	HP RELIEF VALVE LIST OF DOCUMENTS AND DRAWINGS	**413137W4005** Rev.00 **Page 1 of 1**

A. SCOPE OF THE DOCUMENT:

This document lists down the drawings and documents to be followed for executing the order of one number of HP relief valve.

B. LIST OF DOCUMENTS AND DRAWINGS:

S.no.	Item description	Drawing / Document no.	Rev/ Index
1	Specification – HP Relief valve with pneumatic actuator	413137W4100	
2	HP Relief valve drg	4-13137-W1101	
3	Technical purchasing specification: Valves	41313795102	
4	Electrical specs for limit switch and solenoid valves	41810221002	

AGREED DEPTT.	NAME	SIGNATURE & DATE	DEPTT	NAME	SIGNATURE & DATE
CIE	Mudit Jain		TL	Anil Kumar	

No.	Item	Specifications – HP Relief Valve with Pneumatic Actuator
1.	Doc no. Rev no.	413137W4100 01

2. **Basic data:**

Valve Body Material : A217-Gr. WC9

Inlet connection : 168.3 X 10.97 mm (ASTM182F12C2)

Outlet connection : 273.1 X 9.27 mm (ASTM182F12C2)

Pos*	Description	Dimension acc to ASME B36.10M		Connection		
		NPS	Schedule	Type	Form/Figure	Standard
G23	Inlet at HP Relief Valve	6"	80	Butt Weld	5B	ASME B16.25
G24	Outlet at HP Relief Valve	10"	STD	Butt Weld	4	ASME B16.25
T840	Control Air Connection at HP Relief Valve	G3/4''	-	Thread	-	EN ISO 228-1

*See Indicative Drawing for details.

3.	**Valve design**	Spindle	vertical
		Steam Flow Direction	Under the valve cone in opening direction
		Fittings	Perforated cage
		KVS-Valve	245 m^3/h
		Seat diameter	According to tech. design
		Valve stroke	According to tech. design
		Spindle sealing	Graphite /K80S
		Leakage Class	EN 1349-Seat leakage IV L1(0.01% KVS value)
		Valve welding ends acc.to.	ASME B 16.25 Fig. 4 & 5 B
		Yoke Material	Carbon steel
4.	**Pneumatic Actuator**	Spring Working Direction	Opens the valve
		Control Air Working Direction	Closes the valve
		Solenoid valves idle	Opens the valve
		Actuator shall be of proven for the application and shall be subject to BHEL approval	
		Travel Time (100% stroke)	Open ≤ 1 sec. Close ≤ 2 sec.

		Fail safe position of actuator Control Air Connection acc. to	Valve open G3/4" (Type Thread as per EN ISO 228-1)
		Pressure of control air	5 bar ≤ p <10 bar
		Min available Control Air Pressure for the design of the actuator	5 bar
		Design differential pressure of actuator	≥ 78 bar
		Additional force of the actuator	≥ 20 %
5.	**Equipment**	**3/2-Way-Solenoid valves,** connected in series. All pneumatic components are piped. All electrical equipments are wired to a terminal box.	2 pieces
		3/2-way pneumatic valve	2 pieces
		Limit switch-valve OPEN:	1 piece
		Limit switch-valve CLOSED:	1 piece
		Filter Regulator with pressure gauge: Adjustment range 0-10 bar, adjusted and sealed at 5 bar	1 piece
6.	**Design parameter**	**Pressure** **[bar abs]**	**Temperature** **[°C]**
	Design(Operating Case)	57.3	346.9
	Maximal long term	64.3	380.9
	Maximal short term:	70.1	442.9
	1000h	17.2	510
	15 min. per event and max.10,000h of lifetime	17.2	480
	1 min per single event	70.0	510
	Inlet Mass flow (KG/S)	**37.773**	
	The following design data of the adjacent pipes have to be considered:		
	Valve Inlet	**71.69 bar**	**510**
	Valve Outlet	35.8 bar	492.5
	Maximal temperature difference in operation between valve inlet and valve outlet in design case maximal long therm		**338.1**

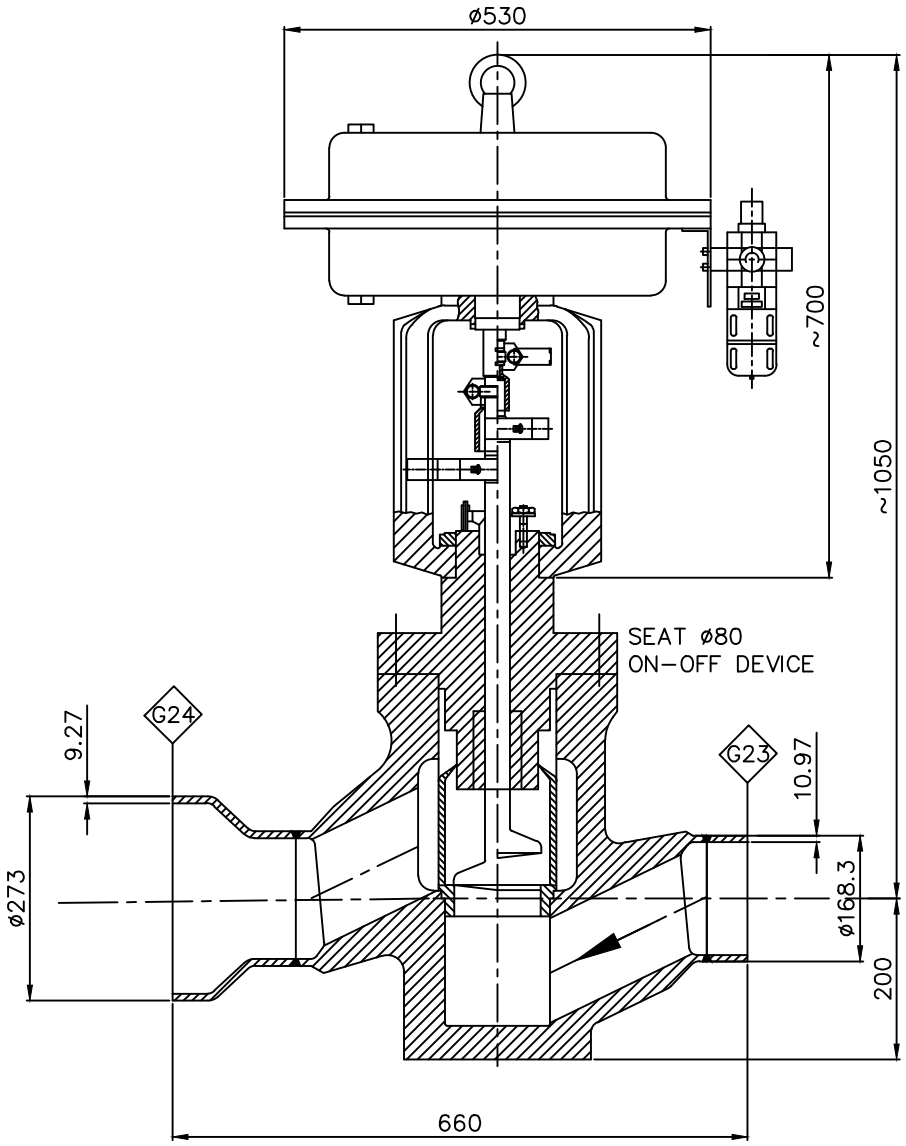
	Minimal Pressure at the valve outlet, approx.	0.0710 bar (a)	
7.	**Seismic Requirements:**	Safe operation	Horizontal: 0.3g Vertical: 0.2 g
8.	**Installation**	Indoor	
	Ambient Conditions	Ambient Temperature min/max	0°C / 50°C
		Absolute Humidity	≥ 60 g/m^3
9.	**KKS Labeling**	**Unit code**	
	HP-Relief Valve	LBC41AA051	
	3/2-Way Solenoid Valve 1	LBC41AA051A	
	3/2-Way Solenoid Valve 2	LBC41AA051B	
	3/2-Way Pneumatic Valve 1	LBC41AA051C	
	3/2-Way Pneumatic Valve 2	LBC41AA051D	
	Proximity Switch – Position 100% OPEN	LBC41CG051B	
	Proximity Switch – Position 0% CLOSE	LBC41CG051C	
	Air filter	LBC41AT021	
	Pressure Relief Valve	LBC41AA261	
	Pressure Gauge	LBC41CP501	
	Terminal Box	LBC41GF051	
1	**Further Requirements;**	We expect in the scope of the agreed quality documentation at least the procurement according to article 10, PED directive 97/23/EC required conformity declaration. The classification of the pressure equipment on the basis of the given layout data in the order (fluid, pressure, volume, nominal size, max temperature) are incumbent on the supplier. As well, the choice of the corresponding conformity quality processes is to carry out by the supplier. The quality declaration must contain all details according to appendix VII of the directive 97/23/EC.	

Prepared by		**Approved by**	
Anil Kumar	Mudit Jain	Sandeep Sonkar	Ms Saswati Srivastava
Sr.Engr- TL	Sr. Engr-CIE	Sr.Mgr	SDGM-CIE

FIRST ANGLE PROJECTION (ALL DIMENSIONS ARE IN mm) FORM DG 39(B)

REV	DATE	ALTERED / CHECKED	REV	DATE	ALTERED / CHECKED	~~GMS No.~~/ C.B.O.M.– NO.	STATUS OF DRG
							U

ZONE		ZONE		AGREED DEPT	NAME	SIGN	DATE



NOTE: –

1. WELD EDGE AS PER FORM FIG. 2A OF ASME B16.25.
2. TYPE OF ACTUATOR, NUMBER OF CYLINDERS AND DIMENSIONS OF VALVE AND ACTUATOR AS GIVEN IN THIS DRAWING ARE INDICATIVE.

Ref.Drawing No>

Sign & Date

Inventory No.

