MINISTRY OF DEFENCE (DGQA)

STANDARD QUALITY ASSURANCE PLAN

MARINE VALVES FOR LOW PRESSURE FLUIDS

VALVES SERVE TO REGULATE THE FLOW OF FLUIDS BY OPENING OR CLOSING PASSAGEWAYS

STANDARD QAP NO. DGQA/DQA(WP)/VALVES/03/2025/REV-2
DATED 04 Mar 25

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ISSUING AUTHORITY

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

RECORD OF AMENDMENTS

Sl. No.	Date of Amendment	Amendments	Authority	Remarks

MINISTRY OF DEFENCE (DGQA)

STANDARD QUALITY ASSURANCE PLAN (SQAP) FOR MARINE VALVES FOR LOW PRESSURE FLUIDS

SQAP NO. DGQA/DQA (WP)/VALVES/03/2025/REV-2

(Iqbal Singh Grewal)
Rear Admiral
ADGQA (WP)
04 Mar 25

Promulgated by

DIRECTORATE OF QUALITY ASSURANCE (WARSHIP PROJECT)
MINISTRY OF DEFENCE (DGQA)
6TH FLOOR, 'B' BLOCK

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 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 Valves 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 Valves and representatives of Professional Directorates and Production Directorates of the *IN*. Any user of this SQAP 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. The SQAP will be applicable only for orders wherein DQA(WP) is the Inspection Authority.

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

Directorate of Quality Assurance (Warship Projects)
Ministry of Defence (DGQA)
6TH Floor, 'B' Block, Defence Office Complex
Africa Avenue, PO - Sarojini Nagar, New Delhi - 110 023

CONTENTS

STANDARDS INVOKED

Sl No.	Specification	Description
1	DME 463	Manually Operated Valves for Low Pressure Fluids
2	NES 360	Valves
3	NES 375	Valve Design & Manufacture
4	NES 747	Requirements for (Naval Alloy) Nickel Aluminium Bronze Alloy
5	NES 833	Requirements for Forgings
6	NES 830	Requirements for Copper Alloy
7	NES 862	Fasteners
8	NES 723	Tally/ Diagram Plates
9	NES 729	Requirements for Non-destructive Testing
10	BS EN 12266-1 & 2	Pneumatic Test & Seat Tightness Test
11	BS EN 12288	Industrial Valves. Copper Alloy Gate Valves
12	BS EN 1092-1	Circular Flanges for Pipes, Valves & Fittings
13	BS 7531	Specifications for Compressed Non-Asbestos Fibre Jointing
14	MIL-STD-1474D	Design Criteria Standard, Noise Limits
15	MIL-STD-167-1	Mechanical Vibrations of Shipboard Equipment
16	MIL-STD-740-2	SBN Measurement & Acceptance Criteria of Shipboard Equipment
17	NSS I/ II	Requirements for High Impact Shock Tests Based on IN Shock Policy, Shipboard Machinery Equipment and systems.
18	API 527	Seat Tightness of Pressure Relief Valves
19	API 598	Valve Inspection & Testing
20	ANSI B16.34	Valves Flanged, Threaded & Welding End

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
CHP	Customer Hold Point
CoC	Certificate of Conformance
COTS	Commercially Off 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
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
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
MCA	Melt Control Analysis
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
QAD	Quality Assurance Document
QAE	Quality Assurance Establishment
QAP	Quality Assurance PLAN
R	Review
RT	Radiographic Testing
SBN	Structure Borne Noise
SOTR	Statement of Technical Requirement
SQAP	Standard Quality Assurance Plan
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
WPQ	Welder Performance Qualification
WPS	Welding Procedure Specification

SPECIFIC REQUIREMENTS

1. Testing of physical and chemical properties has to be done by NABL accredited laboratory only (including firm's NABL accredited laboratory).

2. **Manufacturer's Own Scrap**. Castings are to be poured from ingots/ scrap generated in the foundry (i.e., risers, runners, defective castings, machining chips/ swarf etc). The composition of the scarp in terms of complete range of both alloying elements & impurity elements should be well established. Own scrap proposed to be used is to be segregated and should be identifiable to the inspection agency. No other scrap, including scrap procured from market shall be permitted.

3. **Use of Virgin Metals**. The ingots for non-ferrous castings are to be poured from virgin metals, where specified in the SOTR/ TSP/ applicable standard. The virgin metals shall be identified and Mill TC of the same shall be submitted by the firm for verification by the inspection agency.

4. **Testing of Ingots**. All ingots are to be stamped/ embossed/ labelled by the manufacturer with unique cast/ heat 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 NABL lab for analysis.

5. **Class of Casting**. The *class* of casting is to be invariably mentioned in the drawing/ DBOM. It may be noted that Castings of Hull Valves are to be treated as Class I castings and that of System/ Line Valves are to be treated as Class II castings. The general convention for inspection of pourings shall be as follows:-

(a) All Hull valves shall be cast under pouring witness of QAE rep.

(b) For Line valves, pouring is not to be witnessed by QAE rep, if poured with integral test bar attached to every casting. All such integral test bars shall be subsequently detached from the castings in presence of QAE rep, stamped and randomly selected for testing at NABL Lab. However, if poured without integral test bar, pouring is to be witnessed by QAE rep.

6. 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. Repairs on castings, if necessary, are to be undertaken only post inspection of the casting defects and clearance of the QA Agency.

7. All forgings are to undergo UT for soundness and integrity checks.

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

9. **NDT**.

(a) **Radiographic Testing (RT)**. RT is to be conducted by ASNT / ISNT Level - II/ III technician as per procedure approved by ASNT / ISNT Level - III technician. On completion of testing, the RT report is to be endorsed by ASNT / ISNT Level - III technician.

(b) **Ultrasonic Testing (UT)**. UT is to be conducted by ASNT / ISNT Level II/ III qualified technician as per procedure approved by ASNT / ISNT Level III qualified technician. The UT report is to be endorsed by ASNT / ISNT Level - III technician.

(c) **Other NDT Procedures**. Other tests like MPT and DPT can be performed by ASNT / ISNT Level - II/ III qualified technician as per procedure approved by ASNT / ISNT Level - II/ III qualified technician and the report can be endorsed by ASNT / ISNT Level - III qualified technician.

10. Make of the Items should be as per approved PIL/ Detailed Bill of Material (DBOM) or *IN* approved sources.

11. The outsourced components in the SQAP are indicative only. OEM is to categorize the outsourced components, specific to their product, in the QAP as per the approved DBOM / Drawings and in accordance with Chapter-5 of QAD-01 R01.

12. Imported items will be accepted against following import documents as per DQA(N) letter No. 66301/Policy/DQA(N)/SG dated 14 Nov 17: -

(a) Copy of one among Bill of Lading/ Shipping Bill/ Airway Bill.
(b) Invoice by OEM/ Country of Origin certificate of equipment with packing list.
(c) Bill of Entry for Warehousing.
(d) The 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/ Warrantee certificate from the supplier/ OEM as per supply order.

13. ESS test (Thermal Cycling, Random Vibration and Burn in / Endurance) shall be conducted for electrically operated valves as per DQA(N) policy vide letters 66301/Policy-07/DQA(N)/QA-07 dated 09 Aug 16 (Refer Annexure-1).

14. 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.

15. All Type Tests, pressure tests, torque tests and other tests mentioned under the scope of Final Inspection shall be undertaken as per approved ATP. Firms will have to submit draft ATP, duly covering the test procedures, test pressure, duration, torque value etc for the approval of IHQ MoD(N) DME/ Command Headquarters, on as applicable basis.

16. TT 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. Policy on conduct of Type Test has been promulgated vide DQA(WP) letter 12575/POLICY/DGQA/WP-TC dated 17 Mar 21 (Refer Annexure-2). 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 17 Mar 21 (Refer Annexure-3).

17. If TT and ET have already 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.

18. Shock Testing is mandatory for Hull Valves. For System Line Valves Shock Test shall be undertaken if specified in the SOTR.

19. Bought-out items will be subjected to normal QA inspections as per QAP.

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

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

22. Post promulgation of this SQAP, separate QAP approval for Valves 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.

SCOPE

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.

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.

The following QA activities will be carried out for the Marine Valves: -

(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.

(j) Review of Heat Treatment Charts.

(k) Review of Shock Test and SBN & ABN reports for qualification of TypeTest, as applicable.

