MINISTRY OF DEFENCE (DGQA)

STANDARD QUALITY ASSURANCE PLAN

HEAT EXCHANGER

(SHELL & TUBE TYPE)

STANDARD QAP NO. DGQA/DQA(WP)/HE/44/2023/REV-0
DATED 21 SEP 2023

Shell & Tube Type Heat Exchanger functions to cool the Lubricating Oil of Main Propulsion Engine through heat exchange between the heated oil flowing through Shell and cooling water flowing through tubes.

Total Nos. of Pages: 36

ISSUING AUTHORITY

DIRECTORATE OF QUALITY ASSURANCE (WARSHIP PROJECT)
MINISTRY OF DEFENCE (DGQA)
6TH FLOOR 'B' BLOCK,DEFENCE OFFICES COMPLEX
AFRICA AVENUE, SAROJINI NAGAR PO
NEW DELHI-110023

RECORD OF AMENDMENTS

Sl. No.	Date of Amendment	Amendments	Authority	Remarks

MINISTRY OF DEFENCE (DGQA)

STANDARD QUALITY ASSURANCE PLAN FOR HEAT EXCHANGER (SHELL & TUBE TYPE)

SQAP NO. DGQA/DQA(WP)/HE/44/2023/REV-0

C. Kamalakkannan

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Rear Admiral
ADGQA (WP)
21 Sep 23

Promulgated by

DIRECTORATE OF QUALITY ASSURANCE (WARSHIP PROJECT)
6TH FLOOR 'B' BLOCK, DEFENCE OFFICES COMPLEX
AFRICA AVENUE, SAROJINI NAGAR PO
NEW DELHI 110023

CONDITIONS OF RELEASE

1. This Standard Quality Assurance Plan (SQAP) has been formulated for reference of the Order Placement Agencies, Inspection Authority, Inspection Agencies and 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 Heat Exchanger for *IN* Ships.

3. The website ***htpp://www.dgqadefence.gov.in*** 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 Heat Exchangers 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 their correct application while complying with contractual and other statutory requirements. Compliance with SQAP does not of itself confer immunity from legal obligations.

8. Enquiries in connection to these requirements may be made from:

DTE OF QUALITY ASSURANCE (WARSHIP PROJECT)
MINISTRY OF DEFENCE (DGQA)
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STANDARDS INVOKED

Sl No.	Specification	Description
1	DEF STAN 02-329	Requirements for Heat Exchangers
2	IS 4503	Specification for Shell & Tube Type Heat Exchanger
3	IS 2825	Design requirements of Shell & Tube Type Heat Exchanger
4	DEF STAN 02-745	Classification, Inspection Requirements & Acceptance Standards for Steel Castings
5	DEF STAN 02-747 (Part 1 to 5)	Requirements for NAB Castings & Ingots
6	DEF STAN 02-779 (Part-3)	Requirements for 90/10 CuNi Alloy Material (Tubes)
7	DEF STAN 02-780 (Part-2)	Requirements for 70/30 CuNi Alloy Material - Forgings, Rods & Sections
8	DEF STAN 02-780 (Part-3)	Requirements for 70/30 CuNi Alloy Material (Tubes)
9	DEF STAN 07-253	Requirements for 70/30 CuNi Alloy - Sheets, Strips & Plates
10	DEF STAN 02-830 (Part 1 & 2)	Requirements for Gun Metal Ingots & Castings
11	DEF STAN 02-833 (Part 1)	Requirements for NAB - Sheets, Strips & Plates
12	DEF STAN 02-833 (Part 2)	Requirements for NAB - Forgings, Rods & Sections
13	DEF STAN 02-837	Requirements for copper Tubes
14	BSEN 12451	Copper & Copper Alloy Seamless Round Tubes for Heat Exchangers
15	BSEN 1652	Copper & Copper Alloys - Plates, Sheets & Circles for General Purposes (CuNi 90/10)
16	BSEN 1653	Copper & Copper Alloys - Plates, Sheets & Circles for Boilers & Pressure Vessels (CuNi 90/10)
17	ASTM B265	Specifications for Titanium & Titanium Alloy - Sheets, Strips & Plates
18	ASTMB338	Specifications for Seamless/ Welded Titanium & Titanium Alloy Tubes for Condensers & HEs
19	BSEN 10216 (Part 1-4)	Seamless Steel Tubes for Pressure Purposes
20	BSEN 10217 (Part 1-4)	Welded Steel Tubes for Pressure Purposes
21	BSEN 10028-1 (part 1 to 7)	Specifications for Flat Products Made of Steels for Pressure Purposes
22	BR 3021	*IN* Shock Manual
23	MIL-S-901D	Shock Tests, H.I. (High Impact); Shipboard Machinery
24	DEF STAN 02-341	Cleaning & Preservation
25	DGS 251	Painting specification
26	MIL-STD-167/1	Mechanical Vibration of Shipboard Equipment

27	MIL-STD-740-2	Structure Borne Noise Measurements and acceptance criteria of shipboard equipment
28	MIL-STD-1474D	Airborne Noise limits
29	DEF STAN 02- 723	Marker Plates
30	NES 507/737/ 1005	Painting
31	DME 452	Preparation of the hard copies of documents (manuals and drawings)
32	IS 2335	Method of Drift Expansion Test of Metal Tubes
33	IS 2305	Method of Mercurous Nitrate Test for Copper & Copper Alloys
34	IS 2328	Method of Flattening Test of Metallic Tubes
35	ASMEB31.5	Refrigeration Piping & Heat Transfer Components
36	ASME BPVC VIII	ASME Boiler & Pressure Vessel Code

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

ABBREVIATIONS

ABN	Air Borne Noise
ASNT	American Society of Non-destructive Testing
ATP	Acceptance Test Plan
CDR	Critical Design Review
CHP	Customer Hold Point
CoC	Certificate of Conformance
COTS	Commercially of the Shelf
CPRO	Controller of Procurement
DBOM	Detailed Bill of Material
DI	Dimensional Inspection
DME	Directorate of Marine Engineering
DPRO	Directorate of Procurement
DPT	Dye Penetrant Test
DQA(N)	Directorate of Quality Assurance (Naval)
DQA(WP)	Directorate of Quality Assurance (Warship Project)
ET	Environmental Testing
FATs	Factory Acceptance Trials
GA	General Arrangement
HT	Heat Treatment
IFATs	Integrated Factory Acceptance Trials
IR	Inspection Report
ISNT	Indian Society of Non-destructive Testing
JSG	Joint Services Guide
LTC	Lab Test Certificate
MPT	Magnetic Particle Test
MTC	Material Test Certificate
MCA	Melt Control Analysis
NABL	National Accreditation Board for Testing and Calibration Laboratories
NDT	Non-destructive Testing
OEM	Original Equipment Manufacturer
OPA	Order Placing Authority
P	Perform
PAC	Proprietary Article Certificate
PCB	Printed Circuit Board
PDR	Primary Design Review
PIL	Part Identification List
PQR	Procedure Qualification Record
QA	Quality Assurance

QAE	Quality Assurance Establishment
QAO	Quality Assurance Officer
QAP	Quality Assurance Plan
QAD	Quality Assurance Document
R	Review
SBN	Structure Borne Noise
SOTR	Statement of Technical Requirement
STC	Supplier Test Certificate
TC	Test Certificate
TNC	Technical Negotiation Committee
TSP	Technical Specifications
TT	Type Test
TTR	Type Test Report
UT	Ultrasonic Testing
V	Verification
VI	Visual Inspection
W	Witness
WESEE	Weapons & Electronics System Engineering Establishment
WPQ	Welder Performance Qualification
WPS	Welding Procedure Specification

SPECIFIC REQUIREMENTS

1. Testing of mechanical and chemical properties is to be done at Government or NABL accredited laboratory only (including firm's NABL accredited laboratory).

