KAWASAKI STEEL TECHNICAL REPORT
No.9 (March 1984)

Development of Heavy-wa ll 2 1/4Cr-1Mo Forgings

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Synopsis :
Generally, a 2 1/4Cr-1Mo steel is used as materi al for the pressure ve ssels of oil refining

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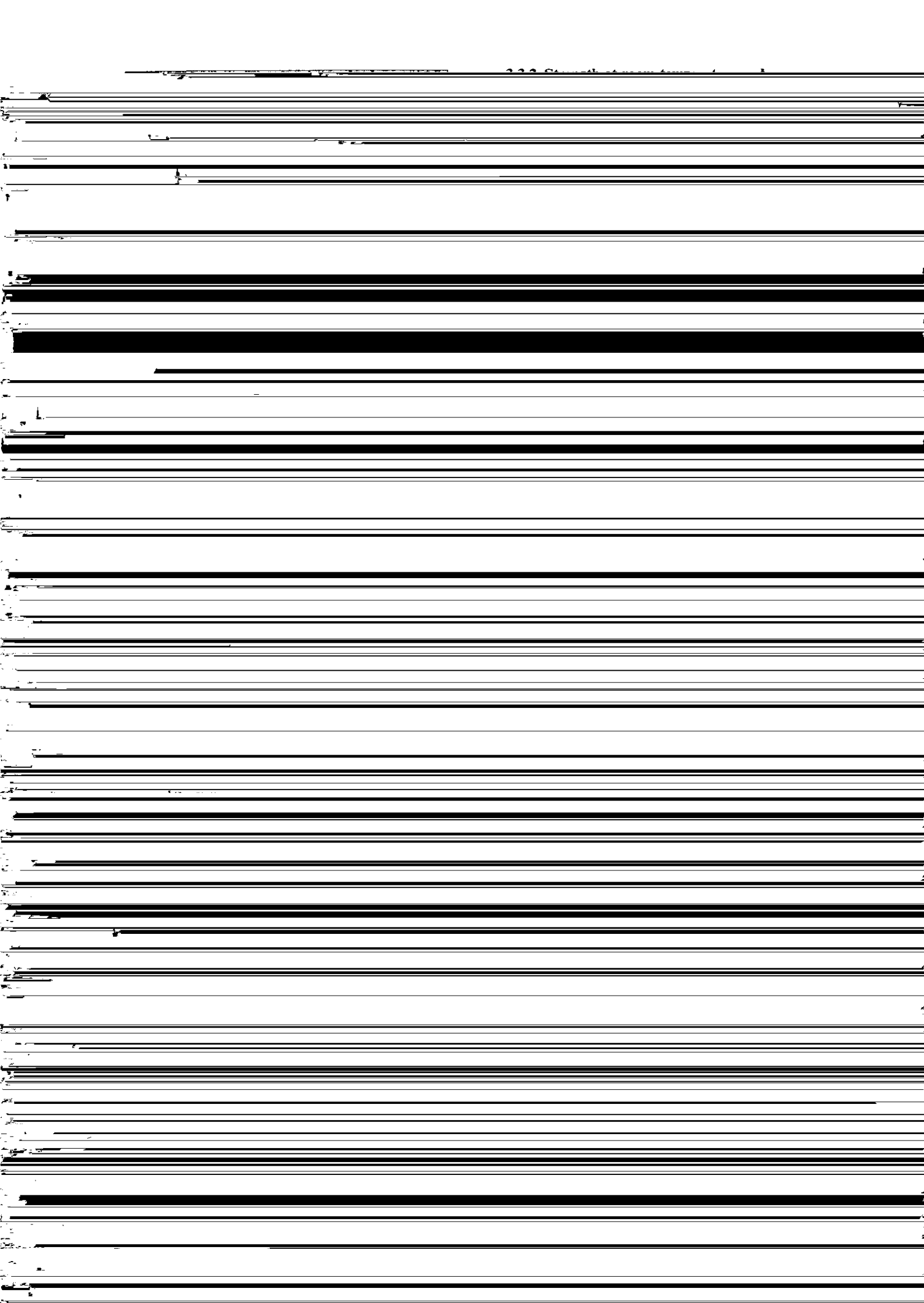
and the like, with requirement for greater thickness, high strength, high toughness, and


0.10%Si-0.004%P
Equivalent thickness : 400 mm
$T_{\gamma 40}$)
80
ΔTT_{54J} : Difference of TT_{54J} between before and after step cooling treatment

[redacted]



