



MINISTRY OF DEFENCE (DGQA)

STANDARD QUALITY ASSURANCE PLAN

REVERSE OSMOSIS PLANTS

REVERSE OSMOSIS PLANTS ARE AN INTEGRAL PART OF MODERN WARSHIPS, ESSENTIALLY REQUIRED FOR EFFICIENT GENERATION OF FRESH WATER FROM SEA WATER.

STANDARD QAP NO. DGQA/DQA (WP)/RO PLANT/26/2020/REV 0
DATED 04 DEC 20

Total Nos. of Pages:16

ISSUING AUTHORITY

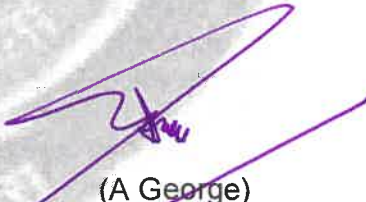
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MINISTRY OF DEFENCE (DGQA)

STANDARD QUALITY ASSURANCE PLAN (SQAP) **FOR REVERSE OSMOSIS PLANTS**

SQAP NO.
DGQA/DQA (WP)/RO PLANTS/26/2020/REV 0


(A George)
Rear Admiral
ADGQA (WP)
04 Dec 20

Promulgated by

DIRECTORATE OF QUALITY ASSURANCE (WARSHIP PROJECT)
MINISTRY OF DEFENCE (DGQA)
'H' BLOCK, NIRMAN BHAWAN PO
NEW DELHI - 110 011

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DIRECTORATE OF QUALITY
ASSURANCE (WARSHIP PROJECTS)
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REV 1

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ABBREVIATIONS

ABN	Air Borne Noise
ASNT	American Society of Non-destructive Testing
CHP	Customer Hold Point
CoC	Certificate of Conformance
DBOM	Detailed Bill of Material
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
IFATs	Integrated Factory Acceptance Trials
IR	Inspection Report
ISNT	Indian Society of Non-destructive Testing
LTC	Lab Test Certificate
MPT	Magnetic Particle Test
MTC	Material Test Certificate
NABL	National Accreditation Board for Testing and Calibration Laboratories
NDT	Non-destructive Testing
OEM	Original Equipment Manufacturer
P	Perform
PIL	Parts Identification List
PO	Purchase Order
PQR	Procedure Qualification Record
QA	Quality Assurance
QAP	Quality Assurance PLAN
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
V	Verification
VI	Visual Inspection
VME	Versa Module Europa
W	Witness
WPQ	Welder Performance Qualification

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11. Conformal coating of PCBs, wherever applicable, to be done as per DQA(N) policy letter 580930/DQA(N)/EL dated 17 Feb 14.

12. Items/ components classified as Bought-out/ COTS is indicative only. In this regard, the approved GA drawing and DBOM shall be final binding.

13. Post promulgation of this SQAP, separate QAP approval for 'RO Plant' is not required. The manufacturer shall be required to submit confirmation to concerned QA Agency regarding acceptance of SQAP either in totality or with some design specific inclusions and/or exclusions, if any, along with the following details:-