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

(m) Hydraulic/ Pneumatic pressure testing.

(n) Torque Test

(p) Issue of CHP clearance.

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

SYSTEM DESCRIPTION

1. Valves are devices that regulate, direct or control the flow of fluids viz., gases, liquids, fluidized solids or slurries by opening or closing or partially obstructing various passageways. The various categories of valves conventionally used onboard *IN* ships and submarines are briefly introduced below.

2. **Isolation Valves**. An Isolation valve in a fluid handling system either stops or allows the flow of fluids to a given location, usually for maintenance or safety purpose. They can also be used to provide flow logic (selecting one flow path versus another), and to connect external equipment to a system. A valve is classified as isolation valve because of its intended function in the system. Many different types of valves viz. Ball, Plug, Butterfly & Gate valves have been broadly classified as isolation valves.

3. **Regulation Valves**. Regulation valves are used to control fluid flow by varying the size of the flow passage. Regulating valves normally respond to signals generated by independent devices such as flow meters or temperature gauges. Screw Down Non-Return, Screw Down Screw Lift and Diaphragm Valves are broadly categorized as regulation valves.

4. **Directional/ Check Valves**. Check valves are designed to preclude the reversal of flow in a piping system. These valves are activated by the flowing material in the pipeline. The pressure of the fluid passing through the system opens the valve, while any reversal of flow will close the valve. Closure is accomplished by the weight of the check mechanism, by back pressure, by a spring, or by a combination of these means. Swing/ Storm, Lift and Dual Plate type valves fall in the category of Directional/ Check valves.

5. **Pressure Valves**. Relief and safety valves prevent equipment damage by relieving accidental over pressurization of fluid systems. The main difference between a relief valve and a safety valve is the extent of opening at the set point pressure. A relief valve gradually opens as the inlet pressure increases above the set point. A safety valve rapidly pops fully open as soon as the pressure setting is reached, and stays fully open until the pressure drops below a reset pressure. Relief valves are typically used for incompressible fluids such as water or oil whereas safety valves are typically used for compressible fluids such as steam or other gases. Reducing valves automatically reduce supply pressure to a pre-selected pressure as long as the supply pressure is at least as high as the selected pressure. Reducing valve operation is controlled by high pressure at the valve inlet and the adjusting screw on top of the valve assembly.

STANDARD QUALITY ASSURANCE PLAN

Part – I. General Information

The following generic information must generally be provided 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) 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)

Part - II.

Standard QAP for Isolation Valves	Appendix- 'A'
Standard QAP for Regulation Valves	Appendix- 'B'
Standard QAP for Directional/ Check Valves	Appendix- 'C'
Standard QAP for Pressure Valves	Appendix- 'D'
DQA(N) letter 66301/Policy-07/DQA(N)/QA-07 dated 09 Aug 16 – *Guidelines for Environmental Stress Screening (ESS) of Naval Electrical/ Electronic Equipment*	Annexure-1
DQA(WP) letter 12575/POLICY/DGQA/WP-TC dated 17 Mar 21 – *Type Testing of Naval Engineering, Hull and NBCD Equipment*	Annexure-2
DQA(WP) letter 12575/POLICY/DGQA/WP-TC dated 11 Oct 21 – *Issue of Type Approval Certificates with Unique Type Approval Number to Firms/ OEMs*	Annexure-3

APPENDIX-A

(Refers to Page 13, Part-II)

SQAP FOR ISOLATION VALVES - BALL, PLUG, BUTTERFLY AND GATE VALVES

Sl No	Material / Component Quality Activity	Characteristic / Type of Check	Quantum of Check	Reference Documents	Acceptance Criteria	Type of Record	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%	(i) Standards, SOTR, TSP & PO (ii) TNC minutes (as applicable)	Standards /Specifications/Values mentioned in reference documents.	DBOM as per QAD R02 Format	R	Manufacturing drawings will be vetted with reference to approved GA drawings and DBOM in OEM premises
1.1.1	Type Test Report	Verification	01/ Type	(i) Standards, SOTR, TSP & PO (ii) TNC minutes (as applicable)	--	--	R	**For Shipyard Orders:** If equipment is not Type Tested OR reports are not held, Type Test to be undertaken as per section IV (Sl. NO. 4.0.0) of SQAP. **For DPRO/CPRO Orders:** Type Test shall be applicable, only if indicated in PO.

Sl No	Material / Component Quality Activity	Characteristic / Type of Check	Quantum of Check	Reference Documents	Acceptance Criteria	Type of Record	Action by QAE	Remarks
2.0.0	**SECTION II : RAW MATERIAL INSPECTION (As per approved drawing, including but not limiting to following)**							
2.1.0	**Casted components** Including but not limited to the following: - **(a) Ball Valve**- Body, Cover, Ball, Seat, Top Plate, Retainer etc. **(b) Plug Valve**- Body, Cover, Plug, Plug Nut, Top Plate etc. **(c) Butterfly Valve-** Body, Disc, Clamp Ring, Bottom Hex Nut, Bracket, Top Plate, Gear Box Casing, Seat Retainer, Bottom Cover, Gland Flange etc. **(d) Gate Valve-** Body, Bonnet, Gate, Wedge, Cover, Back Seat, Seat Ring, Stuffing Box, Gland, Gate Nut, Body Seat, Adaptor Plate, Gear Box Casing, Wedge Nut, Side Cover etc.	(a) Chemical analysis of Ingot / Raw Materials	100%	(i) SOTR, TSP, Approved GA drawing, DBOM, Manufacturing drawing & PO (ii) TNC minutes (as applicable)	Conformity to specifications	MILL TC /MTC /NABL TC	R	Refer to para 4,(Pg 8) of SQAP regarding 'Testing of ingots'.
		(b) Pouring	100%		Conformity to specifications	IR	RMI / W	(i) Refer to para 5, page 8 of SQAP regarding 'Class of Casting'. DGQA policy letter DGQA/STD/005-23 dated 20 Oct 23 and DQA(WP) letter no. 12575 / POLICY / DGQA/WP-TC dated 29 Apr 24 relevant for Hybrid / RMI. (ii) If RMI not available same to be witness by QA inspector.
		(c) Casting identification & Stamping	100%		Conformity to specifications	IR	W/R*	(i) Moulds to be opened in presence of QAE Reps. (ii) R* :- Applicable for all foundries registered with DQA(WP)/DGQA.
		(d) Heat Treatment (If applicable)	100%		Conformity to specifications	HT Chart/ Report	R	--
		(e) Chemical composition& Mechanical properties	01 sample/ heat/ lot		Conformity to specifications	NABL TC	CHP for R	Samples to be drawn by QAE rep
		(f) RT (of Body and Bonnet only)	100%		Conformity to specifications	NDT Report	CHP for R	RT to be undertaken by ISNT / ASNT Level II / III Qualified Technician and sentenced by Level III

Sl No	Material / Component Quality Activity	Characteristic / Type of Check	Quantum of Check	Reference Documents	Acceptance Criteria	Type of Record	Action by QAE	Remarks
2.1.0 Contd.	**Casted components** Including but not limited to the following: -	(g) Dressing of Castings by sand/ shot blasting	100%		Conformity to specifications	IR	R	--
	(a) Ball Valve- Body, Cover, Ball, Seat, Top Plate, Retainer etc. **(b) Plug Valve-** Body, Cover, Plug, Plug Nut, Top Plate etc. **(c) Butterfly Valve-** Body, Disc, Clamp Ring, Bottom Hex Nut, Bracket, Top Plate, Gear Box Casing, Seat Retainer, Bottom Cover, Gland Flange etc. **(d)** Gate Valve- Body, Bonnet, Gate, Wedge, Cover, Back Seat, Seat Ring, Stuffing Box, Gland, Gate Nut, Body Seat, Adaptor Plate, Gear Box Casing, Wedge Nut, Side Cover etc.	(h) **Marking on Body by Cast / engraving**: Direction of flow, Nominal Dia, Pressure Rating, Firm's monogram. **Marking on Body by engraving: -** Heat No. **Marking on Flange by engraving: -** Mfg. Date in MM/YY format.	100%	(i) SOTR, TSP, Approved GA drawing, DBOM, Manufacturing drawing & PO (ii) TNC minutes (as applicable)	Conformity to specifications	IR	R	--

