



HYDRO PROJECTS ENGINEERING DIVISION

SPECIFICATION NO.

REV 01

**TITLE : SPECIFICATION OF
DEWATERING LEVEL MEASURING
EQUIPMENTS (SUBMERSIBLE TYPE)**

241595782-1A

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1. PROJECT: VISHNUGAD PIPAL KOTI - HEP

2. APPLICATION:

Submersible Level Transducer cum Transmitter shall be used for Measurement of Dewatering Water Levels.

3. SCOPE OF SUPPLY:

3.1 - Item - 1 (Main Supply)

Water level measuring equipment - One (1) Set consist of following:

Item description	Quantity	Remark
➤ Dewatering Level Sensor	1 No.	For Measurement of Dewatering level
➤ Digital indicator cum power supply	1 No.	-----do-----
➤ Power line surge protector	1 No.	-----do-----
➤ Signal line surge protector	1 No.	-----do-----
➤ Wall mounted box	1 No.	-----do-----

Note: Level sensor and Digital indicator cum power supply unit should be of same make.

3.2- Item - 2 (Spare Supply)

Item description	Quantity	Remark
➤ Dewatering Level Sensor	1 No.	-

3.3. Item - 3 (Main Supply)

Piping & Fittings for Dewatering Level Measuring System – One (1) Set: Refer Specification No. 241595782-1B Rev 00 & Drawing No. 02311619701 Rev 00.

4. LEVEL TRANSMITTER (SUBMERSIBLE TYPE) –DEWATERING LEVEL SENSOR (With two wire system)

These transducers shall be capable of measuring static or dynamically changing pressure in any non corrosive fluid medium (in this case water). The most important characteristic required for level transducer cum transmitter include reliability, performance, accuracy, compactness and ruggedness. This transducer converts water pressure into proportional electrical signals.

REV.NO.		DISTRIBUTION.	QTY	APPROVED:			
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CHECKED		HSE	01	PREPARED	CHECKED	ISSUED	DATE
APPROVED		MM(H)	06	(AKG)	(YDB)	(HAA)	13.11.19
DATE							



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Transmitters of outstanding linearity and excellent stress and strains characteristics shall be employed in the construction of these transducers. The ceramic element should be perfectly sealed. Zero & span adjustment shall be available on level transmitter if required. This transmitter should be submersible type and protected against lightning voltage.

5. POWER LINE SURGE PROTECTOR:

The power line surge arrester should protect a measuring instrument line side against line surges and voltage peaks which occur due to atmospheric electrical charges or switching processes in the power supply. Both wires of the power cabling should be protected through a surge diverter and a surge resistant resistor which limits the current when the arrester responds.

6. SIGNAL LINE SURGE PROTECTOR:

The signal line surge arrester should protect a measuring instrument signal side against surges and voltage peaks which occur in cable due to atmospheric electrical charges or interference. The signal surge arrester shall be used for signal cables having voltages up to 20V, cable to ground, or up to 40 V, cable to cable (non-grounded, and currents up to 30 mA. The signal line surge arrester shall protect 2 or 3 pole signal inputs or outputs of a measuring unit. The over voltage shall be discharged through a surge diverter in the cabling or a surge -resistant current limiting resistor and a Transzorb diode at the instrument.

7. DIGITAL INDICATOR CUM POWER SUPPLY UNIT FOR DEWATERING SYSTEM:

The digital indicator cum power supply unit should be 48 mm(H) x 96 mm(W) x 150 mm(D) size, flush panel mounting type and suitable for cutout size 45mm(H) x 92mm(W). Indicating LED/LCD should be 5 digits. Digital indicator shall be equipped with built in 24 V DC power supply for powering level transmitter. Input power supply to digital indicator cum power supply unit shall be 230 V AC.

8. SPECIFICATION OF LEVEL SENSORS:

a. Type Submersible type.

b. Setting Range Measuring Range

A. Dewatering Level		
Maximum EL	1017 M	11.5 Mtrs.
Minimum EL	1005.5 M	15.00 Mtrs.

c. Supply voltage DC 24 V

d. Output DC 4 – 20 mA for min. to max. variation & max.
Current 25 mA isolated from input.

e. Temperature range (process) - 30 to 70 °C.
(ambient) - 30 to 70 °C.

f. Safe overload Transducer should be safe for for 3 times of max. measuring range
in bar

g. Accuracy, combined non $\pm 0.25\%$ of span (F.S) or better
linearity and hysteresis

h. Mounting Probe will be mounted inside the guide pipe & always
submerged in water.

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- k. Interface: RS232 on the rear panel 3.5 mm stereo socket.
- l. Transmitter supply Galvanically isolated 24 V dc loop
- m. Accuracy $\pm 0.05\%$
- n. Protection IP65 Front

Note: Zero & span potentiometer if required shall be part of Digital Indicator.

12. PACKING

Each equipment shall be packed in a thermocol box with silica gel packet and placed in a carton or case with adequate cushioning material and water proof cover to minimize the movement of the internals and ensure that the instrument is capable of withstanding the transit conditions without damages.

13. DOCUMENTATION

The supplier shall submit the documents/ drawings (3 sets) at the time of offer which shall include the following.

- i) Outline general arrangement drawings.
- ii) Details, specifications and guaranteed technical particulars.

The supplier shall submit within four weeks from the date of award of contract, Drawings (three prints each) which shall include the following, for our APPROVAL.

- a) Outline general arrangement drawings complete with mounting details.
- b) Q.A. Plan for our approval before start of manufacturing.
- c) 3 copies of Test certificates after testing the equipment
- d) O & M Manual containing the following.
 - Operating principle
 - Mounting details
 - Inter connection wiring diagram
 - Commissioning procedure along with step wise adjustment of setting of instruments at site
 - Trouble shooting

After approval, the supplier shall provide 8 copies of all drawings certified for construction (i.e. as built drgs.) and schematic diagrams.

