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|  | PRODUCT STANDARD HYDRO PROJECTS ENGINEERING | 241525379 |
| | | Rev. 00 |
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| <u>PURCHASE SPECIFICATION OF LEVEL CONTROLLER FOR TGB AND PP SET</u> <u>(CAPACITANCE TYPE)</u> | | |

1. DESCRIPTION:

Level controller (capacitance type) is required for measuring the continuous oil level in the Turbine Guide Bearing (TGB) sump and PP Set (Sump tank). The instrument should meet the highest standards of measurement technique.

2. APPLICATION:

The level controller with level switching contacts shall be used for measuring the oil level of Turbine Guide Bearing sump and PP set (sump tank). The level switching contacts shall be used for machine starting interlock, alarms in the SCADA system.

3. SPECIFICATION & SCOPE OF SUPPLY:

3.1) Each set of level controller for TGB shall consist of:

| | | |
|--|---|-----------|
| A. Level probe cum transmitter | - | 1 No. |
| B. Digital indicator cum power supply unit | - | 1 No. |
| C. Screen cable | - | 50 Meters |


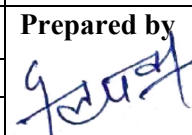
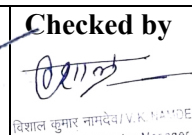
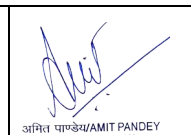
3.2) Each set of level controller for PP Set (Sump tank) shall consist of:


| | | |
|--|---|-----------|
| A. Level probe cum transmitter | - | 1 No. |
| B. Digital indicator cum power supply unit | - | 1 No. |
| C. Screen cable | - | 10 Meters |

Note: For total quantity required, please refer Annexure-A to specification 241525379.


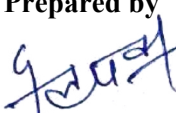
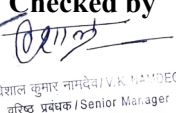

3. A) LEVEL PROBE CUM TRANSMITTER:


The probe cum transmitter shall measure the level in the Turbine guide bearing sump and PP Set (Sump tank) provide the corresponding level output to the indicator unit.

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|----------|--------------|---------|--|---|---|------------------------|
| | | |  Manish Sahu Sr. DGM.-HPE मनीष साहू / MANISH SAHU वरिष्ठ उप महाप्रबंधक / Sr. Dy. General Manager एच. पी. ई. विभाग / HPE Division बी.एच.ई.एल., भोपाल / BHEL, BHOPAL | | | |
| Prepared | | | Prepared by | Checked by | | Date of issue (Rev 00) |
| Checked | | |  Dalpat Borana Manager / HPE |  Vishal Nanddeo Sr. Mgr. / HPE |  Amit Pandey DGM.-HPE | 20-07-22 |
| Approved | | | | | | |

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| <u>PURCHASE SPECIFICATION OF LEVEL CONTROLLER FOR TGB AND PP SET</u> <u>(CAPACITANCE TYPE)</u> | | |

- (a) Probe type : Fully insulated (Teflon insulation) rod type probe
- (b) Probe transmitter housing : Weather proof cast aluminum housing with cable entry of ½” BSP / NPT with cable gland
- (c) Material of probe : Stainless steel
- (d) Reference probe : Co-axial “Reference probe / Grounding Tube” (SS material) should be provided
- (e) Probe length : Refer Annexure-A to specification 241525379
- (f) Process connection of Level Probe : Refer Annexure-A to specification 241525379
- (g) Process connection of Reference : Refer Annexure-A to specification 24155379
Probe / Grounding Tube
- (h) Application media : Turbine Oil (ISO VG-46 / ISO VG-68)
- (i) Media temperature : 0 to 70 Deg C
- (j) Ambient temperature : 0 to 50 Deg C
- (k) Level probe cum transmitter (electronic display unit) shall be part of level probe housing.
- (l) The housing of level probe cum transmitter shall have integral (LED /LCD) type electronic display unit with integrated push buttons for calibrating the range of level measurement. The display unit shall indicate the oil level of the tank in terms of “mm” / “Percentage”.
- (m) Output signal : 4-20 mA DC corresponding to calibrated span (Adjustable) suitable for electrical load of minimum 500 Ohm.
- (n) Accuracy : ±0.5% or better, for calibrated span including linearity, hysteresis and repeatability.
- (o) Loop power supply : 24 VDC (Shall be derived from digital indicator cum power supply unit)
- (p) Connection : Two wire system
- (q) Protection class : IP67
- (r) The instrument shall work against oil charging (oil splashing) in the turbine guide bearing housing within accuracy.

