

Project Name :

**MULTIPURPOSE/BATCH DISTILLATION SYSTEM**

Client Name :

Client Project Number :

Document Title :

**PIPING MTO**

Document Number :

**1402-PI-MT-002**

SAMPLE

|     |      |      |      |            |                    |             |        |
|-----|------|------|------|------------|--------------------|-------------|--------|
|     |      |      |      |            |                    |             |        |
|     |      |      |      |            |                    |             |        |
|     |      |      |      |            |                    |             |        |
|     |      |      |      |            |                    |             |        |
| 0   | MSS  | ASU  | PVP  | 03.07.2015 | ISSUED FOR ENQUIRY | FILE NAME : | Rev. 0 |
| Rev | PRPD | CHKD | APPD | DATE       | ALTERATION         |             |        |

## **Basis of Valve MTO Estimation**

- 1 Piping MTO is based on following input documents - (Scanned copy of all is attached)  
Process PID - 231438.01.31C Sheet 1 of 1 Rev 02  
Process PID - 231439.01.31C Sheet 1 of 1 Rev 02  
PID for Cooling Tower Package - 231438&39.01.42C Sheet 1 of 1 Rev 00  
PID for Steam Heater Package - 231438&39.01.42C Sheet 1 of 1 Rev 00  
Piping Material Specification Rev 0
- 2 All components shown on PID have been accounted.
- 3 Piping Components for equipment mounted instruments are not included.
- 4 Hydro test vent and drain is not part of this MTO.
- 5 Equipment vent/drain valves, not shown on PID, are not accounted in this MTO.
- 6 Control valve is considered as 150# & size as mentioned on PID.
- 7 Piping MTO provided is exact and does not include any contingency/allowances of any kind.
- 8 Strainers are considered as SW- upto 40 NB & Flanged - 50 NB & above
- 9 All components are extracted from PID's and only pipe & elbows are estimated from equipment layout.
- 10 MTO contains all components shown on PID although they are outside B/L i.e. structural building of 8m x 7m.
- 11 MTO contains Pipes and Elbows only within B/L i.e. structural building of 8m x 7m.
- 12 Vessel mounted PG, TI/TG, LSL/LSH are not part of this MTO.
- 13 Services terminated at B/L are considered in grid A-B & 3, 1-2 & A, 1-2 & C of equipment layout as informed By Fenix.
- 14 PSV related MTO is as per size mentioned on PID.
- 15 Extra length bolts for wafer type butterfly valves are not considered in this MTO.

SAMPLE

|     |      |      |      |            |                    |             |        |
|-----|------|------|------|------------|--------------------|-------------|--------|
|     |      |      |      |            |                    |             |        |
|     |      |      |      |            |                    |             |        |
|     |      |      |      |            |                    |             |        |
| 0   | MSS  | ASU  | PVP  | 03.07.2015 | ISSUED FOR ENQUIRY | FILE NAME : | Rev. 0 |
| Rev | PRPD | CHKD | APPD | DATE       | ALTERATION         |             |        |

|         |             |             | PIPING MTO |          |                                                                      |      |      |         |           |     |
|---------|-------------|-------------|------------|----------|----------------------------------------------------------------------|------|------|---------|-----------|-----|
| SR. No. | PIPING SPEC | DESCRIPTION | SIZE1 NB   | SIZE2 NB | MATERIAL DESCRIPTION                                                 | 1438 | 1439 | UTILITY | TOTAL QTY | UOM |
|         |             |             |            |          |                                                                      | QTY  | QTY  | QTY     |           |     |
| 1       | A1G         | PIPE        | 15         |          | SCH 10S, ASME B 36.19, A 312 TP 316, BEVEL END, SEAMLESS             | 6    | 5    | 0       | 11        | M   |
| 2       | A1G         | PIPE        | 25         |          | SCH 10S, ASME B 36.19, A 312 TP 316, BEVEL END, SEAMLESS             | 48   | 64   | 0       | 112       | M   |
| 3       | A1G         | PIPE        | 40         |          | SCH 10S, ASME B 36.19, A 312 TP 316, BEVEL END, SEAMLESS             | 58   | 82   | 0       | 140       | M   |
| 4       | A1G         | PIPE        | 50         |          | SCH 5S, ASME B 36.19, A 312 TP 316, BEVEL END, SEAMLESS              | 75   | 24   | 0       | 99        | M   |
| 5       | A1G         | PIPE        | 65         |          | SCH 5S, ASME B 36.19, A 312 TP 316, BEVEL END, SEAMLESS              | 1    | 1    | 0       | 2         | M   |
| 6       | A1G         | PIPE        | 80         |          | SCH 5S, ASME B 36.19, A 312 TP 316, BEVEL END, SEAMLESS              | 56   | 54   | 0       | 110       | M   |
| 7       | A1G         | PIPE        | 100        |          | SCH 5S, ASME B 36.19, A 312 TP 316, BEVEL END, SEAMLESS              | 17   | 19   | 0       | 36        | M   |
| 8       | A1G         | PIPE        | 150        |          | SCH 5S, ASME B 36.19, A 312 TP 316, BEVEL END, SEAMLESS              | 8    | 13   | 0       | 21        | M   |
| 9       | A1G         | PIPE        | 200        |          | SCH 5S, ASME B 36.19, A 312 TP 316, BEVEL END, EFW, DOUBLE BUTT SEAM | 30   | 0    | 0       | 30        | M   |
| 10      | A1G         | PIPE        | 500        |          | SCH 5S, ASME B 36.19, A 312 TP 316, BEVEL END, EFW, DOUBLE BUTT SEAM | 0    | 29   | 0       | 29        | M   |
| 11      | B1G         | PIPE        | 15         |          | SCH 10S, ASME B 36.19, A 312 TP 304, BEVEL END, SEAMLESS             | 2    | 0    | 0       | 2         | M   |
| 12      | B1G         | PIPE        | 25         |          | SCH 10S, ASME B 36.19, A 312 TP 304, BEVEL END, SEAMLESS             | 0    | 36   | 0       | 36        | M   |
| 13      | B1G         | PIPE        | 50         |          | SCH 5S, ASME B 36.19, A 312 TP 304, BEVEL END, SEAMLESS              | 7    | 2    | 0       | 9         | M   |
| 14      | B1G         | PIPE        | 80         |          | SCH 5S, ASME B 36.19, A 312 TP 304, BEVEL END, SEAMLESS              | 0    | 25   | 0       | 25        | M   |
| 15      | C1G         | PIPE        | 15         |          | HEAVY, IS 1239 HEAVY, IS 1239, PLAIN END, SEAMLESS                   | 0    | 0    | 15      | 15        | M   |
| 16      | C1G         | PIPE        | 25         |          | HEAVY, IS 1239 HEAVY, IS 1239, PLAIN END, SEAMLESS                   | 0    | 0    | 74      | 74        | M   |
| 17      | C1G         | PIPE        | 40         |          | HEAVY, IS 1239 HEAVY, IS 1239, PLAIN END, SEAMLESS                   | 0    | 0    | 8       | 8         | M   |
| 18      | C1G         | PIPE        | 50         |          | HEAVY, IS 1239 HEAVY, IS 1239, BEVEL END, ERW                        | 0    | 0    | 36      | 36        | M   |
| 19      | C1G         | PIPE        | 80         |          | HEAVY, IS 1239 HEAVY, IS 1239, BEVEL END, ERW                        | 0    | 0    | 208     | 208       | M   |
| 20      | C1G         | PIPE        | 100        |          | HEAVY, IS 1239 HEAVY, IS 1239, BEVEL END, ERW                        | 0    | 0    | 30      | 30        | M   |
| 21      | C1G         | PIPE        | 150        |          | HEAVY, IS 1239 HEAVY, IS 1239, BEVEL END, ERW                        | 0    | 0    | 56      | 56        | M   |
| 22      | C1G         | PIPE        | 250        |          | IS 3589 IS 3589, IS 3589-Fe 410, BEVEL END, ERW                      | 0    | 0    | 41      | 41        | M   |
| 23      | D1G         | PIPE        | 15         |          | SCH 40, ASME B 36.10, A 106 GR B(IBR), PLAIN END, SEAMLESS           | 0    | 0    | 4       | 4         | M   |
| 24      | D1G         | PIPE        | 40         |          | SCH 40, ASME B 36.10, A 106 GR B(IBR), PLAIN END, SEAMLESS           | 0    | 0    | 2       | 2         | M   |
| 25      | D1G         | PIPE        | 50         |          | SCH 10, ASME B 36.10, A 106 GR B(IBR), BEVEL END, SEAMLESS           | 0    | 0    | 95      | 95        | M   |
| 26      | D1G         | PIPE        | 80         |          | SCH 10, ASME B 36.10, A 106 GR B(IBR), BEVEL END, SEAMLESS           | 0    | 0    | 79      | 79        | M   |
| 27      | D1G         | PIPE        | 100        |          | SCH 10, ASME B 36.10, A 106 GR B(IBR), BEVEL END, SEAMLESS           | 0    | 0    | 45      | 45        | M   |
| 28      | D1G         | PIPE        | 150        |          | SCH 10, ASME B 36.10, A 106 GR B(IBR), BEVEL END, SEAMLESS           | 0    | 0    | 30      | 30        | M   |
| 29      | D1G         | PIPE        | 200        |          | SCH 10, ASME B 36.10, A 106 GR B(IBR), BEVEL END, SEAMLESS           | 0    | 0    | 26      | 26        | M   |

NOTE:

1)For Bolts : Size 1 (Bolt Size in Inches) x Size 2 (Bolt Length in mm)

|         |             |               | PIPING MTO |          |                                                                                   |      |      |         |           |      |
|---------|-------------|---------------|------------|----------|-----------------------------------------------------------------------------------|------|------|---------|-----------|------|
| SR. No. | PIPING SPEC | DESCRIPTION   | SIZE1 NB   | SIZE2 NB | MATERIAL DESCRIPTION                                                              | 1438 | 1439 | UTILITY | TOTAL QTY | UOM  |
|         |             |               |            |          |                                                                                   | QTY  | QTY  | QTY     |           |      |
| 30      | D1G         | PIPE          | 250        |          | SCH 10, ASME B 36.10, A 106 GR B(IBR), BEVEL END, SEAMLESS                        | 0    | 0    | 25      | 25        | M    |
| 31      | A1G         | 45 ELBOW      | 150        |          | SCH 10S, ASME B 16.9, A 403 WP316, BEVEL END, SEAMLESS                            | 2    | 2    | 0       | 4         | EACH |
| 32      | A1G         | 90 ELBOW      | 15         |          | SCH 10S, ASME B 16.9, A 403 WP316, BEVEL END, SEAMLESS                            | 4    | 4    | 0       | 8         | EACH |
| 33      | A1G         | 90 ELBOW      | 25         |          | SCH 10S, ASME B 16.9, A 403 WP316, BEVEL END, SEAMLESS                            | 19   | 23   | 0       | 42        | EACH |
| 34      | A1G         | 90 ELBOW      | 40         |          | SCH 10S, ASME B 16.9, A 403 WP316, BEVEL END, SEAMLESS                            | 19   | 31   | 0       | 50        | EACH |
| 35      | A1G         | 90 ELBOW      | 50         |          | SCH 5S, ASME B 16.9, A 403 WP316, BEVEL END, SEAMLESS                             | 24   | 8    | 0       | 32        | EACH |
| 36      | A1G         | 90 ELBOW      | 80         |          | SCH 5S, ASME B 16.9, A 403 WP316, BEVEL END, SEAMLESS                             | 36   | 23   | 0       | 59        | EACH |
| 37      | A1G         | 90 ELBOW      | 100        |          | SCH 5S, ASME B 16.9, A 403 WP316, BEVEL END, SEAMLESS                             | 10   | 12   | 0       | 22        | EACH |
| 38      | A1G         | 90 ELBOW      | 150        |          | SCH 5S, ASME B 16.9, A 403 WP316, BEVEL END, SEAMLESS                             | 4    | 6    | 0       | 10        | EACH |
| 39      | A1G         | 90 ELBOW      | 200        |          | SCH 5S, ASME B 16.9, A 403 WP316, BEVEL END, ERW, DOUBLE BUTT SEAM                | 9    | 0    | 0       | 9         | EACH |
| 40      | A1G         | 90 ELBOW      | 500        |          | SCH 5S, ASME B 16.9, A 403 WP316, BEVEL END, ERW, DOUBLE BUTT SEAM                | 0    | 6    | 0       | 6         | EACH |
| 41      | A1G         | 90 ELBOW (SR) | 500        |          | SCH 5S, ASME B 16.9, A 403 WP316, BEVEL END, ERW, DOUBLE BUTT SEAM (SHORT RADIUS) | 0    | 1    | 0       | 1         | EACH |
| 42      | B1G         | 90 ELBOW      | 15         |          | SCH 10S, ASME B 16.9, A 403 WP304, BEVEL END, SEAMLESS                            | 2    | 0    | 0       | 2         | EACH |
| 43      | B1G         | 90 ELBOW      | 25         |          | SCH 10S, ASME B 16.9, A 403 WP304, BEVEL END, SEAMLESS                            | 0    | 12   | 0       | 12        | EACH |
| 44      | B1G         | 90 ELBOW      | 40         |          | SCH 10S, ASME B 16.9, A 403 WP304, BEVEL END, SEAMLESS                            | 0    | 8    | 0       | 8         | EACH |
| 45      | B1G         | 90 ELBOW      | 50         |          | SCH 5S, ASME B 16.9, A 403 WP304, BEVEL END, SEAMLESS                             | 8    | 0    | 0       | 8         | EACH |
| 46      | B1G         | 90 ELBOW      | 80         |          | SCH 5S, ASME B 16.9, A 403 WP304, BEVEL END, SEAMLESS                             | 7    | 10   | 0       | 17        | EACH |
| 47      | C1G         | 90 ELBOW      | 15         |          | CL 3000, ASME B 16.11, A 105, SOCKET END                                          | 0    | 0    | 8       | 8         | EACH |
| 48      | C1G         | 90 ELBOW      | 25         |          | CL 3000, ASME B 16.11, A 105, SOCKET END                                          | 0    | 0    | 42      | 42        | EACH |
| 49      | C1G         | 90 ELBOW      | 50         |          | SCH 40, ASME B 16.9, A 234 GR WPB, BEVEL END, ERW                                 | 0    | 0    | 7       | 7         | EACH |
| 50      | C1G         | 90 ELBOW      | 80         |          | SCH 40, ASME B 16.9, A 234 GR WPB, BEVEL END, ERW                                 | 0    | 0    | 66      | 66        | EACH |
| 51      | C1G         | 90 ELBOW      | 100        |          | SCH 40, ASME B 16.9, A 234 GR WPB, BEVEL END, ERW                                 | 0    | 0    | 17      | 17        | EACH |
| 52      | C1G         | 90 ELBOW      | 150        |          | SCH 40, ASME B 16.9, A 234 GR WPB, BEVEL END, ERW                                 | 0    | 0    | 17      | 17        | EACH |
| 53      | C1G         | 90 ELBOW      | 250        |          | SCH 30, ASME B 16.9, A 234 GR WPB, BEVEL END, ERW                                 | 0    | 0    | 10      | 10        | EACH |
| 54      | D1G         | 90 ELBOW      | 50         |          | SCH 10, ASME B 16.9, A 234 GR WPB(IBR), BEVEL END, SEAMLESS                       | 0    | 0    | 50      | 50        | EACH |
| 55      | D1G         | 90 ELBOW      | 80         |          | SCH 10, ASME B 16.9, A 234 GR WPB(IBR), BEVEL END, SEAMLESS                       | 0    | 0    | 30      | 30        | EACH |
| 56      | D1G         | 90 ELBOW      | 100        |          | SCH 10, ASME B 16.9, A 234 GR WPB(IBR), BEVEL END, SEAMLESS                       | 0    | 0    | 15      | 15        | EACH |
| 57      | D1G         | 90 ELBOW      | 150        |          | SCH 10, ASME B 16.9, A 234 GR WPB(IBR), BEVEL END, SEAMLESS                       | 0    | 0    | 12      | 12        | EACH |

NOTE:

1)For Bolts : Size 1 (Bolt Size in Inches) x Size 2 (Bolt Length in mm)

