



MINISTRY OF DEFENCE (DGQA)


STANDARD QUALITY ASSURANCE PLAN
MARINE AIR CONDITIONER / PACKAGE AIR
CONDITIONER/ SELF CONTAINED AIR
CONDITIONER (SCAC)
(UPTO 7.5 TR)

STANDARD QAP NO. DGQA/DQA(WP)/MARINE AC& SCAC/30/2022/REV 0
18 JAN 22

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DIRECTORATE OF QUALITY ASSURANCE (WARSHIP PROJECT)
MINISTRY OF DEFENCE (DGQA)
6TH FLOOR, 'B' BLOCK, DEFENCE OFFICES COMPLEX
SAROJINI NAGAR PO, NEW DELHI – 110 023

	MINISTRY OF DEFENCE / DGQA DIRECTORATE OF QUALITY ASSURANCE (WP) NEW DELHI – 110 023	MARINE AC/PACKAGE AC/ SCAC STANDARD QAP NO. DGQA/DQA(WP)/ MARINE AC & SCAC /30/2022/ REV-0	PAGE	02
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RECORD OF AMENDMENTS


<u>Sl. No.</u>	<u>Date of Amendment</u>	<u>Amendments</u>	<u>Authority</u>	<u>Remarks</u>

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MINISTRY OF DEFENCE (DGQA)


STANDARD QUALITY ASSURANCE PLAN **MARINE AIR CONDITIONER/ PACKAGE AIR** **CONDITIONER/SELF-CONTAINED** **AIR CONDITIONER (SCAC)** **(UPTO 7.5 TR)**

STANDARD QAP NO.
DGQA/DQA(WP)/MARINE AC& SCAC/30/2022/REV 0
18 JAN 22


(S N Alamanda)
Rear Admiral
ADGQA (WP)

Promulgated by:-

DIRECTORATE OF QUALITY ASSURANCE (WARSHIP PROJECT)
MINISTRY OF DEFENCE (DGQA)
6TH FLOOR, 'B' BLOCK, DEFENCE OFFICES COMPLEX
SAROJINI NAGAR PO, NEW DELHI – 110 023

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CONDITION OF RELEASE

1. This Standard Quality Assurance Plan (SQAP) has been formulated for reference of the Order Placement Agencies, Inspection Authority, Inspection Agencies and the Industry. No alteration is to be made to this SQAP except by the issue of authorised amendment by DQA (WP).
2. It is to be applied, as required, for Quality Assurance during various stages of manufacture of Marine AC/Package AC & SCAC for *IN* Ships.
3. The website **<http://www.dggadefence.gov.in> / indainnavy.gov.in / Naval QA** may also be referred for other Quality Assurance related inputs.
4. The SQAP has been prepared on the basis of decisions made during the collegiate meeting held at DQA (WP) with leading manufacturers of Package AC, Marine AC & SCAC and representatives of Professional Directorates and Production Directorates of the *IN*. Any user of this Standard QAP within DGQA/ *IN* or in industry may propose an amendment to it with valid justification. Proposals not applicable to particular contract can be sent directly to DQA (WP), New Delhi, and those directly applicable to a particular contract are to be dealt with using contract procedures.
5. The specifications and standards laid out in the SQAP are indicative only. The specifications/ parameters and standards given in the Statement of Technical Requirement (SOTR)/ Technical Specifications (TSP)/ MoM of TNC / Approved drawings will be final and binding.
6. DQA (WP) reserves the right to amend or modify the contents of this SQAP without consulting or informing any holder of this document.
7. In case the SQAP is incorporated into contracts, users are responsible for the correct application while complying with contractual and other statutory requirements. Compliance with SQAP does not confer immunity from legal obligations.
8. Enquiries in connection to these requirements may be made from:

Directorate of Quality Assurance (Warship Project)
Ministry of Defence
6th Floor, 'B' Block,
Defence Offices Complex
Sarojini Nagar P.O
New Delhi – 110 023



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LIST OF ANNEXURES


Sl. No.	<u>Annexure No.</u>	<u>Topic</u>
1.	Annexure – I	DQA(N) policy no. 66301/Policy-07/DQA(N)/QA-07 dated 09 Aug 16 regarding ESS Test (Thermal Cycling, Random Vibration and Burn in / Endurance)
2.	Annexure – II	DQA(N) Policy No. 66301/Policy/DQA(N)/SG dated 14 Nov 17 regarding inspection of imported items
3.	Annexure – III	DQA(N) policy letter 580930/DQA(N)/EL dated 17 Feb 14 regarding Conformal Coating of PCBs
4.	Annexure – IV	DQA(WP) policy letter 12575/POLICY/DGQA/ WP-TC dated 28 Sep 20 regarding Guidelines for approval of SQAPs/QAPs.
5.	Annexure – V	DQA(WP) policy letter 12575/POLICY/DGQA/ WP-TC dated 14 Jun 21 regarding use of approved QAP for replenishment order.
6.	Annexure- VI	DQA(WP) policy no. 29814/MISC/DGQA/WP-TC dated 24 Feb 21 regarding SOP for remote inspection for weight measurement, packing & preservation and painting

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STANDARDS INVOKED


Sl. No.	<u>Specification No.</u>	<u>Description</u>
1	NES 102	Requirement of Air Conditioning & Ventilation in Ships
2	NES 329	Cooling Coil
3.	DME 405 (R1)	Instrumentation specification
4.	DME 452	Documentation Specification
5.	DGS 251	Painting
6.	MIL-STD-167	Mechanical Vibrations of Shipyard Equipment
7.	MIL-STD-1474D	Airborne Borne Noise measurements and acceptance criteria of shipboard equipment
8.	MIL-STD-740B	Structure Borne Noise measurements and acceptance criteria of shipboard equipment
9.	MIL-STD-461E	EMI/EMC requirement for Electronic equipment
10.	EED-Q-071(R4)	Specification for AC Motors and Starter/Control Gear

Note: - The Standards given are indicative only. The specifications / standards and parameters given in the SOTR / Technical Specification (TSP) / MoM of TNC / Approved drawings will be final and binding.