BHARAT HEAVY ELECTRICALS LTD.
RANIPUR, HARDWAR

	NAME	SIGN	DATE	NO. OF VAR
DRN	P.S.SHARMA	–Sd–	27.03.17	–
CHD	ANIL	–Sd–	27.03.17	
APPD	S.K.GUPTA	–Sd–	27.03.17	

DEPT STE	SCALE	WEIGHT (KG)	REF. TO ASSY. DRG.	ITEM No.	NO. OF ITEMS
CODE 4011	N.T.S.	–		–	–

TITLE :

HP RELIEF VALVE

CARD CODE

DRAWING NO. 4-13137-W1101 REV 00

7 22 23 24

SHEET No. 01 No. OF SHEETS 01

Table of content **page**

Continued page 2 to 6

1. Scope of Application

This Technical Purchasing Specification covers valves for evacuating of bottled up pressurized steam from steam turbine unit during load throw-off. During normal operation of turbine, this valve shall remain in tightly closed position and down steam side of the valve shall be subjected to condenser vacuum. The valve is to be suitably designed to prevent the ingress of air through valve glands into the system.

The requirements of this specification are valid as far as no other requirements are given in the enquiry.

2. Type-tested Valves

Valves with a valid type-testing certificate according to PED97/23/EC and to the corresponding VdTÜV-Merkblätter, of TRD 110 attachment 1 as well as accordingly to the registration of DIN-DVGW fulfill the requirements of this specification.
For these valves the requirements for manufacturing and testing agreed upon with the TÜVs respectively with the DVGW-federation shall be fulfilled (declaration of commitment).

3. Referenced Documents

- AD2000-W 0
- AD2000-W 7
- AD2000-HP 0
- AD2000-HP 5/3
- TRD 100
- EN 287-1
- DIN EN ISO 15607
- DIN EN ISO 15609-1
- DIN EN ISO 15614-1
- EN 1418
- EN 10028
- EN 10204
- EN 10213
- EN 10222
- EN 10273
- DIN 1690-10
- EN 1559-1
- EN 1559-2
- EN 12266-1/-2
- DIN 17175,
- PED 97/23/EC
- ASME B16.34

In case of differences or contradictions of the referenced documents the higher requirements shall be applied.

4. Technical Data and Design

The criteria, e.g. fluid, pressure, temperature, material of the casing, etc., as well as other technical data are given in the enquiry.

5. Inspection certificate / Declaration of Compliance in Dependence on Fluid, Pressure and Temperature

For all valves an Inspection Certification 3.1 according to EN 10204 must be provided.

6. QA-Requirements regarding the Valve Manufacturer and his Suppliers:

The valve manufacturer as well as his suppliers for the main components like e.g. pressure guiding components, instrumentation and control, shall have an introduced and well-working quality management system, e.g. according to EN ISO 9000 series or equivalent standard. Manufacturers of pressure guiding components shall have in addition a certificate according to AD2000-W 0 respectively TRD 100.

As far as welding will be performed on the valves, the weld shop shall be certified according to AD2000-HP0.

7. Manufacturing and Inspection Plan (MIP)

The valve manufacturer shall prepare a Manufacturing and Inspection Plan containing sufficient information on the sequence and extent of the valve inspections as well as the main raw material and shall deliver this to the purchaser for review at the latest 4 weeks after order receipt, but at least 2 weeks before starting manufacturing.

8. Condition for Manufacturing

Manufacturing of the valve mentioned in point 7 shall not be started before the review for the design as well as for the MIP has been given by the purchaser. To prohibit any delay the valve manufacturer shall call for missing reviews and remind the purchaser on time.

By reviewing the MIP the purchaser does not take on any responsibility for processes or manufacturing details of the valve manufacturer or his suppliers, or for the valve itself.

9. Fabrication and Inspection

9.1 Steel Castings

Steel castings, e.g. valve casings, covers, etc., shall be manufactured and inspected according to EN 10213 and EN 1559 part 1 and part 2 and DIN 1690 part 10, and following minimum requirements:

- Analysis (chemical composition) per heat
- Mechanical properties per heat and heat treatment batch, for castings with an individual weight > 1000 kg testing per casting
- Amount of non-destructive testing according to DIN 1690 part 10:

- Weld ends of valves without connection pieces: Quality class A with quality grades S1 + V1
- Transition areas: quality class B with quality grades S2 + V2
- Weld ends of valves with connection pieces: Quality class B with quality grades S2 + V2

- remaining areas of the casting: quality class D with quality grades S3 + V4; additionally for castings ≥ 500 kg or DN ≥ 400 mm each casting 100% volume inspection shall be performed.

9.2 Rolled or Forged Material

Rolled or forged material, e.g. connection piece, shall be manufactured and inspected according to the corresponding material standard, e.g. EN 10028, EN 10088, EN 10222, EN 10273, DIN EN 10216-2 and DIN 17440, etc. and following supplements:

- Analysis (chemical composition) per heat
- Mechanical properties per heat and heat treatment batch

9.3 Connecting Elements:

Connecting elements shall be manufactured and tested according to AD2000-W 7. As far as there is a requirement for a test certificate for grade properties, this shall be an inspection certificate 3. 1 according to EN 10204.

9.4 Welding

As far as welding will be performed on the valves (also in case of fabrication welding on castings):

- Welding shall be performed only by welders tested in line with EN 287 or mechanized welds by welding operators tested in line with EN 1418
- Corresponding welding procedure specifications and procedure approval records according to
  - DIN EN ISO 15607
  - DIN EN ISO 15609-1
  - DIN EN ISO 15614-1 shall be available.
- Fabrication welds on castings shall be inspected according to DIN 1690.
- Fabrication welds having a length ≥ 150 mm or a depth ≥ 40% of the wall thickness or a depth ≥ 25 mm shall be recorded.
- Design welds shall be inspected according to AD2000-HP 5/3. In case of serial production manufacturer-specific inspection concepts may be applied with written agreement of the purchaser.
- If cast steel parts are subjected to heat treatment in the course of valve manufacture, all parts heated shall subsequently be subjected to a 100% surface crack examination.

9.5 Manufacturing Inspections

Manufacturing Inspections shall be performed according to PED 97/23/EC / EN 12266. The PED 97/23/EC a s a superior legislation shall be observed and applied. These are especially:

a) Pressure test
   - Test P10 according to EN 12266 part 1

b) Leak test
   - Test P11 + P12, leakage class B according to EN 12266 part 1

c) Functional test
   - Test F20 according to EN12266 part 2

d) Verification of dimensions
   - Main dimensions
   - connecting dimensions

   All tolerance ranges which are important for the function shall be recorded. As
   - Stem diameter
   - Diameters of guides and fits

10. Marking

Valves shall be marked as follows:

- The name and address or other means of identification of the manufacturer and, where appropriate, of his authorized representative established within the Community
- Nominal diameter
- Nominal pressure class
- Casing material
- Flow direction arrow
- Identification-no. (Also commission-no.)
- The year of manufacture
- Identification of the pressure equipment according to its nature, such as type, series or batch identification and serial number

- Essential maximum/minimum allowable limits

- CE marking is applied for European Union countries.

Valves with a total weight > 1000 kg shall be marked additionally with a permanent information of the weight on the valve or on an safe name- plate.

The provisional KKS-Labels which are fabricated and properly sized are to be made of plastic or similar unbreakable material and attached to the component by wire. The lettering on the labels should include the KKS classification in back, permanent ink.

Marking of the materials for all pressure loaded casing components shall survive during all manufacturing processes according to AD2000-HP 0.

11. Surface Protection

Surface coating of non-stainless steel valves shall be applied as follows

Paint (Coat)	Paint Type	No. of coat	DFT*
Primer Paint	: Epoxy base Zinc rich primer paint	1 Coat	35
Intermediate Paint	: Epoxy TiO2 Pigmented Polyamide Cured Paint	1 Coat	70
Finish (Final) Paint	: Aliphatic Acrylic 2 Pack Polyurethane Finish paint	2 Coats	75

*DFT – Dry Film Thickness (final) in microns

- Shade as per RAL – Grey 9002

12. Documentation

All the documentation for the delivered valve shall remain with the valve manufacturer and shall be stored for at least 10 years. This documentation shall be labelled such as to ensure traceability and allocation to the corresponding valve and shall be marked as belonging to BHEL. The valve manufacturer shall check the documentation with respect to completeness and correctness before shipping the valve. The valve manufacturer shall certify this at the time of the delivery. It is the obligation of the valve manufacturer to hand over a copy of the total documentation to the purchaser on request and free-of-charge.

BHEL expects a documentation of the module/parts including all instructions which are necessary for service, installation and maintenance. Amendments will be requested separately.

In accordance to the Machinery Directive (98/37/EC) and Pressure Equipment Directive (97/23/EC) the following records and logs shall be provided to the purchaser in any case:

- manufactures declaration
- Declaration of conformity
- Material certificates
- Pressure test
- Non-destructive tests

The documentation - also that of the sub suppliers - shall be written in English language and shall contain at least:

- Test certificates of the prematerial (at least inspection certificate 3.1B according to EN 10204)
- Records of all inspections performed by the valve manufacturer or his sub suppliers during manufacturing:
  - Non-destructive inspections of e.g. weld areas or welds
  - Verification of dimensions
  - Pressure and leak tests
  - Functional tests
- Heat treatments performed
- The European Union guidelines and standards which are valid and can be used for the area of application (e.g. PED 97/23/EG, Low-Voltage Guideline 73/23/EWG, etc..) are to be designated in the declaration of conformity according to the remarks and applied quality modules, and shall include all relevant data (see e.g. appendix VII of Guideline 97/23/EG). Risk disclosure and danger analyses in accordance with EN 1050 are to be handed over to BHEL if necessary.

- If materials without European material approval are drawn on for the order (order papers/designs) (e.g. ANSI/ASME materials) appropriate substitute certificates from a designated authority shall be procured and documented accordingly. If the order pertains to a component of a total design group, then all certificates and certification of the component of the highest category of the total design group shall be made available.

