

# NAVAL TRIALS AND ACCEPTANCE AUTHORITY



## COMPREHENSIVE SHIP'S ENGINEERING SYSTEMS TRIAL PROTOCOLS



### P-25 & 25A CORVETTE

Mar 2021

Ver 1.0



**Commodore Sandeep Puri**  
**Director General**



**Naval Trials and Acceptance Authority**

### **FOREWORD**

1. A new Maintenance-Training-Operations Drawdown cycle has been introduced for transition of ships from refits to operations and has been brought into effect wef 01 Aug 17. As part of this new philosophy, a drawdown phase has been instituted at the beginning of the refit of all ships. This period is envisaged to ensure timely completion of all preparatory activities towards commencement of refit on DSD.
2. The earlier system of trials laid more thrust on assessment of performance of an equipment, normally in a stand-alone mode rather than assessing performance of the complete system, in its entirety. This led to inability in establishing datum for assessing performance of a system, before refit as well as after refit. Consequently, it became difficult to comprehensively identify existing defects which affect performance of the equipment as well as the system. Therefore, meaningful review of scope of work becomes equally challenging.
3. A major change brought in by NATAA post implementation of draw down phase is the trials of engineering systems onboard ships as part of PRT and PST. The equipment-centric trials have been graduated to next level, i.e., to system-centric level wherein the equipment and systems are checked in a comprehensive manner, in scenarios as close to real life situations, as possible.
4. In order to make trials system-centric, there was a need to re-define the scope of these trials. Comprehensive trial Protocols, covering checks of every component of the system was formulated by NATAA/ MTU (Vizag) with inputs taken from ship as well as by referring to system documentation. The Comprehensive System Trial Protocol booklet of P-25 & 25A - Corvette has been prepared so as to undertake trials of ship systems during Pre/ Post refit. The booklet has been compiled in such a way that it gives all the necessary inputs to the trial representative and ship staff to undertake trials in totality, i.e., methodology of capacity trials, checks of components, functionality checks etc.
5. I take this opportunity to thank all concerned especially MTU (Vizag) whose efforts have gone in for preparation and formulation of this Comprehensive Trial Protocol.

Place : Mumbai  
Date : Mar 2021

(Sandeep Puri)  
Commodore  
Director General

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**SECTION I**

**Test and Trial Document for  
Fuel Filling and Transfer System  
Trial Schedule Reference No. - P25/P25A/System/Fuel**

**1. Fuel system consist of following:-**

- (a) The Ship has a total fuel carrying capacity of 120.68 tons. The fuel system consists of 01 triple screw position fuel transfer pump of 15 TPH capacity fitted in Main Engine Room.
- (b) 10 fuel storage tanks. Further, there are 02 RU tanks in FDA (for Port, Stbd & Center DA's), 02 service tanks for Main Engines in MER and 01 RU tank for Aft DA in Aft DA compartment. One header tank of capacity 1500 Ltr is located in FDA compartment.
- (c) 02 FO purifiers of capacity 9500 Ltr/hr (fitted in FDA & Aft DA) provided for purification of fuel from storage tank and supply to service tanks in MER.
- (d) 02 fuel receiving points provided on upper deck, 01 on RAS deck (port side) for fuelling at sea and 01 on foxle for fuelling/defueling at harbour.

**TRIALS – SHEET**

**Fuel Filling and Transfer System**

1. **Fuel Transfer Pump.**

(a) **Carry out following checks before starting the pump.**

<b><u>SNo</u></b>	<b><u>Description</u></b>	<b><u>Remarks</u></b>
(i)	Check pipe system is clean and clear from obstruction.	
(ii)	Prime the pump with fuel oil drawn from the supply system to ensure that the pump will not run in a dry unlubricated condition.	
(iii)	Rotate the pump, by hand, in direction indicated on the driving end cover.	
(iv)	Check that the functional position of all valves should correspond with the valve position indicators.	
(v)	Check that all valves are in the open position.	
(vi)	Start the pump and check correct rotation.	

(b) **Carry out following checks while pump is running.**

(i) **Performance Checks.** Checks of both pumps are to be carried out as per the trials schedule.

(ii) **Capacity Trials.** Pump capacity to be ascertained by transfer of fuel from storage tank no.1 to storage tank no.2 and vice versa with both pumps one by one. The initial sounding of the tanks is required to be recorded. Capacity is to be calculated by transfer of fuel for 30 minutes and measuring the physical sounding level. The average of both capacity readings (measured in both directions) should be taken as pump capacity. If tank no. 1 & 2 are not available, then tank no. 3 & 4 are to be utilised. Capacity is to be calculated in TPH. The rated capacity of the fuel transfer pumps is 15 TPH.

(aa) **Transfer from Tank no. \_\_\_\_\_ to Tank no. \_\_\_\_\_.**

<b><u>SNo</u></b>	<b><u>Description</u></b>	<b><u>Unit</u></b>	<b><u>Initial reading</u></b>	<b><u>Final reading</u></b>	<b><u>Resultant</u></b>

(i)	Sounding of Tank from which fuel transfer is carried out	Tons			
(ii)	Sounding of Tank to which fuel is transferred	Tons			
(iii)	Time of transfer	Hrs			

**Capacity 1 = Amount of fuel transferred in Tons/ Time taken in hrs**

(ab) Transfer from Tank no. \_\_\_\_\_ to Tank no. \_\_\_\_\_.

<b><u>SNo</u></b>	<b><u>Description</u></b>	<b><u>Unit</u></b>	<b><u>Initial reading</u></b>	<b><u>Final reading</u></b>	<b><u>Resultant</u></b>
(i)	Sounding of Tank from which fuel transfer is carried out	Tons			
(ii)	Sounding of Tank to which fuel is transferred	Tons			
(iii)	Time of transfer	Hrs			

**Capacity 2 = Amount of fuel transferred in Tons/ Time taken in hrs.**

**Final capacity =  $\frac{\text{Capacity 1} + \text{Capacity 2}}{2}$**

2. **Motor.** Performance Checks, SPM, Vibration and attenuation to be checked as per trials schedule & following checks as per ETMU trials protocol.

<b><u>SNo</u></b>	<b><u>Description</u></b>	<b><u>Reading</u></b>	<b><u>Remarks</u></b>
(a)	Starting current		
(b)	Running current		
(c)	Insulation		
(d)	Starter calibration checks		

### 3. **Fuel Centrifuge.**

- (a) **Performance.** Trials to be carried out as per trials schedule.
- (b) **Capacity trials.** Centrifuge capacity to be ascertained by transfer of fuel from storage tank no.1 to Fuel oil service tank no.1 or no.2 in MER

with both purifiers one by one. The discharge valve of the centrifuge is to be in fully open position. The initial sounding of the tanks is required to be recorded. Capacity to be calculated by transfer of fuel for 30 minutes and measuring the physical sounding level. If storage tank no.1 is not available, then other available storage tank to be utilised. Capacity to be calculated in TPH.

<b><u>SNo</u></b>	<b><u>Description</u></b>	<b><u>Unit</u></b>	<b><u>Initial reading</u></b>	<b><u>Final reading</u></b>	<b><u>Resultant</u></b>
(i)	Sounding of Tank from which fuel transfer is carried out	Tons			
(ii)	Sounding of Tank to which fuel is transferred	Tons			
(iii)	Time of transfer	Hrs			

**Capacity = Amount of fuel transferred (purified) in Tons/ Time taken in hrs**

#### 4. **Pre Requisite Check – Off List for System Trials.**

<b><u>SNo</u></b>	<b><u>Description</u></b>	<b><u>Status (Sat/Unsat)</u></b>	<b><u>Remarks</u></b>
(a)	Any modifications as part of refit have been incorporated in the drawings. Applicable in case of ABER/ MLU replacement of item.  (NA for PRT)	Fuel Transfer Pump (FDA Compartment)  Purifier no.1  Purifier no.2	
(b)	Pressure gauges and thermometers have been calibrated and red marked, indicating the working pressure of the system.  (NA for PRT)	Pump suction pressure gauge  Pump discharge pressure gauge  Purifier (1 & 2) feed pump suction gauges  Purifier (1 & 2) feed pump discharge gauges  Purifier (1 & 2) outlet pressure gauges  Other gauges	
(c)	Any major modifications / A's and A's in system as part of refit has been incorporated in the reference		

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<b><u>SNo</u></b>	<b><u>Description</u></b>	<b><u>Status</u></b> <b>(Sat/Unsat)</b>	<b><u>Remarks</u></b>
	drawings. (NA for PRT)		
(d)	All FO storage and service tanks have been cleaned/inspected and cleared by respective agencies and are ready to receive fuel oil. (NA for PRT)	Storage tank no.1 Storage tank no.2 Storage tank no.3 Storage tank no.4 Storage tank no.5 Storage tank no.6 Storage tank no.7 Storage tank no.8 Storage tank no.9 Storage tank no.10 Fuel oil service tank Port (MER) Fuel oil service tank Stbd (MER) FDA service tank (Port) FDA service tank (Stbd) Aft DA service tank	
(e)	Sufficient lights available.		
(f)	Communication available between pump control position and tanks. (Motorola)		
(g)	Test area is cleaned.		
(h)	All the pipes are properly supported with clamps.		
(j)	Talley plates are fitted on all valves, cocks and gauges.		
(k)	Portable Fire Fighting extinguishers are placed as per CNAL.		
(l)	Air escape pipes of all FO tanks are open/clear of any obstruction (prior to filling of Tanks).	Storage tank no.1 Storage tank no.2 Storage tank no.3 Storage tank no.4 Storage tank no.5	

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<b><u>SNo</u></b>	<b><u>Description</u></b>	<b><u>Status</u></b> <b>(Sat/Unsat)</b>	<b><u>Remarks</u></b>
	Storage tank no.6		
	Storage tank no.7		
	Storage tank no.8		
	Storage tank no.9		
	Storage tank no.10		
	Fuel oil service tank Port (MER)		
	Fuel oil service tank Stbd (MER)		
	FDA service tank (Port)		
	FDA service tank (Stbd)		
	Aft DA service tank		

5. **System Trials.**

(a) **Piping.** Visual checks of following components are to be carried out for any leakages or damage.

<b><u>SNo</u></b>	<b><u>Description</u></b>	<b><u>Status</u></b> <b>(Sat/Unsat)</b>	<b><u>Remarks</u></b>
(i)	Compensators		
(ii)	Flange-connections		
(iii)	Gaskets		
(iv)	Adapters		
(v)	Suction strainers - for cleanliness and correct fittings	Fuel Transfer Pump	
		Purifier feed pump no.1	
		Purifier feed pump no.2	
(vi)	System Integrity checks - For any type of leakages. (To be undertaken at working pressure during normal operation of system).		
(vii)	Supporting clamps - Sufficient supporting clamps to be provided at regular intervals as per NES 865. Clamps should have rubber inserts and adequate fasteners. End connection of supporting frame should have rigid support.		

(b) **Valves.** Visual and operational checks of following valves are to be carried out. Operate the valves through their complete range of operations to ensure that the valve position indicator moves with the valve.

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<b>SNo</b>	<b>Description</b>		<b>Status</b> <b>(Sat/Unsat)</b>	<b>Remarks</b>
(i)	Pump suction valves.	Fuel Transfer Pump		
		Purifier feed pump no.1		
		Purifier feed pump no.2		
(ii)	Pump discharge valves.	Fuel Transfer Pump		
		Purifier feed pump no.1		
		Purifier feed pump no.2		
(iii)	Tank filling valves.	Storage tank no.1		
		Storage tank no.2		
		Storage tank no.3		
		Storage tank no.4		
		Storage tank no.5		
		Storage tank no.6		
		Storage tank no.7		
		Storage tank no.8		
		Storage tank no.9		
		Storage tank no.10		
		Fuel oil service tank Port (MER)		
		Fuel oil service tank Stbd (MER)		
		FDA service tank (Port)		
		FDA service tank (Stbd)		
(iv)	Tank de-filling valves.	Aft DA service tank		
		Storage tank no.1		
		Storage tank no.2		
		Storage tank no.3		
		Storage tank no.4		
		Storage tank no.5		
		Storage tank no.6		
		Storage tank no.7		
		Storage tank no.8		
		Storage tank no.9		
		Storage tank no.10		
		Fuel oil service tank Port		

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<u>SNo</u>	<u>Description</u>	<u>Status</u> (Sat/Unsat)	<u>Remarks</u>
	(MER)		
	Fuel oil service tank Stbd (MER)		
	FDA service tank (Port)		
	FDA service tank (Stbd)		
	Aft DA service tank		
(v)	Main fuelling valves (fitted on upper deck).	RAS deck (Port side) Foxle	
(vi)	Isolating valves.	AC Compartment SS Dining Hall	
(vii)	Quick - shut off valve operation from DCHQ.	DA RU Tank (Port) DA RU Tank (Stbd) MER Service Tank (Port) MER Service Tank (Stbd) Aft DA RU Tank	
(vii)	Service tank filling and suction valve.	DA RU Tank (Port) DA RU Tank (Stbd)  MER Service Tank (Port)  MER Service Tank (Stbd)  Aft DA RU Tank	
(viii)	Purifier feed pump suction and discharge valves.	Feed pump (FDA) Feed pump (ADA)	
(ix)	Purifier system inlet, outlet, isolating and service tank filling valves.		

(c) **Tanks.** Visual/ functional checks are to be carried out for the following. Test certificate to be obtained as applicable.

<u>SNo</u>	<u>Description</u>	<u>Status</u> (Sat/Unsat)	<u>Remarks</u>
(i)	Sounding tube and sounding tapes – Volumetric marking on sounding chart to be cross checked with sounding tape markings during fuelling. Intactness of sounding tape and tube to be checked during tank cleaning activity.		

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<b><u>SNo</u></b>	<b><u>Description</u></b>	<b><u>Status</u></b> <b>(Sat/Unsat)</b>	<b><u>Remarks</u></b>
(ii)	Volumetric test - Test certificate to be obtained from respective agencies if tank geometry has been affected/ changed  (NA for PRT)		
(iii)	APT - Test certificate to be obtained from respective agencies.  (NA for PRT)		
(iv)	Sight glass (Only for FOST) – to be checked for volumetric marking and has to be cross checked by transfer of fuel from storage tank to service tanks.		
(v)	Paint scheme. As per Navy Order NO 56/16.  (NA for PRT)		
(vi)	Manhole door gaskets to be renewed.		

(d) **Instrumentation.** Visual/ functional checks are to be carried out for the following and test certificate to be obtained.

<b><u>SNo</u></b>	<b><u>Description</u></b>	<b><u>Status</u></b> <b>(Sat/Unsat)</b>	<b><u>Remarks</u></b>
(i)	<u>Pressure gauges.</u> All pressure and vacuum gauges in the system and equipment to be checked for functionality and operation. Pressure gauge marking for operating range to be completed. Calibration certificates to be provided (NA for PRT). Valves in gauge line and on the pressure gauge are to be checked for functionality and operation.	Pump suction pressure gauge Pump discharge pressure gauge FDA Purifier feed pump suction gauge FDA Purifier feed discharge gauge ADA Purifier feed pump suction gauge ADA Purifier feed pump discharge gauge FDA & ADA Purifier outlet pressure gauge Other gauges Storage tank no. 2 level sensor Storage tank no. 3	

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<b><u>SNo</u></b>	<b><u>Description</u></b>	<b><u>Status</u></b> <b>(Sat/Unsat)</b>	<b><u>Remarks</u></b>
	level sensor		
	Storage tank no. 4 level sensor		
	Storage tank no. 5 level sensor		
	Storage tank no.6 sensor		
	Storage tank no.7 sensor		
	Storage tank no.8 sensor		
	Storage tank no.9 sensor		
	Storage tank no.10 sensor		
	Fuel oil service tank Port (MER)		
	Fuel oil service tank Stbd (MER) sensor		
	FDA service tank (Port) sensor		
	FDA service tank (Stbd) sensor		
	Aft DA service tank sensor		
	Fuel purifier no.1 sensor (FDA)		
	Fuel purifier no.2 sensor (ADA)		
(iii)	<u>Gauge lines.</u> All gauge lines to be checked for proper fitting and leakages.		

- (e) **Foundation.** Visual checks of foundation are to be carried out ascertaining its condition. Remarks of foundation survey by Yard/ Ship Staff/ trial agencies needs to be cross checked for completion.

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<u>SNo</u>	<u>Description</u>		<u>Status</u> (Sat/Unsat)	<u>Remarks</u>
(i)	Foundation Fuel transfer pump FDA Purifier ADA Purifiers			

(f) **Mounting.** Condition, attenuation and grouping of mounts are to be checked. Mounts are to be replaced as per MAINTOP routines or on the basis of attenuation and physical condition.

<u>SNo</u>	<u>Description</u>		<u>Status</u> (Sat/Unsat)	<u>Remarks</u>
(i)	Mounting	Physical Condition		
		Attenuation		
		Service life as per MAINTOPS/OEM Doc.		

(g) **Functionality Checks.** Functionality checks of system (fuelling and defuelling lines) are to be carried out as follows:-

(i) **Fuelling.** Functionality checks/ Intactness of the fuelling line are to be checked during fuelling from barge/ ship at harbour.

(ii) **Defueling.** Intactness of the defueling line is to be checked during defueling to the barge/ ship at harbour before the ship goes under refit (during PRT).

