

FUEL FIRING PE (BOILERS)

ANNEXURE – V (a) PUMP DATA SHEET

A.PERFORMANCE DA	TA		F. MECHANICAL SE	AL	
1. OIL GRADE			1.ACTION	SINGLE OR DO	OUBLE ?
2. OIL POUR POINT			2.MAKE		
3. SP.GRAVITY AT 15°C			3.MODEL No.& SIZE		
4.PUMPING TEMP.			4.0 RING SPRING MATL.		
5. OIL VISCOSITY min/max		CST	5.ROTARY RING MATL.		
6.CAPACITY AT min.CST	LPM		6.STATIONARY RING MAT	TL.	
7.CAPACITY AT max. CST	LPM		7.SUCTION PRESS. MAX.	Kg/Cm ²	(g)
8.SUCTION PRESSURE	Kg/Cm ² (g)				
9.DELIVERY PRESSURE	Kg/Cm ² (g)		G.SAFETY RELIEF V	ALVE - INTEGR	AL
10.NPSH REQUIRED	<5 ME	TERS WC AT MA			
11.RPM			2.MODEL No.& SIZE		
12.SENSE OF ROTATION	CW AS SEEN F	ROM MOTOR EN			
13.BHP AT min.CST	KW		4.SET PRESSURE	5 Kg/Cm ² (g)	above delivery press
14.BHP AT max. CST	KW		5.OVER PRESSURE	- 6 - (6)	
15. PUMP EFFICIENCY		@ MIN. cst.	6.SPRING ADJUST RANGE	Kg/Cm ² (g)	TO Kg/Cm ² (g)
			7.RELIEF OUTLET	INTERNAL OF	
B.PERFORMANCE GR	APHS		8. RELIEF OUTLET CONN.		50LBS FLANGED
1.PRESS.VS FLOW & BHP			9.HANDWHEEL		
2.CST VS NPSH REQD.			9.HANDWHEEL		
3.SPEED VS TORQUE			II OTE AM IA CIZETE	NOT DECLUD	ED
3.SFEED V3 TORQUE			H.STEAM JACKET	NOT REQUIR	
			1.STYLE	End cover or ful	
C.PUMP CONSTRUCTION			2.PRESS. DESIGN/TES	ST Kg/Cm ² (g	$Kg/Cm^2(g)$
1.MOUNTING	Vertical / Horizo	ontal / Flange / Foo	3.CONNECTION IN / OUT	Inch npt(f)	Inch npt(f)
2.PITCH & ROTOR DIA	mn	n	mm		
3.PUMP GD ²		Kg / Cm ²	I.DRIVE MOTOR SCO	PE (PURCHASER	S SCOPE)
4.NOZZLES IN	INCH 150	LBS FLANGED	1.MAKE OR FRAME SIZE		
5.NOZZLES OUT		LBS FLANGED	2.KW,V,PHASE& HZ		
6.INLET NOZZLE POSITION	Horizontal axial		3.DIMENSIONAL DRG.		
7.OUTLET NOZZLE POSIT.	Vertical Top		4.DATA SHEET REF.		
8.BODY & COVER MATL.					
9.INSERT MATL.			J.PERFORMANCE GU	ΔRANTEE	
10.ROTOR SHAFT MATL			1.PER VDMA 24284 GROUP		inamanta
11.IDLERS MATL			1.FER VDMA 24284 GROUP	-ii and Kei Speciai requ	frements.
12.BEARING BUSH MATL.			+		
13.BASE FRAME MATL			TZ WEGE GEDWING A	PEG A DIGDE OF	ron.
	2 .		K.TEST CERTIFICA	TES & INSPECT	ION
14.BODY DESIGN /TEST PR.	Kg/Cm ² (g	g) Kg/C	n ² (g) 1.BODY HYDRO TEST;		
			2. PERFORMANCE TEST O		
D.BEARINGS			3.RELIEF VALVE OVER PR	ESSURE TEST	
1.TYPE AND NUMBER OFF					
2.POSITION	EXTERNAL		L. O & M REFF. DOC	CUMENTS (fill co	mpulsorily)
3.ISO No. & CLEARANCE			1.PUMP DESIGNATION SH		
4.LUBRICANT GRADE			2.PERFORMANCE GRAPHS		N - B
5.QTY. & FILLING FREQ.			3.DIMENSIONAL DRAWIN		
The state of the s				OTOR ASSY.	
E.COUPLING (3PIECE	PIN - PIICH)	PUMP :	CARTRIDGE:	
1.MAKE	<u>,, 1 113 - 1 USH</u>	,	RLF. VALVE :	COUPLING:	
	-		4.SECTIONAL DRGS. WITH		TION .
2.MODEL No. & SIZE 3.GD ²		Kg / Cm			ATION:
	Eittad cotto		PUMP BODY :	CARTRIDGE :	
4.DOUBLE PIECE SIDE	Fitted onto pump		RLF. VALVE :	SEAL:	
5.SINGLE PIECE	To fit motor sha	ft in rough bore cor			
			PUMP;	OF AT	
	l	<u> </u>	COUPLING :	SEAL :	
			A DDDAVED DV (DHEI)	
PREPARED BY (VE	(NDOK)	DATE	APPROVED BY (DNEL)	DATE



FO PUMP - MOTOR ENQUIRY DATA SHEET

FUEL SYSTEMS / PE(BOILERS)								
PROJECT								
CUSTOMER NO								
SERVICE								
BHEL MATL. CODE								
QUANTITY								
MOTOR DETAILS:								
POWER OUTPUT REQD.	KW							
POWER SOURCE		415V ± 1	0%: 5	0 HZ ± 5%; CC	MBIN	ED ± 10 %	3 PHASE	
TYPE				REL CAGE INI				
ENCLOSURE		IP 55; FL						
DUTY		CONTIN	UOU	S				
DIRECTION OF ROTATION	N	ANTI CLOCK WISE SEEN FROM PUMP END						
METHOD OF STARTING		DIRECT ON LINE (DOL)						
MOUNTING		HORIZO	NTAI	FOOT		_		
LOAD DATA								
DRIVEN PUMP TYPE				W POSITIVE I		CEMENT		
COUPLING TYPE		PIN TYP	E FLI	EXIBLE COUP	LING	1		
PUMP SPEED	RPM							
PUMP GD ²	KG.M ²							
COUPLING GD ²	KG.M ²							
GD ² TOTAL	2				-			
	KG.M ²							
TORQUE AT ZERO SPEED	KG. M							
TORQUE AT 5 % SPEED	KG. M KG. M							
TORQUE AT 5 % SPEED TORQUE AT RATED SPEE	KG. M KG. M D KG. M							
TORQUE AT 5 % SPEED	KG. M KG. M D KG. M	ED BETWI	EEN V	/ALUES INDIG	CATED	ABOVE		
TORQUE AT 5 % SPEED TORQUE AT RATED SPEE TORQUE VARIES LINEAR	KG. M KG. M D KG. M				CATED) ABOVE		
TORQUE AT 5 % SPEED TORQUE AT RATED SPEE TORQUE VARIES LINEAR LT MOTOR SPEC. NO &	KG. M KG. M D KG. M	TCI 14	1 /	TCI 141 /	CATED	ABOVE		
TORQUE AT 5 % SPEED TORQUE AT RATED SPEE TORQUE VARIES LINEAR	KG. M KG. M D KG. M		1 /		CATED	ABOVE		

PREPARED	DATE	APPROVED	DATE



Specification for

FO Duplex Type 6-Port Integral Change Over Cock Strainer

Data sheet (To be filled and submitted for approval)

Sl.	Parameters	Requirement	Vendor's confirmation
01	Service		
02	Tag No.		
03	BHEL Matl. Code		
04	Quantity		
05	Make		
06	Production Sl. No.		
07	Model No.		
08	Line Fluid		
09	Flow Maximum		
10	Pour point		
11	Operating Pressure		
12	Flow Temperature		
13	Flow Sp. gravity		
14	Flow viscosity		
15	Line size		
16	Body size		
17	Body rating		
18	Body material		
19	Cover material		
20	Cock material		
21	Gasket material		
22	Body test pressure		
23	Cock seat test pressure		
24	Cock leak rate		
25	No. of per section		
26	Degree of filtration		
27	Filtering direction	IN TO OUT	
28	Total filter area/section		
29	Net filter area/section		
30	DP when clean		
31	DP at 50% clogged		
32	Max. allowable DP		
33	Mesh material		
34	Support gauze material		
35	Steam Jacketing		
36	Equalising valve		
37	IN / OUT nozzle		
38	Drain		
39	Vent		
40	Pressure gauge		
41	Testing code		
42	Dimensional Drg.		

ANNEXURE - V (d)

PART - I: DATASHEET FOR TRIP VALVE

BHEL MATERIAL CODE : ENQUIRY No. : SERVICE :

TAG NO :

UNITS: Flow-Liquid Cu M / hr, Steam-Kg / hr, Gas-NCu/hr, Pr-kg /cmSq(g), Temp°c

UNITS: Flow-Li	quid Cu M / hr, Stean	i-Kg / III, Gas-NCu/i								
O.FLOW DATA			_	ENOID PILO)T					
1. Line Fluid			1. Make	/ Type No						
2. Flow Max			2. Style							
3. Normal in pr				pen Main Val						
4. Allowable DP			4. To Cl	lose Main Val	lve					
Actuator Sizing DP			5. Enclo	sure						
6. Temp Max			6. Coil I	Duty		Conti	nuous, for 1	00° C	ambient	
7.Flow Temp			7. Coil I	Rating						
8. Flow Sp Gravity			8. Insula	ation Class						
9. Flow Viscosity			9. Inrusl	h / Hold Wat	tage					
10. Max Flow Cv				ve Flow Cv				1		
11. Plug Life%			11. Bod							
12. Valve Cv			1	ted parts		Forge	d Brass			
13. Valve Closing Time	Sec.		13. Seat	1		_	ess Steel			
14. Valve Opening Time	Sec.Adjust	able	14. Valv	U			ent for tight	shut		
The value opening time	Seen rajust	4010	15. Cab			rtesin	ent for tight	Silat		
A. VALVE BODY			1	ninal Block		Prov	rided			
1. Make/Type No				CK EXHAU	ST VI		eet 0.13			
2. Line Size	ODXT mm			type No	J 1 1 1 1 1	10 1110	0.13			
3. Body/port Size	Nb mm	<u> </u>	2. Port C	* *		 				
4. Plug Travel	Mm		2. I OIL	JOIIII		+				
5. Body Style / Rating	NP		E EI O	W RESTRIC	TOR	To me	eet 0.14			
6. Ends	Flanged to:		1	Type No	JUK	10 1110	At 0.14			
7. Port	rianged to .		2. Port (* *						
	C P					-				
8. Guiding 9. Body Material	Carbon Steel, ASTM		5. Adjus	stable Time R	ange	-				
	Carbon Steel, ASTM	AZIO WCB	E AID	NEW CO.		T	N.T.			
10. Trim No			F. AIRS			Type	No			
11. Plug Matl 12. Steam Size/Material			1. Airse	t set pr						
17 Steam Size/Material										
			~		50	+				
13.Seat, Material			1	T SWITCH	ES				off	
13.Seat, Material 14. Cage Material			1. Make	/Type No						
13.Seat, Material 14. Cage Material 15.Plug/Gage Style			1. Make 2. Mour	Type No nted For		ll open	Full cl	ose	% Open	
13.Seat, Material 14. Cage Material 15.Plug/Gage Style 16. Seat Leak Class	to ANSI FCI	70-2	1. Make 2. Mour 3. Conta	/Type No nted For acts	Ful				% Open	
13.Seat, Material 14. Cage Material 15.Plug/Gage Style 16. Seat Leak Class 17. Plug pushdown to	to ANSI FCI	70-2	Make Mour Conta Conta	/Type No nted For ncts nct Rating					% Open	
13.Seat, Material 14. Cage Material 15.Plug/Gage Style 16. Seat Leak Class 17. Plug pushdown to 18. Flow Tends to	to ANSI FCI	70-2	Make Mount Conta Conta Enclo	Type No nted For ncts nct Rating osure	Ful				% Open	
13.Seat, Material 14. Cage Material 15.Plug/Gage Style 16. Seat Leak Class 17. Plug pushdown to 18. Flow Tends to 19. Bonnet / packing	to ANSI FCI	70-2	1. Make 2. Mour 3. Conta 4. Conta 5. Enclo 6.Cable	c/Type No nted For nects nect Rating osure Entry	Full 240Ac 10)Amp	220		% Open	
13.Seat, Material 14. Cage Material 15.Plug/Gage Style 16. Seat Leak Class 17. Plug pushdown to 18. Flow Tends to 19. Bonnet / packing 20. Lub/Isol Valve	to ANSI FCI	70-2	1. Make 2. Mour 3. Conta 4. Conta 5. Enclo 6.Cable H. TER	Type No nted For nets net Rating osure Entry	Full 240Ac 10		220		% Open	
13.Seat, Material 14. Cage Material 15.Plug/Gage Style 16. Seat Leak Class 17. Plug pushdown to 18. Flow Tends to 19. Bonnet / packing 20. Lub/Isol Valve 21. Drain Valve	to ANSI FCI	70-2	1. Make 2. Mour 3. Conta 4. Conta 5. Enclo 6.Cable H. TER 1.Enclos	Type No nted For acts act Rating osure Entry EMINATION sure	Full 240Ac 10)Amp	220		% Open	
13.Seat, Material 14. Cage Material 15.Plug/Gage Style 16. Seat Leak Class 17. Plug pushdown to 18. Flow Tends to 19. Bonnet / packing 20. Lub/Isol Valve	to ANSI FCI 7	70-2	1. Make 2. Mour 3. Conta 4. Conta 5. Enclo 6.Cable H. TER 1.Enclo 2. No. o	Type No nted For nets net Rating sure Entry EMINATION sure f Terminals	240Ac 10)Amp	220		% Open	
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13.Seat, Material 14. Cage Material 15.Plug/Gage Style 16. Seat Leak Class 17. Plug pushdown to 18. Flow Tends to 19. Bonnet / packing 20. Lub/Isol Valve 21. Drain Valve	to ANSI FCI 7	70-2	1. Make 2. Mour 3. Conta 4. Conta 5. Enclo 6.Cable H. TER 1.Enclo 2. No. o I.SUPP 1. Asser 2. Asser	Type No nted For nets net Rating soure Entry MINATION sure f Terminals LY CONDIT mbly – 1 mbly – 2	Ful 240Ac 10)Amp	220	0 Dc 0	% Open Off 0.25 Amp	
13.Seat, Material 14. Cage Material 15.Plug/Gage Style 16. Seat Leak Class 17. Plug pushdown to 18. Flow Tends to 19. Bonnet / packing 20. Lub/Isol Valve 21. Drain Valve 22. Noise Level	to ANSI FCI	70-2	1. Make 2. Mour 3. Conta 4. Conta 5. Enclo 6.Cable H. TER 1.Enclo 2. No. o I.SUPP 1. Asser 2. Asser 3. Pneur	Type No nted For nets net Rating sure Entry MINATION sure f Terminals LY CONDIT nbly – 1 nbly – 2 matic termina	Ful 240Ac 10	Provi	220 dided	0 Dc 0	% Open	
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13.Seat, Material 14. Cage Material 15.Plug/Gage Style 16. Seat Leak Class 17. Plug pushdown to 18. Flow Tends to 19. Bonnet / packing 20. Lub/Isol Valve 21. Drain Valve 22. Noise Level B. ACTUATOR ASSY 1. Make/Type No 2. Style 3. Size/Volume 4. Diaphragm Matl 5.Spring No/Range 6. Spring No/Range 7. Air to 8. Signal pr 9. Pr port Conn 10. On Air Failure		70-2	1. Make 2. Mour 3. Conta 4. Conta 5. Enclo 6. Cable H. TER 1. Enclo 2. No. o I. SUPP 1. Asser 2. Asser 3. Pneur 4. Spare REF. D 1. Assy 1 2. Assy 1 5. NO	c/Type No Inted For Inter Entry Inter In	BOX TION I Indiv S:(SPECIF) Dwg	Provi	ded To s agged and p	uit 8 m	% Open Off .25 Amp .25 Amp	
13.Seat, Material 14. Cage Material 15.Plug/Gage Style 16. Seat Leak Class 17. Plug pushdown to 18. Flow Tends to 19. Bonnet / packing 20. Lub/Isol Valve 21. Drain Valve 22. Noise Level B. ACTUATOR ASSY 1. Make/Type No 2. Style 3. Size/Volume 4. Diaphragm Matl 5.Spring No/Range 6. Spring No/Range 7. Air to 8. Signal pr 9. Pr port Conn 10. On Air Failure 11. Lockup Valve type No		70-2	1. Make 2. Mour 3. Conta 4. Conta 5. Enclo 6. Cable H. TER 1. Enclo 2. No. o I. SUPP 1. Asser 3. Pneur 4. Spare REF. D 1. Assy 1 2. Assy 1 5. NO 3 4 5 6 7	c/Type No Inted For Inter	BOX TION I Indiv S:(SPECIF) Dwg	Provi	ded To s agged and p	uit 8 m	% Open Off .25 Amp .25 Amp	
13.Seat, Material 14. Cage Material 15.Plug/Gage Style 16. Seat Leak Class 17. Plug pushdown to 18. Flow Tends to 19. Bonnet / packing 20. Lub/Isol Valve 21. Drain Valve 22. Noise Level B. ACTUATOR ASSY 1. Make/Type No 2. Style 3. Size/Volume 4. Diaphragm Matl 5.Spring No/Range 6. Spring No/Range 7. Air to 8. Signal pr 9. Pr port Conn 10. On Air Failure 11. Lockup Valve type No		70-2	1. Make 2. Mour 3. Conta 4. Conta 5. Enclo 6. Cable H. TER 1. Enclo 2. No. o I. SUPP 1. Asser 2. Asser 3. Pneur 4. Spare 4. Spare REF. D 1. Assy 1 2. Assy 1 5. NO 3 4 5 6 7 8	c/Type No Inted For Inter Entry Inter In	BOX TION I Indiv S:(SPECIF) Dwg	Provi	ded To s agged and p	uit 8 m	% Open Off .25 Amp .25 Amp	

PART - I: DATASHEET FOR TRIP VALVE

BHEL MATERIAL CODE : ENQUIRY No. : SERVICE :

:

UNITS: Flow-Liquid Cu M / hr, Steam-Kg / hr, Gas-NCu/hr, Pr-kg /cmSq(g), Temp°c

DATA CSOLENOID PILOT

C.SOLENOID PILOT	ambient		
2. Flow Max 2. Style 3. Normal in pr 3. To Open Main Valve 4. Allowable DP 4. To Close Main Valve 5. Actuator Sizing DP 5. Enclosure 6. Temp Max 6. Coil Duty Continuous, for 100° C a 7. Flow Temp 7. Coil Rating 240V DC 8. Flow Sp Gravity 8. Insulation Class 9. Flow Viscosity 9. Inrush / Hold Wattage 10. Max Flow Cv 10. Valve Flow Cv 11. Plug Life% 11. Body Matl 12. Valve Cv 12. Wetted parts Forged Brass 13. Valve Closing Time Sec. 13. Seating Stainless Steel 14. Valve Opening Time Sec. Adjustable 14. Valve Ends Resilient for tight shut 15. Cable entry 16. Terminal Block Provided 1. Make/Type No D. QUICK EXHAUST VL To meet 0.13 2. Line Size ODXT mm 1. Make/type No 3. Body/port Size Nb mm 2. Port Conn 4. Plug Travel Mm E. FLOW RESTRICTOR To meet 0.14	ambient		
3. Normal in pr 4. Allowable DP 4. To Close Main Valve 5. Actuator Sizing DP 5. Enclosure 6. Temp Max 6. Coil Duty 7. Coil Rating 240V DC 8. Flow Sp Gravity 9. Flow Viscosity 9. Flow Cv 11. Plug Life% 12. Valve Cv 13. Valve Closing Time 14. Valve Opening Time 15. Cable entry 16. Teminal Block 17. Cable entry 18. Insulation Class 9. Forged Brass 18. Valve Cobernson Time 19. Valve Ends 19. Valve Ends 19. Valve Ends 19. Valve Exthaust VL 10. Valve Ends 10. Valve Flow Cv 11. Plug Life% 12. Verted parts 13. Seating 14. Valve Ends 15. Cable entry 16. Terminal Block 16. Terminal Block 17. Cable entry 18. Valve Ends 19. V	ambient		
4. Allowable DP 4. To Close Main Valve 5. Actuator Sizing DP 5. Enclosure 6. Temp Max 6. Coil Duty Continuous, for 100° C at 240 V DC 7. Flow Temp 7. Coil Rating 240 V DC 8. Flow Sp Gravity 8. Insulation Class 9. Flow Viscosity 9. Inrush / Hold Wattage 10. Max Flow Cv 10. Valve Flow Cv 11. Plug Life% 11. Body Matl 12. Valve Cv 12. Wetted parts Forged Brass 13. Valve Closing Time Sec. 13. Seating Stainless Steel 14. Valve Dening Time Sec.Adjustable 14. Valve Ends Resilient for tight shut 15. Cable entry 16. Terminal Block Provided 1. Make/Type No D. QUICK EXHAUST VL To meet 0.13 2. Line Size ODXT mm 1. Make/type No 3. Body/port Size Nb mm 2. Port Conn 4. Plug Travel Mm 5. Body Style / Rating To meet 0.14	ambient		
5. Actuator Sizing DP 6. Temp Max 6. Coil Duty 7. Coil Rating 240V DC 8. Flow Sp Gravity 9. Flow Viscosity 9. Inrush / Hold Wattage 10. Max Flow Cv 11. Plug Life% 12. Valve Cv 13. Valve Closing Time 14. Valve Opening Time 15. Cable entry 16. Terminal Block 17. Coil Rating 240V DC 8. Insulation Class 9. Inrush / Hold Wattage 10. Wat Flow Cv 11. Body Matl 12. Valve Flow Cv 11. Body Matl 12. Valve Cv 12. Wetted parts 13. Seating 14. Valve Ends 15. Cable entry 16. Terminal Block 16. Terminal Block 17. Coil Rating 18. Insulation Class 19. Inrush / Hold Wattage 10. Valve Flow Cv 11. Porged Brass 11. Body Matl 12. Valve Ends 13. Seating 14. Valve Ends 15. Cable entry 15. Cable entry 16. Terminal Block 17. To meet 0.13 18. Make/Type No 19. QUICK EXHAUST VL 19. To meet 0.13 19. Make/Type No 20. Port Conn 20. Port Conn 21. Plug Travel 22. FLOW RESTRICTOR 24. To meet 0.14	ambient		
6. Temp Max 6. Coil Duty 7. Flow Temp 7. Coil Rating 240V DC 8. Flow Sp Gravity 9. Flow Viscosity 9. Inrush / Hold Wattage 10. Max Flow Cv 11. Plug Life% 11. Body Matl 12. Valve Cv 12. Wetted parts 13. Seating 14. Valve Opening Time 15. Cable entry 16. Terminal Block 17. Cable entry 18. Forged Brass 19. Valve Cv 19. Wetted parts 19. Wetted parts 19. Valve Closing Time 19. Cable entry 19. Cable e	ambient		
7. Flow Temp 7. Coil Rating 240V DC 8. Flow Sp Gravity 8. Insulation Class 9. Flow Viscosity 9. Inrush / Hold Wattage 10. Max Flow Cv 10. Valve Flow Cv 11. Plug Life% 11. Body Matl 12. Valve Cv 12. Wetted parts Forged Brass 13. Valve Closing Time Sec. 13. Seating Stainless Steel 14. Valve Opening Time Sec. Adjustable 14. Valve Ends Resilient for tight shut A. VALVE BODY 16. Terminal Block Provided 1. Make/Type No D. QUICK EXHAUST VL To meet 0.13 2. Line Size ODXT mm 1. Make/type No 3. Body/port Size Nb mm 2. Port Conn 4. Plug Travel Mm E. FLOW RESTRICTOR To meet 0.14	ambient		
8. Flow Sp Gravity 9. Flow Viscosity 9. Inrush / Hold Wattage 10. Max Flow Cv 11. Plug Life% 11. Body Matl 12. Valve Cv 12. Wetted parts 13. Valve Closing Time 14. Valve Opening Time 15. Cable entry 16. Terminal Block 17. Make/Type No 18. Insulation Class 19. Inrush / Hold Wattage 10. Valve Flow Cv 11. Body Matl 12. Wetted parts 13. Seating 14. Valve Ends 15. Cable entry 15. Cable entry 16. Terminal Block 17. Make/Type No 18. Insulation Class 19. Inrush / Hold Wattage 10. Valve Flow Cv 11. Body Matl 12. Valve Ends 13. Seating 14. Valve Ends 15. Cable entry 15. Cable entry 16. Terminal Block 17. Make/Type No 18. Insulation Class 19. Inrush / Hold Wattage 10. Valve Flow Cv 11. Make/Type Brass 13. Valve Closing Time 14. Valve Ends 15. Cable entry 15. Cable entry 16. Terminal Block 17. Make/Type No 18. Insulation Class 19. Inrush / Hold Wattage 10. Valve Flow Cv 11. Porged Brass 13. Valve Closing Time 14. Valve Ends 15. Cable entry 15. Cable entry 16. Terminal Block 17. To meet 0.13 18. Avairable of the part of the			
9. Flow Viscosity 9. Inrush / Hold Wattage 10. Max Flow Cv 10. Valve Flow Cv 11. Plug Life% 11. Body Matl 12. Valve Cv 12. Wetted parts Forged Brass 13. Valve Closing Time Sec. 13. Seating Stainless Steel 14. Valve Opening Time Sec. Adjustable 14. Valve Ends Resilient for tight shut 15. Cable entry 16. Terminal Block Provided 1. Make/Type No D. QUICK EXHAUST VL To meet 0.13 2. Line Size ODXT mm 1. Make/type No 3. Body/port Size Nb mm 2. Port Conn 4. Plug Travel Mm E. FLOW RESTRICTOR To meet 0.14			
10. Max Flow Cv			
11. Plug Life% 11. Body Matl 12. Valve Cv 12. Wetted parts Forged Brass 13. Valve Closing Time Sec. 13. Seating Stainless Steel 14. Valve Opening Time Sec.Adjustable 14. Valve Ends Resilient for tight shut 15. Cable entry 16. Terminal Block Provided 1. Make/Type No D. QUICK EXHAUST VL To meet 0.13 2. Line Size ODXT mm 1. Make/type No 3. Body/port Size Nb mm 2. Port Conn 4. Plug Travel Mm E. FLOW RESTRICTOR To meet 0.14			
12. Valve Cv 12. Wetted parts Forged Brass 13. Valve Closing Time Sec. 13. Seating Stainless Steel 14. Valve Opening Time Sec.Adjustable 14. Valve Ends Resilient for tight shut 15. Cable entry 16. Terminal Block Provided 1. Make/Type No D. QUICK EXHAUST VL To meet 0.13 2. Line Size ODXT mm 1. Make/type No 3. Body/port Size Nb mm 2. Port Conn 4. Plug Travel Mm E. FLOW RESTRICTOR To meet 0.14			
13. Valve Closing Time Sec. 13. Seating Stainless Steel 14. Valve Opening Time Sec.Adjustable 14. Valve Ends Resilient for tight shut 15. Cable entry 15. Cable entry 16. Terminal Block Provided 1. Make/Type No D. QUICK EXHAUST VL To meet 0.13 2. Line Size ODXT mm 1. Make/type No 3. Body/port Size Nb mm 2. Port Conn 4. Plug Travel Mm E. FLOW RESTRICTOR To meet 0.14			
14. Valve Opening Time Sec.Adjustable 14. Valve Ends Resilient for tight shut 15. Cable entry 15. Cable entry 16. Terminal Block Provided 1. Make/Type No D. QUICK EXHAUST VL To meet 0.13 2. Line Size ODXT mm 1. Make/type No 3. Body/port Size Nb mm 2. Port Conn 4. Plug Travel Mm E. FLOW RESTRICTOR To meet 0.14			
15. Cable entry			
A. VALVE BODY 16. Terminal Block Provided 1. Make/Type No D. QUICK EXHAUST VL To meet 0.13 2. Line Size ODXT mm 1. Make/type No 3. Body/port Size Nb mm 2. Port Conn 4. Plug Travel Mm E. FLOW RESTRICTOR To meet 0.14			
1. Make/Type No D. QUICK EXHAUST VL To meet 0.13 2. Line Size ODXT mm 1. Make/type No 3. Body/port Size Nb mm 2. Port Conn 4. Plug Travel Mm E. FLOW RESTRICTOR To meet 0.14			
2. Line Size ODXT mm 1. Make/type No 3. Body/port Size Nb mm 2. Port Conn 4. Plug Travel Mm E. FLOW RESTRICTOR To meet 0.14	-		
3. Body/port Size Nb mm 2. Port Conn 4. Plug Travel Mm 5. Body Style / Rating NP E. FLOW RESTRICTOR To meet 0.14			
4. Plug Travel Mm E. FLOW RESTRICTOR To meet 0.14 5. Body Style / Rating NP E. FLOW RESTRICTOR To meet 0.14			
5. Body Style / Rating NP E. FLOW RESTRICTOR To meet 0.14			
8. Guiding Cage or Top & Bottom 3. Adjustable Time Range 9. Body Material Carbon Steel. ASTM A216 WCB			
10. Trim No F. AIRSET Type No 11. Plug Matl 1. Airset set pr	Type NO		
11. Plug Mati 1. Airset set pr 12. Steam Size/Material			
13. Seat, Material G.LIMIT SWITCHES	off		
14. Cage Material 1. Make/Type No	011		
15. Plug/Gage Style 2. Mounted For Full open Full close	% Open		
16. Seat Leak Class to ANSI FCI 70-2 3. Contacts	Off		
17. Plug pushdown to 4. Contact Rating 240Ac 10Amp 220 Dc 0	-		
18. Flow Tends to 5. Enclosure	· · · · · · · · · ·		
19. Bonnet / packing 6. Cable Entry	-		
20. Lub/Isol Valve H. TERMINATION BOX Provided			
21. Drain Valve 1. Enclosure			
22. Noise Level 2. No. of Terminals			
LSUPPLY CONDITION			
1. Assembly – 1			
2. Assembly – 2			
3. Pneumatic rminal To suit 8 m	m tube		
B. ACTUATOR ASSY 4. Spares Individually tagged and packed			
1. Make/Type No			
2. Style REF. DOCUMENTS:(SPECIFY DWG/MANUAL REF.I	NOs. BELOW)		
3. Size/Volume 1.Assy Dimensional Dwg			
4. Diaphragm Matl 2. Assy Hookup Dwg			
5.Spring No/Range S.NO ITEM O & M Manual Spares identifier	r Catalog&Spec		
6. Spring No/Range			
7. Air to 3 A			
8. Signal pr 4 B			
9. Pr port Conn 5 B 11			
10. On Air Failure Stay Put 6 C			
11. Lockup Valve type No 7 D			
12. Lockup Valve Set pr 8 E			
9 F			
10 G	-		

TAG NO

PART - I: DATASHEET FOR TRIP VALVE

BHEL MATERIAL CODE : ENQUIRY No. : SERVICE :

TAG NO :

UNITS: Flow-Liquid Cu M / hr, Steam-Kg / hr, Gas-NCu/hr, Pr-kg /cmSq(g), Temp°c

UNITS: Flow-Liquid	Cu M / hr, Stea	am-Kg / nr, Gas-NCu/ni			'emp°c			
O.FLOW DATA				ENOID PILO)T	1		+
1. Line Fluid				/ Type No				
2. Flow Max			2. Style					
3. Normal in pr				pen Main Val				
4. Allowable DP			4. To C	lose Main Val	ve			
Actuator Sizing DP			5. Enclo	osure				
6. Temp Max			6. Coil	Duty		Continuo	us, for 100° C	ambient
7.Flow Temp			7. Coil	Rating		240V DC		
8. Flow Sp Gravity			8. Insul	ation Class				
9. Flow Viscosity			9. Inrus	h / Hold Watt	age			
10. Max Flow Cv			10. Val	ve Flow Cv				
11. Plug Life%			11. Bod	y Matl				
12. Valve Cv			12. Wet	ted parts		Forged B	rass	
13. Valve Closing Time	Sec	<u>.</u>	13. Seat	ing		Stainless	Steel	
14. Valve Opening Time	Sec	:.Adjustable	14. Val	_		Resilient	for tight shut	
1 2		J	15. Cab	le entrv			U	
A. VALVE BODY	1			ninal Block		Provided	i	
1. Make/Type No				CK EXHAUS	ST VL	To meet (
2. Line Size	ODXT	mm		type No				
3. Body/port Size	Nb	mm	2. Port 0	• •				1
4. Plug Travel	Mm		2.1010					
5. Body Style / Rating	1.2211	NP	E. FLO	W RESTRIC	CTOR	To meet (0.14	
6. Ends	Flanged to:	ı ·=		/Type No				İ
7. Port	Tranged to .		2. Port 0					1
8. Guiding	Cage or Top &	Rottom		stable Time R	ange			
9. Body Material		ASTM A216 WCB	J. Adju	stable Time K	ange			
10. Trim No	Carbon Steer, 1	ABIMIAZIO WEB	F. AIRSET			Type No		
11. Plug Matl	+		1. Airset set pr		1 ypc 110			
12. Steam Size/Material	+		1.711130	t set pi				
13.Seat, Material	+		GIIM	IT SWITCH	FC			off
14. Cage Material	+			Type No	20			UII
15.Plug/Gage Style	+		2. Moui	• •	Eul	l open	Full close	% Open
16. Seat Leak Class	to AN	SI FCI 70-2	3. Conta		Full	open	ruii ciose	Off
17. Plug pushdown to	to Aiv.	31 FC1 70-2		act Rating	240Ac 10	A mn	220 Do (0.25 Amp
18. Flow Tends to	+		5. Enclo		240AC 10	Апр	220 DC (3.23 Amp
19. Bonnet / packing	+							
20. Lub/Isol Valve	+		6.Cable		DOV	Provided		
	+		1.Enclo	MINATION	вох	Provided		
21. Drain Valve			I LEncio	cure				
22. Noise Level								
			2. No. c	f Terminals	TON			
			2. No. o	f Terminals LY CONDIT	TON			
			2. No. o I.SUPP 1. Asser	f Terminals LY CONDIT mbly - 1	TION			
			2. No. of I.SUPP 1. Asset 2. Asset	Terminals LY CONDIT mbly - 1 mbly - 2	TION		1	
			2. No. c LSUPP 1. Asser 2. Asser 3. Pneur	of Terminals LY CONDIT mbly - 1 mbly - 2 matic rminal				
B. ACTUATOR ASSY			2. No. of I.SUPP 1. Asset 2. Asset	of Terminals LY CONDIT mbly - 1 mbly - 2 matic rminal		ually tagge	d and packed	
1. Make/Type No			2. No. c LSUPP 1. Asset 2. Asset 3. Pneu 4. Spare	of Terminals LY CONDIT mbly - 1 mbly - 2 matic rminal	Individ	, ,	•	
1. Make/Type No 2. Style			2. No. c LSUPP 1. Asser 2. Asser 3. Pneu: 4. Spare	of Terminals LY CONDIT mbly - 1 mbly - 2 matic rminal es	Individ	, ,	•	NOs. BELOW)
1. Make/Type No 2. Style 3. Size/Volume			2. No. c I.SUPP 1. Asset 2. Asset 3. Pneu 4. Spare REF. D 1.Assy	of Terminals LY CONDIT mbly - 1 mbly - 2 matic rminal es OCUMENTS Dimensional I	Individ	, ,	•	.NOs. BELOW)
1. Make/Type No 2. Style 3. Size/Volume 4. Diaphragm Matl			2. No. c LSUPP 1. Asser 2. Asser 3. Pneu 4. Spare REF. D 1.Assy 2.Assy	of Terminals LY CONDIT mbly - 1 mbly - 2 matic rminal es OCUMENTS Dimensional I Hookup Dwg	Individ	Z DWG/M	ANUAL REF	,
1. Make/Type No 2. Style 3. Size/Volume			2. No. c I.SUPP 1. Asset 2. Asset 3. Pneu 4. Spare REF. D 1.Assy	of Terminals LY CONDIT mbly - 1 mbly - 2 matic rminal es OCUMENTS Dimensional I	Individ	T DWG/MA	ANUAL REF	er
1. Make/Type No 2. Style 3. Size/Volume 4. Diaphragm Matl			2. No. c LSUPP 1. Asser 2. Asser 3. Pneu 4. Spare REF. D 1.Assy 2.Assy	of Terminals LY CONDIT mbly - 1 mbly - 2 matic rminal es OCUMENTS Dimensional I Hookup Dwg	Individ	T DWG/MA	ANUAL REF	er
1. Make/Type No 2. Style 3. Size/Volume 4. Diaphragm Matl 5. Spring No/Range 6. Spring No/Range			2. No. c LSUPP 1. Asser 2. Asser 3. Pneu 4. Spare REF. D 1.Assy 2.Assy	of Terminals LY CONDIT mbly - 1 mbly - 2 matic rminal es OCUMENTS Dimensional I Hookup Dwg ITEM	Individ	T DWG/MA	ANUAL REF	er
1. Make/Type No 2. Style 3. Size/Volume 4. Diaphragm Matl 5. Spring No/Range 6. Spring No/Range 7. Air to			2. No. c I.SUPP 1. Asset 2. Asset 3. Pneu 4. Spare REF. D 1.Assy 2.Assy S.NO	of Terminals LY CONDIT mbly - 1 mbly - 2 matic rminal es OCUMENTS Dimensional I Hookup Dwg	Individ	T DWG/MA	ANUAL REF	er
1. Make/Type No 2. Style 3. Size/Volume 4. Diaphragm Matl 5. Spring No/Range 6. Spring No/Range 7. Air to 8. Signal pr			2. No. c I.SUPP 1. Asset 2. Asset 3. Pneu 4. Spare REF. D 1.Assy 2.Assy S.NO	of Terminals LY CONDIT mbly - 1 mbly - 2 matic rminal es COCUMENTS Dimensional I Hookup Dwg ITEM A B	Individ	T DWG/MA	ANUAL REF	er
1. Make/Type No 2. Style 3. Size/Volume 4. Diaphragm Matl 5. Spring No/Range 6. Spring No/Range 7. Air to 8. Signal pr 9. Pr port Conn	Stay Put		2. No. c I.SUPP 1. Asset 2. Asset 3. Pneu 4. Spare REF. D 1.Assy 2.Assy S.NO	of Terminals LY CONDIT mbly - 1 mbly - 2 matic rminal es COCUMENTS Dimensional I Hookup Dwg ITEM A B B 11	Individ	T DWG/MA	ANUAL REF	er
1. Make/Type No 2. Style 3. Size/Volume 4. Diaphragm Matl 5. Spring No/Range 6. Spring No/Range 7. Air to 8. Signal pr 9. Pr port Conn 10. On Air Failure	Stay Put		2. No. c LSUPP 1. Asset 2. Asset 3. Pneu 4. Spare 4. Spare REF. D 1.Assy 2.Assy S.NO 3 4 5 6	of Terminals LY CONDIT mbly - 1 mbly - 2 matic rminal es COCUMENTS Dimensional I Hookup Dwg ITEM A B B 11 C	Individ	T DWG/MA	ANUAL REF	er
1. Make/Type No 2. Style 3. Size/Volume 4. Diaphragm Matl 5. Spring No/Range 6. Spring No/Range 7. Air to 8. Signal pr 9. Pr port Conn 10. On Air Failure 11. Lockup Valve type No	Stay Put		2. No. c I.SUPP 1. Asset 2. Asset 3. Pneu 4. Spare REF. D 1.Assy 2.Assy S.NO 3 4 5 6 7	of Terminals LY CONDIT mbly - 1 mbly - 2 matic rminal es COCUMENTS Dimensional I Hookup Dwg ITEM A B B 11 C D	Individ	T DWG/MA	ANUAL REF	er
1. Make/Type No 2. Style 3. Size/Volume 4. Diaphragm Matl 5. Spring No/Range 6. Spring No/Range 7. Air to 8. Signal pr 9. Pr port Conn 10. On Air Failure	Stay Put		2. No. c LSUPP 1. Asset 2. Asset 3. Pneu 4. Spare 4. Spare REF. D 1.Assy 2.Assy S.NO 3 4 5 6 7 8	of Terminals LY CONDIT mbly - 1 mbly - 2 matic rminal es COCUMENTS Dimensional I Hookup Dwg ITEM A B B 11 C D E	Individ	T DWG/MA	ANUAL REF	er
1. Make/Type No 2. Style 3. Size/Volume 4. Diaphragm Matl 5. Spring No/Range 6. Spring No/Range 7. Air to 8. Signal pr 9. Pr port Conn 10. On Air Failure 11. Lockup Valve type No	Stay Put		2. No. c I.SUPP 1. Asset 2. Asset 3. Pneu 4. Spare REF. D 1.Assy 2.Assy S.NO 3 4 5 6 7	of Terminals LY CONDIT mbly - 1 mbly - 2 matic rminal es COCUMENTS Dimensional I Hookup Dwg ITEM A B B 11 C D	Individ	T DWG/MA	ANUAL REF	er