Sl No	Material / Component Quality Activity	Characteristic / Type of Check	Quantum of Check	Reference Documents	Acceptance Criteria	Type of Record	Action by QAE	Remarks
2.1.1	Hand Wheel	Chemical compositionand Mechanical properties	01 sample / heat or lot	(i) SOTR, TSP, Approved GA drawing, DBOM, Manufacturing drawing & PO (ii) TNC minutes (as applicable)	Conformity to specifications	NABL TC/ OEM CoC	R	Samples to be drawn by QAE rep for sending to NABL lab.
2.2.0	**Forged/ Rolled/ Extruded/Machined components** Including but not limited tothe following: - **(a) Ball Valve-** Spindle/ Stem, Backing Plate, Gland, Handle, Rod gearing etc. **(b) Plug Valve-** Gland, Stem/ Spindle, Rod Gearing, Handle, Stopper, Rod Gearing etc. **(c) Butterfly Valve-** Spindle/ Stem, Disc Pin, Body Seat, Soft seat, Gland Bush, Wedge Pin, Gland HexNut, Bracket, Spacer, Bearing, Worm & Worm Wheel etc. **(d) Gate Valve -** Spindle/ Stem, Gear shaft, Gears, Extended shaft, Indicator Plate, Key etc	**(a)** Chemical analysis of Bar stock	100%	(i) SOTR, TSP, Approved GA drawing, DBOM, Manufacturing drawing & PO (ii) TNC minutes (as applicable)	Conformity to specifications	Mill TC	R	--
		(b) Heat Treatment (Ifapplicable	100%		Conformity to specifications	HT Chart/ Report	R	--
		(c) Chemical composition and Mechanical properties	01 sample / heat/ lot		Conformity to specifications	NABL TC	CHP for R	Samples to be drawn by QAE inspector for forwarding to lab.
		(d) UT (Spindle/ Stem, Gear shaft, Extended Shaft)	100%		Conformity to specifications	NDT Report/ Internal Soundness Test Certificate	R	(a) UT is applicable for forged valve body & other components. Format of record – NDT report. (b) For all components made from Rolled bars/ machining, Internal Soundness Test Certificate from OEM as per NES 833 Pt 2 to be submitted. (c) UT to be undertaken by ISNT / ASNT Level II / III Qualified Technician and sentenced by Level III

Sl No	Material / Component Quality Activity	Characteristic / Type of Check	Quantum of Check	Reference Documents	Acceptance Criteria	Type of Record	Action by QAE	Remarks
2.2.1	Soft Seat	Chemical composition (polymer identification) & Physical properties	100%	--	Conformity to specifications	NABLTC/ OEMTC	R	--
2.3.0	**BOUGHT-OUT AND COTS COMPONENTS(As per approved drawing, including but not limiting to the following)**							
2.3.1	Rubber components	Chemical composition (polymer identification)& Physical properties	100%	(i) SOTR, TSP, Approved GA drawing, DBOM, Manufacturing drawing & PO (ii) TNC minutes (as applicable)	Conformity to specifications	MTC/ CoC	R	--
2.3.2	Gaskets/ Gland or Teflon/PTFE Packing etc	Chemical composition (polymer identification) & Physical properties	100%		Conformity to specifications	MTC/ CoC	R	--
2.3.3	Fasteners (Locking screw, stud, nuts & bolts, washers etc.)	**(a)** Chemical composition & Physical properties including Proof Stress	100%		Conformity to specifications	MTC/ CoC/OEM TC	R	--
		(b) Torque Test	100%		Conformity to specifications	IR	R	Only for body & bonnet
2.3.4	Bush	Material Conformity	100%		Conformity to specifications	MTC/ CoC	R	--
2.3.5	Bearings, if applicable	Material Conformity	100%		Conformity to specifications	MTC/ CoC	R	--
2.3.6	Gland Packing	Material Conformity	100%		Conformity to specifications	MTC/ CoC	R	--
2.3.7	Antistatic Device	Material Conformity	100%		Conformity to specifications	MTC/ CoC	R	--
2.3.8	Extended Spindle and Extended Spindle Pin	Material Conformity	100%		Conformity to specifications	MTC/ CoC	R	--
2.3.9	Lever Assembly	Material Conformity	100%		Conformity to specifications	MTC/ CoC	R	--
2.3.10	Locking arrangement & Locking Pin	Material Conformity	100%		Conformity to specifications	MTC/ CoC	R	--

Sl No	Material / Component Quality Activity	Characteristic / Type of Check	Quantum of Check	Reference Documents	Acceptance Criteria	Type of Record	Action by QAE	Remarks
2.3.11	Stopper/ Limiter with indication plate	Material Conformity	100%	(i) SOTR, TSP, Approved GA drawing, DBOM, Manufacturing drawing & PO (ii) TNC minutes (as applicable)	Conformity to specifications	MTC/ CoC	R	--
2.3.12	Actuation Mechanism, if applicable- (a) Electrical (b) Hydraulic (c) Pneumatic	Type, Size, Make, Material Conformity and Rating, as applicable	100%		Conformity to specifications	MTC/ STC	R	--
2.3.13	Sealing Rings (Triple Offset Valves only)	Chemical composition (polymer identification) & Physical properties	100%		Conformity to specifications	MTC/ OEM TC	R	--
3.0.0	**SECTION III- IN-PROCESS INSPECTION**							
3.1.0	Casted valve components	(a) VI & DI	100%	(i) SOTR, TSP, Approved GA drawing, DBOM, Manufacturing drawing & PO (ii) TNC minutes (as applicable)	Conformity to specifications	IR	R	--
		(b) DPT on machined surface only					R	DPT to be undertaken by ISNT/ASNT level II/III & sentencing by level III
3.2.0	Forged, Rolled, Extruded & Machined components	(c) VI & DI	100%		Conformity to specifications	IR	R	--
		(d) DPT on machined surface only					R	DPT to be undertaken by ISNT/ASNT level II/III & sentencing by level III
3.3.0	Valve Body	(e) Hydrostatic Pressure Test	100%		Satisfactory Completion	IR	R	--
3.4.0	Valve Offset	(f) DI	100%		Conformity to specifications	IR	R	For offset valves
3.5.0	Metal Seat	(g) VI post offset machining	100%		Conformity to specifications	IR	R	
3.6.0	Teflon coating (if applicable)	(h) Teflon coating confirmation	100%	--	As per approved drawing	NABL TC	R	--

Sl No	Material / Component Quality Activity	Characteristic / Type of Check	Quantum of Check	Reference Documents	Acceptance Criteria	Type of Record	Action by QAE	Remarks
4.0.0	**SECTION IV- TYPE TESTING**							
4.1.0	Valve Assembly (To be undertaken on as-applicable basis)	(a) VI – Surface Finish	01 unit / type/ size	(i) SOTR, TSP, Approved GA drawing, DBOM, Manufacturing drawing & PO (ii) TNC minutes (as applicable)	Conformity to specifications	TTR	CHP for W and R for NABL (or) Govt. Approved lab TC	--
		(b) DI			Conformity to specifications	TTR		--
		(c) Weight			Conformity to specifications	TTR		--
		(d) Operability/ FunctionalTest			Conformity to specifications	TTR		--
		(e) Body Assembly –Hydrostatic Test			Conformity to specifications	TTR		--
		(f) Seat – Hydrostatic Test			Conformity to specifications	TTR		--
		(g) Pneumatic Test			Conformity to specifications	TTR		--
		(h) Air Bubble Test			Conformity to specifications	TTR		--
		(j) Method of rubber bonding test			Conformity to specifications	TTR		--
		(k) Obturator StrengthTest			Conformity to specifications	TTR		--
		(l) Pipe wracking test			Conformity to specifications	TTR		--
		(m) Initial Torque Test			Conformity to specifications	TTR		--
		(n) Delayed Torque Test			Conformity to specifications	TTR		--
		(p) Cyclic Test (10000Cycles)			Conformity to specifications	TTR		To be conducted with actuator, (as applicable)
		(q) Repeat Initial Torque Test and Seat–Hydrostatic Test			Conformity to specifications	TTR		--

