



**MINISTRY OF DEFENCE (DGQA)**


**STANDARD QUALITY ASSURANCE PLAN**  
**EDUCTOR AND ACCESSORIES**  
**(PORTABLE AND FIXED TYPE)**

**STANDARD QAP NO. DGQA/DQA(WP)/EDUCTOR/51/2024/REV 0**  
**08 JUL 24**

**Total Nos. of Pages: 17**


**ISSUING AUTHORITY**

**DIRECTORATE OF QUALITY ASSURANCE (WARSHIP PROJECT)**  
**MINISTRY OF DEFENCE (DGQA)**  
**6<sup>TH</sup> FLOOR, 'B' BLOCK, DEFENCE OFFICE COMPLEX**  
**SAROJINI NAGAR PO, NEW DELHI – 110 023**

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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>

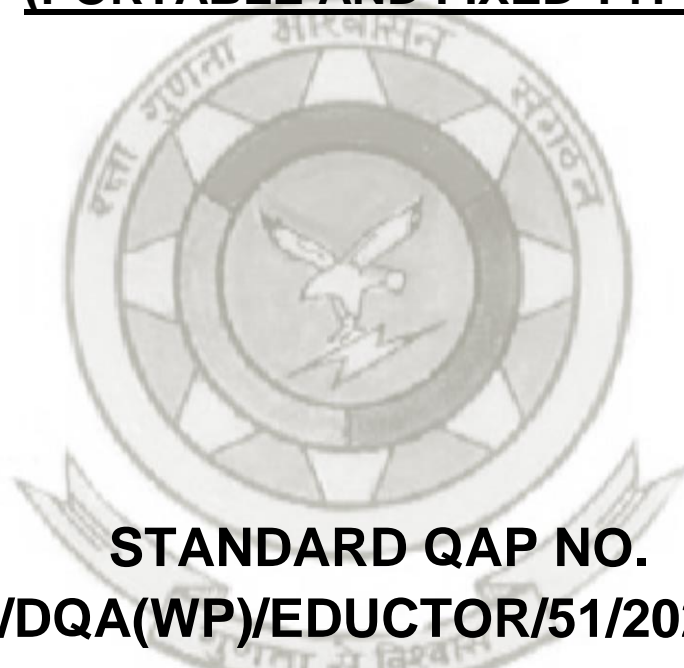
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## **MINISTRY OF DEFENCE (DGQA)**

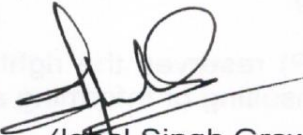
### **STANDARD QUALITY ASSURANCE PLAN**

### **EDUCTOR AND ACCESSORIES**

### **(PORTABLE AND FIXED TYPE)**




**STANDARD QAP NO.  
DGQA/DQA(WP)/EDUCTOR/51/2024/REV 0  
08 JUL 2024**

  
 (Iqbal Singh Grewal)  
 Rear Admiral  
 ADGQA (WP)

Promulgated by:-


**DIRECTORATE OF QUALITY ASSURANCE (WARSHIP PROJECT)**  
**MINISTRY OF DEFENCE (DGQA)**  
**6<sup>TH</sup> FLOOR, 'B' BLOCK, DEFENCE OFFICE COMPLEX**  
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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 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 in the Quality Assurance procedures covering manufacture of Water Jet Eductor for *IN* Ships.
3. The website <http://www.dggqadefence.gov.in> may also be referred for other QA requirements.
4. The Standard QAP has been prepared on the basis of decisions made in consultations with leading manufacturers of Water Jet Eductor, representatives of professional directorates of *IN* and inspection agencies. Any user of this Standard QAP either within DGQA / Indian Navy 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 Standard QAP without consulting or informing any holder of this document.
7. When this Standard QAP is incorporated into contracts, users are responsible for their correct application and for complying with contractual and other statutory requirements. Compliance with Standard QAP does not of itself confer immunity from legal obligations.
8. Enquiries in connection to these requirements may be made from:

