TECHNICAL SPECIFICATION FOR BUTTERFLY VALVE

Prepared	Checked	Approved
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Rev 00		

CONTENTS

1.0 PROJECT INFORMATION	
▪ Owner	NTPC
▪ Buyer	BHEL, Ranipet
▪ Process / application	Wet Lime Stone FGD system
1.1 SITE CONDITIONS	
a) Ambient temperature (Guarantee)	27 Deg C
b) Ambient temperature (Design)	45 Deg C
c) Relative Humidity	60 %
1.2 LOCATION AND APPROACH	
Project location	
a) Place	Dadri
b) District	Gautam Buddha Nagar
c) State	UP

2.0 STANDARDS AND CODES

The valves shall conform to the latest editions of applicable codes and international standards as mentioned elsewhere Valves in general shall conform to the requirements of the following standards:

- Design code: Double flanged/ wafer type of low Leakage rate confirming to AWWA C-504 Class 150 B/ EN 593 Class PN 10.
- Valves inspection test: AWWA C-504 Class 150 B (Bubble tight) /EN 12266 Rate A (No visible weeping or formation of drops or bubbles).
- Valve flanges shall conform to ANSI B 16.5 CL 150.(in case of EPDM lining valve is to be designed with Flat faced
- Valve shall accommodate any (manual gear box, pneumatic or electric) actuator , vendor to design valve with actuator mounting flange dimension as per ISO 5211

3.0 SPECIFICATION FOR DESIGN & CONSTRUCTION

a. The valves as well as all accessories shall be designed for easy disassembly and maintenance.
b. Valves to be installed outside shall be required to have the stem properly protected against atmospheric corrosion
c. The valves supplied shall be suitable for process water, limestone slurry, gypsum slurry, clarified water application and the operating and design conditions are provided in valve list enclosed
d. The seals, both on the body (sleeve) and on the disc shall be of the material specified. Necessary shaft seal shall be provided and adequately designed to ensure no leakage across the seal. This seal shall be designed so that they will allow replacement without removal of the valve shaft. The sealing ring on the disk shall be continuous type and easily replaceable.

e. For all types of valves, the design with shaft eccentric to the disc is preferred. The shaft shall be solid type and shall pivot on bushings. Bushings/sleeve type bearings shall be contained in the hub of valve body. The bearing shall be self-lubricated type with low coefficient of friction and should not have any harmful effect on water and on valve components.Bearing should not be exposed to slurry medium.
f. The design of the shaft shall be such that it will safely sustain maximum differential pressure across the closed valve. The shaft and any key (taper pin etc.) for transmitting the torque between shaft and disc shall be capable of withstanding the maximum torque required to operate the valve. However, the shaft diameter shall not be less than the minimum shaft diameter specified in relevant code. Necessary Torque Calculation and the torque class selected on the basis of the same shall be furnished to the Employer for information.
g. The disc shall rotate from the full open to the tight shut position. The disc shall be contoured to ensure the least possible resistance to flow and shall be suitable for throttling operation. While the disc is in the throttled position, valve shall not create any noise or vibration. The operating mechanism shall be mounted directly on or supported from the valve body.
h. All valves shall be complete with: position indicator (located in a visible place), arrow indicating the flow direction; adjustable mechanical stop limiting devices to prevent over travel of valve disc in open/close position; all valves shall be "tight shut off" and with locking device open/close position or any position
i. <u>Manual override :</u>
    i. <u>Manually operated Valve:</u>
    ii. a)handle will be sufficient for valve dia upto 150mm,
    iii. b)worm and worm wheel gear unit for 200mm and above
    iv. <u>Electrically operated valve:</u>All valve,worm & worm wheel
    v. <u>For Pneumatic valve:</u>Upto 150mm hand lever & 200 and above ,Worm and worm wheel
j. Limit and torque switches (if applicable) shall be IP 65
k. Valves supplied for vent application shall be of full body design
l. All valves shall be provided with proper name plates indicating complete information about the valves
m. All valves shall be provided with embossed name plate giving details such as tag number, type, size etc.
n. The actuator-operated valves shall be designed on the basis of the following :
o. The internal parts shall be suitable to support the pressure caused by the actuators;
p. The valve-actuator unit shall be suitably stiff so as not to cause vibrations, misalignments, etc.
q. All actuators operated valves shall open/ close fully within time required by the process but not later than 60 seconds after actuators starts.
r. The maximum temperature to be considered for the valve design is 100°C

