

### **Quality requirements for Control Type Dampers - IOCL Haldia**

Vendor Quality Plan shall be submitted at the time of offer submission for BHEL review complying with the following minimum testing requirements -

1. Raw material : Carbon steel shall contain max 0.25% C ; UT for Rounds of dia > 40 mm (V)
2. Welding shall be as per enclosed Welding specification charts for the relevant Piping Class.
3. NDE requirement as per ASME Sec V (V)
  - a) 100% LPI on all welds
  - b) 5% RT or 10% UT on Butt welds
  - c) 20% MPI on fillet welds
4. Functional test (Open/close movement) - min 5 cycles ; Opening and Closing time as per Engg Specification (W)
5. Seal tightness test
  - a) Check type and Butterfly type - Sealing Efficiency as per Engg Specification (W)
  - b) Control type - Sealing Efficiency 100% ; Gas leak tight by seal air (W)
6. Dimension test (W)

V- refers to Verification ; W- Refers to Witness.

**WSC FOR PIPING CLASSES: A1A, B1A, D1A, E1A, F1A, A7A, A9A, B9A, D9A, A10A, A13A, B13A, A15A, A20A, A32A, K22A, K24A, K28A, B26**

|                                  |                                              |                                                                                                                                    |                            |                                      |
|----------------------------------|----------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|----------------------------|--------------------------------------|
| MATERIAL SPECIFICATIONS          | PIPES                                        | ASTM A106 GR.B, ASTM A 672 GR.B60 CL.12, ASTM A 672 GR.B60 CL.22, API 5L GR.B PSL1, IS-1239, IS-3589 GR.410, ASTM A 53 GR.B TYPE S |                            |                                      |
|                                  | FITTINGS                                     | ASTM A105, ASTM A 234 GR.WPB, ASTM A 234 GR.WPB-W, ASTM A 105 LINED WITH PTFE, API 5L GR.BPSL1                                     |                            |                                      |
|                                  | FLANGES                                      | ASTM A105, ASTM A105 WITH INTERNAL LINING                                                                                          |                            |                                      |
|                                  | OTHERS                                       | -                                                                                                                                  |                            |                                      |
|                                  |                                              |                                                                                                                                    |                            |                                      |
| BASE METAL 'P' NO                | 1                                            |                                                                                                                                    |                            |                                      |
| WELDING PROCESS                  | GROOVE JOINTS                                |                                                                                                                                    |                            |                                      |
|                                  | BUTT                                         |                                                                                                                                    | OTHER THAN BUTT            |                                      |
|                                  | ROOT PASS: GTAW/SAW (NOTE-1)                 | FILLER PASS: GTAW / SMAW                                                                                                           | ROOT PASS: GTAW / SMAW     | FILLER PASS: GTAW / SMAW             |
|                                  | FILLET JOINTS/ SOCKET JOINTS: SMAW           |                                                                                                                                    |                            |                                      |
|                                  |                                              |                                                                                                                                    |                            |                                      |
| WELDING MATERIALS                | GROOVE JOINTS                                |                                                                                                                                    |                            |                                      |
|                                  | BUTT                                         |                                                                                                                                    | OTHER THAN BUTT            |                                      |
|                                  | ROOT PASS: ER70S-2 / E6010                   | FILLER PASS: ER70S-2 / E7016 / E7018                                                                                               | ROOT PASS: ER70S-2 / E6010 | FILLER PASS: ER70S-2 / E7016 / E7018 |
|                                  | FILLET JOINT/SOCKET JOINT: E7016 / E7018     |                                                                                                                                    |                            |                                      |
|                                  | BACKING RING: -                              |                                                                                                                                    | CONSUMABLE INSERT: -       |                                      |
|                                  |                                              |                                                                                                                                    |                            |                                      |
| JOINT PREPARATION                | ASME B31.3                                   |                                                                                                                                    |                            |                                      |
|                                  |                                              |                                                                                                                                    |                            |                                      |
| GASES                            | PURGING: -                                   |                                                                                                                                    | SHIELDING: ARGON           |                                      |
| GAS COMPOSITION                  | PURGING: -                                   |                                                                                                                                    | SHIELDING: 99.995%         |                                      |
| PREHEATING (NOTE-3)              | PREHEAT TEMP: 10°C MIN/ 100°C FOR THK >25 mm |                                                                                                                                    | INTERPASS TEMP.: ----      |                                      |
| POST HEATING: --                 |                                              |                                                                                                                                    |                            |                                      |
| POST WELD HEAT TREATMENT         | HOLDING TEMP: ---                            |                                                                                                                                    | HOLDING TIME: ---          |                                      |
|                                  | RATE OF HEATING: ---                         |                                                                                                                                    | MIN. HOLDING TIME: ---     |                                      |
|                                  | METHOD OF COOLING: ---                       |                                                                                                                                    | RATE OF COOLING: ---       |                                      |
|                                  |                                              |                                                                                                                                    |                            |                                      |
| MECHANICAL PROPERTY REQUIREMENTS | CHARPY 'V' NOTCH VALUE:                      |                                                                                                                                    | MIN: -                     | AVERAGE: -                           |
|                                  | AT TEMPERATURE:                              |                                                                                                                                    | -                          |                                      |
|                                  | HARDNESS: 200 BHN MAX (NOTE-4)               |                                                                                                                                    |                            |                                      |
|                                  |                                              |                                                                                                                                    |                            |                                      |
| CODE OF FABRICATION              | ASME B31.3                                   |                                                                                                                                    |                            |                                      |

