

**Brief description for Transfer of Technology
on
“DMR-249A Grade Steel Bulb Bars for Naval Applications”**

i. Description of the technology

Bulb bars are used as stiffeners in shipbuilding, especially in naval construction. They are long products with an asymmetric cross-section (see Figure below) that are produced by hot rolling using semi-rolled continuous cast slabs or billets from authorized manufacturers as feedstock. The manufacturing process is fairly complex and involves multiple steps including roll pass design, actual rolling, and subsequently heat treatment. The bulb bars have to meet stringent geometrical, dimensional, physical and metallurgical requirements. Eleven different sections of bulb bars ranging from P6 to P24 (Fig. a) have been developed and productionized in lengths up to 12m. The number following P is the base width of the bulb bar section given in cm ('h' in Fig. a).

Figure: (a) Schematic of bulb bar cross-section indicating the main sectional parameters, (b) sample piece of bulb bar, (c) relative sizes of the eleven sections required, and (d) stacks of painted bulb bars ready for dispatch

Table: Dimensions of representative bulb bars					
Bulb Section	Bar	h (mm)	b (mm)	s (mm)	r, r1, r2 (mm)
P7		70	21	5.0	3.5
P12		120	30	6.5	5.0
P24a		240	52	12.0	9.0
P24b		240	54	14.0	9.0

During the initial development, DMRL has worked in close coordination with the manufacturing agency for heat treatment optimization, straightening, microstructural evaluations etc. to meet the strict requirements i.e. mechanical properties, dimensional tolerances and other criteria.

The vendor has to develop the roll pass design on his own for converting the feedstock to the bulb bars to meet dimensional requirements.

Bulb bars have been accepted by the competent authority of Indian Navy and a Naval Construction Document: NCD 0249 Part-III Issue 1, April 2011 has been issued by Directorate of Naval Architecture (DNA), Integrated Headquarters (IHQ), MOD (Navy).

DMR 249A steel Bulb bars are currently in routine production at approved vendors for use in construction and repair/refit of warships for the Indian Navy.

ii. Application areas

The bulb bars find use in construction and repair/refit of warships.

iii. Its USP-such as certifications and test results etc.

DMR249A bulb bars manufactured by two authorized vendors have met all requirements qualifying them for use in warship construction. The bulb bars produced by one vendor have also been certified through a more rigorous process for use in submarine applications.

iv. Photographs at appropriate places on the technology developed (if available)