## PIPING MTO

| SR. No. | PIPING SPEC | DESCRIPTION        | SIZE1 NB | SIZE2 NB | MATERIAL DESCRIPTION                                               | 1438 | 1439 | UTILITY | TOTAL QTY | UOM  |
|---------|-------------|--------------------|----------|----------|--------------------------------------------------------------------|------|------|---------|-----------|------|
|         |             |                    |          |          |                                                                    | QTY  | QTY  | QTY     |           |      |
| 58      | D1G         | 90 ELBOW           | 200      |          | SCH 10, ASME B 16.9, A 234 GR WPB(IBR), BEVEL END, SEAMLESS        | 0    | 0    | 6       | 6         | EACH |
| 59      | D1G         | 90 ELBOW           | 250      |          | SCH 10, ASME B 16.9, A 234 GR WPB(IBR), BEVEL END, SEAMLESS        | 0    | 0    | 8       | 8         | EACH |
| 60      | A1G         | CONCENTRIC REDUCER | 40       | 25       | SCH 10S/SCH 10S, ASME B 16.9, A 403 WP316, BEVEL END, SEAMLESS     | 4    | 6    | 0       | 10        | EACH |
| 61      | A1G         | CONCENTRIC REDUCER | 50       | 25       | SCH 5S/SCH 10S, ASME B 16.9, A 403 WP316, BEVEL END, SEAMLESS      | 6    | 3    | 0       | 9         | EACH |
| 62      | A1G         | CONCENTRIC REDUCER | 50       | 40       | SCH 5S/SCH 10S, ASME B 16.9, A 403 WP316, BEVEL END, SEAMLESS      | 2    | 0    | 0       | 2         | EACH |
| 63      | A1G         | CONCENTRIC REDUCER | 80       | 50       | SCH 5S/SCH 5S, ASME B 16.9, A 403 WP316, BEVEL END, SEAMLESS       | 1    | 1    | 0       | 2         | EACH |
| 64      | A1G         | CONCENTRIC REDUCER | 100      | 65       | SCH 5S/SCH 5S, ASME B 16.9, A 403 WP316, BEVEL END, SEAMLESS       | 2    | 2    | 0       | 4         | EACH |
| 65      | B1G         | CONCENTRIC REDUCER | 40       | 25       | SCH 10S/SCH 10S, ASME B 16.9, A 403 WP304, BEVEL END, SEAMLESS     | 0    | 2    | 0       | 2         | EACH |
| 66      | B1G         | CONCENTRIC REDUCER | 80       | 50       | SCH 5S/SCH 5S, ASME B 16.9, A 403 WP304, BEVEL END, SEAMLESS       | 0    | 2    | 0       | 2         | EACH |
| 67      | D1G         | CONCENTRIC REDUCER | 80       | 50       | SCH 10/SCH 10, ASME B 16.9, A 234 GR WPB(IBR), BEVEL END, SEAMLESS | 0    | 0    | 4       | 4         | EACH |
| 68      | D1G         | CONCENTRIC REDUCER | 100      | 50       | SCH 10/SCH 10, ASME B 16.9, A 234 GR WPB(IBR), BEVEL END, SEAMLESS | 0    | 0    | 2       | 2         | EACH |
| 69      | D1G         | CONCENTRIC REDUCER | 150      | 50       | SCH 10/SCH 10, ASME B 16.9, A 234 GR WPB(IBR), BEVEL END, SEAMLESS | 0    | 0    | 2       | 2         | EACH |
| 70      | A1G         | ECCENTRIC REDUCER  | 50       | 25       | SCH 5S/SCH 10S, ASME B 16.9, A 403 WP316, BEVEL END, SEAMLESS      | 4    | 4    | 0       | 8         | EACH |
| 71      | A1G         | ECCENTRIC REDUCER  | 50       | 40       | SCH 5S/SCH 10S, ASME B 16.9, A 403 WP316, BEVEL END, SEAMLESS      | 0    | 2    | 0       | 2         | EACH |
| 72      | A1G         | ECCENTRIC REDUCER  | 80       | 40       | SCH 5S/SCH 10S, ASME B 16.9, A 403 WP316, BEVEL END, SEAMLESS      | 4    | 0    | 0       | 4         | EACH |
| 73      | A1G         | ECCENTRIC REDUCER  | 150      | 100      | SCH 5S/SCH 5S, ASME B 16.9, A 403 WP316, BEVEL END, SEAMLESS       | 2    | 2    | 0       | 4         | EACH |
| 74      | C1G         | ECCENTRIC REDUCER  | 80       | 50       | SCH 40/SCH 40, ASME B 16.9, A 234 GR WPB, BEVEL END                | 0    | 0    | 2       | 2         | EACH |
| 75      | A1G         | EQUAL TEE          | 15       | 15       | SCH 10S, ASME B 16.9, A 403 WP316, BEVEL END, SEAMLESS             | 4    | 4    | 0       | 8         | EACH |
| 76      | A1G         | EQUAL TEE          | 25       | 25       | SCH 10S, ASME B 16.9, A 403 WP316, BEVEL END, SEAMLESS             | 10   | 7    | 0       | 17        | EACH |
| 77      | A1G         | EQUAL TEE          | 40       | 40       | SCH 10S, ASME B 16.9, A 403 WP316, BEVEL END, SEAMLESS             | 2    | 10   | 0       | 12        | EACH |
| 78      | A1G         | EQUAL TEE          | 50       | 50       | SCH 5S, ASME B 16.9, A 403 WP316, BEVEL END, SEAMLESS              | 4    | 1    | 0       | 5         | EACH |
| 79      | A1G         | EQUAL TEE          | 80       | 80       | SCH 5S, ASME B 16.9, A 403 WP316, BEVEL END, SEAMLESS              | 6    | 5    | 0       | 11        | EACH |
| 80      | A1G         | EQUAL TEE          | 100      | 100      | SCH 5S, ASME B 16.9, A 403 WP316, BEVEL END, SEAMLESS              | 1    | 2    | 0       | 3         | EACH |
| 81      | A1G         | EQUAL TEE          | 150      | 150      | SCH 5S, ASME B 16.9, A 403 WP316, BEVEL END, SEAMLESS              | 1    | 1    | 0       | 2         | EACH |
| 82      | B1G         | EQUAL TEE          | 15       | 15       | SCH 10S, ASME B 16.9, A 403 WP304, BEVEL END, SEAMLESS             | 2    | 2    | 0       | 4         | EACH |
| 83      | B1G         | EQUAL TEE          | 25       | 25       | SCH 10S, ASME B 16.9, A 403 WP304, BEVEL END, SEAMLESS             | 0    | 8    | 0       | 8         | EACH |
| 84      | B1G         | EQUAL TEE          | 40       | 40       | SCH 10S, ASME B 16.9, A 403 WP304, BEVEL END, SEAMLESS             | 0    | 5    | 0       | 5         | EACH |
| 85      | B1G         | EQUAL TEE          | 50       | 50       | SCH 5S, ASME B 16.9, A 403 WP304, BEVEL END, SEAMLESS              | 3    | 0    | 0       | 3         | EACH |
| 86      | B1G         | EQUAL TEE          | 80       | 80       | SCH 5S, ASME B 16.9, A 403 WP304, BEVEL END, SEAMLESS              | 5    | 2    | 0       | 7         | EACH |

NOTE:

1)For Bolts : Size 1 (Bolt Size in Inches) x Size 2 (Bolt Length in mm)

|         |             |               | PIPING MTO |          |                                                                    |      |      |         |           |      |
|---------|-------------|---------------|------------|----------|--------------------------------------------------------------------|------|------|---------|-----------|------|
| SR. No. | PIPING SPEC | DESCRIPTION   | SIZE1 NB   | SIZE2 NB | MATERIAL DESCRIPTION                                               | 1438 | 1439 | UTILITY | TOTAL QTY | UOM  |
|         |             |               |            |          |                                                                    | QTY  | QTY  | QTY     |           |      |
| 87      | C1G         | EQUAL TEE     | 15         | 15       | CL 3000, ASME B 16.11, A 105, SOCKET END                           | 0    | 0    | 9       | 9         | EACH |
| 88      | C1G         | EQUAL TEE     | 25         | 25       | CL 3000, ASME B 16.11, A 105, SOCKET END                           | 0    | 0    | 4       | 4         | EACH |
| 89      | C1G         | EQUAL TEE     | 250        | 250      | SCH 30, ASME B 16.9, A 234 GR WPB, BEVEL END, ERW                  | 0    | 0    | 4       | 4         | EACH |
| 90      | D1G         | EQUAL TEE     | 50         | 50       | SCH 10, ASME B 16.9, A 234 GR WPB(IBR), BEVEL END, SEAMLESS        | 0    | 0    | 12      | 12        | EACH |
| 91      | D1G         | EQUAL TEE     | 80         | 80       | SCH 10, ASME B 16.9, A 234 GR WPB(IBR), BEVEL END, SEAMLESS        | 0    | 0    | 8       | 8         | EACH |
| 92      | D1G         | EQUAL TEE     | 100        | 100      | SCH 10, ASME B 16.9, A 234 GR WPB(IBR), BEVEL END, SEAMLESS        | 0    | 0    | 4       | 4         | EACH |
| 93      | D1G         | EQUAL TEE     | 150        | 150      | SCH 10, ASME B 16.9, A 234 GR WPB(IBR), BEVEL END, SEAMLESS        | 0    | 0    | 4       | 4         | EACH |
| 94      | D1G         | EQUAL TEE     | 200        | 200      | SCH 10, ASME B 16.9, A 234 GR WPB(IBR), BEVEL END, SEAMLESS        | 0    | 0    | 2       | 2         | EACH |
| 95      | D1G         | EQUAL TEE     | 250        | 250      | SCH 10, ASME B 16.9, A 234 GR WPB(IBR), BEVEL END, SEAMLESS        | 0    | 0    | 4       | 4         | EACH |
| 96      | A1G         | REDUCING TEE  | 25         | 15       | SCH 10S/SCH 10S, ASME B 16.9, A 403 WP316, BEVEL END, SEAMLESS     | 0    | 2    | 0       | 2         | EACH |
| 97      | A1G         | REDUCING TEE  | 40         | 15       | SCH 10S/SCH 10S, ASME B 16.9, A 403 WP316, BEVEL END, SEAMLESS     | 0    | 1    | 0       | 1         | EACH |
| 98      | A1G         | REDUCING TEE  | 40         | 25       | SCH 10S/SCH 10S, ASME B 16.9, A 403 WP316, BEVEL END, SEAMLESS     | 0    | 1    | 0       | 1         | EACH |
| 99      | A1G         | REDUCING TEE  | 80         | 40       | SCH 5S/SCH 10S, ASME B 16.9, A 403 WP316, BEVEL END, SEAMLESS      | 1    | 1    | 0       | 2         | EACH |
| 100     | A1G         | REDUCING TEE  | 80         | 50       | SCH 5S/SCH 5S, ASME B 16.9, A 403 WP316, BEVEL END, SEAMLESS       | 2    | 1    | 0       | 3         | EACH |
| 101     | A1G         | REDUCING TEE  | 100        | 40       | SCH 5S/SCH 10S, ASME B 16.9, A 403 WP316, BEVEL END, SEAMLESS      | 1    | 1    | 0       | 2         | EACH |
| 102     | B1G         | REDUCING TEE  | 25         | 15       | SCH 10S/SCH 10S, ASME B 16.9, A 403 WP304, BEVEL END, SEAMLESS     | 0    | 2    | 0       | 2         | EACH |
| 103     | B1G         | REDUCING TEE  | 40         | 15       | SCH 10S/SCH 10S, ASME B 16.9, A 403 WP304, BEVEL END, SEAMLESS     | 0    | 2    | 0       | 2         | EACH |
| 104     | C1G         | REDUCING TEE  | 80         | 40       | SCH 40/4.00 MM, ASME B 16.9, A 234 GR WPB, BEVEL END, ERW          | 0    | 0    | 5       | 5         | EACH |
| 105     | C1G         | REDUCING TEE  | 100        | 40       | SCH 40/4.00 MM, ASME B 16.9, A 234 GR WPB, BEVEL END, ERW          | 0    | 0    | 1       | 1         | EACH |
| 106     | C1G         | REDUCING TEE  | 250        | 100      | SCH 30/SCH 40, ASME B 16.9, A 234 GR WPB, BEVEL END, ERW           | 0    | 0    | 2       | 2         | EACH |
| 107     | C1G         | REDUCING TEE  | 250        | 150      | SCH 30/SCH 40, ASME B 16.9, A 234 GR WPB, BEVEL END, ERW           | 0    | 0    | 4       | 4         | EACH |
| 108     | D1G         | REDUCING TEE  | 100        | 40       | SCH 10/SCH 10, ASME B 16.9, A 234 GR WPB(IBR), BEVEL END, SEAMLESS | 0    | 0    | 1       | 1         | EACH |
| 109     | D1G         | REDUCING TEE  | 250        | 100      | SCH 10/SCH 10, ASME B 16.9, A 234 GR WPB(IBR), BEVEL END, SEAMLESS | 0    | 0    | 1       | 1         | EACH |
| 110     | D1G         | REDUCING TEE  | 250        | 150      | SCH 10/SCH 10, ASME B 16.9, A 234 GR WPB(IBR), BEVEL END, SEAMLESS | 0    | 0    | 1       | 1         | EACH |
| 111     | A1G         | HALF COUPLING | 50         | 15       | CL 3000, ASME B 16.11, A 182 F316, SOCKET END                      | 2    | 0    | 0       | 2         | EACH |
| 112     | A1G         | HALF COUPLING | 80         | 25       | CL 3000, ASME B 16.11, A 182 F316, SOCKET END                      | 1    | 1    | 0       | 2         | EACH |
| 113     | A1G         | HALF COUPLING | 100        | 15       | CL 3000, ASME B 16.11, A 182 F316, SOCKET END                      | 2    | 2    | 0       | 4         | EACH |
| 114     | A1G         | HALF COUPLING | 150        | 15       | CL 3000, ASME B 16.11, A 182 F316, SOCKET END                      | 2    | 2    | 0       | 4         | EACH |
| 115     | B1G         | HALF COUPLING | 50         | 15       | CL 3000, ASME B 16.11, A 182 F304, SOCKET END                      | 2    | 0    | 0       | 2         | EACH |