**Directorate of Quality Assurance (Warship Projects)**  
**Ministry of Defence**  
**6<sup>th</sup> Floor, 'B' Block**  
**Defence Office Complex**  
**Sarojini Nagar P.O.**  
**New Delhi – 110 023**  
**e-mail: [dqawp@navy.gov.in](mailto:dqawp@navy.gov.in)**

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### **STANDARDS INVOKED**

<b><u>S. No.</u></b>	<b><u>Specification No.</u></b>	<b><u>Description</u></b>
1	BS 1580-1	Unified Screw Tread Part 1: Screw threads with diameter ¼ in and larger-Requirements
2	BS EN 1092	Flanges and their Joints-Circular flanges for pipes, Valves, fittings and accessories, PN designated
3	BS EN 1982	Copper and Copper Alloys-Ingots and Casting
4	DEF STAN 02-863	Requirements for the Classification, Dimensions, Tolerances and General Standards of Acceptance for Copper and Nickel Alloy Castings
5	DEF STAN 02-830	Requirements for Gunmetal Ingots and Castings
6	EN ISO 5167-1	Measurement of fluid flow by means of pressure differential devices inserted in circular-cross section conduits running full- General principles and requirements
7	EN ISO 5167-3	Measurement of fluid flow by means of pressure differential devices inserted in circular-cross section conduits running full- Nozzle and Venturi nozzles
8	IS 2500 Part-1 & 2	Sampling Inspection Procedures

*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

2. All castings are to have the following information on cast or embossed on the body. Alternately this information is to be embossed on the identification plate permanently fasted to body or cover: -

- (a) Nominal Size
- (b) Maker's name / trademark
- (c) Arrow indicating direction of flow
- (d) Working Pressure & Test Pressure
- (e) Heat no.
- (f) Sl. No.
- (g) Project Name, PO No. & Fitting No.
- (f) Item description

3. All NDT to be performed in accordance with DQA(WP) Policy No. 12575/Policy/DGQA/WP-TC dated 25 Mar 22 (**Annexure-I**) and relevant guidelines regarding qualification of NDT personnel 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 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) **Magnetic Particle Testing (MPT) and Dye Penetrant Testing (DPT).**

(i) Procedure / Technique Sheet approval – Level III (ASNT/ ISNT/ PCN/ equipment) certified personnel.

(i) Conduct of test – Level II/III (ASNT/ ISNT/ PCN/ equivalent) certified personnel.

(iii) Interpretation/ Sentencing - Level III (ASNT/ ISNT/ PCN/ equivalent) certified personnel.

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4. Guidelines for approval of SQAPs/QAP, DQA(WP) policy letter 12575/POLICY/DGQA/WP-TC dated 28 Sep 20 (**Annexure –II**) is relevant.

5. Guidelines for approval to use previously approved QAP/Inclusion or exclusion to SQAP for repeat /replenishment orders, DQA(WP) policy letter 12575/POLICY/DGQA/WP-TC dated 23 Nov 23 (**Annexure –III**) is relevant.

6. SDoCs (CoCs) should be as per standard format promulgated by DGQA vide SoP No. DGQA/STD/002-23.


7. Inspection through Virtual/ Hybrid mode to be conducted, wherever feasible, in accordance with DGQA SoP No. DGQA/STD/005-23 dated 20 Oct 2023. A detailed plan for conduct of Virtual Inspection as per this SQAP/ATP is to be worked out and mutually agreed by the firm and Inspection Agency. Requisite Virtual Inspection plan and corresponding undertakings have to be completed prior commencement of the Inspection activities.

8. Raw materials selected through Virtual mode be stamped by the firm's authorised internal quality representative (Inspection Coordinator) with his designated stamp of the firm and to pack in tempered proof sample sealing bag. Serial Nos/Heat No. may be used for easy identification, traceability. Other methods like stickers, holograms may also be adopted on mutual agreement on procedures; such samples should be sent to NABL laboratory by the manufacturer for testing as per the procedure in vogue. For further information please refer DGQA SoP No. Doc No. DGQA/STD/005-23 for Virtual /Hybrid Inspection Of Defence Store and DGQA SoP on SDoC.

