

1-93-171-05223

DRAWING NO.

ALL DIMENSIONS ARE IN MILLIMETERS

NOTES:-

1. DESIGN VALIDATION, MATERIAL, MANUFACTURING & EXAMINATION SHALL BE AS PER APPLICABLE BHEL SPECIFICATION BHE: 3800: 700MWe: D157: 001/LATEST REVISION AND PC-M-965/REV-00.
2. MATERIAL DESIGN, FABRICATION EXAMINATION AND TESTING ETC., SHALL BE AS PER ASME SEC III SUB SECTION NF, CLASS-I SUPPORTS. FURTHER THEY SHALL MEET RELEVANT PROCEDURE APPROVED BY NPCIL.
3. DETAIL DIMENSIONS & DESIGN SHALL BE PROVIDED BY THE SUPPLIER WITH AXIAL LOAD CAPACITY OF 422 TONNES FOR SPHERICAL WASHER ASSEMBLY.
4. THE COMPONENT SHALL BE SUPPLIED AS CLOSE TO THE FINISHED SHAPE AS POSSIBLE.
5. EASILY REMOVABLE RUST PREVENTIVE COATING SHALL BE APPLIED DURING SHIPPING TO ENSURE SEA-WORTHINESS AND FOR STORAGE IN TROPICAL CONDITIONS.
6. AXIS OF BOTH TOP & BOTTOM PART OF SPHERICAL WASHER ASSEMBLY SET SHALL BE CONCENTRIC WITHIN 0.2
7. ALL SHARP EDGES SHALL BE ROUNDED OFF.
8. BRACKETED DIMENSIONS ARE FOR REFERENCE ONLY.
9. MATERIAL:

i) SPHERICAL WASHER TOP : 817M40 (EN24)/EQUIVALENT OR SUPERIOR

ii) SPHERICAL WASHER BOTTOM : 817M40 (EN24) / 34CrNiMo6/ EQUIVALENT (OR) SUPERIOR

10. APPROXIMATE WEIGHT:

i) SPHERICAL WASHER TOP : 48 kg

ii) SPHERICAL WASHER BOTTOM : 61 kg

11. SPHERICAL WASHER SHALL BE SUPPLIED AS A SELF LUBRICATING TYPE STANDARD ITEM SUITABLE FOR FOLLOWING LOAD

|              |                             |
|--------------|-----------------------------|
| CONDITIONS : | DESIGN/LEVEL-A : 192 TONNES |
|              | LEVEL-B : 280 TONNES        |
|              | LEVEL-C : 340 TONNES        |
|              | LEVEL-D : 422 TONNES        |

12. SPHERICAL WASHER ASSEMBLY SHALL ENSURE SMOOTH ROTATION OF HANGER ROD TO ALLOW DISPLACEMENT OF SG BOTTOM IN BOTH HORIZONTAL DIRECTIONS. DISPLACEMENTS AT SG BOTTOM SUPPORT LUG UNDER VARIOUS OPERATION CONDITIONS ARE AS FOLLOWS:

| CONDITION      | DISPLACEMENT (mm) |              | (*) - FOR DIRECTION, REFER DRG. No. 1-93-171-05208/LATEST REV. |
|----------------|-------------------|--------------|----------------------------------------------------------------|
|                | EAST-WEST *       | NORTH-SOUTH* |                                                                |
| DESIGN/LEVEL-A | ±10               | ±10          |                                                                |
| LEVEL-B        | ±15               | ±15          |                                                                |
| LEVEL-C        | ±20               | ±20          |                                                                |
| LEVEL-D        | ±20               | ±20          |                                                                |

13. ENVIRONMENTAL CONDITIONS:

- i) TEMPERATURE:

SPHERICAL WASHER SHALL BE IN CONTACT WITH SLEEVE (ITEM-08, REF. 1-93-171-05208 FOR ASSEMBLY DETAILS) WHICH IS IN CONTACT WITH SG LUG (~ TEMPERATURE 200°C) AT AN AMBIENT TEMPERATURE OF 80° C DURING NORMAL OPERATION, AMBIENT TEMPERATURE DURING ACCIDENTAL CONDITION SHALL PEAK TO 175°C WITHIN ~30 SECONDS AND REDUCE TO 80°C WITHIN APPROX. 3 HOURS TIME.
- ii) RADIATION:

IT SHALL BE DESIGNED TO WITHSTAND GAMMA AND NEUTRON RADIATION ACCUMULATED DOSE OF 20 MRADS OVER 40 YEARS WITHOUT DEGRADATION IN PERFORMANCE.
- iii) HUMIDITY : 100% (MAX)

SPHERICAL WASHER SHALL DESIGNED FOR 40 YEARS LIFE WITHOUT MAINTENANCE AND FOR OPERATION WITHIN THE RATED LOAD, ENVIRONMENTAL CONDITIONS AND ASSEMBLY DETAILS SPECIFIED.