<u>SNo</u>	<u>Description</u>	<u>Status</u> (Sat/Unsat)	<u>Remarks</u>
(i)	<b>Fuelling.</b> Functionality checks/ Intactness of the fuelling line are to be checked during fuelling from barge/ ship at harbour.		
(ii)	<b>Defueling.</b> Intactness of the defueling line is to be checked during defueling to the barge/ship at harbour before the ship goes under refit (during PRT).		
(iii)	Goose necks of foxle fuelling points (Port and Stbd) and pressure gauges are to be checked for proper fitment and working.		
(iv)	Foxle and RAS deck fuelling points (angle valve) are to be checked for proper fitment and intactness.		

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**SECTION II**

**Test and Trial Document for  
Compressed Air System**

**Trial Schedule Reference No. - P25/P25A/System/Compressed Air**

1. The HP air system consists of 03 (HPAC no.1, HPAC no.2 and DD Compressor) air compressors fitted in FDA, MER and AFT DA compartments respectively. All of them have similar kind of constructions and capacity. The compressors are of M/s JP Sauer & Sohn make, three staged intercooled type and develop pressure of 230 Bar. The details of the same are as follows:-

**Compressed Air System consists of following:-**

- (a) **HPAC No.1.** One HPAC is fitted in FDA compartment to provide Starting air (10 Bar) for all three DAs. In FDA compartment 03 HP air bottles of 106 Ltrs capacity are fitted. Two bottles provide DA starting air and third bottle is for supply air to Siren and other auxiliaries viz Siren (5 Bar), Shaft break (90 bar), Positive E cooling (04 Bar) and for AK 630 & AK 176 guns operation.
- (b) **HPAC No.2.** One HPAC is fitted in MER compartment on the Stbd side. Two bottles of capacity 258 Ltrs are installed for supplying starting air for Main Engines (30 Bar).
- (c) **Diesel Driven Air Compressor.** One DD compressor is fitted in Aft DA compartment for emergency purpose. The compressor is similar to HPAC 01 & 02 in capacity, make and model. It charges Aft DA compartment air bottle of capacity 106 ltrs.
- (d) **LP/Control Air Compressor.** One CAC of M/s Ingersol Rand is fitted onboard in Aft DA compartment for both Main Engines Controls (07 bar). In case of emergency, the LP air from starting air system can be provided to control air system through 30/7 bar reducer.
- (e) **Air Bottles.** There are two 258 ltrs capacity bottles fitted in MER and six 106ltrs capacity bottles in FDA compartment, MER lobby, armoury and Aft DA compartment.

**TRIAL SHEET**

**Compressed Air System**

**1. Pre Requisite Check – Off List for System Trials.**

(a) **Undertake following:-**

<b><u>SNo</u></b>	<b><u>Description</u></b>	<b><u>Status</u></b> <b><u>(Sat/Unsat)</u></b>	<b><u>Remarks</u></b>
(i)	Any modifications as part of refit are to be incorporated in the drawings. (Applicable in case of ABER/MLU replacement of item).  (NA for PRT)	HPAC no.1	
		HPAC no.2	
		DD compressor	
		CAC	
(ii)	Any major modifications / A's and A's in system as part of refit are incorporated in the reference drawings.  (NA for PRT)		
(iii)	Sufficient light available in compartment(s).		
(iv)	Communication available between compressor control position and at the location of the air bottles. (Motorola)		
(v)	Test area is cleaned.		
(vi)	All the pipes are properly supported with clamps.		
(vii)	Talley plates are fitted on all valves, cocks and gauges.		

**2. Starting Air Compressor.**

(a) **Carry out following checks before starting the compressor.**

<b><u>SNo</u></b>	<b><u>Description</u></b>	<b><u>Remarks</u></b>
(i)	Check pipe system is clean and clear from obstruction.	
(ii)	Check air intake filter for cleanliness, correct fitting and free from any type of obstruction.	
(iii)	Rotate the compressor, by hand, in direction indicated on the driving end cover.	
(iv)	Check air bottle drain valves are closed.	
(v)	Check air bottle inlet and outlet valves are opened.	

<b><u>SNo</u></b>	<b><u>Description</u></b>	<b><u>Remarks</u></b>
(vi)	Checks that all valves in the system are in open position.	
(v)	Check tightness of compressor foundation bolts.	
(vii)	Check sump oil level of compressor with the help of dip stick.	
(viii)	Check surrounding of compressor to be free from any type of obstruction.	
(ix)	Start the compressor and check correct rotation.	

(b) **Carry out following checks while compressor is running.**

(i) **Performance Checks.** Performance, Vibration, Attenuation checks of both SAC to be carried out as per the trials schedule.

(ii) **Capacity Trials.** Compressor capacity is to be ascertained by filling Starting air bottles (HP AIR bottle, 258 ltrs). Keep single HP air bottle in line with the respective compressor under test. Drain air bottle completely. Close the drain valve. Open air inlet vale and close outlet valve of air bottle. Start the compressor and note the starting time. Fill the reservoir up to 30 bars, stop the compressor and note down time. Capacity will be calculated in ltrs/min as per the designed capacity.

<b><u>SNo</u></b>	<b><u>Description</u></b>	<b><u>Unit</u></b>	<b><u>Initial reading</u></b>	<b><u>Final reading</u></b>	<b><u>Resultant</u></b>
(i)	Air bottle pressure	Bar			
(ii)	Time taken	min			

**Capacity = Volume of bottle (258 ltrs)/ Time taken to charge up to 30 bar (mins)**

(c) **Motor.** Performance Checks, SPM, Vibration and attenuation to be checked as per trials schedule & following checks as per ETMU trials protocol.

<b><u>SNo</u></b>	<b><u>Description</u></b>	<b><u>Reading</u></b>	<b><u>Remarks</u></b>
(a)	Starting current		
(b)	Running current		
(c)	Insulation		
(d)	Starter calibration checks		

3. **Control Air Compressor (Ingersol Rand).**

(a) **Carry out following checks before starting the compressor.**

<b><u>SNo</u></b>	<b><u>Description</u></b>	<b><u>Remarks</u></b>
(i)	Check pipe system is clean and clear from obstruction.	
(ii)	Check air intake filter for cleanliness, correct fitting and free from any type of obstruction.	
(iii)	Rotate the compressor, by hand, in direction indicated on the driving end cover.	
(iv)	Check air bottle drain valves are closed.	
(v)	Check air bottle inlet and outlet valves are opened.	
(vi)	Check that all valves in the system are in open position.	
(v)	Check tightness of compressor foundation bolts.	
(vii)	Check sump oil level of compressor with the help of dip stick.	
(viii)	Check surrounding of compressor to be free from any type of obstruction.	
(ix)	Start the compressor and check correct rotation.	

(b) **Carry out following checks while compressor is running.**

(i) **Performance Checks.** Performance, Vibration, Attenuation checks of LP/Control Air Compressor is to be carried out as per the trials schedule.

(ii) **Capacity Trials.** Compressor capacity is to be ascertained by filling of Control air bottle (LP air bottle, 106 Ltrs). Keep single LP air bottle in line with the respective compressor under test. Drain air bottle completely. Close the drain valve. Open air inlet valve and close outlet valve of air bottle. Start the compressor and note the starting time. Fill the reservoir up to 08 bar, stop the compressor and note down the timing. Capacity will be calculated in ltrs/min at 08 bar pressure. Check as per the designed capacity.

<b><u>SNo</u></b>	<b><u>Description</u></b>	<b><u>Unit</u></b>	<b><u>Initial reading</u></b>	<b><u>Final reading</u></b>	<b><u>Resultant</u></b>
(i)	Air bottle pressure	Bar			
(ii)	Time taken	min			

**Capacity = Volume of bottle (106 ltrs)/ Time taken to charge up to 07 bar (mins)**

(c) **Motor.** Performance Checks, SPM, Vibration and attenuation to be checked as per trials schedule & following checks as per ETMU trials protocol.

<u>SNo</u>	<u>Description</u>	<u>Reading</u>	<u>Remarks</u>
(i)	Starting current		
(ii)	Running current		
(iii)	Insulation		
(iv)	Starter calibration checks		

4. **Diesel Driven Air Compressor (DD Compressor).**

(a) **Carry out following checks before starting the compressor.**

<u>SNo</u>	<u>Description</u>	<u>Remarks</u>
(i)	Check sump oil level of the Diesel engine.	
(ii)	Check sump oil level of compressor.	
(iii)	Check fuel level in the service tank of DD compressor.	
(iv)	Check pipe system is clean and clear from obstruction.	
(v)	Check air intake filter for cleanliness, correct fitting and free from any type of obstruction.	
(vi)	Rotate the compressor, by hand, in direction indicated on the driving end cover.	
(v)	Check air bottle drain valves are closed.	
(vii)	Check air bottle inlet and outlet valves are opened.	
(viii)	Check that all valves in the system are in open position.	
(ix)	Check tightness of compressor foundation bolts.	
(x)	Check surrounding of compressor to be free from any type of obstruction.	
(xi)	Start the compressor and check correct rotation.	

(b) **Carry out following checks while compressor is running.**

(i) **Performance Checks.** Performance and Attenuation checks of DD compressor to be carried out as per the trials schedule.

(ii) **Capacity Trials.** Compressor capacity is to be ascertained by filling of starting air bottle (HP AIR bottle, 106 ltrs). Keep single HP air bottle in line with the DD compressor. Drain air bottle completely. Close the drain valve. Open air inlet vale and close outlet valve of air bottle. Start the compressor and note the starting time. Fill the reservoir up to 30 bar, stop the compressor and note down the timing. Capacity will be calculated in ltrs/min as per the designed capacity.

<u>SNo</u>	<u>Description</u>	<u>Unit</u>	<u>Initial reading</u>	<u>Final reading</u>	<u>Resultant</u>

(i)	Air bottle pressure	Bar			
(ii)	Time taken	min			

**Capacity = Volume of bottle (106 ltrs)/ Time taken to charge up to 30 bar (mins)**

5. **System Trials.**

**HP Air System.**

(a) HP air system consists of 02 HPAC's (MD) and 01 DD Air compressor, 02 HP air bottles (258 ltrs each) and 06 bottles (106 ltrs each) including system pipelines.

(b) **Piping.** Visual checks of following components are to be carried out for any leakages or damage.

<b><u>SNo</u></b>	<b><u>Description</u></b>	<b><u>Status</u></b> <b>(Sat/Unsat)</b>	<b><u>Remarks</u></b>
(i)	Compensators		
(ii)	Flange-connections		
(iii)	Gaskets		
(iv)	Adapters		
(v)	Suction filter - for cleanliness and correct fittings.	HPAC no. 1 HPAC no. 2 DD compressor CAC	
(vi)	System Integrity checks - for any type of leakages. Complete starting air system is to be pressurised up to 30 bar pressure keeping all supply valves for consumers (Main Engines and 30/7 Bar reducer for LP air system) closed. Monitor the system pressure for any drop. If pressure test of the system is satisfactory, then air integrity test to be carried out for pressurising the system up to 30 bar and holding the pressure for 24 hours. The maximum allowable pressure drop is 1.25% of maximum pressure (30 bar), ie 0.375 Bar.		
(vii)	Supporting clamps - Sufficient supporting clamps to be provided at regular intervals as per NES 865. Clamps should have rubber inserts and adequate fasteners. End connection of supporting frame should have rigid support.		

<u>SNo</u>	<u>Description</u>	<u>Status</u> (Sat/Unsat)	<u>Remarks</u>

(c) **Valves.** Visual and operational checks of following valves are to be carried out.

<u>SNo</u>	<u>Description</u>	<u>Status</u> (Sat/Unsat)	<u>Remarks</u>
(i)	Compressor discharge valves.	HPAC no.1 HPAC no.2 DD Compressor CAC	
(ii)	Air bottle filling valves.	HP air bottle no.1 HP air bottle no.2 HP air bottle no.3 HP air bottle no.4 HP air bottle no.5 HP air bottle no.6 HP air bottle no.7 HP air bottle no.8	
(iii)	Air bottle outlet valves.	HP air bottle no.1 HP air bottle no.2 HP air bottle no.3 HP air bottle no.4 HP air bottle no.5 HP air bottle no.6 HP air bottle no.7 HP air bottle no.8	
(iv)	Air bottle drain valves	HP air bottle no.1 HP air bottle no.2 HP air bottle no.3 HP air bottle no.4 HP air bottle no.5 HP air bottle no.6 HP air bottle no.7 HP air bottle no.8	
(v)	Supply valve to 30/7 bar reducer.		
(vi)	Both Main Engines Starting air supply valves.	Port Main Engine Stbd Main Engine	
(vii)	Safety/ relief valves fitted on compressor and reservoir. Test certificate to be provided. (NA for PRT)	HPAC no.1 HPAC no.2 DD Compressor CAC HP air bottle no.1 HP air bottle no.2	

		HP air bottle no.3		
		HP air bottle no.4		
		HP air bottle no.5		
		HP air bottle no.6		
		HP air bottle no.7		
		HP air bottle no.8		

(d) **Air Bottles.** Pressure test certificate are to be obtained for air bottle pressure test up to prescribed standards. HP air system Maintop is to be referred for periodicity of testing of air bottles. The test pressure and date of testing should be inscribed on the bottle. The paint scheme of air bottles is to be conformed to.

(e) **Instrumentation.** Visual/ functional checks are to be carried out for the following and obtain test certificates.

<b><u>SNo</u></b>	<b><u>Description</u></b>	<b><u>Status</u></b> <b><u>(Sat/Unsat)</u></b>	<b><u>Remarks</u></b>
(i)	<u>Pressure gauges.</u> All pressure gauges in the system and equipment to checked for functionality and operation. Pressure gauge marking for operating range to be completed. Calibration certificates to be provided (NA for PRT). Valves in gauge line and on the pressure gauge are to be checked for functionality and operation.	HPAC no.1 discharge pr gauge  HPAC no.2 discharge pr gauge  DD Compressor  CAC  HP air bottle no.1 pr gauge  HP air bottle no.2 pr gauge  HP air bottle no.3 pr gauge  HP air bottle no.4 pr gauge  HP air bottle no.5 pr gauge  HP air bottle no.6 pr gauge  HP air bottle no.7 pr gauge  HP air bottle no.8 pr gauge  Reducer inlet pr gauge	
(ii)	<u>Pressure switches.</u> All pressure switches in the system and equipment to check for functionality and operation. Auto cut-in and cut-off of	HPAC no.1  HPAC no.2	

	compressor to be checked. Calibration certificates to be provided. (NA for PRT).	DD Compressor		
		CAC		
		HP air bottle no.3 pressure sensor		
		HP air bottle no.4 pressure sensor		
		HP air bottle no.5 pressure sensor		
		HP air bottle no.6 pressure sensor		
		HP air bottle no.7 pressure sensor		
		HP air bottle no.8 pressure sensor		
		HPAC no.1 running indication		
		HPAC no.2 running indication		
		DD Compressor		
		CAC		
(iv)	<u>Gauge lines.</u> All gauge lines to be checked for proper fitting and leakages.			

(f) **Foundation.** Visual checks of foundation are to be carried out ascertaining its condition. Remarks of foundation survey by Yard/ Ship Staff/ trial agencies needs to be cross checked for completion.

<b><u>SNo</u></b>	<b><u>Description</u></b>	<b><u>Status</u></b> <b><u>(Sat/Unsat)</u></b>	<b><u>Remarks</u></b>
(i)	Foundation	HPAC no.1	
		HPAC no.2	
		DD Compressor	
		CAC	
		HP air bottle no.1	
		HP air bottle no.2	
		HP air bottle no.3	
		HP air bottle no.4	
		HP air bottle no.5 pressure sensor	
		HP air bottle no.6 pressure sensor	

		HP air bottle no.7 pressure sensor		
		HP air bottle no.8 pressure sensor		

(g) **Mounting.** Condition and attenuation of mounts are to be checked. Mounts are to be replaced as per MAINTOP routines or on the basis of attenuation and physical condition.

<b><u>SNo</u></b>	<b><u>Description</u></b>	<b><u>Status</u></b> <b>(Sat/Unsat)</b>	<b><u>Remarks</u></b>
(i)	Mounting	Physical condition	
		Attenuation	
		Service life as per MAINTOPS/OEM Doc.	

### **LP AIR SYSTEM**

(h) LP air system is supplied by 30/7 bar reducer from HP air system. It consists of system pipelines, general supply points in Engine room and upper decks, supply to LO/FO purifiers, air moisture separator, incinerator, ship siren, DA starting, stern tube deep-sea seal, hydrophore, Emergency supply to ME control system.

(j) **Piping.** Visual checks of following components are to be carried out for any leakages or damage.

<b><u>SNo</u></b>	<b><u>Description</u></b>	<b><u>Status</u></b> <b>(Sat/Unsat)</b>	<b><u>Remarks</u></b>
(i)	Compensators		
(ii)	Flange-connections		
(iii)	Gaskets		
(iv)	Adapters		
(v)	System Integrity checks - for any type of leakages. Complete LP air system is to be pressurised up to 7 bar pressure keeping all supply valves for consumers (general supply points in Engine room and upper decks, supply to LO/FO purifiers, incinerator, fire damper in galley, stern tube, hydrophore, Emergency supply to ME control system and 30/7 Bar reducer for LP air system) closed. Monitor the system pressure for any drop. If pressure		

<u>SNo</u>	<u>Description</u>	<u>Status</u> (Sat/Unsat)	<u>Remarks</u>
	test of the system is satisfactory, then air integrity test to be carried out for pressurising the system up to 7 bar and holding the pressure for 24 hours. The maximum allowable pressure drop is 1.25% of maximum allowable pressure (8 bar), ie 0.1 Bar.		
(vi)	Supporting clamps - Sufficient supporting clamps to be provided at regular intervals as per NES 865. Clamps should have rubber inserts and adequate fasteners. End connection of supporting frame should have rigid support.		

