1"> <tr><td> </td></tr> <tr><td> </td></tr> <tr><td> </td></tr> <tr><td> </td></tr> <tr><td> </td></tr> </table>									
3. Vibration behaviour (visual assessment)	Results	Remarks:								
• Propulsion unit • Shaft generator(s) • Piping systems • Auxiliary boiler • Exhaust gas boiler / heater • Steering gear • Other relevant components	<table border="1"> <tr><td> </td></tr> <tr><td> </td></tr> <tr><td> </td></tr> <tr><td> </td></tr> <tr><td> </td></tr> <tr><td> </td></tr> <tr><td> </td></tr> <tr><td> </td></tr> </table>									
Shipyard	Owner	Surveyor								
(Name)	(Name)	(Name)								

4.6 Redundant Propulsion Systems

Class Notation	Specification of Redundancy		
RP1 x%	<ul style="list-style-type: none"> At least 2 independent propulsion machines and auxiliary systems. No redundancy for propeller, shaft system, gearbox and steering system. 		
RP2 x%	<ul style="list-style-type: none"> At least 2 independent complete propulsion and steering systems. 		
RP3 x%	<ul style="list-style-type: none"> At least 2 independent complete propulsion and steering systems installed in separate compartments. 		
The index x% defines what percentage of the main propulsion power is available as redundancy (the engine with the lower power value to be taken into account).			
	Test Item:	Confirmed:	Criterion to be achieved:
1	Speed test with one propulsion machine/system in service. (If power ratings are not identical, the test to be performed with propulsion machine/system with lower power rating)	_____ kn	≥ 7 kn or ½ design speed (the lower value to be applied)
2	Load test with one propulsion machine/system in service. (If power ratings are not identical, the test to be performed with propulsion machine/system with lower power rating)	_____ kW = _____ %	Specified index x%
3	Emergency operation from local engine room control panel. (cut-off remote control system)		Capability of local emergency
4	Starting up of redundant propulsion machine/system in stand-by. (failure simulation and break-down of one propulsion machine/system)		Starting-up of redundant machine/system within
5	Blackout simulation and re-starting up of one propulsion machine/system.		Independent capability of re-start of redundant machine/system
6	For redundant steering systems only: One redundant steering system must be blocked at maximum deflection.		Steering capability at maximum deflection
Note: <ul style="list-style-type: none"> Further tests to be performed during sea trials. The test program based on failure mode and effects analysis (FMEA) to be submitted for approval prior to sea trials. 			
Shipyard		Owner	Surveyor
(Name)		(Name)	(Name)

4.7 Dynamic Positioning Systems

No.	Test Item:	Confirmed:	Criterion to be achieved:
1	For any ship with DP notation, tests to be performed during sea trial according to DP system maker's program.		Accordance
2	Performance of dynamic positioning system in case of failure. To be demonstrated for DP 2 and DP 3 ships only. (failure simulation and break down of any propulsion machine/system and generator/switchboard)		Not interrupt
<p>Note:</p> <ul style="list-style-type: none"> For DP 2 and DP 3 ships the test program based on failure mode and effects analysis (FMEA) is to be submitted for approval prior to sea trials. 			
Shipyard		Owner	Surveyor
(Name)		(Name)	(Name)

Annex A Example Forms

F.5 Inspection after sea trial

5.1 Inspection after sea trial – propulsion plan

Water depth	:	_____	m		
Draught	:	_____			
fore	:	_____	m		
after	:	_____	m		
midship	:	_____	m		
Item			Date	Results	Remarks
1.	Main Engine (s)				
	- Crank web deflection (hot engine)				
	- Crankcase inspection				
	- Cams and roller				
	- Pistons/ piston rods (connecting rod)				
	- Exhaust valve				
	- Lubrication oil filter				
	- Crank pin bearings				
	- Main bearings				
	- Cross head bearings				
2.	Main gear				
	- Tooth contact pattern				
	- Lubrication oil filter				
3.	Shafting				
	- Bearing reaction force				
	- Lubrication oil sample of stern tube(s)				
Shipyard			Owner		Surveyor
(Name)			(Name)		(Name)

Water depth : _____ m				
Draught : _____				
fore	: _____ m			
after	: _____ m			
midship	: _____ m			
Item		Date	Results	Remarks
1.	Diesel generators			
	- Crank web deflection (hot engine)			
	- Crankcase inspection			
	- Lubrication oil filter			
	- Miscellaneous			
2.	Auxiliaries boiler unit			
	- Feedwater sample			
	- Thermal oil sample			
	- Miscellaneous			
3.	Other units/components			
	-			
	-			
	-			
	-			
	-			
	-			
	-			
	-			
	-			
	-			
	-			
Shipyard		Owner		Surveyor
(Name)		(Name)		(Name)

Annex B Explanatory Notes

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A. Turning Test

1. General

The turning test is a test to verify the ship's turning ability

This test includes both the right turning test and left turning test.

