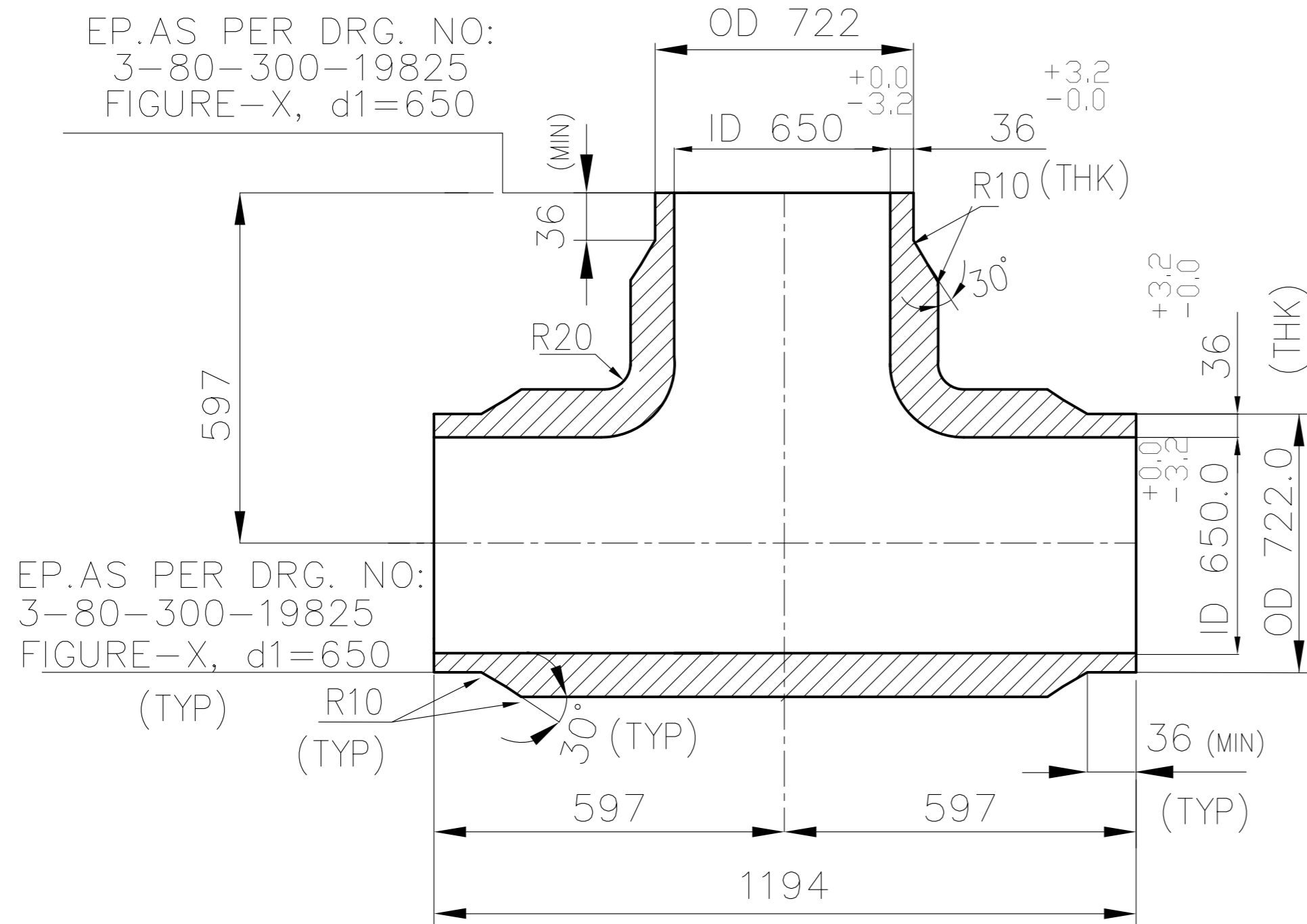
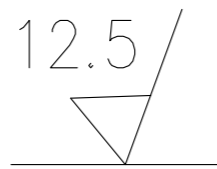