Sl No	Material / Component Quality Activity	Characteristic / Type of Check	Quantum of Check	Reference Documents	Acceptance Criteria	Type of Record	Action by QAE	Remarks
4.1.0 *(Contd)*	Valve Assembly (To be undertaken on as-applicable basis)	(r) Pressure Drop/ Flow Measurement	01 unit / type/ size	(i) SOTR, TSP, Approved GA drawing, DBOM, Manufacturing drawing & PO (ii) TNC minutes (as applicable)	Conformity to specifications	TTR	CHP for W and R for NABL (or) Govt. Approved lab TC	
		(s) Complete strip – VI for corrosion/ wearing & DI			Conformity to specifications	TTR		
		(t) Shock & VibrationTesting			Conformity to specifications	TTR		
		(u) Hydrostatic Test post Shock Test			Conformity to specifications	TTR		
		(v) ET (for electricallyoperated valves)			Conformity to specifications	TTR		
		(w) Fire-safe characteristics, if applicable			Conformity to specifications	TTR		
		(x) Electrical Continuity			Conformity to specifications	TTR		
		(z) Noise Signature			Conformity to specifications	TTR		
5.0.0	**SECTION V – FINAL INSPECTION**							
5.1.0	Valve Assembly	(a) VI – Surface Finish	100%	(i) SOTR, TSP, Approved GA drawing, DBOM, Manufacturing drawing & PO (ii) TNC minutes (as applicable)	Conformity to specifications	IR	CHP for W	--
		(b) DI			Conformity to specifications	IR	CHP for W	Overall dimensions as per GA drawing
		(c) Weight			Conformity to specifications	IR	CHP for W	--
		(d) Pneumatic Test			Conformity to specifications	IR	CHP for W	--
		(e) Air bubble test for balland butterfly valves			Conformity to specifications	IR	CHP for W	20% of the lot to be tested

Sl No	Material / Component Quality Activity	Characteristic / Type of Check	Quantum of Check	Reference Documents	Acceptance Criteria	Type of Record	Action by QAE	Remarks
5.1.0 Contd.	Valve Assembly	(f) Disk Strength Test (forButterfly Valves only)	100%	(i) SOTR, TSP, Approved GA drawing, DBOM, Manufacturing drawing & PO (ii) TNC minutes (as applicable)	Conformity to specifications	IR	CHP for W	--
		(g) Method of rubber bonding test			Conformity to specifications	IR	CHP for W	--
		(h) Repeatability Test (25 Cycles) followed by Body Assembly HydrostaticTest & Seat Hydrostatic Test)			Conformity to specifications	IR	CHP for W	To be conducted with actuator, if applicable
		(j) Performance Test			Conformity to specifications	IR	CHP for W	--
5.2.0	Preservation, Packing and Marking	Verification	100%	PO, TSP/ SOTR	Conformity to specifications	IR	R	Certificate to be submitted
5.3.0	Submission of as-made drawings & other documentation, if applicable	Verification	100%	PO, TSP/ SOTR	Conformity to specifications	IR	R	--
5.4.0	QAP Compliance	Document Verification	100%	All test report as per QAP	As per Drawings & PO	IR	CHP for R	--

APPENDIX-B

(Refers to Page 13, Part-II)

SQAP FOR REGULATION VALVES – DIAPHRAGM SDNR & SDSL VALVES

Sl No	Material / Component Quality Activity	Characteristic / Type of Check	Quantu mof Check	Reference Documents	Acceptance Criteria	Type of Record	Action by QAE	Remarks
1.0.0	**SECTION I : DRAWINGS AND DOCUMENT INSPECTION**							
1.1.0	Drawings & Documents - GA drawings withDBOM - Manufacturing drawings	Verification of drawings/documents	100%	(i) Standards, SOTR, TSP & PO (ii) TNC minutes (as applicable)	Standards /Specificatio ns/Values mentioned in reference documents.	DBOM as per QAD R02 Format	R	Manufacturing drawings willbe vetted with reference to approved GA drawings and DBOM in OEM premises
1.1.2	Type Test Report	Verification	01/ Type	(i) Standards, SOTR, TSP & PO (ii) TNC minutes (as applicable)	--	--	R	**For Shipyard Orders:** If equipment is not Type Tested OR reports are not held, Type Test to be undertaken as per section IV (Sl. NO. 4.0.0) of SQAP. **For DPRO/CPRO Orders:** Type Test shall beapplicable, only if indicated in PO.

Sl No	Material / Component Quality Activity	Characteristic / Type of Check	Quantu mof Check	Reference Documents	Acceptance Criteria	Type of Record	Action by QAE	Remarks
2.0.0	**SECTION II: RAW MATERIAL INSPECTION (As per approved drawing, including but not limiting to following)**							
2.1.0	**<u>Casted components</u>** Including but not limited tothe following: - **(a) <u>Diaphragm Valve</u>-** Body, Bonnet, Compressor etc. **(b) <u>SDNR & SDSL Valve</u>-** Body, Bonnet, Disc, Disc Seat, Back Seat, Disc Nut,Disc Holder, Soft Seat Holder, Clamp Ring,Gland Cover, GlandFlange, Indicator, Yoke Bush, Spindle Guide, Yoke Sleeve, Indicator etc.	(a) Chemical analysis of Ingot / Raw Materials	100%	(i) SOTR, TSP, Approved GA drawing, DBOM, Manufacturing drawing & PO (ii) TNC minutes (as applicable)	Conformity to specifications	MILL TC /MTC /NABL TC	R	Refer to para 4, (page 8) ofSQAP regarding Testing of ingots.
		(b) Pouring	100%		Conformity to specifications	IR	RMI / W	(i) Refer to para 5, page 8 of SQAP regarding 'Class of Casting'. DGQA policy letter DGQA/STD/005-23 dated 20 Oct 23 and DQA(WP) letter no. 12575 / POLICY / DGQA/WP-TC dated 29 Apr 24 relevant for Hybrid / RMI. (ii) If RMI not available same to be witness by QA inspector.
		(c) Casting identification & Stamping	100%		Conformity to specifications	IR	W/R*	(i) Moulds to be opened in presence of QAE Reps. (ii) R* :- Applicable for all foundries registered with DQA(WP)/DGQA.
		(d) Heat Treatment (If applicable)	100%		Conformity to specifications	HT Chart/ Report	R	--
		(e) Chemical composition& Mechanical properties	01sample / heat/ lot		Conformity to specifications	NABL TC	CHP for R	Samples to be drawn by QAE rep
		(f) RT (of Body, Bonnetand Disc only)	100%		Conformity to specifications	NDT Report	CHP for R	RT to be undertaken by ISNT / ASNT Level II / III Qualified Technician and sentenced by Level III

Sl No	Material / Component Quality Activity	Characteristic / Type of Check	Quantu mof Check	Reference Documents	Acceptance Criteria	Type of Record	Action by QAE	Remarks
		(g) Dressing of casting by sand/ shot blasting	100%		Conformity to specifications	IR	R	--
		(h) **Marking on Body by cast/engraving**: - Direction of flow, Nominal Dia, Pressure Rating, Firm's monogram. **Marking on Body by engraving: -** Heat No. **Marking on Flange by** **engraving: -** Mfg. Date in MM/YY format.	100%	(i) SOTR, TSP, Approved GA drawing, DBOM, Manufacturing drawing & PO (ii) TNC minutes (as applicable)	Conformity to specifications	IR	R	--
2.1.1	Hand Wheel	Chemical composition and Mechanical properties	01sample / heat	(i) SOTR, TSP, Approved GA drawing, DBOM, Manufacturing drawing & PO (ii) TNC minutes (as applicable)	Conformity to specifications	NABL TC/ OEM CoC	R	Samples to be drawn by QAE rep