4 SCOPE OF SUPPLY (The scope of supply shall be include but not limited to the following also refer data sheet):

a. Electrically operated valve: Valve+electric actuator+manual override gear unit +TB with power cable gland and lug as per actuator vendor STD+Instrumentation wiring as per actuator vendor STD
b. Pneumatic valve: Valve+ speed control valve+Quick exhaust valve +filter regulator with auto drain,metallic bowl+JB +solenoid valve+2nos limit switch+tubing & fitting + wiring + exhaust silencer
c. Manual valve: valve with +manual lever or gear box as applicable

5 PROOF OF DESIGN TEST (TYPE TEST) FOR BUTTERFLY VALVES

Proof of Design (P.O.D.) test certificates shall be furnished by the bidder for all applicable size-ranges and classes of Butterfly valves supplied by him, in the absence of which actual P.O.D. test shall be conducted by the bidder in the presence of Employer's representative. All valves that are designed and manufactured as per AWWA-C-504 shall be governed by the relevant clauses of P.O.D test in AWWA-C-504. For Butterfly valves designed and manufactured to EN-593 or

equivalent, the P.O.D. test methods and procedures shall generally follow the guidelines of AWWA-C-504 in all respect except that Body & seat hydro test and disc-strength test shall be conducted at the pressures specified in EN-593 or the applicable code. Actuators shall also meet requirements of P.O.D. testof AWWA-C-504

6 SPECIFICATION FOR ELECTRICAL ACTUATOR **SIL2 and Non-Intrusive**

a) Type	: Non-Intrusive & SIL2 Electrical actuator
b) Make	: Rotork/Auma/ Limit torque/ Any renowned make
c) Failure position (power failure)	: stay put
d) Local Position Indicator	: To be provided.
e) Hand wheel for manual	: Required
f) Actuator torque	: Vendor to specify
g) Actuator Protection Class	: IP-68
h) Actuator Thrust	: Vendor to specify
Actuator travel time	: Vendor to specify
Power supply	: 415 V, 3Phase-50 HZ
Power supply	
Working current of actuator	: Vendor to specify
Stall current of actuator	: Vendor to specify
Torque switch / rating	: 2 NOS, 2 NO+2NC contacts suitable for 24V DC/230V AC, min 5A for 24 V DC
Limit switch for open/close feed back	
Control box (3ф)	: Integral starter required with PLC, remote manual operation from operator work stn.

Non-intrusive Hardwired Electric actuators with integral starters along with associated accessories etc shall be supplied on as required basis compatible for Valves to meet the functional and the other specification requirements. The actuators shall be totally enclosed weatherproof with IP-68 degree of protection. All actuator settings including torque,limit shall be possible without opening the actuator cover and LCD indication for actuator alarms, status, valve position indication and diagnostic information shall be available integral to actuator body.
415 V, 3 phase 3 wire power supply shall be given to the actuator from switch board as applicable through a switch fuse unit. The motor shall be squirrel cage induction motor, class F insulated suitable for Direct On Line (DOL)starting. Single Phasing Protection, Over heating protection through Thermostat (as applicable) and wrong phase sequence protection shall be provided over and above other protection features standard to bidder's design.The Position/ Limit measurement shall be done using absolute encoders which will give information of position/ limit in both the directions. Electronic measurement of torque shall be provided. Open/Close command, open/ close status and disturbance monitoring signal (common contact for Overload, Thermostat, control supply failure, L/R selector switch at local & other protections operated) shall be provided hardwired. All actuators shall be certified for **SIL 2** or better

7) SPECIFICATION FOR PNEUMATIC ACTUATOR (Open/close)

a) Type	: Quarter turn , Pneumatic Double acting
b) Make	: Rotex/Elomatic/Virgo/flowserve Bray/Any renowned make
c) Cylinder to be designed for	: 4 minimum Kg/sq.cm for actuation
d) Air Tubing	: 1/4" SS/PVC sheathed copper tube
e) End connections	: NPT
f) Local Position Indicator	: To be provided.
g) Manual override	: Required
h) Actuator travel time	: less than 10 seconds
i) Actuator Protection Class	: IP-65 (Min)
j) Actuator Thrust	: Vendor to specify

k) Speed control valve : Two number to be provided,(NPT)
l) Air Lock Valve : Two number to be provided (NPT)
m) Solenoid valve : Solenoid valve 24V DC with cable gland
n) Solenoid cable : 2corex1.5sqmm unarmoured HR PVC with FRLS property
o) Air filter regulator : Filter regulator with Filter material shall be sintered bronze,Body shall be aluminium, Auto drain ,FNPT connection with dummy cap.