2. Testing Method

While the ship is running ahead at test speed, the ship is steered to the maximum rudder angle (this angle not to exceed 35°). The rudder angle is kept until the ship turn 360°.

Where deemed necessary as a result of considering the effects of wind, waves, or currents, the turning test may be continued until the ship turns 720°

3. Measurement Method

The ship speed and/or turning rate as well as the elapsed time are measured when the heading angle reaches 0, 5, 15, 30, 60, 90, 120, 150, 180, 210, 240, 270, 300, 330, and 360 degrees.

Where the ship continues for a 720° turn, the measurements specified above are taken every 30° after the 360° turn is made.

Where a differential global positioning system (herein after referred to as "DGPS") or doppler log is used for measurement, this equipment is to be appropriately calibrated, and the ship's position, ship speed and elapsed time at each heading angle are measured.

4. Measurement Items and Report

4.1 The following items are to be measured (see Fig. 1)

- Ship speed at the beginning and the end of the test
- Advance 1) and 3) in the figure, actual diameter 2) and 4) in the figure and transfer 5) and 6) in the figure
- Where the ship continues for a 720° turn, the advance, tactical diameter, and transfer of the first and second turns are to be measured separately.
- The elapsed time for the ship to turn 360° (where the ship continues on for a 720° turn, separate times for each 360° turn).
- Number of main engine revolutions at the beginning and the end of the test.

A figure indicating the ship track as shown in Fig. 1 and the measurement items specified in 4.1 are to be reported in the results of the sea trial. The distances shown in the figure are to be measured in ship lengths.

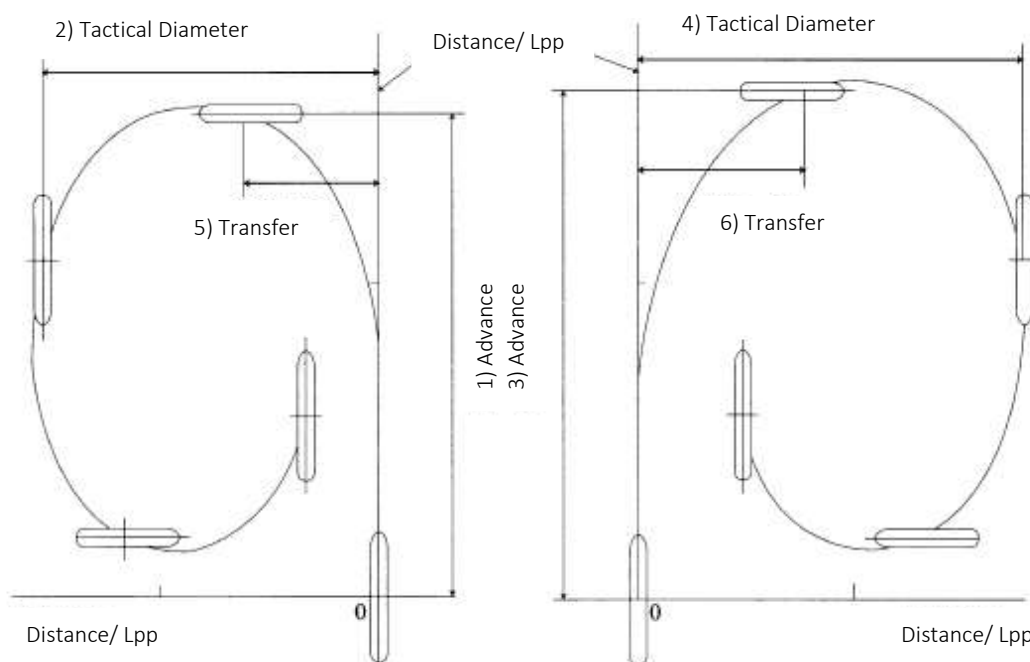


Fig. 1 – Turning Test

B. Stopping Test

1. General

The stopping test is a test to verify the ship's stopping ability

2. Testing Method

While the ship is running ahead at test speed, an order for full astern is issued, and the reversing operation from ahead run to full astern run is carried out as soon as possible. The test is continued until the speed of the ship against the water has become 0.

