8.14	Water Distribution Pipes (Inside CT)	:	PVC
8.15	Hot water line valves		
	a) BF Valves	:	Body: Ni-Cl-FG 260 Shaft: SS Test pressure & duration shall comply with AWWA C504
	b) Sludge pit isolation valves		
	Body	:	Ni-Cl
	Spindle & Trim	:	Bronze
8.16	Sludge outlet pipe	:	As per the material specified above in 8.13
8.17	Submersible Pumps	:	Casing: Ni-CI-FG260 Impeller: SS
8.18	Stop log gates with rubber seals in cold water outlet channel	:	Carbon Steel Plates to IS 2062
8.19	Guide for stop log gates	:	SS-316
8.20	Screen	:	8 gauge SS 316 crimped wire netting with 25 mm clear opening welded to Hot Dip Galvanised (as per IS: 2629) carbon steel frame and supports
8.21	Guide for Screen	:	SS- 316
8.22	Bolts, buts & other hardware	:	SS-316

Note:
(a) Carbon /Mild steel parts or structures used in Cooling Tower or its vicinity shall be Heavily Galvanised.
(b) Material of construction for items not specified shall be subject to purchaser's approval during detailed engineering stage, in the event of order.

9.0 Pipe work Painting / Protection of Pipes:

9.1	Internal surface	Surface preparation : Sand blast to SA 2.5 Internal Paint: Application of two(2) coats of (DFT of each coat 40 to 50 microns) Epoxy based Zinc rich primer followed by 2 to 3 coats of coal tar epoxy paint to achieve total DFT of 125 to 150 microns.
9.2	External surface – over ground piping**:**	Surface preparation : Sand blast to SA 2.5 External Paint: two coats of red oxide Zinc Chromate primer (conforming to IS 2074) with minimum dry film thickness (DFT) of 25 microns per coat and two coats of finish paints using enamel paint to give a minimum total DFT of 100 Microns (after two coats of primer and two coats of finish paint). Shades shall be as per IS

9.3 Buried piping shall be protected as under (as per IS-15337)

- Surface cleaning — Sand blasting to SA 2.5
- Apply one coat of coal tar primer/ coal tar enamel, inner wrap of fibre glass, final outer wrap of enamel impregnated fibreglass. Total thickness of coating shall not be less than 4.0 mm.

  or

  Apply one layer of anti-corrosive tape of 4 mm thick confirming to AWWA C 203-93 & IS 10221. — Yes

INSPECTION AND TESTING

10.0	Quality Surveillance by	:	Manufacturer, purchaser and customer
10.1	Material testing and identification	:	Required
10.2	Stage inspection to be witnessed by Purchaser and customer	:	Yes
10.3	Hydrostatic test for piping & valves required	:	Yes
10.4	Hydrostatic test to be witnessed by Purchaser and customer	:	Yes
10.5	Field performance test of individual items and the cooling tower as a whole required	:	Yes
10.6	Field performance test to be done by	:	Approved CTI agency along with bidder for one Tower. For remaning towers by Bidder.
10.7	All testing instruments by supplier	:	Yes
10.8	Commissioning at site by	:	Bidder
10.9	Mandatory spares:	:	NIL

Attachments:

a) Sketch showing T.P details for hot water riser and discharge channel. Annexure-1.

b) (Key Plan - Annexure-2.

TELANGANA STATE POWER GENERATION CORPORATION LIMITED

TEST REPORT BY ENVIRONMENT SUB DIVISION

1. Sample Name : GODAVARI RIVER WATER
2. Location : AT MANUGURU
3. Sampling date : 09-10-2014.
4. Reporting date : 10-10-2014.

S.NO	TESTING PARAMETER	RESULT
1.	pH	7.73
2.	Conductivity(micro Siemens/cm)	328
3.	Dissolved solids(mg/litre)	218
4.	Total Hardness as $CaCo_3$, mg/litre	94
5.	Calcium as Ca, mg/litre	60
6.	Magnesium as Mg.mg/litre	34
7.	Total Alkanity as $CaCo_3$, mg/litre	140
8.	Chlorides as Cl, mg/litre	30
9.	Sulphates as SO_4,mg/litre	58
10.	Silica as SiO_2,mg/litre	5.20
11.	Iron as Fe,mg/litre	0.007
12.	Turbidity (NTU)	16