JUNCTION BOX (IP55):

Min 16 terminals with proper lugs & 7nos of suitable cable glands (2nos-LS+2nos-SOV+2nos-input/output DCS+1no spare).

LIMIT SWITCHES:

a) Quantity /valve : 2 nos for close / open indication
b) No. of Contacts : 2NO+2NC contacts
c) Contact Rating : 24V DC / 230V AC
d) Protection : Weather proof IP 65.
e) Cable Limit switch-JB : 4pairx0.5sqmm unarmoured HR PVC with FRLS property

All Tubings,solenoid valve,speed control valve,filter regulator,air lock device are pre-assembled at vendor works.
All Wirings,limit switch,solenoid valve & JB with proper cable gland are pre-assembled at vendor works.

8 PAINTING OF VALVES total 120 micron thickness as below

Power tool cleaning to St3 (SSPC-SP3),
Red oxide Zinc phosphate primer to IS 12744 (two coat 30+30 micron)
Synthetic Enamel to IS 2932 Shade: Grey white RAL 9002 (Two coats 30+30 micron)

9 DOCUMENTS / DETAILS ALONG WITH BID

The following information / documents shall be submitted along with the offer

a. Duly filled up data sheet for each valve type as per annexure
b. Detailed assembly drawing with overall dimensions.
c. Valve cross sectional drawings with Bill of Material including the material specifications.
d. Valve Regulation Characteristic Curve.
e. Cv calculation.
f. Reference list for the offered model.
g. Typical Quality plan for supply of the above equipments.
h. Valves Catalogues.
i. List of commissioning spares.
j. Recommended spares list for 3 year O&M along with item wise price.
k. Any deviation shall be specifically mentioned in the enclosed deviation format **Annexure-1**

In case of any deviation, the Bidder shall indicate the deviation, clause by clause in the deviation format attached in **Annexure-1**. If there is no deviation "**NIL**" statement shall be furnished. In the absence of **Annexure-1**, it will be construed that the bid confirms strictly to the specification. Acceptance or rejection of the offer with or without deviations (either fully or partially) is sole discretion of the purchaser without seeking further clarification from the bidder.

NOTE: Bidders to note that failing to submit the above documents, the bid shall be considered as incomplete and liable for rejection.

10 DOCUMENTS / SERVICE AFTER ORDER

a The following documents are to be submitted for BHEL's approval.

- Duly filled up data sheet in the enclosed format.
- Detailed assembly drawing with overall dimensions.
- Valve cross sectional drawings with Bill of Material including the material specifications.
- C_v Calculation
- Quality plan
- Actuator Data sheet to be submitted after P.O
- Pnuematic/Electrical circuit diagram

b. The following are to be submitted to BHEL's review and acceptance.

- Material test certificate
- Hydraulic & Leak test certificates
- Performance guarantee certificate
- Erection manual
- O&M manuals

11 DOCUMENTATION

a. The documentation during bid and post order stage shall meet the following requirements.
b. All documents and drawings shall be submitted in English.
c. Hard copies of all documents and drawings during bid stage to be submitted in duplicate.
d. Hard copies of all documents for approval to be submitted in triplicate.
e. Hard copies of all final documents, drawings, manual etc., shall be submitted in bound folder in duplicate.
f. Soft copies of all final documents in MS office in the form of CD-1 set.
g. Soft copies of all final drawings in AutoCAD, latest version in the form of CD-1 set.

12 ELIGIBILITY

Vendors having manufacturing facility in India are eligible to quote for the offer.

13 INSPECTION

The valves shall be inspected at Vendor's works by BHEL Engineer as per the QP Aprroved by BHEL.

14 GUARANTEE:

The Vendor shall provide guarantee for a period of 12 months from the date of commissioning or 24 months from the date of supply whichever is earlier.

15 PACKING

Valves to be packed based on the sizes and each package or shipping units shall be clearly marked or stenciled on at least two sides as follows.

