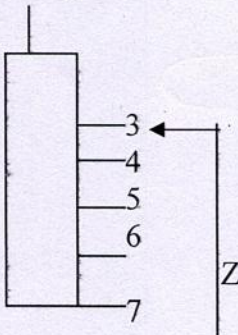


**ANNEXURE-III****P.I. NO 440690953 DT.15.11.2019****PI Item No. 03****SPECIFICATION FOR VERTICAL MOUNTED OFF CIRCUIT TAP SWITCH**

| Sl            |                  | Technical Requirements                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Suppliers Confirmation |   |                                           |               |   |               |   |           |   |               |   |            |   |  |
|---------------|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|---|-------------------------------------------|---------------|---|---------------|---|-----------|---|---------------|---|------------|---|--|
| 1             | General:         | <p><b>800Amp, 33 kV class, 5 position, 3-phase</b> (linear) type Off circuit Tap Switch with operating handle at top/bottom for vertical mounting with bevel gear arrangement to operate from tank side wall. The switch should be rugged in construction and robust in design with best quality of material and workmanship. It should conform to following technical specification and all the requirements of governing IEC 60214-1.</p> <p><b>Note:</b> Top or bottom handle requirement to be intimated at the time of ordering.</p> |                        |   |                                           |               |   |               |   |           |   |               |   |            |   |  |
| 2             | Trfr Data:       | <table><tr><td>Rated Voltage</td><td>:</td><td rowspan="6">} To be furnished at the time of Ordering</td></tr><tr><td>Rated current</td><td>:</td></tr><tr><td>No. of Phases</td><td>:</td></tr><tr><td>Frequency</td><td>:</td></tr><tr><td>Tapping range</td><td>:</td></tr><tr><td>Connection</td><td>:</td></tr></table>                                                                                                                                                                                                              | Rated Voltage          | : | } To be furnished at the time of Ordering | Rated current | : | No. of Phases | : | Frequency | : | Tapping range | : | Connection | : |  |
| Rated Voltage | :                | } To be furnished at the time of Ordering                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                        |   |                                           |               |   |               |   |           |   |               |   |            |   |  |
| Rated current | :                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                        |   |                                           |               |   |               |   |           |   |               |   |            |   |  |
| No. of Phases | :                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                        |   |                                           |               |   |               |   |           |   |               |   |            |   |  |
| Frequency     | :                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                        |   |                                           |               |   |               |   |           |   |               |   |            |   |  |
| Tapping range | :                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                        |   |                                           |               |   |               |   |           |   |               |   |            |   |  |
| Connection    | :                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                        |   |                                           |               |   |               |   |           |   |               |   |            |   |  |
| 3             | Tap Switch Data: |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                        |   |                                           |               |   |               |   |           |   |               |   |            |   |  |
|               | (i)              | Current Rating of Contact: 800 Amp.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                        |   |                                           |               |   |               |   |           |   |               |   |            |   |  |
|               | (ii)             | Extended current rating : 125 % of rated                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                        |   |                                           |               |   |               |   |           |   |               |   |            |   |  |
|               | (iii)            | Step Voltage :To be furnished at the time of Ordering                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                        |   |                                           |               |   |               |   |           |   |               |   |            |   |  |
|               | (iv)             | No. of Position :5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                        |   |                                           |               |   |               |   |           |   |               |   |            |   |  |
|               | (v)              | Short circuit with stand time: 3 sec.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                        |   |                                           |               |   |               |   |           |   |               |   |            |   |  |
|               | (vi)             | Lead joints as per table given below:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                        |   |                                           |               |   |               |   |           |   |               |   |            |   |  |