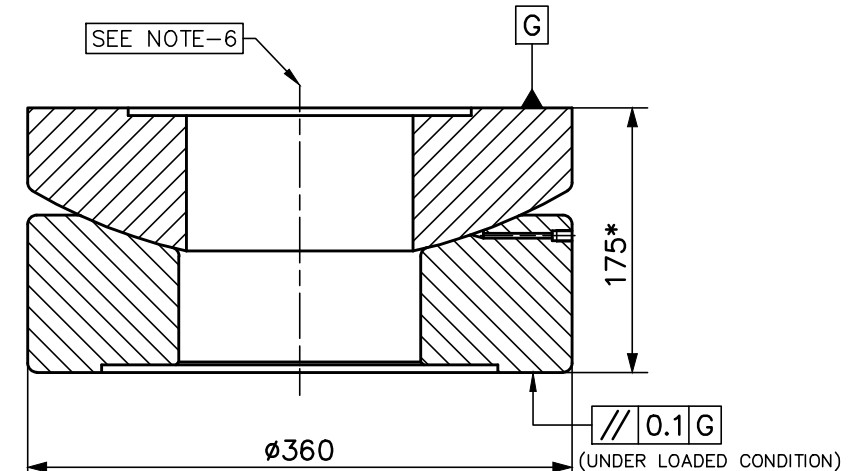
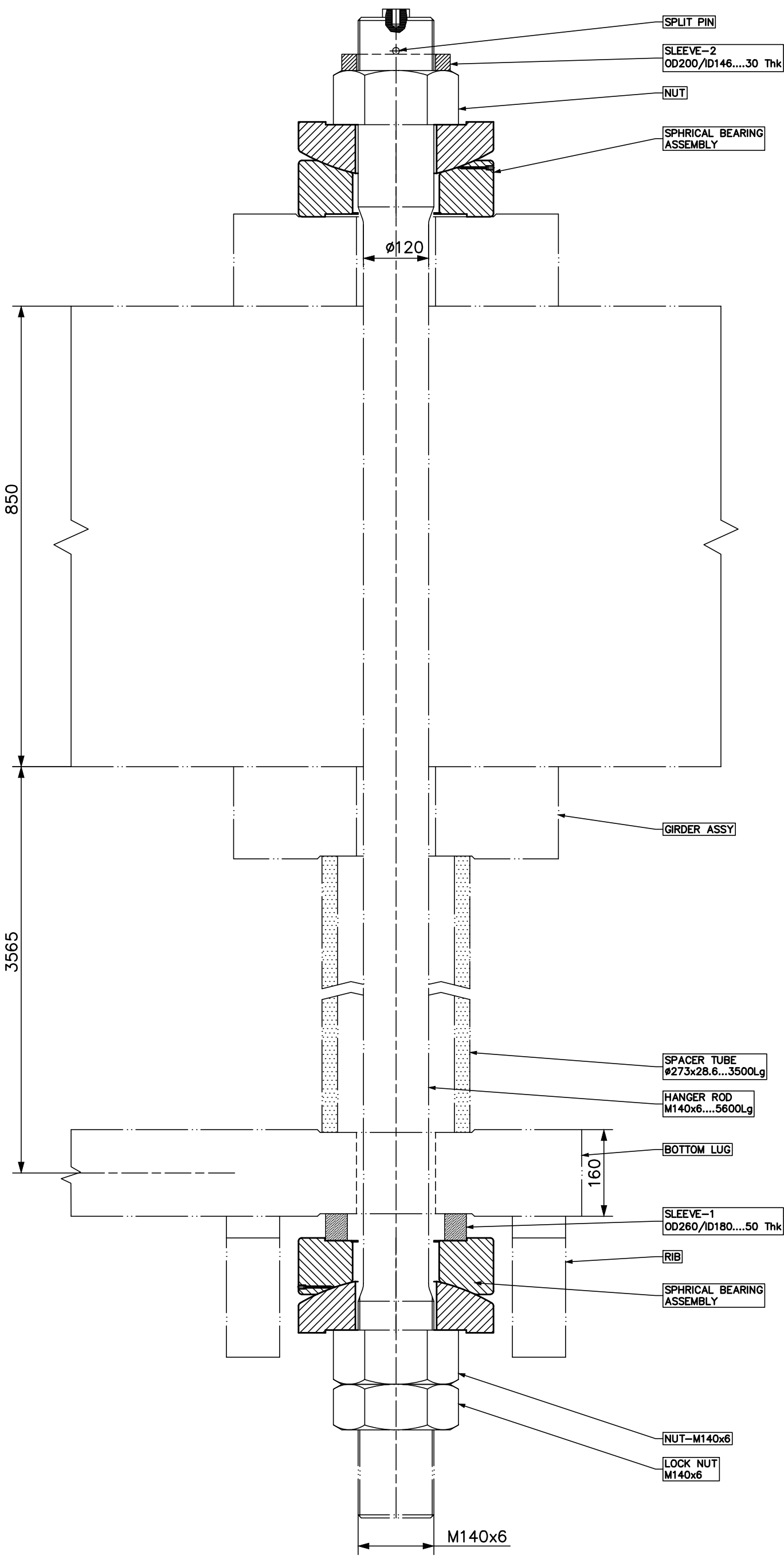
14. SIZE AND DETAILS OF SPHERICAL WASHERS SPECIFIED IN DRAWING ARE INDICATIVE. HOWEVER, DETAILS OF STANDARD SPHERICAL WASHER SHALL BE AS CLOSED AS POSSIBLE TO THE PROVIDED DIMENSIONS.
15. THE MATCHING COMPONENTS SHALL BE MODIFIED IF REQUIRED, BASED ON THE FINAL DIMENSIONS OF THIS COMPONENT SUBJECT TO NPCIL APPROVAL.