2. Testing of 100% sample of sheets to be carried out if OEM marked heat Nos./ batch Nos. not available on raw material sheets. Three test specimens per batch/ lot shall be made. Retest is to be carried out on two further specimens in the event of failure of initial specimen.

3. Castings are to be poured from ingots and scrap. Only manufacturer's own scrap is permitted. No other scrap is permitted. Ingots for non-ferrous castings are to be poured from virgin metals. All ingots are to be stamped/ embossed/ labeled by the manufacturer with unique cast number. Each batch/ lot of ingot is to be accompanied with results of melt control analysis. Randomly selected samples from ingots shall be forwarded to lab for analysis.

4. Castings of Heat Exchangers shall be Class II castings until specified otherwise in the approved drawing/ DBOM. All castings are to be subjected to RT and/ or UT, as applicable, to qualify the same iaw the approved *class* of casting, unless otherwise specified in P.O. & SOTR/ TSP. The extent of RT will be as per the approved drawing. Repairs on castings, if necessary, are to be undertaken only post inspection of casting defects and clearance of QA Agency.

5. Forgings of Heat Exchangers shall be Class II forgings until specified otherwise in the approved drawing/ DBOM. All forgings are to undergo UT for soundness and integrity checks.

6. Shooting sketch indicating critical test zones and test zones are to be submitted prior to testing.

7. Following guidelines are to be followed for inspection of welds:-

   (a) Dimensions of the weld are to be as per established standards, which is to be indicated in the Approved Drawings and QAP.

   (b) Firm is to submit Weld Procedure Specification (WPS), Process Qualification Record (PQR) and Welder Performance Qualification (WPQ) to the Inspection Agencies as per the applicable standards.

   (c) Whenever, welding is to be carried out for critical equipment, the firm shall tack weld the structure/ component and call Inspecting Agency for inspection. The Inspecting Agency is to ascertain that the preparation has been done in accordance with the specifications and only then approve complete welding.

8. **Qualification of NDT Personnel**. Considering the criticality of NDT procedures towards ensuring quality and reliability of ship/ submarine equipment, broad guidelines regarding qualification of NDT personnel for conducting RT, UT, MPT and DPT are as follows:-

(a) **NDT Certification**. All NDT procedures are to be performed and/ or sentenced by NDT personnel who have acquired the desired minimum qualification (Level II/ III) through Central Certification Programs conducted by the Certification Bodies like ISNT, ASNT and BINDT. The certification of these personnel should be in-date and verifiable through the websites of the Certification Bodies. Certification of personnel through Employer Based Programs is not to be treated at par with Central Certification Programs.

(b) **Radiography (RT) and Ultrasonic Testing (UT)**.

(i) RT and UT procedures/ technique sheets are to be approved by ISNT Level-III or ASNT Level-III or PCN Level-III or other equivalent Level-III NDT personnel, certified through Central Certification Programs.

(ii) RT and UT are to be performed by ISNT Level-II/ III or ASNT Level II/ III or PCN Level-II/ III or other equivalent Level-II/ III NDT personnel, certified through Central Certification Programs.

(iii) Interpretation/ sentencing of RT and UT reports are to be done by ISNT Level-III or ASNT Level-III or PCN Level-III or other equivalent Level-III NDT personnel, certified through Central Certification Programs.

(c) **Magnetic Particle Testing (MPT) and Dye Penetrant Testing (DPT)**.

(i) MPT and DPT procedures/ technique sheets are to be approved by ISNT Level-III or ASNT Level-III or PCN Level-III or other equivalent Level-III NDT personnel, certified through Central Certification Programs.

(ii) MPT and DPT are to be performed by ISNT Level-II/ III or ASNT Level-II/ III or ASNT (SNT-TC-1A) Level-II/ III or PCN Level-II/ III or other equivalent Level-II/ III certified NDT personnel.

(ii) Interpretation/ sentencing of MPT and DPT reports are to be carried out by ISNT Level-III or ASNT Level-III or PCN Level-III or other equivalent Level-III NDT personnel, certified through Central Certification Programs, only if there is any ambiguity/ difference of opinion between QA Agency and the supplier.

8. Imported items will be accepted against following import documents as per Para 0504 of QAD-R02

(a) Bill of Lading/ Shipping Bill/ Airway Bill.

(b) Invoice by OEM or Country of Origin certificate of equipment with packing list.

(c) Bill of Entry for Warehousing.

(d) Certificate of Conformity (CoC) indicating governing specifications and values to which the items are tested along with OEM Test Certificates/ Test Reports/ Catalogue/ Data Sheet.

(e) Guarantee/ Warranty certificate from the supplier/ OEM as per supply order.

(f) Non-inclusion of malicious code certificate in case of active electronic components.

9. MTC is to be issued by the original manufacturer of the item. Certificate of Conformity (CoC) may be issued by the equipment manufacturer or integrator who has sourced the item for use in the equipment. CoC / MTC must indicate governing specifications and values to which the item has been tested. The certificate must include copies of test reports.

10. TT will be done at Government/PSU test centers or NABL accredited labs. Policy on conduct of Type Test has been promulgated vide DQA(WP) letter 12575/POLICY/DGQA/WP-TC dated 17 Mar 21 (Refer Annexure - 1). Further, Policy on issuance of Type Approval Certificate with unique Type Approval Number has been promulgated vide DQA(WP) letter 12575/Policy/DGQA/WP-TC dated 11 Oct 21 (Refer Annexure - 2).

11. If TT already has been done in earlier projects on identical units, it will not be done again & the reports of earlier tested units will have to be provided for review of Inspection Agency.

12. Packing material should not contain environmentally hazardous material prohibited by law/ regulation.

13. Only seamless pipes/ tubes are to be used in manufacturing of Heat Exchangers until manufacturing from fabricated plate is specifically approved in the drawings.

14. CoCs should be as per standard format promulgated by DGQA.

15. Post promulgation of SQAP, separate QAP approval for Heat Exchanger (Shell & Tube Type) is not required. The OEM shall be required to submit confirmation to concerned QA Agency and/ or OPA, towards acceptance of SQAP either in totality or with design specific inclusions and/or exclusions, if any. The SQAP along with proposed inclusions/ exclusions approved by DQA(WP) shall be deemed as the approved QAP for the particular PO.

SCOPE

1. **Scope of Quality Assurance**. The scope of QA includes witness / review at all stages of manufacturing viz., raw material stage, in-process stage and final stage. The scope also covers witness / review of Type Testing, wherever applicable.

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

3. The following QA activities will be carried out for the Heat Exchanger (Shell & Tube Type): -

(a) Visual Inspection.

(b) Dimensional Inspection.

(c) Witness of pouring in absence of integral test bar.

(d) Review of Lab Test Certificates.

(e) Witness of in-house Lab Testing, if applicable.

(f) Witness of Non-destructive Testing viz. UT, DPT & MPT.

(g) Review of RT films and reports.

(h) Review of Heat Treatment Charts.

(i) Hydraulic/ Pneumatic pressure testing.

(j) Review of Shock &Vibration and Tilt Test reports for qualification of Type Test, as applicable.

(k) Review of Draft documentation and witness/ stamping of final documentation, as applicable.

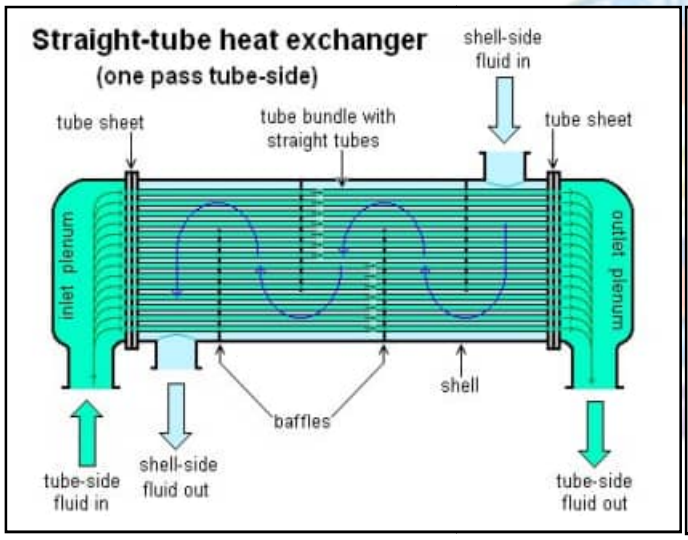
(l) Issue of CHP clearance.