9. Firm shall identify to club more than one inspection activities, as feasible and raise single I-Call. For instance, SQAP sl. No. 4.1.0 (iv, v & vi) can be clubbed and raise single I-Call in order to save inspection time.


10. Post promulgation of this SQAP, separate QAP approval for Water Jet Eductor is not required. The manufacturer shall be required to submit confirmation to concerned QA Agency and/or OPA, towards acceptance of SQAP either in totality or with some design specific inclusions and/or exclusions w.r.t. SQAP, if any. The SQAP along with proposed inclusions/ exclusions approved by DQA(WP) shall be deemed as the approved QAP for the particular PO.



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### **ABBREVIATIONS**

AQL	Acceptance Quality Limit
ATP	Approved Test Procedure
CHP	Customer Hold Point
CoC	Certificate of Conformity)
COTS	Commercial-off-the-shelf
DBOM	Detailed Bill of Material
DEF STAN	Defence Standard
DGQA	Directorate General of Quality Assurance
DI	Dimensional Inspection
GA	General Arrangement
I-Note	Inspection Note
IR	Inspection Report by Vendor
IN	Indian Navy
ITC	Inspection and Test Certificate
MO	Material Organisation
MoM	Minutes of Meeting
MTC	Manufacture Test Certificate
NABL	National Accreditation Board for Testing and Calibration Laboratories
NES	Naval Engineering Standard
OEM	Original Equipment Manufacturer
OPA	Order Placing Authority
P	Perform by
PIL	Parts Identification List
PO	Purchase Order
QA	Quality Assurance
QAE	Quality Assurance Establishment
QAO	Quality Assurance Officer
QAP	Quality Assurance Plan
R	Review by
SDoC	Supplier's Declaration of Conformity
SoP	Standard Operating Procedure
SOTR	Statement of Technical Requirement
SQAP	Standard Quality Assurance Plan
STC	Supplier Test Certificate
TC	Test Certificate
TEC	Technical Evaluation Committee
TNC	Technical Negotiation Committee
TPI	Third Party Inspection
TSP	Technical Specification Particulars
TT	Type Test
VI	Visual Inspection
W	Witness by QA Rep.

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## **SCOPE**

**Scope of Quality Assurance**. The scope of Quality Assurance will cover witness and/or review of all manufacturing activities during all stages viz. raw material stage inspection including, bought out items, in-process stage inspection and final inspection stage. The scope also covers the review and witness of Type Test of equipment, wherever applicable.

This Standard Quality Assurance Plan 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 orders


The following quality assurance activities will be carried out during the quality assurance of equipment:

- (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. DPT & Pressure Test.
- (g) Review of Heat Treatment Charts, if applicable.
- (h) Hydraulic pressure testing.
- (i) Functional Checks as per approved ATP.
- (j) Witness of Painting, Preservation, Packing & Marking.
- (j) Review of draft documentation and witness/ stamping of final documentation, as applicable.
- (k) Issue of CHP clearance.
- (l) Issue of I-Note/ Form-IV or Dispatch Clearance as applicable.

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## **SYSTEM DESCRIPTION**

Water Jet Eductor is a simple type of pump which works on the venturi effect to pump out air, gas or liquid from a specified area. Eductors consists nozzle/venturi nozzle, diffuser and nozzle box. Eductor require only a motive fluid or driving fluid for its operation, which allows it to use at any part of the ships including hazardous areas. The driving fluid (normally sea water or air on ships) is allowed to pass through the nozzle and diffuser of eductor. When the driving fluid achieves desired pressure and capacity, a low pressure is created inside it. This low pressure or vacuum enables the eductor to suck liquid or gas from a certain area and pumped out through the driving fluid discharge.