(k) **Valves.** Visual and operational checks of following valves are to be carried out.

<u>SNo</u>	<u>Description</u>	<u>Status</u> (Sat/Unsat)	<u>Remarks</u>
(i)	Isolating valves for consumers.	DA no.1	
		DA no.2	
		DA no.3	
		DA no.4	
		LO purifier 1&2	
		FO purifier 1&2	
		Stern Tube inflatable seal Port & Stbd	
		Ships Siren	
		FW hydrophore tank	
		Incinerator	
(ii)	30/7 bar reducer	Inlet valve	
		Outlet valve	
(iii)	Reducer emergency supply valve to Main Engine Control air system.		
(iv)	Isolating valves for general consumers in Engine Room and upper decks.		

## **CONTROL AIR SYSTEM**

(l) Control air system consists of a CAC & a LP air bottle (106 ltrs each), system pipelines air moisture separator and ME control air system.

(m) **Piping.** Visual checks of following components are to be carried out for any leakages or damage.

<b><u>SNo</u></b>	<b><u>Description</u></b>	<b><u>Status</u></b> <b><u>(Sat/Unsat)</u></b>	<b><u>Remarks</u></b>
(i)	Compensators		
(ii)	Flange-connections		
(iii)	Gaskets		
(iv)	Adapters		
(v)	Suction filter - for cleanliness and correct fittings.	CAC no. 1	
(vi)	System Integrity checks - for any type of leakages. Complete control air system is to be pressurised up to 8 bar pressure keeping all control air circuit in line. Monitor the system pressure for any drop. If pressure test of the system is satisfactory, then air integrity test to be carried out for pressurising the system up to 8 bar and holding the pressure for 24 hours. The maximum allowable pressure drop is 1.25% of maximum allowable pressure (8 bar), ie 0.1 Bar.		
(vii)	Supporting clamps - Sufficient supporting clamps to be provided at regular intervals as per NES 865. Clamps should have rubber inserts and adequate fasteners. End connection of supporting frame should have rigid support.		

(n) **Valves.** Visual and operational checks of following valves are to be carried out.

<b><u>SNo</u></b>	<b><u>Description</u></b>		<b><u>Status</u></b> <b><u>(Sat/Unsat)</u></b>	<b><u>Remarks</u></b>
(i)	Compressor discharge valves.	CAC no.1		
(ii)	Air bottle filling valves.	Control air bottle		
(iii)	Air bottle outlet valves.	Control air bottle		
(iv)	Air bottle drain	Control air bottle no		

<u>SNo</u>	<u>Description</u>		<u>Status</u> (Sat/Unsat)	<u>Remarks</u>
	valves			
(v)	Both Main Engines control air supply valves.		Port Main Engine Stbd Main Engine	
(vi)	Safety/ relief valves fitted on compressor and reservoir. Test certificate to be provided. (NA for PRT)		CAC Control air bottle	

(p) **Air Bottles.** Pressure test certificate are to be obtained for air bottle pressure test up to prescribed standards. Air system Maintop is to be referred for periodicity of testing of air bottles. The test pressure and date of testing should be inscribed on the bottle. The paint scheme of air bottles is to be conformed to.

(q) **Instrumentation.** Visual/ functional checks are to be carried out for the following and test certificate to be obtained.

<u>SNo</u>	<u>Description</u>	<u>Status</u> (Sat/Unsat)	<u>Remarks</u>
(i)	Pressure gauges. All pressure gauges in the system and equipment to be checked for functionality and operation. Pressure gauge marking for operating range to be completed. Calibration certificates to be provided (NA for PRT). Valves in gauge line and on the pressure gauge are to be checked for functionality and operation.	CAC discharge pr gauge Control air bottle pressure gauge	
(iii)	Sensor. All sensors in the system and related equipment to be checked for functionality and operation. Connection to IPMS and automation (if applicable) also to be checked.	Control air bottle pressure sensor CAC running indication	

<b><u>SNo</u></b>	<b><u>Description</u></b>		<b><u>Status</u></b> <b>(Sat/Unsat)</b>	<b><u>Remarks</u></b>
	Calibration certificates to be provided. (NA for PRT).			
(iv)	<u>Gauge lines.</u> All gauge lines to be checked for proper fitting and leakages.			

(r) **Air moisture separator.** Functionality checks of moisture separator to be carried out. The collected moisture from control air should be drained automatically once the vessel is filled. The normal operation of the drain valve is also to be checked for satisfactory operation.

(s) **Foundation.** Visual checks of foundation are to be carried out ascertaining its condition. Remarks of foundation survey by Yard/ Ship Staff/ trial agencies needs to be cross checked for completion.

<b><u>SNo</u></b>	<b><u>Description</u></b>		<b><u>Status</u></b>	<b><u>Remarks</u></b>
(i)	Foundation	CAC		
		Control air bottle		

(t) **Mounting.** Condition and attenuation of mounts are to be checked. Mounts are to be replaced as per MAINTOP routines or on the basis of attenuation and physical condition.

<b><u>SNo</u></b>	<b><u>Description</u></b>		<b><u>Status</u></b>	<b><u>Remarks</u></b>
(i)	Mounting	Physical condition		
		Attenuation		
		Service life as per MAINTOPS/OEM Doc.		

**SECTION III**

**Test and Trial Document for  
Lub Oil Filling and Transfer System  
Trial Schedule Reference No. - P25/P25A/System/Lub Oil**

1. **Lub oil system consist of following:-**

- (a) Lub oil system consists of a motor driven LO transfer pump (LOTP) and a LO transfer hand pump fitted in Main Engine Room.
- (b) Two LO storage tank (OMD 113) located in Main Engine Room (Port & Stbd) and two in FDA compartment filled by gravity from MER.
- (c) Two LO purifiers (LOP) located in MER, of rated capacity 1300 LPH provided for purification of lub oil from storage tank and supply to sump of Both Main Engines.
- (d) One lub oil receiving point provided on Heli deck on stbd side.

**TRIALS SHEET**

**Lub Oil Filling and Transfer System**

**1. Pre Requisite Check – Off List for System Trials.**

(a) Undertake following:-

<b><u>SNo</u></b>	<b><u>Description</u></b>	<b><u>Status</u></b> <b><u>(Sat/Unsat)</u></b>	<b><u>Remarks</u></b>
(i)	Any modifications as part of refit are to be incorporated in the drawings. Applicable in case of ABER/ MLU replacement of item. (NA for PRT)	Lub oil Transfer pump	
		Purifier no.1	
		Purifier no.2	
		Hand pump	
(ii)	Pressure gauges and thermometers are calibrated and red marked indicating working pressure of the system. (NA for PRT)	Pump suction pressure gauge	
		Pump discharge pressure gauge	
		Purifier feed pump suction gauges	
		Purifier feed pump discharge gauges	
		Purifier outlet pressure gauges	
(iii)	Any major modifications / A's and A's in system as part of refit is incorporated in the reference drawings. (NA for PRT)		
(iv)	The purifier sludge outlet pipe must not be at an angle of more than 30° from the vertical plane. (NA for PRT)		
(v)	The operating water tank should be placed as closed to the separator as possible and in accordance with the drawing. (NA for PRT)		
(vi)	The discharge from relief valve is to be directed to safe position. (NA for PRT)		
(vii)	LO purifier heating pipes are to be insulated. (NA for PRT)		
(viii)	The lub oil storage tank is cleaned, inspected and cleared by respective agencies and ready to receive lub oil. (NA for PRT)		
(ix)	Sufficient lights available.		
(x)	Communication available between pump control position and tanks. (Motorola)		

<b><u>SNo</u></b>	<b><u>Description</u></b>	<b><u>Status (Sat/Unsat)</u></b>	<b><u>Remarks</u></b>
(xi)	Test area is cleaned.		
(xii)	All the pipes are properly supported with clamps.		
(xiii)	Talley plates are fitted on all valves, cocks and gauges.		
(xiv)	Air escape pipes are open/clear of any obstruction (prior to filling of Tanks).		

2. **Lub Oil Transfer Pump.**

(a) **Carry out following checks before starting the pump.**

<b><u>SNo</u></b>	<b><u>Description</u></b>	<b><u>Remarks</u></b>
(i)	Check pipe system is clean and clear from obstruction.	
(ii)	Prime the pump with oil drawn from the supply system to ensure that the pump will not run in a dry unlubricated condition.	
(iii)	Rotate the pumps, by hand, in direction indicated on the driving end cover.	
(iv)	Check that all valves are in the open position.	
(v)	Start the pump and check correct rotation.	

(b) **Carry out following checks while pump is running.**

(i) **Performance Checks.** Performance, Vibration, Attenuation checks of both pumps to be carried out as per the trials schedule.

(ii) **Capacity Trials.** Pump capacity to be ascertained by transfer of lub oil from storage tank to Port Main Engine sump. The initial level of the sump is required to be recorded. Capacity is to be calculated by transfer of lub oil for 30 minutes and measuring the physical level by dip stick. If Port main engine sump is not available, then sump of Stbd Main engine to be used for capacity trials. Capacity is to be calculated in TPH. The rated capacity of the lub oil transfer pump is 275 ltr/min at 4 Bar pressure. Capacity trials are recommended to be undertaken with engine sump in empty condition. The sump is generally emptied as part of routines. Therefore, **capacity trials are recommended to be undertaken during the initial filling of the engine sump.**

**Transfer from Storage Tank to Main Engine sump (PME/SME)**

<b><u>SNo</u></b>	<b><u>Description</u></b>	<b><u>Unit</u></b>	<b><u>Initial reading</u></b>	<b><u>Final reading</u></b>	<b><u>Resultant</u></b>
(i)	Sounding of Storage Tank	Tons			

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(ii)	Sounding of Main engine sump	Tons			
(iii)	Time of transfer	Hrs			

**Capacity = Amount of lub oil transferred in Tons/ Time taken in hrs**

3. **Motor.** Performance Checks, SPM, Vibration and attenuation to be checked as per trials schedule & following checks as per ETMU trials protocol.

<b><u>SNo</u></b>	<b><u>Description</u></b>	<b><u>Reading</u></b>			<b><u>Remarks</u></b>		
		<b>LOTP</b>	<b>LOP - port</b>	<b>LOP - stbd</b>	<b>LOTP</b>	<b>LOP – port</b>	<b>LOP- stbd</b>
(a)	Starting current						
(b)	Running current						
(c)	Insulation						
(d)	Starter calibration checks						

4. **Lub Oil Centrifuge.**

(a) **Performance.** Trials to be carried out as per trials schedule.

(b) **Capacity trials.** Centrifuge capacity is to be ascertained by transfer of lub oil from storage tank (AMR) to PME sump (AER) using Lub oil centrifuge no.2 (AER) and lub oil storage tank to SME (FER) sump using Lub oil centrifuge no.1 (FER). The discharge valve of the centrifuge is to be in fully open position. The initial sounding of the tanks is required to be recorded. Capacity is to be calculated by transfer of lub oil for 30 minutes and measuring the physical level of the sump using dip stick. Capacity is to be calculated in LPM. The rated capacity of the lub oil centrifuge is **1300 Ltrs/hr and recommended is 950 LPM**. Capacity trials are recommended to be undertaken with engine sump in empty condition. The sump is generally emptied as part of routines. Therefore, **capacity trials are recommended to be undertaken during the initial filling of the engine sump.**

**LO purifier no.1**

<b><u>S. No.</u></b>	<b><u>Description</u></b>	<b><u>Unit</u></b>	<b><u>Initial reading</u></b>	<b><u>Final reading</u></b>	<b><u>Resultant</u></b>
(i)	Sounding of storage tank	Tons			
(ii)	Sounding of SME sump	Tons			
(iii)	Time of transfer	Hrs			

**Capacity = Amount of lub oil transferred (purified) in Tons/ Time taken in hrs**

**LO purifier no.2**

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<b><u>SNo</u></b>	<b><u>Description</u></b>	<b><u>Unit</u></b>	<b><u>Initial reading</u></b>	<b><u>Final reading</u></b>	<b><u>Resultant</u></b>
(i)	Sounding of storage tank	Tons			
(ii)	Sounding of PME sump	Tons			
(iii)	Time of transfer	Hrs			

**Capacity = Amount of lub oil transferred (purified) in Tons/ Time taken in hrs**

**5. System Trials.**

- (a) **Piping.** Visual checks of following components are to be carried out for any leakages or damage.

<b><u>SNo</u></b>	<b><u>Description</u></b>	<b><u>Status (Sat/Unsat)</u></b>	<b><u>Remarks</u></b>
(i)	Compensators		
(ii)	Flange-connections		
(iii)	Gaskets		
(iv)	Adapters		
(v)	Suction strainers - for cleanliness and correct fittings		
(vi)	System Integrity checks - For any type of leakages. (To be undertaken at working pressure during normal operation of system).		
(vii)	Supporting clamps - Sufficient supporting clamps to be provided at regular intervals as per NES 865. Clamps should have rubber inserts and adequate fasteners. End connection of supporting frame should have rigid support.		

- (b) **Valves.** Visual and operational checks of following valves are to be carried out. Operate the valves through their complete range of operations to ensure that the valve position indicator moves with the valve.

<b><u>SNo</u></b>	<b><u>Description</u></b>	<b><u>Status (Sat/Unsat)</u></b>	<b><u>Remarks</u></b>
(i)	Pump suction valve.		
(ii)	Pump discharge valve.		
(iii)	Tank filling valve.		
(iv)	Tank de-filling valve.		

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(v)	Isolating/filling valves.	PME		
		SME		
		Port Gear Box		
		Stbd Gear Box		
		Port CPP Tank		
		Stbd CPP Tank		
		Port DA		
		StbdDA		
		Center DA		
		Aft DA		
(vi)	Purifier feed pump suction and discharge valves.	Port LO Purifier		
		Stbd LO Purifier		
(viii)	Purifier system inlet, outlet, isolating valves.	Port LO Purifier		
		Stbd LO Purifier		

(c) **Tanks.** Visual/ functional checks are to be carried out for the following (for LO storage tank in AMR). Test certificate to be obtained as applicable.

<b><u>SNo</u></b>	<b><u>Description</u></b>	<b><u>Status</u></b> <b><u>(Sat/Unsat)</u></b>	<b><u>Remarks</u></b>
(i)	Sounding tube and sounding tapes – Volumetric marking on sounding chart to be cross checked with sounding tape markings during fuelling. Intactness of sounding tape and tube to be checked during tank cleaning activity.		
(ii)	Volumetric test - Test certificate to be obtained from respective agencies if tank geometry has been affected/ changed (NA for PRT)		
(iii)	APT - Test certificate to be obtained from respective agencies. (NA for PRT)		
(iv)	Paint scheme. As per Navy Order NO 56/16. (NA for PRT)		
(v)	Manhole door gaskets to be renewed. (NA for PRT)		

(d) **Instrumentation.** Visual/ functional checks are to be carried out for the following and test certificate to be obtained.

<b><u>SNo</u></b>	<b><u>Description</u></b>	<b><u>Status</u></b> <b><u>(Sat/Unsat)</u></b>	<b><u>Remarks</u></b>
(i)	Pressure gauges. All pressure and vacuum	Pump suction pressure gauge	

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<u>SNo</u>	<u>Description</u>	<u>Status</u> (Sat/Unsat)	<u>Remarks</u>
	gauges in the system and equipment to checked for functionality and operation. Pressure gauge marking for operating range to be completed. Calibration certificates to be provided (NA for PRT). Valves in gauge line and on the pressure gauge are to be checked for functionality and operation.	Pump discharge pressure gauge Port Purifier feed pump suction gauge Port Purifier feed pump discharge gauge Stbd Purifier feed pump suction gauge Stbd Purifier feed pump discharge gauge Port Purifier outlet pressure gauge Stbd Purifier outlet pressure gauge Port Purifier running indication Stbd Purifier running indication	
(iii)	<u>Gauge lines</u> . All gauge lines to be checked for proper fitting and leakages.		

(e) **Foundation**. Visual checks of foundation are to be carried out ascertaining its condition. Remarks of foundation survey by Yard/ Ship Staff/ trial agencies needs to be cross checked for completion.

<u>SNo</u>	<u>Description</u>		<u>Status</u> (Sat/Unsat)	<u>Remarks</u>
(i)	Foundation	Lub oil transfer pump		
		Port Lub oil Purifier		
		Stbd Lub oil Purifier		

(f) **Mounting**. Condition and attenuation of mounts are to be checked. Mounts are to be replaced as per MAINTOP routines or on the basis of attenuation and physical condition.

<u>SNo</u>	<u>Description</u>		<u>Status</u> (Sat/Unsat)	<u>Remarks</u>
		Physical Condition		(Applicable only if mounts are fitted)
		Attenuation		

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(i)	Mounting	Service life as per MAINTOPS/OEM Doc.		
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(g) **Functionality Checks.** Functionality checks of system (filling and disembarkation lines) are to be carried out as follows: -

<b><u>SNo</u></b>	<b><u>Description</u></b>	<b><u>Status</u></b> <b>(Sat/Unsat)</b>	<b><u>Remarks</u></b>
(i)	<b><u>Filling.</u></b> Functionality checks/ Intactness of the deck filling line to be checked.		
(ii)	<b><u>Disembarkation.</u></b> Intactness of the disembarking line to be checked during defiling to the barge/ ship at harbour before the ship goes under refit (during PRT).		
(iii)	Stbd catwalk filling point (angle valve) to be checked for proper fitment with suitable end connection, intactness and operation of valve.		