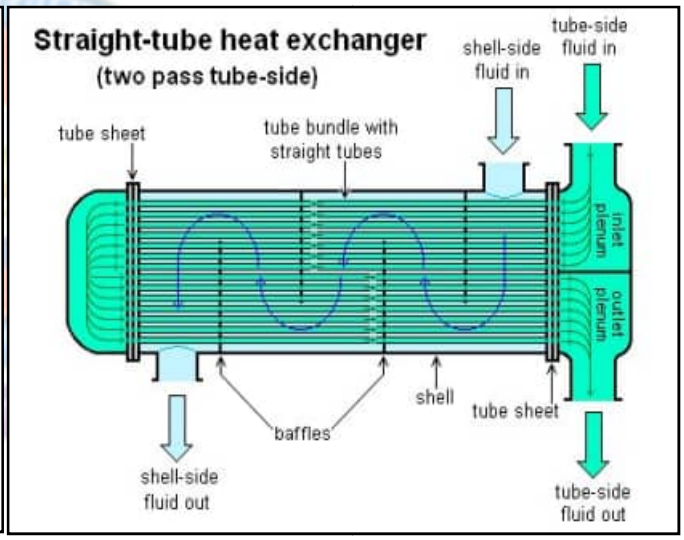
(m) Issue of Dispatch Clearance or Issue of Form-IV, as applicable.

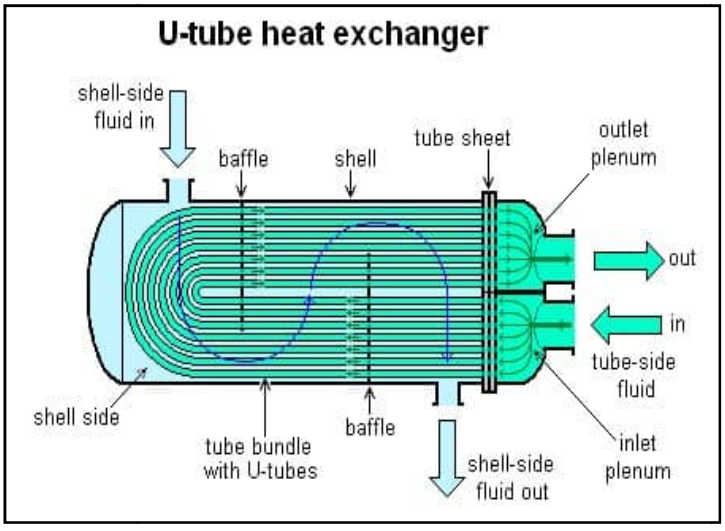
SYSTEM DESCRIPTION

1. Heat Exchanger is a device used to transfer thermal energy between two or more fluids. They are either Heaters or Coolers. The Heaters are used to enhance the temperature of the fluids by adding heat energy. The Coolers are used to maintain the temperature of the fluids within the desirable range by removal of heat through interaction with a cooling medium. Sea water and fresh water are the most commonly used cooling mediums onboard Naval Ships. Fresh water coolants may have chemical additives like antifreeze compounds/ corrosion inhibiters based on the application.

2. Shell and Tube type Heat Exchanger can be built of single or double pass configuration depending on the amount of cooling needed. The number of pass refers to the number of times the fluid in the shell passes by the fluid in the tubes. This is achieved by placing baffles in the shell that allows the fluid to be directed. The baffles also provide support to the tubes.







3. The following Parameters are taken into account while designing heat exchangers:-

(a) Fluids to be handled.

(b) Working pressure and permissible pressure drop.

(c) Degree of heating/ cooling required.

(d) Submersion.

(e) Tube plugging and fouling while in service.

(f) Economy of weight.

(g) Ease of access for maintenance.

(h) Effects of thinning, corrosion and erosion on the tubes.

(j) Velocity of fluid inside the tube.

4. The SQAP covers QA inspection of following kinds of Heat Exchangers:-

(a) Lubricating Oil and fresh Water Coolers of Diesel Engines.

(b) Air Coolers of DAs, HPACs.

(c) Other types of oil coolers viz, Hydraulic Oil Cooler, CPP Oil Coolers etc.

SQAP FOR HEAT EXCHANGER (SHELL & TUBE TYPE)

Sl. No.	Materials / Components as per SORT/QA Activity	Characteristic / Type of Check	Quantum of Check	Reference Documents	Acceptance Criteria	Format of Records	Action by QAE	Remarks
1.0.0	**SECTION I: DRAWINGS AND DOCUMENT INSPECTION**							
1.1.0	Drawings & Documents - GA drawings with DBOM - Manufacturing drawings	Verification of drawings/ documents	100%	PO, SOTR/ TSP & TNC Minutes	PO, SOTR/ TSP & TNC Minutes	List of documents	R	Manufacturing drawings will be vetted with reference to approved GA drawings and DBOM in OEM premises. Submission of manufacturing drawings is not necessary.
1.2.0	Type Test Report	Verification	01/ Type	PO, TSP/ SOTR & TNC Minutes	Equipment is Type Tested and reports are held	Type Test reports	R	**For Shipyard Orders:** If equipment is not Type Tested OR reports are not held, Type Test shall be undertaken as per SQAP. **For DPRO/CPRO Orders:** Type Test shall be applicable, only if indicated in PO.
2.0.0	**SECTION II: RAW MATERIAL INSPECTION (As per approved drawing, including but not limiting to following)**							
2.1.0	Shell : Fabricated Plate or Seamless Pipe	(i) Material Identification & Stamping	100%	As per approved drawing	Conformity to specifications	Mil TC	R	Samples to be drawn by QAE rep. 15% of the length of pipe is to be subjected to RT. NDT Report & RT films. Digitised RT films preferred.
		(ii) Chemical & Mechanical Properties	01 sample / heat / lot			NABL TC	R	
		(iii) RT for confirmation of seamless pipe	01 sample / heat / lot			NDT Report & RT films	R	
2.2.0	Shell Flanges	(i) Material Identification & Stamping	100%	As per approved drawing	Conformity to specifications	Mil TC	R	Samples to be drawn by QAE rep.
		(ii) Chemical & Mechanical Properties	01 sample / heat / lot			NABL TC	R	
2.3.0	Nozzle Pipe (for Shell & Water Header)	(i) Material Identification & Stamping	100%	As per approved drawing	Conformity to specifications	Mil TC	R	Samples to be drawn by QAE rep. 15% of the length of pipe is to be subjected to RT. NDT Report & RT films. Digitised RT films preferred.
		(ii) Chemical & Mechanical Properties	01 sample / heat / lot			NABL TC	R	
		(iii) RT for confirmation of seamless pipe	01 sample / heat / lot			NDT Report & RT films	R	