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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 Eductor And Accessories (Portable And Fixed Type)	Appendix “A”
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## STANDARD QUALITY ASSURANCE PLAN FOR EDUCTOR AND ACCESSORIES (PORTABLE AND FIXED TYPE)

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		<b>APPENDIX-A</b> Technical Inspection / Trials in form of SQAP Part II (Refers to Page No. 12)	DATE	08 JUL 24

SL. NO.	MATERIALS / COMPONENTS AS PER SOTR/ QA ACTIVITY	CHARACTERISTICS / TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE CRITERIA	FORMAT OF RECORD	ACTION BY QAE	REMARKS
<b>1.0.0</b>	<b>SECTION I: VERIFICATION OF DRAWINGS / DOCUMENTS</b>							
1.1.0	Drawings & Documents	GA drawings and detailed bill of material (DBOM)	-	PO & SOTR /TNC Minutes	PO & SOTR/ TNC Minutes	List of approved binding drawings	R	Drawing duly approved by Design authority, Professional & Inspection Authority (or by Command for MO orders) to be verified. Manufacturing drawings will be vetted by QA Rep with reference to approved GA drawings and DBOM at OEM premises.
<b>2.0.0</b>	<b>SECTION II: RAW MATERIAL INSPECTION</b>							
2.1.0	Casted components (i) Body/ Diffuser (ii) Nozzle Box/Suction Chamber (iii) Venturi Nozzle / Nozzle	(i) Pouring with integral test bar	100%	PO & SOTR / TNC Minutes/ Approved drawing	Conformity to specifications	IR	R	<b>Review.</b> If casting is done with integral test bar, review of documents by QA rep.  <b>Witness.</b> If casting is undertaken without integral test bar, pouring to be witnessed by QA rep through virtual mode (live steaming) or submission of videography with time stamp by firm to QA Rep.

## STANDARD QUALITY ASSURANCE PLAN FOR EDUCTOR AND ACCESSORIES (PORTABLE AND FIXED TYPE)

SL. NO.	MATERIALS / COMPONENTS AS PER SOTR/ QA ACTIVITY	CHARACTERISTICS / TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE CRITERIA	FORMAT OF RECORD	ACTION BY QAE	REMARKS
	(iv) Protective Cap (v) Female Instantaneous Coupling (vi) Screw type coupling (full bore) (Applicable as per DBOM)	(ii) Material Identification & Stamping  (iii) Physical Mechanical & Chemical Properties	100%  One Sample/ Heat	PO & SOTR / TNC Minutes/ Approved drawing	Conformity to specifications  Conformity to specifications	IR  NABL TC	W* through virtual mode/ physical  R	* Refer to Specific requirement at Sl no. 7 & 8 (Page No. 8).
<b>BOUGHT OUT ITEMS/ COTS (Applicable as per approved drawings/DBOM)</b>								
2.2.0	Nozzle Retainer, Brass Chain, Tally Plate, Strainer, Gaskets/ Seal/ Packing, Fasteners etc.,	Product Identification	100%	PO & SOTR/ TNC Minutes/ Approved drawing	Conformity to approved drawing	STC/ SDoC (CoC)	R	Virtual/ Physical inspection of components to be undertaken along with review of STC /SDoC (CoC) by QA rep as per the approved drawing before final assembly either at raw material stage or hydro test stage as per SQAP sl. no. 2.3.0 (ii) or in-process stage of inspection, as feasible.  No of components/ items (under Bought out/ COTS items) may vary from design to design. This list is indicative only. Actual components/ items would be as per approved DBOM/ drawings
2.3.0	Suction Hose/ Discharge Hose for Eductor	(i) VI, DI & Verification of STC  (ii) Hydraulic Pressure Test for Hose assembly (1.5 x WP of Hose)	100%  100%	PO & SOTR/ TNC Minutes/ Approved drawing	Conformity to approved drawing and specification  No indication of failure or leakage for period of 01 minutes	IR & STC  IR	W through virtual mode/ physical  W through virtual mode/ physical	