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SPECIFIC REQUIREMENTS

1. Testing of physical, chemical properties and specific tests (wherever mentioned) has to be done by NABL accredited lab (including firm's NABL accredited lab).
2. All castings are to be subjected to RT and / or UT, as applicable, to qualify the same in accordance with the approved class of casting, unless otherwise specified in P.O. & SOTR / TSP. The extent of RT will be as per the approved drawing. The class of casting is to be invariably mentioned in the drawing / DBOM.
3. All forgings are to undergo UT for soundness and integrity checks.
4. Tubes / pipes are to be subjected to Eddy Current Test unless exempted in P.O. / TEC.
5. Make of item should be as per approved PIL / Detailed Bill of Material (DBOM) or IN approved source.
6. ESS Test (Thermal Cycling, Random Vibration and Burn in / Endurance) is to be in accordance with DQA(N) policy no. 66301/Policy-07/DQA(N)/QA-07 dated 09 Aug 16 (Annexure-I).
7. Ingress protection testing will be as per applicable IP rating.
8. Type Test, EMI / EMC test and ET will be done at Government/PSU test centers or NABL accredited labs. EMI / EMC Acceptance Test Plan is to be duly vetted by NEC, Mumbai.
9. If TT, EMI / EMC and ET have already been done in earlier projects on identical units, same need not be done again & the reports of earlier tested units will have to be provided for review of inspection agency.
10. Motors to be procured only from Naval approved vendors.
11. Imported items will be inspected i.a.w DQA(N) Policy No. 66301/Policy/DQA(N)/SG dated 14 Nov 17 (Annexure-II), as amended from time to time. Normally, following documents are inspected: -
 - (a) Bill of Lading / Shipping Bill / Airway bill.
 - (b) Invoice by OEM or Country of Origin Certificate with Packing List
 - (c) Bill of entry to warehousing
 - (d) OEM confirmation Certificate
 - (e) Firm's Guarantee Certificate as per supply orders (SOs)
12. Conformal Coating of PCBs to be done as per DQA(N) policy letter 580930/DQA(N)/EL dated 17 Feb 14 (Annexure-III) and revision, if any.
13. Guidelines for approval of SQAPs/QAPs, DQA(WP) policy letter 12575/POLICY/DGQA/WP-TC dated 28 Sep 20 (Annexure-IV) is relevant.
14. For replenishment order, DQA(WP) policy letter 12575/POLICY/DGQA/WP-TC dated 14 Jun 21 (Annexure- V) is relevant.


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15. Post promulgation of this SQAP, separate QAP approval for Marine Air Conditioner/ Package Air Conditioner/ Self Contained AC is not required. The manufacturer shall be required to submit confirmation to concerned QA Agency and OPA towards acceptance of SQAP either in totality or with some design specific inclusions and/or exclusions, if any, along with the following details: -

- (a) Equipment name.
- (b) Equipment technical details (as applicable).
- (c) Purchase Order reference.
- (d) Sub/Sub-Sub Orders reference (as applicable).
- (e) Name of Main Indenter/ Ordering Authority.
- (f) Name of end user, if available.
- (g) Name of firm / manufacturer.
- (h) SOTRs reference, if available.
- (j) Yard No./ Name of ship where to be fitted (if available)/ End user.
- (k) References of relevant drawings.
- (l) QAP No. & Date (as indicated by the firm).
- (m) Contractual delivery date.
- (n) Inspection Authority.
- (p) Inspection Agency.
- (q) Quantity (as applicable).
- (r) Inclusions, if any.
- (s) Exclusions, if any.


16. The SQAP along with the proposed inclusions/ exclusions approved by DQA(WP) shall be deemed as the approved QAP for the particular PO.

17. Remote Inspection for weight measurement, packing & preservation and painting to be carried out in accordance with DQA(WP) policy no. 29814/MISC/DGQA/WP-TC dated 24 Feb 21 (Annexure-VI).

