



Boiler Auxiliary Plant , Bharat Heavy Electricals  
Limited , Ranipet Tamilnadu- 632406

Purchase Department

Enquiry No: BAP/PUR/Geared Motor dt.16.07.2015  
Due on: 12.08.2015

Item : Geared Motor (0.5 HP/1.1 RPM) &  
(0.5 HP/2.5 RPM)

**Synopsis :**

**(i) Annexure-I**

Pre-Qualification Requirement

Description of item , Quantity details , Consignee details , Drawing and Relevant specification

**(ii) Annexure-II :** General terms and conditions of tender

**(iii) Annexure-III:** Commercial terms and conditions Annexure , MSME split provision & CA certificate format.

**Contact Details**

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**Annexure-I To Open Tender ref: BAP/PUR/GEARED MOTOR dt.16.07.2015**

**For Supply Of "Geared Motor" , Due on : 12.08.2015**

**Pre-Qualification Requirement**

- **Vendor should have supplied at least 50 nos of similar design geared motor each year for 2012-13, 2013-14 and 2014-15.**
- **Vendor should submit Commissioning report of at least 50 nos of Geared Motor supplied in year 2012-13, 2013-14 or 2014-15.**
- **Confirmation to our Specification, Drawing and quality plan.**
- **Vendor should have facility to carry out load test of Geared Motor at their works.**
- **Vendor should be a manufacturer of Geared Motor.**
- **Vendor should furnish purchase orders, commissioning reports and all technical details establishing the quoted geared motors is similar to our requirement.**

**Annexure-I To Open Tender ref: BAP/PUR/GEARED MOTOR dt.16.07.2015**

**For Supply Of "Geared Motor", Due on : 12.08.2015**

**Description of Item, Qty, Drawing and Relevant Specification**

| <b>SI No</b> | <b>Description of Itrm</b>   | <b>Qty</b> | <b>Unit</b> | <b>Project</b>                | <b>Delivery Destination</b>   | <b>O&amp;M Manual Reqt</b> | <b>Delivery</b> |
|--------------|--|------------|-------------|-------------------------------|-------------------------------|----------------------------|-----------------|
| 01           | 962720181000<br>0.5 HP/1.1 RPM Geared Motor, As Per Drg: 4-00-114-30734/Rev 02, Specification TECI:GEN :GM:REV 02 & Quality plan QP:E:809/Rev 06 dt.22.04.2014   | 112        | Sets        | Neyveli Project (R550 & R551) | Direct to Site (Neyveli Site) | Nil                        | 31.10.2015      |
| 02           | 962720181001<br>Initial Fill Oil For The Above Geared Motor.   |            |             |                               |                               |                            |                 |
| 03           | 962720181003<br>10% Extra Oil For The Above Geared Motor.  |            |             |                               |                               |                            |                 |
| 04           | 962721351000<br>0.5 HP/2.5 RPM Geared Motor, As Per Drg: 4-00-114-30735/Rev 03, Specification TECI: GEN: GM:REV 02 & Quality Plan QP:E:809/Rev 06 dt.22.04.2014. | 96         | Sets        | Neyveli Project (R550 & R551) | Direct to Site (Neyveli Site) | Nil                        | 31.10.2015      |
| 05           | 962721351001<br>Initial Fill Oil For The Above Geared Motor.   |            |             |                               |                               |                            |                 |
| 06           | 962721351003<br>10% Extra Oil For The Above Geared Motor   |            |             |                               |                               |                            |                 |
| 07           | 962721351002<br>Rain hood For The Above Geared Motor   |            |             |                               |                               |                            |                 |

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**For Supply Of "Geared Motor", Due on : 12.08.2015**

**Description of Item, Qty, Drawing and Relevant Specification**

| SI No | Description of Itrm   | Qty | Unit | Project                  | Delivery Destination            | O&M Manual Reqt | Delivery   |
|-------|---|-----|------|--------------------------|---------------------------------|-----------------|------------|
| 08    | R79433640001<br>0.5 HP/1.1 RPM Geared Motor, As Per Drg: 4-00-114-30734/Rev 02, Specification TECI:GEN :GM:REV 02 & Quality plan QP:E:809/Rev 06 dt.22.04.2014. <b>Paint Shade - 632 of IS 5.</b> | 80  | Sets | Wanakbori Project (R823) | Direct to Site (Wanakbori Site) | 10 Copies       | 24.09.2016 |
| 09    | R79433640002<br>Initial Fill Oil For The Above Geared Motor.  |     |      |                          |                                 |                 |            |
| 10    | R79433640003<br>10% Extra Oil For The Above Geared Motor.   |     |      |                          |                                 |                 |            |
| 11    | R79433650001<br>0.5 HP/2.5 RPM Geared Motor, As Per Drg: 4-00-114-30735/Rev 03, Specification TECI: GEN:GM:REV 02 & Quality Plan QP:E:809/Rev 06 dt.22.04.2014. <b>Paint Shade - 632 of IS 5.</b> | 72  | Sets | Wanakbori Project (R823) | Direct to Site (Wanakbori Site) | 10 Copies       | 24.09.2016 |
| 12    | R79433650002<br>Initial Fill Oil For The Above Geared Motor.  |     |      |                          |                                 |                 |            |
| 13    | R79433650003<br>10% Extra Oil For The Above Geared Motor  |     |      |                          |                                 |                 |            |
| 14    | R79433650004<br>Rain hood For The Above Geared Motor  |     |      |                          |                                 |                 |            |

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**For Supply Of "Geared Motor", Due on : 12.08.2015**

**Description of Item, Qty, Drawing and Relevant Specification**

| SI No | Description of Itrm  | Qty | Unit | Project                                    | Delivery Destination           | O&M Manual Reqt | Delivery                                   |
|-------|--|-----|------|--|--------------------------------|-----------------|--|
| 15    | R79436300001<br>0.5 HP/1.1 RPM Geared Motor, As Per Drg: 4-00-114-30734/Rev 02, Specification TECI:GEN :GM:REV 02 & Quality plan QP:E:809/Rev 06 dt.22.04.2014. <b>Paint Shade : Opaline Green Shade 275 of IS 5</b>   | 144 | Sets | Bhadradi Project (R373, R374, R375 & R376) | Direct to Site (Bhadradi Site) | 10 Copies       | 36 Sets - 24.03.2016                       |
| 16    | R79436300002<br>Initial Fill Oil For The Above Geared Motor.   |     |      |  |                                |                 | 36 Sets - 24.05.2016                       |
| 17    | R79436300003<br>10% Extra Oil For The Above Geared Motor.  |     |      |  |                                |                 | 36 Sets- 24.07.2016<br>36 Sets- 24.09.2016 |
| 18    | R79433610001<br>0.5 HP/2.5 RPM Geared Motor, As Per Drg: 4-00-114-30735/Rev 03, Specification TECI: GEN: GM: REV 02 & Quality Plan QP:E:809/Rev 06 dt.22.04.2014. <b>Paint Shade : Opaline Green Shade 275 of IS 5</b> | 128 | Sets | Bhadradi Project (R373,R374, R375 & R376)  | Direct to Site (Bhadradi Site) | 10 Copies       | 32 Sets - 24.03.2016                       |
| 19    | R79433610002<br>Initial Fill Oil For The Above Geared Motor.   |     |      |  |                                |                 | 32 Sets - 24.05.2016                       |
| 20    | R79433610003<br>10% Extra Oil For The Above Geared Motor   |     |      |  |                                |                 | 32 Sets- 24.07.2016                        |
| 21    | R79433610004<br>Rain hood For The Above Geared Motor   |     |      |  |                                |                 | 32 Sets- 24.09.2016                        |

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**Description of Item, Qty, Drawing and Relevant Specification**

| <b>Sl No</b> | <b>Description of Itrm</b>   | <b>Qty</b> | <b>Unit</b> | <b>Project</b>               | <b>Delivery Destination</b>  | <b>O&amp;M Manual Reqt</b> | <b>Delivery</b>                                    |
|--------------|--|------------|-------------|------------------------------|------------------------------|----------------------------|--|
| 22           | 962720181000<br>0.5 HP/1.1 RPM Geared Motor, As Per Drg: 4-00-114-30734/Rev 02, Specification TECI:GEN :GM:REV 02 & Quality plan QP:E:809/Rev 06 dt.22.04.2014.  | 144        | Sets        | Ennore Project (R667 & R668) | Direct to Site (Ennore Site) | Nil                        | 72 Sets –<br>24.05.2016<br>72 Sets –<br>24.07.2016 |
| 23           | 962720181001<br>Initial Fill Oil For The Above Geared Motor.   |            |             |                              |                              |                            |  |
| 24           | 962720181003<br>10% Extra Oil For The Above Geared Motor.  |            |             |                              |                              |                            |  |
| 25           | 962721351000<br>0.5 HP/2.5 RPM Geared Motor, As Per Drg: 4-00-114-30735/Rev 03, Specification TECI: GEN: GM:REV 02 & Quality Plan QP:E:809/Rev 06 dt.22.04.2014. | 128        | Sets        | Ennore Project (R667 & R668) | Direct To Site (Ennore Site) | Nil                        | 64 Sets –<br>24.05.2016<br>64 Sets –<br>24.07.2016 |
| 26           | 962721351001<br>Initial Fill Oil For The Above Geared Motor.   |            |             |                              |                              |                            |  |
| 27           | 962721351003<br>10% Extra Oil For The Above Geared Motor   |            |             |                              |                              |                            |  |
| 28           | 962721351002<br>Rain hood For The Above Geared Motor   |            |             |                              |                              |                            |  |

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**For Supply Of "Geared Motor", Due on : 12.08.2015**

