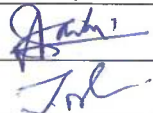
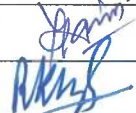
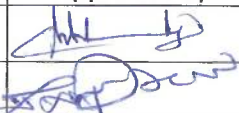
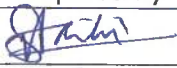
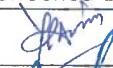
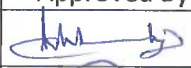
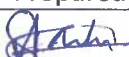
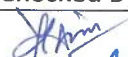
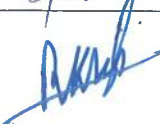
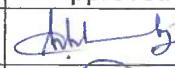
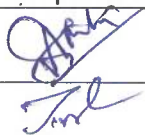
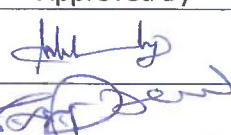


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| <b>MATERIAL CODE</b><br><b>EL8369010032</b>                                                                                                                                                                                      |  <b>EPD</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | <b>1800-01</b><br><b>Rev. 00</b>                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                       | <b>PURCHASE SPECIFICATION FOR</b><br><b>COMPRESSED AIR NETWORK</b> |  | <b>ISSUE NO : 06</b>      |  |
|                                                                                                                                                                                                                                  |                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                       |                                                                    |  | <b>DOC.NO: SPV-UT-002</b> |  |
|                                                                                                                                                                                                                                  |                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                       | <b>REV : 00</b>                                                    |  | <b>JUL-2019</b>           |  |
|                                                                                                                                                                                                                                  |                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                       |                                                                    |  | <b>Page 1 of 11</b>       |  |
| <b>COPY RIGHT AND CONFIDENTIAL</b><br><br>The information on this document is the property of Bharat Heavy Electricals Limited. It must not be used directly or indirectly in anyway detrimental to the interest of the company. |                                                                                              | <b>SCOPE OF WORK FOR SUPPLY, INSTALLATION AND COMMISSIONING OF COMPRESSED AIR NETWORK IN THE COMPRESSOR HOUSE AND SPV MODULE MANUFACTURING SHOP FLOOR</b>                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                       |                                                                    |  |                           |  |
|                                                                                                                                                                                                                                  |                                                                                              | <b>SI No.</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <b>Name of work</b>                                                                 | <b>Description of work</b>                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                       |                                                                    |  |                           |  |
|                                                                                                                                                                                                                                  |                                                                                              | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Inter-connecting pipeline work in compressor house                                  | 1.1. Vendor shall carry out Interconnecting pipeline work inside the compressor house. The work comprises of Connecting the compressors, pre-filters, Refrigerated air dryers, after filters, air receivers and header unit.<br>1.2. Supply of material as per BOQ.<br>1.3. BHEL will provide material handling equipment available in BHEL-EPD premises if required.<br>1.4. Only Aluminium pipings shall be incorporated in the piping work. |                                                                                       |                                                                    |  |                           |  |
| 2                                                                                                                                                                                                                                | Designing of the compressed air layout for SPV Module manufacturing shop                     | 1.1. Vendor shall carry out Interconnecting pipeline work inside the Shop floor, connecting the header line from the compressor house to the loop of shop floor and for further droppings and distribution lines.<br>1.2. Supply of material as per BOQ. However, BOQ is suggestive only, and actual quantity may vary during commissioning. Billing will be made based on actuals.<br>1.3. BHEL will provide material handling equipments available in BHEL-EPD premises if required.<br>1.4. Only Aluminium pipings shall be incorporated in the piping work. |                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                       |                                                                    |  |                           |  |
|                                                                                                                                                                                                                                  | Rev.00:                                                                                      | Issued By                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Prepared By                                                                         | Checked By                                                                                                                                                                                                                                                                                                                                                                                                                                     | Approved By                                                                           | Date                                                               |  |                           |  |
|                                                                                                                                                                                                                                  | 1 <sup>st</sup> Issue                                                                        | SPV PROD GROUP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  |                                                                                                                                                                                                                                                                                                                                                            |  | 01/07/19                                                           |  |                           |  |