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ABBREVIATIONS

ABN	Air Borne Noise
ACCP	ASNT Central Certificate Program
ASNT	American Society of Non-destructive Testing
ATP	Approved Test Procedure
CHP	Customer Hold Point
CoC	Certificate of Conformity
COTS	Commercial-off-the-shelf
DBOM	Detailed Bill of Material
DFT	Dry Film Thickness
DI	Dimensional Inspection
DPT	Dye Penetrant Test
EMC	Electro Magnetic Conduction
EMI	Electro Magnetic Induction
ESS	Environment Stress Screening
ET	Environmental Testing
FATs	Factory Acceptance Trials
GA	General Arrangement
HT	Heat Treatment
I-Note	Inspection Note
IFATs	Integrated Factory Acceptance Trials
IR	Inspection Report (by firm)
ISNT	Indian Society of Non-destructive Testing
LTC	Lab Test Certificate from NABL approved lab
MO	Material Organisation
MoM	Minutes of Meeting
MPT	Magnetic Particle Test
MTC	Manufacture Test Certificate
NABL	National Accreditation Board for Testing and Calibration Laboratories
NDE	Non Destructive Evaluation
NDT	Non Destructive Testing
NSTL	Naval Science & Technological Laboratory
OEM	Original Equipment Manufacturer
OPA	Order Placing Authority
P	Performed by
PIL	Parts Identification List
PQR	Procedure Qualification Record
QA	Quality Assurance
QAE	Quality Assurance Establishment
QAO	Quality Assurance Officer
QAP	Quality Assurance Plan
R	Review (by QA Rep.)
RT	Radiography Testing
SBN	Structure Borne Noise
SOTR	Statement of Technical Requirement
STC	Supplier Test Certificate
TC	Test Certificate
TEC	Technical Evaluation Committee
TNC	Technical Negotiation Committee
TSP	Technical Specifications
TT	Type Test
UT	Ultrasonic Testing
VI	Visual Inspection
W	Witness (by QA Rep.)
WPQ	Welder Performance Qualification
WPS	Welding Procedure Specification


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SCOPE

1. **Scope of Quality Assurance.** The scope of Quality Assurance includes witness/ review at all stages of manufacturing viz. 'Raw Material Stage', 'In-process Stage' and 'Final Stage'. The scope also covers the review and witness of Type test of equipment, wherever applicable.

2. The SQAP contains comprehensive list of inspections and/or trials that is to be applicable for Quality Assurance of the equipment. In addition, Quality Assurance of equipment will also be governed by specific conditions laid down in SOTRs and 'Approved Drawings'. The inspections/ trials must be contemporary to latest technology/ techniques available in the industry at the time of placement of order.


3. The following quality assurance activities will be carried out during the Quality Assurance of Equipment: -
 - (a) Visual Inspection.
 - (b) Dimensional Inspection.
 - (c) Review of Lab Test Certificates/Supplier Test Certificates/Compliance Certificates/Calibration Certificate/Import documents.
 - (d) Witness of in-house Lab Testing, if applicable.
 - (e) Witness of Non-destructive Testing viz. UT, DPT & MPT.
 - (f) Witness of Eddy Current Test or review of Eddy Current Test Report, as applicable.
 - (g) Review of RT films and reports.
 - (h) Review of Heat Treatment Charts.
 - (j) Witness of Endurance Trials & Tilt Test and review of Shock Test, SBN & ABN reports for qualification of Type Test, as applicable.
 - (k) Pressure Test/Leak Test as per approved drawings/Approved ATP.
 - (m) Functional Checks as per approved ATP.
 - (n) Review of ETT, EMI/EMC and ESS reports, in addition to Pre and Post ET inspection, as applicable.
 - (p) Review of Draft documentation and witness/Stamping of final documentation, as applicable.
 - (q) Issue of CHP clearance.
 - (r) Issue of Dispatch Clearance or Issue of Form-IV, as applicable.

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ITEM DESCRIPTION

Marine Air Conditioner / Package Air Conditioner / Self Contained Air Conditioner.

Package ACs / Marine ACs / Self Contained ACs are used onboard Naval ships and submarines for provisioning conditioned air to the compartments local spaces. They are identical to any other AC system in their working principle and components, but are compact, assembled as “one-piece” and generally are of lesser capacity. They are also fitted onboard minor vessels/ boats like ISVs and FICs where Central AC Plants are not provisioned.

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STANDARD QUALITY ASSURANCE PLAN


Part – I: General Information

The following generic information must generally be indicated on each QAP as its identity: -

- (a) Equipment Name
- (b) Equipment Technical Details (as applicable)
- (c) Purchase Order Reference
- (d) Sub/Sub-Sub Orders reference (as applicable)
- (e) Name of Main Indenter/ Ordering Authority
- (f) Name of end user
- (g) Name of Firm / Manufacturer
- (h) SOTR Reference
- (j) Yard No./ Name of Ship where to be fitted (if available)/End User
- (k) References of relevant Drawings
- (l) QAP No. & Date (as indicated by the firm)
- (m) Contractual Delivery Date
- (n) Inspection Authority
- (p) Inspection Agency
- (q) Quantity (as per PO)

Part – II: Technical Inspection/Trials

Standard QAP of Marine AC / Package AC /Self Contained AC	Appendix “A”
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		Appendix-A (Technical Inspection/Trials in form of SQAP Part-II (Refers to Page No. 12))	DATE	JAN 22