The rudder is to be kept at the mid position during the test

3. Measurement method

The ship speed, heading angle and the ship track are to be measured at constant intervals.

Where a DGPS or doppler log is used for the measurement, this equipment is to be appropriately calibrated, and the ship's position and ship speed are to be measured at constant intervals.

4. Measurement items and report

4.1 The following items are to be measured (see Fig.2)

- Ship speed at the beginning of the test.
- Number of main engine revolutions at the beginning, at the time when the full astern is ordered, and at the end of the test

- c) Track reach 1) in the Figure, stopping distance 3) in Figure, lateral deviation 2) in the Figure, and change of ship speed at constant intervals.
- d) The elapsed time for the ship after the full astern order.

A figure indicating the ship track as shown in Fig. 2 and the measurement items specified in 4.1 are to be reported in the results of the sea trial. The distances shown in the figure are to be measured in ship lengths

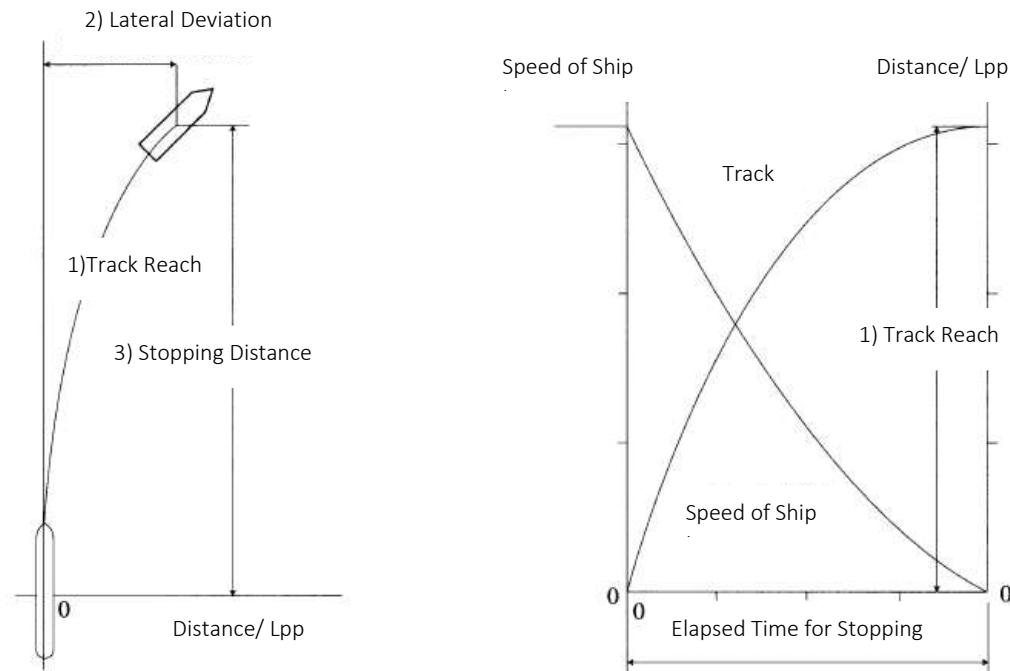


Fig. 2 – Track Chart of Stopping Test

C. Initial Turning Test

1. General

- The initial turning test is a test to verify the ship's initial turning ability.
- This test includes both right turning and left turning tests.
- This test may be conducted at the 10/10-degrees zigzag test.

2. Testing method

While the ship is running ahead at test speed, the rudder angle is changed 10° to one side. This rudder angle is kept until the ship turns 10° from the original course.

Where this test is conducted as part of the 10/10-degrees zigzag test, the testing method is to be in accordance with zigzag test

3. Measurement method

The ship speed, heading angle and number of main engine revolutions are to be measured at constant intervals, as are the elapsed time and distance travelled by the ship to change its heading to 10° from the original course.

Where DPGS or doppler log is used for measurement, this equipment is to be appropriately calibrated, and the ship's position and speed are to be measured at constant intervals.