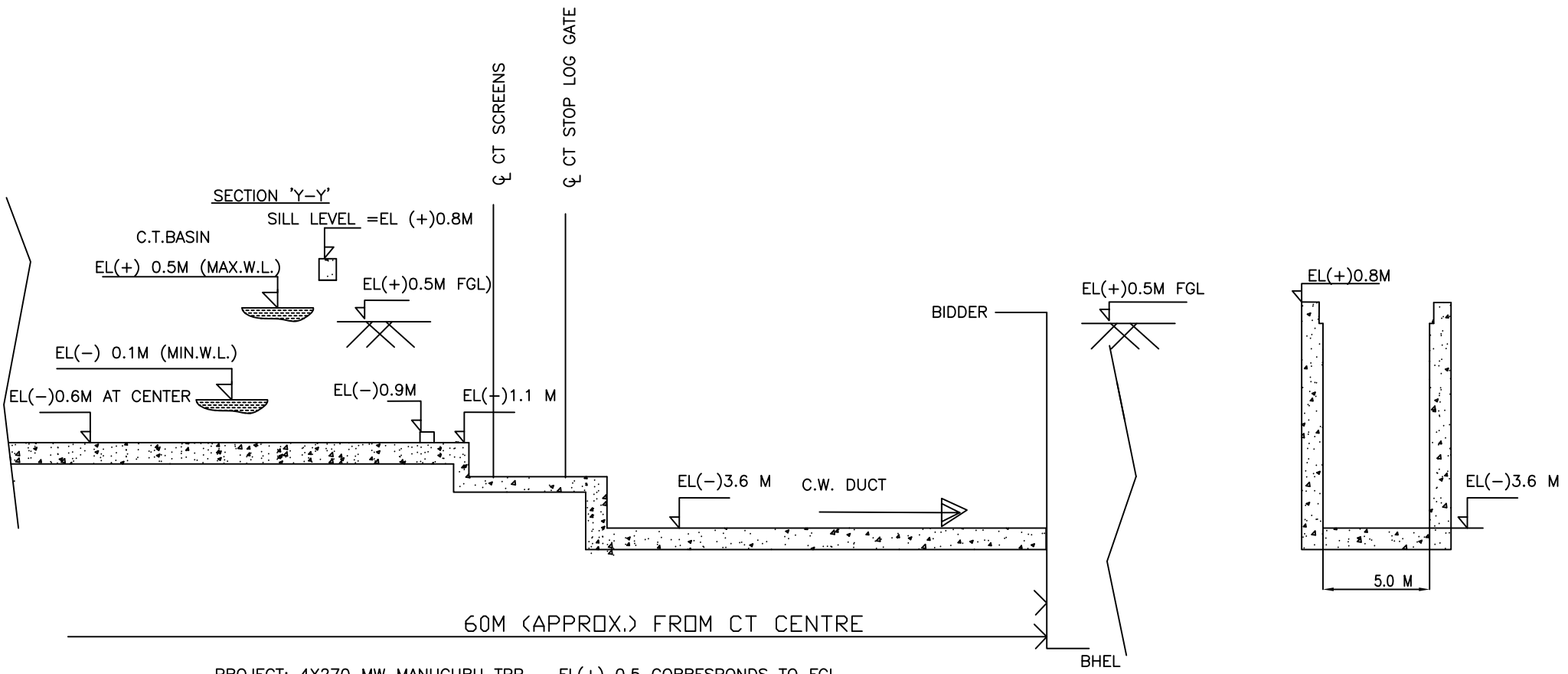
10/10/14

CHEMIST/ENV.SUB.DVN

10/10/14

CLARIFIED WATER ANALYSIS WITH COC OF 5.

ANNEXURE – 1



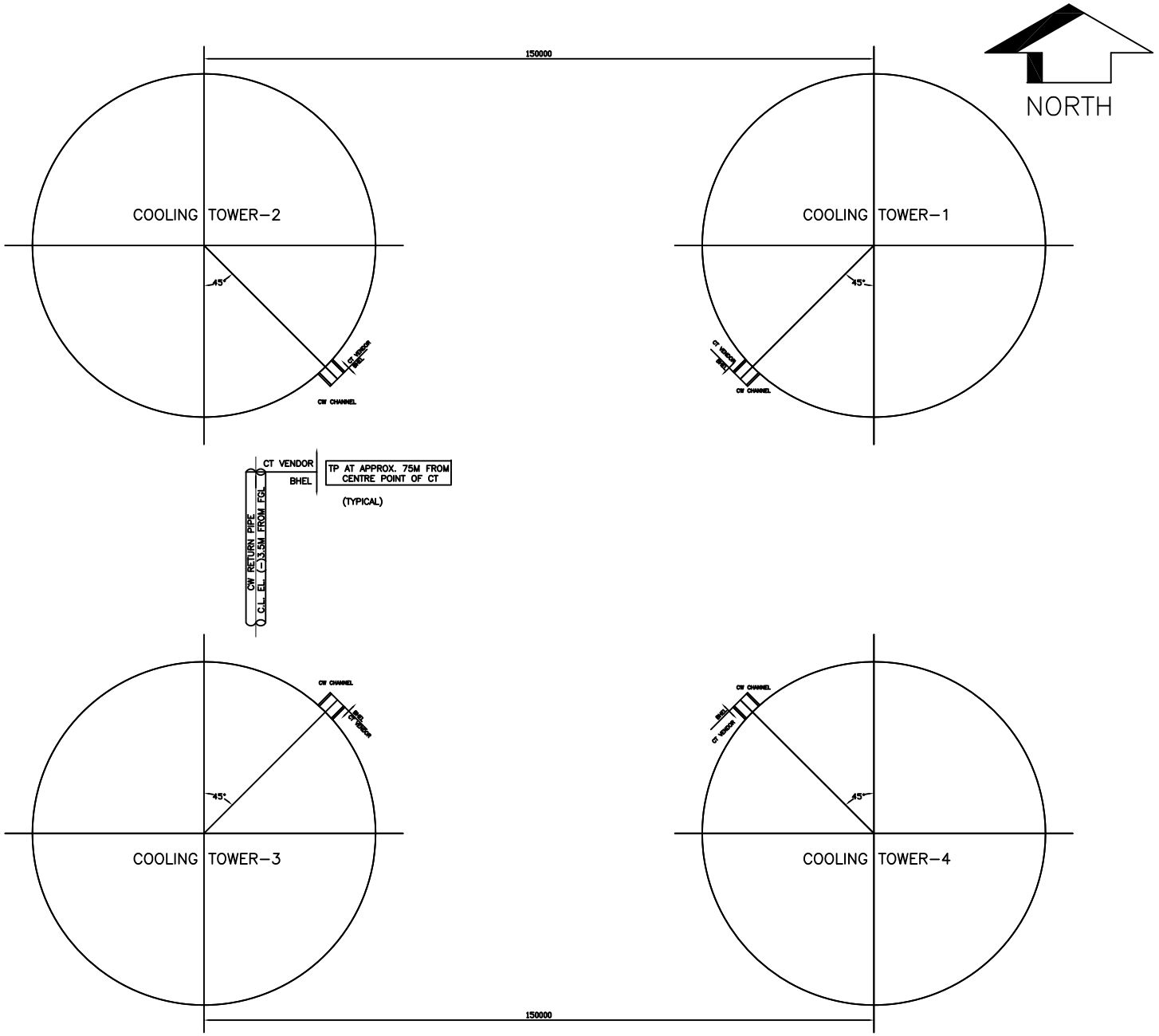
PROJECT: 4X270 MW MANUGURU TPP

EL(+) 0.5 CORRESPONDS TO FGL

COOLING TOWER SPECIFICATIONS

COOLING TOWER COLD WATER OUTLET
WITH CT BASIN WATER LEVELS

Annexure-2



PROJECT: 4X270MW MANUGURU TPP
COOLING TOWERS ARRANGEMENT & CW RETURN PIPES TPs

DRAWING/ DOCUMENTS DISTRIBUTION SCHEDULE

Sl. No.	Type of Document	Number of Copies	
		For Approval	Final
1	Drawings/Documents/Quality Plans etc.	3 Nos	13 Prints
2	Datasheets	3 Nos	13 Prints
3	Test Certificates & Reports	3 Nos	13 Prints
4	Erection/ Installation/ O&M Manuals	3 Nos	13 Prints
5	As Built Drawings/ Documents	3 Nos	13 Prints