PART - I: DATASHEET FOR CONTROL VALVE

BHEL MATEREIAL CODE: ENQUIRY NO

:

SERVICE:

TAG NO :

UNITS: Flow--Liquid CuM/hr, Steam--Kg/hr, Gas--NCuM/hr, Pr.--Kg/cmsq (g), Temp--°C

UNITS: FlowLiquid CuM/hr O.FLOW DATA	, 118, 111, 04		C.POSITIONER	PNEIN	MATIC / FI	ECTRO PNEUMATIC
1.Line Fluid			1.Make/Type No	THEOR	VIATIC / ELI	ECIRO INEUMATIC
			**	Diment /	Reverse Field	A .d
2.Flow Max			2. Action	Direct /	Reverse Field	Adjustable
3.Flow Min			3. Supply Pr	D :1.1		T
4.Max Flow in Pr			4.Bypass/Gauge	Provided	, 2, ,	Three
5.Min Flow in Pr			5. Signal In/Out	0.2 to 1 kg	g/cm² (g)	
6.Max Flow out Pr			6. Air set make & type no			
7. Min Flow out Pr			7.Air set pr. range			
8.Actuator Sizing DP						
9.Temp Max			D.SOLINOID VALVE			
10.Flow Temp			1.Make / Type no			
11.Flow Sp Gravity			2.Style			
12.Flow Viscosity			3.Enclosure			
13.Max / Min Flow Cv			4.Valve flow CV			
14.plug Lifts @ max/minflow	%	%	5.Cable entry			
15.Valve Cv / Cf			E.TERMINAL BOX			
			1.Enclosure		•	
A.VALVE BODY			2.Terminals			
1.Make/Type No						
2.Line Size	OD X t	mm			1	
3.Body/ Port Size	Nb mm	mm			J	
4.Plug Travel	Mm	111111				
5.Body Style/Rating		NP	F.POSITION TRANSMETER	,		off
6.Ends		111	1.Make / Type no			OH
7.Ports	 	1	2.Style		3 Wire / 2 Wire	1
8.Guiding	Cage or Top & Bo	ottom	3.Input		3 WHE / 2 WHE	
	Cage of Top & Bo	OLIOIII	4.Load	_		
9.Body Matl						
10.Trim No			5.Out Put			
11.Plug Matl			6.Cable Entry			
12.Stem Size/Matl			G.LIMIT SWITCHES		2 off	
13.Seat Matl			1.Make/Type no			
14.Cage Matl			2.Mounted for	Max. Plug	g lift / Min. Plug l	ift
15.Plug/ Gauge Style			3.Contacts		Off	
16.Seat Leak Class			4.Contact Rating			
17.Plug Pushdown to			5.Enclosure			
18.Flow Tends to			6.Cable Entry Size			
19.Bonnet/Packing			H.SUPPLY CONDITION			
21.Drain Plug			1.Assembly-1			
22.Noise Level			2Assembly-2			
			3.Pneumatic Terminal	To suit 8n	nm OD x 1.65 mr	n t Tube
B.ACTUATOR ASSY			4.Spares	Individua	lly tagged & pack	ed
1.Make / type no					-	
2.Style						
3.Size/Volume			I.REF. DOCUMENTS : SPEC	IFY DWG/ MA	NUAL REF. NO	OS.
4.Diaphragm Matl			1.Assy Dimentional Dwg		2.Assy Hooku	
1 0	1/4 " NPT		S.No Item O & M Manual			er catalog & specfn.
5. Port Size			3. A		_pares racitari	
5. Port Size 6.Spring no / Range			,		+	
6.Spring no / Range			4 B			
6.Spring no / Range 7.Spring To			4. B			
6.Spring no / Range 7.Spring To 8. Air To			5. B12			
6.Spring no / Range 7.Spring To 8. Air To 9. Signal Pr.			5. B12 6. C			
6.Spring no / Range 7.Spring To 8. Air To 9. Signal Pr. 10. Handwheel	G. D.	Dui.	5. B12 6. C 7. C6			
6.Spring no / Range 7.Spring To 8. Air To 9. Signal Pr. 10. Handwheel 11. On Air Failure	Stay	Put	5. B12 6. C 7. C6 8. D			
6.Spring no / Range 7.Spring To 8. Air To 9. Signal Pr. 10. Handwheel 11. On Air Failure 12.Lockup Valve Type no	Stay	Put	5. B12 6. C 7. C6 8. D 9. F			
6.Spring no / Range 7.Spring To 8. Air To 9. Signal Pr. 10. Handwheel 11. On Air Failure	Stay	Put	5. B12 6. C 7. C6 8. D			

PART - I: DATASHEET FOR CONTROL VALVE

BHEL MATEREIAL CODE ENQUIRY NO

:

SERVICE:

TAG NO :

 $UNITS: Flow--Liquid\ CuM/hr, Steam--Kg/hr, Gas--NCuM/hr, Pr.--Kg/cmsq\ (g), Temp--^{\circ}C$

O.FLOW DATA				C.POSITIONER	PNEUMATIC / ELI PNEUMATIC	ECTRO
1.Line Fluid			-	1.Make/Type No		
2.Flow Max				2. Action	Direct / Reverse Field	Adiustable
3.Flow Min				3. Supply Pr	Direct ,	Tujuou
4.Max Flow in Pr	1			4.Bypass/Gauge	Provided	Three
5.Min Flow in Pr	1			5. Signal In/Out	0.2 to 1 kg/cm ² (g)	
6.Max Flow out Pr	†			6. Air set make & type no		
7. Min Flow out Pr			-	7.Air set pr. range		
8.Actuator Sizing DP			-	7.1.1.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.		
9.Temp Max	1		-	D.SOLINOID VALVE		
10.Flow Temp				1.Make / Type no	1	
11.Flow Sp Gravity				2.Style		
12.Flow Viscosity				3.Enclosure	-	
13.Max / Min Flow Cv		T		4.Valve flow CV	1	
14.plug Lifts @ max/minflow	%	ç	%	5.Cable entry	-	
15. Valve Cv / Cf	/		, ,	E.TERMINAL BOX		
15.74 5 51	+	.1		1.Enclosure	<u> </u>	
A.VALVE BODY	+		•	2.Terminals		
1.Make/Type No	+	Т	•	2.10111111111		
2.Line Size	OD X t	mm	•	+	+	
3.Body/ Port Size	Nb mm		mm	+	<u> </u>	
4.Plug Travel	Mm			+		
5.Body Style/Rating		T N	NP	F.POSITION TRANSMETER		off
6.Ends			<u> </u>	1.Make / Type no		VII
7.Ports	+ -			2.Style	3 Wire / 2 Wire	
8.Guiding	Cage or Top & B	ottom		3.Input	3 WHC/ 2 WHC	
9.Body Matl	Cage of Top & D	Ottom		4.Load	+	
10.Trim No	1			5.Out Put	- -	
11.Plug Matl	+			6.Cable Entry	 	
12.Stem Size/Matl	1	T		G.LIMIT SWITCHES	2 off	
13.Seat Matl	+			1.Make/Type no		
	 			1.Make/Type no 2.Mounted for	M. Disself / Min. Ding I	
14.Cage Matl					Max. Plug lift / Min. Plug l	ift
15.Plug/ Gauge Style				3.Contacts	Off	
16.Seat Leak Class	1			4.Contact Rating	 _	
17.Plug Pushdown to				5.Enclosure		
18.Flow Tends to				6.Cable Entry Size		
19.Bonnet/Packing	_			H.SUPPLY CONDITION		
21.Drain Plug				1.Assembly-1		
22.Noise Level	<u> </u>			2Assembly-2	——————————————————————————————————————	
T - CTTLL TOD - COV	-			3.Pneumatic Terminal	To suit 8mm OD x 1.65 mm	
B.ACTUATOR ASSY	_			4.Spares	Individually tagged & pack	.ed
1.Make / type no	<u> </u>			<u> </u>		
2.Style	<u> </u>					
3.Size/Volume	ļ			I.REF. DOCUMENTS : SPECI		JS.
4.Diaphragm Matl	1/4 ** > TDOT			1.Assy Dimentional Dwg	2.Assy Hookup Dwg	
5. Port Size	1/4 " NPT			S.No Item O & M Manual	Spares identifier catalog &	k specfn.
				3. A		
6.Spring no / Range	+					
7.Spring To				4. B		
7.Spring To 8. Air To				5. B12		
7.Spring To 8. Air To 9. Signal Pr.				5. B12 6. C		
7.Spring To 8. Air To 9. Signal Pr. 10. Handwheel				5. B12 6. C 7. C6		
7.Spring To 8. Air To 9. Signal Pr. 10. Handwheel 11. On Air Failure	Stay	Put		5. B12 6. C 7. C6 8. D		
7.Spring To 8. Air To 9. Signal Pr. 10. Handwheel	Stay	Put		5. B12 6. C 7. C6		

PART - I: DATASHEET FOR CONTROL VALVE

BHEL MATEREIAL CODE: ENQUIRY NO: SERVICE:

TAG NO :

O.FLOW DATA	-	-	C.POSITIONER		MATIC / ELE MATIC	CCTRO
1.Line Fluid			1.Make/Type No			
2.Flow Max			2. Action	Direct /	Reverse Field A	Adjustable
3.Flow Min			3. Supply Pr			
4.Max Flow in Pr			4.Bypass/Gauge	Provided		Three
5.Min Flow in Pr			5. Signal In/Out	0.2 to 1 k	g/cm ² (g)	
6.Max Flow out Pr			6. Air set make & type no	0.2 to 1 k	B/ em (B)	
7. Min Flow out Pr			7. Air set pr. range			
8.Actuator Sizing DP			7 ii iii set pii range	ı		
9.Temp Max			D.SOLINOID VALVE			
10.Flow Temp			1.Make / Type no			
11.Flow Sp Gravity			2.Style			
12.Flow Viscosity			3.Enclosure			
13.Max / Min Flow Cv			4. Valve flow CV			
14.plug Lifts @ max/minflow	%	%	5.Cable entry			
15. Valve Cv / Cf	/0	/0	E.TERMINAL BOX		1	
IJ. VAIVE CV / CI	+	1	1.Enclosure	1		
A.VALVE BODY	+		2.Terminals	1		
	+	1	Z. Terminais		T	
1.Make/Type No	OD V +					
2.Line Size	OD X t	mm				
3.Body/ Port Size	Nb mm	mm				
4.Plug Travel	Mm		7 7 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0			1
5.Body Style/Rating		NP	F.POSITION TRANSMETER	₹		off
5.Ends	ļ	 	1.Make / Type no			
7.Ports			2.Style		3 Wire / 2 Wire	
8.Guiding	Cage or Top & B	ottom	3.Input			
9.Body Matl			4.Load			
10.Trim No			5.Out Put			
11.Plug Matl			6.Cable Entry			
12.Stem Size/Matl			G.LIMIT SWITCHES		2 off	
13.Seat Matl			1.Make/Type no			
14.Cage Matl			2.Mounted for	Max. Plu	g lift / Min. Plug li	ft
15.Plug/ Gauge Style			3.Contacts		Off	
16.Seat Leak Class			4.Contact Rating			
17.Plug Pushdown to			5.Enclosure			
18.Flow Tends to			6.Cable Entry Size			
19.Bonnet/Packing			H.SUPPLY CONDITION			
21.Drain Plug		L	1.Assembly-1			
22.Noise Level			2Assembly-2			
22.1 (dige fie ver			3.Pneumatic Terminal	To suit 8r	nm OD x 1.65 mm	t Tube
B.ACTUATOR ASSY			4.Spares		lly tagged & packet	
1.Make / type no	1		pareo	2.idi i idua	, mgged at packe	· -
2.Style	+			+		
3.Size/Volume	+		I.REF. DOCUMENTS : SPEC	TEV DWC/M	ANIIAI PEE NO	<u>C</u>
4.Diaphragm Matl	+		1.Assy Dimentional Dwg	JIL I D W G/ MI	2.Assy Hookur	
5. Port Size	1/4 " NPT		S.No Item O & M Manual		, ,	er catalog & specfn.
5. Port Size 5. Spring no / Range	1/4 INF1		3. A		Spares identifie	a catalog & specifi.
	+					
7.Spring To	+		4. B 5. B12			
8. Air To	+					
9. Signal Pr.	1		6. C			
Handwheel	_		7. C6			
			1 0 D		1	
11. On Air Failure	Stay	Put	8. D			
11. On Air Failure 12.Lockup Valve Type no 13. Lockup Valve Set Pr.S	Stay	Put	9. F 10. G			

PART - I: DATASHEET FOR CONTROL VALVE

BHEL MATEREIAL CODE: ENQUIRY NO :

SERVICE:

TAG NO

UNITS: Flow--Liquid CuM/hr, Steam--Kg/hr, Gas--NCuM/hr,Pr.--Kg/cmsq (g), Temp--°C

UNITS: FlowLiquid CuM/hr,	, SteamKg/nr, Ga	sNCulvi/nr,Pr		T		
O.FLOW DATA			C.POSITIONER	PNEUMATIC /	/ ELECTRO	PNEUMATIC
1.Line Fluid			1.Make/Type No			
2.Flow Max			2. Action	Direct / Reverse	Field Adjustable	
3.Flow Min			3. Supply Pr			
4.Max Flow in Pr			4.Bypass/Gauge	Provided		Three
5.Min Flow in Pr			5. Signal In/Out	0.2 to 1 kg/cm ² (g)		
6.Max Flow out Pr			6. Air set make & type no			
7. Min Flow out Pr			7.Air set pr. range			
8.Actuator Sizing DP						
9.Temp Max			D.SOLINOID VALVE			
10.Flow Temp			1.Make / Type no			
11.Flow Sp Gravity			2.Style			
12.Flow Viscosity			3.Enclosure			
13.Max / Min Flow Cv			4.Valve flow CV			
14.plug Lifts @ max/minflow	%	%	5.Cable entry			
15.Valve Cv / Cf			E.TERMINAL BOX			
			1.Enclosure	1	I	
A.VALVE BODY			2.Terminals	†		
1.Make/Type No			2.10.1111111115			
2.Line Size	OD X t	mm	1			
3.Body/ Port Size	Nb mm	111111				
5.Dody/ 1 oft bize	110 IIIII	mm		1		
4.Plug Travel	Mm		+	<u> </u>		
5.Body Style/Rating	141111	NP	F.POSITION TRANSMITTE	R		
6.Ends		141	1.Make / Type no			
7.Ports			2.Style	3 Wire / 2	Wire	
8.Guiding	Cage or Top & Bo	ottom	3.Input	3 WHE / Z	WIIC	
9.Body Matl	Cage of Top & Bo	HOIII	4.Load			
10.Trim No			5.Out Put			
11.Plug Matl			6.Cable Entry) PP	
12.Stem Size/Matl			G.LIMIT SWITCHES	4	2 off	
13.Seat Matl			1.Make/Type no	26 20 110 126	T	
14.Cage Matl			2.Mounted for	Max. Plug lift / Min.		
15.Plug/ Gauge Style			3.Contacts		Off	1
16.Seat Leak Class			4.Contact Rating			
17.Plug Pushdown to			5.Enclosure			
18.Flow Tends to		1	6.Cable Entry Size			
19.Bonnet/Packing			H.SUPPLY CONDITION			
21.Drain Plug			1.Assembly-1			
22.Noise Level			2Assembly-2	1		
			3.Pneumatic Terminal	To suit 8mm OD x 1.		
B.ACTUATOR ASSY			4.Spares	Individually tagged &	& packed	
1.Make / type no				1		
2.Style						
3.Size/Volume			I.REF. DOCUMENTS : SPEC	CIFY DWG/ MANUAL	REF. NOS.	
4.Diaphragm Matl			1.Assy Dimentional Dwg		2.Assy Hookuj	Dwg
5. Port Size	1/4 " NPT		S.No Item O & M Manual		Spares identifi	er catalog & specfn.
6.Spring no / Range			3. A			
7.Spring To			4. B			
8. Air To			5. B12			
9. Signal Pr.			6. C		1	
<u> </u>	1		7. C6		1	
Handwheel						
10. Handwheel 11. On Air Failure	Stay l	Put	8. D			
11. On Air Failure	Stay l	Put				
	Stay I	Put	8. D 9. F 10. G			