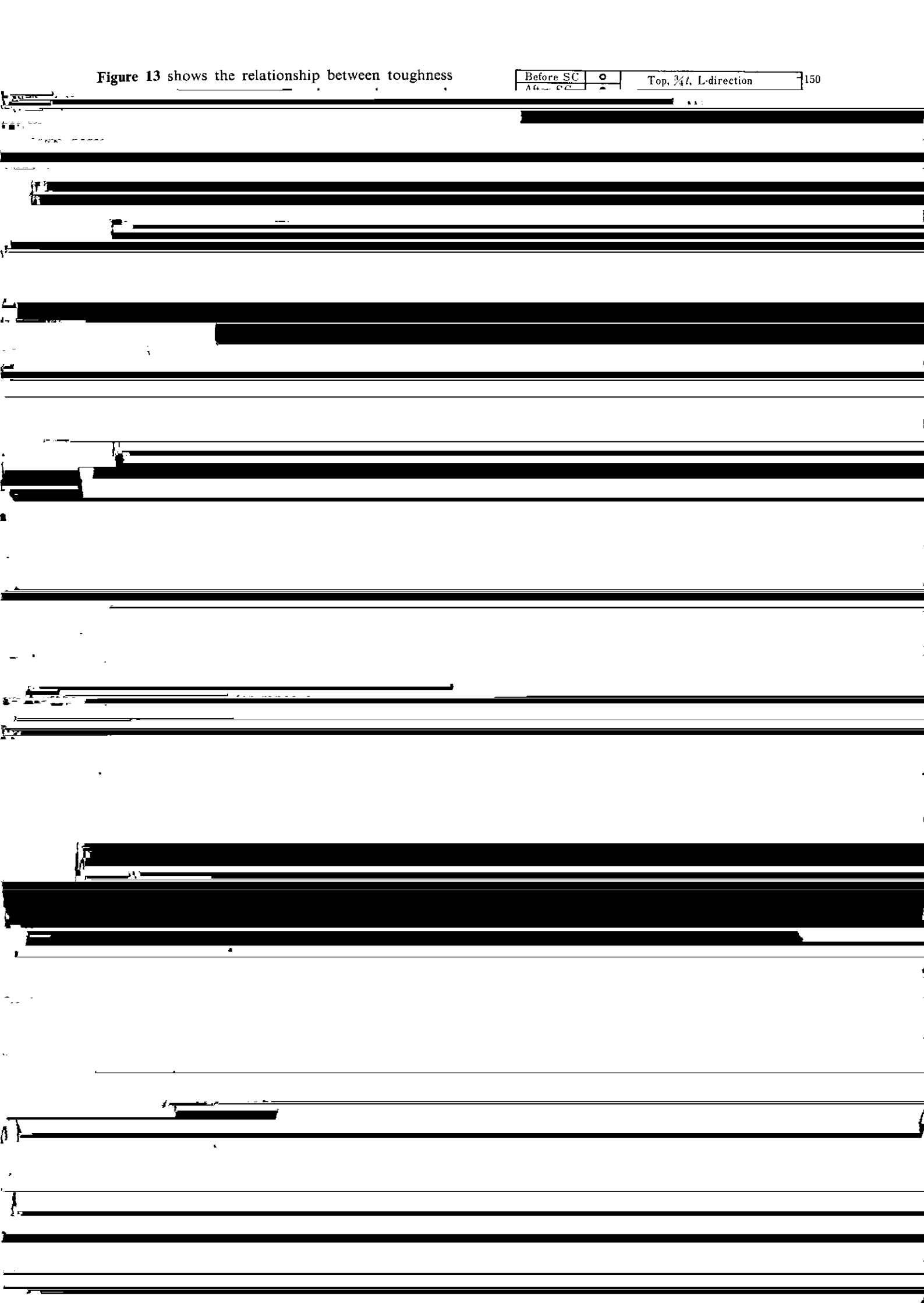
VIII Div. 1 is ensured when T.P. is 20.4×10^3 and less. Further, it is apparent from **Fig. 10** that the good as 80% and over.

kgf/mm² and over are ensured.

Figure 11 shows results of an investigation into creep

Figure 12 shows variations in toughness of the top and the bottom. Although some dependence on the