NO	CHARACTERISTICS CHECKED (3)	CHARACTERISTICS CHECKED (3)	CATE-GORY (4)	TYPE/METHOD OF CHECK (5)	FREQUENCY OF CHECK (6)	REFERENCE DOCUMENTS (7)	ACCEPTABLE NORMS (8)	FORMAT OF RECORD (9)	ASPECT P	ASPECT X	ASPECT V	PLACE (10)	REMARKS (11)
	MATERIAL AND BOUGHT OUT CONTROL												
	FAN BLADE (NON-METALLIC)												
1	DESIGN	CHEM. PROPS.	MA	CHEM. ANALYSIS	11/BATCH	INSTR. SPECN.	INSTR. SPECN.	INSTRS. TO	3	-	2,1	CORRELATION REQD.	
2	FAN BLADE (METALLIC)	PHYS., CHEM. PROPS.	MA	PHYS., CHEM. ANALYSIS	11/HEAT	APPD. DATA SHEET	APPD. DATA SHEET	ITC	3	-	12,11	-DO-	
3	FAN HUB (CENTRE PORTION), SPOKES BRACES ETC.)	-DO-	CR	-DO-	-DO-	-DO-	-DO-	IR	372	-	12,1	-DO-	
4	DRIVE SHAFT & COUPLING	-DO-	CR	-DO-	-DO-	-DO-	-DO-	IR	372	-	12,1	-DO-	
5	REDUCTION GEAR UNIT - GEAR SHAFT, WHEEL, PINION, BEVEL GEARS, CASING	-DO-	CR	-DO-	11/CASE	-DO-	-DO-	IR	372	-	12,1	-DO-	
	1. SHAFT & GEAR BLANKS	SUB-SURFACE DEFECTS	CR	UT	100%	ASTM A388, BACK-WALL ECHOE NOT	DEFECT ECHOE NOT MORE THAN 20% OF BACK WALL ECHOE FALL IN BACK WALL ECHOE NOT MORE THAN 20%	IR	372	12,1	-	FOR DIA 50MM AND ABOVE	

P.NO.	CDS/SRA/12	SIGNATURE		DATE		DATE			DATE
IV.NO./DATE	01/JULY,88	NAME							
GE NO.	6	PART	CUSTOMER/CONSULTANT		BHEL		VENDOR		

PROJECT
VENDOR

STANDARD QUALITY PLAN — ITEM: COOLING TOWER

COMPONENT/OPERATION (2)	CHARACTERISTICS CHECKED (3)	CATEGORY (4)	TYPE/METHOD OF CHECK (5)	EXTENT OF CHECK (6)	REFERENCE DOCUMENTS (7)	ACCEPTANCE NORMS (8)	FORMAT OF RECORD (9)	AGENCY P (10)	AGENCY W (10)	AGENCY V (10)	REMARKS (11)
MATERIALS	1.PHYS., CHEM. PROPS.	MA	PHYS., CHEM. ANALYSIS	IS:2814 TABLE 2	APPD. DATA SHEET	APPD. DATA SHEET	LAB. REPORT	3/2	-	12,1	
	2.DIMENSIONS, VISUAL DEFECTS	MI	MEAS., VISUAL EXAM.	IS:2814 TABLE 3	MFG. DRG.	MFG. DRG.	MDS BOOK	3/2	-	12,1	
	3.UNIFORMITY, WT., ADHESION, SURFACE DEFECTS OF ZINC COATING	CR	DIP TEST, STRIP TEST, ADHESION TEST, VISUAL EXAM.	IS:5358	IS:5358, APPD. DATA SHEET	IS:5358, APPD. DATA SHEET	ITG	3/2	12,1	-	
MAJOR FOR (1) MINOR COMPONENTS											
1.MATERIAL	1.DEFECTS	MA	VISUAL EXAM.	100%	TECH. SPECN. IS:2372	TECH. SPECN. IS:2372	IIR	3/2	12,1	-	
	2.DIMENSIONS	MA	MEAS.	RANDOM	-DO-	-DO-	IIR				
2.PRESERVATIVE TREATMENT	1.PRESERVATIVE RETENTION & PENETRATION	CR	ANALYSIS	1/BATCH	IS:2372, IS:401	IS:2372	IIR	3/2	12,1	-	
WIRES, WIRE ROPE											
1.WIRES	1.PHYS., CHEM. PROPS.	MA	PHYS., CHEM. ANALYSIS, MEAS.	RANDOM	APPD. DATA SHEET	APPD. DATA SHEET	IIC	3/2	-	12,1	
	2.UNIFORMITY, WT., ADHESION, SURFACE DEFECTS OF ZINC COATING	CR	DIP, STRIP, ADHESION TESTS, VISUAL EXAM.	IS:4826	APPD. DATA SHEET IS:4826	APPD. DATA SHEET IS:4826	IIC	3/2	-	12,1	

PREPARED/REVISED	SIGNATURE	DATE	DATE		DATE
APPROVED/DATE	NAME				
PAGE NO. OF	PARTY	CUSTOMER/CONSULTANT		VENDOR	

PROJECT:
VENDOR:

STANDARD QUALITY PLAN

SYSTEM: ITEM : COOLING TOWER

S.NO. (1)	COMPONENT/OPERATION (2)	CHARACTERISTICS CHECKED (3)	CATEGORY (4)	TYPE/METHOD OF CHECK (5)	EXTENT OF CHECK (6)	REFERENCE DOCUMENTS (7)	ACCEPTANCE NORMS (8)	FORMAT OF RECORD (9)	AGENCY P (10)	AGENCY V (10)	AGENCY W (10)	REMARKS (11)
	2.PIPES - PVC COMP. (IF APPLICABLE)	SURFACE DEFECTS, PIN HOLES	CR	VISUAL EXAM., SPARK TEST	100%	IS:4682 PT.IV	IS:4682 PT.IV	TR	3/2	12,1	-	
	3.PIPE MESH	MESH, SIZE, SURFACE DEFECTS	MI	MEAS., VISUAL EXAM.	RANDOM	MFG. DRG.	MFG. DRG.	TR	3/2	-	12,1	
1.9	NOZZLES, FILLS, FIT -SUPPORTS, SPLASH BARS, AND OTHER ACCESSORIES	DIMENSIONS, WORKMANSHIP AND FINISH	MI	-DO-	RANDOM	MFG. DRG./APPD. DATA SHEET	MFG. DRG./APPD. DATA SHEET	TR	3/2	-	12,1	
1.10	VIBRATION SWITCH	1.CONTACT RESISTANCE 2.CONTACT RATING 3.INSULATION RES. 4.DI-ELECTRIC STRENGTH 5.OPTION	MA	ELEC. TESTS	100%	APPD. DATA SHEET/DRG.	APPD. DATA SHEET/DRG.	TR	3/2	12,1	-	
		6.DEGREE OF PROTECTION & VIBRATION TEST	MA	ELEC. TEST	TYPE/SITE	-DO-	-DO-	LAB. REPORT	3/2	-	12,111	
1.10	PIPES, FITTINGS & PIPE WORK	REFER STANDARD QUALITY PLAN FOR PIPES, FITTINGS & PIPE WORKS										
1.12	VALVES (ALL TYPES)	REFER RESPECTIVE STANDARD QUALITY PLANS										
1.13	PUMPS	REFER STANDARD QUALITY PLAN FOR CENTRIFUGAL PUMPS										
1.14	LIGHTING PLAN	REFER STANDARD QUALITY PLAN FOR CONTROL PANELS										