	FACTURER'S NAME &		MANUFA	CTURIN	JRING QUALITY PLAN PROJECT : KOSTI SUDAN, 4 x 125 MW								
	ADDRESS BHEL: TIRUCHIRAPPALLI/			OOLED OI	-	CQP: 2296/ 0 : 29/ 11 /200	S CONTR	ACT NO. :					
APP	D. SUB-CONTRAC	TOR	SUB-SYSTEM			1 OF 5	BHEL (CUST.NO.: 01	157, 0158, 0)159 &	0160		
SL. NO.	COMPONENT &	СНА	RACTERISTICS	CLASS	TYPE OF	QUANTUM	REF .DO	CUMENT/	FORMAT	Α	GENCY	r	REMARKS
	OPERATIONS				CHECK	OF CHECK	ACCEPTAN	ICE NORMS	OF RECORD	M	В	C	
1	2		3	4	5	6	7	8	9		10		11

1.0	MATERIAL #	# Material shall be as per Drg.											
1.1	Plates,Bars,Tubes Rounds, Pipes, SA515 Gr70 SA240(304),SA479 Typ304,ASTM A600 T4,SA 213(304) SA106 GrB,	Chemical and Mechanical Properties	Critical	Review of Documents	100%	As per Material Spec.	TC	P	V	-			
1.2	Sub Deliveries												
1.2.1	Flexible Hoses	Compliance	Major	Review of	100%	Purchase Spec.	R	P	V	-	Procured from		
	Limit switches	to purchase		Document							BHEL approved		
	Air cylinder	order									Sources		

Adm	truly.	LEGEND: M: manufacturer / sub contractor "D" PUBLIC OC / NDTL: "C" Contractor	FOR CUSTOMER USE		
A Francis	GSN Murhty	"B" BHEL QC / NDTL; "C" Customer/ NEC			
PREPARED BY	REVIEWED & APPROVED BY	"R" records / dimensiona reports "p" perform, "W" witness, "V" verification as appropriate			
		TC: test certificate / report	REVIEWED BY	NAME & SIGN. OF	APPROVING AUTHORITY & SEAL
NAME &	SIGNATURE	WPS: weld procedure specification			

	ACTURER'S NAME &		MANUFA	CTURIN	NG QUALIT	ΓY PLAN	PROJEC		OSTI SUD	AN, 4	4 x 125	MW	
ADDRE:	BHEL: TIRUCHIRAPPALLI/ APPD. SUB-CONTRACTOR		ITEM: AIR CO GUN A	OOLED OF SSEMBLY	_	C QP: 2296/ 0 2 : 29/ 11 /2006	CONTR	ACT NO. :					
APP	D. SUB-CONTRAC	TOR	SUB-SYSTEM	•	PAGE	2 OF 5	BHEL (CUST.NO.: 0	157, 0158, ()159 &	0160		
SL. NO.	COMPONENT &	CHA	RACTERISTICS	CLASS	TYPE OF	QUANTUM	REF .DO	CUMENT/	FORMAT	I	AGENCY	ľ	REMARKS
	OPERATIONS				CHECK	OF CHECK	ACCEPTAN	ICE NORMS	OF RECORD	M	В	С	
1	2		3	4	5	6	7	8	9		10		11

2.0 2.1	INPROCESS Marking, cutting and Preparation	Shape, Size Location of Holes	Major	Measurement	100%	Drawing	R	Р	V	-	
2.2	Machining										
2.2.1	Spray Plates Machining	Size,Finish Orientation Of Holes & Lap finish	Major	Measurement & Visual	100%	Drawing	R	P	V	-	
	Nitriding	Sur.hardness # Case depth #	Major Major	Measurement Measurement	sample sample	500 Vickers min at room temp Drawing	R	P	V	-	# Hardness & Case depth will be checked on one test specimen
2.2.2	Nozzle Body Machining	Dimension,Orientation and concentricity	Major	Measurement & Visual	100%	Drawing	R	P	V	-	
	Nitriding	Surface hardness #	Major	Measurement	sample	500 Vickers min at room temp	R	P	V	-	# Hardness & Case depth will be checked on one
222		Case depth #	Major	Measurement	sample	Drawing	D	D	17		test specimen
2.2.3	Cap nut, Seal ring hub	Dimensions Finish	Major	Measurement & Visual	100%	Drawing	R	P	V	-	

	'ACTURER'S NAME &		MANUFA	CTURIN	NG QUALIT	ΓY PLAN	PROJEC		OSTI SUD	AN,	4 x 125	MW	
ADDRE:	SS L : TIRUCHIRAPPA	LLI/	ITEM: AIR CO GUN A	OOLED OI SSEMBLY	-	C QP: 2296/ 0 2 : 29/ 11/2006	CONTR.	ACT NO. :	155 0150 (0150 0	01.60		
APP	D. SUB-CONTRAC	TOR	SUB-SYSTEM	:	PAGE	3 OF 5	BHEL C	CUST.NO.: 0	157, 0158, 0	0159 &	0160		
SL. NO.	COMPONENT & OPERATIONS	CHAI	RACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REF .DOCUMENT/		1	AGENCY	Y	REMARKS
	OFERATIONS				CHECK	OF CHECK	ACCEPTAN	CE NORMS	OF RECORD	M	В	C	
1	2		3	4	5	6	7	8	9		10		11

2.2.4	Removable union	Dimensions	Major	Measurement	100	Drawing	R	P	V	-	
		Orientation of steam		Visual							
		and oil ports, finish									
		Leak-tightness		Hydro test	100%	Drawing	R	P	V	-	No leak is permitted.
2.2.5	Stationary union	Dimensions Orientation of Through holes,	Major	Measurement	100%	Drawing	R	P	V	-	
2.3	Oil gun pipes	Dimensions	Major	Measurement	100%	Drawing	R	P	V	-	
2.4	Nozzle body and Sleeve Sub assy	Dimension Orientation of sleeves gasket& washer	Major	Measurement and visual	100%	Drawing	R	P	V	-	
2.5	Welding	Procedure, Qualification	Major	Review of Document.	100%	AWS D 1.1.	WPS	P	V	-	
		Personnel Qualification	Major	-do-	100%	AWS D 1.1	R	P	V	-	

	ACTURER'S NAME &		MANUFA	CTURIN	NG QUALIT	ΓY PLAN	PROJEC		OSTI SUD	AN, 4	x 125	MW	
ADDRES			ITEM: AIR CO	OLED OI	L QP: (CQP: 2296/ 01	PACKA						
	L:TIRUCHIRAPPA		GUN A	SSEMBLY	DATE	: 29/ 11 /2006)	ACT NO.:	157 0150 (150 8	0170		
APP	D. SUB-CONTRAC	TOR	SUB-SYSTEM	:	PAGE	4 OF 5	BHEL C	CUST.NO.: 01	157, 0158, 0)159 &	0160		
SL. NO.	. NO. COMPONENT & CI		RACTERISTICS	CLASS	TYPE OF	QUANTUM	REF .DO	CUMENT/	FORMAT	A	AGENCY	7	REMARKS
	OPERATIONS				CHECK	OF CHECK	ACCEPTAN	CE NORMS	OF RECORD	M	В	С	
1	2		3	4	5	6	7	8	9		10		11

2.5.1	Weld inspection	Weld size	Minor	Visual	100%	As per Drawing	-	P	V	-	
		Weld quality	Major	LPI/MPI	100%	AWS D 1.1	R	P	V	-	
2.6	Oil gun assembly	KF Dimension, Leak tightness thro' in side & outside port	Critical	Measurement Hydro test	100%	Drawing	R	P	W	-	No leak is permitted.
2.7	Stationary Union assembly	Orientation of limit switch, clamp and attachments	Major	Visual	100%	Drawing	-	P	V	-	
2.8	Guide pipe, Diffuser assy. & Connecting pipe for AC gun	Dimensions, Location of vanes in diff- user Orienta- tion of flexible hoses and attachments	Major	Measurement visual	100%	Drawing	-	P	V	-	

	ACTURER'S NAME &		MANUFA	CTURIN	NG QUALIT	ΓY PLAN	PROJEC		OSTI SUD	AN,	4 x 125	MW	
	SS L : TIRUCHIRAPPA D. SUB-CONTRAC'	-	ITEM : AIR CO GUN A SUB-SYSTEM	SSEMBLY	DATE	CQP: 2296/ 0 : 29/ 11 /2000 5 OF 5	6 CONTR	GE : ACT NO. : CUST.NO. : 0:	157, 0158, (0159 &	: 0160		
SL. NO.	COMPONENT & OPERATIONS	1	RACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		CUMENT/ ICE NORMS	FORMAT OF RECORD	M	AGENCY B	C	REMARKS
1	2		3	4	5	6	7	8	9		10		11

3.0	FINAL										
3.1	Air cooled oil gun assembly complete	Dimension, Orientation of components	Major	Measurement and visual	100%	Drawing	R	P	V	-	
3.2	Verification of completion	Overall dimns. Orientations	Major	Verificn. Visual	100%	As per drawing	-	P	V	-	
3.3	Painting, Preservation & protection	Finish Coat thickness	Minor	Visual Measurement	100% Random	Q:PL:C3-PS / 0157 & Drawing		P	V	-	
3.4	Identification	WO.No.,DU Project	Minor	Visual	100%	Drawing	-	P	V	-	

MANI	UFACTURER'S NAM	LAN	PROJE	CT : K	OSTI SU	DAN	, 4 x	125 I	MW			
	& ADDRESS	ITEM: OIL PREHEA	ATING AN	ND COP NO	0. 2292 / 01	PACK				,		
PRESSURIZING UNIT DATE.: 29 / 11/200							RACT NO.	:				
BHEL : TIRUCHIRAPPALLI SUB-SYSTEM: PAGE 1 OF 4							CUST.NO.	: 0157	, 0158	3, 015	9 & 0	160
SL. NO.	COMPONENT &	CHARACTERISTICS	CLASS	TYPE OF	QUANTUM OF	REF .DOCUMENT/		FORMAT	A	AGENCY	Y	REMARKS
	OPERATIONS			CHECK	CHECK	ACCEPTANCE NORMS		OF RECORD	М	В	С	
								KECOKD				
1	2	3	4	5	6	7	8	9		10		11

1.0	MATERIAL:										
1.1	Plates to SA 515 Gr 70	Chemical & Mechanical	Critical	Review of Document.	100%	Materials Specn.	TC	P	V	-	
	SA 299 IS 2062	Properties Soundness UT	Major	Review of Documents	100%#	Material Specn.	TC	P	V	-	# for plates above 40 mm
1.2	Tubes to SA 210 Gr.A1 SA 179	-do-	Critical	-do-	100%	-do-	TC	Р	V	-	
1.3	Pipes to SA 106 Gr B	Chemical & Mechanical Properties	Critical	-do-	100%	-do-	ТС	Р	V	-	

AUm	tymin	LEGEND: M: MANUFACTURER / SUB CONTRACTOR	FOR CUSTOMER USE	
A Francis	GSN Murhty	B:BHELQC/NDTL C: CUSTOMER/NEC	0.02	
PREPARED BY	REVIEWED & APPROVED BY	P: PERFORM, V VERIFICATION, W: WITNESS		
		R: TEST/DIMENSIONAL REPORTS		
NAME &	SIGNATURE	TC: TEST CERTIFICATES / REPORTS		
		WPS: WELDING PROCEDURE SPECIFICATION.	REVIEWED	NAME & SIGN. OF APPROVING AUTHORITY &
			BY	SEAL

MANU	JFACTURER'S NAMI	E MANUFA	CTURING	G QUALITY P	LAN	PROJE	CT : K	OSTI SU	DAN	, 4 x	125 N	MW
	& ADDRESS	ITEM: OIL PREHEA	ATING AN	ND CQP NC	0. 2292 / 01	PACK	AGE :					
		PRESSURIZ	ING UNI	Γ DATE.: 1	29 / 11/ 2006	CONTI	RACT NO.	:				
BHEL	: TIRUCHIRAPPALL	I SUB-SYSTE	M:	PAGE	2 OF 4	BHEL	CUST.NO.	: 0157	, 0158	3, 015	9 & 0	160
SL. NO.	COMPONENT &	CHARACTERISTICS	CLASS	TYPE OF	QUANTUM OF	REF .D	OCUMENT/	FORMAT	A	AGENCY	Y	REMARKS
	OPERATIONS			CHECK	CHECK	ACCEPTA	ANCE NORMS	OF RECORD	M	В	C	
1	2	3	4	5	6	7	8	9		10		11

1.4	Sub-Deliveries										
1.4.1	Pumps, Strainers, Control valves, Steam traps &	Compliance	Critical	Review of Document.	100%	Purchase Spec.	R	Р	V	-	
	Motors										
2.0	INPROCESS:										
2.1	Welding	Procedure Qualification	Major	Document review	100%	AWS D1.1	WPS	Р	V	-	
2.2	Fabrication										
2.2.1	Base frame	Weld quality	Major	LPI	100%	AWS D 1.1.	R	P	V	-	
2.2.2	Heater shell & Steam channel	soundness	Major	MPI	100%	AWS D 1.1	R	P	W	V	
2.3	Machining of Tube sheet & Baffle plates	Diameter & Thickness	Major	Measurement	100%	Drawing	R	P	V	-	
2.4	Baffle drilling.	Hole size& Finish	Major	Gauging & Visual	*	Drawing	R	Р	V	-	*One plate per stack to be checked fully

MANU	JFACTURER'S NAMI	E MANUFA	CTURING	G QUALITY P	LAN	PROJE	CT : K	OSTI SU	DAN	, 4 x	125 N	MW
	& ADDRESS	ITEM: OIL PREHEA	ATING AN	ND CQP NC	0. 2292 / 01	PACK	AGE :					
		PRESSURIZ	ING UNI	Γ DATE.: 1	29 / 11/ 2006	CONTI	RACT NO.	:				
BHEL	: TIRUCHIRAPPALL	I SUB-SYSTE	M:	PAGE	3 OF 4	BHEL	CUST.NO.	: 0157	, 0158	3, 015	9 & 0	160
SL. NO.	COMPONENT &	CHARACTERISTICS	CLASS	TYPE OF	QUANTUM OF	REF .D	OCUMENT/	FORMAT	I	AGENCY	7	REMARKS
	OPERATIONS			CHECK	CHECK	ACCEPTA	ANCE NORMS	OF RECORD	M	В	С	
1	2	3	4	5	6	7	8	9		10		11

2.5	Expansion holes for tube sheets	Size & Finish	Major	Gauging & Visual	100%	Drawing	R	P	W	V	
		Hole size	Major	Measurement	10%	-do-	R	Р	V	-	10% of holes shall be used for thinning calculation after expansion
2.6	Tube expansion	ID Increase	Major	Gauging	100%	-do-	R	P	V	-	
		Thinning	Major	Measurement	10%	-do-	R	Р	V	-	For holes whose diameter is measured vide 2.5
2.7	Tube to Tube sheet welding	Weld Quality	Major	LPI	100%	AWS D 1.1.	R	Р	W	V	

MANU	JFACTURER'S NAMI	E MANUFA	CTURING	G QUALITY P	LAN	PROJE	CT : K	OSTI SU	DAN	, 4 x	125 I	MW
	& ADDRESS	ITEM: OIL PREHEA	ATING AN	ND CQP NO	0. 2292 / 01	PACK	AGE :					
		PRESSURIZ	ING UNI	Γ DATE.: 1	29 / 11/ 2006	CONT	RACT NO.	:				
BHEL	: TIRUCHIRAPPALL	I SUB-SYSTE	M:	PAGE	4 OF 4	BHEL	CUST.NO.	: 0157	, 0158	3, 015	9 & 0	160
SL. NO.	COMPONENT &	CHARACTERISTICS	CLASS	TYPE OF	QUANTUM OF	REF .D	OCUMENT/	FORMAT	I	AGENCY	Y	REMARKS
	OPERATIONS			CHECK	CHECK	ACCEPTA	ANCE NORMS	OF RECORD	M	В	С	
1	2	3	4	5	6	7	8	9		10		11

3.0	FINAL:										
3.1	Assembly of Heater,Pump & Motor.	Completeness Termial dimensions	Major	Visual Measurement	100% 100%	Drawing Drawing	- R	P	W	V	
3.2	Hydraulic test: Tube side & shell side	Leak tightness	Critical	Visual	100%	Drawing	R	Р	W	V	
3.3	Painting & Preservation	Paint finish Coat thickness	Minor	Visual Measurement	100% Random	Q:PL:C3-PS / 0157	-	P	V	-	
		Identification	Minor	Visual	100%	Drawing	-				

Note: Wherever "V" is indicated in column 10 (C), verification of documents to be done at shop during one of the visits.



Specification for Crude Oil Handling System

SPEC. No.

COHS-001 REV. 00

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Sheet

Annexure - VII

Vendor's Responsibilities

The work to be carried out as per the above scope shall be all in accordance with the requirements, conditions, appendices, etc., stated in the Specification, as completely as if bound herewith. The Contractor shall be responsible for providing all material, equipment and service, which are required to fulfill the intent of ensuring operability, maintainability, reliability and complete safety of the complete work covered under this specification. irrespective of whether it has been specifically listed herein or not. It is not the intent to specify completely herein, all aspects of design and construction of equipment, nevertheless, the equipment shall conform in all aspects to high standards of engineering, design and workmanship and shall be capable of performing in continuous commercial operation, in a manner acceptable to the Purchaser/Owner, who will interpret the meaning of the specification, drawings and shall have a right to reject or accept any work or material which in his assessment is not complete to meet the requirements of this specification and/or applicable international standards.

Bidder is requested to carefully examine and understand the specifications and seek clarifications, if required, to ensure that they have understood the specification. The Bidder's offer should not carry any sections like clarifications, interpretations and / or assumptions. In the event of conflict in interpretation of Technical Specifications vendor may get clarified from purchaser/ owner. However, if the Bidder feels that, in his opinion, certain features brought out in his offer are superior to what has been specified, these may be highlighted separately in the offer.

The Bidder may also make alternate offers provided, such offers are superior in his opinion, to the requirements of these specifications in which case, adequate technical information, operating feed back, etc., are to be enclosed with the offer, to enable the Purchaser/Owner to assess the superiority and reliability of the alternatives offered. In case of each alternative offer, its implications on the performance, guaranteed efficiency, auxiliary power consumption etc., shall be clearly brought out for the Purchaser/Owner to make an overall assessment. In any case, the base offer shall necessarily be in line with the specifications.

