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Recent Progress in Techniques of Manufacturing Small Diameter Electric-Resistance Weld Tubes*

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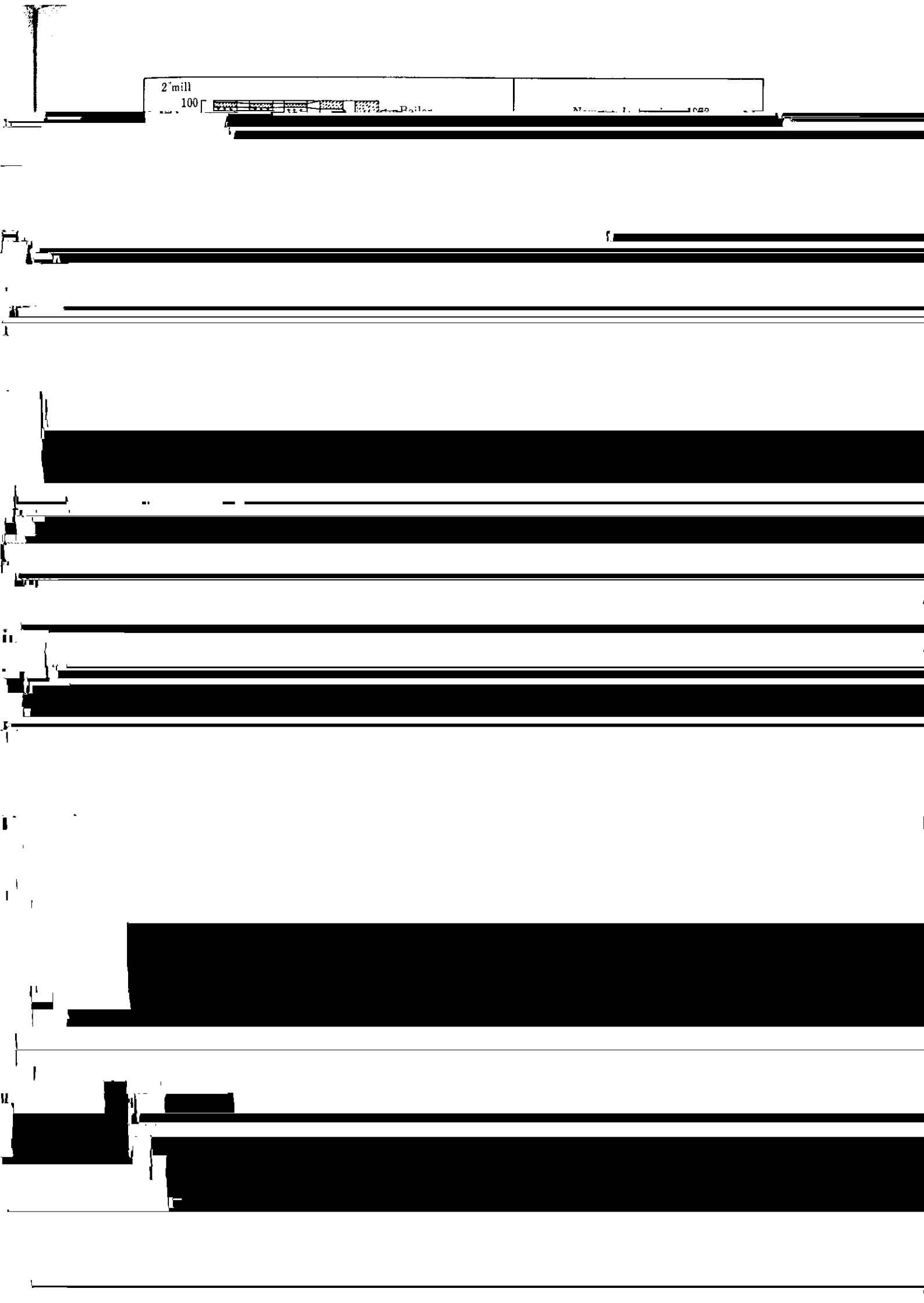
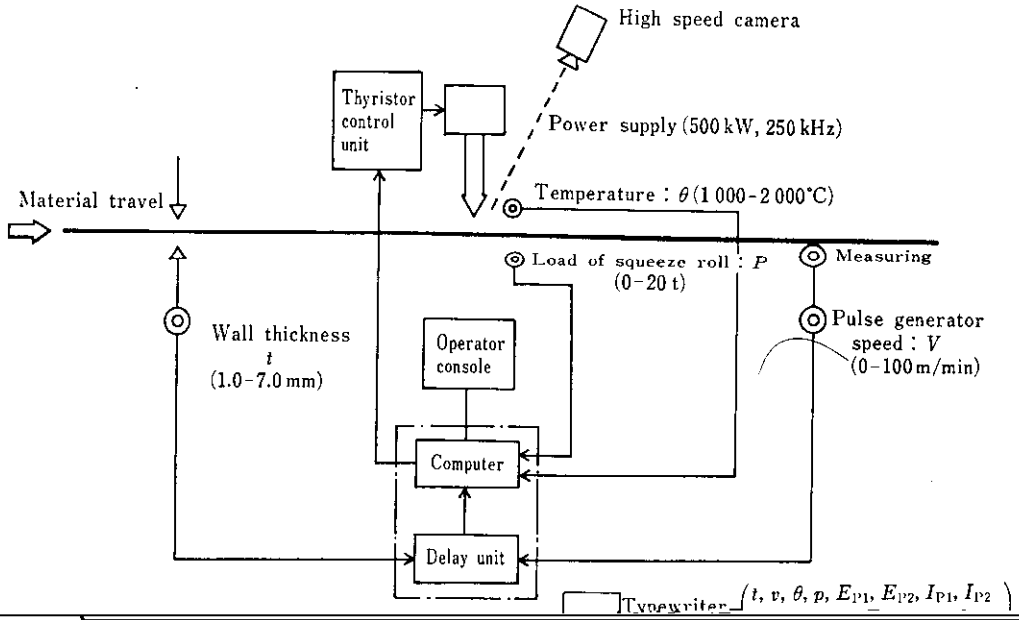
To meet an ever-increasing demand for higher-grade small diameter electric-resistance weld (ERW) tubes such as oil country tubular goods (OCTG), mechanical tubing and boiler tubes, remarkable technical developments have been achieved in the manufacture of these products. This report deals with some of the achievements made in this field by Kawasaki Steel Corporation.