Standard QAP for Marine AC/Package AC/Self Contained AC

SL. NO.	MATERIALS / COMPONENTS AS PER SOTR/ QA ACTIVITY	QTY AS PER P.O.	CHARACTERISTICS / TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE CRITERIA	FORMAT OF RECORD	ACTION BY QAE	REMARKS
1.0.0.0	DRAWINGS/DOCUMENTS/TYPE TEST								
1.1.0.0	GA Drawings along with DBOM & Binding Data		Check for availability of approved drawings and DBOM & Binding data	100%	Purchase Order & SOTR/TNC Minutes	All approved drawings along with DBOM & Binding data are available.	List of Approved Binding Drawings	CHP for R	Approved binding data/drawing to be verified
1.2.0.0	Type Test/ETT/EMI/EMC reports*		Verification of Type Test / Qualification test reports.	100%	Purchase Order, GA drawings, Component drawings& SOTR/TNC Minutes/ JSS 55555	Equipment should have successfully undergone Type Test, EMI/EMC and ETT (as applicable)	Type Test/Qualification Test reports	CHP for R	<p>Shipyard Orders. Type / qualification test are to be conducted if not undertaken earlier or test certificate not held or equipment has undergone changes.</p> <p>MO Orders. Type / qualification tests undertaken only, if mentioned in PO.</p> <p>*EMI/EMC test mandatory for motors, compressors (if semi-hermetically sealed), Starter & Control panel.</p> <p>Decision of IHQ MoD(N) is final for all tests.</p>

SL. NO.	MATERIALS / COMPONENTS AS PER SOTR/ QA ACTIVITY	QTY AS PER P.O.	CHARACTERISTICS / TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE CRITERIA	FORMAT OF RECORD	ACTION BY QAE	REMARKS
2.0.0.0	RAW MATERIAL INSPECTION								
2.1.0.0	Condenser (Shell & Tube)								
2.1.1.0	Shell		(i) Material Identification & stamping*	100%	SOTR, Approved GA drawing, DBOM and component drawing	Conformity to specifications	IR	R	*Refer to Sl. No. 10 of important notes on page no. 26 of this document.
			(ii) Physical, Mechanical & Chemical Properties	One sample/ Heat/Lot		Conformity to specifications	LTC	R	
			(iii) Heat Treatment (If applicable)	100%		Conformity to specifications	HT Reports	R	
2.1.2.0	End Plate/Cover (LH&RH)		(i) Material Identification & Stamping*	100%	SOTR, Approved GA drawing, DBOM and component drawing	Conformity to specifications	IR	R	*Refer to Sl. No. 10 of important notes on page no. 26 of this document.
			(ii) Physical, Mechanical & Chemical Properties	One sample/ Heat/Lot		Conformity to specifications	LTC	R	
			(iii) Heat Treatment (If applicable)	100%		Conformity to specifications	HT Reports	R	
2.1.3.0	Condenser Tubes		(i) Material Identification & Stamping*	100%	SOTR, Approved GA drawing, DBOM and component drawing	Conformity to specifications	IR	R	*Refer to Sl. No. 10 of important notes on page no. 26 of this document.
			(ii) Physical, Mechanical & Chemical Properties	01 Sample / heat/Lot		Conformity to specifications	OEM TC/LTC	R	
2.1.4.0	Tube Sheet, Baffle Plate		(i) Material Identification & Stamping*	100%	SOTR, Approved GA drawing, DBOM and component drawings	Conformity to specifications	IR	R	*Refer to Sl. No. 10 of important notes on page no. 26 of this document.
			Physical, Mechanical & Chemical Properties	One sample/ Heat/Lot		Conformity to specifications	STC/CoC	R	
2.1.5.0	Support Plate, Front and Rear Head, Partition plate		(i) Material Identification & Stamping*	100%	SOTR, Approved GA drawing, DBOM and component drawings	Conformity to specifications	IR	R	*Refer to Sl. No. 10 of important notes on page no. 26 of this document.

SL. NO.	MATERIALS / COMPONENTS AS PER SOTR/ QA ACTIVITY	QTY AS PER P.O.	CHARACTERISTICS / TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE CRITERIA	FORMAT OF RECORD	ACTION BY QAE	REMARKS
			(ii) Physical, Mechanical & Chemical Properties	One sample/ Heat/Lot	SOTR, Approved GA drawing, DBOM and component drawings	Conformity to specifications	STC/CoC	R	
2.2.0.0	AC Enclosure								
2.2.1.0	Enclosure Panels (Base Panel, Cover, Front Panel, Top Back Panel, Side panel, RH side inspection panel Electrical panel door, Right Side corner, Left Side Corner, Drain Tray, Base Frames, Control Panel Box, Coil Mounting Back plate, Coil mounting Frame, Thermostat mounting plate, Supports)		(i) Material Identification & Stamping*	100%	SOTR, Approved GA drawing, DBOM and component drawings	Conformity to specifications	IR	R	*Refer to Sl. No. 10 of important notes on page no. 26 of this document.
			(ii) Physical, Mechanical & Chemical Properties	One sample/ Heat/Lot		Conformity to specifications	STC/CoC	R	
3.0.0.0	OUT SOURCED COMPONENTS								
3.1.0.0	BOUGHT OUT ITEMS								
3.1.1.0	Condenser (Shell & Tube Type)								
3.1.1.1	Tie Rod, Lifting Lug, Saddle Support, Spacer Tube, Nozzles		(i) Material Identification and Stamping*	100%	SOTR, Approved GA drawing, DBOM and component drawings	Conformity to specifications	IR	R	*Refer to Sl. No. 10 of important notes on page no. 26 of this document.
			(ii) Physical Mechanical & Chemical Properties	01 Sample / heat/lot		Conformity to specifications	STC/ CoC**	R	