14. GUARANTEE

Equipment should bear supplier's guarantee for trouble free operation and good workmanship for a period of 18 months from the date of dispatch. Supplier should undertake to replace free of cost any material/ components found defective in operation during guarantee period.



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15. TESTING

All necessary test/ test certificates shall be carried out/ submitted to prove that the instrument supplied meets the requirement of this specification and relevant IS.

- a) Visual testing.
- b) Megger testing with 1000 V Megger before and after H.V. test.
- c) H.V. test 2.5 KV, 50 Hz. r. m. s. voltage, applied for 1 minute between all terminals connected together and all metal parts intended to be earthed during service.
- d) Continuity test.
- e) Calibration curves of level transmitter i.e. level Vs current output.
- f) Linearity test.
- g) Earth continuity test.

6 copies of the final test certificates shall be submitted for our reference and record

16. INSPECTION

The inspecting agency shall certify that the testing has been witnessed as per APPROVED Q.A. Plan supplied by the vendor. Acceptance or waiver of inspection does not absolve the supplier of his responsibility to rectify the equipment in case it does not perform satisfactorily at hydro site where it is actually used.

17. STORAGE & HANDLING:

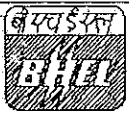
Supplier shall clearly mention the method of storage & handling in BHEL works/ site for long storage. It shall also be mentioned if any special protection is to be provided for this purpose. The above should form part of O & M Manual.

18. IDENTIFICATION

Each instrument shall be identified with the following information.

- 1. Manufacturer's name or identification.
- 2. Manufacturer's model or Serial No.
- 3. Input / Output range connection details.

The above information shall be engraved on the instrument itself/ metal tag fixed permanently.

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**GUARANTEED TECHNICAL PARTICULARS TO BE FURNISHED ALONGWITH THE OFFER
(TO BE FILLED BY THE SUPPLIER)**

- 1. LEVEL TRANSMITTER (SUBMERSIBLE TYPE) -
DEWATERING LEVEL SENSOR**
 - a. Make/ Model No.
 - b. Power supply
 - c. Output signal
 - d. Mounting drawing
 - e. Weight
 - f. Overall size
 - g. Terminal detail drawing
 - h. Accuracy
 - i. Power consumption

- 2. DIGITAL INDICATOR CUM POWER SUPPLY UNIT FOR DEWATERING**
 - a. Make/ Model No.
 - b. Size
 - c. Cutout size
 - d. Mounting drawing
 - e. Input signal
 - f. Output
 - g. Weight
 - h. Power supply
 - i. Terminal detail drgs.
 - j. Power consumption
 - k. Display

- 3. POWER LINE SURGE PROTECTOR**
 - a. Make/ Model No.
 - b. Power supply
 - c. No. of poles
 - d. Surge voltage of arrester
 - e. Series resistance per core
 - f. Mounting drawing
 - g. Weight
 - h. Overall size
 - i. Protection

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4. **SIGNAL LINE SURGE PROTECTOR**

- a. Make/ Model No.
- b. Power supply
- c. No. of poles
- d. Surge voltage of arrester
- e. Series resistance per core
- f. Mounting drawing
- g. Weight
- h. Overall size
- h. Protection



**HYDRO PROJECTS ENGINEERING
DIVISION**

SPECIFICATION NO.

REV 00

**TITLE : SPECIFICATION OF PIPING &
FITTING FOR DEWATERING SYSTEM**

241595782-1B

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PROJECT : VISHNUGAD PIPAL KOTI - HEP

1. SCOPE OF SUPPLY:

1 Set of Piping & Fittings for Dewatering System except Item No. 01 (Probe with Cable, Connecting Box & Cable Holder).

This equipment is to be supplied in completely fabricated machined condition along with all pipings, fasteners, flanges, pipe support etc. generally as per our following drawings.

(i) Piping & Fittings for Dewatering Level Measuring System as per **Drawing No. 02311619701 Rev. 00** except item No. 01.

Supplier is to use his own material as called in various drawings supplied with this.

2. PACKING:

Piping & fittings in suitably dismantled condition shall be packed in a wooden box and waterproof cover. Supplier has to submit the dispatch details box wise (to Engg. Deptt./ indenter) before shipment.

3. MATERIAL GUARANTEE & TEST CERTIFICATE:

Supplier has to supply 3 copies of material test certificates of specially S.S. Pipes used & 3 copies of Guarantee certificate against bad workmanship & defective material for 18 months from the date of supply or 12 months from the date of commissioning.

4. STORAGE AND HANDLING:

Supplier should indicate the method of storage & handling in BHEL works/ site for long storage. It shall also be mentioned if any special precaution is to be provided for this purpose.

5. IDENTIFICATION:

Each item must be punched with 3 mm height letters with their Drg. No. & Item Sl. No. as per above Drgs. for identification of items.

REV.NO.		DISTRIBUTION.	QTY.	APPROVED:			
PREPARED							
CHECKED		HSE	01	PREPARED	CHECKED	ISSUED	DATE
APPROVED		MM(H)	06				13.11.19
DATE				(AKG)	(DB)	(AP)	

INVENTORY NO.	SIGN AND DATE	REF. ORG. NO.
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1. LOCATION OF PIPE COUNTING MUST BE IN NON TURBULENCE ZONE.