In case, all the above requirements are not complied with, the offer may be considered as incomplete and would become liable for rejection.

Deviations, if any, should be very clearly brought out, otherwise, it will presumed that the Vendor's offer is strictly in line with this specification.



Specification for Crude Oil Handling System

SPEC. No. COHS-001

REV. 00

Sheet

2 of 2

The general terms and conditions, instructions to Bidder and the attachments referred to elsewhere are hereby made part of the tender specifications. The equipment materials and works covered by their specification is subject to all the attachments referred in the specification. The Bidder shall be responsible for all requirements stipulated herein after.

Wherever a material or article is specified or described by the name of a particular brand, manufacturer or vendor, the specific items mentioned shall be understood to be descriptive only and not restrictive. Such description indicates the equipment type, function and quality desired. Other manufacturer's products may be considered provided sufficient information so as to enable the Purchaser/Owner to determine that the products proposed are equivalent to those named.

Not withstanding anything stated above, the Purchaser / Owner reserves the right to assess the bidder's capabilities and capacity of the bidder / his collaborators / licenser / his sub-contractor to perform the contract, should the circumstances warrant such assessment in the overall interest of the Purchaser .The bidder shall provide all necessary data related to sub vendor such as type, design, make, capacity, duty conditions, date of commissioning/operation etc

	PRESSURE & DIFFERENTIAL PRESSURE SWITCHES							
1	Application	Pressure vessel and piping.						
2	Medium	Crude oil						
3	Туре	On line – Remote capilliary for Crude oil						
4	Accuracy	(+ or -) 1% of FSD						
5	Repeatability	(+ or -) 0.5 % of FSD						
6	Sensing element type	Diaphragm cum piston or Bellows or capsule						
7	Proof pressure	200 % of operating pressure						
8	Construction	Weather proof, water tight & dust tight as per IP55 of IS 2147 & Explosion proof – intrinsically safe suitable for Hazardous Area classification as per IS 5572, Gas group II A & II B of IS-2148.						
9	Painting	Stoved Enameled anti - corrosive painting or Epoxy powder coated.						
10	Switching element	2SPDT						
11	Type of contact	Environmentally Sealed micro switch with gold plated contact -auto reset.						
12	Contact rating	30 V DC, 1 A mp.						
13	Contact Action	Contact to close on increasing or decreasing parameter as per Data Sheet.						
14	Cable Entry	1/2" NPT (F) – 2 Nos. with suitable plugs.						
15	Terminal strip	To be provided inside the switch enclosure suitable for 2.5 sq.cm wire.Stud type or screw type with pressure plate.						
16	Internal wiring	To be provided inside the switch enclosure suitable for 2.5 sq.cm wire. Stud type or screw type with pressure plate.						
17	Set Point	Continuously adjustable through out the range with calibrated scale						
18	MATERIAL							
19	Case	Die cast Aluminium						
20	Pressure port	Stainless steel						
21	Sensing element	AISI 316 SS						
22	Internal parts	Steel cadmium plated or stainless steel						
23	Contact	Steel cadmium plated or stainless steel silver alloy.						

	TEN	IPERATURE SWITCHES WITH THERMOWELL
1	Application	Pressure vessel and piping.
2	Medium	Crude oil
3	Туре	Remote - Capillary type
4	Accuracy	(+ or -) 1 % of FSR
5	Repeatability	(+ or -) 1 % of FSR
6	Sensing system	Gas actuated / Mercury filled
7	Proof temperature	200 % of operating temperature
8	Type of sensing element	Diaphragm cum piston or bellows
9	Enclosure protection	Weather proof, water tight & dust tight as per IP55 of IS 2147 & Explosion proof – intrinsically safe suitable for Hazardous Area classification as per IS 5572, Gas group II A & II B of IS-2148.
10	Painting	Stoved Enameled anti - corrosive painting or Epoxy powder coated.
11	Switching element	2 Nos of SPDT
12	Type of contact	Environmentally Sealed micro switch with gold plated contact -auto reset.
13	Contact rating	5A at 240 V AC, 50 Hz or 0.25 A at 220 V DC
14	Contact Action	Contact to close increasing or decreasing parameter
15	Cable entry	3 / 4 " NPT (F)
16	Terminal strip	To be provided inside the switch enclosure suitable To be provided inside the switch enclosure suitable for 2.5 sq mm wire. Stud type or screw type with
17	Internal wiring	Shall be done with 1.5 sqmm PVC wire
18	Thermowell connection for process	M 33 X 2 (M)
19	Dead band / Switching	Fixed minimum
20	Differential Set point	Continuously adjustable through out the range with calibrated scale
21	MATERIAL	
22	Body	Die cast Aluminium
23	Sensing element	AISI 316 SS
24	Internal parts	Steel cadmium plated or SS
25	Contact	Silver alloy AISI 316 SS
26	Thermowell	AISI 316 SS

	P	RESSURE GAUGES - BOURDON TYPE
1	Reference standard	IS 3624
2	Туре	Direct reading
3	Scale	Industrial concentric 270° linear
4	Sensing element	Bourdon for Pressure ranges.
5	Nominal Dial Size	150 mm Circular
6	Accuracy	± 1% of URV (FSD)
7	Over range protection	125% of maximum range.
8	Dial graduation	Graduated in Kg / Sq.cm
9	Zero adjustment	External Micrometer adjustable Pointer (from the front after opening the bezel)
10	Enclosure protection	Weather proof, water tight & dust tight IP 55 of IEC - 529 / IS-2147 (IS - 12063)
11	Identification	Separate SS name plate with Tag No. & Service legend attached to the
12	MATERIAL	
13	Case	Stainless Steel (SS 304)
14	Bezel	AISI 316 SS
15	Bourdon / Diaphragm/ Bellows / Capsule	AISI 316 SS
16	Movement assembly	AISI 304 SS
17	Window	Shatter proof glass.
18	Blow out disc	Neoprene
19	Socket	AISI 316 SS

	PRESSURE	GAUGES - CHEMICAL SEAL DIAPHRAGM TYPE
1	Reference standard	IS 3624
2	Туре	Direct reading
3	Scale	Industrial concentric 270 Degree linear
4	Sensing element	Diaphragm with chemical seal
5	Nominal Dial size	150 mm Circular
6	Accuracy	± 1% of FSD
7	Over range protection	125% of maximum range.
8	Dial graduation	Graduated in Kg / Sq.cm
9	Zero adjustment	External Micrometer adjustable Pointer (from the front after opening the bezel)
10	Enclosure protection	Weather proof , water tight & dust tight IP 55 of IEC - 529 / IS-2147 (IS - 12063)
11	Identification	Separate SS name plate with Tag No. & Service legend attached to the gauge
12	MATERIAL	
13	Case	Stainless Steel (SS 304)
14	Bezel	AISI 316 SS
15	Bourdon	AISI 316 SS
16	Movement assembly	AISI 304 SS
17	Window	shatter proof glass.
18	Blow out disc	Neoprene
19	Socket	AISI 316 SS
20	Diaphragm Chamber Sensing Element	AISI 316 SS Teflon coated / Sheathed and welded type diaphragm
21	Top Chamber	AISI 304 SS
22	Bottom Chamber	AISI 316 SS Teflon coated / Sheathed
23	Sealing Liquid	Silicon oil.
24	Capillary	SS 316 with SS 304 armoring of 5 meter length

	DI	FFERENTIAL PRESSURE GAUGE
1	Reference standard	IS 3624
2	Туре	Direct Reading
3	Scale	Linear, 270 deg arc, graduate in metric units.
4	Sensing element	Bourdon for high pressure Diaphragm/Bellow for low pr.
5	Nominal Dial size	150 mm Circular
6	Accuracy	± 2% of FSD
7	Over range protection	The + ve and - ve side of the presure chamber shal be unilaterally over load proof 1,5 ime the full scale value Max 25 Kg/Sq.cm.
8	Dial graduation	
9	Zero / Span adjustment	External Micrometer adjustable Pointer (from the front after opening the bezel)
10	Enclosure protection	Weather proof, water tight and dust tight to IP 55 of IEC - 529 / IS 2147(IS 12063)
11	Identification	Separate SS name plate with Tag No. & Service legend attached to the gauge
12	MATERIAL	
13	Case	Stainless Steel (SS 304)
14	Bezel	AISI 316 SS
15	Diaphragm / Bourdon / Bellows	AISI 316 SS
16	Movement assembly	304SS
17	Window	Shatter proof glass
18	Blow out disc	Neoprene
19	Measuring chamber	Stainless steel

	TEMPERATURE GAUGE WITH THERMOWELL								
1	Reference standard	BS 5235 / SAMA							
2	Туре	Remote capillary type.							
3	Scale	Linear, 270 deg arc, graduate in metric units.							
4	Sensing Element	Liquid / Vapour / Gas filled							
5	Nominal Dial size	150 mm Circular							
6	Accuracy	± 1 % of FSD							
7	Over range protection	125% of max range.							
8	Dial Graduation	Graduated in Deg.C.							
9	Zero Adjustment	External Micrometer adjustable Pointer (from the front after opening the bezel)							
10	Enclosure protection	Weather proof, water tight & dust tight. IP 55 of IEC 529 / IS - 2147 (IS 12063).							
11	Identification	Separate SS name plate with Tag No. & Service legend attached to the gauge							
12	MATERIAL								
13	Case	Stainless Steel (SS 304)							
14	Bezel	AISI 316 SS							
15	Bourdon	Chrome moly steel or AISI 316 SS							
16	Movement assembly	AISI 304 SS							
17	Window	Shatter proof glass .							
18	Thermowell								
19	Thermowell specification	As per ASME performance test code							
20	Thermowell	AISI 316 SS							
21	Thermowell bore dia	Suitable to accommodate sensing bulb							
22	Thermowell process connection	M33 X 2 (M)							
23	Thermowell type	Bar stock / tapered							
24	Bulb								
25	Bulb and stem	AISI 316 SS							
26	Bulb OD	To suit thermowell ID							
27	Bulb to thermowell	1/2" NPT(M)							
28	Capillary								
29	Capillary	AISI 304 with SS flexible armouring & PVC covering over armour.							
30	Capillary size	1.5 mm dia							
31	Capillary sheath	4.5 mm OD SS							
32	Capillary length	5 metres							
33	Test pressure	200 Kg / sqcm							
34	Response time	Not more than 15 secs. (Without thermowell)							

List of C&I Items with QP

 $\underline{\text{Note}}\textsc{:}$ Purchase/MM shall attach the following applicable QPs along with the Specification.

SL.	Description	QP Number
No.		
01	Pressure gauges.	QA:CI:STD:QP:01
02	Temperature gauges	QA:CI:STD:QP:02
03	DP gauges	QA:CI:STD:QP:01
04	Pressure switches	QA:CI:STD:QP:06
05	Temperature switches	QA:CI:STD:QP:18
06	DP switches	QA:CI:STD:QP:06
07	Pneumatic actuator - open / close type	CI:QA:SUDAN:CQP:02
08	Electric actuator regulating	QA:CI:STD:QP:13
09	Flame scanner shielded cable	CI:QA:SUDAN:CQP:04



BHARAT HEAVY ELECTRICALS LIMITED / TIRUCHIRAPPALLI CONTROLS AND INSTRUMENTATION/QA/FB

STANDARD QUALITY PLAN FOR PRESSURE GAUGE (BOURDON, DIAPHRAGM & DRAFT)

REV	DATE	PREPARED	REVIEWED	APPROVED	REVISION
00		Sd	Sd	Sd	HISTORY Initial release.
01		Sd	Sd	Sd	General revision.
02	03.06.93	Sd	Sd	Sd	Converted to 9 column QP.
03	16.06.97	Sd	Sd	Sd	Format revised.
04	21.03.02	Sd	Sd	Sd	Dept. name changed, CTQ_requiremen
05	09.01.04				added & General revision.
	08.01.04	DISTRICTION OF THE PROPERTY OF	N.SRIDHAR	S.SOMASUNDARAM	Revised to include the comments /Feedback of internal discussion / Vendomeet.

QA:CI:STD:QP:01/REV 05 PAGE 02 OF 06

SL. NO.	COMPONENT & OPERATION	CHARACTERISTICS	TYPE OF CHECK	QUANTUM OF CHECK	REF.DOC. & ACCEPTANCE STANDARD	FORMAT OF RECORD	AGENCY	REMARKS
<u>A.</u>	RAW MATERIAL & BO	DUGHTOUT ITEMS INSPE	CTION					
1.	Raw Material For							
	a) Sensing ⇒ element, (Bourdon/Diaphram/Bellow/Capsule)	Material composition	CHEM	One sample per lot.	Manufacturer's standard.	IQR	MQCD/ Lab.	
	b) Movement ⇒ assembly	Material composition	CHEM	- do -	- do -	- do -	- do -	
	c) Socket \Rightarrow	Material composition	CHEM	- do -	- do -	- do -	- do -	
2.	Case and Bezel	a) Dimension	MEAS	100%	- do -	- do -	MQCD	
		b) Finish	PHYS	- do -	- do -	- do -	- do -	
3.	Gasket	a) Material composition	CHEM	One sample per lot.	- do -	- do -	- do -	
		b) Dimension	MEAS	100%	- do -	- do -	- do -	
4.	Pointer	a) Dimension	MEAS	- do -	- do -	- do -	- do -	
		b) Shape	PHYS	- do -	- do -	- do -	- do -	
<u>B.</u>	IN PROCESS INSPECTION							
1.	Formation of bourdon & welding with ⇒	a) Dimension	MEAS	- do -	Manufacturer's standard.	- do -	- do -	

QA:CI:STD:QP:01/REV 05 PAGE 03 OF 06

SL. NO.	COMPONENT & OPERATION	CHARACTERISTICS	TYPE OF CHECK	QUANTUM OF CHECK	REF.DOC. & ACCEPTANCE STANDARD	FORMAT OF RECORD	AGENCY	REMARKS
	Socket		OFILOR	OFFICIAL	(Temperature & duration to be monitored.)	NEGOND		
	\Rightarrow	b) Stress relieving.	MECH	100%	Manufacturer's standard. (Temp & duration to be monitored.)	IQR	MQCD	
	\Rightarrow	c) Leakage(Hydro test/Helium test)	MECH	- do -	Manufacturer's standard	- do -	- do -	
2.	Assembly	a) Range , Connection size and dial size	MECH	- do -	Manufacturer's standard, IS 3624/EN837- 1,2,3	- do -	- do -	
<u>C.</u>	FINISHED PRODUC	T INSPECTION						
1	Routine Tests ⇒	a) Physical & dimensional check including scale marking & tag details.	PHYS	100%	Manufacturer's Standard, IS 3624/EN837- 1,2,3, Approved drawing and Data sheet	- do -	- do -	СНР
	\Rightarrow	b) Calibration test (accuracy) at minimum 5 points over the range before & after over Pressure test.	MEAS & MECH	- do -	- do -	- do -	- do -	СНР

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SL. NO.	COMPONENT & OPERATION	CHARACTERISTICS	TYPE OF CHECK	QUANTUM OF CHECK	REF.DOC. & ACCEPTANCE STANDARD	FORMAT OF RECORD	AGENCY	REMARKS
	\Rightarrow	c) Over range	PHYS & MECH	- do -	- do -	- do -	- do -	СНР
	\Rightarrow	protection test. d) Range.	MEAS	100%	Manufacturer's Standard, IS 3624/EN837- 1,2,3, Approved drawing and Data sheet	IQR	MQCD	СНР
	\Rightarrow	e) Dial size.	MEAS	- do -	- do -	- do -	- do -	СНР
	\Rightarrow	f) Zero adjustment.	PHYS	- do -	- do -	- do -	- do -	СНР
	\Rightarrow	g) Blow out disc.	PHYS	- do -	- do -	- do -	- do -	СНР
	\Rightarrow	h) Mounting , entry and Process Connection	PHYS	- do -	- do -	- do -	- do -	СНР
	\Rightarrow	j) Over pressure test	MECH	- do -	- do -	- do -	- do -	СНР
		j) Check CTQ characters indicated under Raw material & In process inspection for verification of records only.	PHYS	- do -	- do -	- do -	- do -	СНР
		k) Bouardon Arc dia	MEAS	As Per Sampling Plan – Note – G	As Per Relevant Standard	- do -	- do -	СНР

QA:CI:STD:QP:01/REV 05 PAGE 05 OF 06

SL. NO.	COMPONENT & OPERATION	CHARACTERISTICS	TYPE OF CHECK	QUANTUM OF CHECK	REF.DOC. & ACCEPTANCE STANDARD	FORMAT OF RECORD	AGENCY	REMARKS
		I) Hysterisis & Repeatability.	MECH	100%	IS 3624/ EN837- 1,2,3/BS 1780	- do -	- do -	СНР
2	Type Tests	a) Enclosure protection.	ENVI	One of design.	IS 12063, IS13947- 1, IEC 529	T.C	MQCD / Lab	CHP- TC Verification
		b) Endurance test.	MECH	- do -	IS 3624/ EN837- 1,2,3	- do -	MQCD	- do -
		d) Thermal stability test.	ENVI	- do -	NOTE "F"	- do -	- do -	- do -
		e) Vibration test	MECH	- do -	EN837-1,2,3	- do -	- do -	- do -

QA:CI:STD:QP:01/REV 05 PAGE 06 OF 06

D. NOTES:

1. LEGEND

MQCD: MANUFACTURER'S QUALITY CONTROL

DEPARTMENT;

MECH: MECHANICAL; CHEM: CHEMICAL; ENVI :ENVIRONMENTAL LGB: LOG BOOK; T.C.: TEST CERTIFICATE; PHYS: PHYSICAL;

MEAS : MEASUREMENT;

⇒ : CRITICAL TO QUALITY POINTS; IQR : INTERNAL QUALITY REPORT;

LAB : LABORATORY (GOVT . APPROVED / NABL ACCREDITED)

CHP : CUSTOMER HOLD POINT - INSPECTION BY

BHEL.

- All testing facilities shall be arranged by the vendor at their works.
 Tests for which facilities are not available & those tests marked test
 lab in agency column above are to be carried out at recognised
 national test houses like ETDC/ CIL / NPL / ERTL ETC at vendor's cost.
- 3. Through logbooks / any other documents available at the vendor's works, it shall be possible to corelate the finished product with raw material and inprocess stage checks / inspection carried out.
- 4. All measuring and testing instruments shall be periodically calibrated from recognised test houses and valid certificates made available during inspection.
- 5. Test certificates for routine & type tests are to be furnished by the vendor. Type test certificate shall not be earlier than 5 years from the date of Purchase enquiry. If any changes are made in the design, material and process, the type tests shall be repeated, irrespective of the validity of existing type test certificate.
- 6. Vendor to give tentative inspection programme in advance and confirm exact date two weeks in advance for arranging inspection by BHEL or by its authorised Inspection agency
- 7. Packing shall be as per the 'PACKING PROCEDURE' indicated in the Specification

<u>E. REFERENCE STANDARDS</u>: (For The Indicated Standards refer The Latest Version)

BS 1780: Specification for Bourdon tube Pressure and

vacuum gauge

IEC:529: Specification for degrees of protection

provided by enclosure.