Figure 13 shows the relationship between toughness



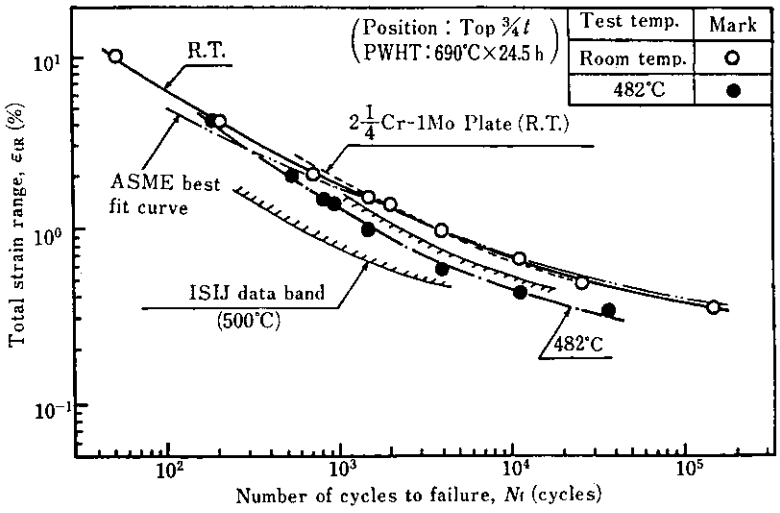
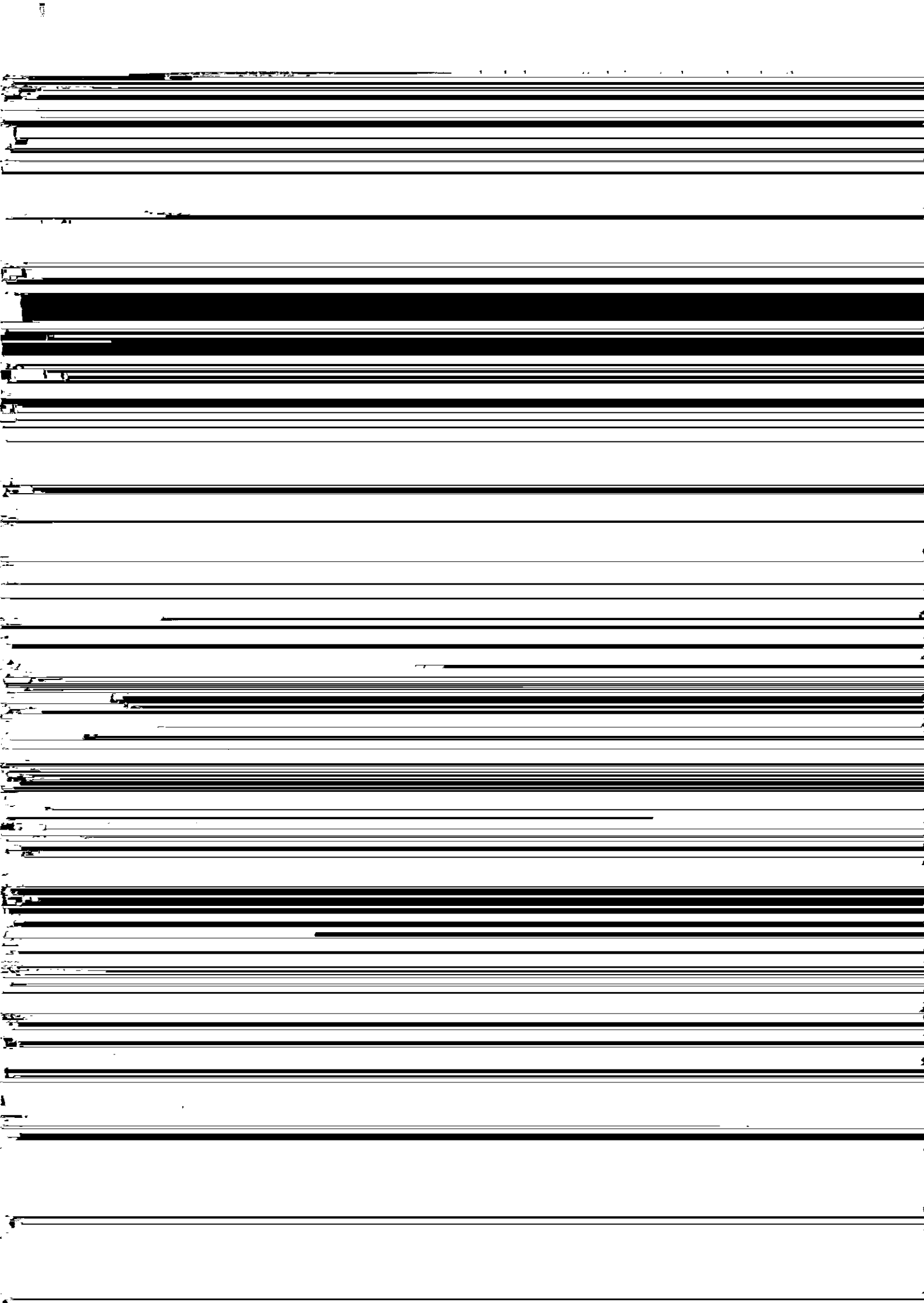


Fig. 17 Results of low cycle fatigue test of shell ring at room temperature and 482°C

with those obtained at room temperature, they are distributed on the upper part of the conventional data band[7]. Furthermore, the data at 482°C are in good

the outer to the inner surface, and were immersed in an autoclave under a high-temperature high-pressure hydrogen atmosphere in order to conduct the hydrogen



those of reactor vessel steel products produced from hollow ingots. Furthermore, the chemical composition of the part of the ingot near the hot top was analyzed to confirm the homogeneity of the whole ingot. As is evident from the results of this investigation shown in **Fig. 20**, almost the same tendency as in previous in-

EDX (energy dispersive X-ray spectroscopy)[11-13]. The X-ray intensity ratio of Cr and Fe in precipitates varies depending on the Si content. That is to say, it is apparent that Fe intensity is high at a high Si content, whereas Cr intensity is high at a low Si content. From results of electron microscopy, it is made clear that the proportion of Fe in carbides in-

According to results of an investigation into the effect of Si on hydrogen attack by the authors[12,15],

The authors are confident that the accumulation of these comprehensive data will lead to a stable manu-