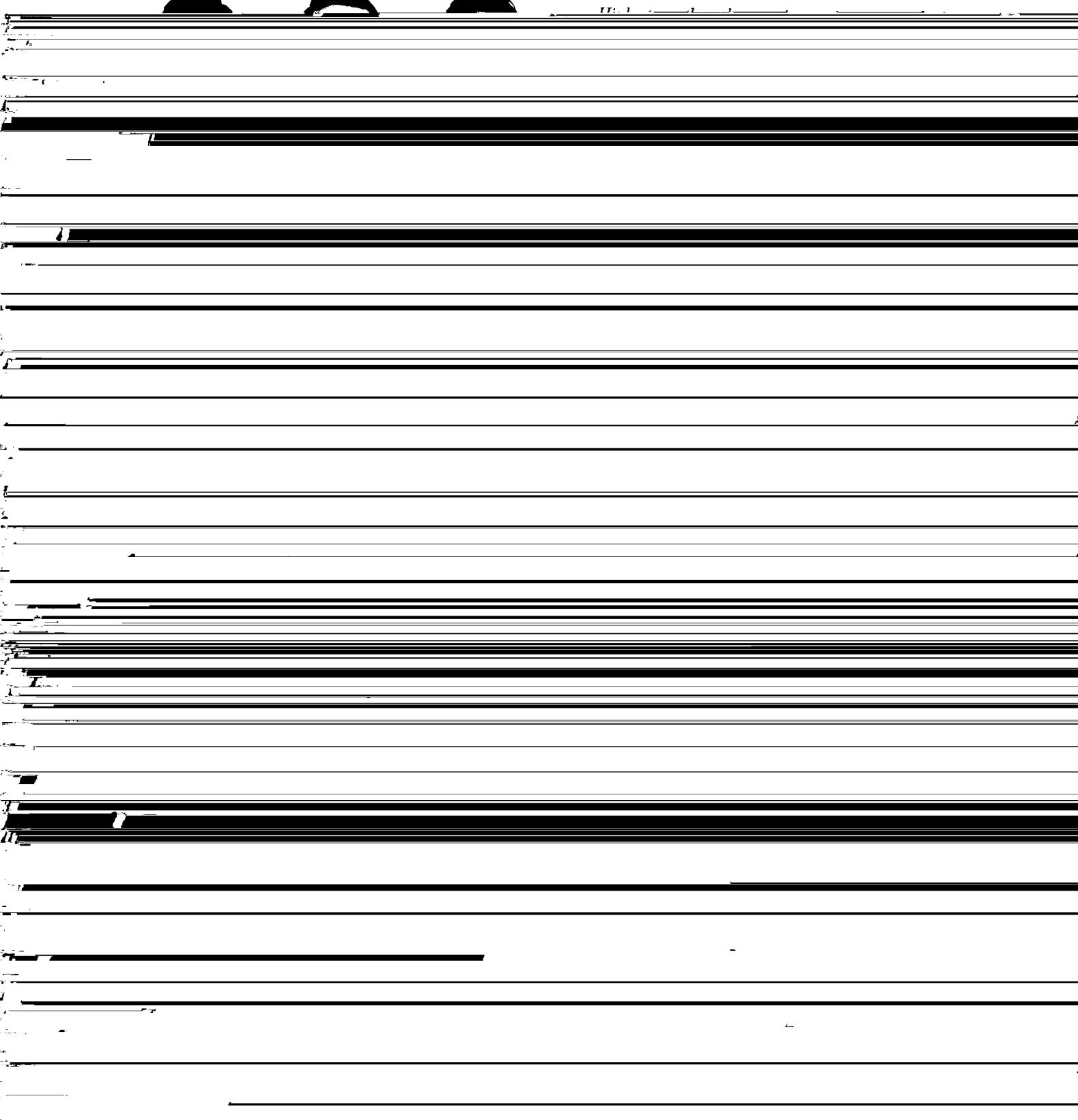


High Performance Tube and Pipe Contributing to Preservation of the Global Environment*

Synopsis:



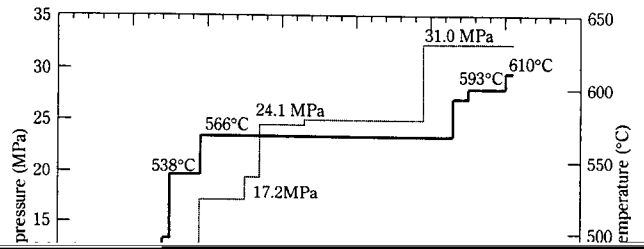


Requirements	1990	1995	2000	2005
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Maximum t/D (%)	3%	5%	7%	Heavy wall line pipe for deep sea offshore
Low-temperature toughness	Charpy 120 J (-10°C)	180 J (-10°C)		Further study of Charpy value of for ultra high pressure (150 bar<)
	BDWTT -46°C			

2.2.3 Automotive structural tubes

In the automotive industry, CO₂ reduction, exhaust gas purification, and resource saving have become main tasks from the viewpoint of global environmental problems, and improved fuel economy and weight reduction are therefore advocated. For this reason, steel tubes as