BHEL SITE OFFICE,

2 X 490 MW, FGD PACKAGE (STAGE 2)

NCTPS – NTPC DADRI

GAUTAM BUDH NAGAR, UP – 201008

INDIA

In addition, each package or shipping unit shall have the symbol painted in red on at least two sides of the package, covering one fourth of the area of the side.

16 SEAL AND SIGNATURE REQUIREMENT

All pages to be duly signed by bidder with seal & date

ANNEXURE-1

FORM FOR TECHNICAL DEVIATIONS (If any)

SL. NO	SEC / CLAUSE NO.	SPECIFICATION	STATEMENT OF DEVIATIONS/VARIATIONS	REASON FOR DEVIATION	COST OF WITHDRAWAL

Date: *Signature & seal of the Bidder*

ANNEXURE- IA

S.No.	Valve size	Mode of operation	Body material	Disc	Stem	Body Lining	End Con.	QTY
1	50	M	IS210 FG220	A182-F44	SUPER DUPLEX 2507	EPDM	WAFER	13
2	100	M	IS210 FG220	A182-F44	SUPER DUPLEX 2507	EPDM	WAFER	8
3	125	M	IS210 FG220	A182-F44	SUPER DUPLEX 2507	EPDM	WAFER	5
4	150	M	IS210 FG220	A182-F44	SUPER DUPLEX 2507	EPDM	WAFER	1
5	200	M	IS210 FG220	A182-F44	SUPER DUPLEX 2507	EPDM	WAFER	9
6	250	M	IS210 FG220	A182-F44	SUPER DUPLEX 2507	EPDM	WAFER	6
7	350	M	IS210 FG220	A182-F44	SUPER DUPLEX 2507	EPDM	WAFER	4
8	500	M	IS210 FG220	A182-F44	SUPER DUPLEX 2507	EPDM	WAFER	2

ANNEXURE- IB

1	80	M	IS210 FG220	A351 CF8M	DUPLEX 2205	EPDM	WAFER	8
2	100	M	IS210 FG220	A351 CF8M	DUPLEX 2205	EPDM	WAFER	8
3	150	M	IS210 FG220	A351 CF8M	DUPLEX 2205	EPDM	WAFER	8
4	200	M	IS210 FG220	A351 CF8M	DUPLEX 2205	EPDM	WAFER	2

ANNEXURE- IC

1	50	M	A216-WCB	13CR	13CR	EPDM	WAFER	2
2	65	M	A216-WCB	13CR	13CR	EPDM	WAFER	1
3	80	M	A216-WCB	13CR	13CR	EPDM	WAFER	4
4	100	M	A216-WCB	13CR	13CR	EPDM	WAFER	1
5	150	M	A216-WCB	13CR	13CR	EPDM	WAFER	6
6	200	M	A216-WCB	13CR	13CR	EPDM	WAFER	12
7	250	M	A216-WCB	13CR	13CR	EPDM	WAFER	2

ANNEXURE- ID

S.No.	Valve size	Mode of operation	Body material	Disc	Stem	Body Lining	End Con.	QTY
1	50	PNEUMATIC	IS210 FG220	A182-F44	SUPER DUPLEX 2507	EPDM	WAFER	55
2	80	PNEUMATIC	IS210 FG220	A182-F44	SUPER DUPLEX 2507	EPDM	WAFER	14
3	100	PNEUMATIC	IS210 FG220	A182-F44	SUPER DUPLEX 2507	EPDM	WAFER	9
4	125	PNEUMATIC	IS210 FG220	A182-F44	SUPER DUPLEX 2507	EPDM	WAFER	10
5	150	PNEUMATIC	IS210 FG220	A182-F44	SUPER DUPLEX 2507	EPDM	WAFER	14
6	200	PNEUMATIC	IS210 FG220	A182-F44	SUPER DUPLEX 2507	EPDM	WAFER	15
7	250	PNEUMATIC	IS210 FG220	A182-F44	SUPER DUPLEX 2507	EPDM	WAFER	8