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|----------|--------------|---------|---|--|---|------------------------|
| | | |  मनीष साहू / MANISH SAHU वरिष्ठ उप महाप्रबंधक / Sr. Dy. General Manager एच. पी. ई. विभाग / HPE Division बी.एच.ई.एल., भोपाल / BHEL, BHOPAL Manish Sahu Sr. DGM.-HPE | | | |
| Prepared | | | Prepared by | Checked by | | Date of issue (Rev 00) |
| Checked | | |  Dalpat Borana Manager / HPE |  विशाल कुमार नामदेव / V.K. NAMDEO वरिष्ठ प्रबंधक / Senior Manager एच. पी. ई. विभाग / HPE Division बी.एच.ई.एल., भोपाल / BHEL, BHOPAL Vishal Namdeo Sr. Mgr. / HPE |  अमित पाण्डेय / AMIT PANDEY उप महाप्रबंधक / Dy. General Manager एच. पी. ई. विभाग / HPE Division बी.एच.ई.एल., भोपाल / BHEL, BHOPAL Amit Pandey DGM.-HPE | 20-07-22 |
| Approved | | | | | | |


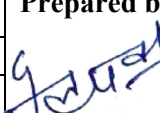
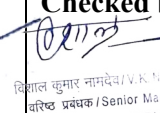
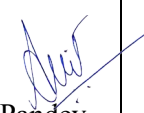
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| <u>PURCHASE SPECIFICATION OF LEVEL CONTROLLER FOR TGB AND PP SET</u> <u>(CAPACITANCE TYPE)</u> | | |


3. B) DIGITAL INDICATOR CUM POWER SUPPLY UNIT:

Digital indicator cum power supply unit should supply necessary power to the level probe cum transmitter and 4-20 mA output signal of transmitter will be fed to digital indicator by screened cable. The Digital Indicator will show the reading in terms of mm. Digital indicator should have minimum four (04) digits indications and should be flush panel mounting type.

- | | |
|---|--|
| <p>(a) <u>Mounting & cutout size</u></p> <p>(b) Display</p> <p>(c) Input signal</p> <p>(d) Transmitted power supply</p> <p>(e) Re-transmitter output</p> <p>(f) Scale reading</p> <p>(g) Configuration push buttons</p> <p>(h) Auxiliary power supply</p> <p>(i) Relay output</p> <p>(j) Relay contact rating</p> <p>(k) Relay indicating</p> <p>(l) Accuracy</p> <p>(m) Ambient temperature</p> <p>(n) Description</p> | <p>: <u>Refer Annexure-A to specification 241525379</u></p> <p>: 4/5 Digits LED / LCD type</p> <p>: 4 -20 mA DC (From level transmitter)</p> <p>: 24 VDC loop power supply to level probe transmitter</p> <p>: Separate one no. 4-20 mA output for retransmission</p> <p>: 0 to calibrated length (max. up to the probe length)</p> <p>: Push buttons should be provided for configuration change, range setting and setting of relays set point in the display unit</p> <p>: 240 VAC \pm 10%, 50 Hz</p> <p>: 4 Nos. (Change over type, SPDT contacts), For Alarms and machine starting interlocks, Setting of each relay should be adjustable between the full calibrated range</p> <p>: 5A / 240 VAC, 0.2 A / 220 VDC</p> <p>: LED indication for operation of each relay should be provided</p> <p>: $\pm 0.2\%$ or better</p> <p>: 0 to 50 Deg C</p> <p>: “Digital indicator for Oil level in Turbine guide bearing” / “Digital indicator for Oil level in PP Set”</p> <p>[As applicable] should be provided on the indicator unit</p> |
|---|--|

NOTE: - LEVEL PROBE CUM TRANSMITTER (3.A) & DIGITAL INDICATOR CUM POWER SUPPLY UNIT (3.B) MUST BE OF SAME MAKE.

| Rev. No. | Date of Rev. | Remarks | Approved by | | | |
|----------|--------------|---------|--|---|---|------------------------|
| | | |  Manish Sahu Sr. DGM.-HPE | | | |
| Prepared | | | Prepared by | Checked by | | Date of issue (Rev 00) |
| Checked | | | | | | |
| Approved | | |  Dalpat Borana Manager / HPE |  Vishal Nardeo Sr. Mgr. / HPE |  Amit Pandey DGM.-HPE | 20-07-22 |

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| <u>PURCHASE SPECIFICATION OF LEVEL CONTROLLER FOR TGB AND PP SET</u> <u>(CAPACITANCE TYPE)</u> | | |

3. C) SCREEN CABLE FOR LEVEL PROBE CUM TRANSMITTER:

The screen cable is required for connecting the level probe cum transmitter with the digital indicator cum power supply unit.