**TECHNICAL NOTES:**

- 1 THE ROOT PASS FOR SINGLE SIDE WELDING SHALL BE DONE BY GTAW PROCESS.
- 2 FOR PIPING SIZES 2" OD AND BELOW SHALL BE ENTIRELY WELDED BY GTAW PROCESS.
- 3 PRE-HEAT TEMPERATURE OF ATLEAST 50°C SHALL BE PROVIDED FOR THE FIRST TWO PASSES FOR THK>=12.5 mm & ≤25 mm.
- 4 PFA LINING SHALL BE RESTORED ON THE INTERNAL SURFACE OF THE WELD JOINT AFTER WELDING. EFFECTIVENESS OF THE RESTORATION PROCESS SHALL BE DEMONSTRATED DURING WELDING PROCEDURE QUALIFICATION.

WSC FOR PIPING CLASSES: **B1D, K34D**

|                                                      |                                                |                                                                          |                                  |                                                        |
|------------------------------------------------------|------------------------------------------------|--------------------------------------------------------------------------|----------------------------------|--------------------------------------------------------|
| MATERIAL SPECIFICATIONS                              | PIPES                                          | ASTM A 335GR.P11, ASTM A 691 GR.1.25CR CL.42                             |                                  |                                                        |
|                                                      | FITTINGS                                       | ASTM A 182GR.F11 CL.2, ASTM A 234 GR.WP11 CL.1, ASTM A 234GR.WP11-W CL.1 |                                  |                                                        |
|                                                      | FLANGES                                        | ASTM A 182GR.F11 CL.2.                                                   |                                  |                                                        |
|                                                      | OTHERS                                         | -                                                                        |                                  |                                                        |
|                                                      |                                                |                                                                          |                                  |                                                        |
| BASE METAL 'P' NO                                    | 4                                              |                                                                          |                                  |                                                        |
| WELDING PROCESS                                      | GROOVE JOINTS                                  |                                                                          |                                  |                                                        |
|                                                      | BUTT                                           |                                                                          | OTHER THAN BUTT                  |                                                        |
|                                                      | ROOT PASS: GTAW                                | FILLERPASS: GTAW/SAW (NOTE-1)                                            | ROOTPASS: GTAW                   | FILLER PASS: GTAW/SAW                                  |
|                                                      | FILLET JOINTS/ SOCKET JOINTS: SMAW             |                                                                          |                                  |                                                        |
|                                                      |                                                |                                                                          |                                  |                                                        |
| WELDING MATERIALS                                    | GROOVE JOINTS                                  |                                                                          |                                  |                                                        |
|                                                      | BUTT                                           |                                                                          | OTHER THAN BUTT                  |                                                        |
|                                                      | ROOT PASS: ER70S-B2L/ ER80S-B2                 | FILLER PASS: ER70S-B2L / ER80S-B2/ E7016-B2L/ E7018-B2L                  | ROOT PASS:ER70S-B2L/ ER80S-B2    | FILLER PASS: ER70S-B2L/ ER80S-B2/ E7016-B2L/ E7018-B2L |
|                                                      | FILLET JOINT/SOCKET JOINT: E7016-B2L/E7018-B2L |                                                                          |                                  |                                                        |
|                                                      | BACKING RING: -                                |                                                                          | CONSUMABLE INSERT: -             |                                                        |
|                                                      |                                                |                                                                          |                                  |                                                        |
| JOINT PREPARATION                                    | ASME B31.3                                     |                                                                          |                                  |                                                        |
|                                                      |                                                |                                                                          |                                  |                                                        |
| GASES                                                | PURGING: -                                     |                                                                          | SHIELDING: ARGON                 |                                                        |
| GAS COMPOSITION                                      | PURGING: -                                     |                                                                          | SHIELDING: 99.995%               |                                                        |
| PREHEATING                                           | PREHEAT TEMP: 150°C MIN                        |                                                                          | INTERPASS TEMP.: ---             |                                                        |
| POST HEATING: AS PER WELDING SPECIFCAITON FOR PIPING |                                                |                                                                          |                                  |                                                        |
| POST WELD HEAT TREATMENT (NOTE-2)                    | HOLDING TEMP: 650-705°C                        |                                                                          | HOLDING TIME: 1HOUR PER INCH THK |                                                        |
|                                                      | RATE OF HEATING: 200°C/HR MAX                  |                                                                          | MIN. HOLDING TIME: 2HRS          |                                                        |
|                                                      | METHOD OF COOLING: CONTROLLED                  |                                                                          | RATE OF COOLING: 200°C/HR MAX    |                                                        |
|                                                      |                                                |                                                                          |                                  |                                                        |
| MECHANICAL PROPERTY REQUIREMENTS                     | CHARPY 'V' NOTCH VALUE:                        |                                                                          | MIN: -                           | AVERAGE: -                                             |
|                                                      | AT TEMPERATURE:                                |                                                                          | -                                |                                                        |
|                                                      | HARDNESS: 225 BHN MAX (NOTE-2)                 |                                                                          |                                  |                                                        |
|                                                      |                                                |                                                                          |                                  |                                                        |
| CODE OF FABRICATION                                  | ASME B31.3                                     |                                                                          |                                  |                                                        |