ANNEXURE-IE

1	25	PNEUMATIC	IS210 FG220	A351 CF8M	DUPLEX 2205	EPDM	WAFER	4
2	50	PNEUMATIC	IS210FG220	A351 CF8M	DUPLEX 2205	EPDM	WAFER	16
3	100	PNEUMATIC	IS210FG220	A351 CF8M	DUPLEX 2205	EPDM	WAFER	50
4	125	PNEUMATIC	IS210 FG220	A351 CF8M	DUPLEX 2205	EPDM	WAFER	11
5	150	PNEUMATIC	IS210 FG220	A351 CF8M	DUPLEX 2205	EPDM	WAFER	4
6	250	PNEUMATIC	IS210 FG220	A351 CF8M	DUPLEX 2205	EPDM	WAFER	2
7	100	PNEUMATIC	A216-WCB	A351 CF8M	DUPLEX 2205	EPDM	WAFER	1
8	150	PNEUMATIC	A216-WCB	A351 CF8M	DUPLEX 2205	EPDM	WAFER	2

ANNEXURE- IF

1	50	PNEUMATIC	A216-WCB	13CR	13CR	EPDM	WAFER	18
2	80	PNEUMATIC	A216-WCB	13CR	13CR	EPDM	WAFER	10
3	100	PNEUMATIC	A216-WCB	13CR	13CR	EPDM	WAFER	1

ANNEXURE- IG

S.No.	Valve size	Mode of operation	Body material	Disc	Stem	Body Lining	End Con.	QTY
1	125	ELECTRIC MOTOR	IS210 FG220	A182-F44	SUPER DUPLEX 2507	EPDM	WAFER	4
2	200	ELECTRIC MOTOR	IS210 FG220	A182-F44	SUPER DUPLEX 2507	EPDM	WAFER	2
3	150	ELECTRIC MOTOR	IS210 FG220	A351 CF8M	DUPLEX 2205	EPDM	WAFER	3
4	200	ELECTRIC MOTOR	IS210 FG220	A351 CF8M	DUPLEX 2205	EPDM	WAFER	8
5	150	ELECTRIC MOTOR	A216-WCB	A351 CF8M	DUPLEX 2205	EPDM	WAFER	1
6	200	ELECTRIC MOTOR	A216-WCB	A351 CF8M	DUPLEX 2205	EPDM	WAFER	2
7	50	ELECTRIC MOTOR	A216-WCB	13CR	13CR	EPDM	WAFER	2
8	150	ELECTRIC MOTOR	A216-WCB	13CR	13CR	EPDM	WAFER	2

S.No.	1	2	3	4	5	6	7	8
Material Code	RFW904290001	RFW904290002	RFW904290003	RFW904290004	RFW904290005	RFW904290006	RFW904290007	RFW904290008
SET NO.	I-G	I-G	I-G	I-G	I-G	I-G	I-G	I-G
Valve size	125	200	150	200	150	200	50	150
Mode of operation	ELECTRIC MOTOR	ELECTRIC MOTOR	ELECTRIC MOTOR	ELECTRIC MOTOR	ELECTRIC MOTOR	ELECTRIC MOTOR	ELECTRIC MOTOR	ELECTRIC MOTOR
Body material	IS210 FG220	IS210 FG220	IS210 FG220	IS210 FG220	A216-WCB	A216-WCB	A216-WCB	A216-WCB
Disc	A182-F44	A182-F44	A351 CF8M	A351 CF8M	A351 CF8M	A351 CF8M	13CR	13CR
Stem	SUPER DUPLEX 2507	SUPER DUPLEX 2507	DUPLEX 2205	DUPLEX 2205	DUPLEX 2205	DUPLEX 2205	13CR	13CR
Body Lining	EPDM	EPDM	EPDM	EPDM	EPDM	EPDM	EPDM	EPDM
End Connection	WAFER	WAFER	WAFER	WAFER	WAFER	WAFER	WAFER	WAFER
QTY	4	2	3	8	1	2	2	2
Body Test Pressure in bar	15	15	15	15	15	15	15	15
Seat Test Pressure in bar	11	11	11	11	11	11	11	11
Test Duration as per AWWA C504	5min	5min	5min	5min	5min	5min	5min	5min