**Description of Item, Qty, Drawing and Relevant Specification**

| <b>Sl No</b> | <b>Description of Itrm</b>   | <b>Qty</b> | <b>Unit</b> | <b>Project</b>                  | <b>Delivery Destination</b>     | <b>O&amp;M Manual Reqt</b> | <b>Delivery</b> |
|--------------|--|------------|-------------|---------------------------------|---------------------------------|----------------------------|-----------------|
| 29           | 962720181000<br>0.5 HP/1.1 RPM Geared Motor, As Per Drg: 4-00-114-30734/Rev 02, Specification TECI:GEN :GM:REV 02 & Quality plan QP:E:809/Rev 06 dt.22.04.2014   | 176        | Sets        | IB Valley Project (R652 & R653) | Direct to Site (IB Valley Site) | Nil                        | 30.09.2015      |
| 30           | 962720181001<br>Initial Fill Oil For The Above Geared Motor.   |            |             |                                 |                                 |                            |                 |
| 31           | 962720181003<br>10% Extra Oil For The Above Geared Motor.  |            |             |                                 |                                 |                            |                 |
| 32           | 962721351000<br>0.5 HP/2.5 RPM Geared Motor, As Per Drg: 4-00-114-30735/Rev 03, Specification TECI: GEN: GM:REV 02 & Quality Plan QP:E:809/Rev 06 dt.22.04.2014. | 160        | Sets        | IB Valley Project (R652 & R653) | Direct to Site (IB Valley Site) | Nil                        | 30.09.2015      |
| 33           | 962721351001<br>Initial Fill Oil For The Above Geared Motor.   |            |             |                                 |                                 |                            |                 |
| 34           | 962721351003<br>10% Extra Oil For The Above Geared Motor   |            |             |                                 |                                 |                            |                 |
| 35           | 962721351002<br>Rain hood For The Above Geared Motor   |            |             |                                 |                                 |                            |                 |

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**Description of Item, Qty, Drawing and Relevant Specification**

| <b>SI No</b> | <b>Description of Itrm</b>   | <b>Qty</b> | <b>Unit</b> | <b>Project</b>            | <b>Delivery Destination</b>      | <b>O&amp;M Manual Reqt</b> | <b>Delivery</b> |
|--------------|--|------------|-------------|---------------------------|----------------------------------|----------------------------|-----------------|
| 36           | R79433670001<br>0.5 HP/2.5 RPM Geared Motor, As Per Drg: 4-00-114-30735/Rev 03, Specification TECI: GEN:GM:REV 02 & Quality Plan QP:E:809/Rev 06 dt.22.04.2014. Paint Shade – Opaline Green Shade 275 of IS 5. | 80         | Sets        | Kothagudem Project (R823) | Direct to Site (Kothagudem Site) | 10 Copies                  | 24.09.2016      |
| 37           | R79433670002<br>Initial Fill Oil For The Above Geared Motor.   |            |             |                           |                                  |                            |                 |
| 38           | R79433670003<br>10% Extra Oil For The Above Geared Motor   |            |             |                           |                                  |                            |                 |
| 39           | R79433670004<br>Rain hood For The Above Geared Motor   |            |             |                           |                                  |                            |                 |

|                                    |                 |
|------------------------------------|-----------------|
| <b>0.5 HP/1.1 RPM Geared Motor</b> | <b>736 Sets</b> |
| <b>0.5 HP/2.5 RPM Geared Motor</b> | <b>584 Sets</b> |

**Annexure-I To Open Tender ref: BAP/PUR/Geared Motor dt.16.07.2015**

**For Supply Of "Geared Motor", Due on : 12.08.2015**

**Description of Item, Qty, Drawing and Relevant Specification**

- **One set of 0.5 HP/1.1 RPM Geared Motor consists** : 01 No of Geared Motor + Initial Fill Oil ( Ltr) (Qty of oil in ltr to be indicated based on suppliers design) + 10% Extra oil (Ltr) (Qty of oil in ltr to be indicated based on suppliers design).
- **One set of 0.5 HP/2.5 RPM Geared Motor consists** : 01 No of Geared Motor + Initial Fill Oil (Ltr) (Qty of oil in ltr to be indicated based on suppliers design) + 10% Extra oil (Unit- Ltr) (Qty of oil in ltr to be indicated based on suppliers design).+ 01 no of canopy

**Spec to be followed:** TECI:GEN:GM:REV 02

**Quality Plan to be followed:** QP:E:809/Rev 06  
dt.22.04.2014.

**Vendors has to quote in the following manner**

**Example : For Wankabori Project (0.5 HP/1.1 RPM) Geared Motor**

**Geared Motor : 80 Nos**

**Initial Fill Oil : x Ltrs (Qty of oil in ltr to be indicated based on suppliers design).**

**10% Extra Fill Oil: y Ltrs (Qty of oil in ltr to be indicated based on suppliers design)**

**Canopy : 80 nos**

**One make of Geared Motor of each variant is acceptable for one project. So vendor has to quote "project wise".**

**Example: Vendor has to quote separately for Wanakbori 0.5 HP/1.1 RPM & Wanakbori 0.5 HP/2.5 RPM geared motor.**

**The same is applicable for all other projects.**

## **Consignee Details**

**1. Neyveli Project :**

Neyveli New Thermal Power Project  
Neyveli, Cuddalore Dist, Tamilnadu-  
607807.

**2. Wanakbori Project:**

Gujarat State Electricity Company Ltd.,  
Wanakbori Thermal Power Station Unit-8,  
Taluk Galteshwar, Dist Kheda, Gujarat – 388239.

**3. Bhadradri Project:**

Bhadradri Project, Manuguru, Khammam Dist,  
Telangana-507117.

**4. IB Valley Project:**

Odisha Power Generation Corporation Ltd.,  
IB Thermal Power Project , Banharpalli Village,  
Jharsuguda dist , Odisha-768234.

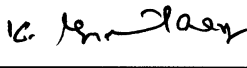


**5. Kothagudem Project:**

Kothagudem Thermal Power Station,  
Paloncha , Khammam Dist, Telangana  
- 507115.

**6. Ennore Project:**

Ennore SEZ Super Critical TPP,  
Tamilnadu Generation and Distribution  
Corporation, Chennai , Tamilnadu –  
600120

TITLE : TECHNICAL SPECIFICATION FOR BOUGHT OUT ITEMS FOR ESP  
 ITEM : GEARED MOTORS  
 CUSTOMER : GENERAL (NTPC AND NON NTPC PROJECTS)

|          | NAME           | DESIGNATION | SIGNATURE   | DATE       |
|----------|----------------|-------------|---|------------|
| PREPARED | R.VENKATARAMAN | EAE         |    | 24-11-2014 |
| CHECKED  | S.RANGARAJAN   | SDGM        |  | 25-11-2014 |
| APPROVED | S.JAYAPRAKASAM | AGM         |   | 25-11-2014 |

ISSUED BY EDC – EC&I

RECORD OF REVISION 02 : NTPC specification TEP:NTPC:GM:004:REV00 and Non NTPC specification (this specification) made common. Drawings in Pages 11 to 14 revised.

|               |                   |            |
|---------------|-------------------|------------|
| REVISION : 02 | REVISED GENERALLY | 25-11-2014 |
| REVISION: 01  | REVISED GENERALLY | 28-02-2010 |
| REVISION: 00  | INITIAL RELEASE   | 10-11-2007 |

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**1.0.0 SCOPE :**

The scope of supply shall be gear unit and drive motors duly assembled in mono- block construction, complete with mounting base and flange. Lubrication oil required for geared motor assembly shall be supplied along with geared motor assembly for initial filling at site.

**2.0.0 ENVIRONMENTAL CONDITION:**

|       |                       |   |  |
|-------|-----------------------|---|--|
| 2.1.0 | Ambient temperature   | : | 5-50 degree Celsius  |
| 2.2.0 | Design ambient        | : | 50 degree Celsius  |
| 2.2.0 | Humidity              | : | 100% at 45 degree Celsius  |
| 2.3.0 | Location              | : | Outdoor  |
| 2.4.0 | Altitude              | : | Less than 1000m  |
| 2.5.0 | Atmospheric condition | : | Heavily dusty with abrasive dust and particles of app. size five to hundred microns in atmosphere in large quantity. Climate is tropical, conducive to fungus growth. The environment is as prevalent in a coal fired thermal power station. |

**3.0.0 APPLICABLE STANDARDS**

3.1.0 Unless otherwise mentioned, the geared motor unit shall meet the requirements of standards mentioned below and their latest amendment if any. If there is a conflict between the standards and this specification, the most onerous condition shall apply.

**3.2.0 STANDARDS**

|       |  |   |  |
|-------|--|---|--|
| 3.2.1 | Three phase induction motors-specification   | : | IS 325   |
| 3.2.2 | Degrees of protection provided by enclosures for rotating electrical machinery   | : | IS 4691  |
| 3.2.3 | Mechanical vibration of rotating electrical machines, with shaft heights 56mm and higher- measurement, evaluation and limits of vibration severity | : | IS 12075                                       |
| 3.2.4 | Permissible limits of noise levels for rotating electrical machines  | : | IS 12065                                       |
| 3.2.5 | Terminal markings  | : | IS 4728  |
| 3.2.5 | Gears  | : | AGMA- 152.2<br>(Or)<br>DIN-3960/<br>3990/17210 |
| 3.2.6 | Colour of readily mixed paints   | : | IS 5   |
| 3.2.7 | Code of practice for climate proofing of electrical equipments.  | : | IS 3202  |

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**4.0.0 APPLICATION OF GEARED MOTORS:**

4.1 The geared motors are meant for operating rapping mechanism of Electrostatic Precipitators (ESP). The rapping will be intermittent and cyclic. However the geared motor shall also be rated for continuous duty as necessitated by certain duty conditions.