13. Final inspection

The purchaser reserves the right to perform final inspections on his ordered parts in the shop of the valve manufacturer, as well as in the shop of his sub suppliers

14. Delivery and Packing

Details regarding delivery are given in the order, however at least following details shall be given together with the delivered parts:

Actualization of standards and instructions

- Purchaser
- Order-no. / project
- Manufacturer commission-no. / works-no.
- Specification
- Number of pieces
- Type / item
- Nominal diameter [DN]
- Maximum allowable pressure [PS]
- Maximum allowable temperature [TS]
- Fluid
- Manufacturer drawing-no.
- Identification-no.of the valve
- Piece weight

Together with the delivery of the valve the valve manufacturer shall hand over a certificate 2.1 according to EN 10204 in English, which confirms that the delivered valve fulfills the requirements given in the order and in this specification. Furthermore the valve manufacturer shall confirm that only materials as listed in the design bill of material have been used and that the documentation is available in his shop in line with Item 12 above and that he has checked the documentation carefully.
Packing of the valve shall be as follows:

- The valve shall be packed and locked that way, that in general case any damage will be prohibited.
- All openings shall be plugged.
- Detail parts respectively components shall be packed individually, however assignment shall be

ensured.

- As far as necessary accessory devices for transportation purposes shall be attached to the valve and/or to the packing, e.g. lifting eyes and lifting signs.
- Bearing areas shall be marked, if necessary.

15. Guarantee

The supplier shall guarantee trouble free operation of the equipment for a period of 2 years after installation and commissioning or a period of 3 years from the date of dispatch of equipment whichever is earlier.

If during erection/commissioning and operation at site, any defect in any component is detected, purchaser's / owner's site representative shall prepare the assessment report and a copy of the same shall be forwarded to the supplier. The supplier shall replace / rectify the concerned items free of charge. The supplier, if he so desires, may deputes his representative to site at his own cost otherwise the report of purchaser's / owner's site representative shall be binding on the supplier.

16. Spares

The offer of valves shall include the requirement of spares to be made available at the time of erection & commissioning. A separate offer of spares to be required for 3 to 5 years of operation shall also be separately enclosed along with main offer.

17. Special tools & tackles

Any special tools & tackles, required for erection, commissioning and maintenance of valves shall be included in main offer per set of valves.

18. Supplementary Requirements

The valve manufacturer shall send following documents in triplicate written in English language to the purchaser's department for records. Documents listed under a) and c) shall be delivered with the order acknowledgement:

a) Part drawing showing the function of the valve and the design bill of material
b) Operating and maintenance instruction
c) Spare part list

19. Deviations

Equivalent ASME B16.34 requirements may be considered in place of given in PED 97/23/EC / EN 12266.

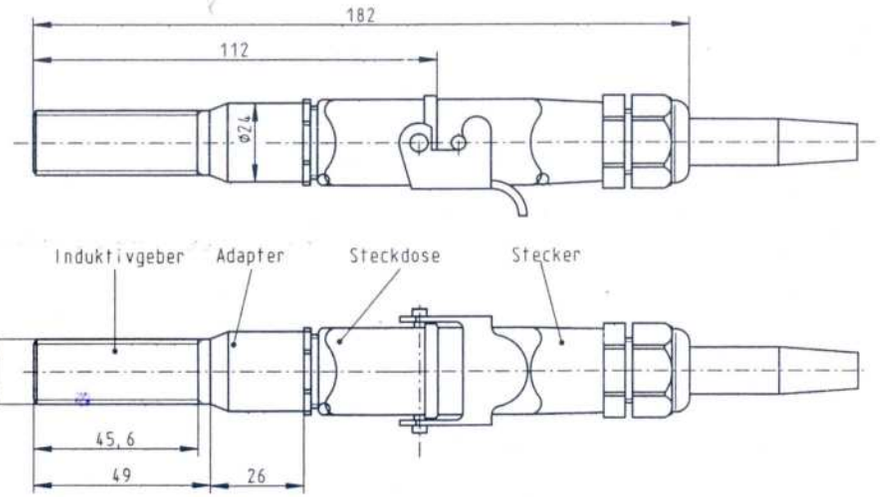
Any deviation from this purchasing specification has to be reported to the purchaser immediately.
Any deviation is accepted only if this has been approved or accepted by the purchaser in writing.
In case of any deviation from the specified properties, also if the proof by testing is not required, the purchaser has the right to reject the material.

BERUEHRUNGSLOSER INDUKTIVGEBER

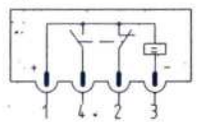
TYP IFL 5-18-11zStPK-1952-2

IFL5-18-1125PTK

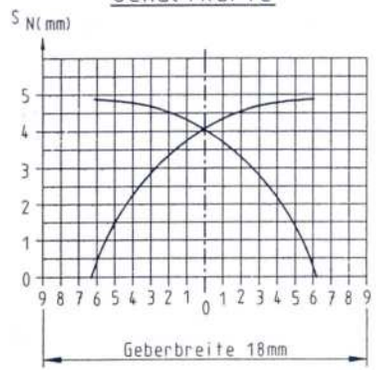
Einbau im Metall	:	buendig
Einbaulage	:	beliebig
Gehaeuse	:	Ms-vernickelt
Sensorflaeche	:	Crastin
Anzugsmoment	:	max. 1300 Ncm
Schockfestigkeit	:	30g, 11 ms gem. IEC68-2-27
Vibrationsfestigkeit	:	10 Hz-55 Hz, 1 mm gem. IEC68-2-6
Schutzart	:	IP 67 fuer den Naeherungsschalter
	:	IP 54 fuer die Steckverbindung
schaltend nach	:	P
Elektrischer Anschluss	:	ueber Steckverbindung Harting HAN 7D mit 0,5mm2 Goldkontakten (Stecker gehoert zum Lieferumfang)
Messart	:	induktiv
max Schaltfrequenz	:	500 Hz
Nennspannung	:	24 VDC
Spannungsbereich	:	10-60 VDC
Restwelligkeit	:	≤10 %
Einschaltdauer	:	100 %
Leerlaufstrom	:	≤4.8 mA
Laststrom	:	≤100mA
Verpolungsschutz	:	ja
Ueberlast- u. Kurzschlussschutz	:	ja
Nennschaltabstand	:	5 mm
Hysterese bei 20 Grad C	:	≤0,5 mm (seitliches Anfahren bei 1,5mm Abstand)
Hysterese bei 110 Grad C	:	≤1,0 mm (seitliches Anfahren bei 1,5mm Abstand)
Wiederholgenauigkeit bei 20 Grad C	:	≤0,10 mm (seitliches Anfahren bei 1,5mm Abstand)
Wiederholgenauigkeit bei 110 Grad C	:	≤0,25 mm (seitliches Anfahren bei 1,5mm Abstand)
Temperatur	:	-25 Grad C bis 110 Grad C
Ausgang	:	Wechsler
Revisionslose Betriebszeit	:	min. 24.000 h
Lieferant	:	K.A. Schmersal & Co Moeddinghofe 30 5600 Wuppertal 2



Anschlussbild



Schaltkurve



NOTE: 4 wire Proximity switch, for taking these wires for termination in JB, NC Contact not used, Pl refer, Sh. 4.

Geräteschlüssel:
INSTRUMENTATION KEY: LGBAD

TITEL : PROXIMITY SWITCH

BHART HEAVY ELECTRICAL LTD

HARIDWAR, RANIPUR, INDIA-249403

Drawing No. 41810221002 Sh 1

PROXIMITY SWITCH FOR HPT EVACUATION
Translated version Doc. No. 41810221002
TYP IFL S-18-11zStPK-1952-2

MOUNTING IN METAL:	to be flush in metal
Mounting position:	Any position
Casing:	Ms. Nickel plated
Sensor surface	Crastin
Stud torque	Max1300 Ncm
Shock reaction	30 gm, 11ms gem. IEC 68-2-27
Resistance to vibration	10Hz 55 Hz,1mm.
Protection	IP67 for proximity probe
Protection	IP 54 for plug connector
Switching to	P
Electrical connection	4 wire with Harting HAN 7D plug socket with 0.5 mm2 gold contact
Mode of measurement	Inductive
Max switching frequency	500Hz
Voltage supply	24V
Supply range	10-6 VDC
Residual ripple	≤ 10%
Running time	100%
Stand by current	≤ 4.8 mA
Running current	≤ 100mA
Non reversible	Yes
Overvoltage protection (short ckt. proof):	Yes
Operating distance	5 mm
Switching hysteresis at 20 Deg	≤ 0.5mm(1.5 mm distance)
Switching hysteresis at 110 Deg	≤ 1.0mm(1.5 mm distance)
Repeat accuracy at 20 Deg	≤ 1.0mm(1.5 mm distance)
Repeat accuracy at 110 Deg	≤ .25mm(1.5 mm distance)
Temp sensor	-25˚C to to 110 ˚C
Output	1 changeover contact with snap action
Inspection time	min 24000 hr
Manufacturer	KA Schemersal & Co Moeddinghofe & co 5600 Wupertal 2

TEST & INSPECTION

1.0 Type Test

1.1.0: Degree of protection

2.0 Routine Test

2.1.1:Functional and calibration test for limit switch

2.1.2 Fail safe position of actuator

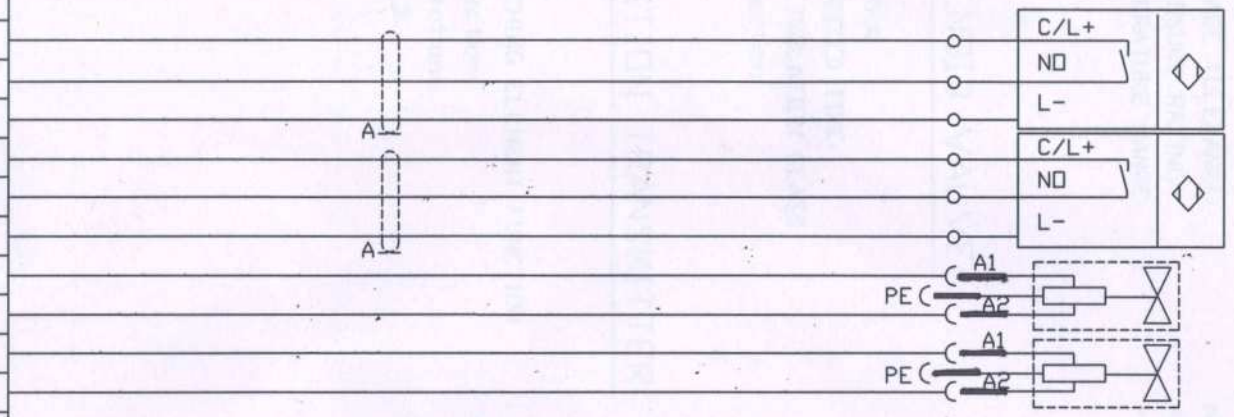
2.1.3 Fully assembly i.e. the valve along with Pneumatic actuator shall be

3.0 Tested for proper function.

3.1.0 Test and Guarantee Certificate Results of all tests enumerated in above shall be compiled in test certificate and to be submitted.