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| <b>MATERIAL CODE</b><br><b>EL8389010032</b>                                                                                                                                                                                      | <br><b>EPD</b> |                                   | <b>PURCHASE SPECIFICATION FOR<br/>COMPRESSED AIR NETWORK</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                          |                                                                                                                                                                                               | <b>ISSUE NO : 06</b>      |                 |
|                                                                                                                                                                                                                                  | 1800-01<br>Rev. 00                                                                              |                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                          |                                                                                                                                                                                               | <b>DOC.NO: SPV-UT-002</b> |                 |
|                                                                                                                                                                                                                                  |                                                                                                 |                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                          |                                                                                                                                                                                               | <b>REV : 00</b>           | <b>JUL-2019</b> |
|                                                                                                                                                                                                                                  | <b>Page 2 of 11</b>                                                                             |                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                          |                                                                                                                                                                                               |                           |                 |
| <b>COPY RIGHT AND CONFIDENTIAL</b><br><br>The information on this document is the property of Bharat Heavy Electricals Limited. It must not be used directly or indirectly in anyway detrimental to the interest of the company. | 3                                                                                               | Material Planning and Procurement | <p>3.1. Aluminium pipings and push fit type fittings only shall be used in the whole compressed air layout. The use of threaded joints shall be minimized.</p> <p>3.2. Vendor must note that components of the following makes only shall be used in the network:</p> <ul style="list-style-type: none"> <li>a. Trans Air equipments by Legris</li> <li>b. Air Net Piping System by Atlas Copco</li> <li>c. Easi Fit airline systems by Boge</li> <li>d. Simple Air Easy Pipeline system by Ingersoll Rand</li> <li>f. Quick air by Canares</li> <li>e. FESTO</li> </ul> <p>3.3. The samples of all the materials to be incorporated in the work shall be furnished to the concerned BHEL officials for due approval prior to bulk procurement. Necessary certificates / documents required for the bought out items are to be produced.</p> <p>3.4. The billing of material shall be done for actual quantity of materials used after necessary inspection and certification by BHEL executives.</p> <p>3.5. Material Guarantee certificate needs to be supplied along with the material at the time of supply.</p> <p>3.6. Delivery period shall not exceed 45 days from the date of receipt of Purchase Order.</p> <p>3.7. The items to be supplied shall be as per BOQ I and BOQ II enclosed as Annexure-B. However, the actuals may vary and payment will be made based on actuals.</p> <p>3.8. The piping material used should be able to conform the following:</p> <ul style="list-style-type: none"> <li>a. Maximum working pressure = 13 bar</li> <li>b. Maximum working temperature = 10° C to 60° C</li> <li>c. Burst Pressure = 130 bar for pipings up to 63 NB<br/>60 bar for pipings from 80 NB and above</li> <li>c. Piping material: Aluminium extruded and calibrated UV radiation resistant – suitable to indoor/outdoor use Corrosion resistant<br/>Resistant to mechanical shock and thermal variation</li> </ul> |                                                                                                                                                                                          |                                                                                                                                                                                               |                           |                 |
|                                                                                                                                                                                                                                  |                                                                                                 |                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                          |                                                                                                                                                                                               |                           |                 |
|                                                                                                                                                                                                                                  | Rev.00:<br>1 <sup>st</sup> Issue                                                                | Issued By<br><br>SPV PROD GROUP   | Prepared By<br><br>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Checked By<br><br> | Approved By<br><br> | Date<br>01/07/19          |                 |

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| <b>MATERIAL CODE</b><br><b>EL8369010032</b>                                                                                                                                                                                      | <br><b>EPD</b> |                                  | <b>1800-01</b><br><b>Rev. 00</b>                             |                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | <b>PURCHASE SPECIFICATION FOR</b><br><b>COMPRESSED AIR NETWORK</b>                                                                                                                            |                  | <b>ISSUE NO : 06</b>            |  |
|                                                                                                                                                                                                                                  |                                                                                                 |                                  |                                                              |                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                               |                  | <b>DOC.NO: SPV-UT-002</b>       |  |
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| <b>COPY RIGHT AND CONFIDENTIAL</b><br><br>The information on this document is the property of Bharat Heavy Electricals Limited. It must not be used directly or indirectly in anyway detrimental to the interest of the company. | 4                                                                                               |                                  | Providing the compressed air pipeline to SPV Module mfg shop |                                                                                                                                                                                           | 1. Subjected to the drawing approval and arrival of the required materials, the installation of the pipeline works shall be carried out by vendor.<br>2. Vendor shall bring all the necessary tools and tackles for the purpose of pipeline connection.<br>3. The Contractor should also bring necessary personal protective equipments like safety shoes, hand gloves so as to work safely.<br>4. The contractor shall dispose the waste and scrap materials properly at the identified places as per the area supervisor instruction and maintain the work place cleanliness.<br>5. Material handling equipments like Floor crane, Fork Lift, Hydraulic crane, if required will be provided by BHEL-EPD. All erection and commissioning shall be carried in presence of qualified engineers of vendor.<br>6. Pressure gauges shall be fixed in the system in the positions designated by BHEL officials.<br>7. All pipe lines should be fabricated and erected as per general pipe laying standards ensuring proper levelling, straightness. Pipe lines shall be routed and fabricated to ensure minimum pressure drop/line loss.<br>8. All the pipe lines are to be properly supported and clamped at required locations. |                                                                                                                                                                                               |                  |                                 |  |
|                                                                                                                                                                                                                                  | 5                                                                                               |                                  | Installation Period and Activity schedule                    |                                                                                                                                                                                           | 5.1. Successful bidder shall come for installation and commissioning of the pipelines as and when called.<br>5.2. The duration for installation of compressed air pipeline in the CCH and Main Line in shop floor shall be within 30 days from the date of clearance given by BHEL.<br>5.3. Installation of the branch lines and connections to individual equipments shall be done within 15 days from the date of service call given by BHEL.<br>5.4. Duration for testing of lines and connections - 1 Week<br>5.5. Successful bidder shall provide detailed activity schedule for the full work after receipt of work order. Any clarification required from BHEL in this regard shall be clearly brought out                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                               |                  |                                 |  |
|                                                                                                                                                                                                                                  |                                                                                                 | Rev 00:<br>1 <sup>st</sup> Issue | Issued By<br><br>SPV PROD GROUP                              | Prepared By<br><br> | Checked By<br><br>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Approved By<br><br> | Date<br>01/07/19 |                                 |  |