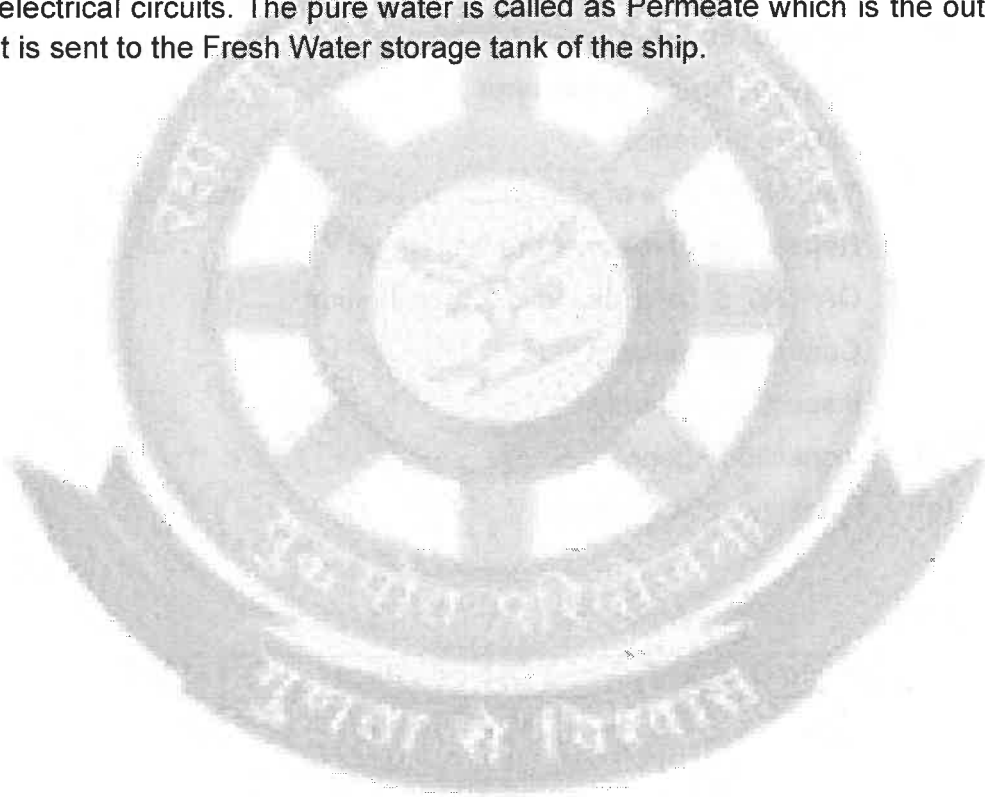
- (a) Equipment name
- (b) Equipment technical details (as applicable)
- (c) Purchase Order reference
- (d) Sub/Sub-Sub Orders reference (as applicable)
- (e) Name of Main Indenter/ Ordering Authority
- (f) Name of end user
- (g) Name of firm / manufacturer
- (h) SOTRs reference
- (j) Yard No./ Name 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 applicable)
- (r) Inclusions, if any
- (s) Exclusions, if any

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

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SYSTEM DESCRIPTION

The Reverse Osmosis Plants work on the principle of Reverse Osmosis. The sea water is pumped into the system by the Pre-Filter Booster Pump at the inlet of the Filter Pump. The Filter Pump further ensures that sufficient pressure is maintained in the system for normal operation. The sea water is then filtered by the Sand Filter and the Cartridge Filter which removes the foreign materials down to 10 microns. The filtered water is then pressurized to 60 bar (normal operating pressure) by the High Pressure Pump. The pressurised water passes over the membrane cushions in the Disc Tube Modules (DT Module). The high pressure is regulated by the Servo Motor Control Valve. About thirty percent water passes to the pure water side. The balance water, called Brine is discharged back to the sea. The entire operation of the RO Plant is automatically controlled by a program stored in the Microprocessor fitted to the Control Panel. The Control Panel houses all the electronics and the electrical circuits. The pure water is called as Permeate which is the output of the RO Plant is sent to the Fresh Water storage tank of the ship.



STANDARD QUALITY ASSURANCE PLAN FOR RO PLANT

Appendix-A
(Refers to Page 11, Part-II)