SL. NO.	MATERIALS / COMPONENTS AS PER SOTR/ QA ACTIVITY	QTY AS PER P.O.	CHARACTERISTICS / TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE CRITERIA	FORMAT OF RECORD	ACTION BY QAE	REMARKS
3.1.1.2	Bracket for Name Plate, Sacrificing Anode		Chemical Properties	01 Sample / heat/lot	SOTR, Approved GA drawing, DBOM and component drawings	Conformity to specifications	LTC/STC/ CoC*	R	*Refer to Sl. No. 9 of important notes on page no. 26 of this document.
3.1.2.0	Evaporator (Coil)*		(i) Product Identification	100%	SOTR, Approved GA drawing, DBOM and component drawings	Conformity to specifications	OEM TC/ STC/CoC**	R	*Refer to Sl. No. 15 of important notes on page no. 26 of this document. **Refer to Sl. No. 9 of important notes on page no. 26 of this document.
			(ii) Pressure Test/Leak Test	100%		Pressure Test/Leak Test is satisfactory	IR/OEM TC***	R	***OEM TC to be reviewed for pressure/leak test, if not undertaken pressure/leak test to be carried out by firm and to be witnessed by QA rep.
3.1.3.0	Fan Blower and motor		Product Identification	100%	SOTR, Approved GA drawing, DBOM and component drawings	Conformity to specifications	OEM TC/ STC/CoC/ OEM Catalogue*	R	*Refer to Sl. No. 9 of important notes on page no. 26 of this document.
3.1.4.0	Supply Air Grill		Product Identification	100%	SOTR, Approved GA drawing, DBOM and component drawings	Conformity to specifications	STC/CoC*	R	*Refer to Sl. No. 9 of important notes on page no. 26 of this document.
3.1.5.0	Air Filter		(i) Product Identification	100%	SOTR, Approved GA drawing, DBOM and component drawings	Conformity to specifications	OEM TC/ STC/CoC*	R	*Refer to Sl. No. 9 of important notes on page no. 26 of this document.
			(ii) Efficiency	100%		Conformity to specifications	OEM TC/ STC/CoC*	R	
3.1.6.0	AC Enclosure - (As applicable)								

SL. NO.	MATERIALS / COMPONENTS AS PER SOTR/ QA ACTIVITY	QTY AS PER P.O.	CHARACTERISTICS / TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE CRITERIA	FORMAT OF RECORD	ACTION BY QAE	REMARKS
3.2.0.0	COTS								
3.2.1.0	Compressor (Reciprocating/ Rotary/Scroll)*		Product Identification	100%	SOTR, Approved GA drawing, DBOM and component drawings	Conformity to specifications	OEM TC/ STC/CoC/ OEM Catalogue**	R	* Refer to Sl. No. 15 of important notes on page no. 26 of this document. **Refer to Sl. No. 9 of important notes on page no. 26 of this document.
3.2.2.0	Condenser (Spiral wound tube-in-tube)		Product Identification	100%	SOTR, Approved GA drawing, DBOM and component drawings	Conformity to specifications	OEM TC/ STC/CoC*	R	*Refer to Sl. No. 9 of important notes on page no. 26 of this document.
3.2.3.0	Condenser (Shell & Tube Type)								
3.2.3.1	Gaskets, Coupling/Plug, Fasteners (Stub Bolt, Washer, Rivets)		Product Identification	100%	SOTR, Approved GA drawing, DBOM and component drawings	Conformity to specifications	OEM TC/ STC/CoC*	R	*Refer to Sl. No. 9 of important notes on page no. 26 of this document.
3.2.4.0	Miscellaneous COTS Items								
3.2.4.1	Pressure / Temp Gauges		Product Identification	100%	SOTR, Approved GA drawing, DBOM and component drawing/ Catalogue /OEM Specification	Conformity to specifications	OEM TC/ STC/CoC& Calibration Certificate*	R	*Refer to Sl. No. 9 of important notes on page no. 26 of this document. Physical verification as feasible may be undertaken during plant performance testing/ Type Testing
3.2.4.2	Pressure / Temp Transmitter		Product Identification	100%		Conformity to specifications	OEM TC/ STC/CoC& Calibration Certificate*	R	
3.2.4.3	HP/LP Cutout		Product Identification	100%		Conformity to specifications	OEM TC/ STC/CoC*	R	
3.2.4.4	Thermostat		Product Identification	100%		Conformity to specifications	OEM TC/ STC/CoC*	R	
3.2.4.5	Limit Switch, Water Pressure Switch		Product Identification	100%		Conformity to specifications	OEM TC/ STC/CoC*	R	