**SECTION IV**

**Test and Trial Document for  
Fresh Water Transfer & Service System  
Trial Schedule Reference No. - P25/P25A/System/Fresh water**

1. **Fresh water system consists of following:-**

- (a) Fresh water system consists of 01 in number centrifugal self-priming fresh water pumps with maximum capacity of 5 TPH and 02 in number hydrophore pumps of capacity of 4 TPH each fitted in Pump room.
- (b) Two distilling plant of 15 TPH capacity located in Main Engine Room on Port and Stbd respectively.
- (c) One RO Plant of 20 TPD capacity is fitted in forward section of the ship.
- (d) Three fresh water storage tanks. Total capacity of freshwater onboard is 40 Tons.

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**TRIALS- SHEET**

**Fresh Water System**

**1. Pre Requisite Check – Off List for System Trials.**

<b><u>SNo</u></b>	<b><u>Description</u></b>	<b><u>Status (Sat/ Unsat)</u></b>	<b><u>Remarks</u></b>
(a)	Any modifications as part of refit are to be incorporated in the drawings. Applicable in case of ABER/ MLU replacement of item. (NA for PRT)	Pump No. 1	
		Pump No. 2	
		Pump No. 3	
(b)	Pressure gauges and thermometers are calibrated and red marked indicating working pressure of the system. (NA for PRT)	Pump No. 1 suction pressure gauge	
		Pump No. 1 disc. pressure gauge	
		Pump No. 2 suction pressure gauge	
		Pump No. 2 disc. pressure gauge	
		Pump No. 3 suction pressure gauge	
		Pump No. 3 disc. pressure gauge	
		Port Distilling Plant discharge pressure gauge	
		Stbd Distilling Plant discharge pressure gauge	
		RO plant FW outlet pressure gauge	
		Other gauges	
(c)	Any major modifications / A's and A's in system as part of refit is incorporated in the reference drawings. (NA for PRT)		
(d)	The fresh water storage tank is cleaned, inspected and cleared by respective agencies and ready to receive fresh water. Necessary clearances from Medical department should be obtained. (NA for PRT)		
(e)	Flexible connections are to be provided at pump suction & discharge flanges.		

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<b><u>SNo</u></b>	<b><u>Description</u></b>	<b><u>Status (Sat/ Unsat)</u></b>	<b><u>Remarks</u></b>
(f)	Fresh water pipes are not to be laid through tanks which contains oil.		
(g)	Sufficient lights available near operating locations.		
(h)	All the pipes are properly supported with clamps with rubber inserts.		
(j)	Hot water pipes are insulated.		
(k)	Talley plates are fitted on all valves, cocks and gauges.		
(l)	Air escape pipes are open/clear of any obstruction (prior to filling of Tanks).		
(m)	Hot water circulating pumps are to be controlled by temperature switch on hot water return line.		

**2. Fresh Water Pump.**

**(a) Carry out following checks before starting the pump.**

<b><u>SNo</u></b>	<b><u>Description</u></b>	<b><u>Remarks</u></b>
(i)	Check pipe system is clean and clear from obstruction.	
(ii)	Ensure priming of the pumps before operation.	
(iii)	Rotate the pumps, by hand, in direction indicated on the driving end cover.	
(iv)	Check that all valves are in the open position.	
(v)	Start the pump and check correct rotation.	

**(b) Pump Performance Checks.** Performance and attenuation checks of both pumps are to be carried out as per the trials schedule.

**(c) Motor.** Performance Checks, SPM, Vibration and attenuation to be checked as per trials schedule & following checks as per ETMU trials protocol.

<b><u>SNo</u></b>	<b><u>Description</u></b>	<b><u>Reading</u></b>			<b><u>Remarks</u></b>		
		<b>PP- 1</b>	<b>PP -2</b>	<b>PP- 3</b>	<b>PP- 1</b>	<b>PP -2</b>	<b>PP- 3</b>
(i)	Starting current						
(ii)	Running current						
(iii)	Insulation						
(iv)	Starter calibration checks						

**3. System Trials.**

**(a) Piping.** Visual checks of following components are to be carried out for any leakages or damage.

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<b><u>SNo</u></b>	<b><u>Description</u></b>	<b><u>Status (Sat/Unsat)</u></b>	<b><u>Remarks</u></b>
(i)	Bellows/ flexible connectors		
(ii)	Flange-connections.		
(iii)	Gaskets.		
(iv)	Adapters.		
(v)	Suction strainers - for cleanliness and correct fittings.		
(vi)	System Integrity checks - For any type of leakages. (To be undertaken at working pressure during normal operation of system).		
(vii)	Supporting clamps - Sufficient supporting clamps to be provided at regular intervals as per NES 865. Clamps should have rubber inserts and adequate fasteners. End connection of supporting frame should have rigid support.		

(b) **Valves.** Visual and operational checks of following valves are to be carried out. Operate the valves through their complete range of operations to ensure that the valve position indicator moves with the valve.

<b><u>SNo</u></b>	<b><u>Description</u></b>		<b><u>Status (Sat/ Unsat)</u></b>	<b><u>Remarks</u></b>
(i)	Pump suction valves	Pump No. 1		
		Pump No. 2		
		Pump No. 3		
(ii)	Pump discharge valves.	Pump No. 1		
		Pump No. 2		
		Pump No. 3		
(iii)	Tank filling valves.	Tank No. 1		
		Tank No. 2		
		Tank No. 3		
(iv)	Tank suction valves.	Tank No. 1		
		Tank No. 2		
		Tank No. 3		
(v)	Isolating valves.	Fwd section		
		Aft section		
		Officers flat		
		Cocks for fuel purifiers 1 &2		
		Cocks for lub oil purifiers 1 &2		

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		Valve for window wipers in bridge		
		General supply to E/R & Upper decks		
(vi)	Deck filling valves	Port		Functionality checks to be undertaken while receiving fresh water.
		Stbd		

(c) **Tanks.** Visual/ functional checks are to be carried out for the following. Test certificate to be obtained as applicable.

<b><u>SNo</u></b>	<b><u>Description</u></b>	<b><u>Status (Sat/Unsat)</u></b>	<b><u>Remarks</u></b>
(i)	Sounding tube and sounding tapes – Volumetric marking on sounding chart to be cross checked with sounding tape markings during filling. Intactness of sounding tape and tube to be checked during tank cleaning activity.		
(ii)	Volumetric test - Test certificate to be obtained from respective agencies if tank geometry has been affected/ changed (NA for PRT)		
(iii)	APT - Test certificate to be obtained from respective agencies. (NA for PRT)		
(iv)	Paint scheme. As per Navy Order NO 56/16. (NA for PRT)		
(v)	Manhole door gaskets to be renewed.		

(d) **Instrumentation.** Visual/ functional checks are to be carried out for the following and test certificate to be obtained.

<b><u>SNo</u></b>	<b><u>Description</u></b>	<b><u>Status (Sat/Unsat)</u></b>	<b><u>Remarks</u></b>
(i)	Pressure gauges.	Pump no.1 suction	

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<b><u>SNo</u></b>	<b><u>Description</u></b>	<b><u>Status (Sat/ Unsat)</u></b>	<b><u>Remarks</u></b>
	All pressure and vacuum gauges in the system and equipment to be checked for functionality and operation. Pressure gauge marking for operating range to be completed. Calibration certificates to be provided (NA for PRT). Valves in gauge line and on the pressure gauge are to be checked for functionality and operation.	pressure gauge Pump no.1 discharge pressure gauge Pump no.2 suction pressure gauge Pump no.2 discharge pressure gauge Pump no.3 suction pressure gauge Pump no.3 discharge pressure gauge Port Distilling Plant discharge pressure gauge Stbd Distilling Plant discharge pressure gauge RO plant FW outlet pressure gauge Pressure gauge in MCR	
(ii)	<u>Sensor.</u> All sensors in the system and related equipment to be checked for functionality and operation. Connection to IPMS and automation (if applicable) also to be checked. Calibration certificates to be provided (NA for PRT).	Level sensor - Tank No 1 Level sensor - Tank No 2 Level sensor - Tank No 3	Tank level digital indicators in MCR to be verified during filling of tanks.
(iii)	<u>Gauge lines.</u> All gauge lines to be checked for proper fitting and leakages.		

(e) **Foundation.** Visual checks of foundation are to be carried out ascertaining its condition. Remarks of foundation survey by Yard/ Ship Staff/ trial agencies needs to be cross checked for completion.

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<b><u>SNo</u></b>	<b><u>Description</u></b>		<b><u>Status</u></b> <b>(Sat/Unsat)</b>	<b><u>Remarks</u></b>
(i)	Foundation	Fresh water pump No. 1		
		Fresh water pump No. 2		
		Fresh water pump No. 3		
		Port Distilling Plant		
		Stbd Distilling Plant		
		RO Plant		

(f) **Mounting.** Condition, attenuation and grouping of mounts are to be checked. Mounts are to be replaced as per MAINTOP routines or on the basis of attenuation and physical condition.

<b><u>SNo</u></b>	<b><u>Description</u></b>		<b><u>Status</u></b> <b>(Sat/Unsat)</b>	<b><u>Remarks</u></b>
(i)	Mounting	Physical Condition		(Applicable only if mounts are fitted)
		Attenuation		
		Service life as per MAINTOPS/ OEM Doc.		

(g) **Functionality Checks.** Functionality checks of system for receiving/supplying of fresh water supply to and fro other ships, tugs, jetty as applicable to be checked.

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**SECTION V**

**Test and Trial Document for  
Bilge Pumping Out System**

**Trial Schedule Reference No. - P25/P25A/System/Bilge Pumping Out**

**Bilge pumping out system consist of following:-**

- (a) Two bilge pumps with maximum capacity of 2.5 TPH with Pump no.1 & 2 fitted in Fwd DA compartment and Main Engine room respectively.
- (b) 11 bilge eductors fitted at various locations operated by fire main pressure.

**TRIAL SHEET**

**Bilge Pumping Out System**

**1. Bilge Pumps.**

(a) **Carry out following checks before starting the pump.**

<b><u>SNo</u></b>	<b><u>Description</u></b>	<b><u>Remarks</u></b>
(i)	Check pipe system is clean and clear from obstruction.	
(ii)	Priming unit is provided for priming of main pump to avoid dry running.	
(iii)	Rotate the pumps, by hand, in direction indicated on the driving end cover.	
(iv)	Check that the functional position of all valves should correspond with the valve position indicators.	
(v)	Check that all valves are in the open position.	
(vi)	Start the pump and check correct rotation.	

(b) **Pump Performance Checks.** Performance and attenuation checks of both pumps to be carried out as per the trials schedule.

(c) **Motor.** Performance Checks, SPM, Vibration and attenuation to be checked as per trials schedule & following checks as per ETMU trials protocol.

<b><u>SNo</u></b>	<b><u>Description</u></b>	<b><u>Reading</u></b>		<b><u>Remarks</u></b>	
		<b><u>PP 1</u></b>	<b><u>PP2</u></b>	<b><u>PP 1</u></b>	<b><u>PP2</u></b>
(i)	Starting current				
(ii)	Running current				
(iii)	Insulation				
(iv)	Starter calibration checks				

**2. Pre Requisite Check – Off List for System Trials.**

(a) Undertake following:-

<b><u>SNo</u></b>	<b><u>Description</u></b>	<b><u>Status (Sat/Unsat)</u></b>	<b><u>Remarks</u></b>

<u>SNo</u>	<u>Description</u>	<u>Status</u> (Sat/ Unsat)	<u>Remarks</u>
(i)	Pump installation completed in accordance with the reference drawings. Any modifications as part of refit are to be incorporated in the drawings. Applicable in case of ABER/ MLU replacement of item.  (NA for PRT)	Pump No. 1	
		Pump No. 2	
(ii)	Pressure and vacuum gauges are calibrated and red marked indicating working pressure of the system.  (NA for PRT)	Bilge Pump pressure gauges	
		Eductor pressure gauges	
(iii)	Any modifications as part of refit to be incorporated in the drawings. (NA for PRT)		
(iv)	Flexible connections are to be provided at pump suction & discharge flanges.		
(v)	Sufficient lights available near operating locations.		
(vi)	All the pipes are properly supported with clamps with rubber inserts.		
(vii)	Talley plates are fitted on all valves, cocks and gauges.		

### 3. System Trials.

(a) **Piping.** Visual checks of following components are to be carried out for any leakages or damage.

<u>SNo</u>	<u>Description</u>	<u>Status</u> (Sat/ Unsat)	<u>Remarks</u>
(i)	Bellows/ flexible connections		
(ii)	Flange-connections		
(iii)	Gaskets		
(iv)	Adapters		
(v)	Suction strainers of eductors and bilge pump - for cleanliness and correct fittings.	Pump no. 1	
		Pump no. 2	
		Eductor no.1	
		Eductor no.2	

		Eductor no.3		
		Eductor no.4		
		Eductor no.5		
		Eductor no.6		
		Eductor no.7		
		Eductor no.8		
		Eductor no.9		
		Eductor no.10		
		Eductor no.11		
(vi)	System Integrity checks - For any type of leakages. (To be undertaken at working pressure during normal operation of system)			
(vii)	Supporting clamps - Sufficient supporting clamps to be provided at regular intervals as per NES 865. Clamps should have rubber inserts and adequate fasteners. End connection of supporting frame should have rigid support.			

(b) **Valves.** Visual and operational checks of following valves are to be carried out. Operate the valves through their complete range of operations to ensure that the valve position indicator moves with the valve.

<b><u>SNo</u></b>	<b><u>Description</u></b>		<b><u>Status</u></b> <b><u>(Sat/Unsat)</u></b>	<b><u>Remarks</u></b>
(i)	Pump suction valve	Pump no. 1		
		Pump no. 2		
(ii)	Pump discharge valve	Pump no. 1		
		Pump no. 2		
(iii)	Eductor power water valve	Eductor no.1		
		Eductor no.2		
		Eductor no.3		
		Eductor no.4		
		Eductor no.5		

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<b><u>SNo</u></b>	<b><u>Description</u></b>	<b><u>Status</u></b> <b>(Sat/ Unsat)</b>	<b><u>Remarks</u></b>
	Eductor no.6		
	Eductor no.7		
	Eductor no.8		
	Eductor no.9		
	Eductor no.10		
	Eductor no.11		
(iv)	Eductor suction valve	Eductor no.1 Eductor no.2 Eductor no.3 Eductor no.4 Eductor no.5	
		Eductor no.6 Eductor no.7 Eductor no.8 Eductor no.9 Eductor no.10 Eductor no.11	
(v)	Eductor discharge valve	Eductor no.1 Eductor no.2 Eductor no.3 Eductor no.4 Eductor no.5 Eductor no.6 Eductor no.7 Eductor no.8 Eductor no.9 Eductor no.10 Eductor no.11	
(vi)	Eductor overboard valve (Bilge pumps 1 &2 and eductor 3 & 4 have common)	Eductor no.1 Eductor no.2 Eductor no.3 Eductor no.4	

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<b><u>SNo</u></b>	<b><u>Description</u></b>	<b><u>Status</u></b> <b>(Sat/ Unsat)</b>	<b><u>Remarks</u></b>
	overboard valves)	Eductor no.5	
		Eductor no.6	
		Eductor no.7	
		Eductor no.8	
		Eductor no.9	
		Eductor no.10	
		Eductor no.11	

(d) **Instrumentation.** Visual/ functional checks are to be carried out for the following and test certificate to be obtained.

<b><u>SNo</u></b>	<b><u>Description</u></b>	<b><u>Status</u></b> <b>(Sat/ Unsat)</b>	<b><u>Remarks</u></b>
(i)	<u>Pressure gauges.</u> All pressure and vacuum gauges in the system and equipment to checked for functionality and operation. Pressure gauge marking for operating range to be completed.  Calibration certificates to be provided (NA for PRT).  Valves in gauge line and on the pressure gauge are to be checked for functionality and operation.	Pump no.1 suction pressure gauge  Pump no.1 discharge pressure gauge  Pump no.2 suction pressure gauge  Pump no.2 discharge pressure gauge  Eductor no.1 suction and main line pressure gauge  Eductor no.2 suction and main line pressure gauge  Eductor no.3 suction and main line pressure gauge  Eductor no.4 suction and main line pressure gauge	

	Eductor no.5 suction and main line pressure gauge		
	Eductor no.6 suction and main line pressure gauge		
	Eductor no.7 suction and main line pressure gauge		
	Eductor no.8 suction and main line pressure gauge		
	Eductor no.9 suction and main line pressure gauge		
	Eductor no.10 suction and main line pressure gauge		
	Eductor no.11 suction and main line pressure gauge		
(iii)	Pump no.2 running indication in MCR  Bilge level indications (high level) in DCHQ  (Engine room bilges as initial fit, any other location as per modification during refits)		
(iii)	Gauge lines. All gauge lines to be checked for proper fitting and leakages.		

(e) **Foundation.** Visual checks of foundation are to be carried out ascertaining its condition. Remarks of foundation survey by Yard/ Ship Staff/ trial agencies needs to be cross checked for completion.