4.0 Vendor shall provide our inspector or authorized representative all facilities to witness the tests.

LBC41GF051:- X01	
1 o	LBC41CG051C
2 o	LBC41CG051C
3 o	LBC41CG051C
4 o	LBC41CG051B
5 o	LBC41CG051B
6 o	LBC41CG051B
7 o	LBC41AA051A
8 o	LBC41AA051A
9 o	LBC41AA051B
10 o	LBC41AA051B
SH o	SHIELD
SH o	SHIELD
PE o	GROUND
PE o	GROUND



ASSIGNMENT OF CORE CONDUCTOR COLOURS (DIN IEC 757)

BK: BLACK
BN: BROWN
BU: BLUE
GY: GREEN
GY: GREY
OG: ORANGE
PK: PINK
PU: PURPLE
RD: RED
WH: WHITE
YE: YELLOW

* THE JUNCTION BOX AND THE JUNCTION BOX COVER HAS TO BE LABELLED WITH ' LBC41GF051'
* SHIELD (A), IF AVAILABLE, CONNECTED TO SHIELD TERMINALS (SH)
* GROUND (PE) CONNECTED TO GROUND TERMINALS

REV	REMARKS	BHARAT HEAVY ELECTRICALS LIMITED HARIDWAR	TITLE: CONNECTION DIAGRAM HP DUMP VALVE LBC41	SH. NO. 4 BHEL ; HARDWAR
			DRAWING NO. 41810221002	

GENERAL REQUIREMENTS:

VOLTAGE:	24 V DC
VOLTAGE TOLERANCE:	min. +10/-15%
ENCLOSURE RATING:	min. IP65/ NEMA 4
TEMPERATURE RANGE:	+ 5°C TO 70°C (+41°F TO 158°F)

SOLENOID VALVE:

Relative ENERGIZED TIME:	100%
	CONSTANT RATED
COIL ISOLATION CLASS	F
Connection:	plug acc. TO DIN EN 175301-803

POSITION TRANSMITTER:

TYPE:	INDUCTIVE
SWITCHING ELEMENT FUNCTION	PNP NORMAL OPEN
Connection:	3-POLE
Connection:	plug acc. TO DIN EN 175301-803
SHIELD:	NOTREQUIRED BUT WIRED IF AVAILABLE

TITLE: ELECTR. SPEC. SOLENOID/GENERAL /24DC/INDOOR

BHARAT HEAVY ELECTRICALS LTD
HARIDWAR, RANIPUR, INDIA-249403

DRAWING NO. 41810221002

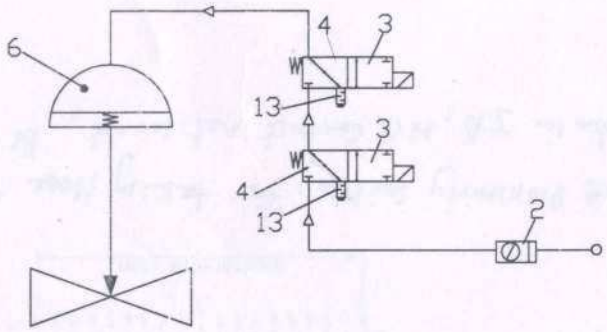
SH. NO. 5

	HOOKUP DIAGRAM NO. 41810221002	date:	09.04.2012
		check:	BSRANA
		sh no. &	
	revison:	plant:	BARA

Air pressure
Spring bar
stroke mm

mounting position: vertical

Pos.	Tag No.
001	



Pos	Qty.	Description	Type/Manuf.	Pneu. con.	Part No.
2	1	Air set			
3	2	Solenoid valve			
4	2	3/2 Way Pneumatic valve			
5	2	3/2 way solenoid valve			
6	1	Pneumatic Actuator			
7		Lock up valve			
8		Miscellaneous			
9		Booster			
10					
11					
12		Pn. Connection			
13		Vent Filter			
14		Filter	☐IP54 ■IP65		
15	2	Limit Switches Fa. Schmersal	BFL 5-1B-11Z STPM-1952-2		

Pipe	Size	Dimensions	Material
	25x2,5	[mm]	SS
Fitting	■ERMETO ☐SWEGELOK	☐PARKER	☐.....
Stroking time	Direction	100...0% 0...100%	ON/OFF with Solenoid valve
	Requested [s]		1s/2s
	Measured [s]		

DATA SHOWN ARE INDICATIVE.

10 LBC41 AA051

RELATED DRAWINGS:

ADDITIONAL NOTES:-

1. TWO NOS ADAPTORS WITH 1/2" FERRULE FITTING FOR CONNECTION TO G1/2" LINE ARE REQUIRED. ALSO G1/2" LINE (APPROX 2 METERS) ARE REQUIRED.

2. LIMIT SWITCHES AND SOLENOID VALVE SHOULD NOT BE MOUNTED ON VALVE TO AVOID DAMAGE DURING ERECTION OF VALVE. THE SAME SHOULD BE LOOSELY PACKED IN A SEPARATE WOODEN BOX / COMPARTMENT TO AVOID BREAKAGE.

3. PROPER LABELLING SUCH AS `ITEM NAME', `PO', ETC SHALL BE CLEARLY INDICATED ON THE LOOSE PACKAGE BOX FOR IDENTIFICATION IN CASE OF MISPLACEMENT .

HP RELIEF VALVE

LIST OF DOCUMENTS AND DRAWINGS

413137W6005

Rev.00

A. SCOPE OF THE DOCUMENT:

This document lists down the drawings and documents to be followed for executing the order of one number of HP relief valve.

B. LIST OF DOCUMENTS AND DRAWINGS:

S.no.	Item description	Drawing / Document no.	Rev/ Index
1	Specification – HP Relief valve with pneumatic actuator	413137W6100	01
2	HP Relief valve drg	4-13137-W1101	
3	Technical purchasing specification: Valves	41313795102	01
4	Electrical specs for limit switch and solenoid valves	41810221002	

CIE	Mudit Jain		TL	Anil Kumar	
AGREED DEPTT.	NAME	SIGNATURE & DATE	DEPTT	NAME	SIGNATURE & DATE

No.	Item	Specifications – HP Relief Valve with Pneumatic Actuator
1.	Doc no. Rev no.	413137W6100 01

2. **Basic data:**

Valve Body Material : A217 Gr.-WC9

Inlet connection : 168.3 X 10.97 mm (ASTM182F22C2)

Outlet connection : 273.1 X 7.80 mm (ASTM182F12C2)

Pos*	Description	Dimension acc to ASME B36.10M		Connection		
		NPS	Schedule	Type	Form/Figure	Standard
G23	Inlet at HP Relief Valve	6"	80	Butt Weld	5B	ASME B16.25
G24	Outlet at HP Relief Valve	10"	30	Butt Weld	4	ASME B16.25
T840	Control Air Connection at HP Relief Valve	G3/4''	-	Thread	-	EN ISO 228-1

*See Indicative Drawing for details.

3.	**Valve design**	Spindle	vertical
		Steam Flow Direction	Under the valve cone in opening direction
		Fittings	Perforated cage
		KVS-Valve	245 m^3/h
		Seat diameter	According to tech. design
		Valve stroke	According to tech. design
		Spindle sealing	Graphite /K80S
		Leakage Class	EN 1349-Seat leakage IV L1(0.01% KVS value)
		Valve welding ends acc.to.	ASME B 16.25 Fig. 4 & 5 B
		Yoke Material	Carbon steel
4.	**Pneumatic Actuator**	Spring Working Direction	Opens the valve
		Control Air Working Direction	Closes the valve
		Solenoid valves idle	Opens the valve
		Actuator shall be of proven for the application and shall be subject to BHEL approval	
		Travel Time (100% stroke)	Open ≤ 1 sec. Close ≤ 2 sec.