2.4.0	Tube Plates/ Sheet	(i) Chemical composition of ingot / bar stock	01 sample / heat / lot	As per approved drawing	Conformity to specifications	Mill TC	R	Ingot for casting. Bar stock for forging.
		(ii) Pouring	100%			IR	R	Only applicable for casting
		(iii) Heat treatment, if applicable				HT Chart/ Report	R	
		(iv) Material Identification & Stamping	100%			IR	W	Samples to be drawn by QAE rep.
		(iv) Chemical & Mechanical Properties	01 sample / heat / lot			NABL TC	R	
		(v) UT/ RT	100%			NDT Report & RT films	W/ R	**CHP**. W for UT and R for RT. Digitised RT films preferred.
2.5.0	Tube (Straight or U-type)/ Finned Tubes	(i) Material Identification & Stamping	100%	As per approved drawing	Conformity to specifications	IR	W	Samples to be drawn by QAE rep.
		(ii) Chemical & Mechanical properties	01 sample / heat / lot			NABL TC	R	
		(iii) Flattening Test						
		(iv) Drift Expanding Test						
		(v) Eddy Current Test	100%			NDT Report/ NABL TC	W/ R	W in case Eddy Current Test is not conducted in NABL lab
		(vi) Mercurous Nitrate Test	01 sample / heat / lot			NABL TC	R	
		(vi) Hydrostatic Test	100%			IR/ STC	R	Hydrostatic Test at 1.5 times working pressure for 10 mins or as mentioned in approved drawing/ ATP
		(vii) Visual	100%			IR	R	
		(viii) Dimensional – OD, ID, Thickness & Ovality	As per IS 2500 Part II			IR	R	
2.6.0	(a) Dish End or Shell Cover or Water Header or Channel Cover (b) Flange Dish End (c) Partition Plate (d) Nozzle Flange	**Manufactured by Casting**						
		(i) Chemical composition of Ingot	01 sample / heat / lot	As per approved drawing	Conformity to specifications	Mill TC	R	
		(ii) Pouring	100%			IR	R	
		(iii) Material Identification & Stamping	100%			IR	W	Samples to be drawn by QAE rep.
		(iv) Chemical Composition & Mechanical Properties	01 sample / heat / lot			NABL TC	R	
		(v) RT	100%			NDT Report & RT films	R	**CHP** Digitised RT films preferred

		Manufactured by Fabrication						
		(i) Material Identification & Stamping	100%	As per approved drawing	Conformity to specifications	IR	W	Samples to be drawn by QAE rep.
		(ii) Chemical Composition & Mechanical Properties	01 sample / heat / lot			NABL TC	R	
		(iii) LPT	100%			NDT Report	W	
2.7.0	(a) Tie rods & spacers (b) Lifting lugs (as applicable)	(i) Material Identification & Stamping	100%	As per approved drawing	Conformity to specifications	IR	W	Samples to be drawn by QAE rep.
		(ii) Chemical Composition & Mechanical Properties	01 sample / heat / lot			NABL TC	R	
2.8.0	(a) Saddle, Bracket, Rib (b) Baffle (c) Flange (d) Blanking Flange	Chemical Composition	01 sample / heat / lot	As per approved drawing	Conformity to specifications	NABL TC	R	
2.9.0	Socket and Plug with Copper Washer (for drain, vent & anode, as applicable)	Material Conformity	100%	As per approved drawing	Conformity to specifications	STC/ CoC	R	
2.10.0	Gasket	Material Conformity	100%	As per approved drawing	Conformity to specifications	STC/ CoC	R	
2.11.0	Hex Bolt	Material Conformity	100%	As per approved drawing	Conformity to specifications	STC/ CoC	R	
2.12.0	Sacrificial Anode	(i) Material Conformity	100%	As per approved drawing	Conformity to specifications	STC/ CoC	R	
		(ii) VI to ensure compliance to approved drawing	100%			IR	W	
2.13.0	Stud & Nut	Material Conformity	100%	As per approved drawing	Conformity to specifications	STC/ CoC	R	
2.14.0	Collar Bolt with Nut	Material Conformity	100%	As per approved drawing	Conformity to specifications	STC/ CoC	R	
2.15.0	Name Plate	Material Conformity	100%	As per approved drawing	Conformity to specifications	STC/ CoC	R	
2.16.0	Packing	Material Conformity	100%	As per approved drawing	Conformity to specifications	STC/ CoC	R	
3.0.0	**SECTION III- IN-PROCESS INSPECTION**							
3.1.0	**WELDING CONTROL**							
3.1.1	(a) WPS & PQR	Suitability of welding procedure	100%	As per approved drawing, ASME SEC IX	Welding specification & procedure	WPS and PQR	R	
3.1.2	(b) WPQ	Suitability of welder qualification	100%		Confirms to specified standard	WPQ	R	

3.2.0	**SHELL ASSEMBLY INSPECTION**							
3.2.1	Shell	(i) VI	100%	As per approved drawing	Conformity to specifications	IR	R	
		(ii) DI - ID, OD & Thickness				IR	R	
		(ii) Radiography Spot, Long seam				NDT Report	R	Only for fabricated Shells
3.2.2	Tube Plates/ Sheet	(i) VI	100%	As per approved drawing	Conformity to specifications	IR	R	
		(ii) DI - Hole dia, Grooves dimension, Thickness						
		(iii)Tube hole layout						
3.2.3	Tube Bundle Assembly	(i) VI	100%	As per approved drawing	Conformity to specifications	IR	R	
		(ii) DI - Baffle dia, Distance between baffles, Tube pitch						
		(iii) Tube Expansion						
3.2.4	Leak test of seal weld (Tube to tube sheet)	Pneumatic (Pressure & time duration specified in approved drawing/ ATP).	100%	As per approved drawing/ ATP	Conformity to specifications	IR	R	
4.0.0	**TYPE TEST**							
4.1.0	Heat Exchanger Assembly	(i) Shell side pressure test	01 Unit	Approved drawing, SOTR, TNC MoM, PO, IS 4503 Other Applicable Standards, & Approved ATP	No leakages	Type Test Report	W	Hydrostatic test at 1.3 X Design pressure for 24 hrs Pneumatic test as per procedure vide IS 4503. Pressure and duration as per approved drg/ ATP.
		(ii) Tube side pressure test	01 Unit		No leakages	Type Test Report	W	
		(iii) Shock & Vibration Test	01 Unit		Conformity to specifications	Type Test Report	R	Test on assembled plant is also acceptable
		(iv) Functional Test	01 Unit		Conformity to specifications	Type Test Report	W	
		(v) Tilt Test	01 Unit		Conformity to specifications	Type Test Report	W	
5.0.0	**FINAL INSPECTION**							
5.1.0	Assembly of Cooler	VI & DI	100%	Approved drawing, SOTR, TNC MoM, PO, IS 4503, Other Applicable Standards, & Approved ATP	Conformity to specifications	IR	W	
5.2.0		(i) Shell side pressure test (Pressure & time duration specified in approved drawing/ ATP).	100%		Conformity to specifications	IR	W	Hydrostatic test at 1.3 X Design pressure for 01 hrs
		(ii) Tube side pressure test (Pressure & time duration specified in approved drawing/ ATP).	100%			IR	W	Pneumatic test as per procedure vide IS 4503. Pressure and duration as per approved drg/ ATP.

5.3.0		Lifting Trials	100%	As per approved drawing	Conformity to specifications	IR	W	1.5 times X Weight
5.4.0		Cleaning, Drying	100%	As per approved drawing / PO	Conformity to specifications	IR	R	
5.5.0		Painting (Epoxy Coating on Dish end & Tube Plate)	100%	As per approved drawing / PO	Conformity to specifications	IR	R	
5.6.0		Weight	100%	As per approved drawing /PO	Conformity to specifications	IR	W	
5.7.0		Preservation, Marking & Packing	100%	As per approved drawing /PO	Conformity to specifications	IR	W	All external opening to be blanked suitably

Annexure - 1

RE-

रक्षा मंत्रालय/ रु.आ.म.नि
गुणता आश्वासन निदेशालय (यु० परि०)
'एच' ब्लाक, निर्माण भवन पोस्ट
नई दिल्ली - 110011
दूरभाष- 011-23015012-4002
फैक्स: 011-23014619
ई-मेल: dqawp@navy.gov.in

Ministry of Defence/ DGQA
Dte of Quality Assurance (WP)
'H'- Block, Nirman Bhawan Post
New Delhi - 110011
Tel:011-23015012-4002
Fax: 011-23014619
e-mail: dqawp@navy.gov.in

12575/POLICY/DGQA/WP-TC

17 Mar 21

As per Distribuition List

TYPE TESTING OF NAVAL ENGINEERING, HULL AND NBCD EQUIPMENT

1. **Introduction**. Equipment/ systems installed onboard warships/ submarines are required to endure the severities of marine environment and perform the intended role under extreme conditions of vibration, shock, heat, corrosive environment, EMI/EMC etc. Prototypes/ first piece of new induction equipment/ systems are subjected to a series of tests to ensure that the desired levels of reliability and ruggedness are embedded to withstand and operate in adverse conditions.