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3.2.4.6	Thermal Expansion Valve, Solenoid Valve, Vent Valve, Drain Valve, Water Flow Regulating Valve, Rotolock Condenser Discharge/Suction, Pressure Safety Valve, Packless Brass Valve, Hand Shut Off Valve, Charging Line Valve		Product Identification	100%	SOTR, Approved GA drawing, DBOM and component drawing/ Catalogue /OEM Specification	Conformity to specifications	OEM TC/STC/CoC*	R	
3.2.4.7	Accumulator		Product Identification	100%		Conformity to specifications	OEM TC/STC/CoC*	R	
3.2.4.8	Insulation Material		Product Identification	100%		Conformity to specifications	OEM TC/STC/CoC*	R	
3.2.4.9	Sight Glass		Product Identification	100%		Conformity to specifications	OEM TC/STC/CoC*	R	
3.2.4.10	Dial Thermometer		Product Identification	100%		Conformity to specifications	OEM TC/STC/CoC*	R	
3.2.4.11	Filter Drier, Strainer		Product Identification	100%		Conformity to specifications	OEM TC/STC/CoC*	R	
3.2.4.12	Vibration Isolator		Product Identification	100%		Conformity to specifications	OEM TC/STC/CoC*	R	*Refer to Sl. No. 9 of important notes on page no. 26 of this document. Physical verification as feasible may be undertaken during plant performance testing/ Type Testing
3.2.4.13	Refrigerant/ Refrigerant Bottle		Product Identification	100%		Conformity to specifications	OEM TC/STC/CoC*	R	
3.2.4.14	Piping and Tubing, Condenser Water Hoses with SS Clips, Cooling Water in/out Connectors, Flexible Connectors with Jubilee Clips, Inlet/ Outlet brass connectors, Flexible Duct, Hydraulic Hoses, Rubber Expansion Joint		Product Identification	100%		Conformity to specifications	OEM TC/STC/CoC*	R	

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3.2.4.15	Step Down Transformers, Contactors with I/O relays, Main Incoming MCB 3Ph/1Ph, Sacrificial Anode Charging Valve, HP / LP Trip Indicator		Product Identification	100%	SOTR, Approved GA drawing, DBOM and component drawing/ Catalogue /OEM Specification	Conformity to specifications	OEM TC/ STC/CoC*	R	
3.2.4.16	Fasteners (Nut, Bolt, Washers, Rivets etc)		Product Identification	100%		Conformity to specifications	OEM TC/ STC/CoC*	R	
4.0.0.0	IN-PROCESS INSPECTION								
4.1.0.0	Condenser (Shell & Tube)								
4.1.1.0	(i) WPS& PQR		Suitability of welding Procedure	100%	SOTR, Approved GA drawing, DBOM and component drawing, ASME SEC. IX	Welding specification & procedure confirms to specified standards	WPS and PQR	R	
	(ii) WPQ		Suitability of Welder Qualification	100%	SOTR, Approved GA drawing, DBOM and component drawing, ASME SEC. IX	Welder performance qualification confirms to specified standards	WPQ	R	
4.1.2.0	Shell		(i) Visual Inspection	100%	SOTR, Approved GA drawing, DBOM and component drawings	Conformity to approved drawings & specifications	IR	R	**Refer to Sl. No. 11, 12 & 13 of important notes on page no. 26 of this document.
			(ii) Dimensional inspection	100%			IR	R	
			(iii) DPT** (Applicable as per Drawing. / specification)	100%		Defects within permissible limits as per applicable standards/ Specifications	NDE Report/ STC	CHP for W	
			(iv) RT** (Applicable as per Drawing/ specification)	100%			NDE Report	CHP for R	

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4.1.3.0	End Plate (RH & LH)		(i) Visual Inspection	100%	SOTR, Approved GA drawing, DBOM and component drawings	Conformity to approved drawings & specifications	IR	R	**Refer to Sl. No. 11, 12 & 13 of important notes on page no. 26 of this document.
			(ii) Dimensional inspection	100%			IR	R	
			(iii) DPT** (Applicable as per Drawing. / specification)	100%		Defects within permissible limits as per applicable standards/ Specifications	NDE Report/ STC	CHP for W	
			(iv) RT** (Applicable as per Drawing/ specification)	100%			NDE Report	CHP for R	
4.1.4.0	Condenser Tube		(i) Visual Inspection	100%	SOTR, Approved GA drawing, DBOM and component drawings	Conformity to approved drawings & specifications	IR	R	
			(ii) Dimensional inspection	100%			IR	R	
			(iii) Pressure Test/Leak test	100%		Nil leakage	STC	R	
			(iv) Eddy current Test on plain tubes	100%		Tubes are free from defects	NDE Report/ STC	R	
4.1.5.0	Tube Sheet, Baffle Plate		(i) Visual Inspection	100%	SOTR, Approved GA drawing, DBOM and component drawings	Conformity to approved drawings & specifications	IR	R	*Refer to Sl. No. 11 & 13 of important notes on page no. 26 of this document.
			(ii) Dimensional inspection	100%			IR	R	
			(iii) DPT* on Shell to Tube Sheet Joint	100%			NDE Report/ STC	R	
4.1.6.0	Support Plate, Front and Rear Head, Partition plate		(i) Visual Inspection	100%	SOTR, Approved GA drawing, DBOM and component drawings	Conformity to approved drawings & specifications	IR	R	*Refer to Sl. No. 11 & 13 of important notes on page no. 26 of this document.
			(ii) Dimensional inspection	100%			IR	R	
			(iii) DPT* on weldment of partition plate	100%			NDE Report/ STC	R	