1100/ 660 V, un-armoured, PVC insulated, multistrand, 2/3 core (whichever is applicable for connecting transmitter with digital indicator) 1.5 mm² screen cable.

4. DOCUMENTS TO BE FURNISHED:

Along with offer:

- Catalogues giving all the technical particulars with model code and O & M manual of the Level probe cum transmitter and digital indicator cum power supply unit.
- List of deviations, if any. Otherwise it shall be understood that the vendor is meeting all the requirements specified by us.


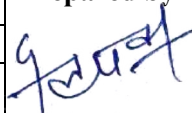
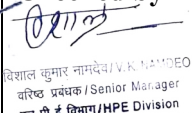

Vendor to note that if above documents are not furnished along with the offer; the offer shall be liable for outright rejection.

After placement of order:

- Supplier has to submit the drawing showing over all dimensions, mounting details, sectional elevation and constructional details of level probe cum transmitter and digital indicator cum power supply unit [For TGB and for PP Set (Sump tank)] for our approval within 4 weeks from the date of P.O. Revised drawing should be submitted within one week after the receipt of our comments. Manufacturing action shall only be started after approval of drawing.
- Supplier has to submit the O&M manual of level probe cum transmitter and digital indicator cum power supply unit for our reference.

At the time of supply:

- 2 copies of test certificates / Calibration certificate and guarantee certificates should be submitted to indenter. One copy of the above documents shall be put inside the case/ package.

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|----------|--------------|---------|---|--|--|------------------------|
| | | |  Manish Sahu Sr. DGM.-HPE मनीष साहू / MANISH SAHU वरिष्ठ उप महाप्रबंधक / Sr.Dy.General Manager एच. पी. ई. विभाग / HPE Division बी.एच.ई.एल., भोपाल / BHEL, BHOPAL | | | |
| Prepared | | | Prepared by | Checked by | | Date of issue (Rev 00) |
| Checked | | | | | | |
| Approved | | |  Dalpat Borana Manager / HPE |  विशाल कुमार नामदेव / V.K. NAMDEO वरिष्ठ प्रबंधक / Senior Manager एच. पी. ई. विभाग / HPE Division बी.एच.ई.एल., भोपाल / BHEL, BHOPAL Vishal Namdeo Sr. Mgr. / HPE |  अमित पाण्डेय / AMIT PANDEY वरिष्ठ उप महाप्रबंधक / Sr.Dy.General Manager एच. पी. ई. विभाग / HPE Division बी.एच.ई.एल., भोपाल / BHEL, BHOPAL Amit Pandey DGM.-HPE | 20-07-22 |

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| <div><div>2022/SEP/04 15:00</div><div><div>बी एच ई एल</div><div><div>BHEL</div></div></div></div> | <div>PRODUCT STANDARD</div> <div><u>HYDRO PROJECTS ENGINEERING</u></div> | <div>241525379</div> |
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| <div><u>PURCHASE SPECIFICATION OF LEVEL CONTROLLER FOR TGB AND PP SET</u></div> <div><u>(CAPACITANCE TYPE)</u></div> | | |

- (b) Shipping / packing lists of the level controller unit should be submitted to indenter and put inside the case / package.

5. TEST CERTIFICATES:

- (a) Calibration certificates issued by an ISO 17025 accredited and certified Lab or Manufacturer calibration certificate for each level transmitter and digital indicator unit are required.

6. INSPECTION & TESTING:

Functional test of level transmitter and digital display unit is to be carried out and certificate for the same to be furnished.

7. GUARANTEE:

The item must be guaranteed for trouble free operation, good workmanship for a period of 18 months from the date of dispatch.



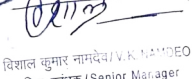

8. PACKAGING:

Each "Level probe cum transmitter unit" and "Digital indicator cum power supply unit" shall be packed separately in individual carton with silica gel, adequate cushioning material and water proof cover to avoid the movement of the internals and ensure that the instrument is capable of withstanding the transit conditions without damages.