		Fail safe position of actuator Control Air Connection acc. to	Valve open G3/4" (Type Thread as per EN ISO 228-1)
		Pressure of control air	5 bar ≤ p <10 bar
		Min available Control Air Pressure for the design of the actuator	5 bar
		Design differential pressure of actuator	≥ 78 bar
		Additional force of the actuator	≥ 20 %
5.	**Equipment**	**3/2-Way-Solenoid valves,** connected in series. All pneumatic components are piped. All electrical equipments are wired to a terminal box.	2 pieces
		3/2-way pneumatic valve	2 pieces
		Limit switch-valve OPEN:	1 piece
		Limit switch-valve CLOSED:	1 piece
		Filter Regulator with pressure gauge: Adjustment range 0-10 bar, adjusted and sealed at 5 bar	1 piece
6.	**Design parameter**	**Pressure** **[bar abs]**	**Temperature** **[°C]**
	Design(Operating Case)	57.3	349.5
	Maximal long term	64.3	381.6
	Maximal short term:	70.2	443.6
	1000h	17.2	480
	15 min. per event and max.10,000h of lifetime	17.2	510
	1 min per single event	70.0	510
	Inlet Mass flow (KG/S)	**37.773**	
	The following design data of the adjacent pipes have to be considered:		
	Valve Inlet	**70.6 bar**	**370**
	Valve Outlet	35.3 bar	338
	Maximal temperature difference in operation between valve inlet and valve outlet in design case maximal long therm		**342.4**

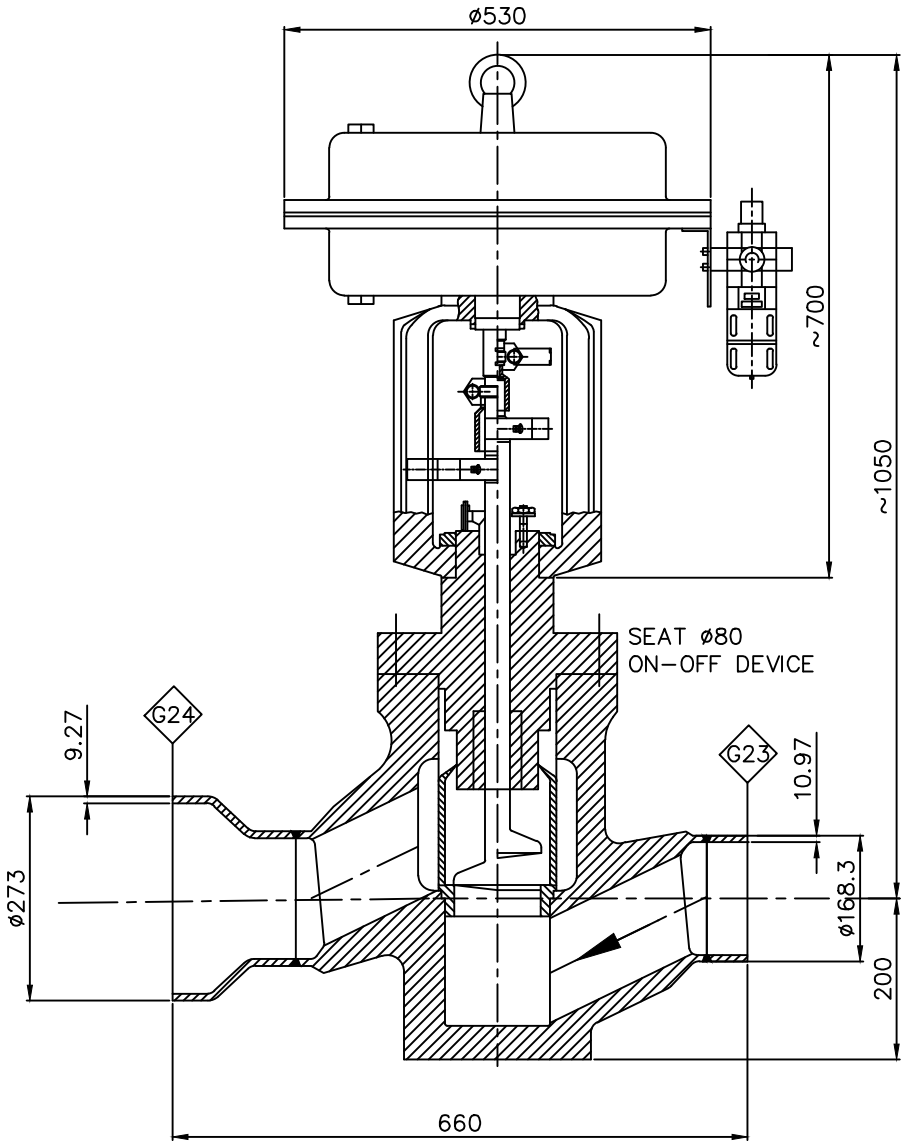
	Minimal Pressure at the valve outlet, approx.	0.0709 bar (a)	
7.	**Seismic Requirements:**	Safe operation	Horizontal: 0.3g Vertical: 0.2 g
8.	**Installation**	Indoor	
	Ambient Conditions	Ambient Temperature min/max	0°C / 50°C
		Absolute Humidity	≥ 60 g/m^3
9.	**KKS Labeling**	**Unit code**	
	HP-Relief Valve	LBC41AA051	
	3/2-Way Solenoid Valve 1	LBC41AA051A	
	3/2-Way Solenoid Valve 2	LBC41AA051B	
	3/2-Way Pneumatic Valve 1	LBC41AA051C	
	3/2-Way Pneumatic Valve 2	LBC41AA051D	
	Proximity Switch – Position 100% OPEN	LBC41CG051B	
	Proximity Switch – Position 0% CLOSE	LBC41CG051C	
	Air filter	LBC41AT021	
	Pressure Relief Valve	LBC41AA261	
	Pressure Gauge	LBC41CP501	
	Terminal Box	LBC41GF051	

Prepared by		**Approved by**	
Anil Kumar	Mudit Jain	Sandeep Sonkar	Ms Saswati Srivastava
Sr.Engr- TL	Sr. Engr-CIE	Sr.Mgr	SDGM-CIE

FIRST ANGLE PROJECTION (ALL DIMENSIONS ARE IN mm) FORM DG 39(B)

REV	DATE	ALTERED / CHECKED	REV	DATE	ALTERED / CHECKED	~~GMS No.~~/ C.B.O.M.– NO.	STATUS OF DRG
							U

ZONE		ZONE		AGREED DEPT	NAME	SIGN	DATE



NOTE: –

1. WELD EDGE AS PER FORM FIG. 2A OF ASME B16.25.
2. TYPE OF ACTUATOR, NUMBER OF CYLINDERS AND DIMENSIONS OF VALVE AND ACTUATOR AS GIVEN IN THIS DRAWING ARE INDICATIVE.

Ref.Drawing No>

Sign & Date

Inventory No.

BHARAT HEAVY ELECTRICALS LTD.
RANIPUR, HARDWAR

	NAME	SIGN	DATE	NO. OF VAR
DRN	P.S.SHARMA	–Sd–	27.03.17	–
CHD	ANIL	–Sd–	27.03.17	
APPD	S.K.GUPTA	–Sd–	27.03.17	

DEPT STE	SCALE	WEIGHT (KG)	REF. TO ASSY. DRG.	ITEM No.	NO. OF ITEMS
CODE 4011	N.T.S.	–		–	–

TITLE :

HP RELIEF VALVE

CARD CODE

DRAWING NO. 4-13137-W1101 REV 00

7 22 23 24

SHEET No. 01 No. OF SHEETS 01

Table of content **page**

Continued page 2 to 6

1. Scope of Application

This Technical Purchasing Specification covers valves for evacuating of bottled up pressurized steam from steam turbine unit during load throw-off. During normal operation of turbine, this valve shall remain in tightly closed position and down steam side of the valve shall be subjected to condenser vacuum. The valve is to be suitably designed to prevent the ingress of air through valve glands into the system.

The requirements of this specification are valid as far as no other requirements are given in the enquiry.

2. Type-tested Valves

Valves with a valid type-testing certificate according to PED97/23/EC and to the corresponding VdTÜV-Merkblätter, of TRD 110 attachment 1 as well as accordingly to the registration of DIN-DVGW fulfill the requirements of this specification.
For these valves the requirements for manufacturing and testing agreed upon with the TÜVs respectively with the DVGW-federation shall be fulfilled (declaration of commitment).

3. Referenced Documents

- AD2000-W 0
- AD2000-W 7
- AD2000-HP 0
- AD2000-HP 5/3
- TRD 100
- EN 287-1
- DIN EN ISO 15607
- DIN EN ISO 15609-1
- DIN EN ISO 15614-1
- EN 1418
- EN 10028
- EN 10204
- EN 10213
- EN 10222
- EN 10273
- DIN 1690-10
- EN 1559-1
- EN 1559-2
- EN 12266-1/-2
- DIN 17175,
- PED 97/23/EC
- ASME B16.34

In case of differences or contradictions of the referenced documents the higher requirements shall be applied.

4. Technical Data and Design

The criteria, e.g. fluid, pressure, temperature, material of the casing, etc., as well as other technical data are given in the enquiry.

5. Inspection certificate / Declaration of Compliance in Dependence on Fluid, Pressure and Temperature

For all valves an Inspection Certification 3.1 according to EN 10204 must be provided.

6. QA-Requirements regarding the Valve Manufacturer and his Suppliers:

The valve manufacturer as well as his suppliers for the main components like e.g. pressure guiding components, instrumentation and control, shall have an introduced and well-working quality management system, e.g. according to EN ISO 9000 series or equivalent standard. Manufacturers of pressure guiding components shall have in addition a certificate according to AD2000-W 0 respectively TRD 100.

As far as welding will be performed on the valves, the weld shop shall be certified according to AD2000-HP0.

7. Manufacturing and Inspection Plan (MIP)

The valve manufacturer shall prepare a Manufacturing and Inspection Plan containing sufficient information on the sequence and extent of the valve inspections as well as the main raw material and shall deliver this to the purchaser for review at the latest 4 weeks after order receipt, but at least 2 weeks before starting manufacturing.

8. Condition for Manufacturing

Manufacturing of the valve mentioned in point 7 shall not be started before the review for the design as well as for the MIP has been given by the purchaser. To prohibit any delay the valve manufacturer shall call for missing reviews and remind the purchaser on time.

By reviewing the MIP the purchaser does not take on any responsibility for processes or manufacturing details of the valve manufacturer or his suppliers, or for the valve itself.