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4.2.0.0	AC Enclosure								
4.2.1.0	(i) WPS& PQR		Suitability of welding Procedure	100%	SOTR, Approved GA drawing, DBOM and component drawing, ASME SEC. IX	Welding specification & procedure confirms to specified standards	WPS and PQR	R	
	(ii) WPQ		Suitability of Welder Qualification	100%		Welder performance qualification confirms to specified standards	WPQ	R	
4.2.2.0	Enclosure Panels (Base Panel, Cover, Front Panel, Top Back Panel, Side panel, RH side inspection panel Electrical panel door, Right Side corner, Left Side Corner, Drain Tray, Base Frames, Control Panel Box, Coil Mounting Back plate, Coil mounting Frame, Thermostat mounting plate, Supports)		(i) Visual Inspection	100%	SOTR, Approved GA drawing, DBOM and component drawings	Conformity to approved drawings & specifications	IR	R	
			(ii) Dimensional inspection	100%			IR	R	
5.0.0.0	PRE-REQUISITE FINAL INSPECTION								
5.1.0.0	SUB-ASSEMBLIES/COMPONENTS-MECHANICAL								
5.1.1.0	Condenser Assembly		(i) Visual Inspection to check completeness of assembly and overall dimension	100%	SOTR, Approved GA drawing, DBOM and component drawings	Conformity to approved drawings & specifications	IR	W	
			(ii) Hydraulic /Pneumatic Pressure Test on Tube side	100%		Pressure test is satisfactory	IR	W	

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			(iii) Hydraulic/ Pneumatic Pressure Test on Shell Side	100%	SOTR, Approved GA drawing, DBOM and component drawings	Pressure test is satisfactory	IR	W	
			(iv) Cleaning, Nitrogen purging & Flushing	100%		Conformity to specifications	IR	W	
5.1.2.0	Fabrication of AC Enclosure		Visual Inspection to check completeness of assembly and overall dimension	100%	SOTR, Approved GA drawing, DBOM and component drawings	Conformity to specifications	IR	W	
5.1.3.0	Shock Mounts		(i) Product Identification	100%	Approved Drawings, Component Drawing, SOTR & SQAP	Conformity to approved Drgs/ DBOM/ SOTR/ Tech Specs/ relevant QAP / Import Documents	IR/I-note/ Form-4/ Dispatch Certificate (as applicable)	W	*SQAP compliance as per latest SQAP of Shock & Vibration Mounts
			(ii) SQAP Compliance*	100%				R	
			(iii) Dispatch clearance	--				R	
5.2.0.0	SUB-ASSEMBLIES/COMPONENTS-ELECTRICAL								
5.2.1.0	Local Control Panel/Starter Panel		(i) Product Identification	100%	Approved Drawings, SOTR & SQAP	Conformity to approved Drgs/ DBOM/ SOTR/ Tech Specs/ relevant QAP/ Import Doc.	IR/I-note/ Form-4/ Dispatch Certificate (as applicable)	W	*SQAP compliance as per latest SQAP of AC Starter/Control Gear
			(ii) SQAP Compliance*	100%				R	
			(iii) Dispatch clearance	--				R	
5.2.2.0	Motor for Compressor		(i) Product Identification	100%	Approved Drawings, SOTR & SQAP	Conformity to approved Drgs/ DBOM/ SOTR/ Tech Specs/ relevant QAP / Import Documents	IR/I-note/ Form-4/ Dispatch Certificate (as applicable)	W	*SQAP compliance as per latest SQAP of AC Motor.
			(ii) SQAP Compliance*	100%				R	
			(iii) Dispatch clearance	--				R	
5.3.0.0	TYPE TEST (S. NO. 1.2.0.0 OF SQAP IS RELEVANT)								
5.3.1.0	Final Assembly of Marine AC/Package AC/SCAC		Visual Inspection to check completeness of assembly and overall dimension	One Plant	SOTR, App. GA drawing, DBOM and component drawings	Conformity to approved Drgs/ DBOM/ SOTR	IR	W	

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5.3.2.0	Endurance test for Assembled AC		Functional & Safety Checks	One Plant	SOTR /TNC Minutes/ Approved Test Procedure	Conform to Approved Test Procedure	Type Test Report	CHP for W	
5.3.3.0	Tilt test of assembled AC		As per SOTR	One Plant		Conform to Approved Test Procedure	Type Test Report	CHP for W	
5.3.4.0	ABN & SBN		(i) Air Borne Noise radiated by the unit	One Plant	SOTR /TNC Minutes / Applicable Standard/ ATP	ABN & SBN meeting the limits specified in SOTR	ABN Report	CHP for R	(i) IHQ MoD(N) is final authority for all tests. (ii) Production may be commenced while type test is in progress at firm’s risk & cost. (iii) ABN & SBN are to be conducted by nominated agencies. (iv) If agreed upon IHQ MoD(N), shock calculations to demonstrate the ability of equipment to withstand the specified standard duly vetted by NSTL and IHQ MoD (N) is also acceptable.
			(ii) Structure Borne Noise radiated by the unit	One Plant			SBN Report	CHP for R	
5.3.5.0	Shock & Vibration Testing		Shock & Vibration Test/Analysis	One Plant	SOTR/NSS-II/ BR 3021/ Applicable Standard/ ATP	Equipment meets the NSS-II requirements & Vibration amplitude specified in SOTR	NSTL Test Report/NSTL approved test report	R	
5.4.0.0	MISCELLANEOUS REQUIREMENT								
5.4.1.0	SOTR/TNC compliance		Compliance	100%	SOTR/TNC Minutes	SOTR/TNC Minutes	Compliance matrix	R	
5.4.2.0	Submission of Approved FAT/IFAT/ATP document		Verification	100%	SOTR/TNC Minutes	SOTR/TNC Minutes	Approved FAT/IFAT/ATP document	R	
5.4.3.0	Firm’s Internal FAT Report		Verification	100%	Approved FATs Document	Approved FATs Document	Internal FAT Report	R	