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**3-80-310-32303**

DRAWING No



**NOTES :-**

01. DESIGN PRESSURE : 68 kg/sq.cm.(g)
02. DESIGN TEMPERATURE : 601° C
03. ALL DIMENSIONS ARE FINISHED DIMENSIONS.
04. MANUFACTURING, INSPECTION AND TESTING SHALL BE AS PER IBR, ASME B16.9 AND SA234.
05. FITTING TO COMPLY WITH ASME B16.9 AND DIMENSIONS ARE AS PER THIS DRAWING.
06. FITTING SPECIFICATION SA182F91 CAN ALSO BE USED INPLACE OF SA234WP91
08. FOLLOW TDG:102 (LATEST REVISION)
09. WEIGHT GIVEN IN TITLE BLOCK IS INDICATIVE ONLY. ACTUAL WEIGHT TO BE FURNISHED BY FITTING SUPPLIER.
10. CONSTRUCTION SHALL BE SEAMLESS
11. AVERAGE INSIDE DIAMETER ON FITTING BODY TO GUARANTEE FLOW AREA MIN 90% OF THE CIRCULATION AREA OF THE CONNECTING PIPE

|          |                          |                |                                |   |               |
|----------|--------------------------|----------------|--------------------------------|---|---------------|
|          | BW EQUAL TEE<br>ID650X36 | 3-80-310-32303 | 92 505 119 0000<br>SA 234 WP91 | A | 1300,000<br>1 |
| ITEM NO. | DESCRIPTION              | DRAWING NO.    | MATERIAL CODE                  | A | UNIT WT.      |
|          |                          |                | MATERIAL SPEC.                 | C | QTY.          |

TYPE OF PRODUCT  
OR NAME OF  
CUSTOMER/PROJECT

|  |   |      |              |      |          |                |
|--|---|------|--------------|------|----------|----------------|
|  | BHARAT HEAVY ELECTRICALS LTD.,<br>PIPING CENTRE,<br>CHENNAI 600 017 | DRN  | NAME         | SIGN | DATE     | NO OF<br>ITEMS |
|  |   | CHD  | I.BISWAS     |      | 05.02.16 |                |
|  |   | APPD | S.RAMAMURTHY |      | 05.02.16 |                |

|           |      |        |
|-----------|------|--------|
| REV<br>01 | DATE | ALTD : |
|           |      | APPD : |

|       |                                    |  |        |              |                       |             |
|-------|------------------------------------|--|--------|--------------|-----------------------|-------------|
| DEPT. | GRADE OF<br>UN TOL. DIM            |  | SCALE  | WEIGHT (Kg). | BHEL PO REF.NO:       | ITEM<br>No. |
| CODE  | C/M/F                              |  | N.T.S. | 1300.000     |                       |             |
| TITLE | <b>BW EQUAL TEE<br/>(ID650X36)</b> |  |        | CARD<br>CODE | DRAWING No.           | REV         |
|       |                                    |  |        | U 01         | <b>3-80-310-32303</b> | <b>00</b>   |

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|     |      |              |
|-----|------|--------------|
| REV | DATE | ALTERED :    |
| 01  |      | CHD & APPD : |

**NOTES:**

- 1) FOLLOW TDC: AS APPLICABLE
- 2) ALL DIMENSIONS ARE FINISHED DIMENSIONS
- 3) DESIGN, MANUFACTURING, INSPECTION, TOLERANCES AND TESTING SHALL BE AS PER IBR, ASME B16.9 & SA234
- 4) CONSTRUCTION SHALL BE SEAMLESS
- 5) MATERIAL SPECIFICATION SHALL BE SA234WP91
- 6) CONNECTING PIPE SIZE ID650X36
- 7) AVERAGE INSIDE DIAMETER ON FITTING BODY TO GUARANTEE FLOW AREA MIN 90% OF THE CIRCULATION AREA OF THE CONNECTING PIPE