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| MATERIAL CODE<br>EL8369610032                                                                                                                                                                                             | <br>EPD |                        | 1800-01<br>Rev. 00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                              |                                                                                                                                                                                | <b>PURCHASE SPECIFICATION FOR<br/>COMPRESSED AIR NETWORK</b> |  | ISSUE NO : 06<br>DOC.NO: SPV-UT-002<br>REV : 00    JUL-2019 |  |
|                                                                                                                                                                                                                           |                                                                                          |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                              |                                                                                                                                                                                |                                                              |  | Page 4 of 11                                                |  |
| COPY RIGHT AND CONFIDENTIAL<br><br>The information on this document is the property of Bharat Heavy Electricals Limited. It must not be used directly or indirectly in anyway detrimental to the interest of the company. | 6                                                                                        | Inspection and Testing | 6.1. Compressor House: All pipe lines after being laid should be tested at recommended pressure and should be checked for leaks. Any leaks noticed should be corrected and the pipelines retested for any leakage. Vendor shall make all the necessary arrangement in the BHEL site for the same.<br>6.2. Shop Floor: Vendor shall arrange for Ultrasonic test of pipelines for detection of air leakage in the shop Floor.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                              |                                                                                                                                                                                |                                                              |  |                                                             |  |
|                                                                                                                                                                                                                           | 7                                                                                        | Guarantee Period       | 7.1. For material: 24 months from the date of arrival of materials at BHEL-EPD premises. Vendor shall arrange for replacement of material in case of any failure.<br>7.2. For workmanship: 18 months from the date of installation certificate signed by BHEL official. Any service required during the warranty period shall be under the scope of vendor.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                              |                                                                                                                                                                                |                                                              |  |                                                             |  |
|                                                                                                                                                                                                                           | 8                                                                                        | Final Drawing          | Vendor to prepare and submit detailed final compressed air network drawing of the compressor house and shop floor as per actual commissioning in pdf and autocad format indicating all the components with detailed nomenclature                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                              |                                                                                                                                                                                |                                                              |  |                                                             |  |
|                                                                                                                                                                                                                           | 9                                                                                        | Catalogue              | Vendor shall provide detailed catalogues of the components to be used for reference of BHEL.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                              |                                                                                                                                                                                |                                                              |  |                                                             |  |
|                                                                                                                                                                                                                           | 10                                                                                       | Qualification Criteria | 10.1. Vendor shall be either OEM for <b>Legris/Boge/ Ingersoll Rand/Atlas Copco/FESTO/ Canares</b> or shall be authorized dealer for the same. Necessary OEM certificate or dealership certificate should be submitted for the same.<br>10.2. Vendor shall have experience in laying compressed air pipeline for shop floor with a pressure requirement of 6 bar or more and flow requirement of min. 400 cfm. Vendor shall submit Minimum 2 Nos commissioning certificate for carrying out similar jobs in the last 3 years.<br>10.3. Certifications and standards:<br>a. <b>Fire Resistance:</b> All the components shall be fire resistant with no propagation of flame<br>i. Pipe-to-pipe and stud connectors, ball valves and butterfly valves: conform to UL94HB standard<br>ii. fixture clips : conform to UL94V-2 standard or equivalent<br>iii. flexible hoses : conform to ISO 8030 norm for compressed air applications<br>b. Should conform to European standard 97/23 CEE - §3.3 (equipment under pressure)<br>c. Makes should conform to the following standards/ Certification :<br>i. Safety certification for components<br>ii. Qualicoat (guarantee of quality of the lacquer finish applied to Aluminium pipings)<br>iii. ASME B31.1 (Non boiler external piping) |                                                                                                                                                                              |                                                                                                                                                                                |                                                              |  |                                                             |  |
|                                                                                                                                                                                                                           | Rev 00:                                                                                  | Issued By              | Prepared By                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Checked By                                                                                                                                                                   | Approved By                                                                                                                                                                    | Date                                                         |  |                                                             |  |
|                                                                                                                                                                                                                           | 1 <sup>st</sup> Issue                                                                    | SPV PROD GROUP         | <br>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <br> | <br> | 01/07/19                                                     |  |                                                             |  |