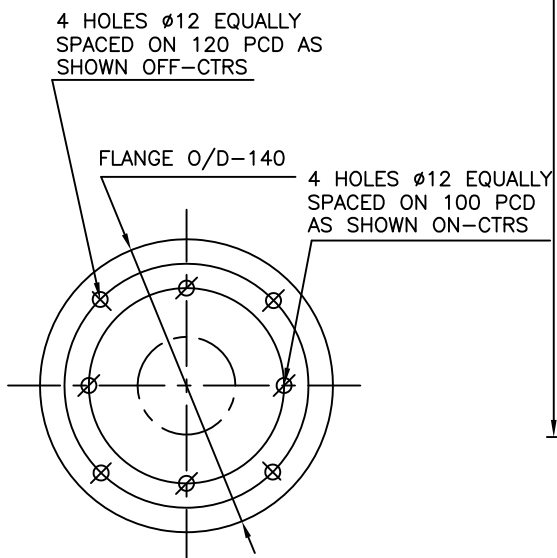
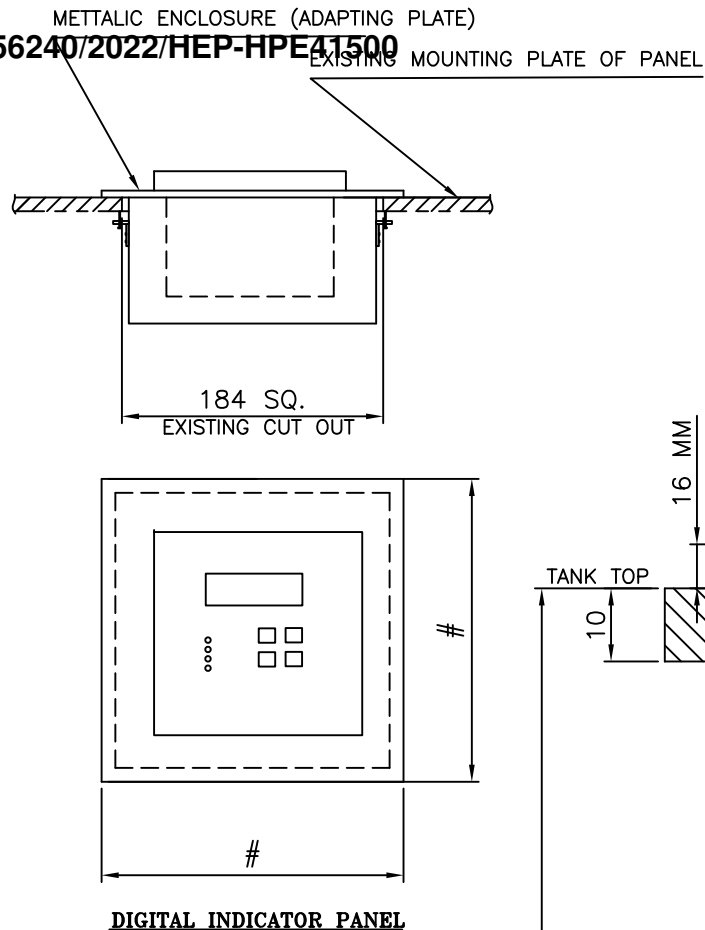
9. IDENTIFICATION:

Each equipment shall be identified with the following information.