2. **Type Tests**. Type Tests refer to a set of tests carried out on equipment/ systems to validate the design, gauge the capability to deliver desired performance under severe marine environmental conditions and qualify them for installation/ exploitation onboard ships and submarines. The tests are conducted under simulated conditions in the laboratory/ testbeds. Some of the tests may accelerate the severity of environmental conditions with commensurate reduction in exposure time of the equipment to such conditions. Type Tests are specific to each equipment/ system based on the material specifications, performance characteristics, operating environment and installation plan onboard ships/ submarines. The scope and sequence of tests is guided by the SOTR and standards viz., Defstan/ NES, MIL Std, EEDQ, JSS 55555, NCD etc., applicable for the equipment/ systems. These may include Endurance Test, Tilt Test, Environmental Test, EMI/ EMC Test, Air/ Structure Borne Noise Test, Vibration Test, Shock Test etc. In a system configuration comprising of multiple independent functional units, each independent functional unit is Type Tested.

3. **Applicability of Type Tests**. All types of hull, engineering, electrical and NBCD equipment/ systems (other than imported and COTS items) are to be subjected to Type Tests prior to induction. This also includes equipment/ systems ordered by shipyards for new construction ships. The type tests will be applicable on following: -

(a) On prototype or first piece/ set of equipment/ system manufactured by an OEM.

(b) On previously inducted equipment/ systems if they have not been Type Tested during induction or have undergone changes/ additions and alterations wrt design, architecture, material specification, duty point, dimensions, manufacturing process and governing standards/ specifications (view obsolescence or technical upgrade) irrespective of the quantum of change or there are changes in environmental conditions to which the equipment/ system was earlier Type Tested. The decision of the Professional Directorate regarding requirement of Type Test of such equipment/ system shall be final and binding.

(c) On previously inducted equipment/ systems, if the OEM is not able to produce previously conducted Type Test reports during Quality Assurance inspections by the Inspections Agencies.

4. **Scope of Type Tests**. The scope of Type Tests will vary for different equipment/ systems and are generally specified in the applicable standards as indicated in SOTR, PO, QAP etc. These tests are to be conducted as per the Acceptance Test Procedure (ATP) promulgated by the concerned Professional Directorate. Some of the generic tests which are undertaken as part of Type Tests are enumerated below: -

(a) **Endurance Test**. Endurance Test involves continuous running of equipment/system for a prolonged duration on the test bed. During the test the operating parameters and performance characteristics of the equipment are monitored by the Inspection Agency. Duration of endurance test is to be as specified in the approved ATP.

(b) **Tilt Test**. The equipment/ systems onboard ships are required to sustain the roll/ pitch of the ship and give the desired performance. To simulate the shipboard conditions, the equipment/ systems are tilted on the test bed and run for a predefined period of time. The operating parameters and performance characteristics of the equipment shall be monitored by the Inspection agency during Tilt Test for the duration as specified in the approved ATP.

(c) **Airborne Noise (ABN) Test**. The ABN test is generally conducted as per MIL-STD-740-1(SH) to ensure that the equipment/ systems comply to the acceptable airborne sound level criteria. The weighted sound pressure levels and octave band sound pressure levels are measured at designated locations and the values obtained are compared with the limits specified in the SOTR to ascertain the acceptability of the equipment/ systems.

(d) **Structure Borne (SBN) Test**. The SBN test is critical, to ensure that the noise transmitted by the equipment to the ship's hull is within the limits prescribed in the approved SOTR. MIL-STD-740-2 is one such guiding documents for undertaking SBN measurements of shipboard equipment.

(e) **Vibration Test**. Vibration Test of equipment encompasses following types of tests: -

(i) **Environmental Vibration Test.** During Environmental Vibration Tests, the equipment is subjected to simulated environment vibration, as may be encountered when installed onboard ships/ submarines, to prove the physical and functional integrity when subjected to the vibration environment.

(ii) **Internally Excited Vibration Test.** In case of Internally Excited Vibration Test, record of overall vibrations and narrow-band analysis are also undertaken on test beds so as ensure that the amplitudes recorded are within the stipulated limits. Abnormal / high vibration levels at the fundamental and harmonic/ sub-harmonic frequencies indicate inherent/ incipient defects in the equipment/ systems. The values recorded on the test bed are also used for benchmarking/ comparison during the service life of the equipment/ systems. ISO 10816 and MIL-STD-167-1A/2 are some of the standards which are referred for undertaking vibration tests.

(f) **Shock Tests**. The shock testing of critical naval equipment is undertaken as a part of Type Test. The tests are guided by BR 3021 and MIL-STD-901(D). As a general convention light (up to 600 kg) and medium (600 - 2500 kg) are shock tested and heavy (more than 2500 kg) are not subjected to shock testing. The tests are done either physically or through mathematical simulation. Guidelines on shock standards have also been issued vide IHQ MoD(N)/DME letters EG/5522/POLICY dated 11 May 07 and EG/Policy/TSV/13/2016 dated 13 Dec 16.

(g) **Environmental Tests (ET)**. These tests cater for the natural (climatic) as well as induced environmental conditions. The following are the standards depending on the origin of equipment: -

(i) **Indigenous Equipment**. JSS 55555:2012 (Rev 03), issued by the Directorate of Standardisation has been promulgated as the guideline for conduct of Environmental Tests on electronic and electrical equipment inducted in service. The list of environmental tests applicable for naval equipment is contained at Table 3.5, 3.6 and 3.7 corresponding to ship-borne equipment protected (Class N1), exposed (Class N2) and submersible (Class N3) respectively.

(ii) **Imported Equipment**. MIL-STD-810G is normally specified as the applicable standards for ET in respect of all equipment being imported from western countries. However, a number of countries, especially Russia, France and Germany, follow their own ET standards viz. GOST, STANAG, VG etc.

(h) **EMI/ EMC Tests**. To ensure functionality of equipment/ systems without any performance degradation during operation in Electromagnetic environment, EMI/EMC Tests as per MIL-STD-461E/F has been specified for all electronic and electrical systems installed onboard in ships. Guidelines for determination of

applicable tests and methodology for EMI/EMC acceptance are contained in DQA(N) letter 66301/Policy-09/DQA (N)/QA-09 dated 14 Jun13.

(j) **Ingress Protection (IP) Tests**. Ingress protection test is carried out to classify and rate the enclosure of control panels / devices as per its degree of protection against ingress of solid particles and liquids. IP rating does not substitute the drip proof test or driving rain test as the former is the rating of the protective enclosure whereas the latter two tests are to check the effect of such environmental condition on electronics.

5. **Yellow Banding**. Equipment/ systems subjected to Type Tests render it unfit for onboard use. Such equipment/ systems are "Yellow Banded" and used for training and display purposes. The requirement of Yellow Banding of equipment is to be adequately covered in the SOTR/ RFP/ PO. The decision regarding the use of yellow-banded prototype for any unavoidable requirement shall be that of the Professional Directorates.

6. **Conduct of Type Tests**. Type Tests are to be conducted in the manufacturer's premises or laboratory depending upon the test procedure. All lab tests are to be conducted at Govt. labs/ private labs accredited by NABL and may not be witnessed by QA agencies. Lab reports are to be reviewed by QA agency for qualifying the product. The consolidated Type Test reports are to be forwarded by the Inspection Agency to the concerned Professional Directorate at IHQ MoD(N) through DQA(WP) for scrutiny and approval.