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| <b>MATERIAL CODE</b><br><b>EL8369 010032</b>                                |  <b>EPD</b> |                                                                                                           | <b>1800-01</b><br><b>Rev. 00</b> |                                                                                                           |              |                                                                                                             | <b>PURCHASE SPECIFICATION FOR</b><br><b>COMPRESSED AIR NETWORK</b> |                         |                 |  | <b>ISSUE NO : 06</b>      |  |  |
|                                                                             |                                                                                              |                                                                                                           |                                  |                                                                                                           |              |                                                                                                             |                                                                    |                         |                 |  | <b>DOC.NO: SPV-UT-002</b> |  |  |
|                                                                             |                                                                                              |                                                                                                           |                                  |                                                                                                           |              |                                                                                                             | <b>REV : 00</b>                                                    |                         | <b>JUL-2019</b> |  |                           |  |  |
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| <b>LIST FOR BILL OF MATERIAL AND INSTALLATION</b>                           |                                                                                              |                                                                                                           |                                  |                                                                                                           |              |                                                                                                             |                                                                    |                         |                 |  |                           |  |  |
| <b>BOQ -I</b>                                                               |                                                                                              |                                                                                                           |                                  |                                                                                                           |              |                                                                                                             |                                                                    |                         |                 |  |                           |  |  |
| <b>BOQ For materials to be used in Compressor house pipeline connection</b> |                                                                                              |                                                                                                           |                                  |                                                                                                           |              |                                                                                                             |                                                                    |                         |                 |  |                           |  |  |
| Sl No.                                                                      | Material Description                                                                         | Qty                                                                                                       | Uom                              | For Supply                                                                                                |              | For Installation & Commissioning                                                                            |                                                                    |                         |                 |  |                           |  |  |
|                                                                             |                                                                                              |                                                                                                           |                                  | Price/ Unit                                                                                               | Amount (INR) | Price / Unit                                                                                                | Amount (INR)                                                       |                         |                 |  |                           |  |  |
| 1                                                                           | ALUMINIUM PIPE 40MM DIA                                                                      | 60                                                                                                        | Mtr                              |                                                                                                           |              |                                                                                                             |                                                                    |                         |                 |  |                           |  |  |
| 2                                                                           | ALUMINIUM PIPE 100MM DIA                                                                     | 10                                                                                                        | Mtr                              |                                                                                                           |              |                                                                                                             |                                                                    |                         |                 |  |                           |  |  |
| 3                                                                           | ALUMINIUM PIPE 80MM DIA                                                                      | 20                                                                                                        | Mtr                              |                                                                                                           |              |                                                                                                             |                                                                    |                         |                 |  |                           |  |  |
| 4                                                                           | ALUMINIUM PIPE 20MM DIA                                                                      | 15                                                                                                        | Mtr                              |                                                                                                           |              |                                                                                                             |                                                                    |                         |                 |  |                           |  |  |
| <b>Compressor Outlet</b>                                                    |                                                                                              |                                                                                                           |                                  |                                                                                                           |              |                                                                                                             |                                                                    |                         |                 |  |                           |  |  |
| 5                                                                           | Compressor outlet 1.5" 40mm X 1 1/2" MALE ADAPTER/NIPPLE SOCKET 40mm X 1 1/2" MALE           | 4                                                                                                         | Nos                              |                                                                                                           |              |                                                                                                             |                                                                    |                         |                 |  |                           |  |  |
| 6                                                                           | 40mm VALVE (DISCHARGE)                                                                       | 4                                                                                                         | Nos                              |                                                                                                           |              |                                                                                                             |                                                                    |                         |                 |  |                           |  |  |
| 7                                                                           | ELBOW 40mm                                                                                   | 36                                                                                                        | Nos                              |                                                                                                           |              |                                                                                                             |                                                                    |                         |                 |  |                           |  |  |
| 8                                                                           | Pre-filter fitting 40mm X 1 1/2" MALE ADAPTER /NIPPLE SOCKET 40mm X 1 1/2" MALE              | 8                                                                                                         | Nos                              |                                                                                                           |              |                                                                                                             |                                                                    |                         |                 |  |                           |  |  |
| 9                                                                           | After filter fitting 40mm X 1 1/2" MALE ADAPTER /NIPPLE SOCKET 40mm X 1 1/2" MALE            | 8                                                                                                         | Nos                              |                                                                                                           |              |                                                                                                             |                                                                    |                         |                 |  |                           |  |  |
| 10                                                                          | Carbon filter fitting 40mm X 1 1/2" MALE ADAPTER /NIPPLE SOCKET 40mm X 1 1/2" MALE           | 8                                                                                                         | Nos                              |                                                                                                           |              |                                                                                                             |                                                                    |                         |                 |  |                           |  |  |
| <b>Rev 00:</b>                                                              |                                                                                              |                                                                                                           |                                  |                                                                                                           |              |                                                                                                             |                                                                    |                         |                 |  |                           |  |  |
| <b>1<sup>st</sup> Issue</b>                                                 |                                                                                              |                                                                                                           |                                  |                                                                                                           |              |                                                                                                             |                                                                    |                         |                 |  |                           |  |  |
| <b>Issued By</b><br>SPV PROD GROUP                                          |                                                                                              | <b>Prepared By</b><br> |                                  | <b>Checked By</b><br> |              | <b>Approved By</b><br> |                                                                    | <b>Date</b><br>01/07/19 |                 |  |                           |  |  |

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|-----------------------|----------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|----------|
| Rev 00:               | Issued By      | Prepared By                                                                         | Checked By                                                                          | Approved By                                                                           | Date     |
| 1 <sup>st</sup> Issue | SPV PROD GROUP |  |  |  | 01/07/19 |
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MATERIAL CODE  
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1800-01  
Rev. 00

## PURCHASE SPECIFICATION FOR COMPRESSED AIR NETWORK

ISSUE NO : 06

DOC.NO: SPV-UT-002

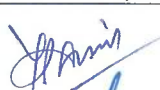
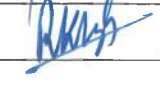
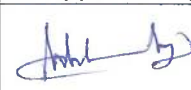
REV : 00

JUL-2019

Page 7 of 11

|                     |                                                                                           |   |     |  |  |  |  |
|---------------------|-------------------------------------------------------------------------------------------|---|-----|--|--|--|--|
| 22                  | Pr. GAUGE<br>CONNECTION ON<br>100mm PIPE FEMALE<br>DROP 1/2"                              | 1 | Nos |  |  |  |  |
| 23                  | Hex Nipple 1/2"                                                                           | 2 | Nos |  |  |  |  |
| 24                  | 1/2" VALVE FOR Pr.<br>GAUGE ISOLATION                                                     | 1 | Nos |  |  |  |  |
| 25                  | PRESS<br>SENSOR 100mm PIPE<br>FEMALE DROP 1/2"<br>ON 100mm PIPE)                          | 1 | Nos |  |  |  |  |
| 26                  | VALVE, BALL,<br>FEMALE THREADED<br>1/2" BSP pressure<br>sensor isolation<br>(Brass/Al/SS) | 1 | Nos |  |  |  |  |
| <b>AIR RECEIVER</b> |                                                                                           |   |     |  |  |  |  |
| 27                  | 80-40-80 REDUCER<br>TEE                                                                   | 4 | Nos |  |  |  |  |
| 28                  | 100-40-100 Reducer<br>TEE                                                                 | 4 | Nos |  |  |  |  |
| 29                  | 40MM 1 1/2" MALE<br>ADAPTER/ QUICK<br>NIPPLE 40MM 1 1/2"                                  | 8 | Nos |  |  |  |  |
| 30                  | DRAIN LINE 1/2" BSP<br>MALE ADAPTER 20<br>mm                                              | 4 | Nos |  |  |  |  |
| 31                  | Receiver DRAIN LINE<br>VALVE, BALL, 20MM                                                  | 4 | Nos |  |  |  |  |
| 32                  | Receiver Drain Line<br>ELBOW 20 MM                                                        | 4 | Nos |  |  |  |  |
| 33                  | 100/110mm END CAP                                                                         | 2 | Nos |  |  |  |  |
| 34                  | 100/110-80mm<br>REDUCER                                                                   | 4 | Nos |  |  |  |  |
| 35                  | 80mm Ball Valve Push<br>fit type (Brass/Al/SS)                                            | 1 | Nos |  |  |  |  |