Sl No	Material / Component Quality Activity	Characteristic / Type of Check	Quantu mof Check	Reference Documents	Acceptance Criteria	Type of Record	Action by QAE	Remarks
2.2.0	**Forged/Rolled/ Extruded/Machined components** Including but not limited to the following: - **(a) Diaphragm Valve -** Stem/ Spindle, Bonnet Bush, Spindle Nut, Diaphragm Stud, Valve Travel Indicator Pin, Hand WheelPin etc. **(b) SDNR & SDSL Valve-** Stem/Spindle, Stem Bush, Stem Locking Ring, Disc, Disc Seat, Back Seat, Disc Nut, Gland Bush, Stem Locking Pin, Extension, Rod Gearing etc.	**(a)** Chemical analysis of Bar stock	100%	(i) SOTR, TSP, Approved GA drawing, DBOM, Manufacturing drawing & PO (ii) TNC minutes (as applicable)	Conformity to specifications	Mill TC	R	--
		(b) Heat Treatment (If applicable	100%		Conformity to specifications	HT Chart/ Report	R	--
		(c) Chemical composition & Mechanical properties	01sample / heat/ lot		NABL TC	CHP for R	NABL TC	Samples to be drawn by QAE rep
		(d) UT (Stem/ Spindle, Extended Shaft and Disc)	100%		Conformity to specifications	NDT Report	R	**(a)** UT is applicable for forged valve body& other components. Format of record – NDT report. **(b)** For all components made from Rolled bars/ machining, Internal Soundness Test Certificate from OEM as per NES 833 Pt 2 to be submitted. **(c)** UT to be undertaken by ISNT / ASNT Level II / III Qualified Technician and sentenced by Level III
2.2.1	Soft Seat	Chemical composition (polymer identification) & Physical properties	100%		Conformity to specifications	NABL TC/ OEM TC	R	--

Sl No	Material / Component Quality Activity	Characteristic / Type of Check	Quantu mof Check	Reference Documents	Acceptance Criteria	Type of Record	Action by QAE	Remarks
2.3.0	**BOUGHT-OUT AND COTS COMPONENTS(As per approved drawing, including but not limiting to the following)**							
2.3.1	Diaphragm / Rubber components	Chemical composition (polymer identification) &Physical properties	100%	(i) SOTR, TSP, Approved GA drawing, DBOM, Manufacturing drawing & PO (ii) TNC minutes (as applicable)	Conformity to specifications	MTC/ CoC	R	--
2.3.2	Gaskets / Gland or Teflon/PTFE Packing etc	Chemical composition (polymer identification) & Physical properties	100%	(i) SOTR, TSP, Approved GA drawing, DBOM, Manufacturing drawing & PO (ii) TNC minutes (as applicable)	Conformity to specifications	MTC/ CoC	R	--
2.3.3	Fasteners (Locking screw,stud, nuts & bolts, washers etc.)	(a) Chemical composition & Physical properties including Proof Stress	100%		Conformity to specifications	MTC / CoC/OE M TC	R	--
		(b) Torque Test	100%		Conformity to specifications	IR	R	Only for body & bonnet
2.3.4	Bush	Material Conformity	100%		Conformity to specifications	MTC/ CoC	R	--
2.3.5	Bearings, if applicable	Material Conformity	100%		Conformity to specifications	MTC/ CoC	R	--
2.3.6	Gear Box	(a) Visual inspection (b) Type, Size, Make &Material conformity	100%		Conformity to specifications	IR, STC/ CoC	R	--
2.3.7	Gland Packing	Material Conformity	100%		Conformity to specifications	MTC/ CoC	R	--
2.3.8	Antistatic Device	Material Conformity	100%		Conformity to specifications	MTC/ CoC	R	--
2.3.9	Extended Spindle and Extended Spindle Pin	Material Conformity	100%		Conformity to specifications	MTC/ CoC	R	--

Sl No	Material / Component Quality Activity	Characteristic / Type of Check	Quantu mof Check	Reference Documents	Acceptance Criteria	Type of Record	Action by QAE	Remarks
2.3.10	Lever Assembly	Material Conformity	100%	(i) SOTR, TSP, Approved GA drawing, DBOM, Manufacturing drawing & PO (ii) TNC minutes (as applicable)	Conformity to specifications	MTC/ CoC	R	--
2.3.11	Locking arrangement & Locking Pin	Material Conformity	100%		Conformity to specifications	MTC/ CoC	R	--
2.3.12	Stopper/ Limiter with indication plate	Material Conformity	100%		Conformity to specifications	MTC/ CoC	R	--
2.3.13	Actuation Mechanism, if applicable- (a) Electrical (b) Hydraulic (c) Pneumatic	Type, Size, Make, Material Conformity and Rating, as applicable	100%		Conformity to specifications	MTC/ STC	R	--
3.0.0	**SECTION III- IN-PROCESS INSPECTION**							
3.1.0	Casted valve components	(a) VI & DI	100%	(i) SOTR, TSP, Approved GA drawing, DBOM, Manufacturing drawing & PO (ii) TNC minutes (as applicable)	Conformity to specifications	IR	R	--
		(b) DPT on machined surface only					R	DPT to be undertaken by ISNT/ASNT level II/III & sentencing by level III
3.2.0	Forged, Rolled, Extruded&Machined components	(a) VI & DI	100%		Conformity to specifications	IR	R	--
		(b) DPT on machined surface only					R	DPT to be undertaken by ISNT/ASNT level II/III & sentencing by level III
3.3.0	Valve Body	Hydrostatic Pressure Test	100%		Satisfactory Completion	IR	R	--

Sl No	Material / Component Quality Activity	Characteristic / Type of Check	Quantu mof Check	Reference Documents	Acceptance Criteria	Type of Record	Action by QAE	Remarks
3.4.0	Teflon coating (if applicable)	Teflon coating confirmation	100%	--	As per approved drawing	NABL TC	R	--
4.0.0	**SECTION IV- TYPE TESTING**							
4.1.0	Valve Assembly (To be undertaken on as-applicable basis)	(a) VI – Surface Finish	01 unit / type/ size	(i) SOTR, TSP, Approved GA drawing, DBOM, Manufacturing drawing & PO (ii) TNC minutes (as applicable)	Conformity to specifications	TTR	CHP for W or R for NABL (or) Govt. Approved lab TC	--
		(b) DI			Conformity to specifications	TTR		--
		(c) Weight			Conformity to specifications	TTR		--
		(d) Operability/ FunctionalTest			Conformity to specifications	TTR		--
		(e) Body Assembly -Hydrostatic Test			Conformity to specifications	TTR		--
		(f) Seat - Hydrostatic Test			Conformity to specifications	TTR		--
		(g) Pneumatic Test			Conformity to specifications	TTR		--
		(h) Air Bubble Test			Conformity to specifications	TTR		--
		(j) Method of rubberbonding test			Conformity to specifications	TTR		--
		(k) Obturator StrengthTest			Conformity to specifications	TTR		--
		(l) Pipe wracking test			Conformity to specifications	TTR		--
		(m) Initial Torque Test			Conformity to specifications	TTR		--
		(n) Delayed Torque Test			Conformity to specifications	TTR		--
		(p) Cyclic Test (10000 Cycles)			Conformity to specifications	TTR		To be conducted with actuator, if applicable

Sl No	Material / Component Quality Activity	Characteristic / Type of Check	Quantu mof Check	Reference Documents	Acceptance Criteria	Type of Record	Action by QAE	Remarks
4.1.0 (Contd)	Valve Assembly (To be undertaken on as-applicable basis)	(q) Repeat Initial Torque Test and Seat – Hydrostatic Test		(i) SOTR, TSP, Approved GA drawing, DBOM, Manufacturing drawing & PO (ii) TNC minutes (as applicable)	Conformity to specifications	TTR		--
		(r) Pressure Drop/ FlowMeasurement			Conformity to specifications	TTR		--
		(s) Complete strip – VI forcorrosion/ wearing and DI			Conformity to specifications	TTR		--
		(t) Shock & Vibration Testing			Conformity to specifications	TTR		--
		(u) Hydrostatic Test postShock Test			Conformity to specifications	TTR		--
		(v) ET (for electricallyoperated valves)			Conformity to specifications	TTR		--
		(w) Fire-safe characteri-stics, if applicable			Conformity to specifications	TTR		--
		(x) Electrical Continuity			Conformity to specifications	TTR		--
		(y) Antistatic Test			Conformity to specifications	TTR		--
		(z) Noise Signature			Conformity to specifications	TTR		--
5.0.0	**SECTION V- FINAL INSPECTION**							
5.1.0	Valve Assembly	(a) VI - Surface Finish	100%	(i) SOTR, TSP, Approved GA drawing, DBOM, Manufacturing drawing & PO (ii) TNC minutes (as applicable)	Conformity to specifications	IR	CHP for W	
		(b) DI			Conformity to specifications	IR	CHP for W	Overall dimensions as per GA drawing
		(c) Weight			Conformity to specifications	IR	CHP for W	--
		(d) Pneumatic Test			Conformity to specifications	IR	CHP for W	--