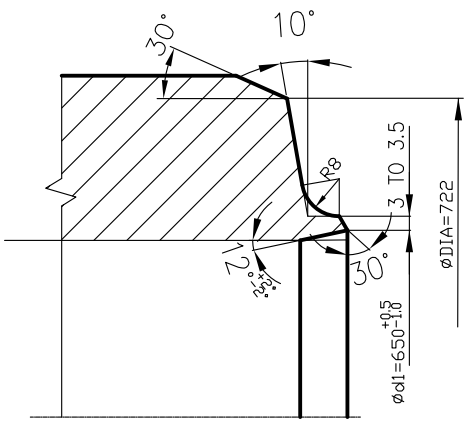
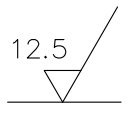
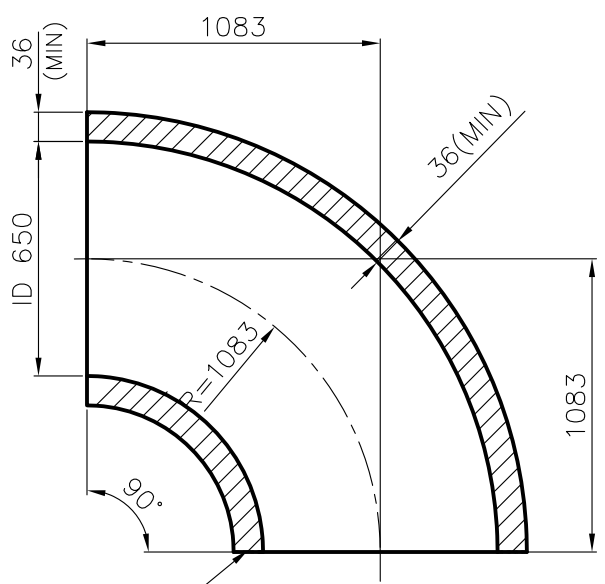


FIGURE-Xf



REF FIGURE-Xf  
(TYP)

|         |                               |                 |                |             |               |
|---------|-------------------------------|-----------------|----------------|-------------|---------------|
| -       | BW LR 90DEG ELBOW<br>ID650X36 | 92 504 108 0000 | A              | 1020        | 000           |
|         |                               |                 |                | SA 234 WP91 |               |
| VAR No. | DESCRIPTION                   | STD             | MATERIAL CODE  | A/C/P       | UNIT          |
|         |                               |                 | MATERIAL SPECN |             | UNIT WT. (KG) |
|         |                               |                 |                |             | QUANTITY      |



**BHARAT HEAVY ELECTRICALS LIMITED**  
PIPING CENTRE  
CHENNAI 600 017

|      | NAME   | SIGNATURE | DATE       |
|------|--------|-----------|------------|
| DRN  | DINESH | —sd—      | 28.01.2016 |
| CHD  | SRM    | —sd—      | 28.01.2016 |
| APPD | KVR    | —sd—      | 28.01.2016 |

|      |                          |            |       |             |                       |
|------|--------------------------|------------|-------|-------------|-----------------------|
| DEPT | ALL DIMENSIONS ARE IN MM | PROJECTION | SCALE | WEIGHT (Kg) | REF TO ASSY / OLD DWG |
| CODE |                          |            | N.T.S |             | —                     |

|                                      |                       |     |
|--------------------------------------|-----------------------|-----|
| TITLE                                | DRAWING NO :          | REV |
| <b>BW LR 90DEG ELBOW</b><br>ID650X36 | <b>4-80-312-79253</b> | 00  |

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|     |      |          |
|-----|------|----------|
| REV | DATE | ALTERED  |
| 01  |      | APPROVED |

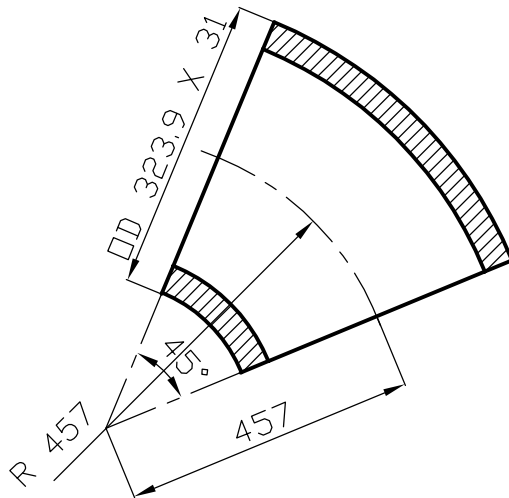
ALL DIMENSIONS ARE IN MILLIMETRES

DESIGN PRESSURE AT 540°C : 198.5 Kg/sq.cm(g)

RAW MATL SPECN.: SA 335 P91 (A)

FITTING SPECN. : SA 234 WP91 (A)

FINISHED FITTING MATERIAL CODE:



**NOTES: -**

01. ALL DIMENSIONS ARE FINISHED DIMENSIONS.
02. FOR TOLERANCES REFER STANDARD DRG.4-80-301-26192.
03. MANUFACTURING, INSPECTION AND TESTING SHALL BE AS PER IBR, ASME B16.9 & SA234.
04. EDGE PREPARATION DETAIL SHALL BE AS PER DRAWING No: 3-80-300-19825 FIG X d1=266
05. O.D AT ANY SECTION SHALL NOT VARY MORE THAN 3mm(320.9 to 326.9)
06. ACTUAL THICKNESS AT ANY POINT SHALL NOT VARY MORE THAN 12.5% OF THE NOMINAL THICKNESS. (27.13 to 34.88)
07. ALTERNATE RAW MATERIAL CAN ALSO BE USED.

|             |               |                 |   |          |
|-------------|---------------|-----------------|---|----------|
| PIPE        | OD 323.9 x 38 | 15 958 114 3550 | A | 203.336  |
|             | L=759         | SA 335 P91      |   |          |
| DESCRIPTION |               | RAW MATL. CODE  | A | UNIT WT. |
|             |               | MATL. SPECN.    | C | QTY      |

**STANDARD**




**BHARAT HEAVY ELECTRICALS LTD**

PIPING CENTRE  
CHENNAI 600 017

|      | NAME        | SIGN | DATE     |
|------|-------------|------|----------|
| DRN  | M.C.SEKARAN |      | 12-06-08 |
| CHD  | C.SARAVANAN |      | 12-06-08 |
| APPD | S.JAYAKUMAR |      | 12-06-08 |

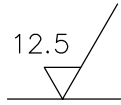
|       |  |  |           |                |                        |
|-------|--|--|-----------|----------------|------------------------|
| DEPT  | GRADE OF UNTOL. DIM                                |  | SCALE     | WEIGHT (KG).   | REF. TO ASSY./OLD DRG. |
| CODE  | C / M / F  |  |           | 203.336        |                        |
| TITLE | <b>BW LR 45 DEG. ELBOW</b><br><b>OD 323.9 x 31</b> |  | CARD CODE | DRAWING NO.    | REV                    |
|       |  |  | U 01      | 4-80-999-93094 | 00                     |

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|   |          |                       |
|---|----------|-----------------------|
| REV   | DATE     | ALTERED : POONGKODI.V |
| 01  | 06.01.12 | CHD & APPD:C.V.NATHAN |
| d1 VALUE REVISED.<br>REVISION MARKED AS  |          |                       |


**NOTES:**

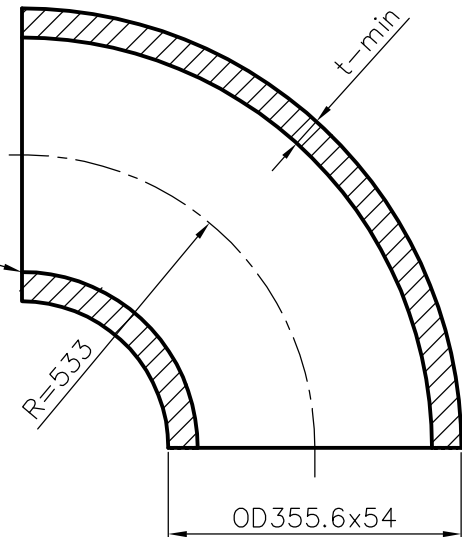
- 1) DESIGN PRESSURE : 270.7 Kg/Cm<sup>2</sup>(g)
- 2) DESIGN TEMPERATURE : 568 °C
- 3) WORKING MEDIUM : STEAM
- 4) FOLLOW TDC No. : TDG-102 (LATEST REVISION)
- 5) ALL DIMENSIONS ARE FINISHED DIMENSIONS
- 6) DESIGN, MANUFACTURING, INSPECTION, TOLERANCES AND TESTING SHALL BE AS PER IBR ANSI B16.9 AND SA 234.
- 7) FLOW AREA SHALL NOT BE LESS THAN 80% OF NOMINAL FLOW AREA.
- 8) t-min SHALL NOT BE LESS THAN 0.875 TIMES OF THE WALL THICKNESS (i.e 0.875 x THICKNESS )