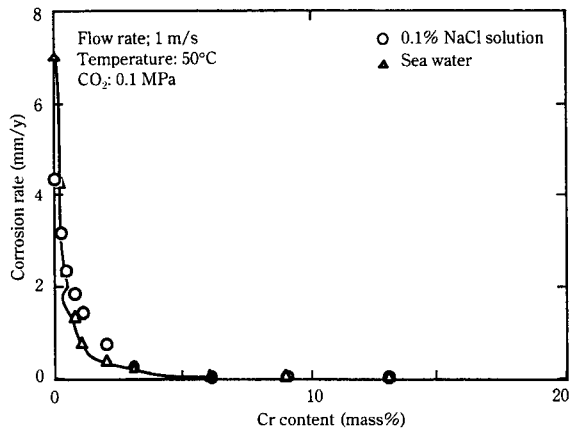


Fig. 5 Effect of Cr content on corrosion rate of steel

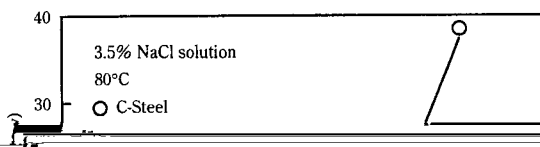
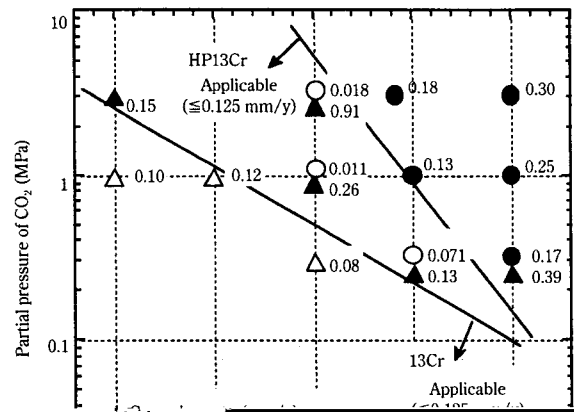


Table 1 Chemical composition of 13Cr and HP13Cr (mass%)

	C	Si	Mn	Cr	Ni	Mo
13Cr	0.20	0.20	0.40	13	0.1	—
HP13Cr-1	0.025	0.25	0.45	13	4.0	1.0
HP13Cr-2	0.025	0.25	0.45	13	5.0	2.0



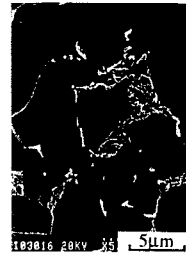
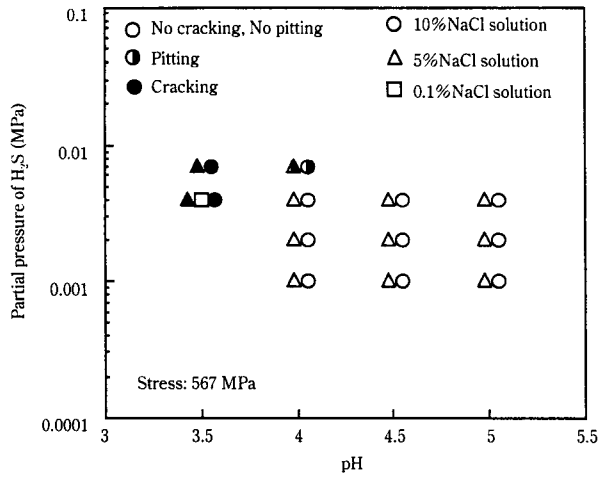
0.1

95 ksi grade
Open: No failure

○ HP-1
△ HP-2

Table 2 Chemical composition of weldable 12Cr (mass%)

	C	Si	Mn	Cr	Ni	Cu	Mo
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ERW tube



HISTORY tube

Photo 1 SEM images of HISTORY and ERW tubes

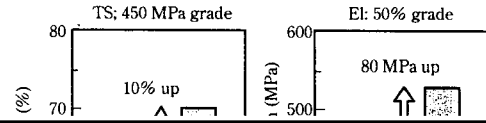


Fig. 10 SSC test results for ERW and HISTORY tubes

Table 3 Mechanical properties of tested tubes
(JIS11, 15 mm ϕ \times 1.8 mmt)

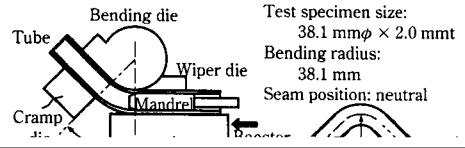
	YS (MPa)	TS (MPa)	EI (%)
HISTORY tube	530	575	32
ERW tube	480	509	18

Table 4 Mechanical properties of tested tubes
(JIS11, 38.1 mm ϕ \times 2.0 mmt)

	YS (MPa)	TS (MPa)	EI (%)
HISTORY tube	519	556	47
ERW tube	360	404	41



Test specimen size:
15 mm ϕ \times 1.8 mmt
← Bending radius: 30 mm



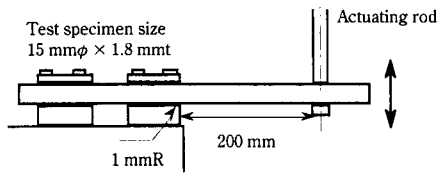


Fig. 16 Procedure of bending fatigue test

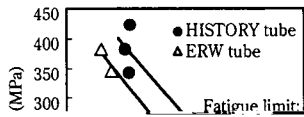
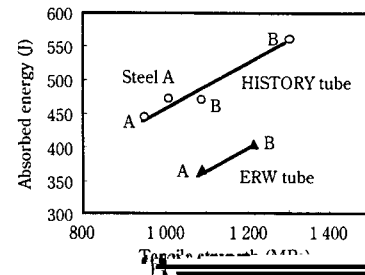


Fig. 18 Comparison of absorbed energy obtained by three point bending test between the HISTORY tube and ERW tube

tion, marine temperature-differential power generation, deep strata water extraction, and use with methane hydrate. Reducing the weight of materials by realizing

- 7) R. Nyberg and A. Dugstad: "Mesa Corrosion Attack in Carbon Steel and 0.5% Chromium Steel", CORROSION/98, Paper No. 29, Houston TX, NACE, (1998)
- 8) I. L. Rosenfield: "CORROSION Inhibitor" (1981), [McGrow-