7. **Type Tests for Imported Items**. In case of items of import nature, Type Tests qualification of the item would be accepted by reviewing the Certificate of Conformity (CoC) submitted by the vendor. The CoC must indicate the governing standards for Qualification Tests and values to which the items have been tested. These may include OEM test certificates/ test reports/ data sheet and compliance matrix vis-à-vis the standards specified in the Purchase Order (PO).

8. **Type Test for New Induction Orders.** The newly inducted equipment/ systems are to mandatorily undergo Type Test. This would also be applicable for all equipment/ systems which are being indigenized by the *IN*. The Naval Order Placing Agencies/ Indigenising Agencies are to specify the requirement of Type Test in the SOTR, RFP and Purchase Orders.

9. **Type Test for Replenishment Orders**. In so far as equipment which are already inducted to the *IN* without Type Testing are concerned, Type Tests will be conducted only if the same is mandated vide the PO issued by any of the Naval Order Placing Agencies.

10. **Type Test for Shipyard Orders**. In case of equipment ordered by the shipyards for the shipbuilding projects, Type Testing will be conducted mandatorily, if the equipment is not Type Tested in the past. In case of any ambiguity, the issue is to be taken up with the concerned Professional Directorate at IHQ MoD(N) for decision. The requirement of Type Testing is to be adequately covered in the SOTR, RFP and Purchase Orders.

11. **Repetition of Type Test**. Equipment/ systems which have already qualified Type Test, need not be subjected to repeat Type Test unless demanded iaw para 3 (b) and (c) above. In case of multiple independent functional units in a given system, repeat Type Test will be applicable for only those independent functional units, which have undergone changes.

12. **Inclusion of Type Test Requirements in SOTR / TSPs and Purchase Orders**. Type Tests of equipment/ systems have cost and time implications. It is therefore essential that Type Test requirements are clearly spelt out as part of equipment specification (SOTRs/ TSPs), RFPs and POs issued by the Naval Procurement Agencies and the shipyards. The Type Test Plan must form part of Quality Assurance Plan for the equipment/ systems.

13. **Type Approval Certificate**. On satisfactory completion of Type Tests, a Type Approval Certificate in respect of the equipment/ systems is to be issued by DQA(WP) based on the test reports. The Type Approval Certificate is to indicate the equipment details and the unique Type Approval Number.

14. **Validity of Type Test**. The Type Approval Certificate will be valid till the time the equipment has not undergone any change or there are changes in environmental conditions to which the equipment/ system was earlier Type Tested.

15. **Type Testing by Third Party Inspection Agency**. The Type Tests can be conducted by Third Party Inspection Agencies (TPIA). In such cases the Type Test Report is to approved by the concerned Professional Directorate at IHQ MoD(N). For conduct of Type Test by TPIA, the schedule for Type Test or the Acceptance Test Plan (ATP) is to be approved by the Professional Directorates. The laboratory tests are to be conducted either at Govt. laboratories or NABL accredited laboratories.

16. **Grant of Green Channel Status or Self Certification Status**. Equipment/ systems which are not Type Tested will not be considered for grant of Green Channel or Self Certification Status. However, completion of Type Testing shall not be prerequisite for award of Green Channel/ Self-certification status for spares.

17. The above guidelines are applicable for RFPs which are issued post promulgation of this letter. This letter supersedes all previous letters on this subject.

Marwaha

(S Marwaha)
Commodore
Commodore QA (WP)
For ADG QA (WP)

Annexure - 2

दूरभाष: ०११-२३०१५०१२-४०१०
Tel: 011-23015012-4010
फैक्स: ०११-२३०१४६१९
Fax: 011- 23014619
ई-मेल: dqawp@navy.gov.in
e-mail: dqawp@navy.gov.in

भारत सरकार / रक्षा मंत्रालय
Govt. of India/ Ministry of Defence
गुणता आश्वासन निदेशालय (यु. परि)
Dte. of Quality Assurance (WP)
'एच' ब्लॉक, नई दिल्ली - 110 011
'H' Block, New Delhi - 110 011

12575/POLICY/DGQA/WP-TC

11 Oct 21

All Field Units of DQA(WP)

ISSUE OF TYPE APPROVAL CERTIFICATES WITH UNIQUE TYPE APPROVAL NUMBER TO FIRMS/ OEMS

1. Refer to DQA(WP) letter 12575/POLICY/DGQA/WP-TC dated 17 Mar 21.

2. Para 13 of letter at para 1 ibid stipulates that DQA(WP) shall issue Type Approval Certificate (TAC) for all Engineering, Hull, NBCD and Electrical systems/ equipment and their associated starters, panels and control system, which fall under the ambit of DQA(WP). The objective of this letter is to lay down the procedure for issuing TACs with a unique Type Approval Number on successful completion of Type Tests.

3. The pre-requisites for processing the case for issue of TACs are as follows:-

(a) Completion of all Type Tests as listed in the approved ATP and QAP/ SQAP.

(b) Approval of Test Reports, as necessary, by the concerned Professional Directorates.

4. The workflow process for issue of TACs is enumerated below and the flow diagram is placed at **Enclosure-I**:-

(a) **Receipt of Type Test Reports from Firms/ OEMs**. Post completion of Type Tests and receipt of approval of the vibration, SBN, ABN and Shock Test/ Analysis reports etc, as necessary, from the Professional Directorates, the Field Unit (CQAE/ QAE) is to make a formal communication to the firm/ OEM to submit four copies of all Type Test reports. The reports are to be submitted in a consolidated form. The format for submitting the Type Test reports is enumerated at **Enclosure- II**.

(b) **Forwarding of Type Test Report to DQA(WP)**. The Field Units are to forward the consolidated Type Test Reports to DQA(WP) with a covering letter by registered post, duly confirming that **'Type Tests of the equipment have been completed i.a.w the approved QAP/ SQAP and ATP'**. This is to be completed within four working days of receipt of the Type Test Reports from the firms/ OEMs.

(c) **Approval by Professional Directorate**. On receipt of the Type Test reports, DQA(WP) is to forward the same on file (along with copy of approved QAP and ATP, if available/ applicable) to the concerned Professional Directorates for concurrence to issue TAC.

(d) **Approval of Draft TAC by ADG QA (WP)**. After concurrence of the Professional Directorates is received, the concerned Tech Group is to put up the Type Test reports along with the draft TAC (as per format placed at **Enclosure-III**) in quadruplicate for approval of ADG QA(WP).

(e) **Issuance of TAC**. The TAC with unique Type Approval Number is be issued after approval of ADG QA (WP) is obtained.

(f) **Distribution of TAC**. Completed TAC and the Type Test Reports are to be forwarded by DQA(WP) as per the below mentioned distribution list by registered post:-

(i) Copy No. 1 - Professional Directorate.

(ii) Copy No. 2 - Firm/ OEM

(iii) Copy No. 3 - CQAE/QAE

(iv) Copy No. 4 - Office copy at DQA(WP)

5. Since issuance of TACs involves multiple stakeholders, completion of the entire workflow may involve time. Therefore, **issuance of I-Notes to firms/ OEMs by Field Units is to be de-linked from the issuance of Type Approval Certificates, in case all parameters observed during Type Tests are within the limits specified in the SOTR/ TSP/ SQAP/ approved QAP/ approved ATP, as applicable**.

6. It is requested that the above mentioned procedure be followed for all current and future procurement orders where DQA(WP) is the nominated Inspection Authority.