material, advanced pipe-making techniques and a


2"mill
100



E_P : Plate voltage, I_P : Plate current
I_g : Grid current

Fig. 2 Automatic heat input control system in 2" ERW mill

longitudinal variation of sheet coil thickness and the

$$\Delta E = \left(A \cdot \frac{t - t_s}{} + B \cdot \frac{v - v_s}{} \right.$$

equation:

Now, since there is a correlation between the upset

Size (mm) and grade	Amount of

Table 2 API specifications

Grade	Type	Chemical composition (%)	Heat treatment	Yield strength	Tensile strength	Elongation	Flattening tests	Hardness

Pipe size : 5½"φ×0.304"t

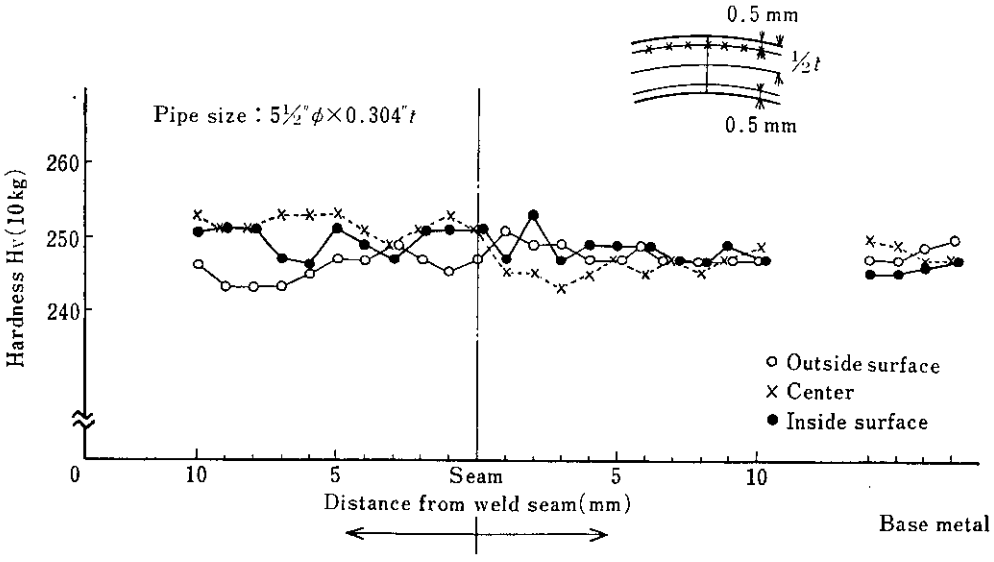


Fig. 8 Hardness distribution of API 5A N-80 across weld

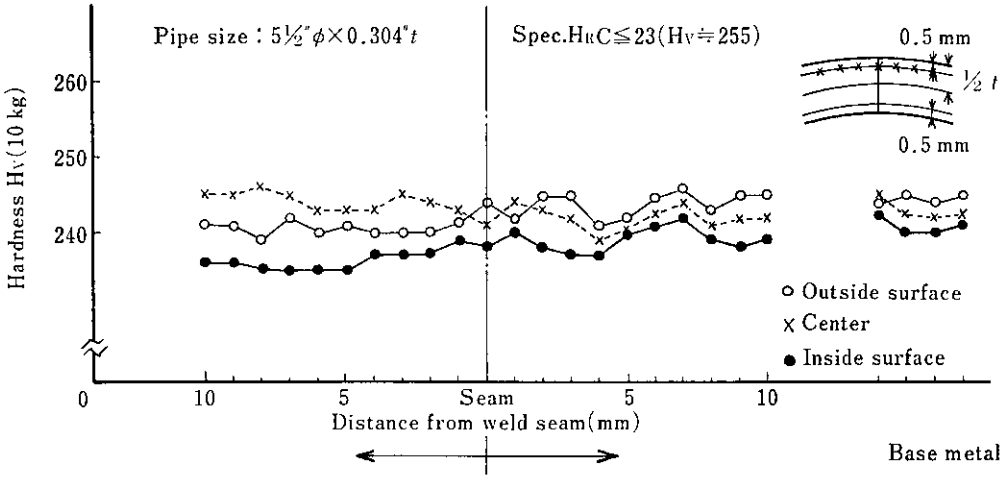


Fig. 9 Hardness distribution of API 5AC L-80 across weld

4.1 Weld quality 4.2 Collapse strength

The API standard stipulates that the flattening test should be performed as one of the methods for evaluating the strength of weld seam portions. In the case of high strength steel pipes such as those of N-80

One of the factors which affect the collapse strength value is the dimensional accuracy of pipes, namely the degree of out-of-roundness and eccentricity; in the case of the quenched and tempered pipes