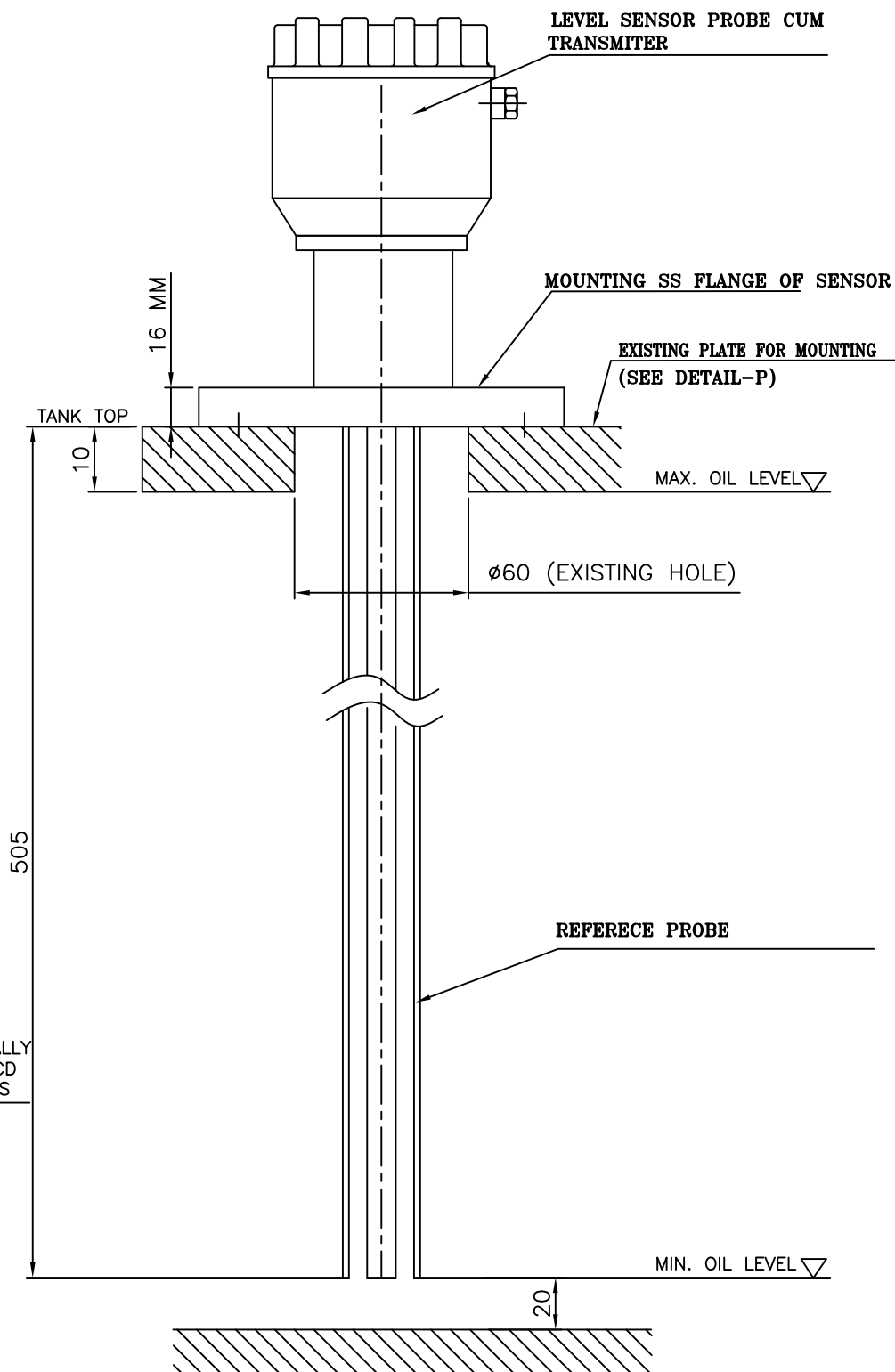
1. Manufacturer's name or identification.
2. Manufacturer's model no. or serial no.
3. Project Name

| Rev. No. | Date of Rev. | Remarks | Approved by | | | |
|----------|--------------|---------|--|--|---|--------------------------------|
| | | | <p align="right">  Manish Sahu Sr. DGM.-HPE </p> | | | |
| Prepared | | | Prepared by | Checked by | | Date of issue |
| Checked | | | | | | (Rev 00) |
| Approved | | | <p align="center">  Dalpat Borana Manager / HPE </p> | <p align="center">  Vishal Namdeo Sr. Mgr. / HPE </p> | <p align="center">  Amit Pandey DGM.-HPE </p> | <p align="center">20-07-22</p> |

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**MOUNTING FLANGE DETAILS OF
LEVEL SENSOR
(DETAIL P)**



LEVEL DETAILS OF SUMP TANK

NOTE: A) DIMENSION MARKED AS # TO BE FURNISHED BY THE VENDOR.

B) FOUR (04) NOS. MOUNTING SCREW (M10 X 30) WITH EACH LEVEL PROBE TO BE SUPPLIED.