**4.2 DETAILS OF POWER SUPPLY**

4.2.1 Power supply available : 415 V, AC, 3PH, 3 WIRE, 50Hz

4.2.2 Power supply variations :  
Voltage - plus or minus 10%  
Frequency - plus or minus 5%  
Combined variation of voltage and frequency - 10% (absolute sum)

**5.0.0 CONSTRUCTIONAL FEATURES AND SPECIAL REQUIREMENTS**

**5.1.0 GENERAL**

The geared motors shall be designed for continuous duty at rated output as mentioned in the purchase enquiry. The mounting base shall be common to the entire geared motor assembly. The general dimensions and the type of mounting shall be as mentioned in the drawings forming part of the enquiry/ PO. The construction shall be robust and rugged. The motor shall be so designed that maximum inrush currents and locked rotor and pull out torque developed by them at extreme voltage and frequency variations do not endanger the motor and driven equipment.

**5.2 MOTOR**

5.2.1 The motor shall be direct on line start, flange mounted, squirrel cage induction type. The motor shall have four poles. The full load current of the geared motor assembly shall be between 0.6 to 1.0 amps for 0.33 HP and between 0.9 to 1.5 amps for 0.5 HP, including BIS tolerance. The KW rating of the motor shall be selected such that the geared motor assembly output shaft shall deliver the rated HP specified. The winding shall be suitable for 24V, AC winding heating.

**5.2.2 ENCLOSURE**

The motor shall be provided with an enclosure fully meeting the requirements of IP -55 as Per IS - 4691 and of weather proof.

**5.2.3 ROTOR**

The rotor shall be of die – cast construction and dynamically balanced.

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**5.2.4 FRAME**

The motor frame shall be cast and rigid.

**5.2.5 DIRECTION OF ROTATION**

All geared motors shall be designed for both directions of rotation.

**5.2.6 INSULATION**

The motor shall be CLASS- F insulated with temperature rise limited to class B limits. The insulation shall be given special treatment to withstand tropical and fungicidal condition as well as conditions of moisture, oil, abrasive, conducting dust and sulphur fumes, ambient with weak acid or alkali fumes.

**5.2.7 TERMINAL BOX**

The stator leads shall be brought out to the terminal box and terminated in stud type terminals. The terminal box shall be weather proof and water tight and suitable for outdoor service, having a degree of protection of IP-55. It shall be provided with removable front cover for making connections. Neoprene gaskets at cover joints shall be provided. The terminal box shall be suitable to withstand 31 MVA for 0.25 seconds without rupture with HRC fuse protection. All terminal boxes shall be provide with DOUBLE compression type cable glands of NICKEL-plated brass suitable to receive 3C x 2.5 sq .mm PVC insulated, stranded, armored (NON NTPC projects) and unarmored (NTPC projects) copper conductor cable. Each terminal shall be provided with washers, nuts and crimping type insulated annealed tinned copper lugs to receive the above cable. The terminal box alone shall be rotatable in steps of 90 degree. Minimum clearance in air between phases and between phase and earth with lugs installed shall be atleast 10mm. Terminals and glands shall be suitable for the type of cable used. Terminal marking shall be as per IS 4728.

**5.2.8 GROUNDING**

Two independent grounding points shall be provided on both the motor and gear unit on opposite sides. The grounding facility shall consist of a 6mm dia threaded hole with M6 bolts, nuts and bevel washers. Earthing bolt shall not be used as fasteners for fixing parts. Motor body earthing shall be interconnected to gearbox assembly body earthing by means of 8 SWG wire using suitable ATC crimping type lugs .

**5.2.9 VIBRATION & NOISE LEVEL**

The motor vibration shall be within the limits specified in IS 12075. The noise level shall be less than 85 dB when measured at a distance of 1.5 meters from the geared motor assembly.

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**5.2.10 BEARING**

Bearings shall be constructed so as to prevent dirt and water reaching the winding. The bearing shall be designed to permit motor running in either direction of rotation. Lubricants shall be selected for prolonged storage and normal use of motors and shall contain corrosion and oxidation inhibitors. Grease shall have suitable bleeding characteristics to minimize setting. The bearing shall have a minimum life of 30,000 working hours.

**5.2.11 NAME PLATE AND DIAGRAM OF CONNECTIONS**

Each motor shall have a name plate showing all particulars as specified in IS -325 along with Design ambient temperature. The rating and name plate of motor and gear box shall be non corrosive metallic material having details of manufacturer's name, equipment, type or serial number,rating,service condition (designed),diagram plate etc.

**5.2.12 STARTING DUTY**

The motor shall be suitable for class S4 duty with 24 starts per hour and CDF of 40% in addition to above the geared motor unit shall also be capable of continuous duty. The motor on load shall smoothly accelerate with the driven equipment to rated speed even with 85% of rated voltage applied. The motor shall also run at a supply voltage of 80% of the rated voltage for 10 minutes with load connected. The motor shall be suitable for DOL starting. The starting current of the motor shall not exceed six times the rated current including tolerance if any. Motor with starting time up to 20 seconds at minimum permissible voltage during starting, the locked rotor withstand time under hot condition at the highest voltage limit shall be atleast 2.5seconds more than the starting time. Minimum number of starts in succession, under specified conditions of load with motor initially at its normal operating temperature shall be two (2) hot starts. Accelerating torque at any speed with lowest permissible starting voltage shall be atleast 10% of rated full load torque of motor.

**5.2.13 FAST BUS TRANSFER**

Motor shall be capable of withstanding the voltage and torque stresses that could be developed Due to the vector difference between the motor residual voltage and the incoming supply voltage equal to 150% of motor rated voltage during fast changeover of the supply.

**5.2.14 TEMPERATURE**

The maximum operating temperature of the motor windings under continuous full load shall be according to IS-325.

**5.2.15 GEAR UNIT**

**5.2.15.1 GEAR BOX:** The gear box shall be of helical type, robust and of integrated for intermediate case and shall be made of graded cast iron. The casing shall have provision for accommodating bearings for intermediate components. The gearbox shall be totally enclosed, weather proof and suitable for outdoor duty. The design shall be such that no water and dust shall enter into the

gearbox. If the gear motor design calls for two stage gearbox with primary gearbox and secondary gearbox, the same housed in two separate oil filled compartment with suitable isolation to one another. Shaft key extension shall be provided as shown in the drawing.

5.2.15.2 **GEAR WHEELS:** All gear wheels shall be designed and manufactured to suit the application specified in this specification.

5.2.15.3 **LUBRICATION (SPLASH TYPE):** The gears shall be splash type oil lubricated. Oil filling plug cum breather shall be fitted on top portion of the gearbox. Oil level indicator and drain plug shall be provided on the gearbox. There should not be any oil leakage from the drain plug or oil level indicator during normal operating conditions. The design of these accessories shall be subject to BHEL approval. Lubrication oil shall be supplied in a separate container. As far as possible, lubricants marketed by the Indian Oil Corporation shall be used. The variety of lubricants shall be kept to a minimum possible.

5.2.16 The unit shall be provided with eye bolts, lugs or other means to facilitate safe lifting.

5.2.17 The unit shall be so constructed as to be disassembled and reassembled with ease.

5.2.18 The unit shall be epoxy painted in matt finish. Color shall be light grey to shade 631 of IS -5 for NON NTPC projects. For NTPC projects, the colour shall be RAL 5012. For any other colours specified by NON NTPC customers, the same shall be provided as per enquiry/PO conditions/Approved drawings. Two coats of epoxy based primer and finish paint shall be applied. The painting shall be such that it should last for at least three years for the ambient conditions specified. Painting thickness shall be minimum 50 microns.

5.2.19 The output rpm shall be 2.5 rpm/ 1.1 rpm as per enquiry / PO, at rated full load speed of motor at normal power supply conditions specified in clause 4.2 above.

5.2.20 The variation in output rpm shall correspond to the variation allowed in the guaranteed slip as per IS -325.

5.2.21 The gearbox shall be of field proven design and shall be as per earlier supplies to BHEL Ranipet.

**5.2.22 MAKES OF MAJOR COMPONENTS.**

MOTOR : KEC/BBL/LHPL /CROMPTON GEAVES /ABB /SIEMENS/NGEF  
BEARING : SKF/ FAG/HMT/TATA/NTN/TORRINGTON/NBC  
CABLE GLANDS : COMET/ POWER ENGG/ BRACCO/CONTROL & SWITCHGEAR/  
SUNIL &CO/SIEMENS/QUALITY PRECISION/ARUP ENGG.  
CABLE LUGS : DOWELLS/JAINSONS

The makes of motor and various components for NTPC projects shall be subjected to NTPC/QA approval for which no additional cost implications is applicable.

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**6.0 INSPECTION AND TESTING**

6.1 Various type, routine and acceptance tests shall be conducted as specified in relevant Quality Plan (QP:E:809:REV 04). In case of new vendor, all applicable type tests as per QP shall be conducted in the presence of BHEL/ BHEL authorized inspection agency representative.

6.2 Documents to be used during inspection:

- a) Purchase order
- b) BHEL/NTPC approved Quality Plan.
- c) BHEL/NTPC approved drawings and data sheet
- d) Technical MOU between BHEL and vendor, if applicable.

**7.0 PACKING**

7.1 The geared motor shall be properly packed to avoid any damage to the equipment during transit, handling or during storage. The packing arrangement drawing shall be submitted for BHEL Approval.

7.2 The packing shall contain the following information:-

Name of the equipment, purchase order number with date, address of the delivery site, name and address of the sender, approximate weight etc.