4. Measurement items and report

4.1 The following items are to be measured (see Fig. 3)

- Ship speed at the beginning and the end of the test
- Number of main engine revolutions at the beginning and the end of the test
- Travelling distance from the original course.
- The elapsed time (t_{a1} in Fig. 3) for the ship's heading angle to change 10° from the original course.

A figure indicating the ship track as shown in Fig. 3 and measurement items specified in 4.1 are to be reported in the results of the sea trial. However, where this test is conducted as a part of the 10/10-degree zigzag test specified in zigzag test, this figure indicating the ship track may be dispensed with.

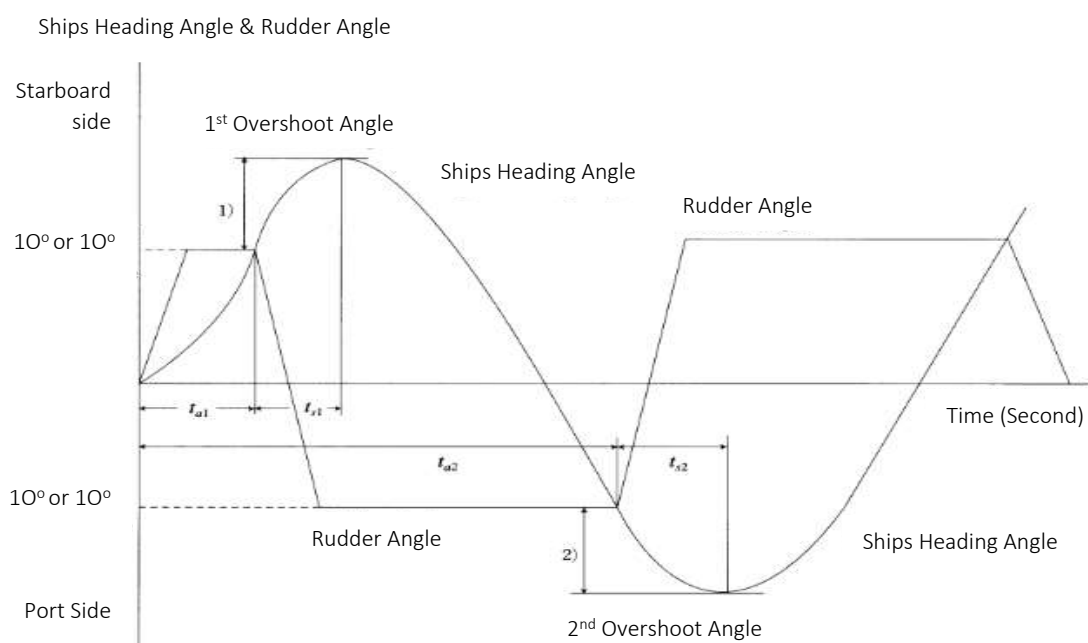


Figure. 3 – Zigzag Test

D. Zigzag Test

1. General

- The zigzag test is a test to verify the ship's yaw checking and course keeping ability
- This test includes both right turning and left turning test
- This test consists of the 10/10 degrees zigzag test and the 20/20 degrees zigzag test.

2. Testing method

The 10/10 degrees zigzag test

2.1 The 10/10 degrees zigzag test is carried out as follows :

- While the ship is running ahead at test speed, the rudder angle is changed to 10° starboard (or port)

- b) When the ships heading reaches 10° starboard (or port) from the original course, the rudder angle is changed to 10° port (or starboard)
- c) When the ships heading reaches 10° port (or starboard) from the original course, the rudder angle is achanged to 10° starboard (or port)
- d) The ship is returned to its original course

2.2 The 20/20 degrees zigzag test

- a) While the ship is running ahead at test speed, the rudder angle is changed to 20° starboard (or port)
- b) When the ships heading reaches 20° starboard (or port) from the original course, the rudder angle is changed to 20° port (or starboard)
- c) The ship is returned to its original course

3. Measurement Method

The ship speed, heading angle and number of main engine revolutions are to be measured at constant intervals, as are the elapsed time and distance travelled for the ship to change its heading to 10° from the original course

Where a DGPS or doppler log log is used for measurement, this equipment is to be appropriately calibrated, ships position and speed are to be measured at constant intervals.