LEVELS OF UNIT DEWATERING:-		
UNIT DEWATERING SYSTEM	DNWS. (AIR.)	ZONE
GAUGE PIPE MOUNTING LEVEL	EL. 1828.00 M	A-1
MINIMUM WATER LEVEL	EL. 1818.00 M	O-2
SURFACE LEVEL	EL. 1816.50 M	O-2

QTY	ITEM	UNIT	PRICE	TOTAL	DATE	BY
1	1/2" x 3/4" x 10' 0"	100	1.40	140.00		
2	1/2" x 3/4" x 10' 0"	100	1.40	140.00		
3	1/2" x 3/4" x 10' 0"	100	1.40	140.00		
4	1/2" x 3/4" x 10' 0"	100	1.40	140.00		
5	1/2" x 3/4" x 10' 0"	100	1.40	140.00		
6	1/2" x 3/4" x 10' 0"	100	1.40	140.00		
7	1/2" x 3/4" x 10' 0"	100	1.40	140.00		
8	1/2" x 3/4" x 10' 0"	100	1.40	140.00		
9	1/2" x 3/4" x 10' 0"	100	1.40	140.00		
10	1/2" x 3/4" x 10' 0"	100	1.40	140.00		
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155	1/2" x 3/4" x 10' 0"	100	1.40	140.00		
156	1/2" x 3/4" x 10' 0"	100	1.40	140.00		
157	1/2" x 3/4" x 10' 0"	100	1.40	140.00		
158	1/2" x 3/4" x 10' 0"	100	1.40	140.00		
159	1/2" x 3/4" x 10' 0"	100	1.40	140.00		
160	1/2" x 3/4" x 10' 0"	100	1.40	140.00		
161	1/2" x 3/4" x 10' 0"	100	1.40	140.00		
162	1/2" x 3/4" x 10' 0"	100	1.40	140.00		
163	1/2" x 3/4" x 10' 0"	100	1.40	140.00		
164	1/2" x 3/4" x 10' 0"	100	1.40	140.00		
165	1/2" x 3/4" x 10' 0"	100	1.40	140.00		
166	1/2" x 3/4" x 10' 0"	100	1.40	140.00		
167	1/2" x 3/4" x 10' 0"	100	1.40	140.00		
168	1/2" x 3/4" x 10' 0"	100	1.40	140.00		
169	1/2" x 3/4" x 10' 0"	100	1.40	140.00		
170	1/2" x 3/4" x 10' 0"	100	1.40	140.00		
171	1/2" x 3/4" x 10' 0"	100	1.40	140.00		
172	1/2" x 3/4" x 10' 0"	100	1.40	140.00		
173	1/2" x 3/4" x 10' 0"	100	1.40	140.00		
174	1/2" x 3/4" x 10' 0"	100	1.40	140.00		
175	1/2" x 3/4" x 10' 0"	100	1.40	140.00		
176	1/2" x 3/4" x 10' 0"	100	1.40	140.00		
177	1/2" x 3/4" x 10' 0"	100	1.40	140.00		
178	1/2" x 3/4" x 10' 0"	100	1.40	14		

VISHNUGAD PIPALKOTI HEP
4 X 111 MW - V. FRANCIS)

[illegible]

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	HYDRO PROJECTS ENGINEERING DIVISION	SPECIFICATION NO.	REV 01
	TITLE : SPECIFICATION OF DRAINAGE LEVEL MEASURING EQUIPMENTS (SUBMERSIBLE TYPE)	241595780-2A	Page 1 of 7

1. PROJECT: VISHNUGAD PIPAL KOTI HEP

2. APPLICATION:

Submersible Level Transducer cum Transmitter shall be used for Measurement of Drainage Water Levels.

3. SCOPE OF SUPPLY:

3.1 - Item - 1 (Main Supply)

Water level measuring equipment - One (1) Set consist of following:

Item description	Quantity	Remark
➤ Drainage Level Sensor	1 No.	For Measurement of Drainage level
➤ Digital indicator cum power supply	1 No.	-----do-----
➤ Power line surge protector	1 No.	-----do-----
➤ Signal line surge protector	1 No.	-----do-----
➤ Wall mounted box	1 No.	-----do-----
Note: Level sensor and Digital indicator cum power supply unit should be of same make.		

3.2- Item - 2 (Spare Supply)

Item description	Quantity	Remark
➤ Drainage Level Sensor	1 No.	-

3.3. Item - 3 (Main Supply)

Piping & Fittings for Drainage Level Measuring System – One (1) Set: Refer Specification No. 241595782-2B Rev 00 & Drawing No. 02311619702 Rev 00.

4. LEVEL TRANSMITTER (SUBMERSIBLE TYPE) –Drainage LEVEL SENSOR
(With two wire system)

These transducers shall be capable of measuring static or dynamically changing pressure in any non corrosive fluid medium (in this case water). The most important characteristic required for level transducer cum transmitter include reliability, performance, accuracy, compactness and ruggedness. This transducer converts water pressure into proportional electrical signals.

REV.NO.		DISTRIBUTION.	QTY	APPROVED:			
PREPARED				(AKG)			
CHECKED		HSE	01	PREPARED	CHECKED	ISSUED	DATE
APPROVED		MM(H)	06	(AKG)	(HOB)		13.11.19
DATE							

	HYDRO PROJECTS ENGINEERING DIVISION	SPECIFICATION NO.	REV 01
	TITLE : SPECIFICATION OF DRAINAGE LEVEL MEASURING EQUIPMENTS (SUBMERSIBLE TYPE)	241595780-2A	Page 2 of 7

Transmitters of outstanding linearity and excellent stress and strains characteristics shall be employed in the construction of these transducers. The ceramic element should be perfectly sealed. Zero & span adjustment shall be available on level transmitter if required. This transmitter should be submersible type and protected against lightning voltage.

5. POWER LINE SURGE PROTECTOR:

The power line surge arrester should protect a measuring instrument line side against line surges and voltage peaks which occur due to atmospheric electrical charges or switching processes in the power supply. Both wires of the power cabling should be protected through a surge diverter and a surge resistant resistor which limits the current when the arrester responds.

6. SIGNAL LINE SURGE PROTECTOR:

The signal line surge arrester should protect a measuring instrument signal side against surges and voltage peaks which occur in cable due to atmospheric electrical charges or interference. The signal surge arrester shall be used for signal cables having voltages up to 20V, cable to ground, or up to 40 V, cable to cable (non-grounded, and currents up to 30 mA. The signal line surge arrester shall protect 2 or 3 pole signal inputs or outputs of a measuring unit. The over voltage shall be discharged through a surge diverter in the cabling or a surge -resistant current limiting resistor and a Transzorb diode at the instrument.

