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Application of High-Efficiency Submerged-Arc Welding to Circumferential Butt Joint

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Synopsis :

A circumferential SAW technique characterized by a two-electrode system and narrowly grooved joint has been developed. The welding process is applicable to butt joints of large diameter heavy wall steel pipes. The two-electrode SAW technique is especially effective in welding steel pipes of larger than 1000mm diameter and the welding efficiency was experimentally confirmed to be up to about 50% higher than that by the conventional single electrode. In welding a V-groove joint with steel backing, blowholes are apt to occur in the first pass bead and so their cause and countermeasure have been studied. As a result of an application of this new technique to the construction of offshore berth facilities in Taiwan, 40% increase in efficiency was attained in welding steel pipes of 1500mm diameter and thus its high productivity and practicality have been proved.

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the effects of the two methods are aimed at in the
KV-process⁵⁾ in which narrow gaps can be obtained

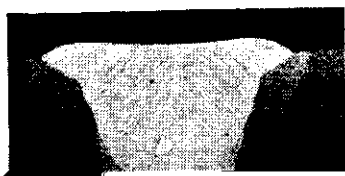


performed with steel plates set horizontally heads must

graph selected depending on the welding current and

(0.5) and hence can be regarded as constant. There

the single-electrode welding is obtained and the molten molten pool length and welding parameters relates to



are suitable in terms of efficiency. Concretely, the total of the current values of the leading and trailing electrodes is calculated. From Fig. 2, a value of 1 400 A is determined.

Table 1 summarizes standard welding conditions for narrow grooves of modified Vee and conventional V-

2.3.3 Confirmation of welding conditions in pipe

A full scale model experiment on steel pipe was



apparent from the photograph, beads obtained by the welding in the above-mentioned angle range are

the beads obtained with uniform incline

line, the applicable welding current can be increased in proportion to the pipe diameter and the larger the pipe diameter, the greater the efficiency improvement. How-

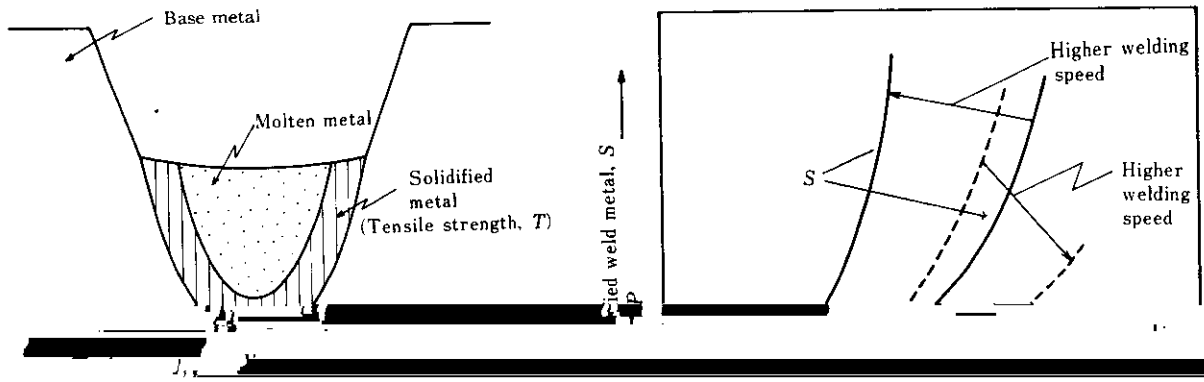


Table 4 Welding consumables used

SAW wire	KW-50 C (4.0 mm ϕ)
SAW flux	KB-120 (12 \times 200 mesh)

diameter steel pipe.

5 Conclusions

To improve the efficiency of circumferential butt

applicability of a two-electrode submerged arc welding technique. The establishment of this technique was

with two-electrode, which can be applied to circumferential welding for large diameter steel pipe such

berth construction work for the Hsinta Power Station of Taiwan Power Company and its high efficiency was proved.

layer is high in welded joints using a steel backing. These blowholes are considered to be formed due to the expansion of the gas existent in the gap between the steel backing and the base metal near the root

References

- 1) M. Tominaga et al.: "Application of Large Diameter UOE Steel Pipe Pile to Offshore Structure", *Kawasaki Steel Giho*, 15(1993)4, 208-217.

(6) Blowholes of this kind are more liable to occur in

- 2) F. Kawabata et al.: "Application of 4-wire Submerged Arc