KAWASAKI STEEL TECHNICAL REPORT
No.14 (March 1986)
Special Issue on Stainless Steels

Ultra-low C and N High Chromium Ferritic Stainless Steel

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Synopsis :
Ultra-low C and N high chromium ferritic stainless steels, SR 26-1, S 30-2 and SR 26-4, have been produced by cost-saving steel making process called the "SS-VOD process". The chemical compositions of the steels are characterized by reducing C and N contents to extremely low levels to improve toughness and corrosion resistance, and by the addition of Nb to prevent intergranular corrosion of weldments. Being free of stress corrosion cracking and superior in corrosion resistance, the steels have been used as materials for heat exchangers and various chemical plants. Especially, S 30-2 and SR 26-4 steels having 2-4% Mo exhibit excellent corrosion resistance on the same level as those of AL-6X and Hastelloy C, and have been applied to heat exchangers for caustic soda plants and rectification towers for acetic acid plants. To obtain weldments having good properties as mentioned above, however, some appropriate measures in welding is necessary.

The body can be viewed from the next page.

Ultra-low C and N High Chromium Ferritic Stainless Steel*

Synopsis:

Ultra-low C and N high chromium ferritic stainless steels, SR 26-1, S 30-2 and SR 26-4, have been produced by cost-saving steel making process called the "SS-VOD

become possible to reduce the carbon and nitrogen in

□ Water quenched

this decrease in toughness with a decrease in the cooling rate from high temperatures or heat treatment after

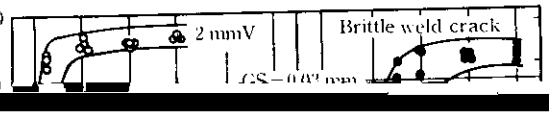


Table 2 Strauß test results on 26 Cr-1 Mo steels

Steel	Air-cooled from 1 200°C after	Senstized at 650°C for 30 mm after air

Figure 6 shows the effect of the (C + N) content on

Table 3 Stress corrosion test results of 29 Cr-2 Mo

rosive environments and economy. The characteristics

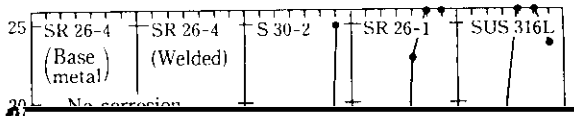
steels in boiling 42% $MgCl_2$ and 20% NaCl solution containing 1% $Na_2Cr_2O_7 \cdot 2H_2O$ (U-

of these three steel grades are described in the following.

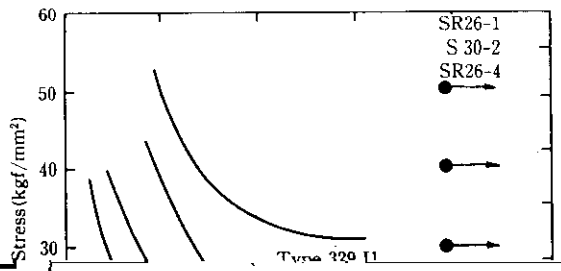
3.1 Chemical Compositions and Manufacturing Process

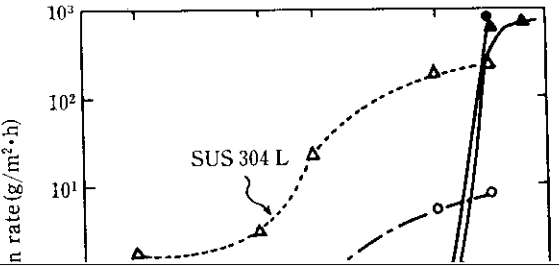
The chemical compositions of SR26-1, S30-3 and SR26-4 are given in **Table 4**. In all these steels, the carbon and nitrogen contents are reduced to extremely low levels of 20 to 30 ppm and 50 to 70 ppm respectively, by the SS-VOD process, to improve formability, toughness, and corrosion resistance of base metals and welds. Furthermore, the steels are stabilized by the addition of

Steel	Boiling 42% $MgCl_2$ solution	Boiling (20% NaCl +1% $Na_2Cr_2O_7 \cdot 2H_2O$) Solution
29Cr-2Mo	Pass	Pass
29Cr-2Mo-0.5Ni	Fail	Pass
29Cr-2Mo-1Ni	Fail	Pass



10% $FeCl_3 \cdot 6H_2O$ aqueous solution, where specimens were tied with glass rods using rubber bands. SR26-4 shows the best crevice corrosion resistance; S30-2 also


60
50
40
30
Stress (kgf/mm²)
SR26-1
S 30-2
SR26-4


10³
10²
10¹
SUS 304 L

organic acid solutions for 48 h ($g/m^2 \cdot h$)

acid solution conducted to estimate corrosion resistance in the rectification process of an acetic acid plant using

Table 11 Mechanical properties of S30-2 steel

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