7. DIGITAL INDICATOR CUM POWER SUPPLY UNIT FOR Drainage SYSTEM:

The digital indicator cum power supply unit should be 48 mm(H) x 96 mm(W) x 150 mm(D) size, flush panel mounting type and suitable for cutout size 45mm(H) x 92mm(W). Indicating LED/LCD should be 5 digits. Digital indicator shall be equipped with built in 24 V DC power supply for powering level transmitter. Input power supply to digital indicator cum power supply unit shall be 230 V AC.

8. SPECIFICATION OF LEVEL SENSORS:

a.	Type	Submersible type.		
b.		Setting Range		Measuring Range
	A. Drainage Level			
	Maximum EL	1017 M	11.5 Mtrs.	15.00 Mtrs.
	Minimum EL	1005.5 M		
c.	Supply voltage	DC 24 V		
d.	Output	DC 4 – 20 mA for min. to max. variation & max. Current 25 mA isolated from input.		
e.	Temperature range (process) (ambient)	- 30 to 70 °C. - 30 to 70 °C.		
f.	Safe overload	Transducer should be safe for for 3 times of max. measuring range in bar		
g.	Accuracy, combined non linearity and hysteresis	± 0.25% of span (F.S) or better		
h.	Mounting	Probe will be mounted inside the guide pipe & always submerged in water.		

	HYDRO PROJECTS ENGINEERING DIVISION	SPECIFICATION NO.	REV 01
	TITLE : SPECIFICATION OF DRAINAGE LEVEL MEASURING EQUIPMENTS (SUBMERSIBLE TYPE)	241595780-2A	Page 3 of 7
i. Sensor MaterialStainless steel j. Housing MaterialStainless steel k. Cable (screened) with cable holder40 Meters length for Drainage l. ProtectionIP68 (permanently hermetically sealed) 9. SPECIFICATION OF POWER LINE SURGE PROTECTOR: a. Power supply90 to 240 V AC ± 15% b. Surge voltage1000 V c. Nominal surge current20 KA d. Temperature Limit-30 °C to 70 °C 10. SPECIFICATION OF SIGNAL LINE SURGE PROTECTOR: a. Max signal voltage20 V (to ground) b. Surge voltage600 V c. Nominal surge current20 KA d. Temperature limit-30 °C to 70 °C 11. SPECIFICATION OF DIGITAL INDICATOR CUM POWER SUPPLY UNIT: a. Size48 mm (H) x 96 mm (W) x 150 mm (D) b. Mounting & cut out sizePanel mounting type suitable for cut out 45 mm (H) x 92 mm (W) c. Display5 digit 7 segments LED / LCD or more d. Display range0 to 9999.99 e. Input signal4 - 20 mA. f. Power output24 VDC g. Scale readingFor I Drainage : 1005.50 M to 1020.5 M h. Auxiliary Power System230 V AC i. Separate galvanically isolated output signal of 4-20 mA from digital indicator for MMI. j. Relay output: 2 Nos. binary output with potential free change over contact. Contact rating should be 250V AC, 5A/ 30 V DC, 5A.			

(15)

	HYDRO PROJECTS ENGINEERING DIVISION TITLE : SPECIFICATION OF DRAINAGE LEVEL MEASURING EQUIPMENTS (SUBMERSIBLE TYPE)	SPECIFICATION NO. 241595780-2A	REV 01 Page 4 of 7
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- k. Interface: RS232 on the rear panel 3.5 mm stereo socket.
- l. Transmitter supply Galvanically isolated 24 V dc loop
- m. Accuracy $\pm 0.05\%$
- n. Protection IP65 Front

Note: Zero & span potentiometer if required shall be part of Digital Indicator.

12. PACKING

Each equipment shall be packed in a thermocol box with silica gel packet and placed in a carton or case with adequate cushioning material and water proof cover to minimize the movement of the internals and ensure that the instrument is capable of withstanding the transit conditions without damages.

13. DOCUMENTATION

The supplier shall submit the documents/ drawings (3 sets) at the time of offer which shall include the following.

- i) Outline general arrangement drawings.
- ii) **Details, specifications and guaranteed technical particulars**

The supplier shall submit within four weeks from the date of award of contract, Drawings (three prints each) which shall include the following, for our APPROVAL.

- a) Outline general arrangement drawings complete with mounting details.
- b) Q.A. Plan for our approval before start of manufacturing.
- c) **3 copies of Test certificates after testing the equipment**
- d) O & M Manual containing the following.
 - Operating principle
 - Mounting details
 - Inter connection wiring diagram
 - Commissioning procedure along with step wise adjustment of setting of instruments at site
 - Trouble shooting

After approval, the supplier shall provide 8 copies of all drawings certified for construction (i.e. as built drgs.) and schematic diagrams.

14. GUARANTEE

Equipment should bear supplier's guarantee for trouble free operation and good workmanship for a period of 18 months from the date of dispatch. Supplier should undertake to replace free of cost any material/ components found defective in operation during guarantee period.

	HYDRO PROJECTS ENGINEERING DIVISION	SPECIFICATION NO.	REV 01
	TITLE : SPECIFICATION OF DRAINAGE LEVEL MEASURING EQUIPMENTS (SUBMERSIBLE TYPE)	241595780-2A	Page 5 of 7

15. TESTING

All necessary test/ test certificates shall be carried out/ submitted to prove that the instrument supplied meets the requirement of this specification and relevant IS.

- Visual testing.
- Megger testing with 1000 V Megger before and after H.V. test.
- H.V. test 2.5 KV, 50 Hz. r. m. s. voltage applied for 1 minute between all terminals connected together and all metal parts intended to be earthed during service.
- Continuity test.
- Calibration curves of level transmitter i.e. level Vs current output.
- Linearity test.
- Earth continuity test.

6 copies of the final test certificates shall be submitted for our reference and record

16. INSPECTION

The inspecting agency shall certify that the testing has been witnessed as per APPROVED Q.A. Plan supplied by the vendor. Acceptance or waiver of inspection does not absolve the supplier of his responsibility to rectify the equipment in case it does not perform satisfactorily at hydro site where it is actually used.