**\*\*** d1=247.6mm IS APPLICABLE FOR KRISHNAPATNAM ONLY.  
d1=250.1mm FOR OTHER PROJECTS.



EDGE PREPARATION  
AS PER DRG NO:  
3-80-300-19825  
FIGURE-X, d1= \*\*  
(TYP) 



|         |                                 |                 |                |         |             |               |
|---------|---------------------------------|-----------------|----------------|---------|-------------|---------------|
| -       | BW LR 90DEG ELBOW<br>OD355.6x54 | 92 524 975 0000 | A              | 396 000 |             |               |
|         |                                 |                 |                |         | SA 234 WP91 | 1             |
| VAR No. | DESCRIPTION                     | STD             | MATERIAL CODE  | A/C/P   | UNIT        | UNIT WT. (KG) |
|         |                                 |                 | MATERIAL SPECN |         |             | QUANTITY      |



**BHARAT HEAVY ELECTRICALS LIMITED**  
PIPING CENTRE  
CHENNAI 600 017

|      | NAME         | SIGNATURE | DATE       |
|------|--------------|-----------|------------|
| DRN  | N.MEGANATHAN | —sd—      | 23/03/2010 |
| CHD  | N.MEGANATHAN | —sd—      | 24/03/2010 |
| APPD | K.V.RAMANI   | —sd—      | 25/03/2010 |

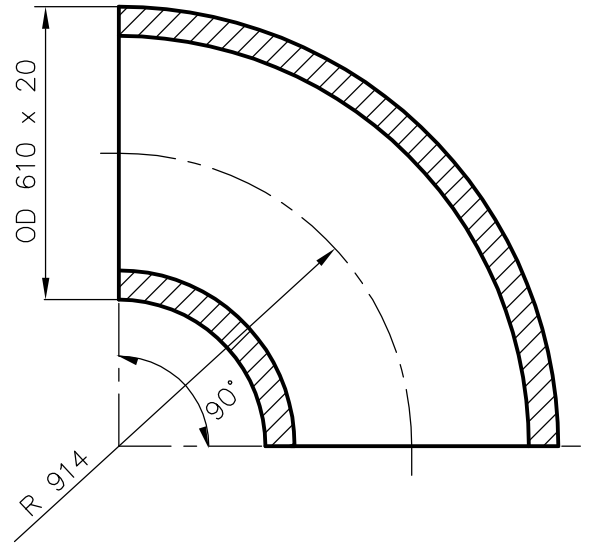
|      |                          |  |                |                        |                            |
|------|--------------------------|--|----------------|------------------------|----------------------------|
| DEPT | ALL DIMENSIONS ARE IN MM | PROJECTION  | SCALE<br>N.T.S | WEIGHT (Kg)<br>396.000 | REF TO ASSY / OLD DWG<br>— |
|------|--------------------------|--|----------------|------------------------|----------------------------|

|   |                                       |                  |
|---|---------------------------------------|------------------|
| TITLE<br><b>ASME B16.9 BW LR 90DEG ELBOW<br/>OD355.6x54</b> | DRAWING NO :<br><b>4-80-304-70628</b> | REV<br><b>01</b> |
|---|---------------------------------------|------------------|

ALL DIMENSIONS ARE IN MILLIMETRES

|     |      |          |
|-----|------|----------|
| REV | DATE | ALTERED  |
| 01  |      | APPROVED |

DESIGN PRESSURE AT 573 °C : 49.4 Kg/sq.cm(g)  
 RAW MATL SPECN.: SA 335 P91 (A).  
 FITTING SPECN. : SA 234 WP91 (A).  
 FINISHED FITTING MATERIAL CODE: 92 524 995 0000  
 WEIGHT OF FINISHED FITTING: 418 kg.



**NOTES: -**

01. ALL DIMENSIONS ARE FINISHED DIMENSIONS.
02. FOR TOLERANCES REFER STANDARD DRG.4-80-301-26192.
03. MANUFACTURING, INSPECTION AND TESTING SHALL BE AS PER IBR, ASME B16.9 & SA234.
04. EDGE PREPARATION DETAIL SHALL BE AS PER DRAWING No: 3-80-300-19825 STYLE X, d1=572.6
05. O.D AT ANY SECTION SHALL BE WITHIN 606.0 TO 614.0 mm.
06. ACTUAL THICKNESS AT ANY POINT SHALL NOT VARY MORE THAN 12.5% OF THE NOMINAL THICKNESS (17.5mm to 22.5mm).
07. ALTERNATE RAW MATERIAL CAN ALSO BE USED.