Min face to face dim in mm (inclu rubber thk) as per AWWA C504 Class 150B (tolr.±3.17 & 4.76 for 250 & above 250 resp.)	64.3	74.6	71.4	74.6	71.4	74.6	44.5	71.4
Leakage class as per AWWA C-504 Class 150 B (Bubble tight)								
POD certificate to be enclosed- vendor to confirm								
Material of body seat ring (If applicable)								
Material of Disc seal clamping ring(If applicable)								
Body&Disk-seat ring,clamping ring shall be similar to disk material								
Connecting pin,fastners in the flow path are similar to disc material								
Material of Seal mounting & other fasteners in the flowpath shall be same material as that of Disc-vendor to confirm								
Solid Shaft Dia as per AWWA C 504								
Body Shell thk as per AWWA C504								
Min Disc thickness- vendor to indicate								
EPDM Lining thickness (min 4mm)-Vendor to confirm								
EPDM lining extends over the flange face-vendor to confirm								
Valve flange drilling, thk,PCD as per ASME 16.5 CL 150(If applicable)								
Stay put -vendor to confirm								
Time of operation-Vendor to Indicate								
Torque on the shaft required to operate valves								
Torque of the actuator selected will be 1.5 times valve torque for electrical								
Actuator output torque-Vendor to Indicate								
Actuator model Non-intrusive & SIL2 (Electrical)								
Actuator motor power (kW)								
For Power & Instrument connection with proper cable gland to be provided as vendor practice								
Limit Switch DPDT 2NO+2NC (2nos)-Vendor to confirm								
Manual over ride for Electrical actuator is worm and worm wheel gear box for all size								
Weight of valve including Gear box and Handwheel								
Valve mounting orientation shall be Horiz/ inclined/ 360°orientation - Vendor to confirm								
Valve shall be provided with position indicator - Vendor to confirm								
Valve shall be provided with flow direction indicator - Vendor to confirm								
Valve shall be provided with locking device in open & close at any position -Vendor to confirm								
GA of valve assembly with sectional view & BOM along with enquiry to be submitted in PDF format - Vendor to confirm								
Electrical circuit drawing to be provided along with enquiry								
Painting as per specification 120micron- vendor to confirm								
CV								