NOTE:

1)For Bolts : Size 1 (Bolt Size in Inches) x Size 2 (Bolt Length in mm)

|         |             |                    | PIPING MTO |          |                                                                                    |      |      |         |           |      |
|---------|-------------|--------------------|------------|----------|------------------------------------------------------------------------------------|------|------|---------|-----------|------|
| SR. No. | PIPING SPEC | DESCRIPTION        | SIZE1 NB   | SIZE2 NB | MATERIAL DESCRIPTION                                                               | 1438 | 1439 | UTILITY | TOTAL QTY | UOM  |
|         |             |                    |            |          |                                                                                    | QTY  | QTY  | QTY     |           |      |
| 116     | B1G         | HALF COUPLING      | 80         | 15       | CL 3000, ASME B 16.11, A 182 F304, SOCKET END                                      | 2    | 0    | 0       | 2         | EACH |
| 117     | C1G         | HALF COUPLING      | 50         | 15       | CL 3000, ASME B 16.11, A 105, SOCKET END                                           | 0    | 0    | 1       | 1         | EACH |
| 118     | C1G         | HALF COUPLING      | 80         | 15       | CL 3000, ASME B 16.11, A 105, SOCKET END                                           | 0    | 0    | 4       | 4         | EACH |
| 119     | C1G         | HALF COUPLING      | 100        | 15       | CL 3000, ASME B 16.11, A 105, SOCKET END                                           | 0    | 0    | 1       | 1         | EACH |
| 120     | C1G         | HALF COUPLING      | 150        | 15       | CL 3000, ASME B 16.11, A 105, SOCKET END                                           | 0    | 0    | 2       | 2         | EACH |
| 121     | C1G         | HALF COUPLING      | 150        | 40       | CL 3000, ASME B 16.11, A 105, SOCKET END                                           | 0    | 0    | 2       | 2         | EACH |
| 122     | C1G         | HALF COUPLING      | 250        | 25       | CL 3000, ASME B 16.11, A 105, SOCKET END                                           | 0    | 0    | 8       | 8         | EACH |
| 123     | D1G         | HALF COUPLING      | 50         | 15       | CL 3000, ASME B 16.11, A 105(IBR), SOCKET END                                      | 0    | 0    | 2       | 2         | EACH |
| 124     | D1G         | HALF COUPLING      | 150        | 40       | CL 3000, ASME B 16.11, A 105(IBR), SOCKET END                                      | 0    | 0    | 1       | 1         | EACH |
| 125     | D1G         | HALF COUPLING      | 250        | 15       | CL 3000, ASME B 16.11, A 105(IBR), SOCKET END                                      | 0    | 0    | 1       | 1         | EACH |
| 126     | C1G         | STUB IN            | 250        | 50       | PIPE TO PIPE CONNECTION                                                            | 0    | 0    | 2       | 2         | EACH |
| 127     | C1G         | STUB IN            | 250        | 80       | PIPE TO PIPE CONNECTION                                                            | 0    | 0    | 16      | 16        | EACH |
| 128     | D1G         | STUB IN            | 200        | 50       | PIPE TO PIPE CONNECTION                                                            | 0    | 0    | 6       | 6         | EACH |
| 129     | D1G         | STUB IN            | 250        | 80       | PIPE TO PIPE CONNECTION                                                            | 0    | 0    | 4       | 4         | EACH |
| 130     | A1G         | FULL COUPLING      | 25         |          | CL 3000, ASME B 16.11, A 182 F316, SOCKET END                                      | 8    | 10   | 0       | 18        | EACH |
| 131     | A1G         | FULL COUPLING      | 40         |          | CL 3000, ASME B 16.11, A 182 F316, SOCKET END                                      | 9    | 13   | 0       | 22        | EACH |
| 132     | B1G         | FULL COUPLING      | 25         |          | CL 3000, ASME B 16.11, A 182 F304, SOCKET END                                      | 0    | 7    | 0       | 7         | EACH |
| 133     | C1G         | FULL COUPLING      | 25         |          | CL 3000, ASME B 16.11, A 105, SOCKET END                                           | 0    | 0    | 11      | 11        | EACH |
| 134     | B1G         | Y TYPE STRAINER    | 40         |          | CL 800, MFG. STD., A 182 F304, SOCKET END, INTERNALS SS304, MESH SIZE HOLD         | 0    | 2    | 0       | 2         | EACH |
| 135     | B1G         | Y TYPE STRAINER    | 80         |          | CL 150, MFG. STD., A 351 GP CF8, FLANGE END, INTERNALS SS304, MESH SIZE HOLD       | 2    | 0    | 0       | 2         | EACH |
| 136     | A1G         | INSTRUMENT ADAPTOR | 15         | 15       | CL 3000, ASME B 16.11, A 182 F316, SOCKET END/THREADED, ONE SIDE SW & OTHER NPT(F) | 4    | 4    | 0       | 8         | EACH |
| 137     | A1G         | INSTRUMENT ADAPTOR | 40         | 25       | CL 3000, ASME B 16.11, A 182 F316, SOCKET END/THREADED, ONE SIDE SW & OTHER NPT(F) | 1    | 1    | 0       | 2         | EACH |
| 138     | B1G         | INSTRUMENT ADAPTOR | 15         | 15       | CL 3000, ASME B 16.11, A 182 F304, SOCKET END/THREADED, ONE SIDE SW & OTHER NPT(F) | 2    | 0    | 0       | 2         | EACH |
| 139     | C1G         | INSTRUMENT ADAPTOR | 15         | 15       | CL 3000, ASME B 16.11, A 105, SOCKET END/THREADED, ONE SIDE SW & OTHER NPT(F)      | 0    | 0    | 9       | 9         | EACH |

NOTE:

1)For Bolts : Size 1 (Bolt Size in Inches) x Size 2 (Bolt Length in mm)