Sl No	Material / Component Quality Activity	Characteristic / Type of Check	Quantu mof Check	Reference Documents	Acceptance Criteria	Type of Record	Action by QAE	Remarks
5.1.0 (Contd)	Valve Assembly (Contd)	(e) Repeatability Test (25 Cycles) followed by Body Assembly Hydrostatic Test and Seat HydrostaticTest)	100%	(i) SOTR, TSP, Approved GA drawing, DBOM, Manufacturing drawing & PO (ii) TNC minutes (as applicable)	Conformity to specifications	IR	CHP for W	To be conducted with actuator, if applicable
		(f) Performance Test			Conformity to specifications	IR	CHP for W	--
5.2.0	Preservation, Packing and Marking	Verification	100%	PO, TSP/ SOTR	Conformity to specifications	IR	R	Certificate to be submitted
5.3.0	Submission of as-made drawings & other documentation, if applicable	Verification	100%	PO, TSP/ SOTR	Conformity to specifications	IR	R	--
5.4.0	QAP Compliance	Document Verification	100%	All test report as per QAP	As per Drawings & PO	IR	CHP for R	--

APPENDIX-C

(Refers to Page 13, Part-II)

SQAP FOR DIRECTIONAL / CHECK VALVES - SWING, LIFT & DUAL PLATE VALVE

Sl No	Material/ Component Quality Activity	Characteristic/ Typeof Check	Quantu mof Check	Reference Documents	Acceptance Criteria	Type of Record	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%	(i) Standards, SOTR, TSP & PO (ii) TNC minutes (as applicable)	Standards /Specifications /Values mentioned in reference documents..	DBOM as per QAD R02 Format	R	Manufacturing drawings will be vetted with reference to approved GA drawings and DBOM in OEM premises
1.1.2	Type Test Report	Verification	01/ Type	(i) Standards, SOTR, TSP & PO (ii) TNC minutes (as applicable	--	--	R	**For Shipyard Orders:** If equipment is not Type Tested OR reports are not held, Type Test to be undertaken as per section IV (Sl. NO. 4.0.0) of SQAP. **For DPRO/CPRO Orders:** Type Test shall be applicable, only if indicated in PO.

Sl No	Material/ Component Quality Activity	Characteristic/ Typeof Check	Quantu mof Check	Reference Documents	Acceptance Criteria	Type of Record	Action by QAE	Remarks
2.0.0	**SECTION II: RAW MATERIAL INSPECTION (As per approved drawing, including but not limiting to following)**							
2.1.0	**Casted components** Including but not limited tothe following: - **(a) Swing & Storm Valve-** Body, Body Cover, Disc,Seat, Stem Nut etc. **(b) Lift Valve**- Body, Body Cover, Disc, Seat etc. **(c) Dual Plate Valve**- Body, Disc etc.	(a) Chemical analysis of Ingot / Raw Materials	01 sample / heat/ lot	(i) SOTR, TSP, Approved GA drawing, DBOM, Manufacturing drawing & PO (ii) TNC minutes (as applicable)	Conformity to specifications	MILL TC /MTC /NABL TC	R	Refer to para 4, (page 8) of SQAP regarding Testing of ingots.
		(b) Pouring	100%		Conformity to specifications	IR	RMI / W	(i) Refer to para 5, page 8 of SQAP regarding 'Class of Casting'. DGQA policy letter DGQA/STD/005-23 dated 20 Oct 23 and DQA(WP) letter no. 12575 / POLICY / DGQA/WP-TC dated 29 Apr 24 relevant for Hybrid / RMI. (ii) If RMI not available same to be witness by QA inspector.
		(c) Casting identification & Stamping	100%		Conformity to specifications	IR	W/R*	(i) Moulds to be opened in presence of QAE Reps. (ii) R* :- Applicable for all foundries registered with DQA(WP)/DGQA.
		(d) Heat Treatment (If applicable)	100%		Conformity to specifications	HT Chart/ Report	R	--
		(e) Chemical composition& Mechanical properties	01 sample / heat/ lot		Conformity to specifications	NABL TC	CHP for R	Samples to be drawn byQAE rep
		(f) RT (of Body, Cover,Disc only)	100%		Conformity to specifications	NDT Report	CHP for R	RT to be undertaken by ISNT / ASNT Level II / III Qualified Technician and sentenced by Level III
		(g) Dressing of Castings by sand/ shot blasting	100%		Conformity to specifications	IR	R	--

Sl No	Material/ Component Quality Activity	Characteristic/ Typeof Check	Quantu mof Check	Reference Documents	Acceptance Criteria	Type of Record	Action by QAE	Remarks
2.1.0 *(Contd)*		(h) **Marking on Body by cast/engraving**: Direction of flow, Nominal Dia, Pressure Rating, Firm's monogram. **Marking on Body byengraving: -** Heat No. **Marking on Flange byengraving: -** Mfg. Date in MM/YY format.	100%		Conformity to specifications	IR	R	--
2.2.0	**Forged/ Rolled/ Extruded/Machined components** Including but not limited tothe following: - **(a) Swing& Storm Valve -** Spindle/ Stem, Disc, DiscPin, Rod Gearing, HingePin etc **(b) Lift Valve-** Spindle/Stem,Disc etc. **(c) Dual Plate Valve-** Disc, Hinge Pin, Hinge Pin, Stop Pin, Retainers, Stop Pin Retainers etc	(a) Chemical analysis of Bar stock	100%	(i) SOTR, TSP, Approved GA drawing, DBOM, Manufacturing drawing & PO (ii) TNC minutes (as applicable)	Conformity to specifications	Mill TC	R	--
		(b) Heat Treatment (If applicable)	100%		Conformity to specifications	HT Chart/ Report	R	--
		(c) Chemical composition and Mechanical properties	01 sample / heat/ lot		NABL TC	CHP for R	NABL TC	Samples to be drawn by QAE rep
		(d) UT (Spindle/ Stem,Hinge Pin and Disc)			Conformity to specifications	NDT Report	R	**(a)** UT is applicable for forged valve body& other components. Format of record – NDT

Sl No	Material/ Component Quality Activity	Characteristic/ Typeof Check	Quantu mof Check	Reference Documents	Acceptance Criteria	Type of Record	Action by QAE	Remarks
			100%	(i) SOTR, TSP, Approved GA drawing, DBOM, Manufacturing drawing & PO (ii) TNC minutes (as applicable)				report. **(b)** For all components made from Rolled bars/ machining, Internal Soundness Test Certificate from OEM as per NES 833 Pt 2to be submitted. (c) UT to be undertaken by ISNT / ASNT Level II /III Qualified Technician and sentenced by Level III
2.2.1	Soft Seat	Chemical composition (polymer identification) & Physical properties	100%		Conformity to specifications	NABLTC/ OEM TC	R	--
2.3.0	**BOUGHT-OUT AND COTS COMPONENTS(As per approved drawing, including but not limited to the following)**							
2.3.1	Rubber components	Chemical composition (polymer identification)& Physical properties	100%	(i) SOTR, TSP, Approved GA drawing, DBOM, Manufacturing drawing & PO (ii) TNC minutes (as applicable)	Conformity to specifications	MTC/ CoC	R	--
2.3.2	Gaskets/ Gland or Teflon/ PTFE Packing etc		100%		Conformity to specifications	MTC/ CoC	R	--
2.3.3	Fasteners (Locking screw, stud, nuts & bolts, washers etc.)	(a)Chemical composition &Physical properties including Proof Stress	100%		Conformity to specifications	MTC/ CoC/ OEM TC	R	--
		(b) Torque Test	100%		Conformity to specifications	IR	R	Only for body & bonnet