S.No.	Material Code	SET NO.	Valve size	Mode of operation	Body material	Disc	Stem	Body Lining	End Connection	QTY	Body Test Pressure in bar	Seat Test Pressure in bar	Test Duration as per AWWA C504	Min face to face dim in mm (inclu rubber thk) as per AWWA C504 Class 150B (tolr.±3.17 & 4.76 for 250 & above 250 resp.)	Leakage class as per AWWA C-504 Class 150 B (Bubble tight)	POD certificate to be enclosed- vendor to confirm	Material of body seat ring (If applicable)	Material of Disc seal clamping ring(If applicable)	Body&Disk-seat ring,clamping ring shall be similar to disk material	Connecting pin,fastners in the flow path are similar to disc material	Material of Seal mounting & other fasteners in the flowpath shall be same material as that of Disc-vendor to confirm	Solid Shaft Dia as per AWWA C 504	Body Shell thk as per AWWA C504	Min Disc thickness- vendor to indicate	EPDM Lining thickness (min 4mm)	EPDM lining extends over the flange face-vendor to confirm	Valve flange drilling, thk,PCD as per ASME 16.5 CL 150(If applicable)	Torque on the shaft required to operate valves	Torque of the actuator selected will be 1.25 times valve torque for pneumatic	Torque of the actuator selected will be 1.5 times valve torque for electrical	Actuator output torque	Actuator model (Electrical/Pneumatic)	Manual operated valve upto 150NPD is lever ,200 NPD and above is worm and worm wheel gear box	Manual operated lever length min 150mm	Worm & Worm wheel Gear box Make & Model No.	Weight of valve including Gear box and Handwheel	Valve mounting orientation shall be Horiz/ inclined/ 360°orientation - Vendor to confirm	Valve shall be provided with position indicator - Vendor to confirm	Valve shall be provided with flow direction indicator - Vendor to confirm	Valve shall be provided with locking device in open & close at any position -Vendor to confirm	GA of valve assembly with sectional view & BOM along with enquiry to be submitted in PDF format - Vendor to confirm	Painting as per specification 120micron- vendor to confirm	CV
1	RFW904240001	I-A	50	Manual	IS210 FG220	A182-F44	SUPER DUPLEX 2507	EPDM	WAFER	13	15	11	5min	44.5																														
2	RFW904240002	I-A	100	Manual	IS210 FG220	A182-F44	SUPER DUPLEX 2507	EPDM	WAFER	8	15	11	5min	57.2																														
3	RFW904240003	I-A	125	Manual	IS210 FG220	A182-F44	SUPER DUPLEX 2507	EPDM	WAFER	5	15	11	5min	64.3																														
4	RFW904240004	I-A	150	Manual	IS210 FG220	A182-F44	SUPER DUPLEX 2507	EPDM	WAFER	1	15	11	5min	71.4																														
5	RFW904240005	I-A	200	Manual	IS210 FG220	A182-F44	SUPER DUPLEX 2507	EPDM	WAFER	9	15	11	5min	74.6																														
6	RFW904240006	I-A	250	Manual	IS210 FG220	A182-F44	SUPER DUPLEX 2507	EPDM	WAFER	6	15	11	5min	79.4																														
7	RFW904240007	I-A	350	Manual	IS210 FG220	A182-F44	SUPER DUPLEX 2507	EPDM	WAFER	4	15	11	5min	96.3																														
8	RFW904240008	I-A	500	Manual	IS210 FG220	A182-F44	SUPER DUPLEX 2507	EPDM	WAFER	2	15	11	5min	130																														
9	RFW904230001	I-B	80	Manual	IS210 FG220	A351 CF8M	DUPLEX 2205	EPDM	WAFER	8	15	11	5min	50.8																														
10	RFW904230002	I-B	100	Manual	IS210 FG220	A351 CF8M	DUPLEX 2205	EPDM	WAFER	8	15	11	5min	57.2																														
11	RFW904230003	I-B	150	Manual	IS210 FG220	A351 CF8M	DUPLEX 2205	EPDM	WAFER	8	15	11	5min	71.4																														
12	RFW904230004	I-B	200	Manual	IS210 FG220	A351 CF8M	DUPLEX 2205	EPDM	WAFER	2	15	11	5min	74.6																														
13	RFW904250001	I-C	50	Manual	A216-WCB	13CR	13CR	EPDM	WAFER	2	15	11	5min	44.5																														
14	RFW904250002	I-C	65	Manual	A216-WCB	13CR	13CR	EPDM	WAFER	1	15	11	5min	47.65																														
15	RFW904250003	I-C	80	Manual	A216-WCB	13CR	13CR	EPDM	WAFER	4	15	11	5min	50.8																														
16	RFW904250004	I-C	100	Manual	A216-WCB	13CR	13CR	EPDM	WAFER	1	15	11	5min	57.2																														
17	RFW904250005	I-C	150	Manual	A216-WCB	13CR	13CR	EPDM	WAFER	6	15	11	5min	71.4																														
18	RFW904250006	I-C	200	Manual	A216-WCB	13CR	13CR	EPDM	WAFER	12	15	11	5min	74.6																														
19	RFW904250007	I-C	250	Manual	A216-WCB	13CR	13CR	EPDM	WAFER	2	15	11	5min	79.4																														