| Rev 00:               | Issued By         | Prepared By | Checked By | Approved By | Date     |
|-----------------------|-------------------|-------------|------------|-------------|----------|
| 1 <sup>st</sup> Issue | SPV PROD<br>GROUP |             |            |             | 01/07/19 |
|                       |                   |             |            |             |          |

|                                                                                                                                                                                                                                  |                                                                                                 |                                                                                                |                                                                                                                                                                                                  |                                                                                                                                                                                                   |                                                                                                                                                                                                      |                         |                                                                    |                                             |                 |  |                           |  |  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|--------------------------------------------------------------------|---------------------------------------------|-----------------|--|---------------------------|--|--|
| <b>MATERIAL CODE</b><br><b>EL8369210032</b>                                                                                                                                                                                      | <br><b>EPD</b> |                                                                                                | <b>1800-01</b><br><b>Rev. 00</b>                                                                                                                                                                 |                                                                                                                                                                                                   |                                                                                                                                                                                                      |                         | <b>PURCHASE SPECIFICATION FOR</b><br><b>COMPRESSED AIR NETWORK</b> |                                             |                 |  | <b>ISSUE NO : 06</b>      |  |  |
|                                                                                                                                                                                                                                  |                                                                                                 |                                                                                                |                                                                                                                                                                                                  |                                                                                                                                                                                                   |                                                                                                                                                                                                      |                         |                                                                    |                                             |                 |  | <b>DOC.NO: SPV-UT-002</b> |  |  |
|                                                                                                                                                                                                                                  |                                                                                                 |                                                                                                |                                                                                                                                                                                                  |                                                                                                                                                                                                   |                                                                                                                                                                                                      |                         | <b>REV : 00</b>                                                    |                                             | <b>JUL-2019</b> |  |                           |  |  |
|                                                                                                                                                                                                                                  |                                                                                                 |                                                                                                |                                                                                                                                                                                                  |                                                                                                                                                                                                   |                                                                                                                                                                                                      |                         |                                                                    |                                             |                 |  | <b>Page 8 of 11</b>       |  |  |
| <b>COPY RIGHT AND CONFIDENTIAL</b><br><br>The information on this document is the property of Bharat Heavy Electricals Limited. It must not be used directly or indirectly in anyway detrimental to the interest of the company. |                                                                                                 | <b>CLAMPS/ CLIPS</b>                                                                           |                                                                                                                                                                                                  |                                                                                                                                                                                                   |                                                                                                                                                                                                      |                         |                                                                    |                                             |                 |  |                           |  |  |
|                                                                                                                                                                                                                                  |                                                                                                 | 36                                                                                             | Clamps 100 mm Wall mounted/ Pipe Clip 80mm                                                                                                                                                       | 3                                                                                                                                                                                                 | Nos                                                                                                                                                                                                  |                         |                                                                    |                                             |                 |  |                           |  |  |
|                                                                                                                                                                                                                                  |                                                                                                 | 37                                                                                             | Clamps 80 mm Wall mounted/ Pipe Clip 80mm                                                                                                                                                        | 10                                                                                                                                                                                                | Nos                                                                                                                                                                                                  |                         |                                                                    |                                             |                 |  |                           |  |  |
|                                                                                                                                                                                                                                  |                                                                                                 | 38                                                                                             | Clamps 40 mm Wall mounted/ Pipe clip 40mm                                                                                                                                                        | 30                                                                                                                                                                                                | Nos                                                                                                                                                                                                  |                         |                                                                    |                                             |                 |  |                           |  |  |
|                                                                                                                                                                                                                                  |                                                                                                 | <b>SUPPLY TOTAL :-</b>                                                                         |                                                                                                                                                                                                  |                                                                                                                                                                                                   |                                                                                                                                                                                                      |                         |                                                                    |                                             |                 |  |                           |  |  |
|                                                                                                                                                                                                                                  |                                                                                                 | <b>INSTALLATION &amp; COMMISSIONING TOTAL :-</b>                                               |                                                                                                                                                                                                  |                                                                                                                                                                                                   |                                                                                                                                                                                                      |                         |                                                                    |                                             |                 |  |                           |  |  |
|                                                                                                                                                                                                                                  |                                                                                                 | <b>BOQ II</b>                                                                                  |                                                                                                                                                                                                  |                                                                                                                                                                                                   |                                                                                                                                                                                                      |                         |                                                                    |                                             |                 |  |                           |  |  |
|                                                                                                                                                                                                                                  |                                                                                                 | <b>BOQ For materials to be used in SPV Module Manufacturing Shop floor pipeline connection</b> |                                                                                                                                                                                                  |                                                                                                                                                                                                   |                                                                                                                                                                                                      |                         |                                                                    |                                             |                 |  |                           |  |  |
|                                                                                                                                                                                                                                  |                                                                                                 |                                                                                                |                                                                                                                                                                                                  |                                                                                                                                                                                                   |                                                                                                                                                                                                      | <b>For Supply</b>       |                                                                    | <b>For Installation &amp; Commissioning</b> |                 |  |                           |  |  |
|                                                                                                                                                                                                                                  |                                                                                                 | Sl No.                                                                                         | Item Description                                                                                                                                                                                 | Qty                                                                                                                                                                                               | UoM                                                                                                                                                                                                  | Price / Unit            | Amount (INR)                                                       | Price / Unit                                | Amount (INR)    |  |                           |  |  |
| 1                                                                                                                                                                                                                                | Aluminum 80 mm Dia Pipe                                                                         | 220                                                                                            | Mtr                                                                                                                                                                                              |                                                                                                                                                                                                   |                                                                                                                                                                                                      |                         |                                                                    |                                             |                 |  |                           |  |  |
| 2                                                                                                                                                                                                                                | Aluminum 40 mm Dia Pipe                                                                         | 180                                                                                            | Mtr                                                                                                                                                                                              |                                                                                                                                                                                                   |                                                                                                                                                                                                      |                         |                                                                    |                                             |                 |  |                           |  |  |
| 3                                                                                                                                                                                                                                | Aluminum 25 mm Dia Pipe                                                                         | 110                                                                                            | Mtr                                                                                                                                                                                              |                                                                                                                                                                                                   |                                                                                                                                                                                                      |                         |                                                                    |                                             |                 |  |                           |  |  |
| 4                                                                                                                                                                                                                                | 40 mm End Cap                                                                                   | 10                                                                                             | Nos                                                                                                                                                                                              |                                                                                                                                                                                                   |                                                                                                                                                                                                      |                         |                                                                    |                                             |                 |  |                           |  |  |
| 5                                                                                                                                                                                                                                | Union/ Coupler/ Connector with clips/Equal socket 80 mm                                         | 50                                                                                             | Nos                                                                                                                                                                                              |                                                                                                                                                                                                   |                                                                                                                                                                                                      |                         |                                                                    |                                             |                 |  |                           |  |  |
| 6                                                                                                                                                                                                                                | Union/ Coupler/ Connector with clips/Equal socket 40 mm                                         | 25                                                                                             | Nos                                                                                                                                                                                              |                                                                                                                                                                                                   |                                                                                                                                                                                                      |                         |                                                                    |                                             |                 |  |                           |  |  |
| 7                                                                                                                                                                                                                                | Union/ Coupler/ Connector with Clips/Equal socket 25 mm                                         | 18                                                                                             | Nos                                                                                                                                                                                              |                                                                                                                                                                                                   |                                                                                                                                                                                                      |                         |                                                                    |                                             |                 |  |                           |  |  |
| <b>Rev 00:</b><br><b>1<sup>st</sup> Issue</b>                                                                                                                                                                                    |                                                                                                 | <b>Issued By</b><br><br>SPV PROD GROUP                                                         | <b>Prepared By</b><br><br> | <b>Checked By</b><br><br> | <b>Approved By</b><br><br> | <b>Date</b><br>01/07/19 |                                                                    |                                             |                 |  |                           |  |  |