ITEM : LEVEL CONTROLLER FOR TGB

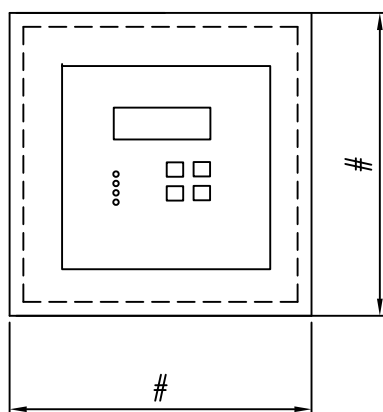
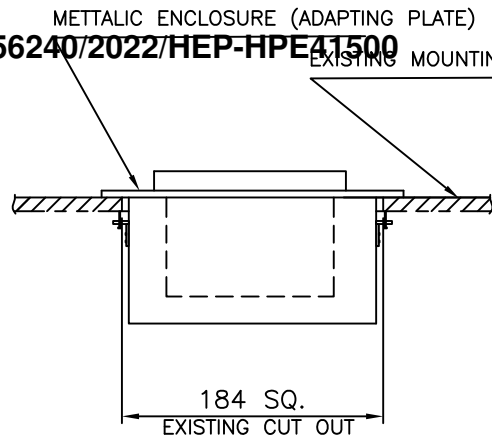
PROJECT : NEEPCO KHANDONG (1x25MW)

SKETCH NO. HPE-GC-447

REV.00

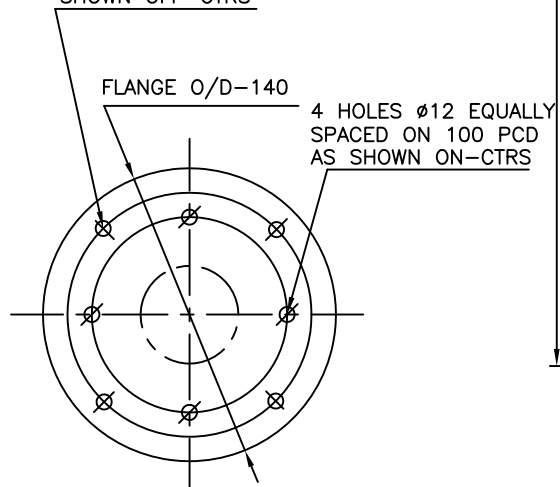
DATE : 20-07-2022

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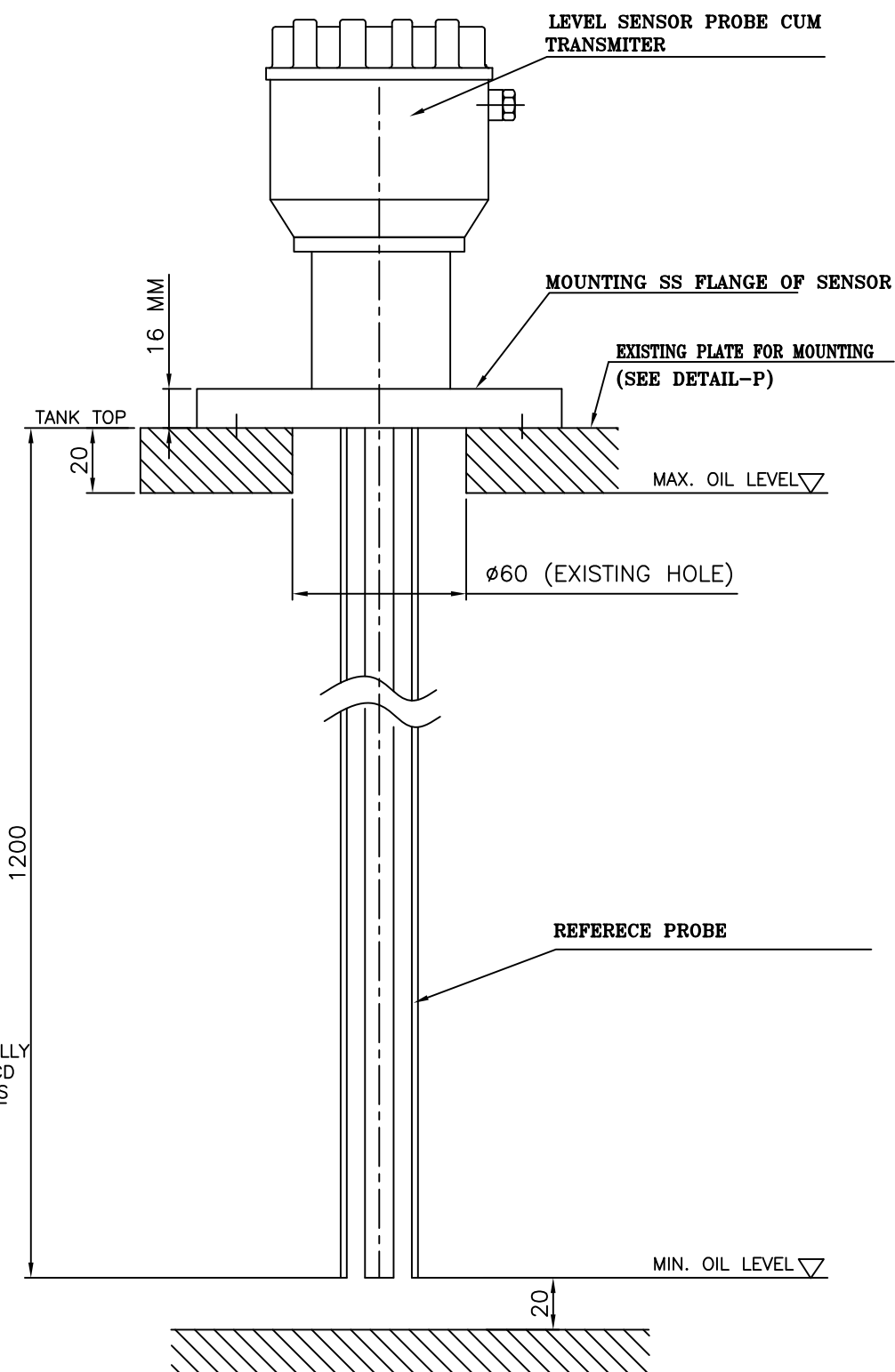