(प्रदीप बिस्वास / Pradeep Biswas)
केपटेन/ Captain
केपटेन क्यू.ए (टेक)/ Captain QA (Tech)
कृते अ.म.नि.गु.आ (युपो.प.)/ for ADGQA (WP)

Enclosures:- As above

Copy to:-

The Principal Director IHQ MoD(N)/ DME Room No. 124 A Wing, Sena Bhawan New Delhi -110 011	The Principal Director IHQ MoD(N)/ DNA Room No. 419, D-II Wing, Sena Bhawan, New Delhi - 110 011

The Principal Director IHQ MoD(N)/ DOI 5th Floor, Chanakya Bhawan Chanakyapuri, New Delhi -110 021	The Principal Director IHQ MoD(N)/ DNBCD Room No. 15, A Block Hutments Dalhousie Road, New Delhi - 110 011
The Principal Director IHQ MoD(N)/ DND (SSG) A-33, Kailash Colony New Delhi - 110 048	The Principal Director IHQ MoD(N)/ DEE 4th Floor, D-II Wing, Sena Bhawan, New Delhi - 110 011
The Principal Director IHQ MoD(N)/ DPRO C Wing, Sena Bhawan New Delhi -110 011	The Principal Director IHQ MoD(N)/ DLS 6th Floor, Yashwant Place, Chanakyapuri New Delhi -110 021
The Principal Director IHQ MoD(N)/ DSP 9th Floor, Chanakya Bhawan Chanakyapuri, New Delhi -110 021	The Flag Officer Commanding-in-Chief (for CSO (TECH)) Headquarters, Western Naval Command Tiger Gate SBS Marg, Mumbai - 400 001
The Flag Officer Commanding-in-Chief (for CSO (TECH)) Headquarters, Eastern Naval Command Naval Base P.O Visakhapatnam - 530 014	The Flag Officer Commanding-in-Chief (for CSO (TECH)) Headquarters, Southern Naval Command Naval Base Kochi - 682 004
The Commander-in-Chief Andaman & Nicobar Command (for CSO (Tech)) Headquarters, Andaman & Nicobar Command Naval Base, Port Blair - 744 102	The Material Superintendent Material Organisation LBS Marg, Ghatkopar (West) Mumbai - 400 086
The Material Superintendent Material Organisation Kancherapalem Post Visakhapatnam - 530 008	The Material Superintendent Material Organisation PO Box No. 621, Haddo Post Port Blair- 744 102
The Material Superintendent Material Organisation Southern Naval Command Kochi - 682 004	The Material Superintendent Material Organisation C/o Naval Base Karwar - 581 308

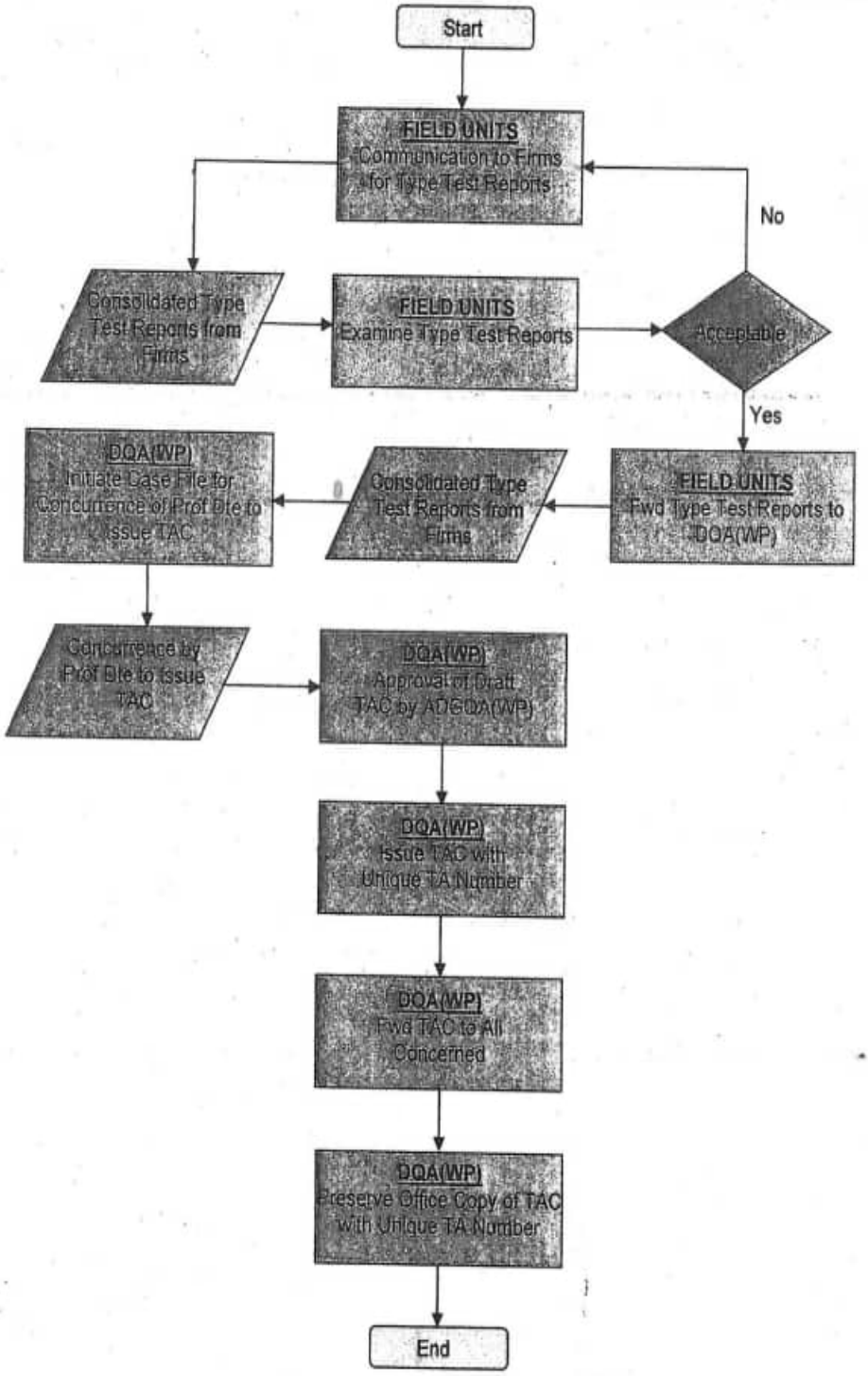
Distribution List:-

The Chief Quality Assurance Officer Chief Quality Assurance Establishment (MS) 7th Floor NMRL DGQA Complex, Tiger Gate Naval Dockyard Mumbai - 400 001	The Chief Quality Assurance Officer Chief Quality Assurance Establishment (WE/WP/EFS) DGQA Complex, LBS Marg, Vikroli (West) Mumbai - 400 083

The Chief Quality Assurance Officer Chief Quality Assurance Establishment (EFS) National Highway No 5 Visakhapatnam - 530 018	The Chief Quality Assurance Officer Quality Assurance Establishment (WE) Annexe N-8A, 'H' Block, DHQ P.O. New Delhi - 110 011
The Quality Assurance Officer Quality Assurance Establishment (WE/FPC) Jalhali Camp Road, Yeshwantpur P.O. Bangalore - 560 022	The Quality Assurance Officer Quality Assurance Establishment (WE) Block-1 Annexe (West Wing) BHEL, Bhopal - 462 022
The Quality Assurance Officer Quality Assurance Establishment (WE/EFS) DGQA Complex, Palavanthangal Post Chennai - 600 114	The Quality Assurance Officer Quality Assurance Establishment (WE) Besides Don Bosco High School Makarpura Road, B/H Shell Petrol Pump ONGC-PO, Vadodara - 390 009
The Quality Assurance Officer Quality Assurance Establishment (WE/WP) Commissariat Road, Hastings Kolkata - 700 022	The Quality Assurance Officer Quality Assurance Establishment (EFS) Commissariat Road, Hastings Kolkata - 700 022
The Quality Assurance Officer Quality Assurance Establishment (WE) Bldg No 375, CQAE (EE) Complex, Aundh Camp Pune - 411 027	The Quality Assurance Officer Quality Assurance Establishment (WE) Building, T-24, Adj. Kendriya Vidyalaya-IV S&T Road Jalandhar Cantt - 144 005

Enclosure-I to DQA(WP) letter 12575/ POLICY/DGQA/WP-TC dated Oct 21

WORKFLOW DIAGRAM FOR ISSUE OF TYPE APPROVAL CERTIFICATES WITH UNIQUE TYPE APPROVAL NUMBER



FORMAT FOR SUBMISSION OF TYPE TEST REPORTS

1. The Type Test Report of an equipment is to be submitted in a consolidated manner in form of a booklet.

2. The booklet should have a page indicating the 'Content' with 'page numbers'.

3. The Type Test Report of each sub-assembly should be segregated by a 'separator sheet' for ease of identification.

For example:- In case of a pump, all Type Test reports of pump and motor should be combined and put together into a single booklet. The reports of the pump and motor should be separated by a 'separator sheet'.