MATERIAL CODE  
EL 8369010032

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1800-01  
Rev. 00

## PURCHASE SPECIFICATION FOR COMPRESSED AIR NETWORK

ISSUE NO : 06

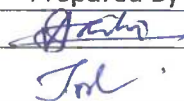
DOC.NO: SPV-UT-002

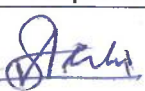
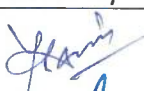
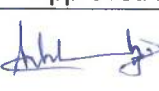
REV : 00 JUL-2019

Page 9 of 11

|    |                                                                    |    |     |  |  |  |  |
|----|--------------------------------------------------------------------|----|-----|--|--|--|--|
| 8  | Equal TEE (80 mm)                                                  | 5  | Nos |  |  |  |  |
| 9  | Equal TEE (40 mm)                                                  | 20 | Nos |  |  |  |  |
| 10 | Equal TEE (25 NB)                                                  | 20 | Nos |  |  |  |  |
| 11 | Reducer Tee /Reducing Tee 80-40-80                                 | 7  | Nos |  |  |  |  |
| 12 | Reducer Tee/ Reducing Tee 40-25-40                                 | 25 | Nos |  |  |  |  |
| 13 | Equal Elbow 80 mm / Elbow 90 Deg 80 mm                             | 6  | Nos |  |  |  |  |
| 14 | Equal Elbow 40 mm / Elbow 90 Deg 40 mm                             | 50 | Nos |  |  |  |  |
| 15 | Equal Elbow 25 mm / Elbow 90 Deg 25 mm                             | 55 | Nos |  |  |  |  |
| 16 | Male Adapter 25 mm - 3/4"/Nipple Socket 25 mm -3/4" Male thread    | 24 | Nos |  |  |  |  |
| 17 | Male Adapter 25 mm - 1/2"/ Nipple Socket 25 mm to 1/2" male thread | 20 | Nos |  |  |  |  |

| Rev 00:               | Issued By      | Prepared By | Checked By | Approved By | Date     |
|-----------------------|----------------|-------------|------------|-------------|----------|
| 1 <sup>st</sup> Issue | SPV PROD GROUP |             |            |             | 01/07/19 |
|                       |                |             |            |             |          |