|         |             |                    | PIPING MTO |          |                                                                                    |      |      |         |           |      |
|---------|-------------|--------------------|------------|----------|------------------------------------------------------------------------------------|------|------|---------|-----------|------|
| SR. No. | PIPING SPEC | DESCRIPTION        | SIZE1 NB   | SIZE2 NB | MATERIAL DESCRIPTION                                                               | 1438 | 1439 | UTILITY | TOTAL QTY | UOM  |
|         |             |                    |            |          |                                                                                    | QTY  | QTY  | QTY     |           |      |
| 140     | C1G         | INSTRUMENT ADAPTOR | 40         | 25       | CL 3000, ASME B 16.11, A 105, SOCKET END/THREADED, ONE SIDE SW & OTHER NPT(F)      | 0    | 0    | 8       | 8         | EACH |
| 141     | D1G         | INSTRUMENT ADAPTOR | 40         | 25       | CL 3000, ASME B 16.11, A 105(1BR), SOCKET END/THREADED, ONE SIDE SW & OTHER NPT(F) | 0    | 0    | 2       | 2         | EACH |
| 142     | A1G         | FLANGES            | 15         |          | CL 150, ASME B 16.5, A 182 F316, RAISED FACE                                       | 7    | 6    | 0       | 13        | EACH |
| 143     | A1G         | FLANGES            | 25         |          | CL 150, ASME B 16.5, A 182 F316, RAISED FACE                                       | 5    | 4    | 0       | 9         | EACH |
| 144     | A1G         | FLANGES            | 40         |          | CL 150, ASME B 16.5, A 182 F316, RAISED FACE                                       | 11   | 11   | 0       | 22        | EACH |
| 145     | A1G         | FLANGES            | 50         |          | CL 150, ASME B 16.5, A 182 F316, RAISED FACE                                       | 41   | 17   | 0       | 58        | EACH |
| 146     | A1G         | FLANGES            | 65         |          | CL 150, ASME B 16.5, A 182 F316, RAISED FACE                                       | 2    | 2    | 0       | 4         | EACH |
| 147     | A1G         | FLANGES            | 80         |          | CL 150, ASME B 16.5, A 182 F316, RAISED FACE                                       | 35   | 29   | 0       | 64        | EACH |
| 148     | A1G         | FLANGES            | 100        |          | CL 150, ASME B 16.5, A 182 F316, RAISED FACE                                       | 13   | 18   | 0       | 31        | EACH |
| 149     | A1G         | FLANGES            | 150        |          | CL 150, ASME B 16.5, A 182 F316, RAISED FACE                                       | 5    | 9    | 0       | 14        | EACH |
| 150     | A1G         | FLANGES            | 200        |          | CL 150, ASME B 16.5, A 182 F316, RAISED FACE                                       | 6    | 0    | 0       | 6         | EACH |
| 151     | A1G         | FLANGES            | 500        |          | CL 150, ASME B 16.5, A 182 F316, RAISED FACE                                       | 0    | 6    | 0       | 6         | EACH |
| 152     | B1G         | FLANGES            | 15         |          | CL 150, ASME B 16.5, A 182 F304, RAISED FACE                                       | 4    | 4    | 0       | 8         | EACH |
| 153     | B1G         | FLANGES            | 25         |          | CL 150, ASME B 16.5, A 182 F304, RAISED FACE                                       | 0    | 8    | 0       | 8         | EACH |
| 154     | B1G         | FLANGES            | 40         |          | CL 150, ASME B 16.5, A 182 F304, RAISED FACE                                       | 0    | 5    | 0       | 5         | EACH |
| 155     | B1G         | FLANGES            | 50         |          | CL 150, ASME B 16.5, A 182 F304, RAISED FACE                                       | 17   | 2    | 0       | 19        | EACH |
| 156     | B1G         | FLANGES            | 80         |          | CL 150, ASME B 16.5, A 182 F304, RAISED FACE                                       | 11   | 10   | 0       | 21        | EACH |
| 157     | C1G         | FLANGES            | 15         |          | CL 150, ASME B 16.5, A 105, SW, RAISED FACE                                        | 0    | 0    | 8       | 8         | EACH |
| 158     | C1G         | FLANGES            | 25         |          | CL 150, ASME B 16.5, A 105, SW, RAISED FACE                                        | 0    | 0    | 12      | 12        | EACH |
| 159     | C1G         | FLANGES            | 50         |          | CL 150, ASME B 16.5, A 105, RAISED FACE                                            | 0    | 0    | 8       | 8         | EACH |
| 160     | C1G         | FLANGES            | 80         |          | CL 150, ASME B 16.5, A 105, RAISED FACE                                            | 0    | 0    | 56      | 56        | EACH |
| 161     | C1G         | FLANGES            | 100        |          | CL 150, ASME B 16.5, A 105, RAISED FACE                                            | 0    | 0    | 8       | 8         | EACH |
| 162     | C1G         | FLANGES            | 150        |          | CL 150, ASME B 16.5, A 105, RAISED FACE                                            | 0    | 0    | 16      | 16        | EACH |
| 163     | C1G         | FLANGES            | 250        |          | CL 150, ASME B 16.5, A 105, RAISED FACE                                            | 0    | 0    | 10      | 10        | EACH |
| 164     | D1G         | FLANGES            | 15         |          | CL 150, ASME B 16.5, A 105(1BR), SW, RAISED FACE                                   | 0    | 0    | 3       | 3         | EACH |
| 165     | D1G         | FLANGES            | 50         |          | CL 150, ASME B 16.5, A 105(1BR), RAISED FACE                                       | 0    | 0    | 58      | 58        | EACH |
| 166     | D1G         | FLANGES            | 80         |          | CL 150, ASME B 16.5, A 105(1BR), RAISED FACE                                       | 0    | 0    | 21      | 21        | EACH |

NOTE:

1)For Bolts : Size 1 (Bolt Size in Inches) x Size 2 (Bolt Length in mm)

|         |             |              | PIPING MTO |          |                                                                        |      |      |         |           |      |
|---------|-------------|--------------|------------|----------|------------------------------------------------------------------------|------|------|---------|-----------|------|
| SR. No. | PIPING SPEC | DESCRIPTION  | SIZE1 NB   | SIZE2 NB | MATERIAL DESCRIPTION                                                   | 1438 | 1439 | UTILITY | TOTAL QTY | UOM  |
|         |             |              |            |          |                                                                        | QTY  | QTY  | QTY     |           |      |
| 167     | D1G         | FLANGES      | 100        |          | CL 150, ASME B 16.5, A 105(IBR), RAISED FACE                           | 0    | 0    | 16      | 16        | EACH |
| 168     | D1G         | FLANGES      | 150        |          | CL 150, ASME B 16.5, A 105(IBR), RAISED FACE                           | 0    | 0    | 16      | 16        | EACH |
| 169     | D1G         | FLANGES      | 200        |          | CL 150, ASME B 16.5, A 105(IBR), RAISED FACE                           | 0    | 0    | 7       | 7         | EACH |
| 170     | D1G         | FLANGES      | 250        |          | CL 150, ASME B 16.5, A 105(IBR), RAISED FACE                           | 0    | 0    | 14      | 14        | EACH |
| 171     | A1G         | BLIND FLANGE | 15         |          | CL 150, ASME B 16.5, A 182 F316, RAISED FACE                           | 7    | 6    | 0       | 13        | EACH |
| 172     | A1G         | BLIND FLANGE | 100        |          | CL 150, ASME B 16.5, A 182 F316, RAISED FACE                           | 1    | 0    | 0       | 1         | EACH |
| 173     | B1G         | BLIND FLANGE | 15         |          | CL 150, ASME B 16.5, A 182 F304, RAISED FACE                           | 4    | 4    | 0       | 8         | EACH |
| 174     | C1G         | BLIND FLANGE | 15         |          | CL 150, ASME B 16.5, A 105, RAISED FACE                                | 0    | 0    | 8       | 8         | EACH |
| 175     | D1G         | BLIND FLANGE | 15         |          | CL 150, ASME B 16.5, A 105(IBR), RAISED FACE                           | 0    | 0    | 3       | 3         | EACH |
| 176     | C1G         | BLIND FLANGE | 250        |          | CL 150, ASME B 16.5, A 105, RAISED FACE                                | 0    | 0    | 4       | 4         | EACH |
| 177     | D1G         | BLIND FLANGE | 200        |          | CL 150, ASME B 16.5, A 105(IBR), RAISED FACE                           | 0    | 0    | 2       | 2         | EACH |
| 178     | D1G         | BLIND FLANGE | 250        |          | CL 150, ASME B 16.5, A 105(IBR), RAISED FACE                           | 0    | 0    | 2       | 3         | EACH |
| 179     | A1G         | GASKET       | 15         |          | CL 150, ASME 16.20, STYLE 54(NON-ASBESTOS METALLIC GASKET), 2.0 MM THK | 7    | 6    | 0       | 13        | EACH |
| 180     | A1G         | GASKET       | 25         |          | CL 150, ASME 16.20, STYLE 54(NON-ASBESTOS METALLIC GASKET), 2.0 MM THK | 5    | 4    | 0       | 9         | EACH |
| 181     | A1G         | GASKET       | 40         |          | CL 150, ASME 16.20, STYLE 54(NON-ASBESTOS METALLIC GASKET), 2.0 MM THK | 11   | 11   | 0       | 22        | EACH |
| 182     | A1G         | GASKET       | 50         |          | CL 150, ASME 16.20, STYLE 54(NON-ASBESTOS METALLIC GASKET), 2.0 MM THK | 41   | 17   | 0       | 58        | EACH |
| 183     | A1G         | GASKET       | 65         |          | CL 150, ASME 16.20, STYLE 54(NON-ASBESTOS METALLIC GASKET), 2.0 MM THK | 2    | 2    | 0       | 4         | EACH |
| 184     | A1G         | GASKET       | 80         |          | CL 150, ASME 16.20, STYLE 54(NON-ASBESTOS METALLIC GASKET), 2.0 MM THK | 35   | 29   | 0       | 64        | EACH |
| 185     | A1G         | GASKET       | 100        |          | CL 150, ASME 16.20, STYLE 54(NON-ASBESTOS METALLIC GASKET), 2.0 MM THK | 13   | 18   | 0       | 31        | EACH |
| 186     | A1G         | GASKET       | 150        |          | CL 150, ASME 16.20, STYLE 54(NON-ASBESTOS METALLIC GASKET), 2.0 MM THK | 6    | 10   | 0       | 16        | EACH |
| 187     | A1G         | GASKET       | 200        |          | CL 150, ASME 16.20, STYLE 54(NON-ASBESTOS METALLIC GASKET), 2.0 MM THK | 6    | 0    | 0       | 6         | EACH |
| 188     | A1G         | GASKET       | 500        |          | CL 150, ASME 16.20, STYLE 54(NON-ASBESTOS METALLIC GASKET), 2.0 MM THK | 0    | 6    | 0       | 6         | EACH |
| 189     | B1G         | GASKET       | 15         |          | CL 150, ASME 16.20, STYLE 54(NON-ASBESTOS METALLIC GASKET), 2.0 MM THK | 4    | 4    | 0       | 8         | EACH |
| 190     | B1G         | GASKET       | 25         |          | CL 150, ASME 16.20, STYLE 54(NON-ASBESTOS METALLIC GASKET), 2.0 MM THK | 0    | 8    | 0       | 8         | EACH |
| 191     | B1G         | GASKET       | 40         |          | CL 150, ASME 16.20, STYLE 54(NON-ASBESTOS METALLIC GASKET), 2.0 MM THK | 0    | 5    | 0       | 5         | EACH |
| 192     | B1G         | GASKET       | 50         |          | CL 150, ASME 16.20, STYLE 54(NON-ASBESTOS METALLIC GASKET), 2.0 MM THK | 17   | 2    | 0       | 19        | EACH |
| 193     | B1G         | GASKET       | 80         |          | CL 150, ASME 16.20, STYLE 54(NON-ASBESTOS METALLIC GASKET), 2.0 MM THK | 11   | 10   | 0       | 21        | EACH |
| 194     | C1G         | GASKET       | 15         |          | CL 150, ASME 16.21, CHAMPION STYLE AF 120 OR EQUAL, 2.0 MM THK         | 0    | 0    | 8       | 8         | EACH |
| 195     | C1G         | GASKET       | 25         |          | CL 150, ASME 16.21, CHAMPION STYLE AF 120 OR EQUAL, 2.0 MM THK         | 0    | 0    | 12      | 12        | EACH |

