

Dt: 01-02-2023

CASING FABRICATION - SCOPE OF WORK

W.O.No. : 1043000800
CUSTOMER : NRL WET GAS
DISCRIPTION : CASING 2MCL1007

Volumetric dims (LxBxH) UP+LP : 4000x2860X3215 mm
Upper Part (LxBxH) : 4000x2860x1215 mm
Lower Part (LxBxH) : 4000x2860x2000 mm
Weight of the Job (UP+LP) : 30880 kgs
Weight of the Job (UP) : 12410 kgs
Weight of the Job (LP) : 18470 kgs

Component Drawings:

Fabricated assly drg : 03310700032-00
(Refer WBOM for component drg)

In-house Facilities required for Pre fabrication machining and Fabrication-

1. Horizontal-Boring machine (spindle dia 160 to 200) with vertical indexing head.
2. Conventional Vertical lathe table dia 4 meter (OMA 40)
3. CNC vertical boring machine table dia 1.2 meter.
4. EOT Crain 30 Tons for handling the job.
5. Plate rolling machine (max thickness of plate -70 mm, Rolling inside dia 2290 mm)
6. Edge planning machine (45x60 degree)
7. CNC Gas cutting facilities (for plate thickness upto 220 mm)
8. Welding facilities –Submerged Arc Welding

Facilities required for Pre fabrication machining and Fabrication which can be outsourced from BHEL approved vendors –

1. Facilities to carry out RT, MPI and UT for weld joint.
2. Furnace for Stress Relieving (Furnace chamber size min- 5000x4000x3000 mm).

CUTTING TOOLS & FIXTURE

1. HSS long twist drill -
 - Dia 75 (Min working length 600 mm)
 - Dia 63 (Min working length 700 mm)
 - Dia 50 (Min working length 400 mm)

- Dia 42 (Min working length 730 mm)
- Dia 38 (Min working length 700 mm)
- Dia 27 (Min working length 700 mm)
- Dia 32 (Min working length 400 mm)

2. Suitable Fixture/support for clamping the End cover on vertical indexing table for Oil & Gas hole drilling.

Note: Special Tools and fixture will be in vendor scope.

CHECK LIST / GUIDE LINES DURING FABRICATION

- 1.** Dimension indicated are without considering finish machining allowance at the parting plane. Finish machining allowance of 10 to 15 mm at all the parting plane shall be ensured during fitment, assembly and welding stage.
- 2.** Dimension indicated are without considering finish machining allowance at the parting plane. Finish machining allowance of 10 mm at all the parting plane shall be ensured during machining stage in case of end cover TB & OTB side.
- 3.** All the Oil & Gas hole in End cover (TB & OTB side) shall be drilled and cleaned before assembly of end cover to casing.
- 4.** For dimension not tolerated <3150: Deviation JS15/js15
For bigger dimension of 3150 :+/-5
- 5.** All the plate shall be subjected to 100% UT as per **std A435/A435M** before cutting.
- 6.** The casing envelope length must be defined **taking into account the welding shrinkage.**
- 7.** Two plates issued for casing envelope shall be welded first to form a single plate and casing envelope shall be rolled out of that single plate.
- 8.** Casing envelope shall be welded to rounded bottom as per drg. 23310700053-00 and casing envelope with rounded bottom shall be cut into two half as per assembly drg. 03310700032-00.
- 9.** DP check should be done on parting plane flange weld edge preparation.
- 10.** Assembly of Fabricated casing is to be done in two halves i.e upper part separately and lower part separately & can be done parallel also.
- 11.** Dimension are to be checked intermittently during welding and rectified the ovality if any and continue welding. (**Max. ovality permitted 1 mm**)
- 12.** Welding should be carried out as per **WPS -WE001.**
- 13.** Use only qualified welder.
- 14.** Carry out LP test after welding the root layers on each butt weld joint to ensure sound weld.
- 15.** Use the proper auxiliary stiffener and supports during fit up and welding to minimize the distortion.
- 16.** All welds shall be checked for **100% Radiography** as per std. **TC72062.**
- 17.** Wherever 100 % Radiography is not feasible all welds shall be subjected to **100 %**

UT as per std. **TC72063**.

18. All weld (Butt and Fillet) shall be checked for **100% MPI** as per std **TC72060**.

19. Witness of NDT test of weld joint by BHEL/BHEL appointed TPIA

20. Final inspection i.e., dimensional check-up of upper part and lower part, visual inspection by M/s. BHEL or BHEL appointed Third party and acceptance to release for Stress relieving.