<b><u>SNo</u></b>	<b><u>Description</u></b>	<b><u>Status</u></b> <b><u>(Sat/</u></b>	<b><u>Remarks</u></b>

			<b>Unsat)</b>	
(i)	Foundation	Bilge pump No. 1		
		Bilge pump No. 2		

(f) **Mounting.** Condition, attenuation and grouping of mounts are to be checked. Mounts are to be replaced as per MAINTOP routines or on the basis of attenuation and physical condition.

<b><u>SNo</u></b>	<b><u>Description</u></b>		<b><u>Status</u></b> <b>(Sat/ Unsat)</b>	<b><u>Remarks</u></b>
(i)	Mounting	Physical Condition		(Applicable only if mounts are fitted)
		Attenuation		
		Service life as per MAINTOPs/ OEM Documents.		

(g) **Functionality Checks.** Functionality checks of system for bilges pumping out by using bilge pump and fixed eductors to be carried out.

**SECTION VI**

**Test and Trial Document for  
Fire main System**  
**Trial Schedule Reference No. - P25/P25A/System/Fire main**

1. **Fire main system consist of following.**

- (a) Fire main system consists of 03 fire main pumps (Pump no.1, 2 & 3) with maximum capacity of 100 TPH and discharge pressure 8 kg/cm<sup>2</sup> fitted Pump room, Forward DA and in Main Engine room respectively.
- (b) 34 fire hydrants, 10 isolating valves located at various places throughout the ship.
- (c) 02 shore fire main connections located at Forward and Aft section for receiving/supplying of fire main supply to and from other ships, tugs, jetty as applicable.

**TRIALS- SHEET**

**Fire main System**

**1. Pre Requisite Check – Off List for System Trials.**

(a) Undertake following:-

<b><u>SNo</u></b>	<b><u>Description</u></b>	<b><u>Status (Sat/Unsat)</u></b>	<b><u>Remarks</u></b>
(i)	Any modifications as part of refit are to be incorporated in the drawings. Applicable in case of ABER/ MLU replacement of item. (NA for PRT)	Fire main pump no.1	
		Fire main pump no.2	
		Fire main pump no.3	
(ii)	Pressure gauges are calibrated and red marked indicating working pressure of the system. (NA for PRT)	Pump suction pressure gauges	
		Pump discharge pressure gauges	
		Other gauges	
(iii)	Any major modifications / A's and A's in system as part of refit is incorporated in the reference drawings. (NA for PRT)		
(iv)	Sufficient light available in compartment.		
(v)	Communication available between pump control position and hydrants. (Motorola)		
(vi)	Test area is cleaned.		
(vii)	All the pipes are properly supported with clamps.		
(viii)	Talley plates are fitted on all valves, cocks and gauges.		

**2. Firemain Pump.**

(a) **Carry out following checks before starting the pump.**

<b><u>SNo</u></b>	<b><u>Description</u></b>	<b><u>Remarks</u></b>
(i)	Check pipe system is clean and clear from obstruction	
(ii)	Rotate the pumps, by hand, in direction indicated on the driving end cover.	
(iii)	Check that all valves are in the open position.	

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(iv)	Start the pump and check correct rotation.	
(v)	Check suction and discharge pressure of the pump.	

(b) **Carry out following checks while pump is running.**

(i) **Performance checks.** Performance, vibration, attenuation checks of both pumps are to be carried out as per the trials schedule.

3. **Motor.** Performance Checks, SPM, Vibration and attenuation to be checked as per trials schedule & following checks as per ETMU trials protocol.

<b><u>SNo</u></b>	<b><u>Description</u></b>	<b><u>Reading</u></b>			<b><u>Remarks</u></b>		
		<b>Fire PP- 1</b>	<b>Fire PP -2</b>	<b>Fire PP- 3</b>	<b>Fire PP- 1</b>	<b>Fire PP -2</b>	<b>Fire PP- 3</b>
(a)	Starting current						
(b)	Running current						
(c)	Insulation						
(d)	Starter calibration checks						

4. **System Trials.**

(a) **Piping.** Visual checks of following components are to be carried out for any leakages or damage.

<b><u>SNo</u></b>	<b><u>Description</u></b>	<b><u>Status (Sat/Unsat)</u></b>	<b><u>Remarks</u></b>
(i)	Compensators		
(ii)	Flange-connections		
(iii)	Gaskets		
(iv)	Adapters		
(v)	Suction strainers - for cleanliness and correct fittings	F/M pump no.1 F/M pump no.2 F/M pump no.3	
(vi)	System Integrity checks - For any type of leakages. (To be undertaken at working pressure during normal operation of system)		
(vii)	Supporting clamps - Sufficient supporting clamps to be provided at regular intervals as per NES 865. Clamps should have rubber inserts and adequate fasteners. End connection of supporting frame should have rigid support		

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(b) **Valves.** Visual and operational checks of following valves are to be carried out. Operate the valves through their complete range of operations to ensure that the valve position indicator moves with the valve.

<b><u>SNo</u></b>	<b><u>Description</u></b>		<b><u>Status</u></b> <b><u>(Sat/Unsat)</u></b>	<b><u>Remarks</u></b>
(i)	Pump suction valves.	F/M pump no.1		
		F/M pump no.2		
		F/M pump no.3		
(ii)	Pump discharge valves.	F/M pump no.1		
		F/M pump no.2		
		F/M pump no.3		
(iii)	Isolating valves.	10 in no.		
(iv)	Fire hydrants	34 in no.		Functionality checks by operating hydrant. Sealing to be checked specifically.
(v)	Shore connection valves	(Foxle) Forward Connection		
		(Q'Deck) Aft Points		
(vi)	Supply valves	Steering gear		
		Stabilisers		
		STP		

(c) **Instrumentation.** Visual/ functional checks are to be carried out for the following and test certificate is to be obtained.

<b><u>SNo</u></b>	<b><u>Description</u></b>		<b><u>Status</u></b> <b><u>(Sat/Unsat)</u></b>	<b><u>Remarks</u></b>
(i)	Pressure gauges. All pressure and vacuum gauges in the system and equipment to checked for functionality and operation. Pressure gauge marking for operating range to be	Pump no.1 suction pressure gauge		
		Pump no.1 discharge pressure gauge		
		Pump no.2 suction pressure gauge		

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	completed. Calibration certificates to be provided (NA for PRT). Valves in gauge line and on the pressure gauge are to be checked for functionality and operation.	Pump no.2 discharge pressure gauge		
		Pump no.3 suction pressure gauge		
		Pump no.3 discharge pressure gauge		
		MCR F/M pressure gauge		
		DCHQ F/M pressure gauge		
		Helo Deck F/M pressure gauge		
		F/M pump no.2 running indication (MCR)		
		F/M pump no.3 running indication (MCR)		
(iii)	<u>Gauge lines.</u> All gauge lines to be checked for proper fitting and leakages.			

(d) **Foundation.** Visual checks of foundation are to be carried out ascertaining its condition. Remarks of foundation survey by Yard/ Ship Staff/ trial agencies needs to be cross checked for completion.

<b><u>SNo</u></b>	<b><u>Description</u></b>		<b><u>Status</u></b> <b><u>(Sat/Unsat)</u></b>	<b><u>Remarks</u></b>
(i)	Foundation	F/M pump no.1		
		F/M pump no.2		
		F/M pump no.2		

(e) **Mounting.** Condition, attenuation and grouping of mounts are to be checked. Mounts are to be replaced as per MAINTOP routines or on the basis of attenuation and physical condition.

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<b><u>SNo</u></b>	<b><u>Description</u></b>		<b><u>Status</u></b> <b>(Sat/Unsat)</b>	<b><u>Remarks</u></b>
(i)	Mounting	Physical Condition		(Applicable only if mounts are fitted)
		Attenuation		
		Service life as per MAINTOPS/OEM Doc.		

(f) **Functionality Checks.** Functionality checks of system for receiving/supplying of fire main supply to and from other ships, tugs, jetty as applicable to be checked.

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**SECTION VII**

**Test and Trial Document for  
AVCAT System**  
**Trial Schedule Reference No. - P25/P25A/System/AVCAT**

1. **AVCAT system consist of following:-**

- (a) One AVCAT transfer pump and One in number AVCAT circulation pump of capacity 1.5 KW (140 Ltr per minute) with working pressure of 1.9 Bar at 2900 rpm are fitted in AVCAT compartment.
- (b) One AVCAT filter water absorber of 140 RPM output with working pressure of 60 PSI and one water separator is located in AVCAT pump room.
- (c) One hand pumps located on Helo deck of capacity 450 USG per hour and working pressure of 60 PSI.
- (d) One AVCAT storage tanks of capacity 08 T and one in number AVCAT service tank of capacity 1.3 T.

**TRIAL SHEET**

**AVCAT System**

**1. Pre Requisite Check – Off List for System Trials.**

(a) Undertake following:-

<b><u>SNo</u></b>	<b><u>Description</u></b>	<b><u>Status (Sat/ Unsat)</u></b>	<b><u>Remarks</u></b>
(i)	Any modifications as part of refit are to be incorporated in the drawings. Applicable in case of ABER/ MLU replacement of item. (NA for PRT)	AVCAT Transfer pump	
		AVCAT Circulating pump	
		Hand pump	
(ii)	Pressure gauges and thermometers are calibrated and red marked indicating working pressure of the system. (NA for PRT)	Transfer pumps suction pressure gauge	
		Transfer pump dis. pressure gauge	
		Circulating pump suction pre. gauge	
		Circulating pump suction pre. gauge	
		Hand pp discharge pressure gauge	
		Filter Water separator inlet pressure gauge	
		Filter Water separator outlet pressure gauge	
		Water absorber inlet pressure gauge	
		Water absorber outlet pressure gauge	
(iii)	Any major modifications / A's and A's in system as part of refit is incorporated in the reference drawings. (NA for PRT)		
(iv)	The AVCAT storage tanks and service tanks are cleaned, inspected and cleared by respective agencies and ready to receive AVCAT. (NA for PRT)		
(v)	Flexible connections are to be provided at pump suction & discharge flanges.		
(vi)	Emergency shut-off valves are to capable of being closed remotely (cable if any).		
(vii)	Sufficient lights available near operating locations.		
(viii)	All the pipes are properly supported with clamps with		

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<u>SNo</u>	<u>Description</u>	<u>Status (Sat/ Unsat)</u>	<u>Remarks</u>
	rubber inserts.		
(ix)	Talley plates are fitted on all valves, cocks and gauges.		
(x)	Air escape pipes and overflow line of service tank are open/clear of any obstruction (prior to filling of Tanks).		

2. **AVCAT Transfer Pump.**(a) **Carry out following checks before starting the pump.**

<u>SNo</u>	<u>Description</u>	<u>Remarks</u>
(i)	Check pipe system is clean and clear from obstruction.	
(ii)	Rotate the pumps, by hand, in direction indicated on the driving end cover.	
(iii)	Check that the functional position of all valves should correspond with the valve position indicators.	
(iv)	Check that all valves are in the open position.	
(v)	Flexible connections (bellows) are provided on suction and delivery line of the pump.	
(vi)	Start the pump and check correct rotation.	

(b) **Pump Performance Checks.** Performance and attenuation checks of both pumps to be carried out as per the trials schedule. The transfer pumps to be operated both from remotely (If any) and from AVCAT pump room.

(c) **Capacity trials.** Pump capacity to be ascertained by transfer of AVCAT from any one storage tank to the other. The tank which is to be filled to be kept at minimum level & initial level is required to be recorded. Capacity is to be calculated by transferring of AVCAT for 15 minutes and measuring the level post transfer. If two storage tanks are not available, then capacity may be calculated by transferring of AVCAT from a storage tank to service tank. The rated capacity of the AVCAT transfer pump is 19 Bar.

Transfer from Tank no. \_\_\_\_\_ to Tank no. \_\_\_\_\_.

<u>SNo</u>	<u>Description</u>	<u>Unit</u>	<u>Initial reading</u>	<u>Final reading</u>	<u>Resultant</u>
(i)	Sounding of Tank from which fuel transfer is carried out	Tons			

(ii)	Sounding of Tank to which fuel is transferred	Tons			
(iii)	Time of transfer	Hrs			

**Capacity = Amount of fuel transferred in Tons/ Time taken in hrs**

(d) **Stopping the Pump.**

- (i) Switch off pump motor.
- (ii) Close suction and delivery valves.

(e) **Motor.** Performance Checks, SPM, Vibration and attenuation to be checked as per trials schedule & following checks as per ETMU trials protocol.

<b><u>SNo</u></b>	<b><u>Description</u></b>	<b><u>Reading</u></b>	<b><u>Remarks</u></b>
(i)	Starting current		
(ii)	Running current		
(iii)	Insulation		
(iv)	Starter calibration checks		

3. **AVCAT Service Pump.**

(a) **Carry out following checks before starting the pump.**

<b><u>SNo</u></b>	<b><u>Description</u></b>	<b><u>Remarks</u></b>
(i)	Check pipe system is clean and clear from obstruction.	
(ii)	Rotate the pumps, by hand, in direction indicated on the driving end cover.	
(iii)	Check that the functional position of all valves should correspond with the valve position indicators.	
(iv)	Check that all valves are in the open position.	
(v)	Flexible connections are provided on suction and delivery line of the pump.	
(vi)	Start the pump and check correct rotation.	

(b) **Pump Performance Checks.** Performance and attenuation checks of both pumps to be carried out as per the trials schedule. The transfer pump to be operated both from AVCAT pump room.

(c) **Capacity trials.** Pump capacity to be ascertained by transferring of AVCAT from a storage tank to service tank. The tank which is to be filled to be kept

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at minimum level & initial level is required to be recorded. Capacity is to be calculated by transferring of AVCAT for 15 minutes and measuring the level post transfer. The rated capacity of the AVCAT transfer pump is 19 Bar.

**Transfer from Tank no. \_\_\_\_\_ to Tank no. \_\_\_\_\_.**

<b><u>SNo</u></b>	<b><u>Description</u></b>	<b><u>Unit</u></b>	<b><u>Initial reading</u></b>	<b><u>Final reading</u></b>	<b><u>Resultant</u></b>
(i)	Sounding of Tank from which fuel transfer is carried out	Tons			
(ii)	Sounding of Tank to which fuel is transferred	Tons			
(iii)	Time of transfer	Hrs			

**Capacity = Amount of fuel transferred in Tons/ Time taken in hrs**

**(d) Stopping the Pump.**

- (i) Switch off pump motor.
- (ii) Close suction and delivery valves.

**(e) Motor.** Performance Checks, SPM, Vibration and attenuation to be checked as per trials schedule & following checks as per ETMU trials protocol.

<b><u>SNo</u></b>	<b><u>Description</u></b>	<b><u>Reading</u></b>	<b><u>Remarks</u></b>
(i)	Starting current		
(ii)	Running current		
(iii)	Insulation		
(iv)	Starter calibration checks		

**4. System Trials.**

**(a) Piping.** Visual checks of following components are to be carried out for any leakages or damage.

<b><u>SNo</u></b>	<b><u>Description</u></b>	<b><u>Status (Sat/Unsat)</u></b>	<b><u>Remarks</u></b>
(i)	Compensators/ Braided hoses		
(ii)	Flange-connections		
(iii)	Gaskets		

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(iv)	Adapters			
(v)	Suction strainers - for cleanliness and correct fittings.		Transfer pump	
			Circulating pump	
(vi)	System Integrity checks - For any type of leakages. (To be undertaken at working pressure during normal operation of system).			
(vii)	Supporting clamps - Sufficient supporting clamps to be provided at regular intervals as per NES 865. Clamps should have rubber inserts and adequate fasteners. End connection of supporting frame should have rigid support.			
(viii)	AVCAT filter/ water separator			Pressure difference across filters to be noted.
(ix)	AVCAT filter/ absorber			
(x)	Flexible hose for helo fuelling			Certificate for pressure testing of hoses to be checked.
(xi)	Operation of fuelling nozzle			To be checked during fuelling. Leakage from the nozzle should not be there.
(xii)	Operation of eductor located at helo deck			

- (i) Pressure difference across AVCAT filter/ water separator: -  
 (ii) Pressure difference across AVCAT filter/ absorber: -

(b) **Valves.** Visual and operational checks of following valves are to be carried out. Operate the valves through their complete range of operations to ensure that the valve position indicator moves with the valve.

<b><u>SNo</u></b>	<b><u>Description</u></b>		<b><u>Status (Sat/ Unsat)</u></b>	<b><u>Remarks</u></b>
(i)	Pump suction valve	Transfer pump		
		Circulating pump		
		Hand pump		
(ii)	Pump discharge valve	Transfer pump		
		Circulating pump		
		Hand pump		
(iii)	Tank filling valve	Storage tank		
		Service tank		
(iv)	Tank suction valve	Storage tank		
		Service tank		

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(v)	Isolating valve	For helo deck supply		
(vi)	Deck filling valve for filling of tanks (on helo deck)			
(vii)	Eductor	Inlet Valve		
		Outlet Valve		
		Suction Valve		

(c) **Tanks.** Visual/ functional checks are to be carried out for the following. Test certificate to be obtained as applicable.

<b><u>SNo</u></b>	<b><u>Description</u></b>	<b><u>Status (Sat/Unsat)</u></b>	<b><u>Remarks</u></b>
(i)	Sounding tube and sounding tapes – Volumetric marking on sounding chart to be cross checked with sounding tape markings during fuelling. Intactness of sounding tape and tube to be checked during tank cleaning activity.		
(ii)	Storage and service tank breathers to be checked for intactness.		
(ii)	Volumetric test - Test certificate to be obtained from respective agencies if tank geometry has been affected/ changed (NA for PRT)		
(iii)	APT - Test certificate to be obtained from respective agencies. (NA for PRT)		
(iv)	Paint scheme. As per Navy Order NO 56/16. (NA for PRT)		
(v)	Manhole door gaskets to be renewed.		
(vi)	Over flow line in service tank to be checked for integrity/ functionality		

(d) **Instrumentation.** Visual/ functional checks are to be carried out for the following and test certificate to be obtained.