17. STORAGE & HANDLING:

Supplier shall clearly mention the method of storage & handling in BHEL works/ site for long storage. It shall also be mentioned if any special protection is to be provided for this purpose. The above should form part of O & M Manual.

18. IDENTIFICATION

Each instrument shall be identified with the following information.

- Manufacturer's name or identification.
- Manufacturer's model or Serial No.
- Input / Output range connection details.

The above information shall be engraved on the instrument itself/ metal tag fixed permanently.

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	HYDRO PROJECTS ENGINEERING DIVISION	SPECIFICATION NO.	REV 01
	TITLE : SPECIFICATION OF DRAINAGE LEVEL MEASURING EQUIPMENTS (SUBMERSIBLE TYPE)	241595780-2A	Page 6 of 7

GUARANTEED TECHNICAL PARTICULARS TO BE FURNISHED ALONGWITH THE OFFER
(TO BE FILLED BY THE SUPPLIER)

1. **LEVEL TRANSMITTER (SUBMERSIBLE TYPE) –
Drainage LEVEL SENSOR**
 - a. Make/ Model No.
 - b. Power supply
 - c. Output signal
 - d. Mounting drawing
 - e. Weight
 - f. Overall size
 - g. Terminal detail drawing
 - h. Accuracy
 - i. Power consumption

2. **DIGITAL INDICATOR CUM POWER SUPPLY UNIT FOR Drainage**
 - a. Make/ Model No.
 - b. Size
 - c. Cutout size
 - d. Mounting drawing
 - e. Input signal
 - f. Output
 - g. Weight
 - h. Power supply
 - i. Terminal detail drgs.
 - j. Power consumption
 - k. Display

3. **POWER LINE SURGE PROTECTOR**
 - a. Make/ Model No.
 - b. Power supply
 - c. No. of poles
 - d. Surge voltage of arrester
 - e. Series resistance per core
 - f. Mounting drawing
 - g. Weight

HYDRO PROJECTS ENGINEERING DIVISION	SPECIFICATION NO.	REV 01
TITLE : SPECIFICATION OF DRAINAGE LEVEL MEASURING EQUIPMENTS (SUBMERSIBLE TYPE)	241595780-2A	Page 7 of 7

- h. Overall size
- h. Protection

4. SIGNAL LINE SURGE PROTECTOR

- Make/ Model No.
- Power supply
- No. of poles
- Surge voltage of arrester
- Series resistance per core
- Mounting drawing
- Weight
- Overall size
- Protection

	HYDRO PROJECTS ENGINEERING DIVISION	SPECIFICATION NO.	REV 00
	TITLE : SPECIFICATION OF PIPING & FITTING FOR DEWATERING SYSTEM	241595782-2B	Page 1 of 1

PROJECT : VISHNUGAD PIPAL KOTI - HEP

1. SCOPE OF SUPPLY:

1 Set of Piping & Fittings for Dewatering System except Item No. 01 (Probe with Cable, Connecting Box & Cable Holder).

This equipment is to be supplied in completely fabricated machined condition along with all pipings, fasteners, flanges, pipe support etc. generally as per our following drawings.

(i) Piping & Fittings for Dewatering Level Measuring System as per **Drawing No. 02311619702 Rev. 00** except item No. 01.

Supplier is to use his own material as called in various drawings supplied with this.

2. PACKING:

Piping & fittings in suitably dismantled condition shall be packed in a wooden box and waterproof cover. Supplier has to submit the dispatch details box wise (to Engg. Deptt./ indenter) before shipment.

3. MATERIAL GUARANTEE & TEST CERTIFICATE:

Supplier has to supply 3 copies of material test certificates of specially S.S. Pipes used & 3 copies of Guarantee certificate against bad workmanship & defective material for 18 months from the date of supply or 12 months from the date of commissioning.