4. The separator sheet should contain following particulars of the sub-assembly:-

(a) Name of the sub-assembly.
(b) Manufacturer's Name
(c) Model No.
(d) Approved GA Drawing Nos.
(e) Applicable SQAP/ Approved QAP No.

STANDARD FORMAT OF TYPE APPROVAL CERTIFICATE

DIRECTORATE OF QUALITY ASSURANCE (WARSHIP PROJECT)
H-BLOCK, NIRMAN BHAWAN POST, DHQ ZONE
NEW DELHI - 110011

Ref: Date:

TYPE APPROVAL CERTIFICATE

It is certified that the system/ equipment as described below is Type Approved and considered suitable for installation onboard ships of Indian Navy.

1.	**Type Approval No**	
2.	**Nomenclature of Main System/ Equipment (Particulars of all sub-assemblies of the system/ equipment are to be mentioned)**	Name - Diesel Alternator Make - M/s GRSE-DEP Model - Approved GA Drawing No -
3.	**Particulars of Sub-assemblies of Main System/ Equipment**	(a) Name - Diesel Engine Make - M/s MTU, Germany Model - Approved GA Drawing No - (b) Name - Alternator Make - M/s Elmot Alternators Model - Approved GA Drawing No - (c) Name - Excitation Panel Make - M/s Elmot Alternators Model - Approved GA Drawing No -

3.	**Particulars of Sub-assemblies of Main System/ Equipment**	(d) Name - Coupling Make -M/s Elmot Alternators Model - Approved GA Drawing No - (e) Name - Local Control Panel Make - M/s Power Control Engineering Model - Approved GA Drawing No - (f) Name - Fire Fighting Panel Make - M/s Agni Controls Model - Approved GA Drawing No - (g) Name - Acoustic Enclosure Make - M/s BBM Acoustics Model - Approved GA Drawing No - (h) Name - Battery Charger Make - M/s Electronic Control Group Model - Approved GA Drawing No - (j) Name - Base Frame Make - M/s Matchwell Engineering Model - Approved GA Drawing No -
2.	**Manufacturer (Name & Address)**	M/s GRSE-DEP Plant Plaza Road Dhurva, Ranchi - 834 004
3.	**Intended Service**	Power generation onboard ships of Indian Navy
4.	**Purchase Order Against Which Type Test Undertaken**	
5.	**SQAP/ Approved QAP Particulars**	
6.	**Conditions of Approval and Validity**	See **Annexure-I**

Seal

(Signature block of authorised signatory)

Annexure - I
(to Type Approval Certificate with Type Approval No _____)

1. The approval is subject to following:-

(a) The basic configuration of the system/ equipment as specified in the approved GA drawings mentioned in the certificate is not changed.

(b) There are no changes in the system/ equipment or it's sub-assemblies w.r.t design, architecture, material specification, duty point, dimensions, manufacturing process and governing standards/ specifications (view obsolescence or technical upgrade).

(c) There are no changes in environmental conditions to which the equipment/ system was earlier Type Tested.

2. The Type Approval Certificate will remain valid till the time the conditions specified at para 1 above are fulfilled.

3. Any changes incorporated in the system/ equipment which renders the same non-compliant to the conditions specified at para 1 above are to be brought to the notice of the concerned Professional Directorate at IHQ MoD (Navy) and DQA(WP). Complete or partial Type Testing shall be undertaken for issue of Type Approval Certificate afresh. The decision of the Professional Directorates at IHQ MoD (Navy) and DQA(WP) regarding requirement of repeat Type Test shall be final and binding.

Annexure - 3

Tele : 011-26193307
Fax No. : 011-26192870
E-mail : naval-dgqa@nic.in
Website : www.dgqadefence.gov.in

भारत सरकार
Government of India
रक्षा मंत्रालय (गु.आ.म.नि.)
Ministry of Defence (DGQA)
गुणता आश्वासन निदेशालय (नौ सेना)
Dte of Quality Assurance (Naval)
पश्चिमी खंड - 5, आर.के. पुरम
West Block - 5, RK Puram
नई दिल्ली - 110 066
New Delhi - 110066

No.: 66301/Policy/DQA(N)/SG

14 Nov 17

As per distribution list

REVISION OF ACCEPTANCE CRITERIA FOR IMPORTED EQUIPMENT/ ITEMS: IMPORT DOCUMENTS

1. Imported stores are, presently, accepted on the basis of validation of following seven import related documents in accordance with Para 17 of Section-V, Chapter 05 and Para 29 of Chapter 13 of DGQA Standing Orders and DQA(N) letter No. 66301/Policy/DQA(N)/SG dated 31 Jul 15:-

(a) Bill of Lading.
(b) Shipping Bill.
(c) Bill of entry to Ware House.
(d) Country of Origin.
(e) Original manufacturers certificate conforming that spares are tested for fitment on main equipment for which spares are ordered i.e. PAC firm's confirmation certificate.
(f) Original manufacturers certificate / Quality Assurance Guarantee certificates
(g) Firm's guarantee certificate as per Supply Orders (SOs).

It has been observed that all of the above documents may not necessarily be needed to assure quality and at times non availability of one or more import related documents has caused undue delay in acceptance of stores. Accordingly, the issue has been examined in detail and it has been decided to rationalise the documents for acceptance of imported stores for ease of doing business yet retaining following essential QA requirements:-

(a) Establishing the traceability of the item i.e the item is supplied by OEM.
(b) Confirmation of items to the specification through certification by supplier / OEM.
(c) Guarantee / Warrantee certificate from OEM

3. In view of the above, the following import documents will be validated fc acceptance of imported stores hence forth: -

(a) Copy of one among Bill of Lading / Shipping Bill / Airway Bill (A document issued by the transporter of the equipment which clearly indicates the description, quantity, port of collection and port of discharge).

(b) Invoice by OEM or Country of Origin certificate of the equipment with packing list.

(c) Bill of Entry into warehouse.

(d) The Certificate of Conformity (CoC) indicating governing specifications and values to which the items are tested alongwith Original Equipment Manufacturer (OEM) test certificates/test reports/ Catalogue/Data Sheet.

(e) Guarantee / Warrantee certificate from the supplier/OEM as per Supply Order.

4. DGQA standing order has been amended accordingly.

5. In view of the above OPAs are requested to include list of documents as at Para 3 above in the Supply Orders pertaining to imported stores.

(Amit Rastogi)
Commodore
Offg Addl. Director General
Quality Assurance (Naval)

Distribution list:-

The Chief of the Naval Staff
(for DLS/DND/DPRO/DSP/DNA/DWE/DEE/DSR/DME/DNS/DSMAQ/DNBCD)
IHQ MoD(N), Sena Bhavan
New Delhi- 110011

DG ATVP
71, Aakanksha, Rao Tularam Marg
Development Enclave,
New Delhi - 110010

The Flag Officer Commanding-in-Chief
{for CSO(P&A)/CSO(Tech)}
Western Naval Command
SBS Marg, Mumbai- 400001