21. Stress relieving of both halves as per BHEL std. **HY0640763**.

22. Final Inspection i.e. dimensional and Visual and Review of Test certificate by BHEL.

23. Casing shall be marked for all machining allowances before dispatching to BHEL.

24. Vendor should submit all relevant documents /Reports to BHEL during the dispatch of the job.

25. Ensure the all free issued materials against part nos. in the WMBOM before fit up and welding.

List of activities involved in the fabrication of casing:

1. Dished end (Machining drg 33310700097-00)

Machining of Dished end and weld edge preparation.

2. Shell Envelope (Drg. no. 23310700054-00)

1. Gas cutting of plates (THICK 70 MM)

2. Weld edge preparation as per detail-B

3. Welding of plates to make it single plate

4. Rolling of plate (**thickness 70 mm**) to inside dia 2290 mm

5. Welding of two edges.

6. Providing the stiffener as per drawing.

7. Machining and weld edge preparation as per Detail-A (Drg.23310700054-00)

3. Upper and Lower end cover TB side(03310700031-00) and OTB side(03310700029-00)

1. Machining of parting plane with 10mm allowance.

2. Machine to rough size as per drg 33310700087-00,33310700098-00,33310700089-00 & 33310700090-00

3. Milling of two side maintaining total width 540 in upper half as per drg 33310700087-00 & 33310700089-00

4. Drilling of oil & Gas holes as per drawing 0-331-07-00031 and 0-331-07-00029.

4. Parting plane Flanges (Drg.13310700036-00 & 13310700037-00)

1. Machining of the all sides, thickness, lifting lugs as per drg.
2. Machine weld bevel as per drg . Detail-D and Sec A-A.
3. Dye penetrant check of weld edge as per TC72061.

5. Fabrication of nozzles(13310700032-00,13310700033-00,13310700034-00 & 13310700035-00)

1. Bending of plate to make half pipe as per drg 33310700094-00,33310700095-00,33310700096-00 & 43310700123.
2. Assembly of two half pipe with rib and welding of cone and rib
3. Weld edge preparation in cone and nozzle flange.
4. Welding of cone with nozzle flange.
5. Post weld NDT inspection.

6. Counter casing fixing ring(drg33310700099-00 , 33310700100 & 43310700132-00)

1. Assembly of fixing ring and welding
2. Machining of Inside & Outside dia

7. ASSEMBLY(drg no. 03310700032-00)

1. Assembly of casing envelope to rounded bottom-dished end (Item 1 to Item 2) drg no23310700053-00.
2. Welding of casing envelope to rounded bottom
3. NDT test
4. Slitting of casing envelope with rounded bottom into two half to accommodate parting plane flanges.
5. Weld edge preparation post slitting

8. ASSEMBLY OF TOP:(drg no. 03310700032-00)

1. Assembly of End cover upper half (TB & OTB side) to top half
2. Tracing of rounded bottom profile and shell profile on the parting plane flange and cutting of the profile
3. Assembly of casing envelope with rounded bottom and end cover to parting plane flanges
4. Welding of casing envelope with rounded bottom to end cover (TB & OTB side).
5. Welding of weldment to parting plane flanges
6. Reverse the job.

7. welding from inside
8. Cutting and matching of Inlet rib on Suction side & welding
9. Assembly of Counter casing fixing ring to top half and welding
10. Post weld NDT inspection.

**9. ASSEMBLY OF BOTTOM:(drq
no 03310700032-00)**

1. Assembly of End cover lower half (TB & OTB side) to bottom half
2. Tracing of rounded bottom profile and shell profile on the parting plane flange and cutting of the profile
3. Assembly of casing envelope with rounded bottom and end cover to parting plane flanges
4. Welding of casing envelope with rounded bottom to end cover (TB & OTB side).
5. Welding of weldment to parting plane flanges
6. Reverse the job
7. welding from inside
8. Transfer the shell profile on to the nozzles and gas cut
9. Assemble the nozzles to the shell and transfer the inside dia. of the nozzles to shell and gas cut
10. Prepare the weld edge
11. Assembly of nozzles to shell and welding.
12. Assembly of Counter casing fixing ring to bottom half and welding
13. Assembly of guide block (pos no. 18 & 19) to Suc nozzle and welding
14. Post weld NDT inspection.
15. Stress-relieving

Enclosure:

- 1) NDT requirement.