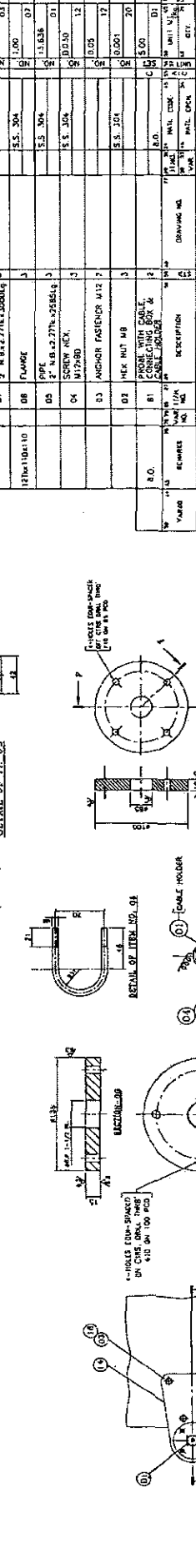
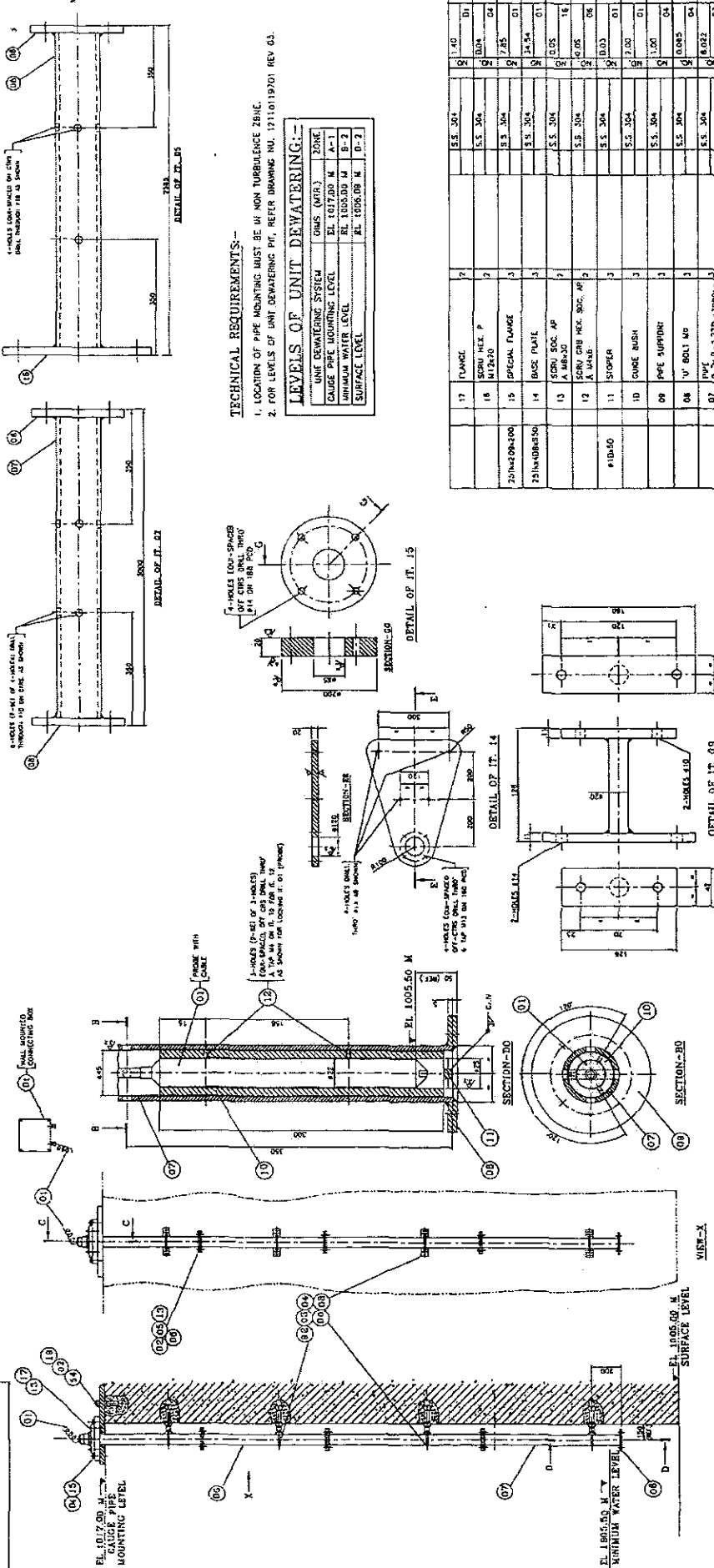
4. STORAGE AND HANDLING:

Supplier should indicate the method of storage & handling in BHEL works/ site for long storage. It shall also be mentioned if any special precaution is to be provided for this purpose.

5. IDENTIFICATION:

Each item must be punched with 3 mm height letters with their Drg. No. & Item Sl. No. as per above Drgs. for identification of items.

REV.NO.	DISTRIBUTION.	QTY.	APPROVED:			
PREPARED						
CHECKED	HSE	01	PREPARED	CHECKED	ISSUED	DATE
APPROVED	MM(H)	06				
DATE						
			(AKG)	(DB)	(AP)	13.11.19



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	HYDRO PROJECTS ENGINEERING DIVISION	SPECIFICATION NO.	REV 01
	TITLE : SPECIFICATION OF FLOOD LEVEL MEASURING EQUIPMENTS (SUBMERSIBLE TYPE)	241595782-3A	Page 1 of 7

1. PROJECT: VISHNUGAD PIPAL KOTI HEP

2. APPLICATION:

Submersible Level Transducer cum Transmitter shall be used for Measurement of Flood Water Levels.

3. SCOPE OF SUPPLY:

3.1 - Item - 1 (Main Supply)

Water level measuring equipment - One (1) Set consist of following:

Item description	Quantity	Remark
➤ Flood Level Sensor	1 No.	For Measurement of Flood level
➤ Digital indicator cum power supply	1 No.	-----do-----
➤ Power line surge protector	1 No.	-----do-----
➤ Signal line surge protector	1 No.	-----do-----
➤ Wall mounted box	1 No.	-----do-----

Note: Level sensor and Digital indicator cum power supply unit should be of same make.

3.2- Item - 2 (Spare Supply)

Item description	Quantity	Remark
➤ Flood Level Sensor	1 No.	-

3.3. Item - 3 (Main Supply)

Piping & Fittings for Flood Level Measuring System – One (1) Set: Refer Specification No. 241595782-3B Rev 00 & Drawing No. 02311619703 Rev 00.

**4. LEVEL TRANSMITTER (SUBMERSIBLE TYPE) –FLOOD LEVEL SENSOR
(With two wire system)**

These transducers shall be capable of measuring static or dynamically changing pressure in any non corrosive fluid medium (in this case water). The most important characteristic required for level transducer cum transmitter include reliability, performance, accuracy, compactness and ruggedness. This transducer converts water pressure into proportional electrical signals.

REV.NO.		DISTRIBUTION.	QTY	APPROVED:			
PREPARED							
CHECKED		HSE	01	PREPARED	CHECKED	ISSUED	DATE
APPROVED		MM(H)	06	(AKG)	(MOB)	(AKG)	13.11.19
DATE							

	HYDRO PROJECTS ENGINEERING DIVISION TITLE : SPECIFICATION OF FLOOD LEVEL MEASURING EQUIPMENTS (SUBMERSIBLE TYPE)	SPECIFICATION NO. 241595782-3A	REV 01 Page 2 of 7
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Transmitters of outstanding linearity and excellent stress and strains characteristics shall be employed in the construction of these transducers. The ceramic element should be perfectly sealed. Zero & span adjustment shall be available on level transmitter if required. This transmitter should be submersible type and protected against lightning voltage.

5. POWER LINE SURGE PROTECTOR:

The power line surge arrester should protect a measuring instrument line side against line surges and voltage peaks which occur due to atmospheric electrical charges or switching processes in the power supply. Both wires of the power cabling should be protected through a surge diverter and a surge resistant resistor which limits the current when the arrester responds.