NOTE:

1)For Bolts : Size 1 (Bolt Size in Inches) x Size 2 (Bolt Length in mm)

|         |             |             | PIPING MTO |          |                                                                                                       |      |      |         |           |      |
|---------|-------------|-------------|------------|----------|-------------------------------------------------------------------------------------------------------|------|------|---------|-----------|------|
| SR. No. | PIPING SPEC | DESCRIPTION | SIZE1 NB   | SIZE2 NB | MATERIAL DESCRIPTION                                                                                  | 1438 | 1439 | UTILITY | TOTAL QTY | UOM  |
|         |             |             |            |          |                                                                                                       | QTY  | QTY  | QTY     |           |      |
| 196     | C1G         | GASKET      | 50         |          | CL 150, ASME 16.21, CHAMPION STYLE AF 120 OR EQUAL, 2.0 MM THK                                        | 0    | 0    | 8       | 8         | EACH |
| 197     | C1G         | GASKET      | 80         |          | CL 150, ASME 16.21, CHAMPION STYLE AF 120 OR EQUAL, 2.0 MM THK                                        | 0    | 0    | 56      | 56        | EACH |
| 198     | C1G         | GASKET      | 100        |          | CL 150, ASME 16.21, CHAMPION STYLE AF 120 OR EQUAL, 2.0 MM THK                                        | 0    | 0    | 8       | 8         | EACH |
| 199     | C1G         | GASKET      | 150        |          | CL 150, ASME 16.21, CHAMPION STYLE AF 120 OR EQUAL, 2.0 MM THK                                        | 0    | 0    | 16      | 16        | EACH |
| 200     | C1G         | GASKET      | 250        |          | CL 150, ASME 16.21, CHAMPION STYLE AF 120 OR EQUAL, 2.0 MM THK                                        | 0    | 0    | 10      | 10        | EACH |
| 201     | D1G         | GASKET      | 15         |          | CL 150, ASME 16.21, CHAMPION STYLE AF 120 OR EQUAL, 2.0 MM THK                                        | 0    | 0    | 3       | 3         | EACH |
| 202     | D1G         | GASKET      | 50         |          | CL 150, ASME 16.21, CHAMPION STYLE AF 120 OR EQUAL, 2.0 MM THK                                        | 0    | 0    | 58      | 58        | EACH |
| 203     | D1G         | GASKET      | 80         |          | CL 150, ASME 16.21, CHAMPION STYLE AF 120 OR EQUAL, 2.0 MM THK                                        | 0    | 0    | 21      | 21        | EACH |
| 204     | D1G         | GASKET      | 100        |          | CL 150, ASME 16.21, CHAMPION STYLE AF 120 OR EQUAL, 2.0 MM THK                                        | 0    | 0    | 16      | 16        | EACH |
| 205     | D1G         | GASKET      | 150        |          | CL 150, ASME 16.21, CHAMPION STYLE AF 120 OR EQUAL, 2.0 MM THK                                        | 0    | 0    | 16      | 16        | EACH |
| 206     | D1G         | GASKET      | 200        |          | CL 150, ASME 16.21, CHAMPION STYLE AF 120 OR EQUAL, 2.0 MM THK                                        | 0    | 0    | 7       | 7         | EACH |
| 207     | D1G         | GASKET      | 250        |          | CL 150, ASME 16.21, CHAMPION STYLE AF 120 OR EQUAL, 2.0 MM THK                                        | 0    | 0    | 14      | 14        | EACH |
| 208     | A1G         | BOLTS       | 1/2"       | 75       | CL 150, ASME B 18.2.1./ASME 18.2.2, A 193 GR B8M/A 194 GR.8MA, FULL LENGTH THREADED STUD & HEAVY BOLT | 28   | 24   | 0       | 52        | EACH |
| 209     | A1G         | BOLTS       | 1/2"       | 85       | CL 150, ASME B 18.2.1./ASME 18.2.2, A 193 GR B8M/A 194 GR.8MA, FULL LENGTH THREADED STUD & HEAVY BOLT | 20   | 16   | 0       | 36        | EACH |
| 210     | A1G         | BOLTS       | 1/2"       | 90       | CL 150, ASME B 18.2.1./ASME 18.2.2, A 193 GR B8M/A 194 GR.8MA, FULL LENGTH THREADED STUD & HEAVY BOLT | 44   | 44   | 0       | 88        | EACH |
| 211     | A1G         | BOLTS       | 5/8"       | 100      | CL 150, ASME B 18.2.1./ASME 18.2.2, A 193 GR B8M/A 194 GR.8MA, FULL LENGTH THREADED STUD & HEAVY BOLT | 164  | 68   | 0       | 232       | EACH |
| 212     | A1G         | BOLTS       | 5/8"       | 110      | CL 150, ASME B 18.2.1./ASME 18.2.2, A 193 GR B8M/A 194 GR.8MA, FULL LENGTH THREADED STUD & HEAVY BOLT | 252  | 268  | 0       | 520       | EACH |
| 213     | A1G         | BOLTS       | 3/4"       | 120      | CL 150, ASME B 18.2.1./ASME 18.2.2, A 193 GR B8M/A 194 GR.8MA, FULL LENGTH THREADED STUD & HEAVY BOLT | 48   | 80   | 0       | 128       | EACH |
| 214     | A1G         | BOLTS       | 3/4"       | 130      | CL 150, ASME B 18.2.1./ASME 18.2.2, A 193 GR B8M/A 194 GR.8MA, FULL LENGTH THREADED STUD & HEAVY BOLT | 48   | 0    | 0       | 48        | EACH |
| 215     | A1G         | BOLTS       | 1-1/8"     | 175      | CL 150, ASME B 18.2.1./ASME 18.2.2, A 193 GR B8M/A 194 GR.8MA, FULL LENGTH THREADED STUD & HEAVY BOLT | 0    | 120  | 0       | 120       | EACH |
| 216     | B1G         | BOLTS       | 1/2"       | 75       | CL 150, ASME B 18.2.1./ASME 18.2.2, A 193 GR B8M/A 194 GR.8MA, FULL LENGTH THREADED STUD & HEAVY BOLT | 16   | 16   | 0       | 32        | EACH |

NOTE:

1)For Bolts : Size 1 (Bolt Size in Inches) x Size 2 (Bolt Length in mm)