**8.0.0 INFORMATIONS TO BE FURNISHED**

8.1.0 After placement of order, following documents shall be submitted within three weeks for approval by BHEL.

8.1.1 General Arrangement drawing of the geared motors showing terminal box, earth terminals, lifting lugs, weight, location of oil level indicator, fill plug, drain plug etc.

8.1.2 Motor data sheet as per annexure -1

8.1.3 Immediately after dispatch of geared motor, 15 copies per project, of specially prepared O&M manuals giving details on GA drawing, data sheet, transportation, handling, storage, unpacking, erection, operation and maintenance etc shall be supplied. The draft manual shall be got approved by BHEL.O&M Manuals shall also be furnished in CD ( 3 CD's) apart from hard copies.

ANNEXURE – 1  
GEARED MOTOR ASSEMBLY DATA SHEET

**I. MOTOR**

|         |  |   |   |
|---------|--|---|---|
| 01.     | Manufacturer   | : |   |
| 02.     | Type and frame size  | : |   |
| 03.     | Application  | : | Rapping mechanism of ESP                    |
| 04.     | Applicable document  | : | BHEL specification TECI: GEN: GM:<br>Rev 02 |
| 05.     | Duty cycle   | : | SI and S4 with 40% CDF                      |
| 06.     | Type of enclosure& ventilation   | : | TEFC, IC 0141                               |
| 07.     | Mounting   | : | Vertical/ Horizontal                        |
| 08.     | Location   | : | Out door                                    |
| 09.     | Rated voltage  | : | 3 phase, 415V, AC                           |
| 10.     | Rated output (KW) (Specify)  | : |   |
| 11.     | No. of phase   | : | Three                                       |
| 12.     | Frequency (Hz)   | : | 50Hz  |
| 13.     | Permissible % of variation in  |   |   |
| 13.1    | Voltage  | : | Plus or minus 10%                           |
| 13.2    | Frequency  | : | Plus or minus 5%                            |
| 13.3    | Voltage and frequency  | : | 10 %( absolute sum)                         |
| 14.0    | At rated voltage and frequency   | : |   |
| 14.1    | Full load speeds (rpm)   | : | Less than 1500 RPM(Vendor to specify)       |
| 14.2    | Full load current (amps)   | : |   |
| 14.3    | No load current (amps)   | : |   |
| 14.4    | Starting current in % of full load current   | : |   |
| 14.5    | Starting torque in % of full load torque   | : |   |
| 14.6    | Pull out torque in % of full load torque   | : | Not less than 205%(Vendor to specify)       |
| 14.7    | Minimum voltage required for starting and<br>Bringing the equipment to rated speed | : | 85%   |
| 14.8    | Minimum permissible running time with<br>Full load at 80% rated voltage            | : | 10 minutes                                  |
| 14.9    | Locked rotor withstand time at rated voltage                                       | : |   |
| 14.9.1  | Under hot condition  | : |   |
| 14.9.2  | Under cold condition   | : |   |
| 14.10   | Allowable temperature rise over an<br>Ambient of degree c.                         | : |   |
| 14.10.1 | By resistance method   | : | 70 degree C                                 |
| 14.10.2 | By thermometer method  | : |   |
| 15.     | Class of insulation  | : | F   |
| 15.1    | Temperature limited to Class B   | : |   |

---

|       |  |   |  |
|-------|--|---|--|
| 16.   | Stator winding                           | : |  |
| 16.1. | Connection during continuous running     | : | STAR   |
| 16.2  | Type and number of terminals brought out | : |  |
| 16.3  | Resistance per phase (ohms)              | : |  |
| 16.4  | Impedance per phase (ohms)               | : |  |
| 17.   | Method of starting                       | : | DOL  |
| 18.   | Power factor at                          | : |  |
| 18.1  | Full load                                | : |  |
| 18.2  | $\frac{3}{4}$ load                       | : |  |
| 18.3  | $\frac{1}{2}$ load                       | : |  |
| 18.4  | $\frac{1}{4}$ load                       | : |  |
| 19.   | Efficiency at                            | : |  |
| 19.1  | Full load                                | : |  |
| 19.2  | $\frac{3}{4}$ load                       | : |  |
| 19.3  | $\frac{1}{2}$ load                       | : |  |
| 19.4  | $\frac{1}{4}$ load                       | : |  |
| 20.   | Bearing type                             | : |  |
| 20.1  | Driving end                              | : |  |
| 20.2  | Non driving end                          | : |  |
| 21.   | Recommended lubrication                  | : |  |
| 21.1  | Specification                            | : |  |
| 21.2  | Quantity                                 | : |  |
| 21.3  | Interval of lubrication                  | : |  |
| 22.   | Rotation viewed from driving and         | : | Bi- directional  |
| 23.   | Cable entry                              | : | Bottom   |
| 24.   | Cable gland type                         | : | Double compression, brass, nickel plated.                          |
| 25.   | Cable gland suitable for cable size      | : | 3C-2.5 sq.mm = 3nos.   |
| 26.   | Cable lug quantity and size              | : | 2.5 sq.mm =3nos  |
| 27.   | Earth terminal particulars               | : | M6 bolt & nut-2no: on both motor &<br>gear unit on opposite sides. |
| 28.   | Weight of motor unit                     | : |  |

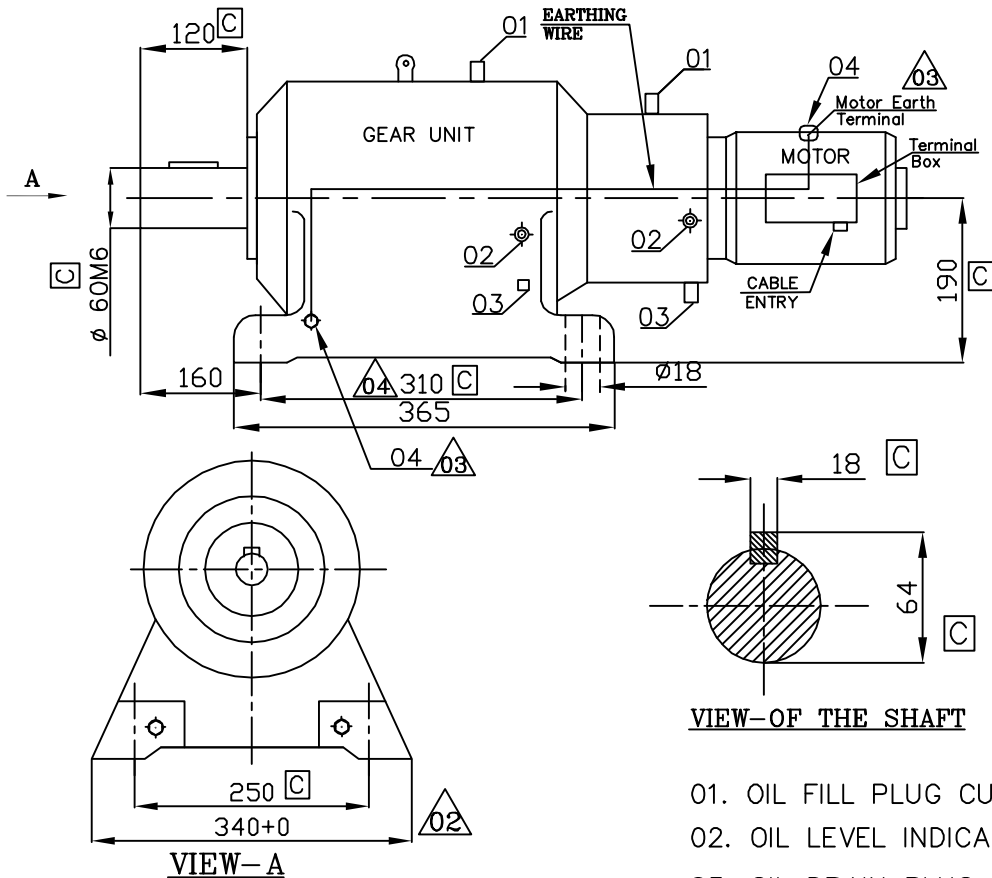
.....

**II. GEARED MOTOR ASSEMBLY**

|      |   |   |                      |
|------|---|---|----------------------|
| 1.0  | Application (GDRM/CERM/EERM)                          | : |                      |
| 1.1  | Location  | : |                      |
| 2.0  | Manufacturer  | : |                      |
| 3.0  | Model Number  | : |                      |
| 4.0  | Motor Details   | : |                      |
| 4.1  | Rated output  | : |                      |
| 4.2  | Output speed in rpm with tolerance in<br>output speed | : |                      |
| 4.3  | Full load current at rated HP & RPM                   | : |                      |
| 4.4  | Motor duty cycle                                      | : | S1 & S4 WITH 40% CDF |
| 4.5  | Motor frame size                                      | : |                      |
| 4.6  | No load current                                       | : |                      |
| 4.7  | Dimensions  | : | As per GA drawing    |
| 4.8  | Location  | : | Outdoor, Dusty.      |
| 4.9  | Mounting  | : |                      |
| 4.10 | Weight of the complete geared motor assy.             | : |                      |
| 5.0  | Lubrication oil                                       | : |                      |
| 5.1  | Specifications  | : |                      |
| 5.2  | Quantity in liters (gear box wise)                    | : |                      |
| 6.0  | Gear ratio  | : |                      |
| 7.0  | Bearings  | : |                      |
| 7.1  | Drive end (POSITION/TYPE/ MAKE/SIZE)                  | : |                      |
| 7.2  | Non drive end (POSITION/ TYPE/ MAKE/SIZE)             | : |                      |

|  |               |                 |      |  |               |                 |      |
|--|---------------|-----------------|------|--|---------------|-----------------|------|
| REV 01   | DATE 02.07.93 | ALTERED CHECKED | -SD- | REV 02   | DATE 01.09.97 | ALTERED CHECKED | -SD- |
| DRAWING RE-TRACED; CRITICAL DIMENSIONS $\square$ IDENTIFIED. |               |                 |      | THE SIGN $\square$ IN DIMENSION 340 DELETED. '+0' ADDED. |               |                 |      |

