## Abridged version

## KAWASAKI STEEL TECHNICAL REPORT

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Ironmaking Technology

and Tubular Products Technology

## Development of Martensitic Stainless Steel Seamless Pipe for Linepipe Application

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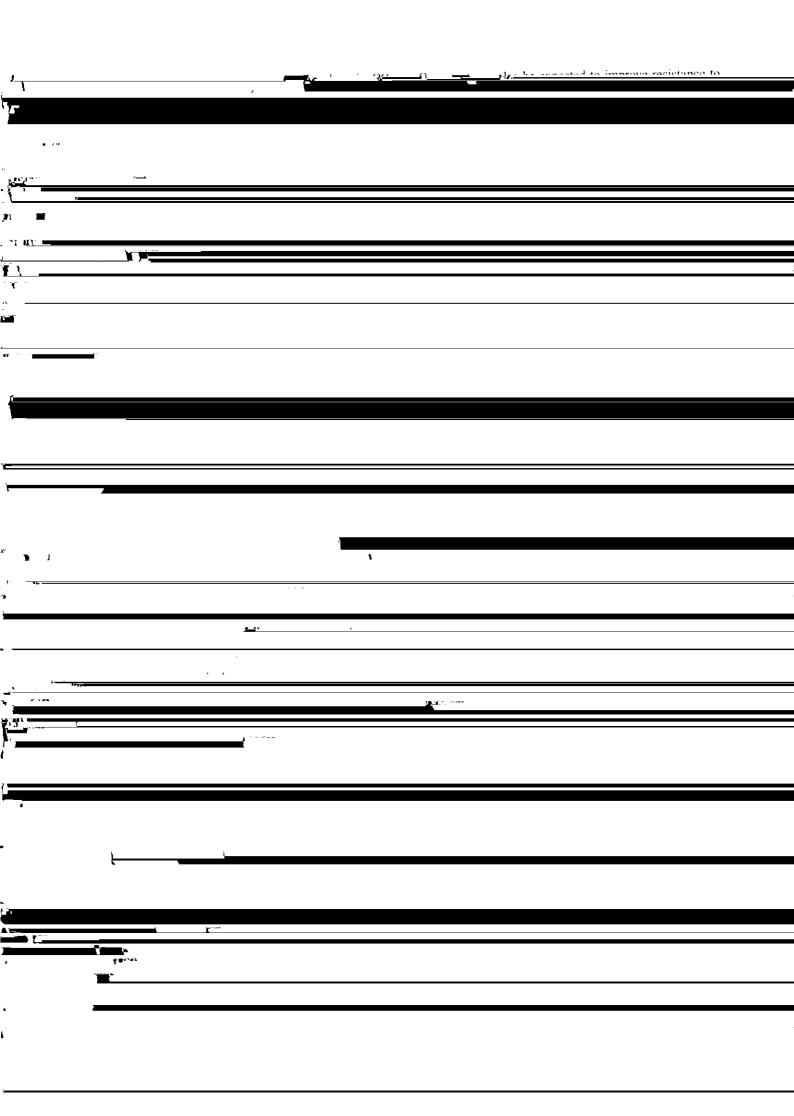
## Synopsis:

Two types of martensitic stainless steel seam less pipes have been developed for linepipe applications. One is 0.01C-11Cr-1.5Ni-0.5Cu-0 .01N steel pipe for CO2 environment, and the other is 0.01C-12Cr-5Ni-2Mo-0.01N steel pipe for CO2 and slight H2S environment. Both pipes are suitable for welding without preheating. They give X80 grade strength and good low temperature toughness of welds without PWHT. The former pipe gives better resistance to CO2 corrosion than the 13Cr martensitic stainless steel for OCTG. The latter pipe gives good SSC resistance in 10% NaCl solution with H2S partial pressure of 0.002 MPa and pH value of 4.0. These steel pipes have a great economical benefit and are expected to substitute conventional flowline pipes using carbon steel with inhibitor injection or costly corrosion resistant materials, such as, duplex stainless steel.

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The body can be viewed from the next page.