|         |             |             | PIPING MTO |          |                                                                                                          |      |      |         |           |      |
|---------|-------------|-------------|------------|----------|----------------------------------------------------------------------------------------------------------|------|------|---------|-----------|------|
| SR. No. | PIPING SPEC | DESCRIPTION | SIZE1 NB   | SIZE2 NB | MATERIAL DESCRIPTION                                                                                     | 1438 | 1439 | UTILITY | TOTAL QTY | UOM  |
|         |             |             |            |          |                                                                                                          | QTY  | QTY  | QTY     |           |      |
| 217     | B1G         | BOLTS       | 1/2"       | 85       | CL 150, ASME B 18.2.1./ASME 18.2.2, A 193 GR B8M/A 194 GR.8MA, FULL LENGTH<br>THREADED STUD & HEAVY BOLT | 0    | 32   | 0       | 32        | EACH |
| 218     | B1G         | BOLTS       | 1/2"       | 90       | CL 150, ASME B 18.2.1./ASME 18.2.2, A 193 GR B8M/A 194 GR.8MA, FULL LENGTH<br>THREADED STUD & HEAVY BOLT | 0    | 20   | 0       | 20        | EACH |
| 219     | B1G         | BOLTS       | 5/8"       | 100      | CL 150, ASME B 18.2.1./ASME 18.2.2, A 193 GR B8M/A 194 GR.8MA, FULL LENGTH<br>THREADED STUD & HEAVY BOLT | 68   | 8    | 0       | 76        | EACH |
| 220     | B1G         | BOLTS       | 5/8"       | 110      | CL 150, ASME B 18.2.1./ASME 18.2.2, A 193 GR B8M/A 194 GR.8MA, FULL LENGTH<br>THREADED STUD & HEAVY BOLT | 44   | 40   | 0       | 84        | EACH |
| 221     | C1G         | BOLTS       | 1/2"       | 75       | CL 150, ASME B 18.2.1./ASME 18.2.2, A 193 GR B7/A 194 GR 7, FULL LENGTH<br>THREADED STUD & HEAVY BOLT    | 0    | 0    | 32      | 32        | EACH |
| 222     | C1G         | BOLTS       | 1/2"       | 85       | CL 150, ASME B 18.2.1./ASME 18.2.2, A 193 GR B7/A 194 GR 7, FULL LENGTH<br>THREADED STUD & HEAVY BOLT    | 0    | 0    | 48      | 48        | EACH |
| 223     | C1G         | BOLTS       | 5/8"       | 100      | CL 150, ASME B 18.2.1./ASME 18.2.2, A 193 GR B7/A 194 GR 7, FULL LENGTH<br>THREADED STUD & HEAVY BOLT    | 0    | 0    | 32      | 32        | EACH |
| 224     | C1G         | BOLTS       | 5/8"       | 110      | CL 150, ASME B 18.2.1./ASME 18.2.2, A 193 GR B7/A 194 GR 7, FULL LENGTH<br>THREADED STUD & HEAVY BOLT    | 0    | 0    | 288     | 288       | EACH |
| 225     | C1G         | BOLTS       | 3/4"       | 120      | CL 150, ASME B 18.2.1./ASME 18.2.2, A 193 GR B7/A 194 GR 7, FULL LENGTH<br>THREADED STUD & HEAVY BOLT    | 0    | 0    | 128     | 128       | EACH |
| 226     | C1G         | BOLTS       | 7/8"       | 145      | CL 150, ASME B 18.2.1./ASME 18.2.2, A 193 GR B7/A 194 GR 7, FULL LENGTH<br>THREADED STUD & HEAVY BOLT    | 0    | 0    | 120     | 120       | EACH |
| 227     | D1G         | BOLTS       | 1/2"       | 75       | CL 150, ASME B 18.2.1./ASME 18.2.2, A 193 GR B7/A 194 GR 7, FULL LENGTH<br>THREADED STUD & HEAVY BOLT    | 0    | 0    | 12      | 12        | EACH |
| 228     | D1G         | BOLTS       | 5/8"       | 100      | CL 150, ASME B 18.2.1./ASME 18.2.2, A 193 GR B7/A 194 GR 7, FULL LENGTH<br>THREADED STUD & HEAVY BOLT    | 0    | 0    | 232     | 232       | EACH |
| 229     | D1G         | BOLTS       | 5/8"       | 110      | CL 150, ASME B 18.2.1./ASME 18.2.2, A 193 GR B7/A 194 GR 7, FULL LENGTH<br>THREADED STUD & HEAVY BOLT    | 0    | 0    | 212     | 212       | EACH |
| 230     | D1G         | BOLTS       | 3/4"       | 120      | CL 150, ASME B 18.2.1./ASME 18.2.2, A 193 GR B7/A 194 GR 7, FULL LENGTH<br>THREADED STUD & HEAVY BOLT    | 0    | 0    | 128     | 128       | EACH |
| 231     | D1G         | BOLTS       | 3/4"       | 130      | CL 150, ASME B 18.2.1./ASME 18.2.2, A 193 GR B7/A 194 GR 7, FULL LENGTH<br>THREADED STUD & HEAVY BOLT    | 0    | 0    | 56      | 56        | EACH |

NOTE:

1)For Bolts : Size 1 (Bolt Size in Inches) x Size 2 (Bolt Length in mm)

|            |                |             | PIPING MTO  |             |                                                                                                       |      |      |         |              |      |
|------------|----------------|-------------|-------------|-------------|-------------------------------------------------------------------------------------------------------|------|------|---------|--------------|------|
| SR.<br>No. | PIPING<br>SPEC | DESCRIPTION | SIZE1<br>NB | SIZE2<br>NB | MATERIAL DESCRIPTION                                                                                  | 1438 | 1439 | UTILITY | TOTAL<br>QTY | UOM  |
|            |                |             |             |             |                                                                                                       | QTY  | QTY  | QTY     |              |      |
| 232        | D1G            | BOLTS       | 7/8"        | 145         | CL 150, ASME B 18.2.1./ASME 18.2.2, A 193 GR B7/A 194 GR 7, FULL LENGTH<br>THREADED STUD & HEAVY BOLT | 0    | 0    | 168     | 168          | EACH |

SAMPLE

NOTE:

1)For Bolts : Size 1 (Bolt Size in Inches) x Size 2 (Bolt Length in mm)

Project Name :

**MULTIPURPOSE/BATCH DISTILLATION SYSTEM**

Client Name :

Client Project Number :

Document Title :

**VALVE MTO**

Document Number :

**1402-PI-MT-001**

**SAMPLE**

|     |      |      |      |          |                    |             |        |
|-----|------|------|------|----------|--------------------|-------------|--------|
|     |      |      |      |          |                    |             |        |
|     |      |      |      |          |                    |             |        |
|     |      |      |      |          |                    |             |        |
|     |      |      |      |          |                    |             |        |
| 0   | MSS  | ASU  | PVP  | 7/3/2015 | ISSUED FOR ENQUIRY | FILE NAME : | Rev. 0 |
| Rev | PRPD | CHKD | APPD | DATE     | ALTERATION         |             |        |

## **Basis of Valve MTO Estimation**

- 1 Valve MTO is based on following input documents - (Scanned copy of all is attached)  
Process PID - 231438.01.31C Sheet 1 of 1 Rev 02  
Process PID - 231439.01.31C Sheet 1 of 1 Rev 02  
PID for Steam Header Package - 231438&39.01.42C Sheet 1 of 1 Rev 0  
PID for Cooling Tower Package - 231438&39.01.32C Sheet 1 of 1 Rev 0  
Piping Material Specification Rev 0
- 2 Valves related to instruments mounted on equipment are not included in this MTO.
- 3 Valves shown on PID have been accounted.
- 4 Hydro test vent and drain valves are not included in this MTO.
- 5 Equipment vent/drain valves, not shown on PID, are not accounted in this MTO.
- 6 Control valve and ON/OFF valve are not part of this MTO.
- 7 Valve MTO provided is exact and does not include any contingency/allowances of any kind.

SAMPLE

|     |      |      |      |          |                    |             |        |
|-----|------|------|------|----------|--------------------|-------------|--------|
|     |      |      |      |          |                    |             |        |
|     |      |      |      |          |                    |             |        |
|     |      |      |      |          |                    |             |        |
| 0   | MSS  | ASU  | PVP  | 7/3/2015 | ISSUED FOR ENQUIRY | FILE NAME : | Rev. 0 |
| Rev | PRPD | CHKD | APPD | DATE     | ALTERATION         |             |        |