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VIEW-OF THE SHAFT

- 01. OIL FILL PLUG CUM BREATHER
- 02. OIL LEVEL INDICATOR
- 03. OIL DRAIN PLUG
- 04. EARTH TERMINAL(M6)

**NOTE**

- 01. DIMENSIONS MARKED THUS  $\square$  IN THE DRG. ARE CRITICAL AND SHALL BE MAINTAINED.
- 02. THE OTHER DIMENSIONS SHOWN ARE TENTATIVE. VENDORS SHALL SUITABLY DECIDE BASED ON THEIR DESIGN.
- 03. TYPE OF MOUNTING : HORIZONTAL FOOT MOUNTED (B3).
- 04. OIL LEVEL INDICATOR, SHOULD BE OF ALUMINIUM ALLOY (POLISHED). PVC SHOULD NOT BE USED. ASSEMBLY SHOULD BE LEAK PROOF.
- 05. GLASS (TOUGHENED) SHOULD BE TRANSPARENT. OIL LEVEL SHOULD BE VISIBLE AT NORMAL ENVIRONMENT.
- 06. OIL LEVEL INDICATOR DRAWING IS TO BE SUBMITTED ALONGWITH OTHER DRAWINGS/DATASHEET.
- 07. INSPECTION TO ENSURE LEVEL MARKING IN METALLIC OIL LEVEL INDICATOR.
- 08. COMPLETE OIL SHOULD BE DRAINED AFTER OPENING THE DRAIN PLUG. INSPECTION TO ENSURE COMPLETE OIL DRAIN RANDOMLY (QUANTUM TO BE DECIDED SUITABLY).
- 09. BREATHER SHALL BE CONNECTED WITH CASING THROUGH CHAIN BY SUITABLE ARRANGEMENT.

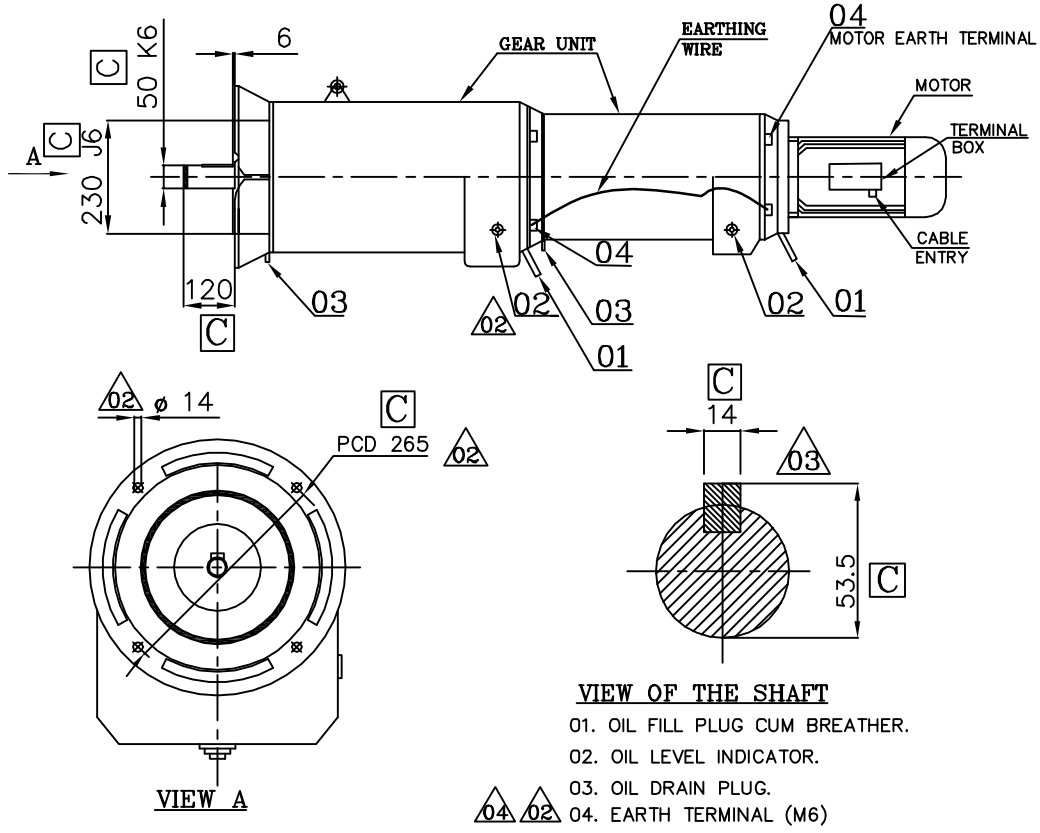
|   |               |                 |           |
|---|---------------|-----------------|-----------|
| REV 04  | DATE 25.11.14 | ALTERED CHECKED | R. Kantat |
| NOTE NO 04 TO 09 ADDED. DIMENSION 310mm INDICATED AS $\square$ EARTHING TERMINAL M12 CHANGED TO M6. |               |                 |           |
| REV 03  | DATE 15.11.07 | ALTERED CHECKED | R. Kantat |
| GENERALLY REVISED   |               |                 |           |

|                                    |                    |   |              |                        |                |      |          |              |          |            |
|------------------------------------|--------------------|---|--------------|------------------------|----------------|------|----------|--------------|----------|------------|
|                                    |                    | <b>BHARAT HEAVY ELECTRICALS LTD.</b><br>UNIT: BOILER AUXILIARIES PLANT.<br>RANIPET - 632 406. |              | DRN                    | R.VR           | SIGN | -SD-     | DATE         | 02.07.93 | NO. OF VAR |
|                                    |                    |   |              | CHD                    | S.R            |      |          | 02.07.93     |          |            |
|                                    |                    |   |              | APPD                   | S.J.P          |      |          | 02.07.93     |          |            |
| DEPT AQCS                          | GRADE OF UNTOL DIM | SCALE   | WEIGHT (KG). | REF. TO ASSY./OLD DRG. |                |      | ITEM NO. | NO. OF ITEMS |          |            |
| CODE 862                           | C / M / F          | --  | --           | --                     |                |      |          |              |          |            |
| TITLE                              |                    |   |              | CARD CODE              | DRAWING NO.    |      |          |              | REV      |            |
| STANDARD                           |                    |   |              | U 01                   | 4-00-114-26057 |      |          |              | 04       |            |
| GA OF 0.33HP X 1.1RPM GEARED MOTOR |                    |   |              |                        |                |      |          |              |          |            |

|  |               |                 |      |                   |               |                 |                    |
|--|---------------|-----------------|------|-------------------|---------------|-----------------|--------------------|
| REV 01   | DATE 02.07.93 | ALTERED CHECKED | -sd- | REV 02            | DATE 15.11.07 | ALTERED CHECKED | R. Venkat<br>S. P. |
| DRAWING RE-TRACED; CRITICAL DIMENSIONS IDENTIFIED. |               |                 |      | GENERALLY REVISED |               |                 |                    |

TECI: GEN: GM: REV 02  
PAGE 12 OF 14

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- VIEW OF THE SHAFT**
- 01. OIL FILL PLUG CUM BREATHER.
  - 02. OIL LEVEL INDICATOR.
  - 03. OIL DRAIN PLUG.
  - 04. EARTH TERMINAL (M6)