4. Measurement items and report

4.1 The following items for the 10/10 degrees zigzag are to be mesured (see [figure 3](#))

- a) Ship speed at the beginning and the end of the test
 - b) Number of main engine revolutions at the beginning and the end of the test
 - c) Elapsed time (t_{a1} and t_{a2} in the figure) and distance travelled for the ship to change its heading to 10 degrees from the original course
 - d) 1st overspeed angle 1) in the figure
 - e) Elapsed time (t_{a1} and t_{a2} in the figure) from when the overshoots the 10 degree heading until when the ship starts turning in the opposite direction
 - f) 2nd overshoot angle 2) in the figure
- 2) In the 20/20 degrees zigzag test, measurement items specified in [1\)](#) are to be read 20 degrees instead of 10 degrees, except 6)
- 3) A figure indicating the time history of rudder angle and ships heading as shown in [Fig. 3](#) and measurement items specified in [1\)](#) and [7\)](#) are to be reported in the results of the sea trial.

E. Spiral Manoeuvre Test

1. General

The spiral manoeuvring test is a test to verify the ship's course keeping ability by using the unstable loop width obtained from the yaw rate -rudder angle curve shown in [Fig. 4](#)

The spiral manoeuvring test includes the direct spiral spiral manoeuvre test, reversed spiral manoeuvre test, and simplified spiral manoeuvre test

2. Direct spiral manoeuvre test

1) Testing Method

- While the ship is running ahead at test speed, the rudder angle is changed to 15 degrees starboard (or port) and held until the yaw rate remains constant for approximately one minute. The rudder angle is decreased in 5 degrees increment, and is held at each increment until a constant yaw rate is obtained

2) Measurement method

- At each rudder angle, the ship speed and yaw rate are measured

3) Measurement item and report

- i) The following items are to be measured
 - Rudder angle
 - Ship speed and yaw rate at each rudder angle
 - Elapsed time for until the yaw rate becomes steady state after the ship is steered
- ii) The yaw rate – rudder angle curve as shown in Fig.4 and the measurement items specified in i) are to be reported in the results of the sea trials

3. Reversed spiral manoeuvre test

1) Testing method

- While the ship is running ahead at test speed, the rudder angle is changed to over 15 degrees starboard (or port) and held until a constant yaw rate is obtained. A new yaw rate is then selected and the rudder angle is changed accordingly (lesser angle) causing the ship to ease out of the turn slightly. This is repeated until 15 degrees port (or starboard) is attained. The mean rudder angle required to produce this yaw rate is measured, and the yaw rate – angle curve is created as shown in Fig.4

2) Measurement method

- At each specific yaw rate, ship speed and rudder angle are measured

3) Measurement items and report

- i) The following items are to be measured
 - Yaw rate
 - Ship speed and rudder angle at each yaw rate
- 4) The yaw rate - rudder angle curve as shown in Fig.4 and measurement items specified in i) are to be reported in the result of the sea trials

4. Simplified spiral manoeuvre test

1) Testing method

- While the ship is running ahead at test speed, the ship is steered to the maximum rudder angle until a constant yaw rate is obtained. The rudder angle is then brought to zero until the yaw rate returns to zero., the ship is stable and the test may be terminated. If the ship does not return to zero yaw rate, the ship is steered to half of the following angles in the opposite direction until the yaw rate stabilizes at zero.
- $L/V < 9s$ 0 degrees
- $9 \leq L/V < 45s$ $\{-3+1/3 \cdot (L/V)\}$ degrees
- $L/V \geq 45s$ 12°

2) Measurement method

- Yaw rate, ship speed and rudder angle are measured
- 3) Measured item and report
 - i) The following items are to be measured
 - Yaw rate, maximum rudder angle, and ship speed when a constant yaw rate is obtained at the maximum rudder angle
 - Ship speed and yaw rate when the rudder is returned of the neutral position
 - Time taken to achieve a constant yaw rate after the rudder is returned to neutral position
 - Yaw rate, rudder angle, and ships speed for ships requiring steering in the opposite direction
 - ii) The yaw rate/ rudder angle relation curve and the measurement items specified in i) are to be reported in the results of the sea trials

F. Pull out Manoeuvre Test

1. Testing method

After the turning test is completed, the rudder angle is returned to zero degrees, and held until a steady yaw rate is obtained.

2. Measurement Method

Yaw rate and ship speed are measured at constant intervals.