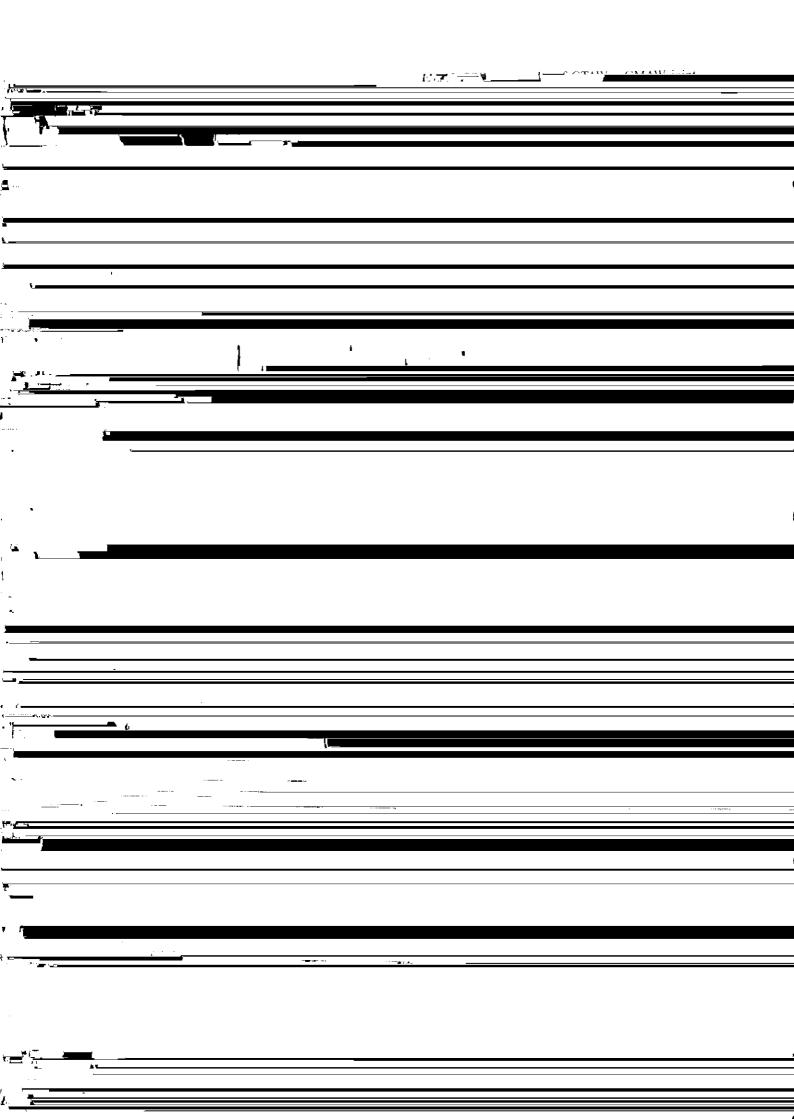


pipe								(mass%)
Material	С	Si	Mn	Cr	Ni	Cu	Мо	N
11Cr base metal	0.01	0.16	1.13	11.1	1.5	0.48		0.01
GTAW filler wire	0.01	0.30	0.38	25.3	9.5	<u>-</u>	4.0	0.27
GMAW wire	0.02	0.33	0.41	25.1	9.6		4.0	0.27

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Charpy full size specimen Longitudinal direction GTAW (As welded) 3 Development of 12Cr Steel Pipe for Linepipe in CO + Slight H S Environments. O Bond 1.

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	Excellent weldability was secured by reducing the C	any of the welds with these pipes, and excellent weld-	
	and N contents to 0.01% as with the 11Cr steel nine dis-	ability was confirmed	
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	cussed above. To compensate for the reduction in hot	The tensile test, side bend test, hardness measure-	
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	welded joint of the 12Cr steel nine for COs + slight	
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,	H <sub>2</sub> S environments.  (4) The welded joint of the 11Cr steel pipe for CO <sub>2</sub> environments possesses CO <sub>2</sub> corrosion resistance	References  1) L. van Bodegon, K. van Gelder, and J. A. M. Spanines: Corro-
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