Sl No	Material/ Component Quality Activity	Characteristic/ Typeof Check	Quantu mof Check	Reference Documents	Acceptance Criteria	Type of Record	Action by QAE	Remarks
2.3.4	Bush	Material Conformity	100%		Conformity to specifications	MTC/ CoC	R	--
2.3.5	Bearings, if applicable	Material Conformity	100%			MTC/ CoC	R	--
2.3.6	Springs	(a) Material Conformity (b) Load Test	100%		Conformity to specifications	MTC/ CoC	R	--
3.0.0	**SECTION III- IN-PROCESS INSPECTION**							
3.1.0	Casted valve components	(a) VI & DI	100%	(i) SOTR, TSP, Approved GA drawing, DBOM, Manufacturing drawing & PO (ii) TNC minutes (as applicable)	Conformity to specifications	IR	R	--
		(b) DPT on machined surface only					R	DPT to be undertaken by ISNT/ASNT level II/III & sentencing by level III
3.2.0	Forged, Rolled & Machined components	(a) VI & DI	100%		Conformity to specifications	IR	R	--
		(b) DPT on machined surface only					R	DPT to be undertaken by ISNT/ASNT level II/III & sentencing by level III
3.3.0	Valve Body	Hydrostatic Pressure Test	100%		Satisfactory Completion	IR	R	--
3.4.0	Teflon coating (if applicable)	Teflon coating confirmation	100%	-	As per approved drawing	NABL TC	R	--
4.0.0	**SECTION IV- TYPE TESTING**							
4.1.0	Valve Assembly (To be undertaken on as-applicable basis)	(a) VI – Surface Finish	01 unit / type/ size	(i) SOTR,TSP, Approved GA drawing, DBOM, Manufacturing drawing & PO	Conformity to specifications	TTR	CHP for W or R for NABL (or) Govt. Approved lab TC	--
		(b) DI			Conformity to specifications	TTR		--
		(c) Weight			Conformity to specifications	TTR		--

Sl No	Material/ Component Quality Activity	Characteristic/ Typeof Check	Quantu mof Check	Reference Documents	Acceptance Criteria	Type of Record	Action by QAE	Remarks
		(d)Operability/ FunctionalTest		(ii) TNC minutes (as applicable)	Conformity to specifications	TTR		--
		(e) Body Assembly - Hydrostatic Test			Conformity to specifications	TTR		--
		(f) Seat - HydrostaticTest			Conformity to specifications	TTR		--
		(g) Pneumatic Test			Conformity to specifications	TTR		--
		(h) Air Bubble Test			Conformity to specifications	TTR		--
		(j) Obturator StrengthTest			Conformity to specifications	TTR		--
		(k) Pipe wracking test			Conformity to specifications	TTR		--
		(l) Cyclic Test (10000Cycles)			Conformity to specifications	TTR		--
		(m) Pressure Drop/ Flow Measurement			Conformity to specifications	TTR		--
		(n) Complete strip – VI for corrosion/ wearing and DI			Conformity to specifications	TTR		--
4.1.0 (Contd)	Valve Assembly (To be undertaken on as-applicable basis)	(p) Shock & Vibration Testing		(i) SOTR, TSP, Approved GA drawing, DBOM, Manufacturing drawing & PO	Conformity to specifications	TTR		--
		(q) Hydrostatic Test post Shock Test			Conformity to specifications	TTR		--
		(r) ET (for electrically		(ii) TNC minutes (as applicable)	Conformity to specifications	TTR		--

Sl No	Material/ Component Quality Activity	Characteristic/ Typeof Check	Quantu mof Check	Reference Documents	Acceptance Criteria	Type of Record	Action by QAE	Remarks
		operated valves)						
		(s) Fire-safe characteri-stics, if applicable			Conformity to specifications	TTR		--
		(t) Electrical Continuity			Conformity to specifications	TTR		--
		(u) Antistatic Test			Conformity to specifications	TTR		--
		(j) Noise Signature			Conformity to specifications	TTR		--
5.0.0	**SECTION V- FINAL INSPECTION**							
5.1.0	Valve Assembly	(a) VI – Surface Finish	100%	(i) SOTR, TSP, Approved GA drawing, DBOM, Manufacturing drawing & PO (ii) TNC minutes (as applicable)	Conformity to specifications	IR	CHP for W	--
		(b) DI			Conformity to specifications	IR	CHP for W	Overall dimensions as per GA drawing
		(c) Weight			Conformity to specifications	IR	CHP for W	--
		(d) Pneumatic Test			Conformity to specifications	IR	CHP for W	--
5.1.0 (Contd)	Valve Assembly (Contd)	(e) Repeatability Test(25 Cycles) followed by Body Assembly Hydrostatic Test and Seat Hydrostatic test)			Conformity to specifications	IR	CHP for W	--
		(f) Performance Test			Conformity to specifications	IR	CHP for W	--

Sl No	Material/ Component Quality Activity	Characteristic/ Typeof Check	Quantu mof Check	Reference Documents	Acceptance Criteria	Type of Record	Action by QAE	Remarks
5.2.0	Preservation, Packing and Marking	Verification	100%	PO, TSP/ SOTR	Conformity to specifications	IR	R	Certificate to be submitted
5.3.0	Submission of as-made drawings and other documentation, if applicable	Verification	100%	PO, TSP/ SOTR	Conformity to specifications	IR	R	--
5.4.0	QAP Compliance	Document Verification	100%	All test report as per QAP	As per Drawings & PO	IR	CHP for R	--

APPENDIX-D

(Refers to Page 13, Part-II)

SQAP FOR PRESSURE VALVES -PRESSURE REDUCING AND PRESSURE RELIEF VALVES

Sl No	Material/ Component Quality Activity	Characteristic/ Typeof Check	Quantum of Check	Reference Documents	Acceptance Criteria	Type of Record	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%	(i) Standards, SOTR, TSP & PO (ii) TNC minutes (as applicable)	Standards /Specifications/ Values mentioned in reference documents.	DBOM as per QAD R02 Format	R	Manufacturing drawings will be vetted with reference to approved GA drawings and DBOM in OEM premises
1.1.2	Type Test Report	Verification	01/Type	(k) Standards, SOTR, TSP & PO (ii) TNC minutes (as applicable	--	--	R	**For Shipyard Orders:** If equipment is not Type Tested OR reports are not held, Type Test to be undertaken as per section IV (Sl. NO. 4.0.0) of SQAP. **For DPRO/CPRO Orders:** Type Test shall be applicable, only if indicated in PO.

Sl No	Material/ Component Quality Activity	Characteristic/ Typeof Check	Quantum of Check	Reference Documents	Acceptance Criteria	Type of Record	Action by QAE	Remarks
2.0.0	**SECTION II: RAW MATERIAL INSPECTION(As per approved drawing, including but not limited to the following)**							
2.1.0	**<u>Casted components</u>** Including but not limited tothe following: - <u>(a) Pr. Reducing Valve</u>. Body, Body Seat, Bonnet, Plug, Sleeve etc. <u>(b) Pr. Relief Valve</u>. Body, Body Seat, Piston, Sleeve, Top Flange & Top Plate etc.	(a) Chemical analysis of Ingot / Raw Materials	100%	(i) SOTR, TSP, Approved GA drawing, DBOM, Manufacturing drawing & PO (ii) TNC minutes (as applicable)	Conformity to specifications	MILL TC /MTC /NABL TC	R	Refer to para 4, (page 8) of SQAP regarding Testing of ingots.
		(b) Pouring	100%		Conformity to specifications	IR	RMI / W	(i) Refer to para 5, page 8 of SQAP regarding 'Class of Casting'. DGQA policy letter DGQA/STD/005-23 dated 20 Oct 23 and DQA(WP) letter no. 12575 / POLICY / DGQA/WP-TC dated 29 Apr 24 relevant for Hybrid / RMI. (ii) If RMI not available same to be witness by QA inspector.
		(c) Casting identification & Stamping	100%		Conformity to specifications	IR	W/R*	(i) Moulds to be opened in presence of QAE Reps. (ii) R* :- Applicable for all foundries registered with DQA(WP)/DGQA.
		(d) Heat Treatment (If applicable	100%		Conformity to specifications	HT Chart/ Report	R	--
		(e) Chemical composition& Mechanical properties	01 sample / heat/ Lot		Conformity to specifications	NABL TC	CHP for R	Samples to be drawn byQAE rep

Sl No	Material/ Component Quality Activity	Characteristic/ Typeof Check	Quantum of Check	Reference Documents	Acceptance Criteria	Type of Record	Action by QAE	Remarks
2.1.0 *(Contd)*	**Casted components** Including but not limited tothe following: -	(g) RT (of Body and Bonnet only)	100%		Conformity to specifications	NDT Report	CHP for R	RT to be undertaken by ISNT / ASNT Level II / III Qualified Technician and sentenced by Level III
	(a) Pr. Reducing Valve. Body, Body Seat, Bonnet, Plug, Sleeve etc.	(h) Dressing of Castingsby sand/ shot blasting	100%		Conformity to specifications	IR	R	--
	(b) Pr. Relief Valve. Body, Body Seat, Piston, Sleeve, Top Flange & Top Plate etc.	(j) **Marking on Body by cast / engraving**: - Direction of flow, Nominal Dia, Pressure Rating, Firm's monogram. **Marking on Body byengraving: -** Heat No. **Marking on Flange byengraving: -** Mfg. Date in MM/YY format.	100%		Conformity to specifications	IR	R	--