**STANDARD**

|                            |                 |   |          |
|----------------------------|-----------------|---|----------|
| PIPE OD 610 x 25<br>L=1836 | 15 958 124 5150 | A | 534.254  |
|                            | SA 335 P91      |   |          |
| DESCRIPTION                | RAW MATL. CODE  | A | UNIT WT. |
|                            | MATL. SPECN.    | C | QTY      |



**BHARAT HEAVY ELECTRICALS LTD**  
 PIPING CENTRE  
 CHENNAI 600 017

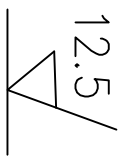
|      | NAME             | SIGN | DATE     |
|------|------------------|------|----------|
| DRN  | BISWAS/SVRK      |      | 15.06.10 |
| CHD  | AP.MADHAVANKUTTY |      | 15.06.10 |
| APPD | S.JAYAKUMAR      |      | 15.06.10 |

|  |                    |  |       |              |                        |           |
|--|--------------------|--|-------|--------------|------------------------|-----------|
| DEPT   | GRADE OF UNTOL DIM |  | SCALE | WEIGHT (KG). | REF. TO ASSY./OLD DRG. |           |
| CODE   | C / M / F          |  |       | 534.254      |                        |           |
| TITLE  |                    |  |       | CARD CODE    | DRAWING NO.            | REV       |
| <b>BW LR 90 DEG. ELBOW<br/>                 OD 610x20 WP91</b> |                    |  |       | U 01         | <b>4-80-999-93256</b>  | <b>00</b> |

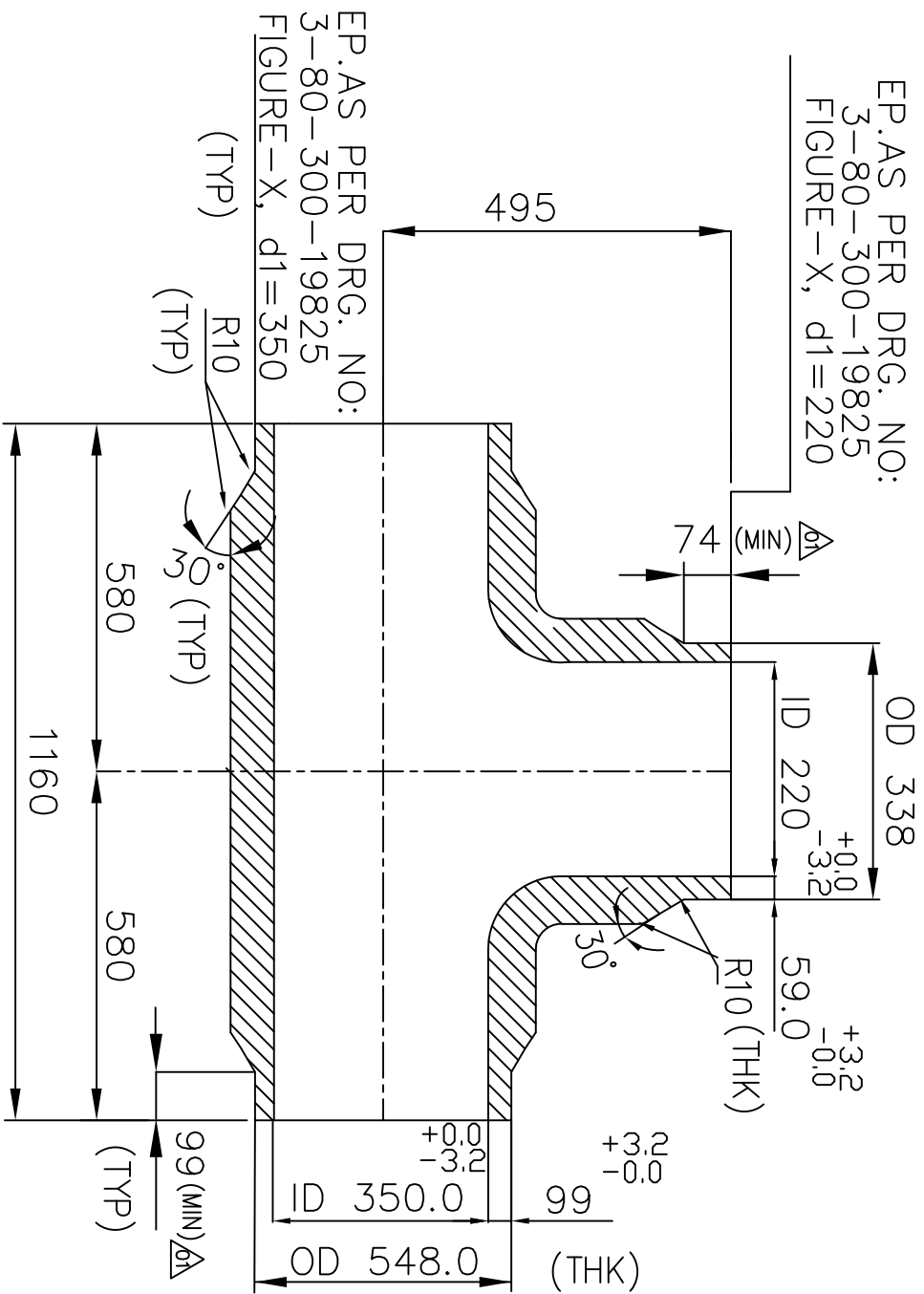
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**L14123-103-08-3**