S.No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Material Code	RFW9042600001	RFW9042600002	RFW9042600003	RFW9042600004	RFW9042600005	RFW9042600006	RFW9042600007	RFW9042700001	RFW9042700002	RFW9042700003	RFW9042700004	RFW9042700005	RFW9042700006	RFW9042700007	RFW9042700008	RFW9042800001	RFW9042800002	RFW9042800003
SET NO.	I-D	I-D	I-D	I-D	I-D	I-D	I-D	I-E	I-E	I-E	I-E	I-E	I-E	I-E	I-E	I-F	I-F	I-F
Valve size	50	80	100	125	150	200	250	25	50	100	125	150	250	100	150	50	80	100
Mode of operation	PNEUMATIC	PNEUMATIC	PNEUMATIC	PNEUMATIC	PNEUMATIC	PNEUMATIC	PNEUMATIC	PNEUMATIC	PNEUMATIC	PNEUMATIC	PNEUMATIC	PNEUMATIC	PNEUMATIC	PNEUMATIC	PNEUMATIC	PNEUMATIC	PNEUMATIC	PNEUMATIC
Body material	IS210 FG220	IS210 FG220	IS210 FG220	IS210 FG220	IS210 FG220	IS210 FG220	IS210 FG220	IS210 FG220	IS210 FG220	IS210 FG220	IS210 FG220	IS210 FG220	IS210 FG220	A216-WCB	A216-WCB	A216-WCB	A216-WCB	A216-WCB
Disc	A182-F44	A182-F44	A182-F44	A182-F44	A182-F44	A182-F44	A182-F44	A351 CF8M	A351 CF8M	A351 CF8M	A351 CF8M	A351 CF8M	A351 CF8M	A351 CF8M	A351 CF8M	13CR	13CR	13CR
Stem	SUPER DUPLEX 2507	SUPER DUPLEX 2507	SUPER DUPLEX 2507	SUPER DUPLEX 2507	SUPER DUPLEX 2507	SUPER DUPLEX 2507	SUPER DUPLEX 2507	DUPLEX 2205	DUPLEX 2205	DUPLEX 2205	DUPLEX 2205	DUPLEX 2205	DUPLEX 2205	DUPLEX 2205	DUPLEX 2205	13CR	13CR	13CR
Body Lining	EPDM	EPDM	EPDM	EPDM	EPDM	EPDM	EPDM	EPDM	EPDM	EPDM	EPDM	EPDM	EPDM	EPDM	EPDM	EPDM	EPDM	EPDM
End Connection	WAFER	WAFER	WAFER	WAFER	WAFER	WAFER	WAFER	WAFER	WAFER	WAFER	WAFER	WAFER	WAFER	WAFER	WAFER	WAFER	WAFER	WAFER
QTY	55	14	9	10	14	15	8	4	16	50	11	4	2	1	2	18	10	1
Body Test Pressure in bar	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
Seat Test Pressure in bar	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
Test Duration as per AWWA C504	5min	5min	5min	5min	5min	5min	5min	5min	5min	5min	5min	5min	5min	5min	5min	5min	5min	5min
Min face to face dim in mm (inclu rubber thk) as per AWWA C504 Class 150B (tolr.±3.17 & 4.76 for 250 & above 250 resp.)	44.5	50.8	57.2	64.3	71.4	74.6	79.4	33.5	44.5	57.2	64.3	71.4	79.4	57.2	71.4	44.5	50.8	57.2
Leakage class as per AWWA C-504 Class 150 B (Bubble tight)																		
POD certificate to be enclosed- vendor to confirm																		
Material of body seat ring (If applicable)																		
Material of Disc seal clamping ring(If applicable)																		
Body&Disk-seat ring,clamping ring shall be similar to disk material																		
Connecting pin,fastners in the flow path are similar to disc material																		
Material of Seal mounting & other fasteners in the flowpath shall be same material as that of Disc-																		
Solid Shaft Dia as per AWWA C 504																		
Body Shell thk as per AWWA C504																		
Min Disc thickness- vendor to indicate																		
EPDM Lining thickness (min 4mm)-Vendor to confirm																		
EPDM lining extends over the flange face-vendor to confirm																		
Valve flange drilling, thk,PCD as per ASME 16.5 CL 150(If applicable)																		
Equalizing valve / By-pass valve require-vendor to confirm																		
4/2 or 5/2 solenoid valve 24V DC-vendor to confirm																		
Stay put (Air Lock Device required-vendor to confirm)																		
Speed control valve with quick exhast for each port-Vendor to confirm																		
Time of operation-Vendor to Indicate																		
Air Filter regulator with auto drain,metallic bowl-Vendor to confirm																		
Actuator Cylinder Test Pressure 11 Bar																		
Drive mechanisam Rack & Pinion/Scotchyoke-Vendor to indicate																		
Torque on the shaft required to operate valves																		
Torque of the actuator selected will be 1.25 times valve torque for pneumatic-Vendor to Confirm																		
Actuator output torque-Vendor to Indicate																		
Actuator model (Electrical/Pneumatic)																		
All Tubings,solenoid valve,speed control,filter regulator,air lock device are pre-assembled at																		
All Wirings,limit switch,solenoid valve & JB with proper cable gland are pre-assembled at vendor																		
Limit Switch DPDT 2NO+2NC (2nos)-Vendor to confirm																		
Limit switch & solenoid valve wiring to be terminated in a local junction box (IP55)																		
Manual over ride for pneumatic upto150mm lever, 200 and above gear box																		
Manual operated lever length min 150mm																		
Worm & Worm wheel Gear box Make & Model No.																		
Weight of valve including Gear box and Handwheel																		
Valve mounting orientation shall be Horiz/ inclined/ 360°orientation - Vendor to confirm																		
Valve shall be provided with position indicator - Vendor to confirm																		
Valve shall be provided with flow direction indicator - Vendor to confirm																		
Valve shall be provided with locking device in open & close at any position -Vendor to confirm																		
GA of valve assembly with sectional view & BOM along with enquiry to be submitted in PDF format -																		
Pneumatic circuit drawing to be provided along with enquiry																		
Painting as per specification 120micron- vendor to confirm																		
CV																		