**NOTE: -**

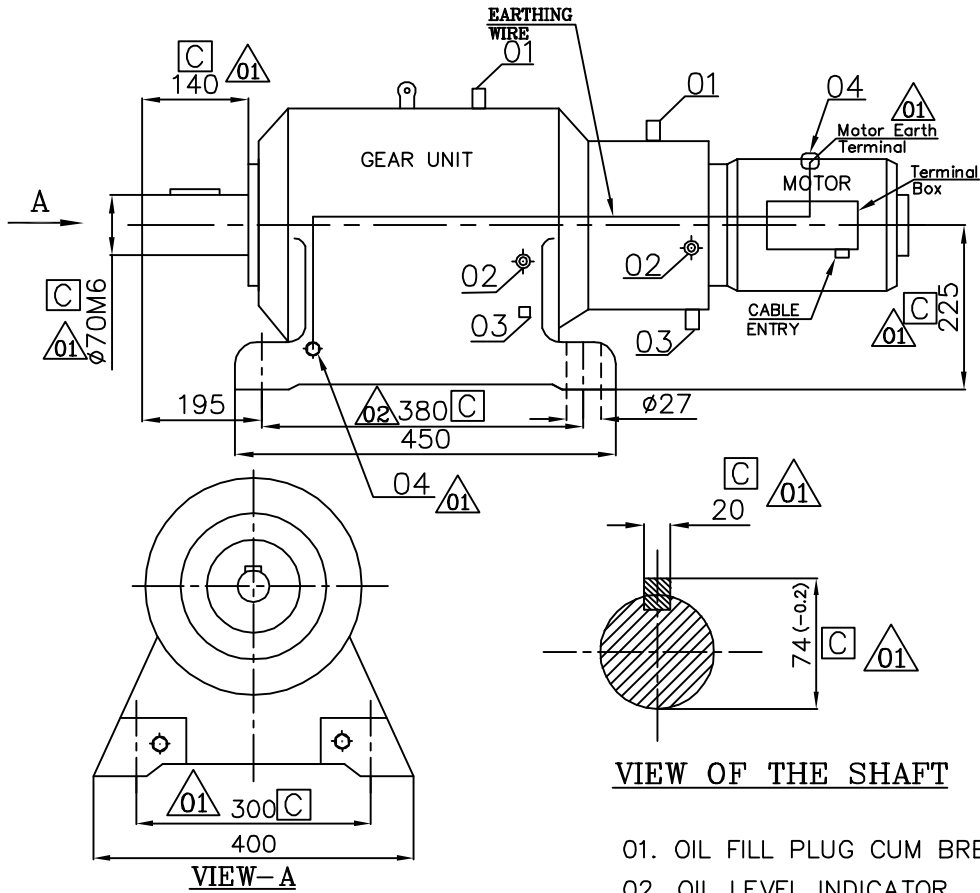
- 01. CANOPY SHALL BE PROVIDED FOR THE MOTOR WITHOUT AFFECTING THE VENTILATION, TO PROTECT FROM RAIN & THE DRG. SHALL BE SUBMITTED FOR APPROVAL.
- 02. DIMENSIONS MARKED THUS [C] IN THE DRG. ARE CRITICAL AND SHALL BE MAINTAINED.
- 03. THE OTHER DIMENSIONS SHOWN ARE TENTATIVE. VENDORS SHALL SUITABLY DECIDE BASED ON THEIR DESIGN.
- 04. TYPE OF MOUNTING : VERTICAL FLANGE MOUNTED (VI).
- 05. OIL LEVEL INDICATOR, SHOULD BE OF ALUMINIUM ALLOY (POLISHED). PVC SHOULD NOT BE USED. ASSEMBLY SHOULD BE LEAK PROOF.
- 06. GLASS (TOUGHENED) SHOULD BE TRANSPARENT. OIL LEVEL SHOULD BE VISIBLE AT NORMAL ENVIRONMENT.
- 07. OIL LEVEL INDICATOR DRAWING IS TO BE SUBMITTED ALONGWITH OTHER DRAWINGS/DATASHEET.
- 08. INSPECTION TO ENSURE LEVEL MARKING IN METALLIC OIL LEVEL INDICATOR.
- 09. COMPLETE OIL SHOULD BE DRAINED AFTER OPENING THE DRAIN PLUG. INSPECTION TO ENSURE COMPLETE OIL DRAIN RANDOMLY (QUANTUM TO BE DECIDED SUITABLY).
- 10. BREATHER SHALL BE CONNECTED WITH CASING THROUGH CHAIN BY SUITABLE ARRANGEMENT.

|  |               |                 |                    |
|--|---------------|-----------------|--------------------|
| REV 04   | DATE 25.11.14 | ALTERED CHECKED | R. Venkat<br>S. P. |
| NOTE NO 05 TO 10 ADDED. EARTHING TERMINAL M12 CHANGED TO M6. |               |                 |                    |
| REV 03   | DATE 13.03.10 | ALTERED CHECKED | Remya<br>S. P.     |
| GENERALLY REVISED  |               |                 |                    |

|   |                     |       |                |                            |               |              |
|---|---------------------|-------|----------------|----------------------------|---------------|--------------|
| <p><b>BHARAT HEAVY ELECTRICALS LTD.,</b><br/>UNIT: BOILER AUXILIARIES PLANT.<br/>RANIPET - 632 406.</p> |                     | DRN   | NAME R.VR      | SIGN -sd-                  | DATE 02.07.93 | NO. OF VAR   |
|   |                     | CHD   | S.R            | -sd-                       | 02.07.93      |              |
|   |                     | APPD  | S.J.P          | -sd-                       | 02.07.93      |              |
| DEPT AQCS   | GRADE OF UNTOL. DIM | SCALE | WEIGHT (KG).   | REF. TO ASSY./OLD DRG.     | ITEM NO.      | NO. OF ITEMS |
| CODE 862  | C / M / F           | --    | --             | --                         |               |              |
| TITLE <b>STANDARD</b><br>GA OF 0.33HP X 2.5RPM<br>GEARED MOTOR  |                     |       | CARD CODE U 01 | DRAWING NO. 4-00-114-26748 | REV 04        |              |

|                   |               |                 |                    |   |               |                 |                    |
|-------------------|---------------|-----------------|--------------------|---|---------------|-----------------|--------------------|
| REV 01            | DATE 15.11.07 | ALTERED CHECKED | R. Venkat<br>S. R. | REV 02  | DATE 25.11.14 | ALTERED CHECKED | R. Venkat<br>S. R. |
| GENERALLY REVISED |               |                 |                    | NOTE NO 04 TO 09 ADDED.<br>DIMENSION 380mm INDICATED AS [C]<br>EARTHING TERMINAL M12 CHANGED TO M6. |               |                 |                    |

TECI: GEN: GM: REV 02  
PAGE 13 OF 14



VIEW OF THE SHAFT

- 01. OIL FILL PLUG CUM BREATHER
- 02. OIL LEVEL INDICATOR
- 03. OIL DRAIN PLUG
- 04. EARTH TERMINAL(M6) 01 02

**NOTE**

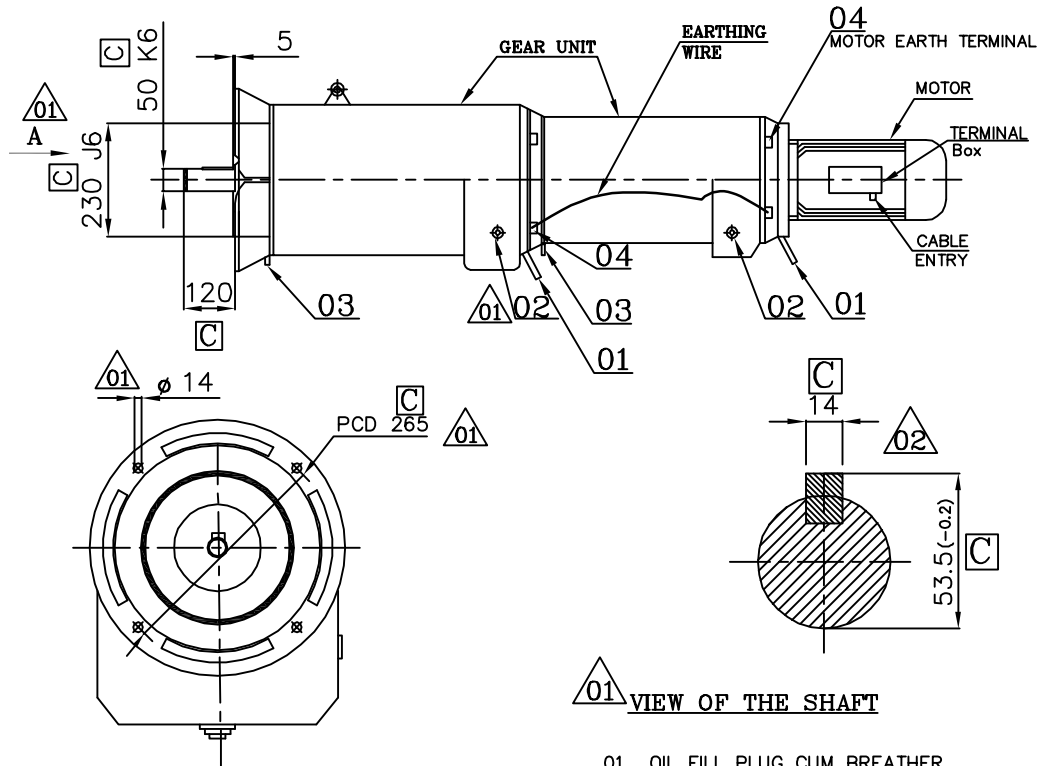
01. DIMENSIONS MARKED THUS [C] IN THE DRG. ARE CRITICAL AND SHALL BE MAINTAINED.
02. THE OTHER DIMENSIONS SHOWN ARE TENTATIVE. VENDORS SHALL SUITABLY DECIDE BASED ON THEIR DESIGN.
03. TYPE OF MOUNTING : HORIZONTAL FLANGE MOUNTED (B3).
04. OIL LEVEL INDICATOR, SHOULD BE OF ALUMINIUM ALLOY (POLISHED). PVC SHOULD NOT BE USED. ASSEMBLY SHOULD BE LEAK PROOF.
05. GLASS (TOUGHENED) SHOULD BE TRANSPARENT. OIL LEVEL SHOULD BE VISIBLE AT NORMAL ENVIRONMENT.
06. OIL LEVEL INDICATOR DRAWING IS TO BE SUBMITTED ALONGWITH OTHER DRAWINGS/ DATASHEET.
07. INSPECTION TO ENSURE LEVEL MARKING IN METALLIC OIL LEVEL INDICATOR.
08. COMPLETE OIL SHOULD BE DRAINED AFTER OPENING THE DRAIN PLUG. INSPECTION TO ENSURE COMPLETE OIL DRAIN RANDOMLY (QUANTUM TO BE DECIDED SUITABLY).
09. BREATHER SHALL BE CONNECTED WITH CASING THROUGH CHAIN BY SUITABLE ARRANGEMENT.

|   |           |      |       |              |                        |          |          |        |     |
|---|-----------|------|-------|--------------|------------------------|----------|----------|--------|-----|
| <p><b>BHARAT HEAVY ELECTRICALS LTD.,</b><br/>UNIT: BOILER AUXILIARIES PLANT.<br/>RANIPET - 632 406.</p> |           | DRN  | S.S   | SIGN         | -sd-                   | DATE     | 01.08.05 | NO. OF | VAR |
|   |           | CHD  | S.R   | SIGN         | -sd-                   | DATE     | 01.08.05 |        |     |
|   |           | APPD | S.R   | SIGN         | -sd-                   | DATE     | 01.08.05 |        |     |
| DEPT  | GRADE OF  |      | SCALE | WEIGHT (KG). | REF. TO ASSY./OLD DRG. | ITEM NO. | NO. OF   |        |     |
| AQCS  | UNTOL DIM |      | --    | --           | --                     |          | ITEMS    |        |     |
| CODE  | C / M / F |      |       |              |                        |          |          |        |     |
| 862   |           |      |       |              |                        |          |          |        |     |
| TITLE   |           |      |       | CARD CODE    | DRAWING NO.            |          |          | REV    |     |
| STANDARD  |           |      |       | U 01         | 4-00-114-30734         |          |          | 02     |     |
| GA OF 0.5HP X 1.1RPM  |           |      |       |              |                        |          |          |        |     |
| GEARED MOTOR  |           |      |       |              |                        |          |          |        |     |