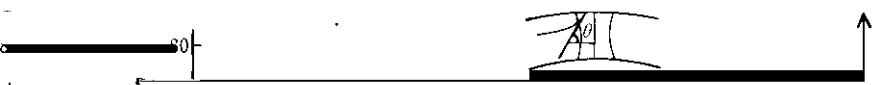
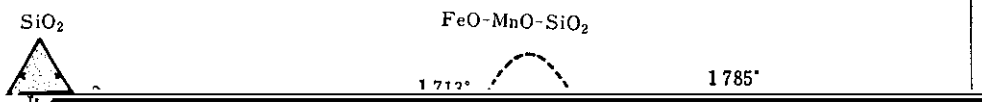
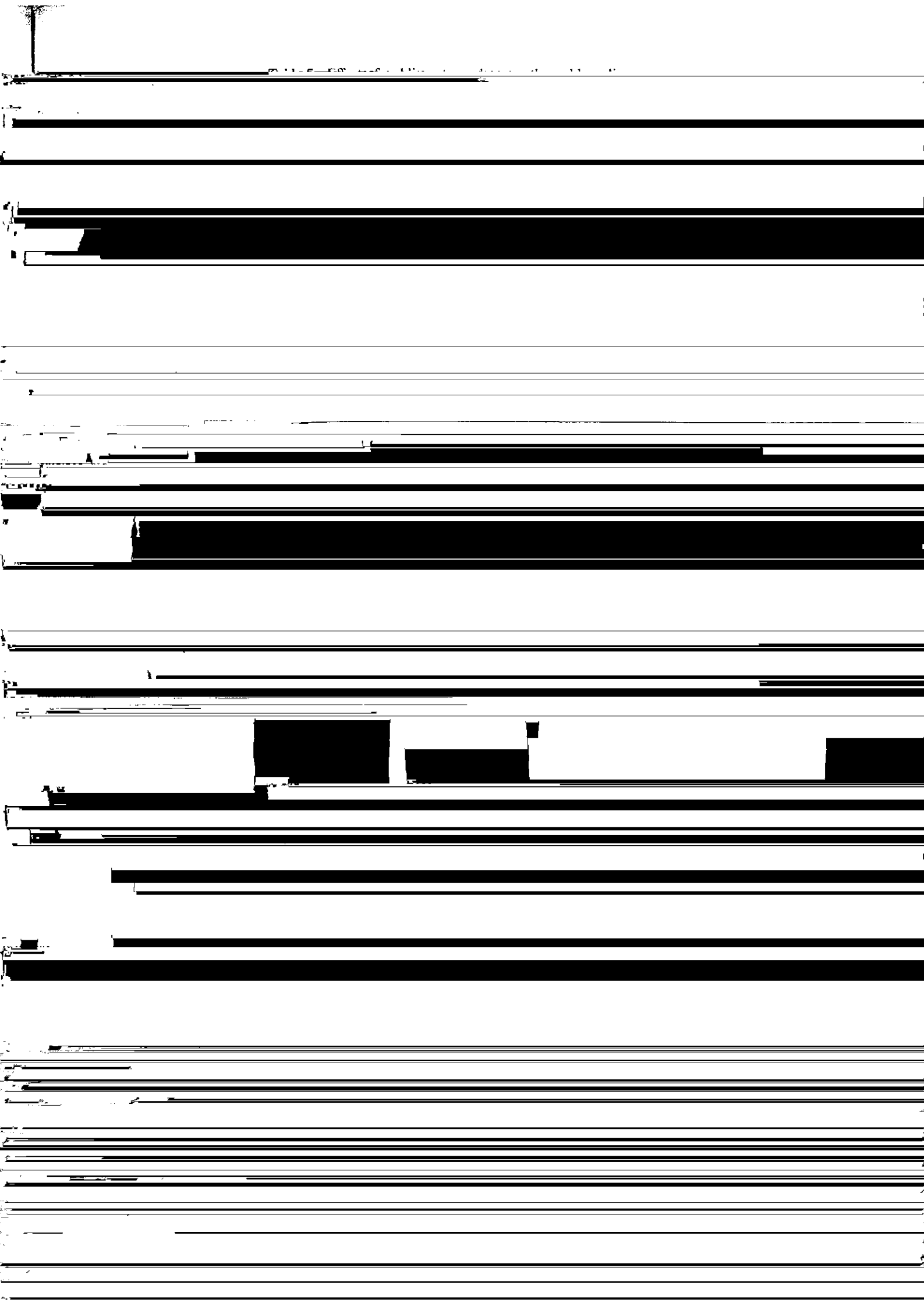


Table 3 Chemical compositions of penetrator in Cr bearing low alloy ERW steel pipes

Table 4 Measured melting temperature of various FeO-MnO-SiO_2-Cr_2O_3 oxides


SiO_2
$FeO-MnO-SiO_2$
1712°
1785°



6 Conclusion

The recent trend toward higher grade of small

References

1) S. Sugimura, K. Okuyama, T. Fukuda and H. Nakasui