P.O.NO. : CW/SOP/12	SIGNATURE :	DATE :	DATE :	DATE :
REV.NO./DATE: 0/ -11-85 : 01/JULY,88	NAME :			
PAGE NO. : 3 OF 4	PARTY : CUSTOMER/CONSULTANT			

(2)	CHARACTERISTICS CHECKED (3)	CATE-GORY (4)	TYPE/METHOD OF CHECK (5)	EXTENT OF CHECK (6)	REFERENCE DOCUMENTS (7)	ACCEPTANCE NORMS (8)	FORMAT OF RECORD (9)	AGENCY P (10)	AGENCY V (10)	REMARKS (11)
15	CASTING									
		KA	1.TYPE TESTS INCLUDING FRLS TESTS	VERF. OF TYPE TEST CERT.	IS:1554	TECH. SPECN., APPD. DATA SHEET	TECH. SPECN., APPD. DATA SHEET	TYPE TC	3	- 12,14
					IS:1554,IS:5931	IS:1554,IS:5931				
		KA	2.ROUTINE TESTS	ELECT. TESTS	-DO- IS:1554	-DO- IS:1554	ROUTINE TC	3	- 12,14	
		KA	3.ACCEPTANCE TESTS	-DO-	-DO-	-DO-	ACCEPT. TC	3	- 12,14	
.0	IN-PROCESS CONTROL									
.1	FINISHED (CLOSED & FINISHED/MACHINED	KA	1.HARDNESS	PHYS. TEST	SAMPLE	APPD.DATA SHEET/ IKFG.STD., IS:10661	APPD.DATA SHEET/ IKFG.STD., IS:10661	LOG BOOK/IR	3/2	- 12,14 (1 TO 3) FOR IGP/IRP ONLY.
		CR	2.PROFILE	TEMPLATE/GAGE	SAMPLE	IKFG.STD./ORG.	IKFG.STD./ORG.	IR	3/2	- 12,14
		KA	3.DIMENSIONS	MEASUREMENT	SAMPLE	-DO-	-DO-	IR	3/2	- 12,14
		CR	4.DEFLECTION/PROOF LOAD & CAPACITY	DEFLECTION TEST/ PROOF LOAD TEST	100%	-DO-	IXO PERM.DEFCTN./ IXO CRACK	IR	3/2 12,14	-
		KA	5.WORKMANSHIP AND FINISH	VISUAL EXAM.	100%	-DO-	-DO-	IR	3/2 12,14	-
		KA	6.SURFACE DEFECTS OF HUB ENDS	DPT	100%	ASME 165	IXO SURFACE DEFECT	IR	3/2 12,14	- (OK NETALLIC BLADES ONLY
2.2	HUBS DRIVE SHAFT & COUPLING (BEFORE GALVANISING)	KA	1.DIMENSIONS	MEASUREMENT	100%	IRFG.DRG./STD.	IRFG.DRG./STD.	IR	3/2 12,14	-
		KA	2.WORKMANSHIP AND FINISH	VISUAL EXAM.	100%	-DO-	-DO-	IR	3/2 12,14	-
		KA	3.SURFACE DEFECTS	DPT	100%	ASME 165	IXO SURFACE DEFECT	IR	3/2 12,14	-
		CR	4.STATIC, DYNAMIC RESIDUAL UNBALANCE	STATIC, DYNAMIC BALANCING	100%	ISO 1940	ISO 1940 IG 6.3	IR	3/2 12,14	-
2.2.1	HUB, DRIVE SHAFT & COUPLING (AFTER GALVANISING)	CR	1.UNIFORMITY, WT., ADHESION SURFACE DEFECTS OF ZINC COATING	DIP,STRIP,ADHESION TESTS, VISUAL EXAM.	1/BATCH IS:2633 100%	APPD.DATA SHEET IS:2633	APPD.DATA SHEET IS:2633	IR	3/2 12,14	-

O.P. NO.	SIGNATURE	DATE	DATE	DATE	DATE
REVISED DATE: 01-11-85	NAME			VENDOR	
PAGE NO. 11 OF 6	FIRM	CUSTOMER/CONSULTANT	DIEL		

BINKAT (EAST ELECTRICALS) LIMITED
CORPORATE QUALITY ASSURANCE

PROJECT:
VENDOR:

STANDARD QUALITY PLAN

SYSTEM:
ITEM: COOLING TOWER

S.NO.	COMPONENT/OPERATION	CHARACTERISTICS CHECKED (3)	CATEGORY (4)	TYPE/METHOD OF CHECK (5)	EXTENT OF CHECK (6)	REFERENCE DOCUMENTS (7)	ACCEPTANCE NORMS (8)	FORMAT OF RECORD (9)	AGENCY P (10)	AGENCY W (10)	AGENCY V (10)	REMARKS (11)
2.3	SUBASSEMBLY OF ALL COMPONENTS	1.OVERALL DIMENSIONS AND FINISH, DIMENSIONS	MA	VISUAL & DIMENSIONAL MEAS.	100%	MFG.DRG.	MFG.DRG.	LOG BOOK/IR	3/2	-	12,1	
2.3.1	GEARS, WORMS	1.HEAT TREATMENT CYCLE, HARDNESS, CASE DEPTH	MA	CERT.OF TEST CHART MEAS.	100% RANDOM	MFR.SPECN./ APPD.DATA SHEET	MFR.SPECN./ APPD.DATA SHEET	TEST CHART, LOG BOOK	3/2	-	12,1	
2.3.2	BEARINGS	1.UNIFORMITY OF CONTACT	MA	BLUE-MATCHING	100%	MFR.SPECN.	MFR.SPECN.	LOG BOOK	3/2	-	12,1	
2.3.3	SHAFT AND GEARS	1.SURFACE DEFECTS	MA	DPI	100%	ASTME 165	NO SURFACE DEFECTS	IR	3/2	12,1	-	
3.0	ASSEMBLY COMPONENTS FINAL TESTS											
3.1	FAN ASSEMBLY DOES WITH IMPELLER	1.STATIC RESIDUAL UNBALANCE	CR	STATIC BALANCING	100%	TECH.SPECN.	NO RESIDUAL UNBALANCE	IR	2	1	-	
3.2	COMPLETE GEAR UNIT	1.GEAR RATIO, ORIENTATION, NOISE, TEMP. RISE, LEAKAGES	MA	VISUAL EXAM. NO LOAD RUNNING FOR 1 HR.	100%	MFG.STD., APPD. DATA SHEET	MFG.STD., APPD. DATA SHEET, NO LEAKAGES	IR	3/2	12,1	-	
3.3	COMPLETE FAN ASSEMBLY	1.AIR DELIVERY 2.POWER CONSUMED 3.FAN EFFICIENCY 4.NOISE, VIBRATION	CR	PERFORMANCE TEST(TYPE/SIZE)	100%	IOS OLD PT 1,2 TYPE-C/BULLETIN 103 IP IOS-COOLING TOWER INSTT. OF USA	APPD.DATA SHEET IOS OLD PT 1,2 TYPE-C/BULLETIN 103 IP IOS-COOLING TOWER INSTT. OF USA	TYPE TEST REPORT	2	1	-	1X ABOVE TYPE TEST REPORT, WITNESS WHERE

PREPARED BY	SIGNATURE	DATE	APPROVED BY	DATE
NAME				

CUSTOMER CONSULTANT | BHEL | VENDOR

PROJECT: [illegible] STANDARD QUALITY PLAN SYSTEM: [illegible] ITEM: COOLING TOWER

(1)	COMPONENT/OPERATION (2)	CHARACTERISTICS CHECKED (3)	CATE-GORY (4)	TYPE/METHOD OF CHECK (5)	EXTENT OF CHECK (6)	REFERENCE DOCUMENTS (7)	ACCEPTANCE NORMS (8)	FORMAT OF RECORD (9)	AGENCY P (10)	AGENCY K (10)	AGENCY V (10)	REMARKS (11)
1.0	COMPLETE COOLING TOWER											
1.1	COMPLETE COOLING TOWER	PERFORMANCE TESTS, DIMENSIONS, WORKMANSHIP & FINISH	CR	PERFORMANCE TEST MEAS. VISUAL REVIEW.	100%	TECH.SPECN./APPD. DATA SHEET/DRG.	TECH.SPECN./APPD. DATA SHEET/DRG.	R	2	1	-	AT SITE

DOC.NO.	COS/SQP/02	SIGNATURE		DATE	DATE	REV
REV.NO.	DATE 20/1-11-85	17/JUL/1 80	NAME			1 1
PAGE NO.	6 OF 6		COMPANY	CUSTOMER/CONSULTANT	BHEL	VENDOR

STANDARD QUALITY PLAN

PROJECT :
VENDOR :

SYSTEM :
ITEM : BUTERFLY VALVES

S N	COMPONENT / OPERATION	CHARACTERISTICS CHECKED	CAT-EGO-RY	TYPE / METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENTS	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY P	AGENCY W	AGENCY V	REMARKS
1	2	3	4	5	6	7	8	9		10		11
1.0	RAW MATERIAL BOUGHT-OUT CONTROL											
1.1	BODY & SHAFT SEAT RING	1.CHEM COMPOSITION & PHYS. PROPS	MA	CHEM. & PHYS TESTS	ONE/HEAT BATCH	TECH SPEC APPD DRG	TECH SPEC / APPD DRG.	LAB REPORT / INSPN REPORT	3/2	-	2.1	CORRELATION NOT REQUIRED FOR GREY CI. FOR OTHERS POURING WITNESS BY BHEL
		2.INTERNAL DEFECTS OF SHAFT DIA ≥ 50MM	CR	UT	100%	ASTM A388 & XS 100%		INSPN. REPORT	3/2	2.1	-	MATERIAL IDENTIFICATION OF SHAFTS BY BHEL NOTE. COMPLIANCE TO FOR MS & CI CORRELATION & IDENTIFICATION FOR SS
		3.CASTING DEFECTS/ FORGING DEFECT	MA	1. VISUAL 2. MPI	100% 100%	MSSSP65 TECH SPEC. APPD DATA SHEET	MSSSP55 TECH. SPEC / APPD DATA SHEET	-DO-	3/2	-	2.1	
1.2	DISC & SHAFT SEAL	1. VISUAL INSPECTION	MA	VISUAL	100%	TECH SPEC	TECH. SPEC	LOG BOOK	3/2	-	-	COMPLIANCE TO
		2. DIMENSIONS	MA	MEAS	100%	-DO-	-DO-	-DO-	3/2	-		
		3. HARDNESS	MA	MEAS	100%	-DO-	-DO-	TEST CERT.	3/2	-		
		4. O ZONE RESISTANCE	MA	TESTING	1/BATCH	-DO-, ASTM D1149	-DO-, RELV. STD.	-DO-	3/2	-		
		5. AGEING TEST	MA	TESTING	-DO-	IS 3400	-DO-	-DO-	3/2	-		
1.3	COUNTER FLANGES	1. CHEM., PHYS. PROPERTIES	MA	CHEM. PHYS. TEST	1/HEAT	APPD. DRG. /DATA SHEET	APPD. DRG. /DATA SHEET	LAB. REPORT, INSPN. REPORT	3/2	-	-	COMPLIANCE TC FOR MATERIAL IDENTIFICATION BY BHEL

		PREPARED BY	REVIEWED BY	APPROVED BY	ACCEPTED BY VENDOR
Q.P NO	PEM/MSE/SQP/03	PEM	CQS & PEM	PEM	
REV. NO/DATE	00/8-10-97	NAME			NAME
		SIGNATURE			SIGN
PAGE NO.	1 OF 7	DATE			DATE