|                                                                                                                                                                                                                                  |                                                                                              |                                                                                                                                                                                                        |                                                                                     |                                                                                      |                                                                                       |          |  |                                 |  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|----------|--|---------------------------------|--|
| <b>MATERIAL CODE</b><br><b>EL8369 D10032</b>                                                                                                                                                                                     |  <b>EPD</b> |                                                                                                                                                                                                        | <b>1800-01</b><br><b>Rev. 00</b>                                                    |                                                                                      | <b>PURCHASE SPECIFICATION FOR</b><br><b>COMPRESSED AIR NETWORK</b>                    |          |  | <b>ISSUE NO : 06</b>            |  |
|                                                                                                                                                                                                                                  |                                                                                              |                                                                                                                                                                                                        |                                                                                     |                                                                                      |                                                                                       |          |  | <b>DOC.NO: SPV-UT-002</b>       |  |
|                                                                                                                                                                                                                                  |                                                                                              |                                                                                                                                                                                                        |                                                                                     |                                                                                      |                                                                                       |          |  | <b>REV : 00</b> <b>JUL-2019</b> |  |
|                                                                                                                                                                                                                                  |                                                                                              |                                                                                                                                                                                                        |                                                                                     |                                                                                      |                                                                                       |          |  | <b>Page 10 of 11</b>            |  |
| <b>COPY RIGHT AND CONFIDENTIAL</b><br><br>The information on this document is the property of Bharat Heavy Electricals Limited. It must not be used directly or indirectly in anyway detrimental to the interest of the company. | 18                                                                                           | Pressure gauge mounting arrangement for vertically mounting Pressure gauge with end fitting of 1/2" BSP male thread with provision for isolation using 1/2" Ball Valve (to be fixed in 40 mm Dia pipe) | 5                                                                                   | Sets                                                                                 |                                                                                       |          |  |                                 |  |
|                                                                                                                                                                                                                                  | 19                                                                                           | Pressure Sensor mounting arrangement for Pressure sensor with end fitting of 1/4" BSP male thread with provision for isolation using 1/2" Ball Valve (to be fixed in 40 mm Dia pipe)                   | 2                                                                                   | Sets                                                                                 |                                                                                       |          |  |                                 |  |
|                                                                                                                                                                                                                                  | 20                                                                                           | For Auto Drain valve provision - Drop, Straight/Quick Drop, 80mm X 25mm                                                                                                                                | 2                                                                                   | Nos                                                                                  |                                                                                       |          |  |                                 |  |
|                                                                                                                                                                                                                                  | 21                                                                                           | For Auto Drain valve provision - Ball Valve 25 mm (Brass/Al/SS)                                                                                                                                        | 2                                                                                   | Nos                                                                                  |                                                                                       |          |  |                                 |  |
|                                                                                                                                                                                                                                  | 22                                                                                           | Push fit type Ball Valve 80 mm (Brass/Al/SS)                                                                                                                                                           | 1                                                                                   | Nos                                                                                  |                                                                                       |          |  |                                 |  |
|                                                                                                                                                                                                                                  | 23                                                                                           | Push fit type Ball Valve 40 mm (Brass/Al/SS)                                                                                                                                                           | 10                                                                                  | Nos                                                                                  |                                                                                       |          |  |                                 |  |
|                                                                                                                                                                                                                                  |                                                                                              |                                                                                                                                                                                                        |                                                                                     |                                                                                      |                                                                                       |          |  |                                 |  |
|                                                                                                                                                                                                                                  | Rev 00:                                                                                      | Issued By                                                                                                                                                                                              | Prepared By                                                                         | Checked By                                                                           | Approved By                                                                           | Date     |  |                                 |  |
|                                                                                                                                                                                                                                  | 1 <sup>st</sup> Issue                                                                        | SPV PROD GROUP                                                                                                                                                                                         |  |  |  | 01/07/19 |  |                                 |  |