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|                   |               |                 |                    |                   |               |                 |                |
|-------------------|---------------|-----------------|--------------------|-------------------|---------------|-----------------|----------------|
| REV 01            | DATE 15.11.07 | ALTERED CHECKED | R. Venkat<br>S. R. | REV 02            | DATE 13.03.10 | ALTERED CHECKED | Remya<br>S. R. |
| GENERALLY REVISED |               |                 |                    | GENERALLY REVISED |               |                 |                |

TECI: GEN: GM: REV 02  
PAGE 14 OF 14



01 VIEW OF THE SHAFT

- 01. OIL FILL PLUG CUM BREATHER.
- 02. OIL LEVEL INDICATOR.
- 03. OIL DRAIN PLUG.
- 04. EARTH TERMINAL (M6)

**NOTE: -**

- 01. CANOPY SHALL BE PROVIDED FOR THE MOTOR WITHOUT AFFECTING THE VENTILATION TO PROTECT FROM RAIN & THE DRG. SHALL BE SUBMITTED FOR APPROVAL.
- 02. DIMENSIONS MARKED THUS [C] IN THE DRG. ARE CRITICAL AND SHALL BE MAINTAINED.
- 03. THE OTHER DIMENSIONS SHOWN ARE TENTATIVE. VENDORS SHALL SUITABLY DECIDE BASED ON THEIR DESIGN.
- 04. TYPE OF MOUNTING : VERTICAL FLANGE MOUNTED (V).
- 05. OIL LEVEL INDICATOR, SHOULD BE OF ALUMINIUM ALLOY (POLISHED). PVC SHOULD NOT BE USED. ASSEMBLY SHOULD BE LEAK PROOF.
- 06. GLASS (TOUGHENED) SHOULD BE TRANSPARENT. OIL LEVEL SHOULD BE VISIBLE AT NORMAL ENVIRONMENT.
- 07. OIL LEVEL INDICATOR DRAWING IS TO BE SUBMITTED ALONGWITH OTHER DRAWINGS/DATASHEET.
- 08. INSPECTION TO ENSURE LEVEL MARKING IN METALLIC OIL LEVEL INDICATOR.
- 09. COMPLETE OIL SHOULD BE DRAINED AFTER OPENING THE DRAIN PLUG. INSPECTION TO ENSURE COMPLETE OIL DRAIN RANDOMLY (QUANTUM TO BE DECIDED SUITABLY).
- 10. BREATHER SHALL BE CONNECTED WITH CASING THROUGH CHAIN BY SUITABLE ARRANGEMENT.

|        |               |                 |                    |
|--------|---------------|-----------------|--------------------|
| REV 03 | DATE 25.11.14 | ALTERED CHECKED | R. Venkat<br>S. R. |
|--------|---------------|-----------------|--------------------|

NOTE NO 05 TO 10 ADDED.  
EARTHING TERMINAL M12 CHANGED TO M6.




**BHARAT HEAVY ELECTRICALS LTD.,**  
UNIT: BOILER AUXILIARIES PLANT.  
RANIPET - 632 406.

| DRN  | NAME | SIGN | DATE     | NO. OF VAR |
|------|------|------|----------|------------|
| S.S  |      | -sd- | 01.08.05 |            |
| CHD  | S.R  | -sd- | 01.08.05 |            |
| APPD | S.R  | -sd- | 01.08.05 |            |

|  |                    |       |              |                        |                |              |
|--|--------------------|-------|--------------|------------------------|----------------|--------------|
| DEPT AQCS  | GRADE OF UNTOL DIM | SCALE | WEIGHT (KG). | REF. TO ASSY./OLD DRG. | ITEM NO.       | NO. OF ITEMS |
| 862  | C / M / F          | --    | --           | --                     |                |              |
| TITLE  |                    |       |              | CARD CODE              | DRAWING NO.    | REV          |
| STANDARD<br>GA OF 0.5HP X 2.5RPM<br>GEARED MOTOR |                    |       |              | U 01                   | 4-00-114-30735 | 03           |

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|   |   |                  |
|---|---|------------------|
| <br><b>RANIPET</b>   | <b>STANDARD QUALITY PLAN FOR GEARED MOTOR FOR ESP APPLICATION</b> |                  |
| REF.NO.   | REVISION NO.  | EFFECTIVE DATE   |
| QP : E:809  | 06  | 22 04 2014       |
| <p>TITLE : <b>GEARED MOTOR FOR ESP APPLICATION</b></p> <p style="text-align: right;">SIGNATURE</p> <p>PREPARED BY : CH.ANILSINGH / Asst.Engineer/QA <span style="float: right; border: 1px solid black; padding: 2px;"><i>Ch. Anil Singh</i></span></p> <p>REVIEWED BY : C.Srinivasan/SM/QA <span style="float: right; border: 1px solid black; padding: 2px;"><i>C. Srinivasan</i><br/>25/04/2014</span></p> <p>Approved by : J.Ravisankar/SDGM/BE,QA&amp; QC(Proc) <span style="float: right; border: 1px solid black; padding: 2px;"><i>J. Ravisankar</i></span></p> |   |                  |
| ISSUED & CONTROLLED BY :: QUALITY ASSURANCE<br>BHEL, RANIPET – 632 406  |   |                  |
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| ISSUED TO :   | CONTROL COPY NO.  |                  |
| PAGE : 1 of 9   |   |                  |




RANIPET

## STANDARD QUALITY PLAN FOR GEARED MOTOR FOR ESP APPLICATION

|            |              |                |
|------------|--------------|----------------|
| REF.NO.    | REVISION NO. | EFFECTIVE DATE |
| QP : E:809 | 06           | 22 04 2014     |

### RECORD OF REVISION

| REV.NO | Effective Date | Remarks  |
|--------|----------------|--|
| 00     | 15 08 1996     | Original Issue   |
| 01     | 05 02 1996     | Revised to include points vide letter BAP/QA/97/2817 Dt 14 10 97 and other feedback from vendors.  |
| 02     | 22 10 2000     | Revised based on the CTQ meeting held on 28 09 2000 wrt load testing in once in a year   |
| 03     | 27 07 2011     | Revised based on TMQW Audit findings on SL.NO.0 (1) wrt Load test .i.e once in a year  |
| 04     | 28 02 2010     | General review and to include M/s LHPL material details.   |
| 05     | 28 07 2011     | Revised based on Load test duration is increased   |
| 06     | 22 04 2014     | Check on Oil level Indicator and marking included .<br><br>As part of functional check ,load test on one sample / type in each purchase order (in fully assembled condition) included. |

| SI no  |  | Component & operation  | Characteristics | Class   | Type of Check | Quantum of Check | Reference Documents | Acceptance Norms | Format Of Records | Agency | Remarks |  |  |
|--|--|--|-----------------|---|---------------|------------------|---------------------|------------------|-------------------|--------|---------|--|--|
| 1  |  | 2  | 3               | 4   | 5             | 6                | 7                   | 8                | 9                 | 10     | 11      |  |  |
| <br><b>Ranipet</b> |  | <b>MANUFACTURER'S NAME &amp; ADDRESS</b><br>M/S BHEL / BAP / RANIPET<br>TAMIL NADU-632 406 |                 | <b>ITEM/SUB SYSTEM:STANDARD QUALITY PLAN FOR GEARED MOTOR</b> |               |                  |                     |                  |                   |        |         | Doc. Ref. No<br>Rev. No<br>Date<br>Page No | QP:E:809<br>06<br>22.04.2014<br>3 of 9 |

| <b>A IMPORTANT BOUGHT OUT MATERIAL</b> |  |                                      |       |                                 |          |                 |  |          |        |        |  |
|--|--|--------------------------------------|-------|---------------------------------|----------|-----------------|--|----------|--------|--------|--|
| 1                                      | Bearing                                  | Make , Model No                      | Major | Visual verification of type No  | 100 %    | Spec'n          | As per Col 7   | R        | V      | V      |  |
| 2                                      | Gasket (if applicable)                   | Dimension                            | Major | Measurement                     | 5 %      | -do-            | Sub vendor catalogue                                     | R        | V      | V      |  |
| 3                                      | Oil Seal                                 | Dimension                            | Major | Measurement                     | 5%       | -do-            | Sub vendor catalogue                                     | R        | V      | V      |  |
| 4.                                     | Castings gear case                       | 1. Tensile strength<br>2. Hardness   | Major | Review of TC<br>Mechanical test | 5 %      | -do-            | IS 210<br>Min grade FG 200<br>IS 210<br>Min grade FG 200 | CC<br>CC | V<br>V | V<br>V | CC :<br>Compliance Certificate   |
| 5.                                     | <b>Gears and Pinions , Pinion shaft#</b> |                                      |       |                                 |          |                 |  |          |        |        |  |
|  | A. Raw Material                          | 1. Chemical Composition (C, Cr , Mn) | Major | Chemical analysis               | Sampling | As per drg & TC | As per drg TC  | TC       | V      | V      | #LHPI<br>Gear / Pinion/<br>Gear shaft<br>20MnCr5<br>(as per DIN 17210)<br>#NAW<br>SAE 8620 |

