KAWASAKI STEEL GIHO
Vol.21 (1989) No.1

70 80kgf/mm2

Development of Controlled-Rolled 70 kgf/mm2 and 80 kgf/mm2 Class High Tensile Strength Steel Plate for Weld Structure

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:

HT 70 (25.4mm) HT 80 (12.7mm)
TiC
Ceq
HT 80

Synopsis :
To meet demands for higher strength steel plates for construction machines with excellent cold formability and weldability, as-rolled HT 70 steel plates (TS: 686 MPa) having a maximum thickness of 25.4 mm and as-rolled HT80 (TS: 784 MPa) steel plates of 12.7 mm thickness have successfully been developed by using a plate mill. Both precipitation hardening and inhibition of recovery of deformed ferrite are maximized by optimizing ferrite and austenite dual-phase region rolling. Consequently, strength of the plate has been much increased without deteriorating toughness for lower Ceq. The cold formability of the developed steels is superior to that of conventional as-hot-rolled HT80. Weldability tests have shown that the steels developed have good impact properties at welded HAZ and do not need pre-heating in weld fabrication. The fatigue limit of the steels with mill scale is slightly higher than 50% of its TS, indicating the same behavior as that of the conventional HT 80.

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溶接構造用非調質 HT70 および HT80 kgf/mm² 鋼の開発*

川崎製鉄技報
21 (1989) 1, 19-25

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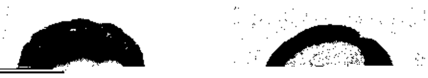


要旨

建設産業機械の軽量化，大型化を図る目的で，溶接性および冷間

Table 1 Chemical compositions of steels

[illegible]

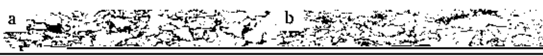
Steel	C	Si	Mn	P	S	Al	Nb	Ti	N	C_{eq}*1	P_{cm}*2
1	0.10	0.24	1.79	0.015	0.003	0.042	0.039	0.14	0.007	0.40	0.198
2	0.10	0.25	1.80	0.013	0.005	0.038	0.041	0.005	0.004	0.40	0.196

*1 $C_{eq}=C+Mn/6+(Cr+Mo+V)/5+(Cu+Ni)/15$

*2 [illegible]

[illegible]

a b



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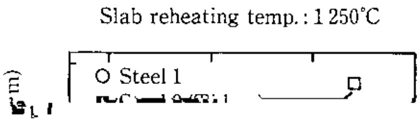

Slab reheating temp. : 1 250°C
O Steel 1

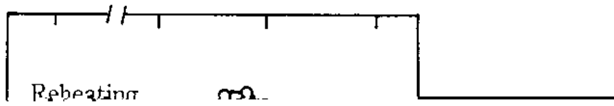

Reheating

Table 2 Aimed properties of steel plates

Steel	Thick. (mm)	Tensile properties (T-direction)		Bending property*1	Impact properties*2 (L-direction)	
		YS (kgf/mm²) (MPa)	TS (kgf/mm²) (MPa)	Test condition	Test temp. (°C)	Av. absorbed energy (kgf·m) (J)

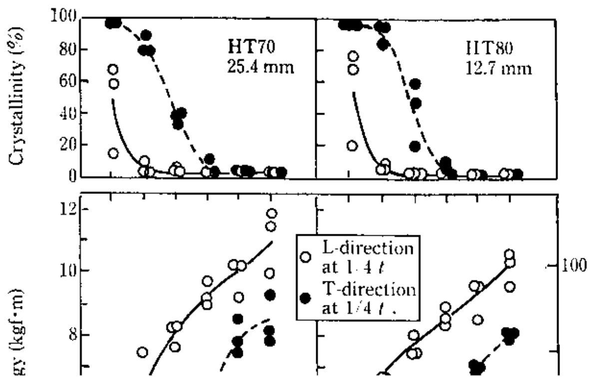
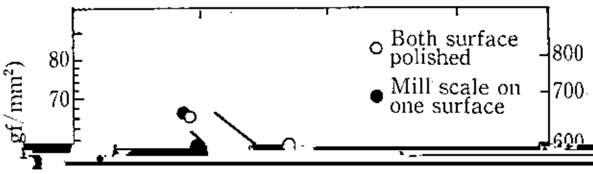


Table 5 Test conditions for cold bending

Steel	Specimen			Bending			Evaluation
	Size (mm)	Direction	Edge preparation	Method	Angle	Direction	Crack length
			As flame cut				
[illegible]							

Table 9 Mechanical properties of welded joints



（1） （α+γ）2 相域圧延の最適化により，TiC の歪誘起析出および加工 α の回復抑制効果が重なり，靱性の劣化なしに高強度化が可能となる。

（2） 上記効果を実現するにはスラブ加熱時に TiC を溶解させ，