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7% Ni 5ð b * 8 ö _ > | p M Cu b s8j
Effect of Cu Addition on the Low Temperature Notch-Toughness of 7% Ni Steel

+ê2z %i k(Tokushi Funakoshi) š Ì ([Yoshihiro Kajinaga) +\ / ¾ Â (Noriaki Koshizuka)

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Ni-Cu 5ð b, ò ^ * 8 ö b N I † Â } ? _ M • S u>*>5># Ni 5ð \>5>#Ni-Cu >0>#5ð b!• v] K _ | ~ Ò M • œ î « ¸ ¼ – º \ Cu b ò · > | g W4Š))Ê b š ì †/ª Á"I ö \6õ 4 I O Z7Á8§0{ 9 _ | W Z1* m>*X B b) Ý † " S 1)>5>#Ni- >0>#Cu 5ð b * 8 ö c>5># Ni 5ð | ~ M D €>*4: G!• v] K Ø>& 560 ¥>' c>5># Ni 5ð | ~ * 8 2)>5>#Ni- >0>#Cu 5ð b Ò œ î « ¸ ¼ – º c>5># Ni 5ð | ~ ¤(ý [>* Cu µ w5 v9× C>* * [b ó ö @ ± A 8 3)>5>#Ni- >0>#Cu 5ð b!• v] K _ | • § È ¢ Þ – å b B6× c Cu b Ò _ | W Z 560 ¥ è W [c š D I € •

Synopsis :

The low temperature notch-toughness of 7% Ni steel is known to be improved by the addition of Cu. To clarify this mechanism, the precipitation behavior of austenite and Cu and the changes in the sub-grain size were investigated on tempering of quenched 7% Ni and 7% Ni-2% Cu steels by electron -microscopy and impact test. The results obtained are as follows: 1) The impact values of the Ni-Cu steel at -196 ¥ are higher than those of the Ni steel. The most suitable tempering temperature for the Ni-Cu steel(560 ¥) was 30 ¥ lower than that for the Ni steel. 2) The austenite precipitated in the Ni-Cu steel on tempering exhibits smaller grain size and higher copper content than that in the Ni steel, resulting in better st ability at low temperatures. 3) The growth of the sub-grains in the Ni-Cu steel on tempering at temperatures below 560 ¥ is prevented by the precipitating of Cu.

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7％ Ni 鋼の低温靱性におよぼす Cu の影響

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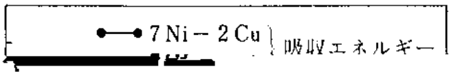
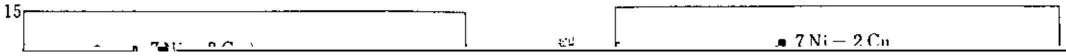
7 %Ni鋼	0.03	0.15	0.35	0.004	0.013	7.06	0.04	0.021

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7Ni－2Cu
7Ni－2Cu

ルテンサイトに変態したものをオーステナイトとして扱った。7％Ni鋼のオーステナイトの間隔は焼もどし温度の上昇とともに直線的に増加す

3·3 下部組織

[illegible]

る。7％Ni—2％Cu鋼のオーステナイトの間隔は500～560°Cの低温焼もどしでは7％Ni鋼にほぼ等しいが，560°C以上で一定値に近づき両鋼の差は大きくなる。

オーステナイトの間隔に差異が認められた 590°C において等温焼もどしを行なった試料の衝撃試験結果と析出オーステナイトの大きさの変化を図5に示す。7％Ni鋼の脆性破面率は焼もどし

化があげられる。光学顕微鏡では針状組織である7％Ni—2％Cu鋼と 7％Ni鋼の結晶粒の大きさを比較することは困難であるので，電子顕微鏡によるサブグレインの大きさを測定した。焼もどし温度によるサブグレインの平均大きさの変化を図6に示す。焼入れのままあるいは500°Cの焼も