3. Measurement Items and Report

3.1 The following items are to be measured.

- Yaw rate at constant interval
- Ship speed and rudder angle

3.2 The yaw rate time history curve as shown in [Fig.5](#) and the measurement items specified in [3.1](#) are to be reported in the result of the sea trial.

G. Modified Zigzag Test

The modified zigzag test is a modified version of the 10/10-degrees zigzag test and 20/20-degrees zigzag test specified in [Guidance for the Test of Ship Manoeuvrability](#) that is conducted at 10/20-degrees. The testing method and measurement items are to be in accordance with zigzag test, [Guidance for the Test of Ship Manoeuvrability](#).

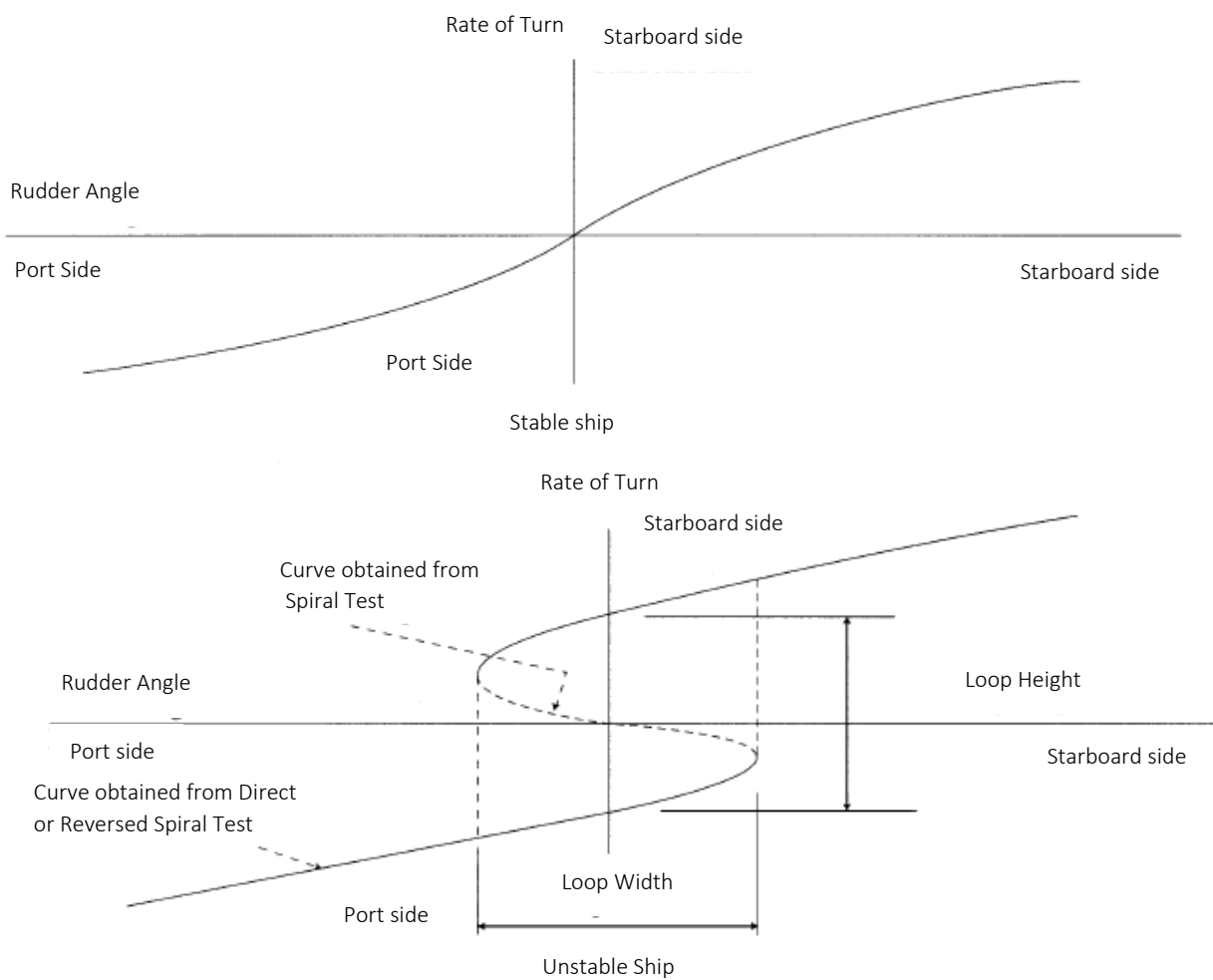


Fig. 4 Spiral Manoeuvre Test

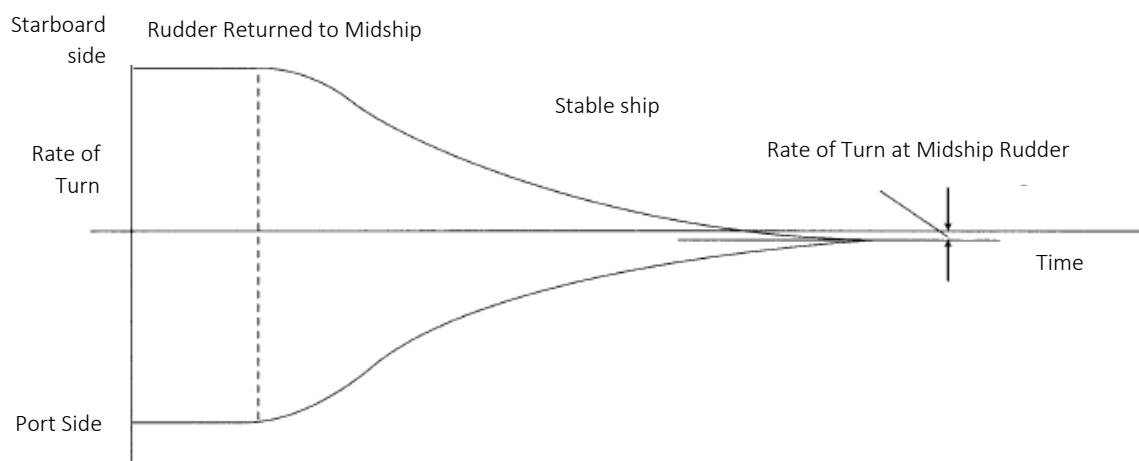


Fig. 5a. Pull out Manoeuvre test

Annex B Explanatory Notes

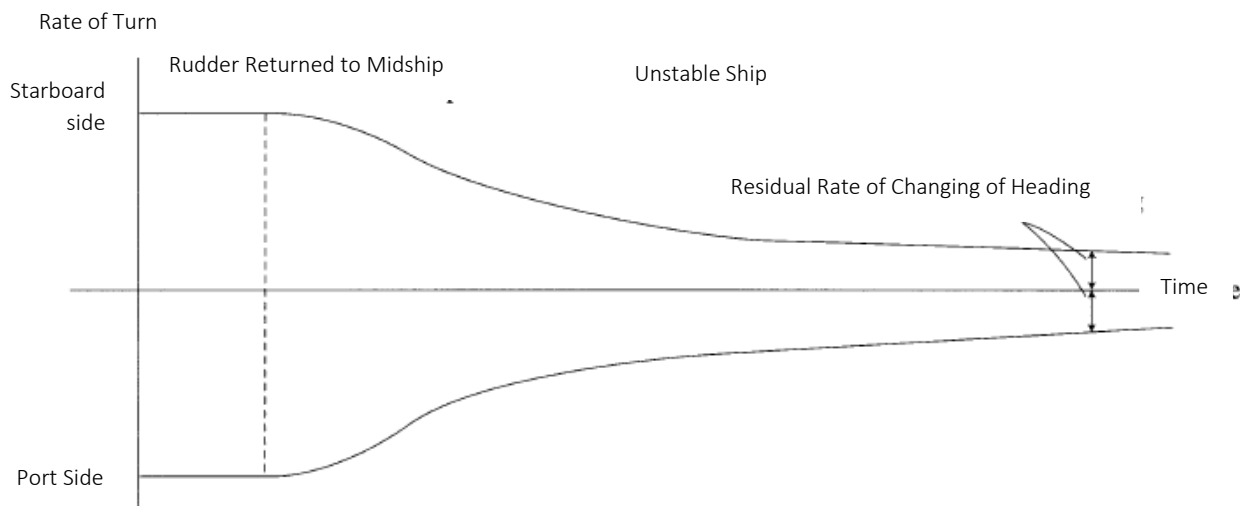


Fig. 5a. Pull out Manoeuvre test

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