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420 MPa and 500 MPa Yield Strength Steel Plates with High HAZ Toughness Produced by TMCP for Offshore Structures

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Synopsis :
Steel plates for offshore structures with satisfactory welded joint toughness were produced by both continuous casting and thermo-mechanical control processes. These plates were 101.6 mm thick with YP 420 MPa fo r large structures, 60 mm thick with YP 420 MPa for arctic use, and the 50 mm thick with YP 500 MPa. The chemical

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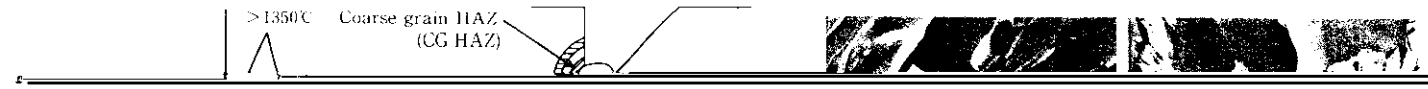
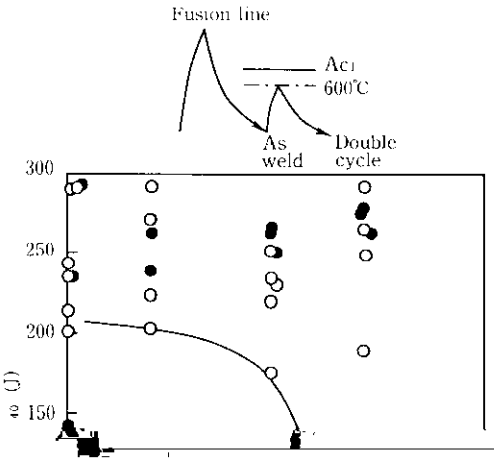
Table 1 Target properties of the steel plates and the welded joints

Steel	Plate thickness (mm)	Steel plate			Welded joint		
		[illegible]	[illegible]	V Charpy absorbed	Welding	Heat input	CTOD value


>1350℃
Coarse gram HAZ
(CG HAZ)

[redacted]



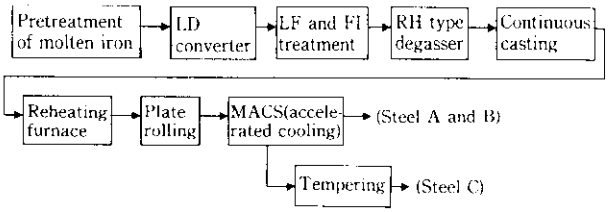
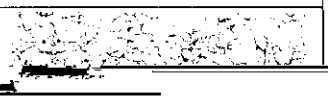


Fig. 6 Manufacturing process of steel plates

levels and REM was added. The steel was then continuously cast into 310-mm-thick slabs. In the plate rolling process, each slab was reheated to a moderately high

Steel	Thick-ness (mm)	25μm
		

was investigated by the Y-groove cracking test specified in JIS Z3158.

The preheating temperature without cracking was lower than 25°C for steels A and B, and 25°C for steel

that the changes of 50% HATT and threshold

5 Welded Joint Properties

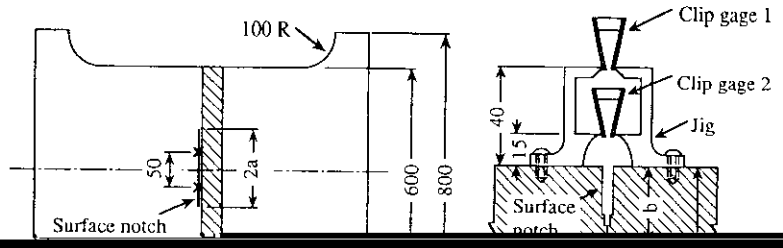
5.2 Basic Properties of Welded Joints

The results of tensile tests and Charpy impact tests at

In the case of steel B being welded with a heat input

of 19.3 kJ/mm, the absorbed energy met or exceeded

Nakano et al.[10] and Yajima et al.,[11] a CTOD value of


100 R
Clip gage 1
Clip gage 2
Jig
40
15
50
2a
600
800
Surface notch
Surface notch
b

6 Conclusions

On the basis of fundamental studies to improve the

References

1) E. Kobayasi, S. Deshimaru, I. Hirai, T. Ogawa, K. Amano, and Y. Nakano: *Kawasaki Steel Giho.* **19**(1987)2. 105–110