|                                                                                                                                                                                                                                  |                                                                                                 |                                                                                     |                                                                                      |                                                                                       |                                                                    |                 |                           |                      |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|--------------------------------------------------------------------|-----------------|---------------------------|----------------------|
| <b>MATERIAL CODE</b><br><b>EL8369010032</b>                                                                                                                                                                                      | <br><b>EPD</b> |                                                                                     | <b>1800-01</b><br><b>Rev. 00</b>                                                     |                                                                                       | <b>PURCHASE SPECIFICATION FOR</b><br><b>COMPRESSED AIR NETWORK</b> |                 | <b>ISSUE NO : 06</b>      |                      |
|                                                                                                                                                                                                                                  |                                                                                                 |                                                                                     |                                                                                      |                                                                                       |                                                                    |                 | <b>DOC.NO: SPV-UT-002</b> |                      |
|                                                                                                                                                                                                                                  |                                                                                                 |                                                                                     |                                                                                      |                                                                                       |                                                                    | <b>REV : 00</b> |                           | <b>JUL-2019</b>      |
|                                                                                                                                                                                                                                  |                                                                                                 |                                                                                     |                                                                                      |                                                                                       |                                                                    |                 |                           | <b>Page 11 of 11</b> |
| <b>COPY RIGHT AND CONFIDENTIAL</b><br><br>The information on this document is the property of Bharat Heavy Electricals Limited. It must not be used directly or indirectly in anyway detrimental to the interest of the company. | 24                                                                                              | Push fit type Ball Valve<br>25 mm (Brass/Al/SS)                                     | 30                                                                                   | Nos                                                                                   |                                                                    |                 |                           |                      |
|                                                                                                                                                                                                                                  | 25                                                                                              | Clamps 80 mm Wall<br>mouted/ Pipe Clip 80mm                                         | 115                                                                                  | Nos                                                                                   |                                                                    |                 |                           |                      |
|                                                                                                                                                                                                                                  | 26                                                                                              | Clamps 40 mm Wall<br>mouted/ Pipe clip 40mm                                         | 100                                                                                  | Nos                                                                                   |                                                                    |                 |                           |                      |
|                                                                                                                                                                                                                                  | 27                                                                                              | 25 mm Plastic<br>Clamp/Pipe Clip 25 mm                                              | 60                                                                                   | Nos                                                                                   |                                                                    |                 |                           |                      |
|                                                                                                                                                                                                                                  | 28                                                                                              | Flexible PU tubes 12 mm                                                             | 100                                                                                  | Mtr                                                                                   |                                                                    |                 |                           |                      |
|                                                                                                                                                                                                                                  | 29                                                                                              | Flexible PU tubes 16 mm                                                             | 80                                                                                   | Mtr                                                                                   |                                                                    |                 |                           |                      |
|                                                                                                                                                                                                                                  | 30                                                                                              | Push in fittings 1/2"X12<br>mm                                                      | 30                                                                                   | Nos                                                                                   |                                                                    |                 |                           |                      |
|                                                                                                                                                                                                                                  | 31                                                                                              | Push in fittings 3/4"X16<br>mm                                                      | 15                                                                                   | Nos                                                                                   |                                                                    |                 |                           |                      |
|                                                                                                                                                                                                                                  | 32                                                                                              | 3/4" Ball valve threaded<br>female (Brass/Al/SS)                                    | 12                                                                                   | Nos                                                                                   |                                                                    |                 |                           |                      |
|                                                                                                                                                                                                                                  | 33                                                                                              | 1/2" Ball valve threaded<br>female (Brass/Al/SS)                                    | 20                                                                                   | Nos                                                                                   |                                                                    |                 |                           |                      |
|                                                                                                                                                                                                                                  | 34                                                                                              | Tie Rod                                                                             | 200                                                                                  | Nos                                                                                   |                                                                    |                 |                           |                      |
|                                                                                                                                                                                                                                  | SUPPLY TOTAL :-                                                                                 |                                                                                     |                                                                                      |                                                                                       |                                                                    |                 |                           |                      |
|                                                                                                                                                                                                                                  | INSTALLATION & COMMISSIONING TOTAL:-                                                            |                                                                                     |                                                                                      |                                                                                       |                                                                    |                 |                           |                      |
|                                                                                                                                                                                                                                  | SUPPLY TOTAL BOQ -I + BOQ -II :                                                                 |                                                                                     |                                                                                      |                                                                                       |                                                                    |                 |                           |                      |
|                                                                                                                                                                                                                                  | INSTALLATION & COMMISSIONING TOTAL BOQ -I + BOQ -II :                                           |                                                                                     |                                                                                      |                                                                                       |                                                                    |                 |                           |                      |
|                                                                                                                                                                                                                                  | P & F CHARGES :                                                                                 |                                                                                     |                                                                                      |                                                                                       |                                                                    |                 |                           |                      |
|                                                                                                                                                                                                                                  | GST                                                                                             |                                                                                     |                                                                                      |                                                                                       |                                                                    |                 |                           |                      |
|                                                                                                                                                                                                                                  | FREIGHT CHARGES :                                                                               |                                                                                     |                                                                                      |                                                                                       |                                                                    |                 |                           |                      |
|                                                                                                                                                                                                                                  | SUB TOTAL SUPPLY & ERECTION :                                                                   |                                                                                     |                                                                                      |                                                                                       |                                                                    |                 |                           |                      |
|                                                                                                                                                                                                                                  | GRAND TOTAL SUPPLY & ERECTION (INCLUDING ALL TAXES) :                                           |                                                                                     |                                                                                      |                                                                                       |                                                                    |                 |                           |                      |
| Rev 00:                                                                                                                                                                                                                          | Issued By                                                                                       | Prepared By                                                                         | Checked By                                                                           | Approved By                                                                           | Date                                                               |                 |                           |                      |
| 1 <sup>st</sup> Issue                                                                                                                                                                                                            | SPV PROD GROUP                                                                                  |  |  |  | 01/07/19                                                           |                 |                           |                      |
|                                                                                                                                                                                                                                  |                                                                                                 |  |  |  |                                                                    |                 |                           |                      |

MATERIAL CODE  
ELI8369010032

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1800-01  
Rev. 00

## PURCHASE SPECIFICATION FOR COMPRESSED AIR NETWORK

ISSUE NO : 06

DOC.NO: SPV-UT-002

REV : 00 JUL-2019

Page 11 of 11

SPECIFICATION REVIEWED AND APPROVED

| NAME              | SIGNATURE |
|-------------------|-----------|
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Ref: PR No. 5000323  
Date: 01.07.201

| Sl No. | Item / Description                                                 | Unit | Quantity | Rate | Amount | Remarks                                                                                                                                                                                                                            |
|--------|--------------------------------------------------------------------|------|----------|------|--------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1      | Compressed air main and distribution lines with accessories        | set  | 1        |      |        | The Compressed air main and distribution line with accessories as per Purchase Specification No. SPV-UT-002 Complete inclusive of the following units / components and not limited to:<br>a. List of items as per BOQ-I and BOQ-II |
| 2      | Installation and Commissioning of the Line at BHEL - EPD           | Set  | 1        |      |        | Details in Technical specification                                                                                                                                                                                                 |
| 3      | Technical Documentation/ Drawings and other associated information |      |          |      |        |                                                                                                                                                                                                                                    |
|        |                                                                    |      |          |      |        |                                                                                                                                                                                                                                    |
|        |                                                                    |      |          |      |        |                                                                                                                                                                                                                                    |
|        |                                                                    |      |          |      |        |                                                                                                                                                                                                                                    |