|                                                                                          |                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                          |                                  |       |   |      |   |       |   |       |   |       |                   |
|------------------------------------------------------------------------------------------|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|-------|---|------|---|-------|---|-------|---|-------|-------------------|
|                                                                                          |                                 | <p>Phase Diagram</p>                                                                                                                                                                                                                                                                                                                                            | <p>Tap Position.</p> <table><tr><td>1</td><td>Z - 7</td></tr><tr><td>2</td><td>Z- 6</td></tr><tr><td>3</td><td>Z - 5</td></tr><tr><td>4</td><td>Z - 4</td></tr><tr><td>5</td><td>Z - 3</td></tr></table> | 1                                | Z - 7 | 2 | Z- 6 | 3 | Z - 5 | 4 | Z - 4 | 5 | Z - 3 | <p>Lead Joint</p> |
| 1                                                                                        | Z - 7                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                          |                                  |       |   |      |   |       |   |       |   |       |                   |
| 2                                                                                        | Z- 6                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                          |                                  |       |   |      |   |       |   |       |   |       |                   |
| 3                                                                                        | Z - 5                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                          |                                  |       |   |      |   |       |   |       |   |       |                   |
| 4                                                                                        | Z - 4                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                          |                                  |       |   |      |   |       |   |       |   |       |                   |
| 5                                                                                        | Z - 3                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                          |                                  |       |   |      |   |       |   |       |   |       |                   |
| <p>NOTE: Terminal marking may change during order and same to be marked accordingly.</p> |                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                          |                                  |       |   |      |   |       |   |       |   |       |                   |
| 4                                                                                        | Test Voltages                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                          |                                  |       |   |      |   |       |   |       |   |       |                   |
|                                                                                          |                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Power rms                                                                                                                                                                                                | Frequency                        |       |   |      |   |       |   |       |   |       |                   |
|                                                                                          |                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                          | Lightening Imp. 1.2/50 Micro Sec |       |   |      |   |       |   |       |   |       |                   |
|                                                                                          | (i)                             | Tap Switch to Earth                                                                                                                                                                                                                                                                                                                                                                                                                              | 70kV                                                                                                                                                                                                     | 170 kVp                          |       |   |      |   |       |   |       |   |       |                   |
|                                                                                          | (ii)                            | Between Phases                                                                                                                                                                                                                                                                                                                                                                                                                                   | 70kV                                                                                                                                                                                                     | 170 kVp                          |       |   |      |   |       |   |       |   |       |                   |
|                                                                                          | (iii)                           | Between Step                                                                                                                                                                                                                                                                                                                                                                                                                                     | 10kV                                                                                                                                                                                                     | 40 kVp                           |       |   |      |   |       |   |       |   |       |                   |
|                                                                                          | (iv)                            | Across Range                                                                                                                                                                                                                                                                                                                                                                                                                                     | 70kV                                                                                                                                                                                                     | 170 kVp                          |       |   |      |   |       |   |       |   |       |                   |
| 5                                                                                        | Provisions:                     | The tap switch must have following provisions:<br>a) Tap position indication<br>b) End limit stops<br>c) Pad locking arrangement<br>d) Leak proof stuffing box<br>e) Smooth operation of tap switch to be ensured.<br>f) Lead No. on fixed & moving contacts as per table given above to be engraved or painted on each phase board.<br>g) Switch should be suitable to mount in vertical position and smooth operation from external tank wall. |                                                                                                                                                                                                          |                                  |       |   |      |   |       |   |       |   |       |                   |
| 6                                                                                        | Surface treatment & protection: | i) Fixed & moving contacts shall be <b>silver plated</b> minimum thickness of silver plating should be 15 micron.<br>ii) All steel parts to be mounted inside transformer tank should be protected with Epilux-4 varnish to HE std.5371.<br>iii) External parts should be chromium plated and passivated /power coated suitably to avoid rusting in saline & humid atmosphere.                                                                   |                                                                                                                                                                                                          |                                  |       |   |      |   |       |   |       |   |       |                   |
| 7                                                                                        | Shipment:                       | The switch shall be supplied in suitable packing to avoid any damage. Any damage if occurred during transport, same shall be made good within one-week time by the supplier free of cost.                                                                                                                                                                                                                                                        |                                                                                                                                                                                                          |                                  |       |   |      |   |       |   |       |   |       |                   |
| 8                                                                                        | Drawing &                       | Following details drawings/documents required along with                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                          |                                  |       |   |      |   |       |   |       |   |       |                   |

|                     | <b>Documents:</b>             | quotation in triplicate for our review at technical evaluation and for final approval at order execution stage.<br>a) Outline general arrangement.<br>b) Mounting arrangement of Tap switch & handle arrangement.<br>c) Type test/routine test reports conducted on similar rating of OCTS.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  |                               |                     |      |                |      |              |      |              |      |  |
|---------------------|-------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|-------------------------------|---------------------|------|----------------|------|--------------|------|--------------|------|--|
| 9                   | <b>Test Schedule:</b>         | <p>Following checks/Tests shall be conducted on the tap switch at supplier's / BHEL works.</p> <ul style="list-style-type: none"><li>a. Construction &amp; dimensional checks as per approved drawings including silver plating of 15 Microns minimum.</li><li>b. Contact resistance measurement on all positions by milli volts method.</li><li>c. Mechanical operation test for 500 cycles shall be performed, each cycle consists of complete operation 1 to 5 &amp; 5 to 1.</li><li>d. Contact resistance measurement after 500 cycles of mechanical operation &amp; check the healthiness of contact. Variation should not be more than + 5%.</li><li>e. Leakage proof test on stuffing box applying 1Kg/Sq Cm oil pressure.</li><li>f. Insulation resistance measurement Test.</li><li>g. Power frequency test keeping the switch inside transformer oil.</li></ul> <table border="1"><thead><tr><th></th><th>Power Frequency Voltage (rms)</th></tr></thead><tbody><tr><td>Tap switch to Earth</td><td>70kV</td></tr><tr><td>Between Phases</td><td>70kV</td></tr><tr><td>Between step</td><td>10kV</td></tr><tr><td>Across Range</td><td>70kV</td></tr></tbody></table> |  | Power Frequency Voltage (rms) | Tap switch to Earth | 70kV | Between Phases | 70kV | Between step | 10kV | Across Range | 70kV |  |
|                     | Power Frequency Voltage (rms) |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  |                               |                     |      |                |      |              |      |              |      |  |
| Tap switch to Earth | 70kV                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  |                               |                     |      |                |      |              |      |              |      |  |
| Between Phases      | 70kV                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  |                               |                     |      |                |      |              |      |              |      |  |
| Between step        | 10kV                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  |                               |                     |      |                |      |              |      |              |      |  |
| Across Range        | 70kV                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  |                               |                     |      |                |      |              |      |              |      |  |
| 10                  |                               | Apart from above, other general requirements applicable for OCTS may be accepted as per ultimate user/Customer.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  |                               |                     |      |                |      |              |      |              |      |  |

AB<sup>10</sup>  
 15/11/19  
 [PVK Bara]  
 DGM(TRE)