DIGITAL INDICATOR PANEL

4 HOLES $\phi 12$ EQUALLY
SPACED ON 120 PCD AS
SHOWN OFF-CTRS



**MOUNTING FLANGE DETAILS OF
LEVEL SENSOR
(DETAIL P)**



LEVEL DETAILS OF SUMP TANK

ITEM : LEVEL CONTROLLER FOR PP SET
(SUMP TANK)

PROJECT : NEEPCO KHANDONG (1x25MW)

SKETCH NO. HPE-GC-448


REV.00

DATE : 20-07-2022

NOTE: A) DIMENSION MARKED AS # TO BE FURNISHED BY THE VENDOR.

**B) FOUR (04) NOS. MOUNTING SCREW (M10 X 30) WITH EACH
LEVEL PROBE TO BE SUPPLIED.**

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| | | |
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|  | BHARAT HEAVY ELECTRICALS LIMITED, BHOPAL HYDRO PROJECTS ENGINEERING | ANNEXURE-A to Specification No. 241525379 |
| | LEVEL CONTROLLER (CAPACITANCE TYPE) FOR OIL LEVEL MEASUREMENT IN TGB SUMP AND PP SET | |

1. PI NO.: 2415253792. PROJECT: NEEPCO KHANDONG (1 x 25 MW)3. SCOPE OF SUPPLY:


PI Item No. 1: Level controller for TGB (as per scope of supply) defined against clause 3.1 of specification 241525379.

| Qty. (Set) | Level probe cum transmitter | | Digital indicator cum power supply unit | Remarks |
|---------------|---|--------------------------------------|---|--|
| | Final Process connection of Level Probe & Coaxial Grounding Tube / Reference Probe (Assembly) | Probe length (From mounting surface) | Suitable for final Panel cutout size | |
| 1 Set | Flange type (As per sketch) (Refer Sketch No.: HPE-GC-447) | 505 mm | 184 mm X 184 mm | a) Material Code – HT4325127216 b) Refer Sketch No.: HPE-GC-447 c) Cut-out in the panel is 184 mm x 184 mm. The standard Digital indicator should be suitable for installing in cut-out of 92 mm x 92 mm. An Adapting plate of Steel material with suitable hardware for installing the digital indicator in the panel of cut-out of 184 mm x 184 mm should be supplied. |


PI Item No. 2: Level controller for PP Set (Sump tank) (as per scope of supply) defined against clause 3.2 of specification 241525379.