Shesh Kumar
Manager/TC Technology

NDT REQUIREMENTS OF BHEL FOR THE FABRICATION OF NRL WET GAS COMPRESSOR CASING

WBS.NO: P-1043000800-33107

SL.NO	JOINT DETAILS	ITEM NOS	DRG REF	BHEL NDT REQUIREMENT
1.	SHELL TO DISHED END	ITEM NO 1&2	23310700053-00	X-RAY & MPI
2.	(SHELL+DISHED END) TO ENDCOVERS UPPER HALF	ITEM NO 1&2 TO ITEM NO 3 & 6	03310700032-00	X-RAY & MPI
3.	(SHELL+DISHED END) TO ENDCOVERS LOWER HALF	ITEM NO 1&2 TO ITEM NO 3 & 6	03310700032-00	X-RAY & MPI
4.	(SHELL+DISHED END+ ENDCOVERS) TO PARTING PLANE FLANGES UPPER HALF	ITEM NO 1,2,3,6 TO ITEM NO 9	03310700032-00	UT & MPI
5.	(SHELL+DISHED END+ ENDCOVERS) TO PARTING PLANE FLANGES LOWER HALF	ITEM NO 1,2,3,6 TO ITEM NO 10	03310700032-00	UT & MPI
6.	40" NOZZLE TO LOWER HALF (SHELL+DISHED END+ ENDCOVERS+PP FLANGES)	ITEM NO 11 TO ITEM NO 1,2,3,6 & 10	03310700032-00 & 13310700032-00	UT & MPI
7.	20" NOZZLE TO LOWER HALF (SHELL+DISHED END+ ENDCOVERS+PP FLANGES)	ITEM NO 12 TO ITEM NO 1,2,3,6 & 10	03310700032-00 & 13310700033-00	UT & MPI
8.	24" NOZZLE TO LOWER HALF (SHELL+DISHED END+ ENDCOVERS+PP FLANGES)	ITEM NO 15 TO ITEM NO 1,2,3,6 & 10	03310700032-00 & 13310700034-00	UT & MPI
9.	10" NOZZLE TO LOWER HALF (SHELL+DISHED END+ ENDCOVERS+PP FLANGES)	ITEM NO 16 TO ITEM NO 1,2,6 & 10	03310700032-00 & 13310700035-00	UT & MPI
10.	6" NOZZLE TO LOWER HALF (SHELL+DISHED END+ ENDCOVERS+PP FLANGES)	ITEM NO 17 TO ITEM NO 1,2,3,6 & 10	03310700032-00 & 43310701002-00	UT & MPI
11.	40" NOZZLE JOINTS DETAIL- D & DETAIL- E	ITEM NO 2 TO 2 AND 2 TO 1 OF Drg.no.13310700032-00	DETAIL D & DETAIL E 13310700032-00	X-RAY & MPI
12.	20" NOZZLE JOINTS DETAIL- D & DETAIL- E	ITEM NO 2 TO 2 AND 2 TO 1 OF Drg.no.13310700033-00	DETAIL -D & DETAIL-E 13310700033-00	X-RAY & MPI
13.	24" NOZZLE JOINTS DETAIL -B & DETAIL -C	ITEM NO 2 TO 2 AND 2 TO 1 OF Drg.no.13310700034-00	DETAIL -B & DETAIL C 13310700034-00	X-RAY & MPI
14.	10" NOZZLE JOINTS DETAIL G ,DETAIL C & DETAIL F	ITEM NO 3 TO 3 AND 3 TO 2 AND (3+2) TO 1 OF Drg.no.13310700035-00	DETAIL G ,DETAIL C & DETAIL F 13310700035-00	X-RAY & MPI
15.	SHELL TO COUNTER CASING FIXING RING	ITEM NO 20,21, 22 TO ITEM 1 OF DRG NO. 03310700032-00	SEC A-A 03310700032-00	MPI

NOTE: 1. MAGNETIC PARTICAL TEST (MPI) IS TO BE DONE ON ALL BUTT WELDS & FILLET WELDS

2. VERIFICATION OF X-RAY FILMS BY BHEL/BHEL'S TPIA

3. VERIFICATION OF ALL TEST RECORDS BY BHEL