IS 3624: Specification for pressure and vacuum

gauges.

IS4905: Methods for Random Sampling

IS12063: Classification of Degrees of protection

provided by enclosures for electrical

equipment

IS 13947- 1: Specification For General Rules for Low

Voltage Switch Gear.

F. THERMAL STABILITY TEST:

A cyclic temperature test shall be performed in a suitable test chamber by Elevating the temperature to the maximum rated temperature within two hours. The instrument case shall be held at the maximum temperature for 10 hours. The case temperature shall then be lowered to the specified minimum Temper ature over a 2 hours period. The minimum temperature shall also be held for 10 hours. 2 Cycles at Third Party Lab (Govt. Appd / NABL Accrediated) or 5 Cycles at MQCD is acceptable. Maximum & minimum temperatures are as per Manufacturer's catalogue. At the end of this period, there shall be no visible deterioration of the gaskets, seals, protective coating nor any significant distortion of the case.

G. SAMPLING PLAN FOR INSPECTION:

- a) As Per IS 4905 or 10% of offered quantity as per the discretion of the inspector.
- b) If non-conformance is observed on one number in any character, then inspection shall be carried out on all 100%.

BHARAT HEAVY ELECTRICALS LIMITED / TIRUCHIRAPPALLI CONTROLS AND INSTRUMENTATION/QA/FB

STANDARD QUALITY PLAN FOR TEMPERATURE GAUGE

REV	DATE	PREPARED	REVIEWED	APPROVED	REVISION
00		Sd	Sd	Sd 	Initial release.
01		Sd	Sd	Sd	General revision.
02	03.06.93	Sd	Sd	Sd	Converted to 9 column qp.
03	16.06.97	Sd	Sd	Sd	Format revised.
04	21.03.02	Sd	Sd	Sd	Dept. name changed, CTQ requirements added & General revision.
05	08.01.04	RM.VAIRAVAN	N.SRIDHAR	S.SOMASUNDARAM	Revised to include the comments /Feedback of internal discussion / Vendors meet.

QA:CI:STD:QP:02/REV 05 PAGE 02 OF 06

SL. NO.	COMPONENT & OPERATION	CHARACTERISTICS	TYPE OF CHECK	QUANTUM OF CHECK	REF.DOC. & ACCEPTANCE STANDARD	FORMAT OF RECORD	AGENCY	REMARKS
<u>A.</u>	RAW MATERIAL & E	BOUGHTOUT ITEMS INSP	PECTION					
1	Raw Material For a) Sensing ⇒ element, (Bourdon / Diaphram)	a) Material composition.	CHEM	One sample per lot.	Manufacturer's standard	IQR	MQCD/ Lab	
	b) Movement ⇒ assembly	Material composition	CHEM	- do -	- do -	- do -	- do -	
	c) Socket \Rightarrow	Material composition	CHEM	- do -	- do -	- do -	- do -	
2.	Case and Bezel	a) Dimension	MEAS	100%	- do -	- do -	MQCD	
		b) Finish	PHYS	- do -	- do -	- do -	- do -	
3.	Gasket	c) Material Composition	CHEM	One sample per lot.	- do -	- do -	- do -	
		b) Dimension	MEAS	100%	- do -	- do -	- do -	
4.	Pointer	a) Dimension	MEAS	- do -	- do -	- do -	- do -	
		b) Shape	PHYS	- do -	- do -	- do -	- do -	
5	Thermowell	a) Material composition.	CHEM	One sample per lot.	- do -	- do -	MQCD/ Lab	

QA:CI:STD:QP:02/REV 05 PAGE 03 OF 06

SL. NO.	COMPONENT & OPERATION	CHARACTERISTICS	TYPE OF	QUANTUM OF	REF.DOC. & ACCEPTANCE	FORMAT OF	AGENCY	REMARKS
		a) Dimension	CHECK MEAS	CHECK 100%	STANDARD Manufacturer's standard.	RECORD IQR	MQCD	
6	Capillary/Bulb	a) Leak tightness.	PHYS	100%	- do	- do	MQCD	Pressure Test.
<u>B.</u>	IN PROCESS INSPEC	TION						
1	Forming Bourdon & Welding with Socket	a) Dimension	MEAS	100%	Manufacturer's standard. (Temperature & duration to be monitored.)	IQR	MQCD	
	\Rightarrow	b) Stress relieving.	MECH	- do -	- do -	- do -	- do -	
	\Rightarrow	c) Leakage (Hydro test/Helium test)	MECH	- do -	Manufacturer's standard	- do -	- do -	
2	Machining of Thermowell (Turning, boring Threading, Finishing & buffing)	a) Dimension	MEAS	- do -	Specification; PO & Approved drawing	- do -	- do -	
		b) Surface finish	VISU	- do -	- do -	- do -	- do -	
	\Rightarrow	c) Concentricity	VISU	- do -	- do -	- do -	- do -	
		d) Thickness	MEAS	- do -	- do -	- do -	- do -	
3	Assembly	a) Pointer motion.	PHYS	- do -	Manufacturer's standard	- do -	- do -	

QA:CI:STD:QP:02/REV 05 PAGE 04 OF 06

SL. NO.	COMPONENT & OPERATION	CHARACTERISTICS	TYPE OF CHECK	QUANTUM OF CHECK	REF.DOC. & ACCEPTANCE STANDARD	FORMAT OF RECORD	AGENCY	REMARKS
<u>c.</u>	FINISHED PRODUCT	INSPECTION						
01	Routine Test ⇒	a) Physical and dimensional check including process connection for gauge and thermowell, scale marking and Tag details.	PHYS	100%	Manufacturer's Standard, BS 5235/EN837- 1,2,3, Approved Drawing and Data sheet	IQR	MQCD	CHP (IBR FORM IIIC where required shall be submited for thermowell)
	\Rightarrow	b) Calibration test (accuracy) at minimum 5 points over the range before & after over Pressure test.	MEAS & MECH	- do -	Manufacturer's Standard, BS 5235/EN837- 1,2,3, Approved Drawing and Data sheet	- do -	- do -	СНР
		c) Hydraulic Test for Thermowell.	MECH	- do -	- do -	- do -	- do -	СНР
		d) Response time test.	THER	- do -	Refer Note:F	- do -	- do -	СНР
	\Rightarrow	e) Range.	MEAS	- do -	- do -	- do -	- do -	СНР
	\Rightarrow	f) Dial size.	MEAS	- do -	- do -	- do -	- do -	СНР
	\Rightarrow	g) Mounting , entry and Process Connection	PHYS	- do -	- do -	- do -	- do -	СНР

QA:CI:STD:QP:02/REV 05 PAGE 05 OF 06

SL. NO.	COMPONENT & OPERATION	CHARACTERISTICS	TYPE OF CHECK	QUANTUM OF CHECK	REF.DOC. & ACCEPTANCE STANDARD	FORMAT OF RECORD	AGENCY	REMARKS
		h) check CTQ characters indicated under Raw material & In process inspection for verification of records only.	PHYS	100%	Manufacturer's Standard, BS 5235/EN837- 1,2,3, Approved Drawing and Data sheet	IQR	MQCD	CHP
		i) Hysterisis & Repeatability.	MECH	- do -	- do -	- do -	- do -	СНР
2.	Type Tests.	a) Enclosure protection.	MECH	One of design	IEC 529 / IS 12063/IS 13947-1 Specification , PO , BS 5235 & drawing	T.C	MQCD/ Lab	CHP Verification of TC.
		b).Over Temperature stability Test.	MECH	- do -	- do -	- do -	- do -	
		c).Vibration test.	MECH	- do -	EN837-1,2,3	- do -	- do -	
		d).Ambient temperature compensation test.	THER	- do -	Refer Note F	- do -	- do -	

QA:CI:STD:QP:02/REV 05 PAGE 06 OF 06

D. NOTES:

1. MQCD: MANUFACTURER'S QUALITY CONTROL DEPARTMENT;

MECH: MECHANICAL; CHEM: CHEMICAL; VISU: VISUAL; THER: THERMAL; SPEC: SPECIFICATION; LGB: LOG BOOK;

T.C. : TEST CERTIFICATE; MEAS : MEASUREMENT;

PHYS: PHYSICAL;

IQR : INTERNAL QUALITY REPORT

P.O: PURCHASE ORDER;

LAB : LABORATORY (GOVT. APPROVED/ NABL ACCREDITED)
CHP : CUSTOMER HOLD POINT - INSPECTION BY BHEL.

- 2. All testing facilities shall be arranged by the vendor at their works. Tests for which facilities are not available & those tests marked test lab in agency column above are to be carried out at recognized national test houses like ETDC / CIL / NPL /ERTL etc.. at vendor's cost.
- 3. Through logbooks/any other documents available at the vendor's works, it shall be possible to correlate the finished product with raw material and in process stage checks/inspection carried out.
- 4. All measuring and testing instruments shall be periodically calibrated from recognized test houses and certificates made available during inspection for verification.
- 5. Test certificates for routine & type tests are to be furnished by the vendor. Type test certificate shall not be earlier than 5 years from the date of Purchase enquiry. If any changes are made in the design, material and process, the type tests shall be repeated, irrespective of the validity of existing type test certificate.

- 6. Vendor to give tentative inspection program in advance and confirm exact date two weeks in advance for arranging inspection by BHEL or by the authorized inspection agency.
- 7. Packing shall be as per the 'PACKING PROCEDURE' indicated in the Specification.

E.REFERENCE STANDARDS: (For The Indicated Standards Refer The Latest Version)

1) **BS 5235** : Dial type thermometer.

2) **IEC 529** : Specification for degrees of protection provided by

enclosure.

3) **IS4905** : Methods for Random Sampling

4) IS 12063 : Specification on degrees of protection offered by

enclosure.

F.TYPICAL PROCESS & TEST REQUIREMENTS:

- 1) Response time test: Time taken to reach 63% of the temperature difference between bath temperature and room temp. shall not exceed 15 seconds, when the bulb is directly immersed in a well stirred liquid bath, and shall not exceed 50 seconds when used with a thermowell.
- 2) Ambient temperature compensation test: The thermometer case (along with capillary in the case of capillary thermometers) shall be kept in an environment chamber, where the temperature shall be varied from 0 to 60 °C. keeping the thermometer bulb in a constant temperature bath, the resultant difference in gauge reading due to temp. variation in the chamber shall not exceed the specified accuracy limits.

G. SAMPLING PLAN FOR INSPECTION:

- a) As Per IS 4905 or 10% of offered quantity as per the discretion of the inspector.
- b) If non-conformance is observed on one number in any character, then inspection shall be carried out on all 100%.

BHARAT HEAVY ELECTRICALS LIMITED TIRUCHIRAPPALLI

QUALITY ASSURANCE CONTROLS AND INSTRUMENTATION

QA:CI:STD:QP:18/REV 02

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STANDARD QUALITY PLAN

FOR

TEMPERATURE SWITCHES

	T		DOLGENED	APPROVED	REVISION HISTORY
REV	DATE	PREPARED	REVIEWED	ATTROVED	
00	17.01.90	Sd	Sd	Sd	Initial release.
01	16.06.97	Sd	Sd	Sd	Format revised
02	21.03.02	A.J.OMPRAKASH	R.VARADARAJAN	G.MATHIYALAGAN	Department name changed, CTQ requirements added
		Myndon	entre	Tomath	& General revision.
1	1				

QA : CI : STD : QP : 18 / RE > 02

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₹O.	COMPONENT & OPERATION	CHARACTERISTICS	TYPE OF CHECK	QUANTUM OF CHECK	REF. DOC & ACCEPTANCE STD	FORM OF RECORD	AGENCY	REMARKS
x) 1	ROUTINE TEST	FINISHED PRODUCT INSPECTION 1) PHYSICAL & DIMENSIONAL CHECK FOR INSTRUMENTS & THERMOWELL	PHYS & MEAS	100 %	P.O; SPEC & MFR'S STD	TC	MQCD	СНР
	·	♦2) PROCESS CONNECTON	PHYS]	
		\$3) CALIBRATION (ACCURACY) AT 4 POINTS OVER THE RANGE	месн					
		4) OVER-TEMP. TEST	THER					\$ T
		5) INSULATION RESISTANCE TEST (INSULATION RESISTANCE SHOULD MORE THAN 10 MEGA OHM - THERE SHALL BE NO FLASH OVER)	ELEC					
		6) HIGH VOLTAGE TEST AT 1.5 KV FOR 1 MINUTE	ELEC		· ·			
		♦7) CONTACT TYPE, RATING AND ACTION	PHYS			,		
	:	♦8) SET POINT	PHYS	•	•			
		♦9) PULSATION DAMPER/SNUBBER	PHYS	# ,	•	·		
		♦10) PROOF PRESSURE TEST	MEAS		· ·			
		♦11) CHECK FOR SWITCHING DIFFERENTIAL (DEAD BAND) AND REPEATABILITY	MEAS	•				_
		♦12) VALVE MANIFOLD	PHYS		· •/			
	TYPE TEST	♦ ENCLOSURE PROTECTION TEST	ENVI	ONE OF DESIGN	SPEC; IS 13947 Pt 1 & NEMA	TEST REPORT	TEST LAB	CHP-For verification of type test certificates

QA: CI: STD: QP: 18/REV 02

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B) NOTES:

MQCD : Manufacturer's quality control dept;

PHYS : Physical; MECH: Mechanical:

MEAS : Measurement: ENVI : Environmental; ELEC: Electrical;

SPEC : Specification; THER: Thermal;

TC : Test Certificate: STD

MFR'S STD: Manufacturer's Standard;

: Standard: TEST LAB: Test laboratory:

: Purchase Order; NEMA : National Electrical Manufactures Association;

Critical To Quality (CTQ) Points;

Customer Hold Point - Inspection by BHEL. CHP

- ii) All testing facilities shall be arranged by the vendor at their works. Test's for which facilities are not available & Those tests marked as test lab in agency column above are to be carried out at recognised national test houses like ETDC / CIL / NPL / ERTL etc: at vendor's cost.
- iii) Through log books/any other documents available at the vendor's works, it shall be possible to corelate the finished product with raw material & in - process stage checks/inspection carried out.
- iv) All measuring & testing instruments shall be periodically calibrated from recoginsed test house and certificates made available during inspection for verification.
- v) Test certificate for Routine/Type test are to be furnished by the vendor. The type test certificate shall not be earlier than 5 years from the date of purchase enquiry.

- vi) Vendor to give tentative inspection programme in advance & confirm exact date three weeks in advance for arranging BHEL's inspection.
- vii) Packing shall be as per the "PACKING PROCEDURE" indicated in the Specification.
- C) REFERENCE STANDARD (FOR THE INDICATED STANDARDS REFER THE LATEST VERSION)
 - 1) IS 13947 Pt 1: General rules for low voltage switchgear (Degrees of
 - enclosure protection offered by enclosures)
 - 2) NEMA : Nema standard "Enclosures for electrical equipment

(1000V max.)".

D) SAMPLING PLAN FOR INSPECTION:

- (a) 10% of offered quantity subject to a maximum of five numbers.
- (b) If non-conformance is observed on one number in any character. then inspection shall be carried out on all 100%.

L: QPS: STDQP: STDQP18.DOC

BHARAT HEAVY ELECTRICALS LIMITED / TIRUCHIRAPPALLI CONTROLS AND INSTRUMENTATION/QAC/FB

CONTRACT QUALITY PLAN

FOR

PNEUMATIC ACTUATORS (POWER CYLINDER)

(OPEN / CLOSE AND REGULATING TYPE) (BOUGTOUT ITEMS)

KOSTI SUDAN 4 X 125 MW

NATIONAL ELECTRICITY CORPORATION, SUDAN

REV	DATE	PREPARED	REVIEWED	APPROVED	REVISION HISTORY
00	09/05/06	Sd/-	Sd	Sd	Initial Release
01	20/11/06	Sd/-	Sd	Sd	Revised as per IO/BHEL email dt. 16/11/06.
02	05/02/07	RM.VAIRAVAN	N.SRIDHAR	S.SOMASUNDARAM	General revisions

SL.	COMPONENT &	CHARACTERISTICS	TYPE	QUANTUM	REFERENCE DOC. &	FORMAT	A	GEN	CY	REMARKS
NO	OPERATION		OF CHECK	OF CHECK	ACCEPTANCE STANDARD	OF RECORD	М	В	С	
<u>A.</u>	RAW MATERIALS & BO	UGHT ITEMS INSPECTION	1							
1.	Cylinder	a) Material	CHEM	OSPL	Specification & BS 970	LGB	Р	-	-	
		b) Dimension	MEAS	100%	Mfr standard	- do -	Р	-	-	
		c) Finish	MEAS	100%	- do -	- do -	Р	-	-	
		d) Pressure resistance test	PHYS	OSPL	JIS B8377	LGB	Р	V		
2.	Piston rod, Cylinder caps, Piston ring	a) Material	CHEM	OSPL	Specification, BS970	LGB	Р	-	-	
		b) Dimension	MEAS	- do -	Mfr standard	- do -	Р	-	-	
3.	" O " ring	a) Material	CHEM	- do -	Specification	- do -	Р	-	-	
		b) Dimension	MEAS	- do -	Mfr standard	- do -	Р	-	-	
		c) Hardness	MEAS	- do -	- do -	- do -	Р	-	-	
4.	Housing & cover	a) Material	CHEM	- do -	- do -	- do -	Р	-	-	
		b) Dimension	MEAS	- do -	- do -	- do -	Р	-	-	
5.	Air filter regulator	a) Type & Make	PHYS	- do -	Specification & data sheet	- do -	Р	-	-	
		b) Pressure gauge range	PHYS	- do -	- do -	- do -	Р	-	-	
		c) Dimension of process connection	MEAS	- do -	- do -	- do -	Р	-	-	
		d) Filter size in Microns	PHYS	- do -	do –	- do -	Р	-	-	
6.	Limit switches	a) Make &Type number	PHYS	100%	Specification & Data sheet	LGB	Р	-	-	
		b) Functional check	ELEC	- do -	- do -	- do -	Р	-	-	
7.	Air lock relay	a) Functional check	PHYS	- do -	- do -	- do -	Р	-	-	
	,	b) Make, Type number	PHYS	- do -	- do -	- do -	Р	-	-	
8.	Solenoid valve (only for open / close)	a) Make &Type number	PHYS	- do -	- do -	- do -	Р	-	-	
	,	b) Class of insulation	PHYS	- do -	- do -	- do -	Р	-	-	
		c) Functional check	ELEC& MECH	- do -	- do -	- do -	Р	-	-	
9.	Positioner (Applicable only for regulating power cylinder)	Make &Type	VISU	- do -	Specification & Data Sheet	- do -	Р	-	-	Performance to be checked during complete assembly testing.