<b><u>SNo</u></b>	<b><u>Description</u></b>	<b><u>Status (Sat/Unsat)</u></b>	<b><u>Remarks</u></b>
(i)	<u>Pressure gauges.</u> All pressure and vacuum gauges in the system and equipment to be checked for functionality and operation. Pressure	Transfer pump suction pressure gauge	
		Transfer pump discharge pressure gauge	
		Circulating pump suction pressure	

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<u>SNo</u>	<u>Description</u>	<u>Status</u> (Sat/ Unsat)	<u>Remarks</u>
	gauge marking for operating range to be completed.	gauge	
	Calibration certificates to be provided (NA for PRT).	Circulating pump discharge pressure gauge	
	Valves in gauge line and on the pressure gauge are to be checked for functionality and operation.	Hand transfer pump discharge pressure gauge	
		Hand stripping pump discharge pressure gauge	
		Water separator inlet pressure gauge	
		Water separator outlet pressure gauge	
		Water absorber inlet pressure gauge	
		Water absorber outlet pressure gauge	
		Pressure gauge in helo fuelling line	
(iii)	Gauge lines. All gauge lines to be checked for proper fitting and leakages.		

(e) **Foundation.** Visual checks of foundation are to be carried out ascertaining its condition. Remarks of foundation survey by Yard/ Ship Staff/ trial agencies needs to be cross checked for completion.

<u>SNo</u>	<u>Description</u>		<u>Status</u> (Sat/ Unsat)	<u>Remarks</u>
(i)	Foundation	AVCAT Transfer pump AVCAT Circulating pump		

(f) **Mounting.** Condition, attenuation and grouping of mounts are to be checked. Mounts are to be replaced as per MAINTOP routines or on the basis of attenuation and physical condition.

<u>SNo</u>	<u>Description</u>	<u>Status</u> (Sat/ Unsat)	<u>Remarks</u>

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(i)	Mounting	Physical Condition		(Applicable only if mounts are fitted)
		Attenuation		
		Service life as per MAINTOPS/ OEM Doc.		

(g) **Functionality Checks.**

- (i) Functionality checks of system for fuelling system to checked during fuelling to helo.
- (ii) Filling system of AVCAT to be checked during fuelling from other ships, jetty or tanker.
- (iii) Operation of both transfer pump as well as service pump is to be checked from fuelling station panel on deck 01 and also from respective pump rooms.

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**SECTION VIII**

**Test and Trial Document for  
Ballasting/ De-ballasting System  
Trial Schedule Reference No. – P25/P25A/System/Ballast**

1. **Ballast system consists of following:-**

- (a) Ballasting and Deballasting onboard is done by 03 fire pumps located in Pump room, Fwd DA compartment and Main Engine Room respectively.
- (b) There are total 03 in number ballast tanks of which one tank is located in the Forward most section of the ship and the other two are located at the aft.
- (c) The capacity of all ballast tanks are tabulated below: -

<b><u>SNo</u></b>	<b><u>Tank Name</u></b>	<b><u>Capacity (in litre)</u></b>
(i)	Ballast tank no. 1	13T
(ii)	Ballast tank no. 2	9T
(iii)	Ballast tank no. 3	9T

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**TRIAL SHEET**

**Ballasting/ De-ballasting System**

**1. Pre Requisite Check – off List for System Trials.**

<b><u>SNo</u></b>	<b><u>Description</u></b>	<b><u>Status (Sat/ Unsat)</u></b>	<b><u>Remarks</u></b>
(i)	Any modifications as part of refit are to be incorporated in the drawings. Applicable in case of ABER/ MLU replacement of item. (NA for PRT)	Fire Pump No. 1	
		Fire Pump No. 2	
		Fire Pump No. 3	
(ii)	Pressure gauges are calibrated and red marked indicating working pressure of the system. (NA for PRT)	Fire Pump No.1 suction pressure gauge	
		Fire Pump No. 1 discharge pressure gauge	
		Fire Pump No. 2 suction pressure gauge	
		Fire Pump No. 2 dis. pressure gauge	
		Fire Pump No.3 suction pressure gauge	
		Fire Pump No.3 dis. pressure gauge	
(iii)	Any modifications as part of refit are to be incorporated in the drawings. (NA for PRT)		
(iv)	Flexible connections are to be provided at pump suction & discharge flanges.		
(v)	All the pipes are properly supported with clamps with rubber inserts.		
(vi)	Sufficient lights available near operating locations.		
(vii)	Talley plates are fitted on all valves, cocks and gauges.		
(viii)	Air purging cocks are in shut position and the outlet is led to drain.		

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2. **Bilge & Ballast Pump.**

(a) **Carry out following checks before starting the pump.**

<b><u>SNo</u></b>	<b><u>Description</u></b>	<b><u>Remarks</u></b>
(i)	Check pipe system is clean and clear from obstruction.	
(ii)	Prime the pumps by opening the pump suction valve and carry out purging of pump casing.	
(iii)	Rotate the pumps, by hand, in direction indicated on the driving end cover.	
(iv)	Check that the functional position of all valves should correspond with the valve position indicators.	
(v)	Check that all valves are in the open position.	
(vi)	Start the pump and check correct rotation.	

(b) **Carry out following checks while pump is running.**

(i) **Performance checks.** Performance, Vibration, Attenuation checks of both pumps to be carried out as per the trials schedule.

(ii) **Capacity trials.** Pump capacity to be ascertained by filling of sea water from sea to any of the ballast tanks. The tank which is required to be filled for capacity trial is to be emptied first and the initial level to be recorded. The rated capacity of the Fire pump is 100TPH.

<b><u>SNo</u></b>	<b><u>Description</u></b>	<b><u>Unit</u></b>	<b><u>Initial reading</u></b>	<b><u>Final reading</u></b>	<b><u>Resultant</u></b>
(i)	Sounding of Tank (in which ballasting is carried out)	Tons			
(ii)	Time of transfer	Hrs			

**Capacity = Amount of sea water transferred in Tons/ Time taken in hrs**

(c) **Stopping the Pump.**

(i) Switch off pump motor.

(ii) Close suction and delivery valves.

3. **Motor.** Performance Checks, SPM, Vibration and attenuation to be checked as per trials protocol of Fire Main System.

4. **System Trials.**

(a) **Piping.** Visual checks of following components are to be carried out for any leakages or damage.

<b><u>SNo</u></b>	<b><u>Description</u></b>		<b><u>Status (Sat/Unsat)</u></b>	<b><u>Remarks</u></b>
(i)	Compensators			
(ii)	Flange-connections			
(iii)	Gaskets			
(iv)	Adapters			
(v)	Suction strainers - for cleanliness and correct fittings.	Fire Pump no.1 Fire Pump no.2		
		Fire Pump no.3		
(vi)	System Integrity checks - For any type of leakages. (To be undertaken at working pressure during normal operation of system).			
(vii)	Supporting clamps - Sufficient supporting clamps to be provided at regular intervals as per NES 865. Clamps should have rubber inserts and adequate fasteners. End connection of supporting frame should have rigid support.			

(b) **Valves.** Visual and operational checks of following valves are to be carried out. Operate the valves through their complete range of operations are to ensure that the valve position indicator moves with the valve.

<b><u>SNo</u></b>	<b><u>Description</u></b>		<b><u>Status (Sat/Unsat)</u></b>	<b><u>Remarks</u></b>
(i)	Pump suction valve	Pump no. 1		
		Pump no. 2		
		Pump no. 3		
(ii)	Pump discharge valve	Pump no. 1		
		Pump no. 2		
		Pump no. 3		
(iii)	Tank filling valve	Tank no. 1		
		Tank no. 2		
		Tank no. 3		
(iv)	Tank suction valve	Tank no. 1		
		Tank no. 2		
		Tank no. 3		
(v)	Isolating/ Interconnecting valve			
(vi)	Overboard valve	Pump no. 1		
		Pump no. 2		

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		Pump no. 3		
(vii)	Supply valve to fire main	Pump no. 1		
		Pump no. 2		
		Pump no. 3		

(c) **Tanks.** Visual/ functional checks are to be carried out for the following. Test certificate is to be obtained as applicable.

<b>SNo</b>	<b>Description</b>	<b>Status (Sat/ Unsat)</b>	<b>Remarks</b>
(i)	Sounding tube and sounding tapes – Volumetric marking on sounding chart to be cross checked with sounding tape markings during fuelling. Intactness of sounding tape and tube to be checked during tank cleaning activity.		
(ii)	Volumetric test - Test certificate to be obtained from respective agencies if tank geometry has been affected/ changed (NA for PRT)		
(iii)	APT - Test certificate to be obtained from respective agencies. (NA for PRT)		
(iv)	Paint scheme. As per Navy Order NO 56/16. (NA for PRT)		
(v)	Manhole door gaskets to be renewed.		

(d) **Instrumentation.** Visual/ functional checks are to be carried out for the following and test certificate is to be obtained.

<b>SNo</b>	<b>Description</b>	<b>Status (Sat/ Unsat)</b>	<b>Remarks</b>
(i)	Pressure gauges. All pressure and vacuum gauges in the system and equipment to be checked for functionality and operation. Pressure gauge marking for operating range to be completed. Calibration certificates to be provided (NA for PRT). Valves in gauge line and on the pressure gauge are	Pump no.1 suction pressure gauge	
		Pump no.1 discharge pressure gauge	
		Pump no.2 suction pressure gauge	
		Pump no.2 discharge	

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	to be checked for functionality and operation.	pressure gauge		
		Pump no.3 suction pressure gauge		
		Pump no.3 discharge pressure gauge		
		Pump no.2 running indication (in MCR)		
		Pump no.3 running indication (in MCR)		
(iii)	Gauge lines. All gauge lines to be checked for proper fitting and leakages.			

(e) **Foundation.** Visual checks of foundation are to be carried out ascertaining its condition. Remarks of foundation survey by Yard/ Ship Staff/ trial agencies needs to be cross checked for completion.

<b><u>SNo</u></b>	<b><u>Description</u></b>		<b><u>Status</u></b> <b>(Sat/Unsat)</b>	<b><u>Remarks</u></b>
(i)	Foun datio n	Pump No. 1		
		Pump No. 2		
		Pump No. 3		

(f) **Mounting.** Conditions, attenuation of mounts are to be checked. Mounts are to be replaced as per MAINTOP routines or on the basis of attenuation and physical condition.

<b><u>SNo</u></b>	<b><u>Description</u></b>		<b><u>Status</u></b> <b>(Sat/ Unsat)</b>	<b><u>Remarks</u></b>
(i)	Mounting	Physical Condition		(Applicable only if mounts are fitted)
		Attenuation		
		Service life as per MAINTOPS/ OEM Doc.		

(g) **Functionality Checks.** Functionality checks of system for ballasting of all ballast tanks viz forepeak as well as aft peak tanks to be ascertained. De-ballasting of all ballast tanks viz fore-peak as well as aft-peak tanks are to be checked. Ship's stability is to be maintained throughout the duration of functionality checks. Supply to fire main system from ballast pump also to be ascertained by making fire main system live using ballast pump.

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**SECTION IX**

**Test and Trial Document for  
Chilled Water System**  
**Trial Schedule Reference No. - P25/P25A/System/Chilled water**

.1. **Chilled water system consists of following:-**

- (a) Two centrifugal chilled water pumps (Port & Stbd) fitted in AC compartment provided for 03 AC plants (Forward, Port & Stbd ACs).
- (b) Two expansion tank located in AC Compartment.
- (c) Four ATUs (Air Treatment Unit) provided for heat exchange at various locations.
- (d) Chilled water shore connection inlet and outlet valve provided on foxle stbd side for shore chiller plant.

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**TRIAL SHEET**

**Chilled Water System**

**1. Pre Requisite Check – Off List for System Trials.**

<b><u>SNo</u></b>	<b><u>Description</u></b>	<b><u>Status (Sat/ Unsat)</u></b>	<b><u>Remarks</u></b>
(a)	Any modifications as part of refit are to be incorporated in the drawings. Applicable in case of ABER/ MLU replacement of item. (NA for PRT)	Port CW Pump Stbd CW Pump ATU no. 1 ATU no. 2 ATU no. 3 ATU no. 4	
(b)	Pressure gauges and thermometers are calibrated and red marked indicating working pressure of the system. (NA for PRT)	Pump suction pressure gauges Pump discharge pressure gauges ATU inlet pressure gauges ATU outlet pressure gauges ATU inlet thermometers ATU outlet thermometers	
(c)	Any major modifications / A's and A's in system as part of refit is incorporated in the reference drawings. (NA for PRT)		
(d)	Flexible connections are to be provided at pump suction & discharge flanges.		
(e)	Chilled water pipes are not to be laid through tanks which contains oil.		
(f)	All the pipes are properly supported with clamps with rubber inserts.1		
(g)	Sufficient lights available near operating locations.		
(h)	All chilled water pipes are insulated with cold lagging.		
(j)	Talley plates are fitted on all valves, cocks and gauges.		
(k)	Air purging cocks are in shut position and the outlet is led to drain.		

**3. Chilled Water Pump.**

**(a) Carry out following checks before starting the pump.**

<b><u>SNo</u></b>	<b><u>Description</u></b>	<b><u>Remarks</u></b>
(i)	Check pipe system is clean and clear from obstruction.	

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(ii)	Prime the pumps by opening the pump suction valve and carry out purging of pump casing (for initial starting).	
(iii)	Rotate the pumps, by hand, in direction indicated on the driving end cover.	
(iv)	Check that the functional position of all valves should correspond with the valve position indicators.	
(v)	Check that all valves are in the open position.	
(vi)	Start the pump and check correct rotation.	

(b) **Pump Performance Checks.** Performance, Vibration and attenuation checks of both pumps to be carried out as per the trials schedule.

(c) **Motor.** Performance Checks, SPM, Vibration and attenuation to be checked as per trials schedule & following checks as per ETMU trials protocol.

<b>SNo</b>	<b>Description</b>	<b>Reading</b>		<b>Remarks</b>	
		<b>Port Pump</b>	<b>Stbd Pump</b>	<b>Port Pump</b>	<b>Stbd Pump</b>
(i)	Starting current				
(ii)	Running current				
(iii)	Insulation				
(iv)	Starter calibration checks				

#### 4. **System Trials.**

(a) **Piping.** Visual checks of following components are to be carried out for any leakages or damage.

<b>SNo</b>	<b>Description</b>	<b>Status (Sat/Unsat)</b>	<b>Remarks</b>
(i)	Bellows/ flexible connections		
(ii)	Flange-connections		
(iii)	Gaskets		
(iv)	Adapters		
(v)	Suction strainers - for cleanliness and correct fittings	Port CW Pump Stbd CW Pump ATU no. 1 ATU no. 2 ATU no. 3 ATU no. 4	
(vi)	System Integrity checks - For any type of leakages. (To be undertaken at working pressure		

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	during normal operation of system)			
(vii)	Supporting clamps - Sufficient supporting clamps to be provided at regular intervals as per NES 865. Clamps should have rubber inserts and adequate fasteners. End connection of supporting frame should have rigid support			

(b) **Valves.** Visual and operational checks of following valves are to be carried out. Operate the valves through their complete range of operations to ensure that the valve position indicator moves with the valve.

<b><u>SNo</u></b>	<b><u>Description</u></b>	<b><u>Status (Sat/Unsat)</u></b>	<b><u>Remarks</u></b>
(i)	Pump suction valve	Port CW Pump	
		Stbd CW Pump	
(ii)	Pump discharge valve	Port CW Pump	
		Stbd CW Pump	
(iii)	Expansion tank filling valve		
(iv)	Expansion tank outlet valve		
(v)	Expansion tank purging valve		
(vi)	ATU inlet valve	ATU no. 1	
		ATU no. 2	
		ATU no. 3	
		ATU no. 4	
(vii)	ATU outlet valve	ATU no. 1	
		ATU no. 2	
		ATU no. 3	
		ATU no. 4	
(ix)	Chilled water shore connection	Inlet valve	
		Outlet valve	

(c) **Expansion tank.** Visual/ functional checks are to be carried out for the following. Test certificate is to be obtained as applicable.

<b><u>SNo.</u></b>	<b><u>Description</u></b>	<b><u>Status (SAT/UNSAT)</u></b>	<b><u>Remarks</u></b>
(i)	Sight glass for level indication to be intact and clear.		

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(ii)	APT - Test certificate to be obtained from respective agencies. (NA for PRT)		
(iii)	Paint scheme. As per Navy Order NO 56/16. (NA for PRT)		
(iv)	Inspection door gaskets to be renewed.		

(d) **Instrumentation.** Visual/ functional checks are to be carried out for the following and test certificate to be obtained.

