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Recent Manufacturing Techniques of Tube for Boiler—Cr-Mo Electric-Resistance-Welded Tube & Rifled Seamless Tube*

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2 West Power Station No. 3 Unit at Chiba Works

The No. 3 boiler of the West Power Station at Chiba Works has a 125MW steam power generating capacity. the steam condition (169 kgf/cm^2, 538°C) conventionally used mainly for 375 MW class boilers was adopted, with higher efficiency to be achieved by adopting a cycle for large air drawing capacity. To obtain a higher boiler

heater is a world's record among the gas-fueled boilers. heat-exchanged so as to raise the blast furnace gas tem-

3 Cr-Mo ERW tube STB A22E · G

The production of Cr-containing low-alloy ERW tube is difficult, because the chromium oxide of high melting

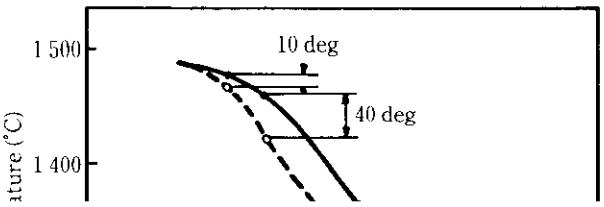
3.1.2 Automatic welding heat input control technique

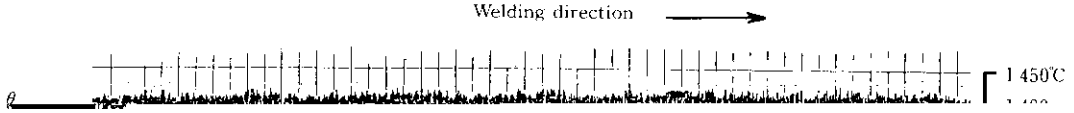
Heat input for ERW tube-making must be properly

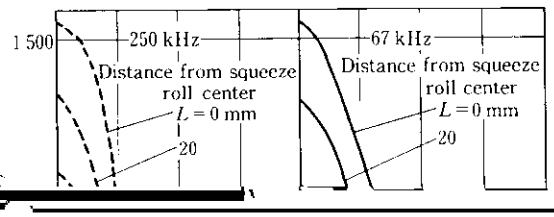
fusion weld zone. In order to prevent the penetrator speed. In STB A22E · G, the above requirement is espe

Table 2 Specifications of equipment for automatic heat control system

Instruments and controllers	Specifications
DDD (Direct digital	MEDAC 16/11 (Micro computer)




Welding direction
1 450℃


1 500
250 kHz
Distance from squeeze roll center
L = 0 mm
20
67 kHz
Distance from squeeze roll center
L = 0 mm
20

3.2 Manufacturing System

The combination of the automatic welding heat input

has made it possible to manufacture Cr-containing low alloy steel pipe. In the manufacture of Cr-Mo ERW tube STB A22E · G, these techniques are applied effectively,

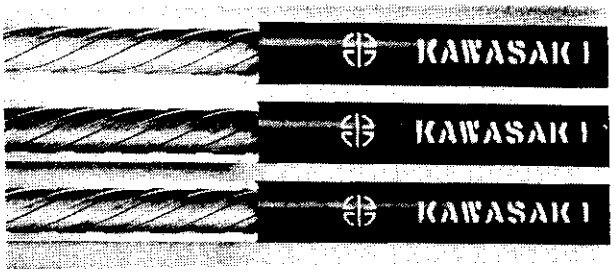


Photo 4 Inside view of rifled tube

4.1 Forming of Rifled Ribs

In the processing of the rifled tube, mother pipe is squeezed externally by a die set in a die stand placed at the center of a cold drawn bench, while a grooved plug placed inside forms a spiral ribs on the internal surface. The plug turns freely, which is an important element in the design of the mechanism. On the rifle forming, the plug contour is a large factor in determining product characteristics such as rib height and rib shape, especially, rib corner and lead angle.

Plug shape has been the subject of independent study by various makers. Kawasaki Steel, as a result of its study and experiments, has succeeded in the development of a plug shape which assures an easy forming of rib height, a higher fill up ratio of rib configuration, and a complete

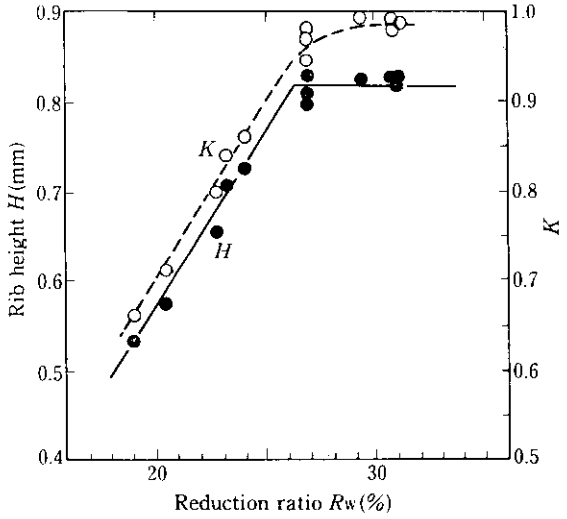


Fig. 10 Relation between reduction ratio, rib height, and K

(1) Rib height H

The relationship between the thickness reduction ratio R_w at rib bottom and rib height H is shown in **Fig. 10**. The area reduction ratio is changed by changing the thickness of the mother pipe for rifling. During drawing in the low area reduction zone

Table 3 Manufacturing process and quality control

Process	Equipment	Main quality control item
Hot rolling	Mandrel mill	1. Heating temperature 2. Roll setting 3. Dimension

(mm) $n = 492$ $\bar{x} = 38.11$

(℃) $n = 516$ $\bar{x} = 55.8$