BHARAT HEAVY ELECTRICALS LIMITED
PROJECT ENGINEERING MANAGEMENT

STANDARD QUALITY PLAN

PROJECT :
VENDOR

SYSTEM :
ITEM BUTERFLY VALVES

S. NO	COMPONENT / OPERATION	CHARACTERISTICS CHECKED	CAT-EGO-RY	TYPE / METHOD OF CHECK	EXTENT OF CHEC	REFERENCE DOCUMENTS	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY P	AGENCY W	AGENCY V	REMARKS
1	2	3	4	5	6	7	8	9		10		11
		2 DIMENSION	MA	MEASURE-MENT	100%	-DO-	-DO-	INSPN. REPORT	3/2	2 1		
		3. INTERNAL DEFECTS FOR THICKNESS 50MM AND ABOVE	CR	UT	100%	ASTM A435	ASTM A435	INSPN. REPORT	3/2	2 1		
		4 HEAT TREATMENT		SRM T CHART	100%	STANDARD PRACTICE	STANDARD PRACTICE	CORRELATED SRM T. CHART	3/2			
4	MATERIALS (APPD) MAKE	1 VERIFICATION OF MAKE GRADE	MI	VISUAL	100%	TECH SPEC /DATA SHEET	TECH SPEC DATA SHEET	INSPN. REPORT	3/2	2	1	
5	OPERATORS (GEAR BOX GE	COMPOSITION	MA	CHEM ANALYSIS	ONE/BATCH	AS PER MATERIAL SPEC	AS PER MATERIAL SPEC	TC'C'	3	3	2/1	
5 1	GEAR WORM SHAFT	HARDNESS	MA	MEAS	SAMPLING	AS PER APPD DRG /MATL SPEC	AS PER APPD DRG /MATL SPEC	TC'C'	3	3	2/1	
		DIMENSION	MA	-DO-	-DO-	-DO-	-DO-	REPORT	3	3	2/1	UT ON GEAR BLANKS
		NDT	MA	UT/MPI	100%	-DO-	-DO-	TC'C'	3	3/2	2/1	UT ON SHAFTS & DC MOIA
5 2	FUNCTIONAL TEST OF GEAR BOX AT 2/3 RATED TORQUE	TORQUE TRANSMITTING	MA	TESTING	ONE/TYPE	AWWA C504 STD 87	AWWA C504 STD 87	TC'C' CHP	3	3/2	2/1	MPI OR LPI ON GEAR & SHAFT AFTER MACHINING TO NO DAMAGE TO TEETH FACE OF GEAR
5 3	ELECTRICAL ACTUATORS	1 TORQUE TESTING & SETTING OF TORQUE SWITCH	MA	MECH / ELEC TESTS	100%	TECH SPEC /APPD DRG /DATA SHEET/ IS 9334	APPD DRG /DATA SHEET/IS 9334	INSPN REPORT	3	2 1		BHEL TO WITNESS 1 PER TYPE IF QTY IS MORE THAN 10/TYPE

			PREPARED BY	REVIEWED BY	APPROVED BY		ACCEPTED BY
O.P NO	PEM/MSE/SOP/03		PEM	COS & PEM	PEM		VENDOR
REV NO/DATE	00/8-10-97	NAME				NAME	
		SIGNATURE				SIGN.	
PAGE NO.	2 OF 7	DATE				DATE	

BHARAT HEAVY ELECTRICALS LIMITED
PROJECT ENGINEERING MANAGEMENT

STANDARD QUALITY PLAN

PROJECT :
VENDOR :

SYSTEM :
ITEM : BUTERFLY VALVES

SL NO	ACTIVITY / OPERATION	CHARACTERISTICS CHECKED	CATEGORY	TYPE / METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENTS	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY P	AGENCY W	AGENCY	REMARKS
1	2	3	4	5	6	7	8	9		10		
		2. TRAVEL/STROKE	MA									
		3. TRAVEL TIME	MA									
		4. OPERATION OF LIMIT SWITCH										
		5. MANUAL OPERATION THROUGH HAND WHEEL	MA									
		6. OPERATION TEST WITH POWER SUPPLY VARIATION, ENERGISE TO OPEN/CLOSE, CURRENT DRAWN	MA									
		7. IR : HV, IR	MA									
		8. DEGREE OF PROTECTION	MA	WATER DUST TEST	1/TYPE	-DO-	-DO-	3rd PARTY TEST CERT	3	-	2.1	
6	HYD. TEST	1. CHEM & PHYS. PROPS	MA	CHEM. PHYS TESTS	1/HEAT/ BATCH	APPD. DRG. /DATA SHEET	APPD. DRG. /DATA SHEET	TEST CERT	3/2	-	2.1	
		2. HARDNESS	MA	MEAS	100%	-DO-	-DO-	-DO-	3/2	-	2.1	
		3. DIMENSIONS	MA	MEAS.	100%	MFG. DRG	MFG. DRG.	LOG BOOK	3/2	-	-	
		4. LEAK TIGHTNESS	MA	HYDRO TEST	100%	APPD. DATA SHEET	NO LEAKAGE	INSPN. REPORT	3/2	2.1	-	
	BODY	1. CHEM., PHYS. PROPS.	MA	CHEM., PHYS. TESTS	1/HEAT	APPD. DATA SHEET	APPD. DATA SHEET	TEST CERT.	3/2	2	1.1	
		2. DIMENSION	MA	MEASUREMENT	100%	MFG. DRG.	MFG. DRG.	LOG SHEET	3/2	-	-	

			PREPARED BY	REVIEWED BY	APPROVED BY		ACCEPTED BY
Q.P. NO	PEM/MSE/SQP/03		PEM	CQS & PEM	PEM		VENDOR
REV. NO	DATE 00/8-10-97	NAME				NAME	
		SIGNATURE				SIGN	
PAGE NO	3 OF 7	DATE				DATE	

BHARAT HEAVY ELECTRICALS LIMITED
PROJECT ENGINEERING MANAGEMENT

STANDARD QUALITY PLAN

PROJECT :
VENDOR :