| Qty. (Set) | Level probe cum transmitter | | Digital indicator cum power supply unit | Remarks |
|---------------|---|--------------------------------------|---|--|
| | Final Process connection of Level Probe & Coaxial Grounding Tube / Reference Probe (Assembly) | Probe length (From mounting surface) | Suitable for final Panel cutout size | |
| 1 Set | Flange type (As per sketch) | 1200 mm | 184 mm X 184 mm | a) Material Code – HT4325127208 b) Refer Sketch No.: HPE-GC-448 c) Cut-out in the panel is 184 mm x 184 mm. The standard Digital indicator should be suitable for installing in cut-out of 92 mm x 92 mm. An |

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|  | BHARAT HEAVY ELECTRICALS LIMITED, BHOPAL HYDRO PROJECTS ENGINEERING | ANNEXURE-A to Specification No. 241525379 |
| | LEVEL CONTROLLER (CAPACITANCE TYPE) FOR OIL LEVEL MEASUREMENT IN TGB SUMP AND PP SET | |

| | | | | |
|--|--|--|--|---|
| | | | | Adapting plate of Steel material with suitable hardware for installing the digital indicator in the panel of cut-out of 184 mm x 184 mm should be supplied. |
|--|--|--|--|---|


 दलपत बोराणा / DALPAT BORANA
 प्रबंधक (अभियंता) / Manager (Design)
 एच.पी.ई. विभाग / H.P.E. Division
 बी.एच.ई.एल., भोपाल / BHEL, BHOPAL

PREPARED BY



 विशाल कुमार नामदेव / V.K. NAMDEO
 वरिष्ठ प्रबंधक / Senior Manager
 एच.पी.ई. विभाग / H.P.E. Division
 बी.एच.ई.एल., भोपाल / BHEL, BHOPAL

CHECKED BY


 मनीष साहू / MANISH SAHU
 वरि. उप महाप्रबंधक / Sr.Dy.General Manager
 एच.पी.ई. विभाग / H.P.E. Division
 बी.एच.ई.एल., भोपाल / BHEL, BHOPAL

APPROVED BY

956240/2022/HEP-HPE41500

| MANUFACTURER'S Logo | | MANUFACTURER'S Name and Address | | SAMPLE QUALITY ASSURANCE PLAN Item : LEVEL CONTROLLER FOR TGB AND PP SET (CAPACITANCE TYPE) SUB-System: Governing system | | | Project : PO /Indent No: | |  | |
|-----------------------|--|---|-------|---|------------------|---|-----------------------------|--------|---|---------|
| | | | | | | | | | | |
| | | | | QP No. : QA/HPE/241525379/001 Rev.No. : 00 Date : 20-07-2022 page : 01 OF 01 | | | | | | |
| SL. NO | COMPONENT & OPERATIONS | CHARACTERISTICS | CLASS | TYPE OF CHECK | QUANTUM OF CHECK | REFERENCE DOCUMENT / ACCEPTANCE NORM | FORMAT OF RECORD | AGENCY | | REMARKS |
| 1. | 2. | 3. | 4. | 5. | 6. | 7. | 8. | 1 | 2 | 10. |
| 1 | LEVEL CONTROLLER FOR TGB & PP SET (CAPACITANCE TYPE) [Level transmitter (Capacitance type) & Digital Indicator cum Power Supply] | 1) Verifying Model No. 2) Calibration certificate of transmitter 3) Calibration certificate of digital indicator cum power supply 4) Verification of serial No. as per calibration certificates | Major | | 100% | -Technical Specification - Approved Drawings & -Approved Data Sheet | TC | P | V | TC |
| | | 1) Functional test of level probe cum transmitter for Accuracy & Operating Features 2) Functional test digital indicator cum power supply for Accuracy and Operating features | Major | | 100% | -Technical Specification - Approved Drawings & -Approved Data Sheet | TC | P | W* | |
| | | LEGEND: 1: MANUFACTURER/SUB-SUPPLIER 2: BHEL/ NOMINATED INSPECTION AGENCY P: PERFORM V: VERIFICATION W: WITNESS RR – REVIEW OF RECORD IR – INTERNAL RECORD JIR – JOINT INSPECTION REPORT | | | | | | | | |
| QA-HYDRO | | ENGINEERING- HPE | | | | | | | | |
| (PREPARED & REVIEWED) | | Accepted by (Vendor' QC representative) | | | | | | | | |

NOTE : VENDOR HAS TO SUBMIT THE MANUFACTURER'S QUALITY ASSURANCE PLAN INLINE WITH BHEL SAMPLE QUALITY PLAN AFTER PLACEMENT OF PO FOR APPROVAL.