SL.	COMPONENT &	CHARACTERISTICS	TYPE	QUANTUM	REFERENCE DOC. &	FORMAT	A	GEN	CY	REMARKS
NO	OPERATION		OF CHECK	OF CHECK	ACCEPTANCE STANDARD	OF RECORD	М	В	С	
10	Position feedback transmitter (applicable For regulating type only)	a) Type b) Functional check c)H.V. Test (500 V AC for 1 Min.)	VISU MEAS ELEC	100% 100% OSPL	Specification, Data sheet, Mfr's Procedure	LGB	P	V	-	Performance to be checked during complete assy testing.
11	Wiring connection	a) continuity	ELEC	100%	Drawing	-do-	Р	-	-	
	PROCESS INSPECTION									
1.	Complete Assembly.	a) Functional check	PHYS & ELEC	100%	Specification, Data sheet	LGB	Р	-	-	
C. FI	NISHED PRODUCT INSPE									
1.	Routine Tests	a) No load operation test	PHYS	100%	JIS B 8377,	T.R	Р	W		
		b) Physical Verification of Mounting & Finish.	PHYS	- do -	Specification , PO & Data sheet.	- do -	Р	W		
	⇒	c) Dimensional Check including process connections	MEAS	- do -	Specification & Drawing	- do -	Р	W		
		d) Verification of Type Make & components	PHYS	- do -	Specification, Drawing	- do -	Р	W		
		e) Stroking length & time.	MEAS	- do -	- do -	- do -	Р	W		
		f) Provision of accessories like linkage, mechanism	PHYS	- do -	Data sheet	- do -	Р	W		
	⇒	g) Performance test (Sensitivity, Hysterisis, calibration, Accuracy, Repeatability, Action of driving equipment)	MECH	- do -	Specification	- do -	Р	W		
	⇒	h) Check operation of stay put device	VISU	100%	Specification Data sheet	T.R	Р	W		
	⇒	i) Solenoid valve – coil type & duty cycle	VISU	- do -	Specification Appd. Data sheet	- do -	Р	W		Applicable for open / close type
	⇒	j) Air filter – filter element size in microns	VISU	- do -	- do -	- do -	V	V		Verification of TR
2.	Type Tests	a) Load operation test.	PHYS	One of design	JIS B 8377	T.R / T.C	V	V		
		b) Durability test.	PHYS	- do -	- do -	- do -	V	V		

D.NOTES:

1. LEGEND:

PHYS : Physical CHEM : Chemical ELEC : Electrical MECH : Mechanical MEAS : Measurement VISU : Visual

TC : Test certificate OSPL : One sample per lot LGB : Log Book Mfr's : Manufacturer's

TR: Test Report

⇒ - CRITICAL TO QUALITY POINTS;

- 2. All test facilities shall be arranged by the vendor at their works. Tests for which facilities are not available are to be carried out at recognized national test houses like ETDC/CIL/NPL/ERTL/NABL accredited lab at vendor's cost.
- 3. Through logbooks / any other documents available at the vendor's works, it shall be possible to correlate the finished product with raw material and in process stage checks / inspection carried out.
- 4. All measuring and testing instruments shall be periodically calibrated from recognized test houses and certificates made available during Inspection.
- 5. Test certificates for routine & type test to be furnished by the vendor.
- 6. Vendor to give tentative inspection program in advance and confirm exact date three weeks in advance for arranging BHEL inspection.

- 7. Packing shall be as per the 'PACKING PROCEDURE' as indicated in specification.
- 8. Inspection / verification will be done by BHEL / Authorised Inspection Agency.

E. REFERENCE STANDARDS:

(For Indicated Standards Refer the Latest Version)

1. JIS B 8377 : Specification for Pneumatic cylinder.

2. BS 970 : Specification for Wrought steel for

Mechanical end

3. IS 4905 : Method of random sampling.

SAMPLING PLAN FOR INSPECTION:

- 1. As per 4905 or 20% of offered quantity subject to a minimum of two nos. per model at the discretion of Inspector.
- 2. If non-conformance is observed on one sample in any character, then inspection shall be carried out on all 100%.

SUDANCQP02.DOC

QA:CI:STD:QP:13/REV 03

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BHARAT HEAVY ELECTRICALS LIMITED / TIRUCHIRAPPALLI CONTROLS AND INSTRUMENTATION/QA/FB

STANDARD QUALITY PLAN FOR ELECTRIC ACTUATOR (OPEN/CLOSE AND REGULATING)

REV	DATE	PREPARED	REVIEWED	APPROVED	REVISION HISTORY
00	06.08.90	Sd	Sd	Sd	Initial release.
01	16.06.97	Sd	Sd	Sd	Format revised
02	21.03.02	Sd	Sd	Sd	Department name changed, CTQ requirements added & General revision.
03	08.01.04	RM.VAIRAVAN	N.SRIDHAR	S.SOMASUNDARAM	Revised to include the comments /Feedback of internal discussion.

SL. NO.	COMPONENT & OPERATION	CHARACTERISTICS	TYPE OF CHECK	QUANTUM OF CHECK	REF.DOC. & ACCEPTANCE STANDARD	FORMAT OF RECORD	AGENCY	REMARKS
<u>A.</u>	FINISHED PRODUCT	INSPECTION						
1.	Routine Tests	a) Over all and mounting dimension.	MEAS	100%	P.O , Specification , IS 325 & IS 9334	T.C	MQCD	CHP
		b) Name plate verification for model no, make & type.	VISU	100%	P.O , Specification , IS 325 & IS 9334	T.C	MQCD	CHP
		c) Verification of paint shade thickness & finish	VISU & MEAS	- do -	- do -	- do -	- do -	CHP
	\Rightarrow	d) Limit / Torque switches- Rating & contact combination.	PHYS	- do -	- do -	- do -	- do -	CHP
		e) Manual operation	MECH	- do -	- do -	- do -	- do -	CHP
		f) Checking the operation of limit switches, torque switches	MECH	- do -	- do -	- do -	- do -	CHP
		g) Oil / Grease leakage	MECH	- do -	- do -	- do -	- do -	CHP
		h) Direction of rotation.	VISU	- do -	- do -	- do -	- do -	CHP

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				1				
SL. NO.	COMPONENT & OPERATION	CHARACTERISTICS	TYPE OF CHECK	QUANTUM OF CHECK	REF.DOC. & ACCEPTANCE STANDARD	FORMAT OF RECORD	AGENCY	REMARKS
		i) Dielectric test for assembled actuator.	ELEC	100%	2 KV for 1 Minute- No flash over	T.C	MQCD	CHP
		j) Functional test for electronic positioner (along with actuator). – Applicable for Regulating Actuator.	ELEC	- do -	Purchase Order , Specification , IS 325 & IS 9334	- do -	- do -	CHP
		k) Measurement of operating time.	PHYS	- do -	- do -	- do -	- do -	CHP
	\Rightarrow	Verification of name plate for Motor	VISU	- do -	- do -	- do -	- do -	CHP
		1. Class of insulation						
		2. Motor duty rating.						
	\Rightarrow	m) Actuator bore	MEAS	- do -	- do -	- do -	- do -	CHP
	\Rightarrow	n) Total turns	MEAS	- do -	- do -	- do -	- do -	CHP
		o) Accessories.	PHYS	- do -	- do -	- do -	- do -	CHP
	\Rightarrow	p) Secondary gear box						
		1. Self locking worm gears	PHYS	100%	Purchase Order , Specification , Data sheet, IS 325 &	T.C	MQCD	CHP

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SL. NO.	COMPONENT & OPERATION	CHARACTERISTICS	TYPE OF	QUANTUM OF	REF.DOC. & ACCEPTANCE	FORMAT OF	AGENCY	REMARKS
	01 218 (1101)		CHECK	CHECK	STANDARD	RECORD		
					IS 9334			
		2. Key way dimensions	MEAS	100%	Purchase Order , Specification , Data sheet, IS 325 & IS 9334	T.C	MQCD	CHP
		3. Splined / removable bush & dimensions	PHYS & MEAS	- do -	- do -	- do -	- do -	CHP
	\Rightarrow	q) Minimum starting torque	MECH	- do -	- do -	- do -	- do -	СНР
	\Rightarrow	r) Minimum 15 minutes torque (As applicable)	MECH	- do -	- do -	- do -	- do -	СНР
2.	Type Tests	a) Measurement of noise.	MECH	One of design for each type	Specification, IS 325, IS 12075, BS 4999 & IS 13947 (Part 1)	Test Report	Lab	CHP – for Verification of test reports
		b) Measuement of vibration.	MECH	- do -	- do -	- do -	- do -	CHP – for Verification of test reports
	\Rightarrow	c) Rated torque test	MECH	- do -	- do -	- do -	- do -	CHP – for Verification of test reports
	\Rightarrow	d) Stall torque test.	MECH	- do -	- do -	- do -	- do -	CHP – for Verification of

QA:CI:STD:QP:13/REV 03 PAGE 05 OF 06

SL. NO.	COMPONENT & OPERATION	CHARACTERISTICS	TYPE OF CHECK	QUANTUM OF CHECK	REF.DOC. & ACCEPTANCE STANDARD	FORMAT OF RECORD	AGENCY	REMARKS
		e) Temperature rise test.	ELEC	One of design for each type	Specification, IS 325, IS 12075, BS 4999 & IS 13947 (Part 1)	Test Report	Lab	test reports CHP – for Verification of test reports
	\Rightarrow	f) Enclosure protection test for total actuator g) Gear box sturdiness test.	ENVI MECH	- do - - do -	- do - - do -	- do - - do -	- do - - do -	CHP – for Verification of test reports CHP – for Verification of
								test reports

B. NOTES

1. ELEC : ELECTRICAL; MECH : MECHANICAL; ENVI : ENVIRONMENTAL; MEAS : MEASUREMENT; VISU : VISUAL; T.C. : TEST CERTIFICATE;

PHYS: PHYSICAL

MQCD: MANUFACTURER'S QUALITY CONTROL DEPARTMENT;

⇒ : CRITICAL TO QUALITY POINTS;

CHP: CUSTOMER HOLD POINT - INSPECTION BY BHEL.

2. All the testing facilities shall be arranged by the vendor at their works.

- 3. All measuring and test instruments must be periodically calibrated at recognised test laboratories and test certificates shall be made available during inspection for verification.
- 4. Test certificates for routine & type tests are to be furnished by the vendor. Type test certificate shall not be earlier than 5 years from the date of Purchase enquiry. If any changes are made in the design, material and process, the type tests shall be repeated, irrespective of the validity of existing type test certificate.
- 5. Packing shall be as per the "PACKING PROCEDURE" indicated in the Specification.
- 6. Packing shall be as per the 'PACKING PROCEDURE' indicated in the Specification. Any loose supply items for the purpose of 'Safe transit' shall be clearly indicated in the packing slip.

7. Vendor to give tentative inspection programme in advance & confirm exact date two weeks in advance for arranging BHEL's inspection

C. REFERENCE STANDARDS: (For The Indicated Standards Refer The Latest Version)

IS 325 : Specification for three phase Induction

motor.

IS 9334 : Specification for Electric motor operated

actuator.

IS 12075 : Vibration Measurement on Rotating

Electrical machine.

IS4905 : Methods for Random Sampling

IS 13947

(Part 1) : General rules for low voltage

switchgear (Degrees of Enclosure

protection offered by enclosure.)

BS 4999 : General requirement for rotating

Electrical machinery.

D. SAMPLING PLAN FOR INSPECTION (CHP)

- a) As Per IS 4905 or 10% of offered quantity as per the discretion of the inspector.
- b) If non conformance is observed on one number in any character, then inspection shall be carried out on all 100%.

STDQP13R.DOC

BHARAT HEAVY ELECTRICALS LIMITED / TIRUCHIRAPPALLI CONTROLS AND INSTRUMENTATION/QAC/FB

CONTRACT QUALITY PLAN

FOR

FLAME SCANNER CABLES

(ELASTOMERIC/THERMOPLASTIC/EQUIVALENT CABLES)
(BOUGTOUT ITEMS)

KOSTI SUDAN 4 X 125 MW NATIONAL ELECTRICITY CORPORATION, SUDAN

REV	DATE	PREPARED	REVIEWED	APPROVED	REVISION HISTORY
00	09/05/06	Sd/-	Sd	Sd	Initial Release
01	20/11/06	Sd/-	Sd	Sd	Revised as per IO/BHEL email dt. 16/11/06.
02	05/02/07	RM.VAIRAVAN	NSRIDHAR	S.SOMASUNDARAM	General revisions

SL. NO.	COMPONENT & OPERATION	CHARACTERISTICS	TYPE OF	QUANTUM OF CHECK	REF.DOC. & ACCEPTANCE	FORMAT OF	A	AGEN	CY	REMARKS
NO.	OPERATION		HECK	CHECK	STANDARD	RECORD	М	В	С	REWARNS
NOT			<u>I</u>			-				
					bles of all combination	n.				
	•	will be based on		•	requirements.	ı				
<u>A.</u>	RAW MATERIALS &	BOUGHT OUT ITEMS	INSPEC	TION						
1.	Copper Rod / Wires	a) Diameter	MEAS	OSPL of 1000 mtr.	IS 613, IS 8130 & spec.	T.R / LGB	P	V	-	Material TC from Supplier shall be produced at the time of inspection.
		b) Tensile strength	MECH	- do -	- do -	- do -	Р	V	-	
		c) % Elongation	MECH	- do -	- do -	- do -	Р	V	-	
		d) Resistivity	ELEC	- do -	- do -	- do -	Р	٧	-	
2.	Elastomeric compound (for insulation sheath) # Refer Note-11	a) Tensile strength and Elongation (Before and after ageing).	MECH	- do -	IS 10810 , IS 6380, Appd data sheet	- do -	P	V	-	
		b) Volume resistivity at 27 °C	ELEC	- do -	- do -	- do -	Р	V	-	
		C) Hot Deformation	THER	- do -	- do -	- do -	Р	V	-	
3.	Galvanised wire / strip (If applicable)	a) Dimension	MEAS	OSPL of 1000 mtr.	IS 3975 & speci.	T.R / LGB	Р	V	-	
		b) Tensile strength & % Elongation	MECH	- do -	- do -	- do -	Р	V	-	
		c) Mass of Zinc Coating	CHEM	- do -	- do -	- do -	Р	V	-	
		d) Uniformity of Zinc Coating	CHEM	- do -	- do -	- do -	P	V	_	
4.	Melinex type	a) Dimension	MEAS	OSPL of 1000 mtr.	Appd Data sheet	- do -	P	V	-	
		b) Tensile strength	MECH	- do -	Mfr STD	- do -	Р	V	-	
		c) Heat stability	THER	- do -	- do -	- do -	Р	V	-	
		d) Tear strength	PHYS	- do -	- do -	- do -	Р	V	-	
5.	Aluminium Backed	a) Dimension	MECH	OSPL of 1000	Mfr STD	T.R/	Р	V	-	

SL. NO.	COMPONENT & OPERATION	CHARACTERISTICS	TYPE OF	QUANTUM OF CHECK	REF.DOC. & ACCEPTANCE	FORMAT OF	A	AGEN	CY	REMARKS
110.			HECK		STANDARD	RECORD	М	В	С	TEMATIKO
	Mylar Tape			mtr.		LGB				
		b) Adhesion of Aluminium tape with Mylar tape.	CHEM	OSPL of 1000 mtr.	Mfr STD	- do -	P	V	-	
		c) Conductivity of Aluminium tape	ELEC	- do -	Mfr STD	TR/LGB	Р	V	-	
<u>B.</u>	IN PROCESS INSPE	ECTION								
1.	Copper Wire (For Conductor & Drain Wire)	a) Diameter	MEAS	- do -	IS 8130 , IS 10810 , Spec & Apprd data sheet.	LGB	Р	V	-	
		b) Surface finish	VISU	- do -	- do -	- do -	Р	V	-	
		c) % Elongation	MECH	- do -	- do -	- do -	Р	V	-	
		d) Per Sulphate Test (Applicable For tinned conductor)	CHEM	- do -	- do -	- do -	Р	V	-	
		e) Resistance	ELEC	- do -	- do -	- do -	Р	V	-	
2.	Conductor formation (For conductor & drain wire)	a) Number of wires	VISU	At start on sample from each setting	IS 8130 , IS 10810 & Specification Approved data sheet	LGB	Р	V	-	
		b) Diameter of wire	MEAS	- do -	- do -	- do -	Р	V	-	
		c) Stranding direction	VISU	- do -	- do -	- do -	Р	V	-	
		d) Stranding pitch	MEAS	- do -	- do -	- do -	Р	٧	-	
		e) Conductor surface	VISU	100%	- do -	- do -	Р	V	-	
		f) Conductor resistance	ELEC	- do -	- do -	- do -	Р	V	-	
3.	Insulated Core # Refer Note-11	a) Thickness and colour of insulation	MEAS	At start on sample from each setting	IS10810 ,IS 9968 (Part 1) , IS 6380 & Appd data sheet	- do -	P	V	-	
		b) Dia over insulation	MEAS	- do -	- do -	- do -	Р	V	-	
		c) Concentricity	MEAS	- do -	Mfr STD	- do -	Р	V	-	
		d) Tensile strength	MECH	- do -	Appd data sheet	- do -	Р	V	-	

SL. NO.	COMPONENT & OPERATION	CHARACTERISTICS	TYPE OF	QUANTUM OF CHECK	REF.DOC. & ACCEPTANCE	FORMAT OF	<i>A</i>	AGEN	CY	REMARKS
110.	OI LITATION		HECK	OFFICIAL	STANDARD	RECORD	М	В	С	TILWATINO
		e) % Elongation	MECH	- do -	Appd data sheet	- do -	Р	V	-	
		f) Insulation Resistance	ELEC	100%	Appd data sheet	- do -	Р	V	-	
		g) Spark test	ELEC	100 %	3 KV RMS	LGB	Р	V	-	
		h) HV test	ELEC	One Sample from each setting	2 KV rms for 1 minute in water.	- do -	Р	V	-	
4.	Pair Twisting and cable formation.	a) Colour sequence of cores	VISU	Sample from each setting	Spec , Appd data sheet	- do -	Р	V	-	
		b) Direction of laying up	VISU	- do -	Mfr STD	- do -	Р	V	-	
		c) Lay length	MEAS	- do -	Appd data sheet	- do -	Р	V	-	
		d) Diameter over laid up core	MEAS	- do -	- do -	- do -	Р	V	-	
		e) Binder type	VISU	- do -	- do -	- do -	Р	V	-	
5.	Individual pair Screening & over all	a) Number of layers	VISU	- do -	Spec Appd data sheet	- do -	Р	V	-	
	screening with Drain Wire.	b) Over lap	VISU	- do -	- do -	- do -	Р	V	-	
		c) Tightness & coverage	VISU MEAS	- do -	- do -	- do -	Р	V	-	
		d) Surface finish	MEAS	- do -	- do -	- do -	Р	V		
		e) Continuity	ELEC	- do -	- do -	- do -	Р	V	-	
6.	Inner Sheath (If applicable) # Refer Note-11	a) Diameter over inner sheath	MEAS	OSPL	IS 9968 (Part 1), IS 6380 Spec and Appd data sheet	LGB	Р	V	-	
		b) Thickness	MEAS	OSPL	- do -	- do -	Р	V	-	
		c) Surface finish	VISU	- do -	- do -	- do -	Р	V	-	
7.	Armouring (If applicable)	a) Size of wire/strip	MEAS	Starting & End of Sample	Approved data sheet	- do -	Р	V	-	
		b) Diameter over armour	MEAS	- do -	- do -	- do -	Р	V	-	
		c) Direction of Lay &	VISU	- do -	- do -	- do -	Р	V	-	