9. Fabrication and Inspection

9.1 Steel Castings

Steel castings, e.g. valve casings, covers, etc., shall be manufactured and inspected according to EN 10213 and EN 1559 part 1 and part 2 and DIN 1690 part 10, and following minimum requirements:

- Analysis (chemical composition) per heat
- Mechanical properties per heat and heat treatment batch, for castings with an individual weight > 1000 kg testing per casting
- Amount of non-destructive testing according to DIN 1690 part 10:

- Weld ends of valves without connection pieces: Quality class A with quality grades S1 + V1
- Transition areas: quality class B with quality grades S2 + V2
- Weld ends of valves with connection pieces: Quality class B with quality grades S2 + V2

- remaining areas of the casting: quality class D with quality grades S3 + V4; additionally for castings ≥ 500 kg or DN ≥ 400 mm each casting 100% volume inspection shall be performed.

9.2 Rolled or Forged Material

Rolled or forged material, e.g. connection piece, shall be manufactured and inspected according to the corresponding material standard, e.g. EN 10028, EN 10088, EN 10222, EN 10273, DIN EN 10216-2 and DIN 17440, etc. and following supplements:

- Analysis (chemical composition) per heat
- Mechanical properties per heat and heat treatment batch

9.3 Connecting Elements:

Connecting elements shall be manufactured and tested according to AD2000-W 7. As far as there is a requirement for a test certificate for grade properties, this shall be an inspection certificate 3. 1 according to EN 10204.

9.4 Welding

As far as welding will be performed on the valves (also in case of fabrication welding on castings):

- Welding shall be performed only by welders tested in line with EN 287 or mechanized welds by welding operators tested in line with EN 1418
- Corresponding welding procedure specifications and procedure approval records according to
  - DIN EN ISO 15607
  - DIN EN ISO 15609-1
  - DIN EN ISO 15614-1 shall be available.
- Fabrication welds on castings shall be inspected according to DIN 1690.
- Fabrication welds having a length ≥ 150 mm or a depth ≥ 40% of the wall thickness or a depth ≥ 25 mm shall be recorded.
- Design welds shall be inspected according to AD2000-HP 5/3. In case of serial production manufacturer-specific inspection concepts may be applied with written agreement of the purchaser.
- If cast steel parts are subjected to heat treatment in the course of valve manufacture, all parts heated shall subsequently be subjected to a 100% surface crack examination.

9.5 Manufacturing Inspections

Manufacturing Inspections shall be performed according to PED 97/23/EC / EN 12266. The PED 97/23/EC a s a superior legislation shall be observed and applied. These are especially:

a) Pressure test
   - Test P10 according to EN 12266 part 1

b) Leak test
   - Test P11 + P12, leakage class B according to EN 12266 part 1

c) Functional test
   - Test F20 according to EN12266 part 2

d) Verification of dimensions
   - Main dimensions
   - connecting dimensions

   All tolerance ranges which are important for the function shall be recorded. As
   - Stem diameter
   - Diameters of guides and fits

10. Marking

Valves shall be marked as follows:

- The name and address or other means of identification of the manufacturer and, where appropriate, of his authorized representative established within the Community
- Nominal diameter
- Nominal pressure class
- Casing material
- Flow direction arrow
- Identification-no. (Also commission-no.)
- The year of manufacture
- Identification of the pressure equipment according to its nature, such as type, series or batch identification and serial number

- Essential maximum/minimum allowable limits

- CE marking is applied for European Union countries.

Valves with a total weight > 1000 kg shall be marked additionally with a permanent information of the weight on the valve or on an safe name- plate.

The provisional KKS-Labels which are fabricated and properly sized are to be made of plastic or similar unbreakable material and attached to the component by wire. The lettering on the labels should include the KKS classification in back, permanent ink.

Marking of the materials for all pressure loaded casing components shall survive during all manufacturing processes according to AD2000-HP 0.

11. Surface Protection

Surface coating of non-stainless steel valves shall be applied as follows

Paint (Coat)	Paint Type	No. of coat	DFT*
Primer Paint	: Epoxy base Zinc rich primer paint	1 Coat	35
Intermediate Paint	: Epoxy TiO2 Pigmented Polyamide Cured Paint	1 Coat	70
Finish (Final) Paint	: Aliphatic Acrylic 2 Pack Polyurethane Finish paint	2 Coats	75

*DFT – Dry Film Thickness (final) in microns

- Shade as per RAL – Grey 9002

12. Documentation

All the documentation for the delivered valve shall remain with the valve manufacturer and shall be stored for at least 10 years. This documentation shall be labelled such as to ensure traceability and allocation to the corresponding valve and shall be marked as belonging to BHEL. The valve manufacturer shall check the documentation with respect to completeness and correctness before shipping the valve. The valve manufacturer shall certify this at the time of the delivery. It is the obligation of the valve manufacturer to hand over a copy of the total documentation to the purchaser on request and free-of-charge.

BHEL expects a documentation of the module/parts including all instructions which are necessary for service, installation and maintenance. Amendments will be requested separately.

In accordance to the Machinery Directive (98/37/EC) and Pressure Equipment Directive (97/23/EC) the following records and logs shall be provided to the purchaser in any case:

- manufactures declaration
- Declaration of conformity
- Material certificates
- Pressure test
- Non-destructive tests

The documentation - also that of the sub suppliers - shall be written in English language and shall contain at least:

- Test certificates of the prematerial (at least inspection certificate 3.1B according to EN 10204)
- Records of all inspections performed by the valve manufacturer or his sub suppliers during manufacturing:
  - Non-destructive inspections of e.g. weld areas or welds
  - Verification of dimensions
  - Pressure and leak tests
  - Functional tests
- Heat treatments performed
- The European Union guidelines and standards which are valid and can be used for the area of application (e.g. PED 97/23/EG, Low-Voltage Guideline 73/23/EWG, etc..) are to be designated in the declaration of conformity according to the remarks and applied quality modules, and shall include all relevant data (see e.g. appendix VII of Guideline 97/23/EG). Risk disclosure and danger analyses in accordance with EN 1050 are to be handed over to BHEL if necessary.

- If materials without European material approval are drawn on for the order (order papers/designs) (e.g. ANSI/ASME materials) appropriate substitute certificates from a designated authority shall be procured and documented accordingly. If the order pertains to a component of a total design group, then all certificates and certification of the component of the highest category of the total design group shall be made available.

13. Final inspection

The purchaser reserves the right to perform final inspections on his ordered parts in the shop of the valve manufacturer, as well as in the shop of his sub suppliers

14. Delivery and Packing

Details regarding delivery are given in the order, however at least following details shall be given together with the delivered parts:

Actualization of standards and instructions

- Purchaser
- Order-no. / project
- Manufacturer commission-no. / works-no.
- Specification
- Number of pieces
- Type / item
- Nominal diameter [DN]
- Maximum allowable pressure [PS]
- Maximum allowable temperature [TS]
- Fluid
- Manufacturer drawing-no.
- Identification-no.of the valve
- Piece weight

Together with the delivery of the valve the valve manufacturer shall hand over a certificate 2.1 according to EN 10204 in English, which confirms that the delivered valve fulfills the requirements given in the order and in this specification. Furthermore the valve manufacturer shall confirm that only materials as listed in the design bill of material have been used and that the documentation is available in his shop in line with Item 12 above and that he has checked the documentation carefully.
Packing of the valve shall be as follows:

- The valve shall be packed and locked that way, that in general case any damage will be prohibited.
- All openings shall be plugged.
- Detail parts respectively components shall be packed individually, however assignment shall be

ensured.

- As far as necessary accessory devices for transportation purposes shall be attached to the valve and/or to the packing, e.g. lifting eyes and lifting signs.
- Bearing areas shall be marked, if necessary.

15. Guarantee

The supplier shall guarantee trouble free operation of the equipment for a period of 2 years after installation and commissioning or a period of 3 years from the date of dispatch of equipment whichever is earlier.

If during erection/commissioning and operation at site, any defect in any component is detected, purchaser's / owner's site representative shall prepare the assessment report and a copy of the same shall be forwarded to the supplier. The supplier shall replace / rectify the concerned items free of charge. The supplier, if he so desires, may deputes his representative to site at his own cost otherwise the report of purchaser's / owner's site representative shall be binding on the supplier.

16. Spares

The offer of valves shall include the requirement of spares to be made available at the time of erection & commissioning. A separate offer of spares to be required for 3 to 5 years of operation shall also be separately enclosed along with main offer.

17. Special tools & tackles

Any special tools & tackles, required for erection, commissioning and maintenance of valves shall be included in main offer per set of valves.

18. Supplementary Requirements

The valve manufacturer shall send following documents in triplicate written in English language to the purchaser's department for records. Documents listed under a) and c) shall be delivered with the order acknowledgement:

a) Part drawing showing the function of the valve and the design bill of material
b) Operating and maintenance instruction
c) Spare part list

19. Deviations

Equivalent ASME B16.34 requirements may be considered in place of given in PED 97/23/EC / EN 12266.

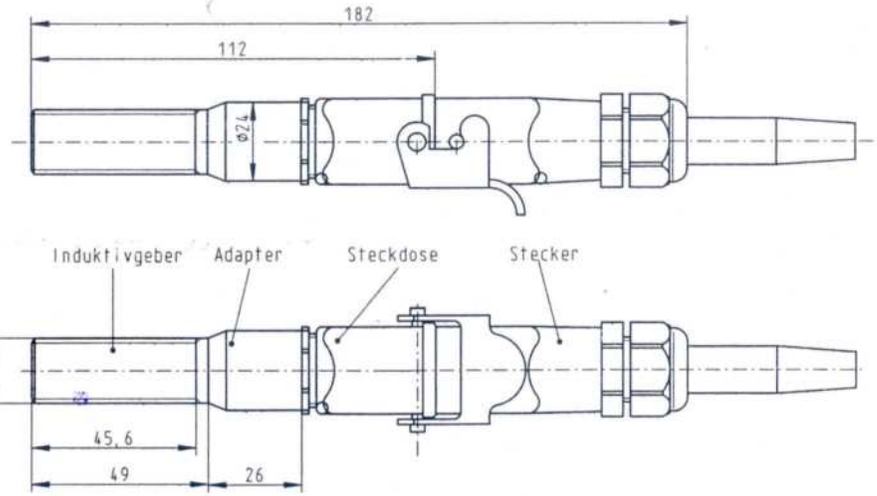
Any deviation from this purchasing specification has to be reported to the purchaser immediately.
Any deviation is accepted only if this has been approved or accepted by the purchaser in writing.
In case of any deviation from the specified properties, also if the proof by testing is not required, the purchaser has the right to reject the material.