**LEGEND**

"R" - Incoming Material Logbook/TC/Inspection report  
 "PS/Spec - BHEL Purchase Specification  
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Ranipet

**MANUFACTURER'S NAME & ADDRESS**  
M/S BHEL / BAP / RANIPET  
TAMIL NADU-632 406

## STANDARD QUALITY PLAN

### ITEM/SUB SYSTEM: STANDARD QUALITY PLAN FOR GEARED MOTOR

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| SI no | Component & operation | Characteristics | Class | Type of Check | Quantum of Check | Reference Documents | Acceptance Norms | Format Of Records | Agency | Remarks |
|-------|-----------------------|-----------------|-------|---------------|------------------|---------------------|------------------|-------------------|--------|---------|
| 1     |                       | 3               | 4     | 5             | 6                | 7                   | 8                | 9                 | 10     | 11      |

|   |                   |                       |       |                 |                               |                            |                            |                            |   |  |
|---|-------------------|-----------------------|-------|-----------------|-------------------------------|----------------------------|----------------------------|----------------------------|---|--|
|   |                   | 2. Internal Soundness | Major | UT              | 100 % for diameter > 63 mm    | As per drg & TC            | As per drg & TC            | TC                         | V | #PBL<br>Gear / Pinion/<br>Gear shaft<br>20MnCr5 or<br>16 MnCr5<br>(as per DIN<br>17210)              |
|   |                   | 3. Tensile Strength   | Major | Mechanical Test | Each test per heat / HT batch | As per mat'l specification | As per mat'l specification | TC                         | V | #KEC<br>Gear / Pinion/<br>Gear shaft<br>080M40 (EN8) of BS 970 / 1983 or 2C40/ 3C40 (EN10083-1/1991) |
| B | <b>IN PROCESS</b> | 1. Dimension          | Major | Measurement     | One / Setting                 | Drawing                    | Drawing                    | Observation sheet / Record | P |  |
|   |                   | 2. NDE                | Major | Visual          | 100%                          | Drawing                    | Drawing                    | Observation sheet / Record | P |  |

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## STANDARD QUALITY PLAN

### ITEM/SUB SYSTEM: STANDARD QUALITY PLAN FOR GEARED MOTOR

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| SI no | Component & operation | Characteristics | Class | Type of Check | Quantum of Check | Reference Documents | Acceptance Norms | Format Of Records | Agency | Remarks |
|-------|-----------------------|-----------------|-------|---------------|------------------|---------------------|------------------|-------------------|--------|---------|
| 1     | 2                     | 3               | 4     | 5             | 6                | 7                   | 8                | 9                 | 10     | 11      |

|   |                   |                                       |       |                                 |   |  |  |                                  |        |  |
|---|-------------------|---------------------------------------|-------|---------------------------------|---|--|--|----------------------------------|--------|--|
| C | HEAT TREATMENT    | 1. Hardness<br>2. Case Depth          | Major | Mechanical Test<br>Measurement  | 100%<br>1 piece /charge                                   | Drawing<br>Drawing   | Drawing<br>Drawing   | Observation sheet / Record<br>CC | P<br>V | ** Output shaft<br>LHPL<br>EN8 for 0.5 HP - 1.1 RPM<br>EN24 for 0.33 HP/0.5 HP - 2.5 RPM<br>0.33HP - 1.1 RPM |
| 6 | OUTPUT SHAFT (**) |                                       |       |                                 |   |  |  |                                  |        |  |
| A | RAW MATERIAL      | 1. Chemical Composition<br>2. Tensile | Major | Chemical analysis<br>Mechanical | 1 in each heat / HT batch<br>Each test per heat/ HT batch | As per drawing & Material spec'n<br>As per drawing & Material spec'n | As per drawing & Material spec'n<br>As per drawing & Material spec'n | Supplier's TC<br>Supplier's TC   | V<br>V | NAW 1C45 (EN 10083), 2C45 (DIN17200) or C45 (N) of IS 1570<br>PBL 080M40 (En8) of BS 970 /1983               |

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# STANDARD QUALITY PLAN

## ITEM/SUB SYSTEM: STANDARD QUALITY PLAN FOR GEARED MOTOR

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**MANUFACTURER'S NAME & ADDRESS**  
 M/S BHEL / BAP / RANIPET  
 TAMIL NADU-632 406




| SI no | Component & operation | Characteristics | Class | Type of Check | Quantum of Check | Reference Documents | Acceptance Norms | Format Of Records | Agency | Remarks |
|-------|-----------------------|-----------------|-------|---------------|------------------|---------------------|------------------|-------------------|--------|---------|
| 1     | 2                     | 3               | 4     | 5             | 6                | 7                   | 8                | 9                 | 10     | 11      |

|   |  |                                    |       |             |                              |                                  |                                  |        |   |  |
|---|--|------------------------------------|-------|-------------|------------------------------|----------------------------------|----------------------------------|--------|---|--|
|   |  | 3. Hardness                        | Major | Mechanical  | Each test per heat/ HT batch | As per drawing & Material spec'n | As per drawing & Material spec'n | CC     | V | KEC 080M40(EN8) of BS970 2C40/3C40 of EN10083-1/1991 |
|   |  | 4. Internal Soundness              | Major | UT          | 100 % for dia > 63 mm        | As per drawing & Material spec   | As per drawing & Material spec'n | CC     | V |  |
| B | <b>IN PROCESS</b>  | 1. Dimension                       | Major | Measurement | One / Setting                | Drawing                          | Drawing                          | Record | P |  |
|   |  | 2. NDE                             | Major | Visual      | One / Setting                | Drawing                          | Drawing                          | Record | P |  |
| 7 | <b>Electric Motor ( KEC, BBL, LHP, CGL, ABB and SIEMENS make )</b> | 1. Verification of make and rating | Major | Visual      | 10 % of sample               | As per spec                      | As per spec                      | TC     | P |  |
|   |  | 2. Dimension                       | Major | Measurement | One/ Lot                     | catalogue                        | Drawing                          | TC     | P |  |

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| <br>Ranipet |  | <b>MANUFACTURER'S NAME &amp; ADDRESS</b><br>M/S BHEL / BAP / RANIPET<br>TAMIL NADU-632 406 |  | <b>STANDARD QUALITY PLAN</b><br>ITEM/SUB SYSTEM:STANDARD QUALITY PLAN<br>FOR GEARED MOTOR |                           |                              |                                 | Doc. Ref. No<br>QP:E:809     |                               |                     |                      |
|---|--|--|--|---|---------------------------|------------------------------|---------------------------------|------------------------------|-------------------------------|---------------------|----------------------|
| Component & operation<br><b>2</b>   |  | Characteristics<br><b>3</b>  |  | Class<br><b>4</b>   | Type of Check<br><b>5</b> | Quantum of Check<br><b>6</b> | Reference Documents<br><b>7</b> | Acceptance Norms<br><b>8</b> | Format Of Records<br><b>9</b> | Agency<br><b>10</b> | Remarks<br><b>11</b> |
| SI no<br><b>1</b>   |  |  |  |   |                           |                              |                                 |                              |                               |                     |                      |


|          |                                       |   |        |             |  |                                  |                                  |    |   |   |   |
|----------|---------------------------------------|---|--------|-------------|--|----------------------------------|----------------------------------|----|---|---|---|
| <b>8</b> | <b>Final assembly Functional test</b> | 3. Type test & Routine test. Type test includes Degree of protection test and vibration test. | Major  | Measurement | One no of each type                        | IS 325                           | Specification                    | TC | V | V | The valid type test report for identical design shall be submitted. The validity shall be five years from the date of Purchase order. Other wise vendor to conduct the type test in the presence of BHEL/TPIA.. |
|          |                                       |   | Major  | Measurement | AQL-4% Table 1 & 2A of IS 2500 Part-1 2000 | Drawing & Purchase specification | Drawing & Purchase specification | TC | P | W | The sample size shall be Minimum 10% of the lot or as per sampling plan indicated in the column 6 and which ever is greater.  |
|          |                                       |   | - do - | - do -      | - do -                                     | - do -                           | - do -                           | TC | P | W | <b>At No load</b>   |

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# STANDARD QUALITY PLAN

|  |  |  |  |  |  |                          |  |                          |  |                        |  |
|--|--|--|--|--|--|--------------------------|--|--------------------------|--|------------------------|--|
| <br><b>Ranipet</b> |  | <b>MANUFACTURER'S NAME &amp; ADDRESS</b><br>M/S BHEL / BAP / RANIPET<br>TAMIL NADU-632 406 |  | <b>ITEM/SUB SYSTEM: STANDARD QUALITY PLAN FOR GEARED MOTOR</b> |  |                          |  | Doc. Ref. No<br>QP:E:809 |  |                        |  |
|  |  | Component & operation<br>2   |  | Characteristics<br>3   |  | Reference Documents<br>7 |  | Acceptance Norms<br>8    |  | Format Of Records<br>9 |  |
| SI no<br>1   |  | Class<br>4   |  | Type of Check<br>5   |  | Quantum of Check<br>6    |  | Date<br>22 .04.2014      |  | Agency<br>10           |  |
| Remarks<br>11  |  | Page No<br>9 of 9  |  | Rev. No<br>06  |  | Remarks<br>11            |  | Agency<br>10             |  | Remarks<br>11          |  |

|   |          |        |       |       |      |   |   |   |   |
|---|----------|--------|-------|-------|------|---|---|---|---|
| 9 | Painting | Visual | Major | 100 % | -do- | - | V | V | order preferably in first offer lot for inspection. |
|---|----------|--------|-------|-------|------|---|---|---|---|

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