REFER DRG. NO. 1-93-171-05208

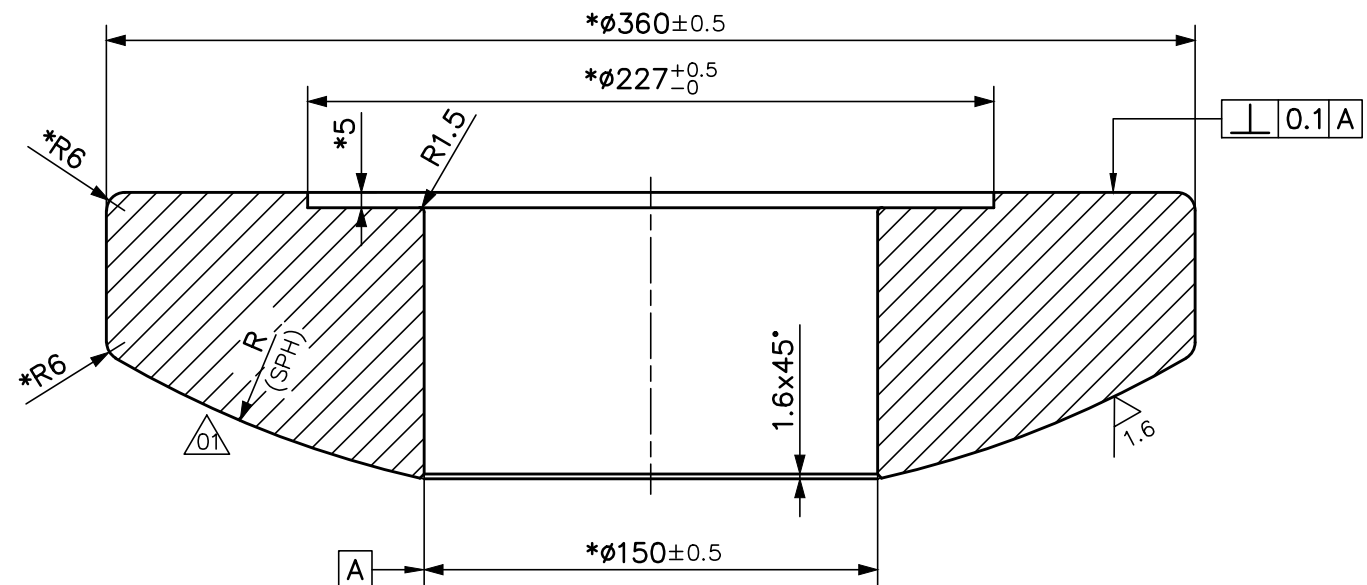
FOR VERTICAL SUPPORT ASSEMBLY PARTS

| TOLERANCE IF NOT SPECIFIED SHALL BE AS BELOW (REFER IS:2102-m) (FOR MACHINING)            |                           |                        |                                             |        |                        |
|-------------------------------------------------------------------------------------------|---------------------------|------------------------|---------------------------------------------|--------|------------------------|
| GENERAL TOLERANCES FOR FABRICATION                                                        |                           |                        | LINEAR                                      |        |                        |
| FDR LINEAR                                                                                | ± 1.5                     |                        | 0.5 TO 3                                    | ±0.1   | 400 TO 1000 ±0.8       |
| FDR ANGLES                                                                                | ± 1°                      |                        | 3 TO 6                                      | ±0.1   | 1000 TO 2000 ±1.2      |
| FDR MACHINING                                                                             | IS2102-m                  |                        | 6 TO 30                                     | ±0.2   | 2000 TO 4000 ±2.0      |
| FDR WELDING                                                                               | DIN EN ISO 13920 :1996-11 |                        | 30 TO 120                                   | ±0.3   | 120 TO 400 ±1.0        |
|                                                                                           |                           |                        | 120 TO 400                                  | ±0.5   | OVER 400 ± 5°          |
| REV                                                                                       | DATE                      | ALTERED :              | REV                                         | DATE   | ALTERED :              |
| 02                                                                                        | 280120                    | CHD&APPD : [Signature] | 01                                          | 091119 | CHD&APPD : [Signature] |
| AXIAL LOAD CAPACITY CHANGED FROM 450 TO 422 TONNES IN NOTE-03 BASED ON CUSTOMER COMMENTS. |                           |                        | DRAWING REVISED BASED ON CUSTOMER COMMENTS. |        |                        |