<b><u>SNo</u></b>	<b><u>Description</u></b>	<b><u>Status (Sat/ Unsat)</u></b>	<b><u>Remarks</u></b>
(i)	Pressure gauges. All pressure and vacuum gauges in the system and equipment to be checked for functionality and operation. Pressure gauge marking for operating range to be completed. Calibration certificates to be provided (NA for PRT). Valves in gauge line and on the pressure gauge are to be checked for functionality and operation.	Port pump discharge pressure gauge Stbd Pump suction pressure gauge Port pump suction pressure gauge Stbd Pump discharge pressure gauge ATU no.1 inlet pressure gauge ATU no. 1 outlet pressure gauge ATU no.2 inlet pressure gauge ATU no. 2 outlet pressure gauge ATU no.3 inlet pressure gauge ATU no. 3 outlet pressure gauge ATU no.4 inlet pressure gauge ATU no. 4 outlet pressure gauge ATU no.1 inlet thermometer ATU no. 1 outlet thermometer ATU no.2 inlet thermometer ATU no. 2 outlet thermometer ATU no.3 inlet	

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<b><u>SNo</u></b>	<b><u>Description</u></b>	<b><u>Status (Sat/ Unsat)</u></b>	<b><u>Remarks</u></b>
	thermometer		
	ATU no. 3 outlet thermometer		
	ATU no.4 inlet thermometer		
	ATU no.4 outlet thermometer		
(ii)	<u>Sensor.</u> All sensors in the system and related equipment to be checked for functionality and operation. Connection to IPMS and automation (if applicable) also to be checked. Calibration certificates to be provided (NA for PRT).		
(iii)	<u>Gauge lines.</u> All gauge lines to be checked for proper fitting and leakages.		

(e) **Foundation.** Visual checks of foundation are to be carried out ascertaining its condition. Remarks of foundation survey by Yard/ Ship Staff/ trial agencies needs to be cross checked for completion.

<b><u>SNo</u></b>	<b><u>Description</u></b>	<b><u>Status (Sat/ Unsat)</u></b>	<b><u>Remarks</u></b>
(i)	Foundation	Port Chilled water pump Stbd Chilled water pump Expansion tank (Port) Expansion tank (Stbd)	

(f) **Mounting.** Condition, attenuation of mounts is to be checked. Mounts are to be replaced as per MAINTOP routines or on the basis of attenuation and physical condition.

<b><u>SNo</u></b>	<b><u>Description</u></b>	<b><u>Status (Sat/ Unsat)</u></b>	<b><u>Remarks</u></b>
(i)	Mounting	Physical Condition Attenuation Service life as per MAINTOPS/ OEM Doc.	(Applicable only if mounts are fitted)

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(g) **Functionality Checks.** Functionality checks of chilled water system from shore chiller plant using shore chilled water connection to be undertaken during refit.

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**SECTION X**

**Test and Trial Document for  
Sprinkling System**  
**Trial Schedule Reference No. - P25/P25A/System/Sprinkling**

1. **Sprinkling system consist of following:-**

(a) Three in number fire main pumps with maximum capacity of 100TPH and discharge pressure 8 Kg/cm<sup>2</sup> (Pump no.1, 2 & 3) fitted in Pump room, Fwd DA compartment and in Main Engine room respectively.

(b) The sprinkling system is provided with five stations. The details are as follows:-

(i) Station 1 & 3 are located in store office for forward guns ammunition magazines and barbettes (viz AK 176 & AK 630).

(ii) Station 2 is located in front of SS dining hall for Chaff magazine.

(iii) Station 4 & 5 are located in MER lobby for Aft 630 gun magazines and barbettes

**TRIALS SHEET**

**Sprinkling System**

**1. Pre Requisite Check – Off List for System Trials.**

(a) Undertake following:-

<b><u>SNo</u></b>	<b><u>Description</u></b>	<b><u>Status (Sat/Unsat)</u></b>	<b><u>Remarks</u></b>
(i)	Any modifications as part of refit are to be incorporated in the drawings. Applicable in case of ABER/ MLU replacement of item. (NA for PRT)	Fire main pump no.1	
		Fire main pump no.2	
		Fire main pump no.3	
(ii)	Pressure gauges are calibrated and red marked indicating working pressure of the system. (NA for PRT)	Pump suction pressure gauges	
		Pump discharge pressure gauges	
		Sprinkling system gauges	
(iii)	Any major modifications / A's and A's in system as part of refit is incorporated in the reference drawings (NA for PRT).		
(iv)	Sufficient light available.		
(v)	Communication available between pump control position and sprinkling location. (Motorola)		
(vi)	Test area is cleaned.		
(vii)	All the pipes are properly supported with clamps.		
(viii)	Talley plates are fitted on all valves, cocks and gauges.		
(ix)	All nozzles/ sprinklers to be covered with plastic bags so as to avoid filling of water in the compartment.		
(x)	Inlet and outlet valve of QOV(pneumatic valve) for sprinkling system of particular compartment to be in open position		

**2. Fire main Pump.** Trials of all fire pumps are to be carried out as per the trials schedule.

3. **System Trials.**

(a) **Piping.** Visual checks of following components are to be carried out for any leakages or damage.

<b>SNo</b>	<b>Description</b>	<b>Status (Sat/Unsat)</b>	<b>Remarks</b>
(i)	Compensators		
(ii)	Flange-connections		
(iii)	Gaskets		
(iv)	Adapters		
(v)	Suction strainers - for cleanliness and correct fittings.	F/M pump no.1 F/M pump no.2 F/M pump no.3	
(vi)	System Integrity checks - For any type of leakages from sprinkling system pipelines and nozzles. (To be undertaken at working pressure during normal operation of system).		Nozzles should not be dripping after operation of sprinkling.
(vii)	Supporting clamps - Sufficient supporting clamps to be provided at regular intervals as per NES 865. Clamps should have rubber inserts and adequate fasteners. End connection of supporting frame should have rigid support.		

(b) **Valves.** Visual and operational checks of following valves are to be carried out. Operate the valves through their complete range of operations.

<b>SNo</b>	<b>Description</b>	<b>Status (Sat/Unsat)</b>	<b>Remarks</b>
(i)	Station 1 & 3 Sprinkling valves for forward section magazines and gun barbettes	046 in no. (inlet, outlet, pneumatic and bypass) valves	Functionality checks of pneumatic valves by operating air cock.
(ii)	Station 2 Sprinkling valves for Chaff magazine	03 in no. (inlet, outlet, pneumatic and bypass)	
(iii)	Station 4 &5 Sprinkling valves for Aft main magazines	06 in no. (inlet, outlet, pneumatic and	

**RESTRICTED**

	and gun barbettes	bypass.		
(vi)	Valves for helo hanger foam sprinkling system	Inlet valve Outlet valve By-pass valve		

(c) **Instrumentation.** Visual/ functional checks are to be carried out for the following and test certificate to be obtained.

<b><u>SNo</u></b>	<b><u>Description</u></b>	<b><u>Status (Sat/Unsat)</u></b>	<b><u>Remarks</u></b>
(i)	<u>Pressure gauges.</u> All pressure and vacuum gauges in the system and equipment to checked for functionality and operation. Pressure gauge marking for operating range to be completed. Calibration certificates to be provided (NA for PRT). Valves in gauge line and on the pressure gauge are to be checked for functionality and operation.	Sprinkling system pressure gauge of Station 1 &3  Sprinkling system pressure gauge of Station 2  Sprinkling system Of station 4&5	
(iii)	<u>Gauge lines.</u> All gauge lines to be checked for proper fitting and leakages.		

(d) **Functionality Checks.** Functionality checks of sprinkling system are to be carried out by operating sprinkling valves for various locations and checking all nozzles for correct functioning and operating from remote pneumatic cocks at various locations.

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## AIR PRESSURE TEST REPORT

1. SHIP	
2. DATE	
3. AUTHORITY	
4. HULL INSPECTOR	
5. QC CLEARED BY AND DATE	
6. DETAILS OF COMPARTMENT/ CLUSTER OF COMPARTMENTS	
7. NO OF TY BLANKS WITH REASON	
8. NO OF PERMANENT BLANKS WITH REASON	

9. ANY OTHER OBSERVATIONS

10. ANY REMARKS ON WT DOORS/ WT HATCHES/ MUSHROOM HEADS AND

11. MAJOR HOTWORK IN THIS CLUSTER

COMPLETED / NOT COMPLETED

**NOTE:** DETAILS OF HOTWORKS/ APT AFFECTED WORKS TO BE UNDERTAKEN POST CONDUCTING OF AIR PRESSURE TEST BE INTIMATED TO THE SHIP'S STAFF AND HITU(V) ON PRIORITY

SHIP'S STAFF REP  
(Name, Rank, P.No.)

Refitting Authority REP  
(Name, Rank, P.No.)

HITU(V) REP  
(Name, Rank, P.No.)



RESTRICTED

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HULL INSPECTION & TRIALS UNIT  
C/O FMO, VISHAKHAPATNAM - 530014  
PH NO. 2049 / 2691 FAX NO. 0891- 2749138

REPORT ON CITADEL TEST – INS

1. CITADEL NO : \_\_\_\_\_
2. CITADEL BOUNDARY : \_\_\_\_\_  
\_\_\_\_\_
3. DATE OF LAST TEST : \_\_\_\_\_
4. DATE OF PRESENT TEST : \_\_\_\_\_
5. AUTHORITY : \_\_\_\_\_
6. TYPE OF TEST (tick as applicable) :  MANUAL MODE /  REMOTE \*\*\* OPERATION
7. TOTAL NUMBER OF AFUs : \_\_\_\_\_
8. TOTAL NUMBER OF NBC FILTERS : \_\_\_\_\_

RESTRICTED

<u><b>AFU</b></u>								
AFU : OPS / NON-OPS								
AFU : IN USE / BY PASSED								
		1	2	3	4	5	6	7
		8						
<u><b>NBC FILTERS</b></u>								
		<p>PRESSURE OR → FLOW RATE ACHIEVED</p> <p>↓ DESIGN PRESSURE OR FLOW RATE</p>						
<b>A</b>	MAKE							
	RENEWAL DATE							
	EXPIRY DATE							
	DIFFERENTIAL PRESSURE							
	OPS/NON-OPS							
<b>B</b>	MAKE							
	RENEWAL DATE							
	EXPIRY DATE							
	DIFFERENTIAL PRESSURE							
	OPS/NON-OPS							

5. TOTAL NUMBER OF BLEED VALVES : \_\_\_\_\_

BLEED VALVES	TYPE : MANUAL / PNEUMATIC	MAKE / BRAND	OPERATING PRESSURE		OPS / NON-OPS
			DESIGN	ACHIEVED	
1					
2					
3					
4					
5					
6					
7					
8					

6. DETAILS OF PMT BLANKING (IF ANY) : \_\_\_\_\_

7. DETAILS OF TEMPORARY BLANKING (IF ANY) : \_\_\_\_\_

8. HOTWORK IN CITADEL BOUNDARY (IF ANY) : \_\_\_\_\_

9. ANY DEFECT ON WT DOORS / HATCHES / : \_\_\_\_\_  
MUSHROOM HEADS /VENT FLAPS / AOQCs

10. NO OF MANOMETERS & LOCATION : \_\_\_\_\_

11. GRAQS/REFERENCE DOCUMENT : \_\_\_\_\_

12. DESIGN PRESSURE : \_\_\_\_\_

13. PRESSURE ACHIEVED / TIME TAKEN : \_\_\_\_\_

14. CHECK-OFF LIST FOR CLOSING DOWN : \_\_\_\_\_  
CONDITION (HELD / NOT HELD)

15. SAT / UNSAT : \_\_\_\_\_

16. \*\*\*REMOTE OPERATION : \_\_\_\_\_

17. OBSERVATIONS : \_\_\_\_\_

18. RECOMMENDATIONS:

Ship Staff Rep (Name, Rank, No, Date)	Yard Rep (Name, Rank, No, Date)	HITU Rep (Name, Rank, No, Date)
--	------------------------------------	------------------------------------

# Helo Deck Friction Test Report - INS

Authority			
Date of Inspection			
Date of last friction test			
Occasion of friction test			
Last paint renewal details	100% Paint scheme renewal post _____ blasting undertaken in _____ by _____ with M/s _____ paint scheme		

	Original Paint Scheme	Maintenance Coat
Surface Preparation		
No of Coats/DFT (Primer)		
No of Coats/DFT (Anti-Corrosive)		
No of Coats/ avg DFT (Anti-Skid)		
Primer Manufacturer		
Paints Manufacturer		
Date of Application		
Applied By		

## FRICTION MEASUREMENTS AT LOCATION – 1 (VICINITY OF HARPOON GRID)

(FV = FRICTION VALUE; CFV – CORRECTED FRICTION VALUE)

	Location	Dist from C/L	Coefficient of Friction										Remarks	
			Port				Center				Stbd			
			Temp (°C)	Correction	FV	CFV	Temp (°C)	Correction	FV	CFV	Temp (°C)	Correction	FV	CFV
<u>Wet Condition</u>	FS :													
	FS :													
	FS :													
<u>Oily Condition</u>	FS :		NA				NA				NA			
	FS :		NA				NA				NA			
	FS :		NA				NA				NA			

Note:(1) **Permissible values of Coefficient of Friction** (IHQ (N)/DNA letter NC/Policy/Material/H-100 dated 06 Dec 15)

(a) Wet Condition  $\geq 0.60$ , (b) Oily Condition  $\geq 0.30$

(2) **Temperature Correction Factor (Applicable for Wet Condition Only)**. Refer to Para 2(b)(i) of Enclosure-1 of IHQ(N)/DNA letter NC/Policy/Material/H-100 dated 06 Dec 15 and Table/Para 5.11 of Operating Instructions of Munro Portable Skid Resistance Tester

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# **PRESERVATION REPORT BY SHIP STAFF**

## **(FOR PHASE-II INSPECTIONS)**

**SHIP :** \_\_\_\_\_

**Note:** - For surface preparation: - ABRASIVE BLASTING SA 2.5  
POWER TOOLING ST 3

**OEM/QC INSPECTION CERTIFICATE (AS APPLICABLE) ENCLOSED: -**

### HMO Sign:

**Name:**

**Rank:** \_\_\_\_\_

## Office Seal

**INSPECTION / TESTS AND TRIALS PROTOCOL - PHASE-I INSPECTION**

**DATE OF INSPECTION -**

**NAME OF INSPECTOR -**

<b><u>SI No</u></b>	<b><u>Description</u></b>	<b><u>Observation</u></b>
<b>1</b>	<b>Material State (No 01/15)</b>	
1.1	Details of Last Inspection	
1.2	Details of Last Refit	
1.3	OPDEFs	
(a)	No of OPDEFs since Last Inspection	
(b)	Details of Hull OPDEFs	
1.4	Hull Concessions details if any	
1.5	Structural Defects (Cracks, Holes, Pitting, Thinning of Structure, Suspect Structure)	
<b>2</b>	<b>Preservation (NO 20/03)</b>	
<b>2.1</b>	<b>Machinery Compartments</b>	
(a)	Present Paint Scheme (NO 53/16)	
(b)	Date of Last 100% Renewal	
(c)	Present Paint Condition	
(d)	General Bilges Hygiene Presence of Water / Oil in Bilges	
(e)	Condition of Foundations of Seachest/ Sea Water Cooling Pumps/ Firemain Pumps in all Machinery Compartments	
(f)	Other Observations	
<b>2.2</b>	<b>Weather Decks/ Ship Side/ Boot Top</b>	
(a)	Present Paint Scheme (NO 53/16)	
(b)	Date of 100 % Paint Renewal	
(c)	Present Paint Condition	
(d)	Maintenance Standard	
(e)	Rusting / Corrosion	
<b>2.3</b>	<b>Helo / Flight Deck (NO 53/16)</b>	
(a)	Helo deck paint scheme and last renewed	
(b)	Condition of deck/ dkhd/bkhd	
(c)	Condition of moving parts	
(d)	Present Paint Condition	
(e)	Maintenance Standard	
(f)	Rusting / Corrosion	
(g)	Date of last friction test	
(h)	Maintenance Standard	
(j)	Condition of dados of hangar	
(k)	Present Paint Condition	
(l)	Rusting / Corrosion	
(m)	Any other defects	
<b>2.4</b>	<b>Internal / wet Compartments</b>	
(a)	Condition of dadoes in Wet compartments / fan rooms	
(b)	Rusting / Corrosion	
(c)	Any other defects	
(d)	Condition of dadoes	
<b>2.5</b>	<b>Super Structure {NO 53/16}</b>	
(a)	Rusting / Corrosion	

(b)	Any other defects	
<b>2.6</b>	<b>Deck Coverings</b>	
(a)	Present System	
(b)	Cracks /peeling off	
(c)	Other observations	
<b>3</b>	<b>Documentation</b>	
<b>3.1</b>	<b>Documentation</b>	
(a)	Record of Hull Survey by SS (NO 01/15)	
(b)	Record of Hull Potential Measurements (NO 06/2011)	
(c)	EMAP	
(d)	Boat Log Book (NO 04/2005)	
(e)	Record of Defects	
(f)	HMP/VMP Log Book	
(g)	Weight mangement book	
<b>3.2</b>	<b>Returns</b>	
(a)	IN-378 (NO 01/15, NO (Str) 03/10)	
(b)	Quarterly Hull Survey by SS (NO 01/15, NO(Str) 03/10)	
(c)	Hull Potential / ICCP (NO 06/2011)	
(d)	Boat Returns / Boat History Sheet (NO 04/05)	
<b>3.3</b>	<b>Miscellaneous Records</b>	
(a)	Policy File	
(b)	MAINTOPS	
(c)	IN 305 (Anchor Chain Cable - NO 07/2011)	
(d)	IN 379 (Docking Form)	
(e)	Hull Survey Report by Yard	
<b>3.4</b>	<b>HMP / VMP</b>	
(a)	Regular Yes / No	
(b)	Whether HMP / VMP Adequate	
(c)	Whether Employed IAW Maintops or Not	
<b>4</b>	<b>Water Tight and Gas Tight Integrity (NO 01/15)</b>	
<b>4.1</b>	<b>Air Pressure Test of W/T compartments</b>	
(a)	List of Compartments Tested Successfully in presence of HITU(V)	
(b)	Availability of APT Equipment	
(c)	25% proving of the total number of clusters every year(Group A,B and C) and 100% proving of all clusters in every Two year cycle for group D ships(Beyond 20 Years) as per IHQ letter NC/Policy/H-102/Refit dated 29 Jan 16.	
(e)	Remarks if any	
<b>4.2</b>	<b>CITADEL</b>	
(a)	Status of Citadel	
(b)	Type : Pre refit / Post Refit / Annual	
(c)	Next due on	
(d)	Routines on AFU	
(e)	Whether NBC filter indate or not	