ON DRAWING



EP.AS PER DRG. NO:  
3-80-300-19825  
FIGURE-X, d1=220



**NOTES :-**

01. DESIGN PRESSURE : 285.8 kg/sq.cm.(g)
02. DESIGN TEMPERATURE : 601° C
03. ALL DIMENSIONS ARE FINISHED DIMENSIONS.
04. DESIGN,MANUFACTURING, INSPECTION AND TESTING SHALL BE AS PER IBR, ASME B16.9 AND SA234.
05. FITTING TO COMPLY WITH ASME B16.9 AND DIMENSIONS ARE AS PER THIS DRAWING.
06. FITTING SPECIFICATION SA182F91 CAN ALSO BE USED INPLACE OF SA234WP91
07. FOLLOW TDG:102 (LATEST REVISION)
08. WEIGHT GIVEN IN TITL BLOCK IS INDICATIVE ONLY. ACTUAL WEIGHT TO BE FURNISHED BY FITTING SUPPLIER.
09. CONSTRUCTION SHALL BE SEAMLESS
10. CONNECTING PIPE SIZE - ID350x99/ID220x59
11. AVERAGE INSIDE DIAMETER ON FITTING BODY TO GUARANTEE FLOW AREA MIN 90% OF THE CIRCULATION AREA OF THE CONNECTING PIPE

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|                                |          |        |       |
|--------------------------------|----------|--------|-------|
| REV                            | DATE     | ALTD : | M.R.K |
| 01                             | 09.11.15 | APPD : | S.R.M |
| MATERIAL SPECIFICATION ALTERED |          |        |       |

| ITEM NO. | DESCRIPTION       | DRAWING NO.    | ITEM NO. | MATERIAL CODE | UNIT WT. | QTY.     |
|----------|-------------------|----------------|----------|---------------|----------|----------|
|          | BW UNEQUAL TEE    | 3-80-301-32141 |          |               |          |          |
|          | ID350X99/ID220X59 |                |          |               |          |          |
|          |                   |                | 92       | 505 037 0000  |          | 1311.230 |
|          |                   |                |          | SA 234 WP91   | A        | 1        |

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT



BHARAT HEAVY ELECTRICALS LTD.,  
PIPING CENTRE,  
CHENNAI 600 017

|      |              |      |      |          |             |
|------|--------------|------|------|----------|-------------|
| DRN  | M.R.KRISHNA  | NAME | SIGN | DATE     | NO OF ITEMS |
| CHD  | I.D.B.RAJU   |      |      | 30.04.15 |             |
| APPD | S.RAMAMURTHY |      |      | 30.04.15 |             |

|       |                               |        |              |                 |          |
|-------|-------------------------------|--------|--------------|-----------------|----------|
| DEPT. | GRADE OF UN TOL. DIM          | SCALE  | WEIGHT (Kg). | BHEL PO REF.NO. | ITEM No. |
|       | C/M/F                         | N.T.S. | 1311.230     |                 |          |
| TITLE | BW UNEQUAL TEE                |        | CARD CODE    | DRAWING No.     | REV      |
|       | (ID350x99/ID220x59-SA234WP91) |        | U 01         | 3-80-301-32141  | 01       |