



**SPECIFICATIONS FOR CONVERSION  
BY RING ROLLING**  
CENTRAL FOUNDRY FORGE PLANT  
BHEL, RANIPUR, HARDWAR

NO.	FTECH/ ULABY
DATE	27-08-2013
REV	00
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**1.0 Description :**

This specification governs the quality requirements alloy steels rings, ring rolled on ring rolling machine from ingots/ cake supplied by CFFP.

**2.0 Scope of Work :**

2.1 The supplier is to convert the ingots/ cake size to the rings by ring rolling operation. The item for ring rolling and the cake size are mentioned as below:

SNo	Delivery after Ring Rolling & machining				CFFP Bloom/ Cake		
	OD (mm)	ID (mm)	Thickness (mm)	Wt. (Kg)	Dia (mm)	Length (mm)	Wt. (Kg)
1	3530 <sup>+5/-0</sup>	3145 <sup>+0/-5</sup>	180 <sup>+5/-0</sup>	2855	700 <sup>+5/-0</sup>	1340 <sup>+10/-0</sup>	4045

2.2 Delivery Condition of the item: CFFP supplied cake / bloom/ Ingot will be return after ring rolling, subcritical annealing and rough machining.

**3.0 Chemical Composition :**

Actual chemical composition of the item will be intimated to supplier before sending the material for ring rolling operation. However, the chemistry of the cake/ blooms will be within the limits given below:

(All figures are in %)

Grade		C	S	P	Si	Mn	Ni	Cr	Mo
ASTM 473M	Min.	---	----	----	---	0.50	3.50	11.50	0.50
Type 41500	Max.	0.05	0.030	0.030	0.60	1.00	5.50	14.00	0.80

**4.0 Process :**

Heating For Forging: Due care will be taken in loading the forging in the reheating Furnace. Ingots/ cakes/ bloom should be rest on the furnace stands of approx. size 400 x 400mm which is laid on the Reheating furnace. Care should be taken to avoid flame impingement on the ingots/ cakes/ bloom. The heating rate should be selected in such a way that cracks due to excessive thermal shock will not occur. Sufficient soaking time will be given to ensure uniform temperature is obtained across the cross section of Forging. Overheating and Burning during heating is not acceptable.

**5.0 Forging and Ring Rolling :**

*The Upsetting/indenting/Punching must be carried out on hydraulic forging press of sufficient capacity.* Ring Rolling operation shall be carried out on Continuous Ring Rolling machine. End Temperature of Rolling operation must be reported and shall lie in the range of 900-800°C.

Reduction ratio achieved in each forging operation may also be furnished. Actual dimensions and ovality if any after ring rolling shall be measured and recorded.



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**6.0 Heat Treatment:**

Forgings after ring rolling shall be collected and charged in furnace held at 750  $\pm 20$  °C and control cooled at 15°C (max) to < 50°C, then to be subcritical annealed at 760  $\pm 10$  °C, followed by air cooling. Soaking at 760°C shall be of minimum 4 Hrs.

Hardness shall be carried out on each rings (at three locations 120 apart on both faces of the forging). The variation on hardness shall not be greater than 20 BHN.

**7.0 Hardness :**

Hardness of each forging shall be measured on minimum of three place 120° apart on both ends of the ring. The difference between three values for the rings shall not exceed 20 BHN.


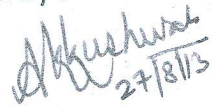

**8.0 Inspection :**

- i. Heat Treatment charts.
- ii. Dimension. The Ring rolling forging must be free from cracks and overlapping.
- iii. Random verification of chemistry (spectro analysis), after completion of process, will done by CFFP-inspector.
- iv. CFFP Reserves the right to witness the process at supplier work's.

**9.0 Marking and Packing :**

Before sending the Ring Rolled forging to CFFP following to be punched on each forging

- i. Forge Number
- ii. Heat Number
- iii. Item name

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