

ANNEXURE-1

Dt: 21-05-20201

SCOPE OF WORK FOR 2D IMPELLER SCOOP MILLING

W.O. No.: 1044302300

CUSTOMER: IOCL BARUNI OHC, BCL 308A

DESCRIPTION: 2D IMPELLER SCOOP MILLING

Raw material weight for impeller: 83 kg.

Weight of impeller after rough turning: 32 kg.

Weight of the scrap in rough turning for impeller: 51 kg.

Weight of impeller after vane milling: 24.5 Kg.

Weight of scrap of impeller in vane milling: 7.5 kg.

Weight of the raw material for mock up piece of impeller: 63 kg.

Weight of mockup piece after rough turning: 32 kg.

Weight of the scrap for mock up piece in rough turning: 31 kg.

Weight of mockup piece after vane milling: 30.5 kg.

Weight of scrap for mock up in vane milling: 1.5 kg.

Impeller Drawings:

Mock up piece for all impellers: 33320800023-00

Impeller ϕ 310 L3 - CCW with balancing groove (For HY19391): 13320805166-00

Impeller ϕ 310 L3 - CCW (For HY19391): 13320805167-00

Facilities required for Scoop milling of 2D impellers:

1. 5 Axis CNC machining center: (Brief specification to be submitted)
 - a. Pallet size: 600X600 mm (min).
 - b. Load carrying capacity: 120 kg (min).
2. 3D CMM for inspection of the impeller vane after vane milling: (Brief specification to be submitted)
 - a. Diameter of the job that can be inspected: 600 mm (min).
 - b. Height of the job that can be inspected: 180 mm (min).
 - c. The weight of the finished job to be inspected: 200 kg (min).
3. Facilities for machining the 85 X 12 X 5 mm slot before mounting on the 5 axis machine for vane milling.
4. CAM software for CNC programming: (Details to be submitted).
5. Inspection software for 3D CMM: (Details to be submitted).

CUTTING TOOLS:

For roughing: Lollipop end mill cutters, Ball nose cutters or end mills

For finishing: Taper ball nose cutters R2, Centering and Clamping fixtures.

SCOPE OF WORK:

1. Scoop milling of 3 vanes on the mock up piece for the impellers:
33320800023-00.
2. Inspection of the vane profile on 3D CMM and approval from BHEL.
3. Scoop milling of all the 17 vanes on the 1st impeller: 13320805166-00.
4. Inspection of vane profile of 3 vanes, 120 degrees apart, on 3D CMM and submission of the inspection report to BHEL.
5. Scoop milling of all the 17 vanes on the 2nd impeller: 13320805167-00.
6. Inspection of vane profile of 3 vanes, 120 degrees apart, on 3D CMM and submission of the inspection report to BHEL.

CAD model	BHEL scope
CNC Programming	Vendor scope
All tooling & fixtures	
Inspection on 3D CMM	

NOTE:

1. **The inspection on 3D CMM may be outsourced. Relevant documents of the tie up have to be submitted.**

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