<b>4.3</b>	<b>W/T, G/T Doors/ Hatches /Flaps</b>	
(a)	Date of Chalk Test (Every 6 months by SS)	
(b)	No of Defective Doors	
(c)	No of Defective Hatches	
(d)	No of hatches with spring assisted mechanism and operable from above and below by one man	
(e)	No of Defective flaps	
(f)	Condition of Rubber Seals (visual)	
(g)	Other Defects	
(h)	Condition of ITPs (fitted or not Fitted)(Refer to HQENC fax NC/3000/6/2 dated 26 Jun 18)	
<b>4.4</b>	<b>Escape Hatch (IHQ Policy NC/8333/Policy dated 12 Dec 17)</b>	
(a)	Total no. of Emergency Escape Hatches	
(b)	No. of Emergency Escape Hatches of standardized size (600 mm x 600 mm)	
(c)	Nos and Location where installation of standardized EEHs not feasible	
(d)	Locations where installation of standardized EEHs not feasible	
<b>4.5</b>	<b>Escape Scuttles (IHQ Policy NC/8333/ Policy dated 12 Dec 17)</b>	
(a)	Total no. of Emergency Escape Scuttles	
(b)	No. of Emergency Escape Scuttles of standardized size (600 mm x 600 mm)	
(c)	Nos and Location where installation of standardized Scuttles not feasible	
(d)	Locations where installation of standardized EEHs not feasible	
<b>4.6</b>	<b>Mushroom Heads</b>	
(a)	No Defective and Details	
(b)	Other Defect	
<b>5.0</b>	<b>Lifting Appliances (INBR 1552)</b>	
<b>5.1</b>	<b>Operational State, Last Date of Load Test Details and Known Defects</b>	
		Operational State
		Last Load Test Details
		<b>Wire rope Last renewed</b> (wire rope are to be replaced period not exceeding five years as per IHQ letter NC/Ploicy/H-04/Equipment dated 09 May 16.)
		Limit Switch Ops / Non Ops
		OEM certificate
		Lubrication of wire ropes (Sat/UnSat)
		Auto catch mechanism of boat davit (Ops / Non ops)
		Operational State
		Limit Switch Ops/ Non Ops
		Last Load Test Details
		<b>Wire rope Last renewed</b> (wire rope are to be replaced period not exceeding five years as per IHQ letter NC/Ploicy/H-04/Equipment dated 09 May 16.)
		Lubrication of wire ropes (Sat/UnSat)
		OEM certificate
(a)	Boat Davits	
(b)	Derricks and Associated Fittings/ Mine Sweeping Davits (Port & Stbd) (as applicable)	

		Operational State	
		Last Load Test Details	
(c)	Single Arm Davit	<b>Wire rope Last renewed</b> (wire ropes are to be replaced period not exceeding five years as per IHQ letter NC/Policy/H-04/Equipment dated 09 May 16.)	
		Lubrication of wire ropes (Sat/UnSat)	
		OEM certificate	
		Remote operation (Ops / non Ops)	
(d)	Auto Release Hook (Serviceability checks in every 12 months)	Operational State	
		Last Load Test Details	
		Known Defects	
(e)	Polyster web slings (Renewal in every 24 months)	Operational State	
		Last Load Test Details	
		Polyster web slings Last renewed	
(f)	RAS Points Including (portable fittings)	Operational State	
		Last Load Test Details	
		Known Defects	
(g)	Accommodation Ladder	Operational State	
		Last Load Test Details	
		<b>Wire rope Last renewed</b> (wire ropes are to be replaced period not exceeding five years as per IHQ letter NC/Policy/H-04/Equipment dated 09 May 16.)	
		Lubrication of wire ropes (Sat/UnSat)	
		Limit Switch Ops / Non Ops	
		OEM certificate	
(h)	Ships Brow (big/small)	Operational State	
		Last Load Test Details	
		Known Defects	
(j)	Helo Deck and Hangar Deck Rings / Eyes	Operational State	
		Last Load Test Details	
		Known Defects	
(k)	Towing Arrangements / Towing Rope (polypropylene)	Operational State	
		Last Load Test Details	
		Known Defects	
(l)	Helo deck Safety Nets (Duration 6 months by SS)	Operational State	
		Last Load Test Details	
		Known Defects	
(m)	Anchor Strop	Operational State	
		Last Load Test Details	
		Known Defects	

<b>6.0</b>	<b>Systems</b>
<b>6.1</b>	<b>ICCP System/ Cathodic Protection (06/2011) and NHQ Policy letter NC/Policy /H-77 dated 02 Mar 15</b>
(a)	Operational / Non Operational
(b)	Set Potential wrt Zinc RE
(c)	Reading in Panel (Ag/AgCl or Zn)
(d)	External Reading wrt Portable Zinc RE
(e)	Last Calibration Date of portable Zinc RE
(f)	Routine undertaken iaw MAINTOPS (Yes/ No)
(g)	Known Defects of ICCP System if any
<b>6.2</b>	<b>Ventilation System</b>
(a)	Operational/ Non Operational
(b)	Details of Defects
(c)	State of ATU Ops / Non Ops
(d)	ATU Routines
(e)	State of HEs
(f)	Choking of Trunkings if any
(g)	Routine undertaken iaw MAINTOPS (Yes/ No)
(h)	Last cleaning date of fins/coils of ATUS / FCUS IAW HQENC Letter NC/3200/13/Policy dated 06 Jul 7
<b>6.3</b>	<b>Fresh Water Systems</b>
(a)	Ops / Non Ops
(b)	Details of Defects if any
<b>6.4</b>	<b>Sewage Treatment Plant</b>
(a)	Name / Make / Model / Type / Date of Installation
(b)	Operational / Non Operational
(c)	Details of Defects if any
(d)	Whether Routine Undertaken iaw Manual/ MAINTOPS (Yes/ No)
(e)	Spray head assembly in STPs iaw manual (OPS/NON OPS)
(f)	Details of Last Effluent Test and Result (iaw NCD 3930 Rev-3 of Sep 16)
(g)	Details of H <sub>2</sub> S Sensor: Portable (minimum 02 nos) Fixed (date of Installation /Location/ Qty fitted / Ops status) (HQENC letter NC/3200/14/Policy dated 02 Feb 17)
(h)	H <sub>2</sub> S Sensor Calibration Date(fixed/ portable)
(i)	Maintenance repair/routines of Sewage Treatment plants/Sewage Tanks& associated pipe lines . IHQ Policy advisory on handling NC/Policy/h-107/Equipment dated 14 Jun 16
(k)	Repeater for fixed H <sub>2</sub> S Sensor in DCHQ (YES/NO)
(l)	Weather forced ventilation provided in STP compartment (iaw NCD 3930 Rev -3 of Sep 16)
<b>6.5</b>	<b>Pre-wetting System</b>
(a)	Operational / Non operational
(b)	Date Last Operated
(c)	Details of Defects if any
<b>6.6</b>	<b>Sanitary System</b>
(a)	Defects if any
(b)	Chokes if any
(c)	State of Flushing Valves

<b>7</b>	<b>Hull Equipment</b>	
<b>7.1</b>	<b>Anchor Chain Cable and Associated Fittings</b>	
(a)	Last Survey Details (NO 07/2011)	
(b)	Date of Load Test	
(c)	Anchor Stopper	
(d)	Blake Slip	
(e)	Compressor	
(f)	BER Ttems if any	
(g)	Routine undertaken iaw MAINTOPS (Yes/ No)	
(h)	Deficiency if any	
<b>7.2</b>	<b>Capstan and Cable Holders</b>	
(a)	Ops Status	
(b)	Routine undertaken iaw MAINTOPS (Yes/ No)	
(c)	Remote operation of capstan, If any (Ops/Non Ops)	
(d)	Defects if any	
<b>7.3</b>	<b>Winches</b>	
(a)	Ops Status	
(b)	Routine undertaken iaw MAINTOPS (Yes/ No)	
(c)	Defects if any	
<b>7.4</b>	<b>Crane</b>	
(a)	Ops Status	
(b)	Routine undertaken iaw MAINTOPS (Yes/ No)	
(c)	Defects if any	
<b>7.5</b>	<b>Hangar Shutter</b>	
(a)	Ops Status	
(b)	Routine undertaken iaw MAINTOPS (Yes/ No)	
(c)	Defects if any	
<b>7.6</b>	<b>Boom</b>	
(a)	Ops Status	
(b)	Defects if any	
<b>7.7</b>	<b>A's &amp; A's / ABER</b>	
<b>8.0</b>	<b>Life Saving Appliances</b>	
<b>8.1</b>	<b>Boats</b>	
(a)	Authorisation	
(b)	Held / Deficiency Onboard	
(c)	Weighting /valid upto	
(d)	BER	
(e)	Landed for Repairs	
(f)	Weight of each boat wrt to weight during Pre-Dispatch inspection	
(g)	Speed trials carried out iaw trials protocol (copy enclosed - Yes/No)	
(h)	Visual examination of Forward and aft lifting hooks arrangement	
(i)	DP test of adapter piece between the hook and the base plate being carried out annually by refitting authority.	
(k)	Periodic Inspection and maintenance / testing of lifting hook arrangement as stipulated MAINTOP MT- 17023 is carried out by SS/ND(V)	
(l)	visual survey of strong back area of hooks, connecting rods, adapter plate, securing bolts, weld joints and GRP Laminate around it.	
(m)	Defects if any	

<b>8.2</b>	<b>Life rafts</b>	
(a)	Authorisation	
(b)	Held / Deficiency Onboard	
(c)	stowage arrangement	
(d)	Sureyed/ Valid upto	
(e)	Landed for Repairs	
(f)	Hydrostatic release gear	
(g)	Defects if any	
<b>9</b>	<b>Habitability</b>	
<b>9.1</b>	<b>Living Conditions</b>	
(a)	Rationalisation of Habitability iaw IHQ(N)/DNA Policy letter NC/Policy/H-121/Equipment dated 05 Apr 17. Salient aspects mentioned below	
(b)	Panelling to be present only in Admirals Cabin, CO Cabin, Wardroom & Wetspaces	
(c)	Use of MPL Panels to be discontinued	
(d)	Use of Single Skin/Ceiling/Sandwich Panels 0.9 mm Panels of CRCA/SS to be as per IHQ Guidelines Issue 2 of Feb 2013	
(e)	Inspection Windows be provided on every third continuous Panel (max height 1 m from deck)	
(f)	Use of Wooden Flooring/Glass/Ceramics to be discontinued	
<b>9.2</b>	<b>Ships Husbandry</b>	
<b>9.3</b>	<b>A/C Discipline</b>	
<b>10.0</b>	<b>Ships Husbandry Tools</b>	
10.1	Authorisation of Tools (IHQ Policy Letter NC/Policy/H-08/Equipment Dated 22 Aug 12)	
10.2	Held as per Authorisation	
10.3	Operational	
<b>11</b>	<b>Recommendations</b>	
11.1	Following recommended by SS	

Note:- The Check off list is to be read in conjunction with extant policies and does not supercede any relevant directive in vogue

## VENTILATION SYSTEM TRIALS - INS

2	Canteen	2											
3	Gyro	2											
4	DCHQ	2											
5	Telephone Exchange	2											
<b>Total</b>													

**ATU No: 2**

SI No	Compartment (as per Ship's book/ present nomenclature)	No of Ducts	Air Flow (m/s)	Duct Area (m <sup>2</sup> )	Air flow (m <sup>3</sup> /hr)	Total Airflow (m <sup>3</sup> /hr)		Temp (°C)(DB/WB)		Humidity(%)	Observations
						Actual	Design	Actual	Design		
6	PPM/ Ballast	1									
7	Regulating Office	2									
8											
9	TX Room	2									
10											
11	Ward Room	7									
12											
13											
14											
15											
<b>Total</b>						<b>0</b>	<b>0</b>				



SI No	Compartment (as per Ship's book/ present)	No of Ducts	Air Flow (m/s)	Duct Area (m <sup>2</sup> )	Air flow (m <sup>3</sup> /hr)	Total Airflow (m <sup>3</sup> /hr)		Temp (°C)(DB/WB)		Humidity(%)	Remarks	Observations
						Actual	Design	Actual	Design			
30	Seamen Mess (23 Men)											
31												
32												
33	Aircraft Instrument Space											
34	Shipwright Office											
35	FLYCO											
<b>Total</b>						<b>0</b>	<b>0</b>					
SI No	Compartment (as per Ship's book/ present)	No of Ducts	Air Flow (m/s)	Duct Area (m <sup>2</sup> )	Air flow (m <sup>3</sup> /hr)	Total Airflow (m <sup>3</sup> /hr)		Temp (°C)(DB/WB)		Humidity(%)	Remarks	Observations
						Actual	Design	Actual	Design			
37	EO's Cabin											
38	EXO's cabin											
39	NO's Cabin											
40	FLTCDR's Cabin											
41	CO's Day Cabin											
43	CO's Cabin											
44	Radar Office											
45	Sr.Pilot											
46	Chart Room											
47	VHF/ UHF Room											
48	Enclosed Bridge											
<b>Total</b>						<b>0</b>	<b>0</b>					

ATU No.5:												
SI No	Compartment (as per Ship's book/ present nomenclature)	No of Ducts	Air Flow (m/s)	Duct Area (m <sup>2</sup> )	Air flow (m <sup>3</sup> /hr)	Total Airflow (m <sup>3</sup> /hr)		Temp (°C)(DB/WB)		Humidity(%)	Remarks	Observations
						Actual	Design	Actual	Design			
49	Sick Bay											
50	Dispensary											
51	Shipwright workshop											
<b>Total</b>					<b>0</b>	<b>0</b>						

**NOTE:-**

- (A) AMBIENT TEMPERATURE DURING TRIALS WAS --- ° C.
- (B) MAGAZINE COMPARTMENT TEMPERATURE IS TO BE LESS THAN 32 ° C IN ACCORDANCE WITH NES 102.
- (C) OTHER COMPARTMENTS TEMPERATURE IS TO BE LESS THAN 27 ° C (DRY BULB) AND 19.5° C (WET BULB) IN ACCORDANCE WITH NES 102.
- (D) GALLEY COMPARTMENT TEMPERATURE IS TO BE LESS THAN 34.5° C (DRY BULB) AND 26° C (WET BULB) IN ACCORDANCE WITH NES 102.
- (E) DESIGN VALUES OBTAINED FROM TRIALS DATA BOOK -----

5	<b>OBSERVATIONS</b> <b>THE TRIALS ARE UNSATISFACTORY VIEW FOLLOWING OBSERVATIONS:-</b>
	(A) INSUFFICIENT / EXCESS AIR FLOW
	(C) OTHER COMPARTMENTS TEMPERATURE IS TO BE LESS THAN 27 ° C (DRY BULB) AND 19.5° C (WET BULB) IN ACCORDANCE WITH NES 102.
	(C) DEFECTIVE AIR DIFFUSERS AND BELOWS DICCONNED AT INDICATED COMPARTMENTS.
6	<b>RECOMMENDATIONS</b>
	(A) AIR BALANCING TO BE UNDERTAKEN FOR COMPARTMENTS WHICH HAVE EXCESS / INSUFFICIENT AIR FLOW
	(B) DEFECTS AS MENTIONED AGAINST EACH SERIAL BE LIQUIDATED.
	(C) FOLLOWING NR ROUTINES ON VENTILATION SYSTEM ARE TO BE COMPLETED PRIOR TO OFFERING OF POST REFIT TRIALS IAW MT 15023
	(I) RENEW RUBBER SEALS AS NECESSARY AND CHALK TEST ALL WT COVER SEALS .
	(II) CARRY OUT INTERNAL CLEANING OF 50% VENTILATION TRUNKING AND 100 % TRUNKING OF GALLEY EXHAUST TRUNKING AS PER BR 2203 AND CHECK WT SLUICE VALVES FOR AIR TIGHTNESS AS PER BR2170
	(III) OPEN GAS FLAP BOXES EXAMINE FLAPS FOR DISTORTION AND RUBBER'S FOR DETERIORATION AND CARRY OUT CHALK TEST
	(IV) GREASE FILTERS OF EXHAUST TRUNKING IN GALLEYS TO BE CLEANED AND PRESERVED

(V) STRIP , EXAMINE AND REFIT VENTILATION VALVES AND WTSV'S, SPECIFIC ATTENTION TO BE PAID TO STRUCTURE IN THE IMMEDIATE VICINITY

(VI) VENTILATION VALVES AND GEARINGS TO BE EXAMINED. ALSO, REPLACE GLANDS AS NECESSARY AND SURVEY THE AREA IN VICINITY