## STANDARD QUALITY ASSURANCE PLAN FOR EDUCTOR AND ACCESSORIES (PORTABLE AND FIXED TYPE)

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<b>3.0.0</b>	<b>SECTION III: IN PROCESS INSPECTION</b>							
3.1.0	(i) Body/Diffuser	(i) Sand Blasting (casted surface only)	100%	PO & SOTR / TNC Minutes /Approved drawing	SA 2.5	SDoC (CoC)	R	
	(ii) Nozzle Box/ Suction Chamber							
	(iii) Venturi Nozzle/ Nozzle	(ii) Visual & Dimensional inspection	100%		Conformity to approved drawings	IR	R	
	(iv) Protective Cap							
	(v) Female Instantaneous Coupling	(iii) DPT on machined Surfaces (Applicable as per approved drawings/ Specification)	100%	PO & SOTR / TNC Minutes /Approved drawing	Conformity to approved drawing and specification	NDE Report/ IR	W through physical	All NDT activities carried out as per HQ DQA(WP) Policy letter no. 12575/POLICY/DGQA/WP-TC dated 25 Mar 22.
3.2.0	(vi) Screw type coupling full bore							
	Eductor Assembly	Performance Check (Suction capacity as per specified suction head, discharge head & motive head)	100%	PO & SOTR / TNC Minutes / Approved drawing & Approved ATP	Conformity to approved drawing	IR	R	Measuring parameters like motive pressure, motive flow rate, suction lift, discharge pressure, discharge flow rate, suction capacity to be checked as per the approved drawing

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<b>4.0.0</b>	<b>SECTION IV: FINAL INSPECTION</b>							
4.1.0	Eductor Assembly	(i) Visual Inspection	100%	PO & SOTR/ TNC Minutes/ Approved drawing	Conformity to approved drawing	IR	W through physical	
		(ii) Overall Dimensions	100 % by firm & as per IS 2500 by QA Rep			IR		Unless otherwise specified, Inspection Level-II as per IS 2500 Part-I and AQL 1.5 shall be used
		(iii) Hydraulic Pressure Test	100 %	PO & SOTR/ TNC Minutes/ Approved drawing	No visible leak or reduction in pressure for period of 15 minutes	IR		
		(iv) Performance Check as per approved ATP (Suction capacity as per specified suction head, discharge head & motive head)	One per Lot/ Type	PO & SOTR/ TNC Minutes/ Approved drawing & Approved ATP	Conformity to approved drawing	IR	W through physical	Measuring parameters like motive pressure, motive flow rate, suction lift, discharge pressure, discharge flow rate, suction capacity to be checked as per the approved drawing. Firm should submit graphical representation of total head against suction flow rate for appropriate water suction at each driving head and flow rate.
		(v) Weight Measurement	100%	PO & SOTR/ TNC Minutes/ Approved drawing	Conformity to approved drawing	Weight Certificate	W through virtual mode/ physical	
		(vi) Marking, Packing & Preservation	100%		Conformity to app. drawing & Standards	IR		



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4.2.0	Submission of as-made drawings/ SDoC and other documentation, as applicable	Verification	100%	PO & SOTR/ TNC Minutes/ Approved drawing	As built drawings are approved and completeness of documents	As Built drawings, SDoC (CoC) etc., as applicable	R	<p>For Shipyard Orders, after manufacture of first piece is completed, an "As-Built drawing incorporating all changes is to be made and to be vetted by Inspection agency. The same to be forwarded to the drawing approving authority for final approval.</p> <p>SDoC (CoC) shall be submitted by the firm as per the format given at Annexure-I of DGQA SoP on SDoC (Ref No. DGQA/STD/002-23)</p>
4.3.0	Submission of Form-4	Correctness	100%	PO & SOTR	Error free	Form 4	Issue of Form 4	