BERUEHRUNGSLOSER INDUKTIVGEBER

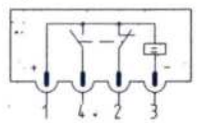
TYP IFL 5-18-11zStPK-1952-2

IFL5-18-1125PTK

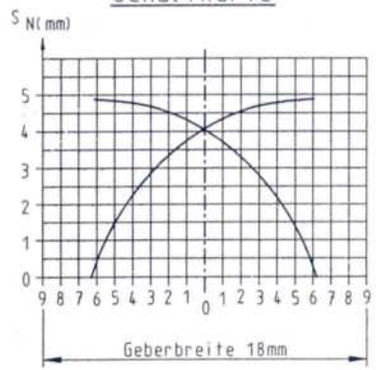
Einbau im Metall	:	buendig
Einbaulage	:	beliebig
Gehaeuse	:	Ms-vernickelt
Sensorflaeche	:	Crastin
Anzugsmoment	:	max. 1300 Ncm
Schockfestigkeit	:	30g, 11 ms gem. IEC68-2-27
Vibrationsfestigkeit	:	10 Hz-55 Hz, 1 mm gem. IEC68-2-6
Schutzart	:	IP 67 fuer den Naeherungsschalter
	:	IP 54 fuer die Steckverbindung
schaltend nach	:	P
Elektrischer Anschluss	:	ueber Steckverbindung Harting HAN 7D mit 0,5mm2 Goldkontakten (Stecker gehoert zum Lieferumfang)
Messart	:	induktiv
max Schaltfrequenz	:	500 Hz
Nennspannung	:	24 VDC
Spannungsbereich	:	10-60 VDC
Restwelligkeit	:	±10 %
Einschaltdauer	:	100 %
Leerlaufstrom	:	±4.8 mA
Laststrom	:	±100mA
Verpolungsschutz	:	ja
Ueberlast- u. Kurzschlussschutz	:	ja
Nennschaltabstand	:	5 mm
Hysterese bei 20 Grad C	:	±0,5 mm (seitliches Anfahren bei 1,5mm Abstand)
Hysterese bei 110 Grad C	:	±1,0 mm (seitliches Anfahren bei 1,5mm Abstand)
Wiederholgenauigkeit bei 20 Grad C	:	±0,10 mm (seitliches Anfahren bei 1,5mm Abstand)
Wiederholgenauigkeit bei 110 Grad C	:	±0,25 mm (seitliches Anfahren bei 1,5mm Abstand)
Temperatur	:	-25 Grad C bis 110 Grad C
Ausgang	:	Wechsler
Revisionslose Betriebszeit	:	min. 24.000 h
Lieferant	:	K.A. Schmersal & Co Moeddinghofe 30 5600 Wuppertal 2



Anschlussbild



Schaltkurve



NOTE: 4 wire Proximity switch, for taking these wires for termination in JB, NC Contact not used, Pl refer, Sh. 4.

Geräteschlüssel:
INSTRUMENTATION KEY: LGBAD

TITEL : PROXIMITY SWITCH

BHART HEAVY ELECTRICAL LTD

HARIDWAR, RANIPUR, INDIA-249403

Drawing No. 41810221002 Sh 1

PROXIMITY SWITCH FOR HPT EVACUATION
Translated version Doc. No. 41810221002
TYP IFL S-18-11zStPK-1952-2

MOUNTING IN METAL:	to be flush in metal
Mounting position:	Any position
Casing:	Ms. Nickel plated
Sensor surface	Crastin
Stud torque	Max1300 Ncm
Shock reaction	30 gm, 11ms gem. IEC 68-2-27
Resistance to vibration	10Hz 55 Hz,1mm.
Protection	IP67 for proximity probe
Protection	IP 54 for plug connector
Switching to	P
Electrical connection	4 wire with Harting HAN 7D plug socket with 0.5 mm2 gold contact
Mode of measurement	Inductive
Max switching frequency	500Hz
Voltage supply	24V
Supply range	10-6 VDC
Residual ripple	≤ 10%
Running time	100%
Stand by current	≤ 4.8 mA
Running current	≤ 100mA
Non reversible	Yes
Overvoltage protection (short ckt. proof):	Yes
Operating distance	5 mm
Switching hysteresis at 20 Deg	≤ 0.5mm(1.5 mm distance)
Switching hysteresis at 110 Deg	≤ 1.0mm(1.5 mm distance)
Repeat accuracy at 20 Deg	≤ 1.0mm(1.5 mm distance)
Repeat accuracy at 110 Deg	≤ .25mm(1.5 mm distance)
Temp sensor	-25˚C to to 110 ˚C
Output	1 changeover contact with snap action
Inspection time	min 24000 hr
Manufacturer	KA Schemersal & Co Moeddinghofe & co 5600 Wupertal 2

TEST & INSPECTION

1.0 Type Test

1.1.0: Degree of protection

2.0 Routine Test

2.1.1:Functional and calibration test for limit switch

2.1.2 Fail safe position of actuator

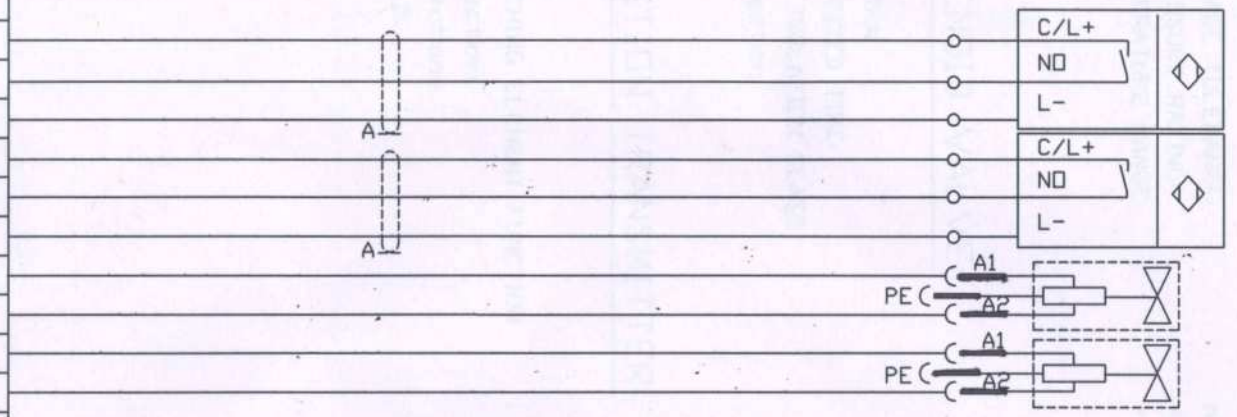
2.1.3 Fully assembly i.e. the valve along with Pneumatic actuator shall be

3.0 Tested for proper function.

3.1.0 Test and Guarantee Certificate Results of all tests enumerated in above shall be compiled in test certificate and to be submitted.

4.0 Vendor shall provide our inspector or authorized representative all facilities to witness the tests.

LBC41GF051:- X01	
1 o	LBC41CG051C
2 o	LBC41CG051C
3 o	LBC41CG051C
4 o	LBC41CG051B
5 o	LBC41CG051B
6 o	LBC41CG051B
7 o	LBC41AA051A
8 o	LBC41AA051A
9 o	LBC41AA051B
10 o	LBC41AA051B
SH o	SHIELD
SH o	SHIELD
PE o	GROUND
PE o	GROUND



ASSIGNMENT OF CORE CONDUCTOR COLOURS (DIN IEC 757)

BK: BLACK
BN: BROWN
BU: BLUE
GY: GREEN
GY: GREY
OG: ORANGE
PK: PINK
PU: PURPLE
RD: RED
WH: WHITE
YE: YELLOW

* THE JUNCTION BOX AND THE JUNCTION BOX COVER HAS TO BE LABELLED WITH ' LBC41GF051'
* SHIELD (A), IF AVAILABLE, CONNECTED TO SHIELD TERMINALS (SH)
* GROUND (PE) CONNECTED TO GROUND TERMINALS

REV	REMARKS	BHARAT HEAVY ELECTRICALS LIMITED HARIDWAR	TITLE: CONNECTION DIAGRAM HP DUMP VALVE LBC41	SH. NO. 4 BHEL ; HARDWAR
			DRAWING NO. 41810221002	

GENERAL REQUIREMENTS:

VOLTAGE:	24 V DC
VOLTAGE TOLERANCE:	min. +10/-15%
ENCLOSURE RATING:	min. IP65/ NEMA 4
TEMPERATURE RANGE:	+ 5°C TO 70°C (+41°F TO 158°F)

SOLENOID VALVE:

Relative ENERGIZED TIME:	100%
	CONSTANT RATED
COIL ISOLATION CLASS	F
Connection:	plug acc. TO DIN EN 175301-803

POSITION TRANSMITTER:

TYPE:	INDUCTIVE
SWITCHING ELEMENT FUNCTION	PNP NORMAL OPEN
Connection:	3-POLE
Connection:	plug acc. TO DIN EN 175301-803
SHIELD:	NOTREQUIRED BUT WIRED IF AVAILABLE