Sl No	Material/ Component Quality Activity	Characteristic/ Type of Check	Quantum of Check	Reference Documents	Acceptance Criteria	Format of Record	Action by QAE	Remarks
1.0.0	DRAWINGS AND DOCUMENT INSPECTION							
1.1.0	Drawings & Documents -GA and P&ID 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
1.2.0	Type Test Reports	Verification	01/ Type	PO, TSP/ SOTR & TNC Minutes	Equipment is Type Tested and reports are held	Type Test reports	R	Shipyard Orders: If equipment is not Type Tested OR reports are not held, Type Test shall be undertaken as per SQAP. DPRO/ CPRO Orders: Type Test shall be applicable, only if indicated in PO.
2.0.0	RAW MATERIAL INSPECTION							
2.1.0	Structural Section (Plate/ Angles/ Sections etc)	(a) Material Identification (b) Chemical composition & Mechanical properties	100%	TSP/ SOTR, Approved Drawings, Manufacturing Drawings & TNC Minutes	Conformity to specifications	IR NABL TC	W R	Sample to be drawn by QAE rep
2.2.0	Bought-out/ COTS Items							
2.2.1	(a) Sand Filters (b) Cartridge Filter (c) De-Acidification Filter	(a) VI & DI (b) Material Conformity & Filter Grade (c) Hydro Test @ 1.5 x WP	100%	TSP/ SOTR, Approved Drawings, Manufacturing Drawings, TNC Minutes & Approved ATP	Conformity to specifications	IR MTC/ STC IR	R R W	
2.2.2	LP Pipe lines	(a) VI & DI (b) Material conformity (c) Hydro Test @ 1.5 x WP	100%		Conformity to specifications	IR MTC/ STC/ NABL TC IR	R R W	Sampling @ 01 sample/ lot in case tested at lab
2.2.3	HP Pipe Lines	(a) VI & DI (b) Chemical composition & Mechanical properties (c) Hydro Test @ 1.5 x WP	100%		Conformity to specifications	IR NABL TC IR	R R W	

2.2.10	Fasteners	(a) VI & DI (b) Chemical composition & Mechanical properties	100% 01 sample / lot	TSP/ SOTR, Approved Drawings, Manufacturing Minutes & TNC	Conformity to specifications	IR STC/Coc	R	
2.2.11	(a) Pulley for HP Pump (b) V-Belt	VI & DI	100%		Conformity to specifications	STC/IR	R	
2.2.12	Pulsation Damper	(a) Type, Size, Make & Material conformity (b) Charge at (30 bar) defined Pressure	100%		Conformity to specifications	STC	R	
2.2.13	HP Pump Crank Case Oil	VI	100%		Conformity to pump manual	IR/STC	R	STC to cover specific viscosity, gravity, flash point & pour point of oil
2.2.14	UV Steriliser	(a) VI (b) Functional Test	100%		Conformity to specifications	STC/ OEM TC IR	R W	To be checked during FATs
2.2.15	Membrane Cleaners	(a) Specific Gravity, pH & Colour	100%		Conformity to specifications	STC/ OEM TC	R	
2.2.16	<u>Pumps (as applicable)</u> (a) HP Pump (b) Pre-filter Pump (c) Filter Pump (d) Permeate Transfer Pump	Inspection as per SQAP for pumps	100%		Conformity to specifications	I-Note	R	In case items are imported in nature, only import documents will be checked. Performance will be checked during final inspection, when integrated to system.
2.2.17	<u>Motors</u> (a) HP Pump (b) Filter Pump, (c) Permeate Transfer Pump	Inspection as per SQAP for motors	100%		Conformity to specifications	I-Note	R	
2.2.18	S&V Mounts	Inspection as per SQAP for S&V Mounts	100%		Conformity to specifications	I-Note	R	
2.2.19	<u>RO Module</u> DT (Disc Tube)/ CD (Circular Disc)/ PT (Plate Tube)/ SW (Spiral wound)	(a) Type, Size, Make & Material conformity (b) Pressure Test	100%		Conformity to specifications	OEM TC/ STC OEM TC/ STC	R R	In case items are imported in nature, only import documents will be checked. Performance will be checked during final inspection, when integrated to the system.
2.2.20	EDI (Electro de-ionization) Unit, if applicable	Type, Size, Make & Material conformity	100%		Conformity to specifications	STC / OEM Coc	R	
2.2.21	Control Panels	Inspection as per SQAP for Control Panels	100%		Conformity to specifications	I-Note	R	