SYSTEM :
ITEM : BUTERFLY VALVES

S NO	COMPONENT / OPERATION	CHARACTERISTICS CHECKED	CATEGORY	TYPE / METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENTS	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY P	AGENCY W	AGENCY V	REMARKS
1	2	3	4	5	6	7	8	9		10		11
	1) PISTON ROD	1 CHEM PHYS PROPS	MA	CHEM PHYS TESTS	1/BATCH	MATL SPEC /APPD ORG.	MATL SPEC /APPD ORG	LOG BOOK	3/2	2	1	
		2 DIMENSIONS	MA	MEAS.	100%	MFG ORG.	MFG ORG	-DO-	3/2	2	1	
		3 HARDNESS	MA	MEAS	100%	-DO-	-DO-	TEST CERT	3/2	2	1	
2.0	IN-PROCESS CONTROL											
2.1	BODY & DISC	1 SURFACE DEFECTS	MA	PT	100%	ASTME-165	NO DEFECTS	INSPN REPORT	3/2	2	1	
		2 DIMENSIONS	MA	MEAS	100%	MFG ORG	APPD ORG	LOG BOOK	3/2	-	-	
		3 LEAK TIGHTNESS OF BODY	MA	HYDRO TEST	100%	TECH. SPEC /APPD ORG /DATA SHEET	NO LEAKAGE	INSPN REPORT	3/2	-	2,1	
2.2	SHAFT	1 DIMENSIONS	MA	MEAS	100%	MFG ORG	APPD ORG	LOG BOOK	3/2	-	-	
		2 SURFACE DEFECTS AT DISC	MA	PT	100%	ASTME-165	NO SURFACE DEFECTS	INSPN REPORT	3/2	-	2 1	
2.3	SEAT RING	1 DIMENSIONS	MA	MEAS	100%	MFG ORG	APPD ORG	LOG BOOK	3/2	-	-	
		2 BOND STRENGTH IN CASE OF RUBBER SEAT	MA	PEEL STRENGTH	ONE/BATCH	ASTMD 429	ASTMD429	TEST CERT	3/2	-	2,1	
		3 HARDNESS	MA	MEAS	100%	MFG ORG	MFG ORG	-DO-	3/2	2	1	

O.P. NO.	PEM/MSE/SOP/03		PREPARED BY	REVIEWED BY	APPROVED BY	ACCEPTED BY
			PEM	CQS & PEM	PEM.	VENDOR
REV NO/DATE	00/8-10-97	NAME				NAME
		SIGNATURE				SIGN.
PAGE NO.	4 OF 7	DATE				DATE

BHARAT HEAVY ELECTRICALS LIMITED
PROJECT ENGINEERING MANAGEMENT

STANDARD QUALITY PLAN

PROJECT :
VENDOR :

SYSTEM :
ITEM : BUTERFLY VALVES

S NO	COMPONENT OPERATION	CHARACTERISTICS CHECKED	CATEGORY	TYPE / METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENTS	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY P	AGENCY W	AGENCY V	REMARKS
2	3	4	5	6	7	8	9		10			11
		4 SURFACE DEFECTS	MA	PT	100%	ASTME 165	NO SURFACE DEFECTS	DO	3/2	2	1	
			MA	PHYS TESTS	100%	ASME IX	ASME IX	FORMATS OF ASME IX	3/2	2.1	1	
2.4	WELDED FLANGES/OUTER FLANGES											
		1 FIT UP	MA	MEAS. TEMPLATE, VISUAL	100%	MFG DRG	MFG DRG	LOG BOOK	3/2	-	2.1	FOR FABRICATED FLANGES ONLY FILMS TO BE SHOWN TO BHEL
		2 INTERNAL DEFECTS OF WELDMENTS	CR	RT/UT	100%	ASME VIII DIV I	ASME VIII DIV I	RADIO GRAPH REPORT FILMS	3	-	2.1	
2.4.1	WELDING PROCEDURE SPECIFICATION	CORRECTNESS	MA	EXAM	100%	ASME SEC IX	ASME SEC IX	QW 482 OF ASME SEC IX	3/2	-	2.1	
2.4.2	WELDING PROCEDURE QUALIFICATION	WELD SOUNDNESS	MA	VISUAL, PHYS. TESTS RT (AS APPLICABLE)	100%	ASME SEC IX	ASME SEC IX	QW 483 OF ASME IX	3/2	2.1	-	WELDING PROCEDURE APPROVED BY BHEL AS WELL AS 3RD PARTY (LLOYDS, BVQI OR EQ.)
2.4.3	WELDER PERFORMANCE QUALIFICATION	WELL SOUNDNESS	MA	DO	100%	ASME SEC. IX	ASME SEC. IX	QW 484 OF ASME	3/2	2.1	-	

			PREPARED BY	REVIEWED BY	APPROVED BY	ACCEPTED BY
Q.P. NO.	PEM/MSE/SQP/03		PEM	QCS & PEM	PEM	VENDOR
REV. NO/DATE	00/8-10-97	NAME				NAME
PAGE NO.	5 OF 7	SIGNATURE				SIGN
		DATE				DATE

BHARAT HEAVY ELECTRICALS LIMITED
PROJECT ENGINEERING MANAGEMENT

STANDARD QUALITY PLAN

PROJECT
VENDOR

SYSTEM :
ITEM : BUTERFLY VALVES

S NO	COMPONENT / OPERATION	CHARACTERISTICS CHECKED	CATEGORY	TYPE / METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENTS	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY P	AGENCY W	AGENCY V	REMARKS
1	2	3	4	5	6	7	8	9		10		11
2.4.4	WELD FIT-UPS	1 DIMENSION ALIGNMENT	MA	MEAS, VISUAL EXAM	100%	WPS, MFG DRAWING	WPS, MFG DRAWING	IR/LOG BOOK	3/2	-	-	
2.4.5	ROOT RUNS	1 SURFACE DEFECTS	MA	PENETRANT TEST	100%	ASTME 165	NO SURFACE DEFFECT	-DO-	3/2	-	2	
2.4.6	WELDMENTS	1 SURFACE DEFECTS	MA	-DO-	100%	ASTME 165	ASME-VIII, DIV. I,	INSPN REPORT	3/2	2,1	-	
2.4.7	BUTT WELDS	INTERNAL DEFECT	MA	UT/RT	100%			IR	3/2	-	2,1	WITNESSING OF U T
2.4.8	S/R WELDING	S/R	-	SR	100%	ASME SEC. V	ASME SEC VIII, DIVI	IR	3/2	-	2,1	
3.0	FINAL ASSEMBLY											
3.1	VERIFICATION OF ALL PREVIOUS TEST AND DOCUMENTS	VERIFICATION OF RECORDS	MA	-DO-	100%	TECH. SPEC.	TECH. SPEC		2	-	1	
3.2	TESTS (HYDRAULIC)	1 BODY TEST 2 DISC STRENGTH 3 SEAT LEAKAGE 4 PERFORMANCE TEST	MA MA MA MA	HYDRO TEST HYDRO TEST -DO- PERFORMANCE	100% 1/TYPE 100% 3 TIMES UNDER NO LOAD/FLOW COND. BOTH MANUAL & THROUGH OPERATORS	TECH. SPEC /REL STD -DO- -DO- -DO-	TECH /SPEC / REL STD -DO- -DO- -DO-	TEST CERT -DO- -DO- -DO-	3/2 3/2 3/2 3/2	2,1 2,1 2,1 2,1	- - - -	