|            |              |                    |               |      | VALVE MTO                                                                           |      |      |         |              |      |
|------------|--------------|--------------------|---------------|------|-------------------------------------------------------------------------------------|------|------|---------|--------------|------|
| SR.<br>No. | PIPE<br>SPEC | DESCRIPTION        | VALVE<br>CODE | SIZE | MATERIAL DESCRIPTION                                                                | 1438 | 1439 | UTILITY | TOTAL<br>QTY | UOM  |
|            |              |                    |               |      |                                                                                     | QTY  | QTY  | QTY     |              |      |
|            |              |                    |               |      |                                                                                     |      |      |         |              |      |
| 1          | A1G          | BALL VALVE         | V1            | 15   | BALL VALVE, CL 800, API 608/ASME B 16.34, A182F316, SOCKET END, TRIM NO.12          | 10   | 10   | 0       | 20           | EACH |
| 2          | A1G          | BALL VALVE         | V1            | 25   | BALL VALVE, CL 800, API 608/ASME B 16.34, A182F316, SOCKET END, TRIM NO.12          | 10   | 11   | 0       | 21           | EACH |
| 3          | A1G          | BALL VALVE         | V1            | 40   | BALL VALVE, CL 800, API 608/ASME B 16.34, A182F316, SOCKET END, TRIM NO.12          | 3    | 8    | 0       | 11           | EACH |
| 4          | A1G          | BALL VALVE         | V1            | 50   | BALL VALVE, CL 150, API 608/ASME B 16.34, A351 GR CF8M, FLANGE END, TRIM NO.12      | 10   | 4    | 0       | 14           | EACH |
| 5          | A1G          | BALL VALVE         | V1            | 80   | BALL VALVE, CL 150, API 608/ASME B 16.34, A351 GR CF8M, FLANGE END, TRIM NO.12      | 11   | 9    | 0       | 20           | EACH |
| 6          | A1G          | BALL VALVE         | V1            | 100  | BALL VALVE, CL 150, API 608/ASME B 16.34, A351 GR CF8M, FLANGE END, TRIM NO.12      | 2    | 3    | 0       | 5            | EACH |
| 7          | A1G          | GLOBE VALVE        | V7            | 25   | GLOBE VAVE, CL 800, BS5352/ASME B 16.34, A182 F316, SOCKET END, TRIM NO.12          | 2    | 2    | 0       | 4            | EACH |
| 8          | A1G          | GLOBE VALVE        | V7            | 40   | GLOBE VAVE, CL 800, BS5352/ASME B 16.34, A182 F316, SOCKET END, TRIM NO.12          | 1    | 5    | 0       | 6            | EACH |
| 9          | A1G          | GLOBE VALVE        | V7            | 50   | GLOBE VAVE, CL 150, BS1873/ASME B 16.34, A351 GR CF8M, FLANGE END, TRIM NO.12       | 2    | 0    | 0       | 2            | EACH |
| 10         | A1G          | GLOBE VALVE        | V7            | 80   | GLOBE VAVE, CL 150, BS1873/ASME B 16.34, A351 GR CF8M, FLANGE END, TRIM NO.12       | 1    | 0    | 0       | 1            | EACH |
| 11         | A1G          | GLOBE VALVE        | V7            | 100  | GLOBE VAVE, CL 150, BS1873/ASME B 16.34, A351 GR CF8M, FLANGE END, TRIM NO.12       | 0    | 1    | 0       | 1            | EACH |
| 12         | A1G          | GLOBE VALVE        | V7            | 150  | GLOBE VAVE, CL 150, BS1873/ASME B 16.34, A351 GR CF8M, FLANGE END, TRIM NO.12       | 2    | 2    | 0       | 4            | EACH |
| 13         | A1G          | CHECK VALVE        | V6            | 40   | LIFT CHECK VAVE, CL 800, BS5352/ASME B 16.34, A182 F316, SOCKET END, TRIM NO.12     | 0    | 2    | 0       | 2            | EACH |
| 14         | A1G          | CHECK VALVE        | V6            | 50   | SWING CHECK VAVE, CL 150, BS1868/ASME B 16.34, A351 GR CF8M, FLANGE END, TRIM NO.12 | 2    | 0    | 0       | 2            | EACH |
| 15         | A1G          | CHECK VALVE        | V6            | 100  | SWING CHECK VAVE, CL 150, BS1868/ASME B 16.34, A351 GR CF8M, FLANGE END, TRIM NO.12 | 2    | 2    | 0       | 4            | EACH |
| 16         | A1G          | FLUSH BOTTOM VALVE |               | 150  | AS PER RECORD DATA SHEET                                                            | 1    | 1    | 0       | 2            | EACH |
| 17         | B1G          | BALL VALVE         | V1            | 15   | BALL VALVE, CL 800, API 608/ASME B 16.34, A182 F304, SOCKET END, TRIM NO.12         | 6    | 6    | 0       | 12           | EACH |
| 18         | B1G          | BALL VALVE         | V1            | 25   | BALL VALVE, CL 800, API 608/ASME B 16.34, A182 F304, SOCKET END, TRIM NO.12         | 0    | 8    | 0       | 8            | EACH |
| 19         | B1G          | BALL VALVE         | V1            | 40   | BALL VALVE, CL 800, API 608/ASME B 16.34, A182 F304, SOCKET END, TRIM NO.12         | 0    | 6    | 0       | 6            | EACH |
| 20         | B1G          | BALL VALVE         | V1            | 50   | BALL VALVE, CL 150, API 608/ASME B 16.34, A351 GR CF8, FLANGE END, TRIM NO.12       | 3    | 0    | 0       | 3            | EACH |
| 21         | B1G          | BALL VALVE         | V1            | 80   | BALL VALVE, CL 150, API 608/ASME B 16.34, A351 GR CF8, FLANGE END, TRIM NO.12       | 6    | 3    | 0       | 9            | EACH |
| 22         | B1G          | GLOBE VALVE        | V7            | 25   | GLOBE VAVE, CL 800, BS5352/ASME B 16.34, A182 F304, SOCKET END, TRIM NO.12          | 0    | 2    | 0       | 2            | EACH |
| 23         | B1G          | GLOBE VALVE        | V7            | 50   | GLOBE VAVE, CL 150, BS1873/ASME B 16.34, A351 GR CF8, FLANGE END, TRIM NO.12        | 1    | 0    | 0       | 1            | EACH |
| 24         | B1G          | GLOBE VALVE        | V7            | 80   | GLOBE VAVE, CL 150, BS1873/ASME B 16.34, A351 GR CF8, FLANGE END, TRIM NO.12        | 0    | 1    | 0       | 1            | EACH |
| 25         | B1G          | CHECK VALVE        | V6            | 25   | LIFT CHECK VALVE, CL 800, BS5352/ASME B 16.34, A182 F304, SOCKET END, TRIM NO.12    | 0    | 2    | 0       | 2            | EACH |
| 26         | B1G          | CHECK VALVE        | V6            | 50   | SWING CHECK VAVE, CL 150, BS1868/ASME B 16.34, A351 GR CF8, FLANGE END, TRIM NO.12  | 2    | 0    | 0       | 2            | EACH |
| 27         | C1G          | BALL VALVE         | V1            | 15   | BALL VALVE, CL 800, API 608/AMSE B 16.34, A 105, SOCKET ENG, TRIM NO.1              | 0    | 0    | 16      | 16           | EACH |
| 28         | C1G          | BALL VALVE         | V1            | 25   | BALL VALVE, CL 800, API 608/AMSE B 16.34, A 105, SOCKET ENG, TRIM NO.1              | 0    | 0    | 4       | 4            | EACH |
| 29         | C1G          | GLOBE VALVE        | V7            | 25   | GLOBE VAVE, CL 800, BS5352/ASME B 16.34, A 105, SOCKET END, TRIM NO.1               | 0    | 0    | 4       | 4            | EACH |
| 30         | C1G          | GLOBE VALVE        | V7            | 50   | GLOBE VAVE, CL 150, BS1873/ASME B 16.34, A216 GR WCB, FLANGE END, TRIM NO.1         | 0    | 0    | 1       | 1            | EACH |

|            |              |                 |               | VALVE MTO |                                                                                   |      |      |         |              |      |
|------------|--------------|-----------------|---------------|-----------|-----------------------------------------------------------------------------------|------|------|---------|--------------|------|
| SR.<br>No. | PIPE<br>SPEC | DESCRIPTION     | VALVE<br>CODE | SIZE      | MATERIAL DESCRIPTION                                                              | 1438 | 1439 | UTILITY | TOTAL<br>QTY | UOM  |
|            |              |                 |               |           |                                                                                   | QTY  | QTY  | QTY     |              |      |
| 31         | C1G          | GLOBE VALVE     | V7            | 80        | GLOBE VAVE, CL 150, BS1873/ASME B 16.34, A216 GR WCB, FLANGE END, TRIM NO.1       | 0    | 0    | 8       | 8            | EACH |
| 32         | C1G          | GLOBE VALVE     | V7            | 100       | GLOBE VAVE, CL 150, BS1873/ASME B 16.34, A216 GR WCB, FLANGE END, TRIM NO.1       | 0    | 0    | 1       | 1            | EACH |
| 33         | C1G          | GLOBE VALVE     | V7            | 150       | GLOBE VAVE, CL 150, BS1873/ASME B 16.34, A216 GR WCB, FLANGE END, TRIM NO.1       | 0    | 0    | 2       | 2            | EACH |
| 34         | C1G          | BUTTERFLY VALVE | V4            | 50        | BUTTERFLY VALVE, CL 150, API 609/MFG. STD., DUCTILE IRON, WAFER END, RUBBER LINED | 0    | 0    | 1       | 1            | EACH |
| 35         | C1G          | BUTTERFLY VALVE | V4            | 80        | BUTTERFLY VALVE, CL 150, API 609/MFG. STD., DUCTILE IRON, WAFER END, RUBBER LINED | 0    | 0    | 8       | 8            | EACH |
| 36         | C1G          | BUTTERFLY VALVE | V4            | 100       | BUTTERFLY VALVE, CL 150, API 609/MFG. STD., DUCTILE IRON, WAFER END, RUBBER LINED | 0    | 0    | 1       | 1            | EACH |
| 37         | C1G          | BUTTERFLY VALVE | V4            | 150       | BUTTERFLY VALVE, CL 150, API 609/MFG. STD., DUCTILE IRON, WAFER END, RUBBER LINED | 0    | 0    | 2       | 2            | EACH |
| 38         | D1G          | BALL VALVE      | V1            | 100       | BALL VALVE, CL 150, API 608/ASME B 16.34, A216 GR WCB(IBR), FLANGE END, TRIM NO.1 | 0    | 0    | 2       | 2            | EACH |
| 39         | D1G          | BALL VALVE      | V1            | 150       | BALL VALVE, CL 150, API 608/ASME B 16.34, A216 GR WCB(IBR), FLANGE END, TRIM NO.1 | 0    | 0    | 2       | 2            | EACH |
| 40         | D1G          | GLOBE VALVE     | V7            | 100       | GLOBE VAVE, CL 150, BS1873/ASME B 16.34, A216 GR WCB(IBR), FLANGE END, TRIM NO.1  | 0    | 0    | 1       | 1            | EACH |
| 41         | D1G          | GLOBE VALVE     | V7            | 150       | GLOBE VAVE, CL 150, BS1873/ASME B 16.34, A216 GR WCB(IBR), FLANGE END, TRIM NO.1  | 0    | 0    | 1       | 1            | EACH |
| 42         | D1G          | GLOBE VALVE     | V8            | 15        | GLOBE VAVE, CL 800, BS5352/ASME B 16.34, A216 GR WCB(IBR), SOCKET END, TRIM NO.1  | 0    | 0    | 3       | 3            | EACH |
| 43         | D1G          | GLOBE VALVE     | V8            | 50        | GLOBE VAVE, CL 150, BS1873/ASME B 16.34, A216 GR WCB(IBR), FLANGE END, TRIM NO.1  | 0    | 0    | 18      | 18           | EACH |
| 44         | D1G          | GLOBE VALVE     | V8            | 80        | GLOBE VAVE, CL 150, BS1873/ASME B 16.34, A216 GR WCB(IBR), FLANGE END, TRIM NO.1  | 0    | 0    | 4       | 4            | EACH |
| 45         | D1G          | GLOBE VALVE     | V8            | 100       | GLOBE VAVE, CL 150, BS1873/ASME B 16.34, A216 GR WCB(IBR), FLANGE END, TRIM NO.1  | 0    | 0    | 3       | 3            | EACH |
| 46         | D1G          | GLOBE VALVE     | V8            | 150       | GLOBE VAVE, CL 150, BS1873/ASME B 16.34, A216 GR WCB(IBR), FLANGE END, TRIM NO.1  | 0    | 0    | 3       | 3            | EACH |
| 47         | D1G          | GLOBE VALVE     | V8            | 250       | GLOBE VAVE, CL 150, BS1873/ASME B 16.34, A216 GR WCB(IBR), FLANGE END, TRIM NO.1  | 0    | 0    | 3       | 3            | EACH |
| TOTAL QTY  |              |                 |               |           |                                                                                   | 77   | 88   | 88      | 253          |      |