TECHNICAL NOTES

- FOR PIPING SIZES 2" OD AND BELOW SHALL BE ENTIRELY WELDED BY GTAW PROCESS.
- PWHT SHALL BE DONE FOR ALL WALL THICKNESSES AND POST HEAT TREATED HARDNESS OF WELD SHALL NOT EXCEED 225 BHN. ANY KIND OF ATTACHMENTS ON SUCH PIPING SHALL BE STRESS RELIEVED AND SHALL ALSO MEET THE HARDNESS LIMIT.

WSC FOR PIPING CLASSES: **A1N, B1N, K42N**

|                                  |                                        |                                                                      |                             |                                   |
|----------------------------------|----------------------------------------|----------------------------------------------------------------------|-----------------------------|-----------------------------------|
| MATERIAL<br><br>SPECIFICATIONS   | PIPES                                  | ASTM A 312 TP316L, ASTM A 358 TP316L CL.1                            |                             |                                   |
|                                  | FITTINGS                               | ASTM A 182 GR.F316L, ASTM A 403 GR.WP316L-S, ASTM A 403 GR.WP316L-WX |                             |                                   |
|                                  | FLANGES                                | ASTM A 182 GR.F316L                                                  |                             |                                   |
|                                  | OTHERS                                 | -                                                                    |                             |                                   |
|                                  |                                        |                                                                      |                             |                                   |
| BASE METAL 'P' NO                | 8                                      |                                                                      |                             |                                   |
| WELDING PROCESS                  | GROOVE JOINTS                          |                                                                      |                             |                                   |
|                                  | BUTT                                   |                                                                      | OTHER THAN BUTT             |                                   |
|                                  | ROOT PASS: GTAW                        | FILLERPASS: GTAW/SAW                                                 | ROOTPASS: GTAW              | FILLER PASS: GTAW/SAW             |
|                                  | FILLET JOINTS/ SOCKET JOINTS: SMAW     |                                                                      |                             |                                   |
|                                  |                                        |                                                                      |                             |                                   |
| WELDING MATERIALS                | GROOVE JOINTS                          |                                                                      |                             |                                   |
|                                  | BUTT                                   |                                                                      | OTHER THAN BUTT             |                                   |
|                                  | ROOT PASS: ER316L                      | FILLER PASS: ER316L / E316L-15/16                                    | ROOT PASS: ER316L           | FILLER PASS: ER316L / E316L-15/16 |
|                                  | FILLET JOINT/SOCKET JOINT: E316L-15/16 |                                                                      |                             |                                   |
| BACKING RING: -                  |                                        | CONSUMABLE INSERT: -                                                 |                             |                                   |
|                                  |                                        |                                                                      |                             |                                   |
| JOINT PREPARATION                | AS PER ASME B31.3                      |                                                                      |                             |                                   |
|                                  |                                        |                                                                      |                             |                                   |
| GASES                            | PURGING: ARGON                         |                                                                      | SHIELDING: ARGON            |                                   |
| GAS COMPOSITION                  | PURGING: 99.995%                       |                                                                      | SHIELDING: 99.995 %         |                                   |
| PREHEATING                       | PREHEAT TEMP: 10 °C                    |                                                                      | INTER PASS TEMP.: 175°C MAX |                                   |
| POST HEATING: ---                |                                        |                                                                      |                             |                                   |
| POST WELD HEAT TREATMENT         | HOLDING TEMP: -                        |                                                                      | HOLDING TIME: -             |                                   |
|                                  | RATE OF HEATING: -                     |                                                                      | MIN. HOLDING TIME: -        |                                   |
|                                  | METHOD OF COOLING: -                   |                                                                      | RATE OF COOLING: -          |                                   |
|                                  |                                        |                                                                      |                             |                                   |
| MECHANICAL PROPERTY REQUIREMENTS | CHARPY 'V' NOTCH VALUE:                |                                                                      | MIN: -                      | AVERAGE: -                        |
|                                  | AT TEMPERATURE:                        |                                                                      | -                           |                                   |
|                                  | HARDNESS: -                            |                                                                      |                             |                                   |
|                                  |                                        |                                                                      |                             |                                   |
| CODE OF FABRICATION              | AS PER ASME 31.3                       |                                                                      |                             |                                   |

TECHNICAL NOTES:

- FOR PIPING SIZES 2" OD AND BELOW SHALL BE ENTIRELY WELDED BY GTAW PROCESS.