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6.0.0.0	FINAL INSPECTION								
6.1.0.0	Marine AC / Package AC/ Self Contained AC -Factory Acceptance Trials (FATs)/Integrated Factory Acceptance Trials (IFATs)/Acceptance Test Procedure		(i) Visual Inspection to check completeness of final assembly and overall dimension	100%	SOTR, Approved GA drawing, DBOM and component drawings / Approved FATs document/ Applicable standard	Conformity to Specification	IR	CHP for W	These tests are to be conducted as per PO/SOTR/ATP/IFAT or directions of OPA. ABN, SBN & Vibration Trials are to be conducted by agency nominated by IHQ MoD(N), otherwise witnessing by QA rep.
			(ii) Pressure Test/Leak Test of Assembly	100%		Pressure test/leak test is satisfactory	IR	W	
			(iii) Air Borne Noise	-		Conformity to Specification	IR	R	
			(iv) Structure Borne Noise	-			IR	R	
			(v) Vibration Analysis/test	-			IR	R	
			(vi) Performance test/tests (As per approved FAT/IFAT/ATP)	100%		Conformity to approved FAT/IFAT/ ATP/ SOTR	IR	CHP for W	
7.0.0.0	PRE-REQUISITE-ISSUE OF FORM-4 (INSPECTION AND TEST CERTIFICATE)								
7.1.0.0	Submission of As Built binding Drawings		Verification & Stamping	100%	Approved Drawings, Concessions & Deviations	As drawings built are approved and complete	As drawings built are approved and complete	CHP for R	As built binding drawing to be submitted by the firm to professional directorate through inspection agency for approval
7.2.0.0	Liquidation of observation during FATs, if any		Defect rectification	100%	Approved Drawing, SOTR & FAT document	All defects liquidated	IR	CHP for R	
7.3.0.0	Weight		Weight recording	100%	Approved Drawing, SOTR& PO	To be within specified limits	Weight certificate	W	Witnessing through remote mode also acceptable

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7.4.0.0	Painting		Visual Inspection & DFT	100%	Approved Drawing, SOTR, Paint Plan	Confirms to specification / Painting Plan	IR	W	Witnessing through remote mode also acceptable
7.5.0.0	Preservation & Packing		Visual Inspection	100%	Approved Drawing, SOTR, OEM Preservation Plan	Confirms to specifications	IR	W	Witnessing through remote mode also acceptable Packing Procedure is to be mentioned by firm which shall be cleared by QA rep.
7.6.0.0	Submission of Form -4 (Inspection and Test Certificate)		Correctness	100%	SOTR, PO	SOTR, PO	Form-4	Issue of Form-4	

Important Notes: -

- Each type of Equipment & accessories to be supplied shall confirm to specification acceptable to the TYPE APPROVAL AUTHORITY.
- If casting is being poured without integral test bar, then the pouring is to be witnessed by Inspector. No repair of casting whatsoever is to be undertaken without approval by QAE.
- RT shooting sketches indicating Critical test regions and Test regions to be submitted prior to testing.
- A copy of WPS & PQR, with trade sensitive information blanked (if any), be provided to QAE for reference & record.
- The "Outsourced" items in the QAP are indicative only. The firm is required to categorically define the 'Bought out'/COTS items specific to their products in the DBOM of GA drawings. Items will be categorized as bought out or COTS in the SQAP on the basis of approved drawings. Further, only finished products will be accepted as COTS and no raw material for manufacturing will be acceptable as a COTS item.
- The SQAP does not apply to items not in the scope of supply of the firm.
- Inspection of assemblies/sub-assemblies and other items which have not been included in SQAP but form an important part of the system will also be undertaken
- The column 'Quantity as per P.O' has been left blank which has to be filled by the firm as per P.O while submitting QAP for approval.

9. Certificate to include the specification of item
10. Material identification & stamping to be done by firm and ensure the tractability of material as per test certificate
11. All NDT procedures are to be approved by ASNT (ACCP) / ISNT Level III qualified NDT personnel based on standards and acceptance criteria specified in SOTR / TSP / Applicable Standards.
12. RT & UT are to be carried out by ASNT (ACCP) Level-II/III or ISNT Level-II/III qualified NDT personnel. Interpretation/sentencing of RT and UT reports are to be carried out by ASNT (ACCP) Level-III or ISNT Level-III NDT personnel only.
13. MPT & DPT are to be carried out by certified ASNT (ACCP/SNT-TC-1A) Level-II/III or ISNT Level-II/III NDT personnel. Interpretation/sentencing of MPT and DPT reports are to be carried out by ASNT (ACCP) Level-III or ISNT Level-III NDT personnel only.
14. Witnessing of inspections can be done in remote mode, wherever feasible. The modalities of remote inspection are to be worked out jointly by the firm and QAO.
15. In this SQAP, the compressor is considered as COTS item and Evaporator (Coil) is considered as brought out item. Firm has to submit separate QAP through inspection agency for approval, if these items are under in house manufacturing as per DBOM of approved drawings.
16. Customer Holds Point (CHP): a point beyond which the vendor will not proceed without a written authority from QAO. The process / activity will be inspected by QA rep
17. Review of certificate and records by QA rep (R): a point at which client will review documentation records at an agreed time after completion of activity.