TITLE: ELECTR. SPEC. SOLENOID/GENERAL /24DC/INDOOR

BHARAT HEAVY ELECTRICALS LTD
HARIDWAR, RANIPUR, INDIA-249403

DRAWING NO. 41810221002

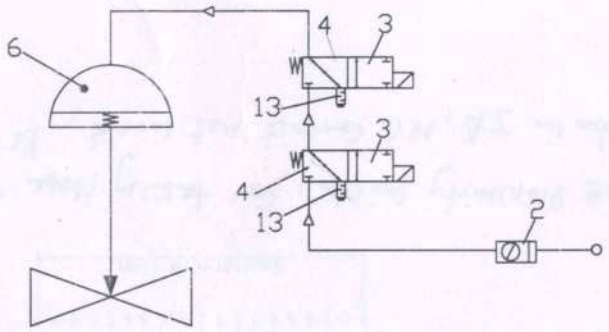
SH. NO. 5

	HOOKUP DIAGRAM NO. 41810221002	date:	09.04.2012
		check:	BSRANA
		sh no. &	
revison:		plant:	BARA

Air pressure
Spring bar
stroke mm

mounting position: vertical

Pos.	Tag No.
001	



Pos	Qty.	Description	Type/Manuf.	Pneu. con.	Part No.
2	1	Air set			
3	2	Solenoid valve			
4	2	3/2 Way Pnuematic valve			
5	2	3/2 way solenoid valve			
6	1	Pnuematic Actuator			
7		Lock up valve			
8		Miscellaneous			
9		Booster			
10					
11					
12		Pn. Connection			
13		Vent Filter			
14		Filter	☐IP54 ■IP65		
15	2	Limit Switches Fa. Schmersal	BTL 5-18-UZ STPH-1952-2		

Pipe	Size	Dimensions	Material
	25x2,5	[mm]	SS
Fitting	■ERMETO ☐SWEGELOK	☐PARKER	☐.....
Stroking time	Direction	100...0%	0...100% ON/OFF with Solenoid valve
	Requested [s]		1s/2s
	Measured [s]		

DATA SHOWN ARE INDICATIVE.

10 LBC41 AA051

RELATED DRAWINGS:

ADDITIONAL NOTES:-

1. TWO NOS ADAPTORS WITH 1/2" FERRULE FITTING FOR CONNECTION TO G1/2" LINE ARE REQUIRED. ALSO G1/2" LINE (APPROX 2 METERS) ARE REQUIRED.

2. LIMIT SWITCHES AND SOLENOID VALVE SHOULD NOT BE MOUNTED ON VALVE TO AVOID DAMAGE DURING ERECTION OF VALVE. THE SAME SHOULD BE LOOSELY PACKED IN A SEPARATE WOODEN BOX / COMPARTMENT TO AVOID BREAKAGE.

3. PROPER LABELLING SUCH AS `ITEM NAME', `PO', ETC SHALL BE CLEARLY INDICATED ON THE LOOSE PACKAGE BOX FOR IDENTIFICATION IN CASE OF MISPLACEMENT .

MANUFACTURER'S NAME AND ADDRESS		STANDARD QUALITY PLAN		TO BE FILLED BY BHEL	TO BE FILLED BY BHEL
BHEL	VENDOR'S NAME	ITEM	HP RELIEF VALVE	QP NO.	QA_BI_QP_116
				DATED	10/02/13
		DRG. NO.	AS PER PO		
		SPEC.	AS PER PO		
		REV	00	Page 1 of 2	

SL. NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORDS	D	AGENCY M	AGENCY B	AGENCY N	REMARKS
1	2	3	4	5	6	7	8	9		10			11
1.0- RAW MATERIALS & BOUGHT OUT ITEMS													
1.1	Body and Bonnet	Physical & Chemical Properties	MA	Physical & Chemical Examinations	One per Heat	BHEL, Approved Data Sheet	BHEL, Approved Data Sheet	Test Certificate	√	P	V		
1.2		Heat Treatment	MA	Verification	One per Heat	BHEL, Approved Data Sheet	BHEL, Approved Data Sheet	Test Certificate	√	P	V		
1.3		Visual Examination	MA	Visual Examination	100%	BHEL, Approved Data Sheet	BHEL, Approved Data Sheet	Test Certificate	√	P	V		
1.4		Internal Soundness	CR	Radiograph Test	100% on CA	ASME Sec V	ASME B 1634 Appendix I	Test Certificate	√	P	V		
1.5		Sub surface inspection	CR	Magnetic particle test	100% on Access Area	ASME Sec V	ASME B 1634 Appendix II	Test Certificate	√	P	V		
1.6	Trim (Plug Seat Ring & Stem)	Physical & Chemical Propertics	MA	Physical & Chemical Examinations	One per Heat	BHEL, Approved Data Sheet	BHEL, Approved Data Sheet	Test Certificate	√	P	V		
1.7	Prosser Resisting Fasteners	Physical & Chemical Propertics	MA	Physical & Chemical Examinations	One per Heat	BHEL, Approved Data Sheet	BHEL, Approved Data Sheet	Test Certificate	√	P	V		
1.8	Accessories	Visual	MA	Visual/Model Verification	100%	BHEL, Approved Data Sheet	BHEL, Approved Data Sheet	Compliance Certificate	√	P	V		
2.0- IN PROCESS INSPECTION													
2.1	Body, Bonnet, Plug, Seat Rings after machining	Dimensional Check	MA	Measurement	100%	BHEL, Approved Data Sheet/Drawing	BHEL, Approved Data Sheet/Drawing	IR	√	P	V		
2.2	Body & Bonnet	Pressure Resistance	CR	Hydro Test	100%	ASME B 1634/ BHEL, Approved Data Sheet	No Leak	IR	√	P	V		
2.3	Plug & Seat Contact	Blue match	MA	Plug & Seat Contact	100%	BHEL, Approved Data Sheet	Full line contact	IR	√	P	V		

MANUFACTURER/SUBCONTRACTOR	Digitally signed by Sanjeev Kr. Bhardwaj Date: 2020.05.12 08:16:29 +05'30'	LEGEND: ! RECORDS IDENTIFIED WITH 'TICK' SHALL BE ESSENTIALLY INCLUDED BY CONTRACTOR IN QA DOCUMENTATION. M: MANUFACTURER / SUBCONTRACTOR B: BHEL / NOM. INSPECTION AGENCY N: CUSTOMER INDICATE 'P' PERFORM 'W' WITNESS AND 'V' VERIFICATION ALL 'W' INDICATED IN COLUMN 'N' SHALL BE 'CHP' OF CUSTOMER	FOR CUSTOMER USE APPROVED BY

MANUFACTURER'S NAME AND ADDRESS		STANDARD QUALITY PLAN		TO BE FILLED BY BHEL	TO BE FILLED BY BHEL
BHEL	VENDOR'S NAME	ITEM	HP RELIEF VALVE	QP NO.	QA_BI_QP_116
				DATED	10/02/13
		DRG. NO.	AS PER PO		
		SPEC.	AS PER PO		
		REV	00	Page 2 of 2	

SL. NO.	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORDS	D	AGENCY M	AGENCY B	AGENCY N	REMARKS
1	2	3	4	5	6	7	8	9		10			11
3.0- FINAL INSPECTION & TESTING													
3.1	Performance Test on Assembled valve fitted with Accessories	Hydro Test	CR	Hydro Test	100%	BHEL, Approved Data Sheet/Drawing	BHEL, Approved Data Sheet/Drawing	Test Certificate	√	P	W		
3.2		Seat Leak Test	CR	Leak Test	100%	BHEL, Approved Data Sheet/Drawing	BHEL, Approved Data Sheet/Drawing	Test Certificate	√	P	W		
3.3		Performance test of Valve	CR	Calibration (hyerisis, Travel, stroke, Stroking time)	100%	BHEL, Approved Data Sheet	BHEL, Approved Data Sheet	Test Certificate	√	P	W		
3.4		Packing Tightness	CR	Packing Leal Test	100%	BHEL, Approved Data Sheet	BHEL, Approved Data Sheet	Test Certificate	√	P	W		
3.5		Control Valve Flow Capacity	CR	Capacity Test	One / Type	BHEL Approved Date Sheet/ISA 75.02	Full Capacity	Test Certificate	√	P	V		
3.6		Model Verification of Actuator and positioner	MA	Visual	100%	BHEL Approved Date Sheet	BHEL, Approved Data Sheet	Test Certificate	√	P	W		
4.0 PAINTING, PRESERVATION & PACKING													
4.1	Final Inspection	Dimension & Visual	MA	Over all Dimension & Visual	100%	App GA Drawing	App GA Drawing	Test Certificate	-	P	W		
4.2	Painting	Paint finish color shade	MA	Visual DFT Measurement	100%	Purchase Specification	Purchase Specification	-	-	P	V		
4.3	Assembled Valve Completeness	Marking/Name Plate & Tagging	MA	Marking/Name Plate & Tagging	100%	BHEL, Approved Data Sheet	BHEL, Approved Data Sheet	-	-	P	W		
4.4	Packing	Packing List, Safety	MA	Verification	100%	Customer Spec	Customer Spec	-	√	P	V		

MANUFACTURER/SUBCONTRACTOR	Digitally signed by Sanjeev Kr. Bhardwaj Date: 2020.05.12 08:16:40 +05'30'	LEGEND: ! RECORDS IDENTIFIED WITH 'TICK' SHALL BE ESSENTIALLY INCLUDED BY CONTRACTOR IN QA DOCUMENTATION. M: MANUFACTURER / SUBCONTRACTOR B: BHEL / NOM. INSPECTION AGENCY N: CUSTOMER INDICATE 'P' PERFORM 'W' WITNESS AND 'V' VERIFICATION ALL 'W' INDICATED IN COLUMN 'N' SHALL BE 'CHP' OF CUSTOMER	FOR CUSTOMER USE APPROVED BY