			PREPARED BY	REVIEWED BY	APPROVED BY		ACCEPTED BY
			PEM	CQS & PEM	PEM		VENDOR
Q.P NO	PEM/MSE/SQP/03	NAME					NAME
REV NO/DATE	00/8-10-97	SIGNATURE					SIGN.
PAGE NO.	6 OF 7	DATE		2.11			DATE

BHARAT HEAVY ELECTRICALS LIMITED
PROJECT ENGINEERING MANAGEMENT

STANDARD QUALITY PLAN

PROJECT
VENDOR

SYSTEM
ITEM BUTERFLY VALVES

SL NO	COMPONENT / OPERATION	CHARACTERISTICS CHECKED	CATEGORY	TYPE / METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENTS	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY P	AGENCY W	AGENCY V	REMARKS
2		3	4	5	6	7	8	9		10		11
		5 TESTING OF ACCESSORIES	MA	TESTING	100%	TECH SPEC /REL STD	TECH SPEC /REL STD	TC	3.2	2		
		6 PROOF OF DESIGN TEST	MA	TESTING	1 TYPE	DO.	DO.	TC	3.3	2		NOTE: IF CYCLE LIFE TEST ALREADY CONDUCTED ON SIMILAR SIZE, RANGE & TYPE OF VALVE REPORT SHALL BE SUBMITTED
4	SHIPPING RELEASE											
5	FINAL INSPECTION	1 OVERALL DIMENSIONAL	MA	MEASUREMENT	100%	APPD DRG	APPD DRG		3.2	2		
		2. DOCUMENTATION REVIEW	MA	REVIEW	100%	TECH SPEC APPD DRG	TECH SPEC APPD DRG		3.1			
		3 CLEANLINESS	MA	VISUAL	100%	DO.	DO.		3.2	2		
		4 NAME PLATE DETAILS	MA	VISUAL	100%	DO	DO		3.1			
		5 STAMPING	MA	STAMPING	100%	DO.	DO.		3			
6	PAINTING	1 SURFACE PREP	MI	VISUAL, MEAS.	100%	TECH SPEC	TECH SPEC	INSPN REPORT	3.2		2.1	
		2. UNIFORMITY & THICKNESS	MI	DO.	100%	DO.	DO.	DO.	3.2		1	

			PREPARED BY	REVIEWED BY	APPROVED BY		ACCEPTED BY
			PEM	CQS & PEM	PEM		VENDOR
Q.P.NO.	PEM/MSE/SQP/03	NAME					NAME
REV NO/DATE	00/8-10-97	SIGNATURE					SIGN
PAGE NO	7 OF 7	DATE					DATE

	QUALITY PLAN	CUSTOMER:	PROJECT:		SPEC. NO :
		BIDDER/VENDOR	QP NO.PE-QP-999-100-M004	REV. 00 DT.31.03.99	SPEC. TITLE
	SHEET 1 OF 3	SYSTEM **POWER CYCLE/ LP VALVES**	ITEM: GATE/ GLOBE VALVE		SECTION VOLUME

S.NO.	COMPONENT/ OPERATION	CHARACTERISTICS CHECKED	CATE-GORY	TYPE/METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY P	AGENCY W	AGENCY V	REMARKS
1.0	**MATERIALS**											
1.1	BODY,BONNET, YOKE,WEDGE/DISC, SPINDLE, BODY SEAT, BACK SEAT, THRUST PLATE	1. PHYS,CHEM,PROPS	MA	PHYS,CHEM. TESTS	ONE/HEAT	APPD. DRG./ TECH.SPEC.	APPD. DRG./ TECH.SPEC.	TEST CERT.	3/2	2	1	CORRELATION REQD. FOR BODY BONNET, SPINDLE - FOR GREY C.I. ONLY PHYS. TEST.
		2. HEAT TREATMENT	MA	REVIEW OF H.T. CHART	100%	-DO-	-DO-	H.T. CHART	3/2	2	1	
		3. SURFACE DEFECTS	MA	VISUAL	100%	MSS-SP-55	MSS-SP-55	INSPN. REPORT	3/2	2	1	
1.2	BODY & BONNET FOR RATING 900 & ABOVE (ALSO FOR LOWER RATING IF REQUIRED IN SPEC.)	1. SURFACE DEFECTS	CR	PT/MT	100%	ANSI B16.34 AND TECH. SPEC.	ANSI B16.34 AND TECH. SPEC.	-DO-	3/2	2,1	-	
		2. SUB-SURFACE DEFECTS	CR	RT/UT	100%	ANSI B16.34 AND TECH. SPEC.	ANSI B16.34 AND TECH. SPEC.	-DO-	3/2	-	2,1	FILM REVIEW BY BHEL
1.3	ACTUATORS 1. ELECTRIC ACTUATORS	1. TORQUE TESTING & SETTING OF TORQUE SWITCH	MA	MECH., ELEC. TESTS	100%	TECH. SPEC./ APPD. DRG./ DATA SHEET/ IS:9334	APPD. DRG./ DATA SHEET./ IS:9334	INSPN. REPORT	3	2,1	1 *	*BHEL TO WITNESS IF QTY. MORE THAN 10/ TYPE
		2. TRAVEL/STROKE	MA									
		3. TRAVEL TIME	MA									
		4. OPERATION OF LIMIT SWITCH	MA									
		5. MANUAL OPERATION THROUGH HAND WHEEL	MA									
		6. OPERATION TEST WITH POWER SUPPLY VARIATION ENERGISES TO OPEN/CLOSE	MA									
		7. IR,HV,IR	MA									
		8.DEGREE OF PROTECTION	MA	WATER, DUST TEST	1/TYPE	TECH. SPEC./ APPD. DRG./ DATA SHEET/ IS:9334	APPD. DRG./ DATA SHEET/ IS:9334	3RD PARTY TEST CERT.	3	-	2,1	

BHEL	PARTICULARS	BIDDER/VENDOR	
	NAME		
	SIGNATURE		
	DATE		BIDDER'S/ VENDOR'S COMPANY SEAL