Sl No	Material/ Component Quality Activity	Characteristic/ Typeof Check	Quantum of Check	Reference Documents	Acceptance Criteria	Type of Record	Action by QAE	Remarks
2.2.0	**Forged/ Rolled/ Extruded/Machined components** Including but not limited tothe following: - (a) Pr. Reducing Valve. Spindle, Plug Washer, Piston, Stud & Nut etc. (b) Pr. Relief. Valve. Plug, Spindle, Bush, Spindlepin, Spring Guide, Plug Washer Tie Rod, Adjusting Bolt etc.	(a) Chemical analysis of Bar stock	100%	(i) SOTR, TSP, Approved GA drawing, DBOM, Manufacturing drawing & PO (ii) TNC minutes (as applicable)	Conformity to specifications	Mill TC	R	--
		(b) Heat Treatment (If applicable	100%		Conformity to specifications	HT Chart/ Report	R	--
		(c) Chemical composition and Mechanical properties	01 sample / heat/ Lot		NABL TC	CHP for R	NABL TC	Samples to be drawn byQAE rep
		(d) UT (Spindle)	100%		Conformity to specifications	NDT Report	R	(a) UT is applicable for forged valve body& other components. Format ofrecord – NDT report. (b) For all components made from Rolled bars/ machining, Internal Soundness Test Certificatefrom OEM as per NES 833 Pt 2to be submitted. (c) UT to be undertaken by ISNT / ASNT Level II /III Qualified Technician and sentenced by Level III
2.2.1	Soft Seat	Chemical composition (polymer identification) & Physical properties	100%		Conformity to specifications	NABL TC/ OEM TC	R	--

Sl No	Material/ Component Quality Activity	Characteristic/ Typeof Check	Quantum of Check	Reference Documents	Acceptance Criteria	Type of Record	Action by QAE	Remarks
2.3.0	**BOUGHT-OUT AND COTS COMPONENTS (As per approved drawing, including but not limited to the following)**							
2.3.1	Rubber components(O-ring, U-seal etc)	Chemical composition (polymer identification) & Physical properties	100%	(i) SOTR, TSP, Approved GA drawing, DBOM, Manufacturing drawing & PO (ii) TNC minutes (as applicable)	Conformity to specifications	MTC/ CoC	R	--
2.3.2	Gaskets / Gland or Teflon / PTFE Packing etc.	Chemical composition (polymer identification) & Physical properties	100%		Conformity to specifications	MTC/ CoC	R	--
2.3.3	Fasteners (Locking screw, stud, nuts, washers etc.)	(a) Chemical composition &Physical properties including Proof Stress	100%		Conformity to specifications	MTC/ CoC/ OEM TC	R	--
		(b) Torque Test	100 %		Conformity to specifications	MTC/ CoC/ OEM TC	R	Only for body & bonnet.
2.3.4	Bush	Material Conformity	100%		Conformity to specifications	MTC/ CoC	R	--
2.3.5	Bearings	Material Conformity	100%		Conformity to specifications	MTC/ CoC	R	--
2.3.6	Gland Packing /Packing	Material Conformity	100%		Conformity to specifications	MTC/ CoC	R	--
2.3.7	Springs	(c) Material Conformity (d) Load Test	100%		Conformity to specifications	MTC/ CoC	R	--

Sl No	Material/ Component Quality Activity	Characteristic/ Typeof Check	Quantum of Check	Reference Documents	Acceptance Criteria	Type of Record	Action by QAE	Remarks
3.0.0	**SECTION III- IN-PROCESS INSPECTION**							
3.1.0	Casted valve components	(a) VI & DI	100%	(i) SOTR, TSP, Approved GA drawing, DBOM, Manufacturing drawing & PO (ii) TNC minutes (as applicable)	Conformity to specifications	IR	R	--
		(b) DPT on machined surface only					R	DPT to be undertaken by ISNT/ASNT level II/III & sentencing by level III
3.2.0	Forged, Rolled, Extruded & Machined components	(a) VI & DI	100%		Conformity to specifications	IR	R	--
		(b) DPT on machined surface only					R	DPT to be undertaken by ISNT/ASNT level II/III & sentencing by level III
4.0.0	**SECTION IV- TYPE TESTING**							
4.1.0	Valve Assembly (To be undertaken on as-applicable basis)	(a) VI – Surface Finish	01 unit/ type/ size	(i) SOTR, TSP, Approved GA drawing, DBOM, Manufacturing drawing & PO (ii) TNC minutes (as applicable)	Conformity to specifications	TTR	CHP for W or R for NABL (or) Govt. Approved lab TC	--
		(b) DI			Conformity to specifications	TTR		--
		(c) Weight			Conformity to specifications	TTR		--
		(d) Operability / Functional Test			Conformity to specifications	TTR		--
		(e) Body Assembly - Hydrostatic Test			Conformity to specifications	TTR		--
		(f) Seat - Hydrostatic Test			Conformity to specifications	TTR		--
		(g) Pneumatic Test			Conformity to specifications	TTR		--

Sl No	Material/ Component Quality Activity	Characteristic/ Typeof Check	Quantum of Check	Reference Documents	Acceptance Criteria	Type of Record	Action by QAE	Remarks
4.1.0 *(Contd)*	Valve Assembly (To be undertaken on as-applicable basis)	(h) Air Bubble Test	01 unit/ type/ size	(i) SOTR, TSP, Approved GA drawing, DBOM, Manufacturing drawing & PO (ii) TNC minutes (as applicable)	Conformity to specifications	TTR	CHP for W or R for NABL (or) Govt. Approved lab TC	--
		(j) Cyclic Test (10000 Cycles)			Conformity to specifications	TTR		--
		(k) Pressure Drop/ FlowMeasurement			Conformity to specifications	TTR		--
		(l) Complete strip – VI for corrosion/ wearing & DI			Conformity to specifications	TTR		--
		(m) Shock & Vibration Testing			Conformity to specifications	TTR		--
		(n) Hydrostatic Test post Shock Test			Conformity to specifications	TTR		--
		(p) Fire-safe characteristics , if applicable			Conformity to specifications	TTR		--
		(q) Electrical Continuity			Conformity to specifications	TTR		--
		(r) Antistatic Test			Conformity to specifications	TTR		--
		(s) Noise Signature			Conformity to specifications	TTR		--

Sl No	Material/ Component Quality Activity	Characteristic/ Typeof Check	Quantum of Check	Reference Documents	Acceptance Criteria	Type of Record	Action by QAE	Remarks
5.0.0	**SECTION V- FINAL INSPECTION**							
5.1.0	Valve Assembly	(a) VI – Surface Finish	100%	(i) SOTR, TSP, Approved GA drawing, DBOM, Manufacturing drawing & PO (ii) TNC minutes (as applicable)	Conformity to specifications	IR	CHP for W	--
		(b) DI			Conformity to specifications	IR	CHP for W	Overall dimensions as per GA drawing
		(c) Weight			Conformity to specifications	IR	CHP for W	--
		(d) Seat Tightness Test (for Relief Valves only)			Conformity to specifications	IR	CHP for W	--
		(e) Pneumatic Test			Conformity to specifications	IR	CHP for W	--
		(f) Repeatability Test (25 Cycles) followed by Body Assembly Hydrostatic Test and Seat Hydrostatic Test)			Conformity to specifications	IR	CHP for W	--
		(g) Performance Test			Conformity to specifications	IR	CHP for W	--
5.2.0	Preservation, Packing and Marking	Verification	100%	PO, TSP/ SOTR	Conformity to specifications	IR	R	Certificate to be submitted
5.3.0	Submission of as-made drawings & other documentation, if applicable	Verification	100%	PO, TSP/ SOTR	Conformity to specifications	IR	R	--
5.4.0	QAP Compliance	Document Verification	100%	All test report as per QAP	As per Drawings & PO	IR	CHP for R	--