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SL. NO.	COMPONENT & OPERATION	CHARACTERISTICS	TYPE OF	QUANTUM OF CHECK	REF.DOC. & ACCEPTANCE	FORMAT OF	A	AGEN	CY	REMARKS
			HECK	0	STANDARD	RECORD	М	В	С	
		coverage								
		d) Surface finish	VISU	Starting & End of Sample	Mfr STD	- do -	Р	V	-	
8.	Outer sheath # Refer Note-11	a) Diameter over sheath	MEAS	One Random sample of 1 m	Appd data sheet	LGB	Р	V	-	
		b) Thickness	MEAS	- do -	- do -	- do -	Р	V	_	
		c) Eccentricity	VISU	- do -	Mfr STD	- do -	P	V	-	
		d) Surface finish	VISU	Over continuous length	- do -	- do -	P	V	-	
		e) Tensile Strength & % Elongation	MEAS	One Random Sample of 1 M	IS 9968	- do -	Р	V	-	
		f) Marking & Embossing	VISU	- do -	- do -	- do -	Р	V	-	
9.	Drums	a) Anti Termite Treatment	VISU	100%	Manufacturer 's Std.,	- do -	Р	-	-	
		b) Anti Fungus Treatment	CHEM	- do -	- do -	- do -	Р	-	-	
		c) Nails clinched inside	VISU	- do -	- do -	- do -	Р	-	-	
		d) Clearance from logging minimum 10 mm	VISU	- do -	- do -	- do -	Р	-	-	
		e) Painting & Packing	VISU	- do -	- do -	- do -	Р	-	-	
<u>C.</u>	FINAL INSPECTION	ON								
1.	Routine tests	a) Conductor resistance	ELEC	100%	IS 8130, IS 10810 Appd data sheet.	LGB	Р	W	-	
		b) Insulation resistance	ELEC	- do -	- do -	- do -	Р	W	-	
		d) HV test	ELEC	- do -	- do -	- do -	Р	W	-	
		e) Drain wire continuity	ELEC	- do -	- do -	- do -	Р	W	-	
2.	Acceptance Tests	a) Conductor	ELEC	10% of	Approved data sheet	T.R	Р	W	-	

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SL. NO.	COMPONENT & OPERATION	CHARACTERISTICS	TYPE OF	QUANTUM OF CHECK	REF.DOC. & ACCEPTANCE	FORMAT OF)F		CY	REMARKS
110.	OI EII/(IIOIV		HECK	OnLor	STANDARD	RECORD	М	В	С	TILIWIATING
		resistance		quantity subject to a minimum of 1 drum						
	\Rightarrow	b) Constructional , Dimensional check & Colour coding	VISU & MEAS	- do -	- do -	- do -	P	W	-	
		d) Drain wire continuity	ELEC	- do -	- do -	- do -	Р	W	-	
		e) Insulation resistance test	ELEC	- do -	- do -	- do -	Р	W	-	
	⇒	f) Electrical test parameter (Mutual Capacitance, characteristic impedance, attenuation and cross talk)	ELEC	10% of quantity subject to a minimum of 1 drum	Approved data sheet	T.R	Р	W	-	
		g) Per sulphate test(Applicable for tinned conductor)	ELEC	- do -	IS 8130	- do -	Р	W	-	
		h) Verification of coil length, finish and cable marking	MEAS	- do -	Approved data sheet	- do -	Р	W	-	
		i) Flammability Characteristic (Finished cable)	PHYS	-do-						
		i) Swedish chimney test.	ENVI	OSPL	SS 424 14 75,Cl.F3	- do -	Р	W	-	
		ii) Vertical Flame Test.	ENVI	- do -	IEEE - 383	- do -	Р	W	-	
		j) FRLS test for insulation and sheath	PHYS	-do-	-do-					
		i) Oxygen index	ENVI	- do -	ASTM-D 2863 & Appd	- do -	Р	W	-	

P - PERFORM; V - VERIFICATION BY BHEL; W - WITNESS BY BHEL; M - MANUFACTURER; B - BHEL/TPI; C - CUSTOMER (NEC, SUDAN)

SL. COMPONENT NO. OPERATION		CHARACTERISTICS	TYPE OF	QUANTUM OF CHECK	REF.DOC. & ACCEPTANCE	FORMAT OF	A			REMARKS
110.	Of Elitation		HECK	ONEOR	STANDARD	RECORD	М	В	С	T LEIVIN II II CO
					data sheet					
		ii) Temperature index	ENVI	- do -	ASTM D 2863	- do -	Р	W	-	
		iii) Smoke density rating	ENVI	- do -	ASTM-D 2843 & Appd data sheet	T.R	Р	W	-	
		iv) Acid gas generation	ENVI	- do -	IEC 754 (1) & Appd data sheet .	- do -	Р	W	-	
		I) Volume resistivity at 27 deg. C	ELEC	- do -	Approved data sheet	- do -	Р	W	-	
		m)Tensile strength % elongation of insulation and sheath before and after ageing	ENVI	- do -	- do -	- do -	Р	W	-	
3.	Type Tests	a) Per Sulphate test (For tinned copper)	CHEM	OSPL	IS 8130, IS 10810 & Approved data sheet	- do -	Р	V	-	
		b) Annealing test (For Copper)	MECH	- do -	- do -	- do -	Р	V	-	
		c) Conductor resistance	ELEC	- do -	- do -	T.R	Р	V	-	
		d) Test For Thickness of insulation and sheath and overall diameter.(Where Specified)	MEAS	- do -	- do -	- do -	P	V	-	
		e) Physical tests for insulation and sheath (As applicable)	PHYS	-do-	-do-	-do-	Р	V	-	
		i) Tensile strength and elongation at break	MECH	- do -	- do -	- do -	Р	V	-	
		ii) Ageing in air	ENVI	- do -	- do -	- do -	Р	V	_	

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SL. NO.	COMPONENT & OPERATION	CHARACTERISTICS	TYPE OF	QUANTUM OF CHECK	REF.DOC. & ACCEPTANCE	FORMAT OF			CY	REMARKS
110.	OI EIWIIOIV		HECK	ONEON	STANDARD	RECORD	М	В	С	TILIVII II IO
		oven								
		iii) Hot deformation test	ENVI	OSPL	IS 8130, IS 10810 & Approved data sheet	- do -	Р	V	-	
		f) Insulation resistance	ELEC	- do -	- do -	- do -				
		g) High voltage test	ELEC	- do -	IS 10810 & Approved data sheet	T.R	Р	V	-	
		h) Flammability test (Applicable to finished cable)								
		i) Swedish chimney test.	ENVI	OSPL	SS 424 14 75,Cl.F3	- do -	Р	V	-	
		ii) Vertical Flame Test.	ENVI	- do -	IEEE- 383	- do -	Р	V	-	

D. NOTES:

1.LEGEND:

PHYS: PHYSICAL; CHEM: CHEMICAL; ELEC: ELECTRICAL; VISU: VISUAL;

MECH: MECHANICAL; MEAS: MEASUREMENT OSPL: ONE SAMPLE PER LOT; TEST CERTIFICATES;

⇒: CRITICAL TO QUALITY POINTS; TR: TEST REPORT

FRLS: FIRE RETARDANT LOW SMOKE:

- 2. All testing facilities shall be arranged by the vendor at their works.
- 3. Through Log Books/any other documents available at the vendor's works, it shall be possible to correlate the finished product with raw material & in process stage checks / inspection carried out.
- 4. All measuring & testing instruments shall be periodically calibrated from recognized test houses & certificates made available during inspection for verification.
- 5. Test certificates for routine & type tests conducted on offered cables are to be furnished by the vendor.
- 6. Vendor to give tentative inspection program in advance & confirm exact date two weeks in advance for arranging BHEL's inspection.
- 7. Packing shall be as per the "PACKING PROCEDURE" indicated in the Specification.
- 8. Cable ends shall be sealed with heat shrinkable type PVC caps to avoid ingress of moisture.
- 9. Process records for all stages shall be certified by vendors QC and are subject to review during inspection. Traceability shall be possible during inspection for raw material of conductor, insulation, sheath, wire and compound.
- 10. Elastomeric/Thermoplastic/Equivalent compound and other raw materials shall be procurred from reputed manufacturer only. If special insulation and sheath compounds (eg. Low Smoke Low Halogen type) are being used, manufacturer's guaranteed technical particulars and T.C shall be available for review.
- 11. Wherever Thermoplastic/Equivalent material is offered for Insulation and Sheath, the same shall be indicated under "Remarks" column of QP with applicable standard. QP will be reviewed for the suitability as per the options provided in the Engg. Specification.

12. If non - conformance is observed on sample drum in any character, then inspection shall be carried out on all 100%.

13. Inspection / verification will be done by BHEL / Authorised Inspection Agency.

F. REFERENCE STANDARDS:

(For The Indicated Standards Refer The Latest Version)

IS 9968 / : Specification for Elastomeric insulated cables (Part 1) : (Heavy Duty)for working Voltages upto and

including 1100V.

IS 3975 : Mild Steel wires, strips and tapes for armouring

cables.

IS 6380 : Specification for Elastomeric insulation and sheath

electric cables.

IS 8130 : Conductors for insulator electric cables & Flexible

cables.

IS 10810 : Method of test for cables.

ASTM-D 2843 : Standard test method for density of smoke from

burning and discomposition of plastics.

ASTM-D 2863 : Standard test method for Oxygen / temperature

index test.

IEC 754 / : Test on Gases evolved during combustion of (Part 1) : Electric cables (Part1) : Determination of that

Electric cables (Part1): Determination of that amount of Halogen acid gas evolved during the combustion of polymeric materials taken from

cables.

IEEE- 383 : Standard for type test class IE Electric cables,

Filler

splices & connection for Nuclear power generating

stations.

SS 424 14 75 : Svensk Standard - Flammability Testing. : Copper Rods and Bars for Electrical Purposes .

IEC 332 / : Test on Electric cables under fire conditions.

(Part 1)

SUDANCQP04.DOC

BHARAT HEAVY ELECTRICALS LIMITED TIRUCHIRAPPALLI

QUALITY ASSURANCE CONTROLS AND INSTRUMENTATION

QA:CI:STD:QP:06/REV 02

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STANDARD QUALITY PLAN . FOR

PRESSURE & DP SWITCHES

-	REV	DATE	PREPARED	REVIEWED	APPROVED	REVISION HISTORY
	00	03.11.92	Sd	Sd	Sd	Initial release.
	01	16.06.97	Sd	Sd	Sd	Format revised
	02	21.03.02	A.J.OMPRAKASH	R.VARADARAJAN	G.MATHIYALAGAN	Department name changed, CTQ requirements added
			Myndash	PATITICE	Jon all	& General revision.
				() ()	0.0	

COMPONENT & OPERATION ROUTINE	CHARACTERISTICS FINISHED PRODUCT INSPECTION	TYPE OF CHECK	QUANTUM OF CHECK	REF. DOC & ACCEPTANCE STD	FORM OF	AGENCY	REMARKS
ROUTINE	FINISHED PRODUCT INSPECTION			ACCEL TAILCE STD	RECORD		
		⊣					
TEST	PHYSICAL & DIMENSIONAL CHECK PROCESS AND ELECTRICAL CONNECTON. CALIBRATION (ACCURACY) TEST	PHYS MEAS. MEAS	100 %	SPEC., BS 6134 & IS 3624	TEST REPORT	MQCD	СНР
	INCLUDING HYSTERISIS AT RAISING / FALLING PARAMETERS BEFORE AND AFTER OVER PRESS. (MIN. 4 POINTS	WIL/ IS					
	4) REPEATABILITY TEST 5) CHECK FOR SWITCHING DIFFERENTIAL	MEAS ELEC					
	6) HIGH VOLTAGE TEST.7) INSULATION RESISTANCE TEST	ELEC ELEC					
	8) OVER PRESSURE TEST 9) CONTACT TYPE, RATING AND ACTION 10) SET POINT 11) PULSATION DAMPER / SNUBBER	MEAS PHYS PHYS PHYS MEAS					
	SWITCH	PHYS					
TYPE TEST	ENCLOSURE PROTECTION TEST	ENVI	ONE OF DESIGN	SPEC & IS 13947Pt 1	TEST REPORT	TEST LAB	VERIFICA TION OF TYPE TEST CERTIFIC ATES – C H P
	TYPE TEST	FALLING PARAMETERS BEFORE AND AFTER OVER PRESS. (MIN. 4 POINTS OVER RANGE) 4) REPEATABILITY TEST 5) CHECK FOR SWITCHING DIFFERENTIAL (DEAD BAND). 6) HIGH VOLTAGE TEST. 7) INSULATION RESISTANCE TEST BEFORE & AFTER HIGH VOLTAGE TEST 8) OVER PRESSURE TEST 9) CONTACT TYPE, RATING AND ACTION 10) SET POINT 11) PULSATION DAMPER / SNUBBER 12) PROOF PRESSURE TEST- FOR DP SWITCH 13) 3/5 VALVE MANIFOLD - FOR DP SWITCH	FALLING PARAMETERS BEFORE AND AFTER OVER PRESS. (MIN. 4 POINTS OVER RANGE) 4) REPEATABILITY TEST 5) CHECK FOR SWITCHING DIFFERENTIAL (DEAD BAND). 6) HIGH VOLTAGE TEST. 7) INSULATION RESISTANCE TEST BEFORE & AFTER HIGH VOLTAGE TEST 8) OVER PRESSURE TEST 9) CONTACT TYPE, RATING AND ACTION 10) SET POINT 11) PULSATION DAMPER / SNUBBER 12) PROOF PRESSURE TEST- FOR DP SWITCH 13) 3/5 VALVE MANIFOLD - FOR DP SWITCH TYPE TEST FINAL HEAS PHYS MEAS PHYS MEAS PHYS MEAS	FALLING PARAMETERS BEFORE AND AFTER OVER PRESS. (MIN. 4 POINTS OVER RANGE) 4) REPEATABILITY TEST MEAS 5) CHECK FOR SWITCHING DIFFERENTIAL (DEAD BAND) . 6) HIGH VOLTAGE TEST. ELEC (DEAD BEFORE & AFTER HIGH VOLTAGE TEST BEFORE & AFTER HIGH VOLTAGE TEST 8) OVER PRESSURE TEST MEAS 9) CONTACT TYPE, RATING AND ACTION PHYS 10) SET POINT PHYS 11) PULSATION DAMPER / SNUBBER PHYS 12) PROOF PRESSURE TEST- FOR DP SWITCH 13) 3/5 VALVE MANIFOLD - FOR DP SWITCH PHYS TYPE TEST ENCLOSURE PROTECTION TEST ENVI ONE OF	FALLING PARAMETERS BEFORE AND AFTER OVER PRESS. (MIN. 4 POINTS OVER RANGE) 4) REPEATABILITY TEST MEAS 5) CHECK FOR SWITCHING DIFFERENTIAL (DEAD BAND). 6) HIGH VOLTAGE TEST. ELEC BEFORE & AFTER HIGH VOLTAGE TEST BEFORE & AFTER HIGH VOLTAGE TEST 9) CONTACT TYPE, RATING AND ACTION 10) SET POINT PHYS 11) PULSATION DAMPER / SNUBBER 12) PROOF PRESSURE TEST - FOR DP MEAS SWITCH 13) 3/5 VALVE MANIFOLD - FOR DP SWITCH TYPE TEST ENCLOSURE PROTECTION TEST ENVI ONE OF SPEC &	FALLING PARAMETERS BEFORE AND AFTER OVER PRESS. (MIN. 4 POINTS OVER RANGE) 4) REPEATABILITY TEST 5) CHECK FOR SWITCHING DIFFERENTIAL (DEAD BAND). 6) HIGH VOLTAGE TEST. 7) INSULATION RESISTANCE TEST BEFORE & AFTER HIGH VOLTAGE TEST BEFORE & AFTER HIGH VOLTAGE TEST 9) CONTACT TYPE, RATING AND ACTION 10) SET POINT 11) PULSATION DAMPER / SNUBBER 12) PROOF PRESSURE TEST- FOR DP SWITCH 13) 3/5 VALVE MANIFOLD - FOR DP SWITCH TYPE TEST ENCLOSURE PROTECTION TEST ENVI ONE OF SPEC & TEST	FALLING PARAMETERS BEFORE AND AFTER OVER PRESS. (MIN. 4 POINTS OVER RANGE) 4) REPEATABILITY TEST MEAS 5) CHECK FOR SWITCHING DIFFERENTIAL (DEAD BAND). 6) HIGH VOLTAGE TEST ELEC

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[:] CRITICAL TO QUALITY (CTQ) POINTS

QA: CI: STDQP: 06/ REV 02 PAGE 03 OF 03

C. NOTES:

i) MQCD : MANUFACTURER'S QUALITY CONTROL DEPARTMENT;

PHYS : PHYSICAL;
MECH : MECHANICAL;
MEAS : MEASUREMENT;
ELEC : ELECTRICAL;
SPEC : SPECIFICATION;
ENVI : EUVIRONMENTAL:

: CRITICAL TO QUALITY (CTQ) POINTS;

STD : STANDARD; DOC : DOCUMENT;

DP : DIFFERENTIAL PRESSURE;

CHP: CUSTOMER HOLD POINT - INSPECTION BY BHEL.

ii) All testing facilities shall be arranged by the vendor at their works.

- iii) Measuring & testing instruments shall be periodically calibrated from recoginsed test house and certificates made available during inspection.
- iv) Test certificate for routine tests and type tests to be furnished by the vendor.
- v) Matl. subject to inspection and vendor to give inspection programme 3 weeks in advance for arranging BHEL inspection.

- vi) Type test to be carried out at recognised test house and type test certificate shall not earlier than 5 years from the date of Purchase enquiry. If there is any change in design material or process then the type test shall be repeated irrespective of the validity of the existing type test certificate.
- vii) Packing shall be as per the 'PACKING PROCEDURE' indicated in the Spection.

<u>D. REFERENCE STANDARDS</u>: (FOR THE INDICATED STANDARDS REFER THE LATEST VERSION)

BS: 6134 : Specn. for pressure, vaccum switches.

IS: 13947Pt 1 : General rules for low voltage switch gear (Degree of protection provided by enclosures.)

IS: 3624 : Specification for pressure vaccum gauges

E.SAMPLING PLAN FOR INSPECTION:

- a) 10% of offered quantity subject to a maximum of five numbers.
- b) If non-conformance is observed on one number in any character, then inspection shall be carried out on all 100%.

L: QPS: STDQP: STDQP06.DOC