6. SIGNAL LINE SURGE PROTECTOR:

The signal line surge arrester should protect a measuring instrument signal side against surges and voltage peaks which occur in cable due to atmospheric electrical charges or interference. The signal surge arrester shall be used for signal cables having voltages up to 20V, cable to ground, or up to 40 V, cable to cable (non-grounded, and currents up to 30 mA. The signal line surge arrester shall protect 2 or 3 pole signal inputs or outputs of a measuring unit. The over voltage shall be discharged through a surge diverter in the cabling or a surge -resistant current limiting resistor and a Transzorb diode at the instrument.

7. DIGITAL INDICATOR CUM POWER SUPPLY UNIT FOR FLOOD SYSTEM:

The digital indicator cum power supply unit should be 48 mm(H) x 96 mm(W) x 150 mm(D) size, flush panel mounting type and suitable for cutout size 45mm(H) x 92mm(W). Indicating LED/LCD should be 5 digits. Digital indicator shall be equipped with built in 24 V DC power supply for powering level transmitter. Input power supply to digital indicator cum power supply unit shall be 230 V AC.

8. SPECIFICATION OF LEVEL SENSORS:

a.	Type	Submersible type.								
b.	Setting Range	Measuring Range								
<table> <tr> <td data-bbox="219 1389 574 1489">A. Flood Level</td><td data-bbox="574 1389 1028 1489"></td><td data-bbox="1028 1389 1360 1489"></td></tr> <tr> <td>Maximum EL</td><td>1020 M</td><td rowspan="2">4 Mtrs.</td></tr> <tr> <td>Minimum EL</td><td>1016 M</td></tr> </table>			A. Flood Level			Maximum EL	1020 M	4 Mtrs.	Minimum EL	1016 M
A. Flood Level										
Maximum EL	1020 M	4 Mtrs.								
Minimum EL	1016 M									
c.	Supply voltage	DC 24 V								
d.	Output	DC 4 – 20 mA for min. to max. variation & max. Current 25 mA isolated from input.								
e.	Temperature range (process) (ambient)	- 30 to 70 °C. - 30 to 70 °C.								
f.	Safe overload	Transducer should be safe for for 3 times of max. measuring range in bar								
g.	Accuracy, combined non linearity and hysteresis	± 0.25% of span (F.S) or better								
h.	Mounting	Probe will be mounted inside the guide pipe & always submerged in water.								



HYDRO PROJECTS ENGINEERING DIVISION	SPECIFICATION NO.	REV 01
TITLE : SPECIFICATION OF FLOOD LEVEL MEASURING EQUIPMENTS (SUBMERSIBLE TYPE)	241595782-3A	Page 3 of 7

- | | | |
|----|---|---|
| i. | Sensor Material | Stainless steel |
| j. | Housing Material | Stainless steel |
| k. | Cable (screened) with cable holder | 25 Meters length for Flood |
| l. | Protection | IP68 (permanently hermetically sealed) |

9. SPECIFICATION OF POWER LINE SURGE PROTECTOR:

- | | | |
|----|-----------------------|--------------------------|
| a. | Power supply | 90 to 240 V AC $\pm$ 15% |
| b. | Surge voltage | 1000 V |
| c. | Nominal surge current | 20 KA |
| d. | Temperature Limit | -30 °C to 70 °C |

10. SPECIFICATION OF SIGNAL LINE SURGE PROTECTOR:

- | | | |
|----|-----------------------|------------------|
| a. | Max signal voltage | 20 V (to ground) |
| b. | Surge voltage | 600 V |
| c. | Nominal surge current | 20 KA |
| d. | Temperature limit | -30 °C to 70 °C |

11. SPECIFICATION OF DIGITAL INDICATOR CUM POWER SUPPLY UNIT:

- | | | |
|----|--|---|
| a. | Size | 48 mm (H) x 96 mm (W) x 150 mm (D) |
| b. | Mounting & cut out size | Panel mounting type suitable for cut out 45 mm (H) x 92 mm (W) |
| c. | Display | 5 digit 7 segments LED / LCD or more |
| d. | Display range | 0 to 9999.99 |
| e. | Input signal | 4 - 20 mA. |
| f. | Power output | 24 VDC |
| g. | Scale reading | For Partial Flood : 1016 M to 1021 M |
| h. | Auxiliary Power System | 230 V AC |
| i. | Separate galvanically isolated output signal of 4-20 mA from digital indicator for MMI. | |
| j. | Relay output: 2 Nos. binary output with potential free change over contact. Contact rating should be 250V AC, 5A/ 30 V DC, 5A. | |

	HYDRO PROJECTS ENGINEERING DIVISION	SPECIFICATION NO.	REV 01
	TITLE : SPECIFICATION OF FLOOD LEVEL MEASURING EQUIPMENTS (SUBMERSIBLE TYPE)	241595782-3A	Page 4 of 7

- k. Interface: RS232 on the rear panel 3.5 mm stereo socket.
- l. Transmitter supply Galvanically isolated 24 V dc loop
- m. Accuracy $\pm 0.05\%$
- n. Protection IP65 Front

Note: Zero & span potentiometer if required shall be part of Digital Indicator.

12. PACKING

Each equipment shall be packed in a thermocol box with silica gel packet and placed in a carton or case with adequate cushioning material and water proof cover to minimize the movement of the internals and ensure that the instrument is capable of withstanding the transit conditions without damages.

13. DOCUMENTATION

The supplier shall submit the documents/ drawings (3 sets) at the time of offer which shall include the following.

- i) Outline general arrangement drawings.
- ii) **Details, specifications and guaranteed technical particulars**

The supplier shall submit within four weeks from the date of award of contract, Drawings (three prints each) which shall include the following, for our APPROVAL.

- a) Outline general arrangement drawings complete with mounting details.
- b) Q.A. Plan for our approval before start of manufacturing.
- c) **3 copies of Test certificates after testing the equipment**
- d) O & M Manual containing the following.
 - Operating principle
 - Mounting details
 - Inter connection wiring diagram
 - Commissioning procedure along with step wise adjustment of setting of instruments at site
 - Trouble shooting

After approval, the supplier shall provide 8 copies of all drawings certified for construction (i.e. as built drgs.) and schematic diagrams.