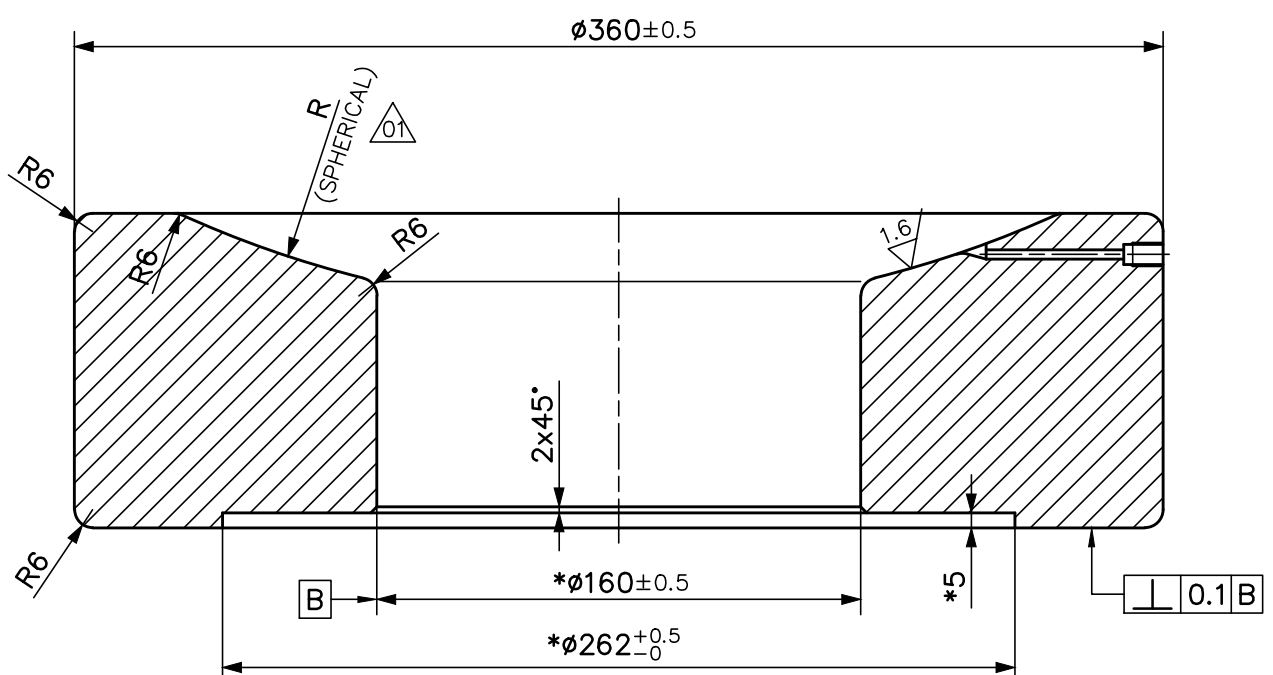
|                                                                                       |                                  |                                                                   |             |
|---------------------------------------------------------------------------------------|----------------------------------|-------------------------------------------------------------------|-------------|
| TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT                                           |                                  | 700MWe Steam Generator W.O.No.D157 TO D160-001-1-93-171-GHAVP-1&2 |             |
|  | Bharat Heavy Electricals Ltd     |                                                                   | DRN         |
|                                                                                       | UNIT: HIGH PRESSURE BOILER PLANT |                                                                   | CHD         |
|                                                                                       | TIRUCHIRAPALLI - 620014          |                                                                   | APPD        |
| DEPT                                                                                  | NC                               | GRADE OF UNTRL DIM                                                | SCALE       |
| CODE                                                                                  | 150                              | C/M/F                                                             | WEIGHT (Kg) |
| TITLE                                                                                 |                                  | CARD CODE                                                         | REV         |
| SPHERICAL BEARING ASSEMBLY                                                            |                                  | U 01                                                              | 02          |



SPHERICAL BEARING ASSY



TOP SPHERICAL WASHER



BOTTOM SPHERICAL WASHER