14. GUARANTEE

Equipment should bear supplier's guarantee for trouble free operation and good workmanship for a period of 18 months from the date of dispatch. Supplier should undertake to replace free of cost any material/ components found defective in operation during guarantee period.

	HYDRO PROJECTS ENGINEERING DIVISION	SPECIFICATION NO.	REV 01
	TITLE : SPECIFICATION OF FLOOD LEVEL MEASURING EQUIPMENTS (SUBMERSIBLE TYPE)	241595782-3A	Page 5 of 7

15. TESTING

All necessary test/ test certificates shall be carried out/ submitted to prove that the instrument supplied meets the requirement of this specification and relevant IS.

- a) Visual testing.
- b) Megger testing with 1000 V Megger before and after H.V. test.
- c) H.V. test 2.5 KV, 50 Hz. r. m. s. voltage applied for 1 minute between all terminals connected together and all metal parts intended to be earthed during service.
- d) Continuity test.
- e) Calibration curves of level transmitter i.e. level Vs current output.
- f) Linearity test.
- g) Earth continuity test.

6 copies of the final test certificates shall be submitted for our reference and record

16. INSPECTION

The inspecting agency shall certify that the testing has been witnessed as per APPROVED Q.A. Plan supplied by the vendor. Acceptance or waiver of inspection does not absolve the supplier of his responsibility to rectify the equipment in case it does not perform satisfactorily at hydro site where it is actually used.

17. STORAGE & HANDLING:

Supplier shall clearly mention the method of storage & handling in BHEL works/ site for long storage. It shall also be mentioned if any special protection is to be provided for this purpose. The above should form part of O & M Manual.

18. IDENTIFICATION

Each instrument shall be identified with the following information.

1. Manufacturer's name or identification.
2. Manufacturer's model or Serial No.
3. Input / Output range connection details.

The above information shall be engraved on the instrument itself/ metal tag fixed permanently.

(4)

	HYDRO PROJECTS ENGINEERING DIVISION	SPECIFICATION NO.	REV 01
	TITLE : SPECIFICATION OF FLOOD LEVEL MEASURING EQUIPMENTS (SUBMERSIBLE TYPE)	241595782-3A	Page 6 of 7

GUARANTEED TECHNICAL PARTICULARS TO BE FURNISHED ALONGWITH THE OFFER
(TO BE FILLED BY THE SUPPLIER)

**1. LEVEL TRANSMITTER (SUBMERSIBLE TYPE) –
FLOOD LEVEL SENSOR**

- a. Make/ Model No.
- b. Power supply
- c. Output signal
- d. Mounting drawing
- e. Weight
- f. Overall size
- g. Terminal detail drawing
- h. Accuracy
- i. Power consumption

2. DIGITAL INDICATOR CUM POWER SUPPLY UNIT FOR FLOOD

- a. Make/ Model No.
- b. Size
- c. Cutout size
- d. Mounting drawing
- e. Input signal
- f. Output
- g. Weight
- h. Power supply
- i. Terminal detail drgs.
- j. Power consumption
- k. Display

3. POWER LINE SURGE PROTECTOR

- a. Make/ Model No.
- b. Power supply
- c. No. of poles
- d. Surge voltage of arrester
- e. Series resistance per core
- f. Mounting drawing
- g. Weight
- h. Overall size
- h. Protection

	HYDRO PROJECTS ENGINEERING DIVISION	SPECIFICATION NO.	REV 01
	TITLE : SPECIFICATION OF FLOOD LEVEL MEASURING EQUIPMENTS (SUBMERSIBLE TYPE)	241595782-3A	Page 7 of 7

4. SIGNAL LINE SURGE PROTECTOR

- a. Make/ Model No.
- b. Power supply
- c. No. of poles
- d. Surge voltage of arrester
- e. Series resistance per core
- f. Mounting drawing
- g. Weight
- h. Overall size
- h. Protection

	HYDRO PROJECTS ENGINEERING DIVISION	SPECIFICATION NO.	REV 00
	TITLE : SPECIFICATION OF PIPING & FITTING FOR FLOOD SYSTEM	241595782 - 3B	Page 1 of 1

PROJECT : VISHNUGAD PIPAL KOTI HEP

1. SCOPE OF SUPPLY:

1 Set of Piping & Fittings for Flood System except Item No. 01 (Probe with Cable, Connecting Box & Cable Holder).

This equipment is to be supplied in completely fabricated machined condition along with all pipings, fasteners, flanges, pipe support etc. generally as per our following drawings.

(i) Piping & Fittings for Flood Level Measuring System as per Drawing No. 02311619703 Rev. 00 except item No. 01.

Supplier is to use his own material as called in various drawings supplied with this.

2. PACKING:

Piping & fittings in suitably dismantled condition shall be packed in a wooden box and waterproof cover. Supplier has to submit the dispatch details box wise (to Engg. Deptt./ indenter) before shipment.

3. MATERIAL GUARANTEE & TEST CERTIFICATE:

Supplier has to supply 3 copies of material test certificates of specially S.S. Pipes used & 3 copies of Guarantee certificate against bad workmanship & defective material for 18 months from the date of supply or 12 months from the date of commissioning.

4. STORAGE AND HANDLING:

Supplier should indicate the method of storage & handling in BHEL works/ site for long storage. It shall also be mentioned if any special precaution is to be provided for this purpose.

5. IDENTIFICATION:

Each item must be punched with 3 mm height letters with their Drg. No. & Item Sl. No. as per above Drgs. for identification of items.

REV.NO.		DISTRIBUTION.	QTY.	APPROVED:			
PREPARED							
CHECKED		HSE	01	PREPARED	CHECKED	ISSUED	DATE
APPROVED		MM(H)	06				
DATE				(AKG)	(DB)	(AP)	13.11.19

