

00995-51021-1 ON 'DRU

Steam Turbine
Description

Gas Heating Device
for prestressing
Bolted Joints

1 Principle of hot prestressing

To prestress a bolted joint, the bolts are first heated with the gas heating device, which causes them to expand. The nuts are then screwed down by hand to a predetermined position. As the bolts cool they contract, and by measuring the actual extension under load the prestressing of the joint can be accurately determined.

2 Principle of the gas heating device

Basically, the gas heating device consists of a heating tube, a clamping device, and a mixing chamber complete with supply pipes. It uses a flammable mixture of gas and oxygen (e.g. acetylene and oxygen) and compressed air.

The heating tube is inserted into the hole bored through the bolt, where it is held in a central position by the clamping device. The flame of the burning gas/oxygen mixture in the mixing chamber is surrounded by compressed air. This high temperature mixture flows through the heating tube, is reversed by the bottom of the split hole in the bolt and flows back up between the outside of the heating tube and the sides of the hole in the bolt to emerge at the end of the bolt. Assuming that the instructions given in paragraphs 4.4 and 4.5 are correctly carried out, this arrangement prevents any local overheating of the material.

3 Application

The gas heating device can be used on any bolt having a bore of 20, 25, 32 or 35 mm. Two bolts may be heated simultaneously.

4 Method of use

4.1 In order that the extension of the bolt may be determined after prestressing has been carried out, the measurement described in para. 6 must be taken before heating commences.

4.2 Depending on the case in hand, the heating device is to be assembled as shown in Fig. 1 to 3. When inserting the rigid tube of the heating device in the heating bore as per Fig. 1, hold the tube so that its end is 30 to 40 mm from the base of the bore by means of the clamping device (split clamp ring and union nut). If the heating bore is so deep that the tube is not long enough establish this gap by welding on a suitable length of extension tube, machining the weld bulge down until flush with the outer circumference of the tube.

Where flexible heating tubes are used as shown in Fig. 2, establish the gap between the end of the tube and the base of the bore by shortening the tubes.

4.3 The diffuser tips are then screwed to welding blowtorches. The following are the various sizes of nozzle for the various sizes of heating tubes and bolt heating holes:

Tip mm	Acc. heating tube mm	Bolt heating hole mm
Size 8 to 10	16 dia. ± 0.6	20 dia.
Size 10 to 14	20 dia. ± 0.6	25 dia.
Size 14 to 20	26 dia. ± 0.6	32 dia.
Size 20 to 30	35 dia. ± 0.9	36 dia.

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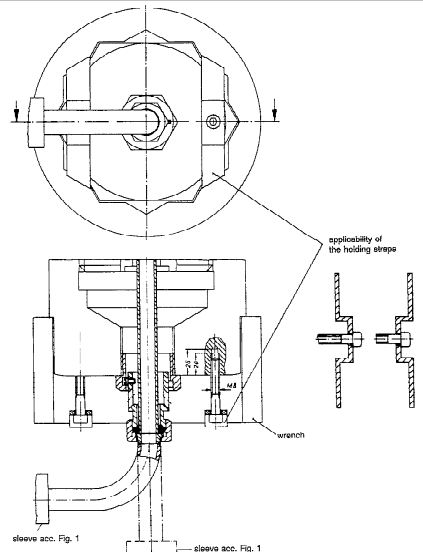


Fig. 3
Clamping device, when the heating device is used from below or from the side (for heating hole Ø20 and 25 mm only)

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Anwendung an

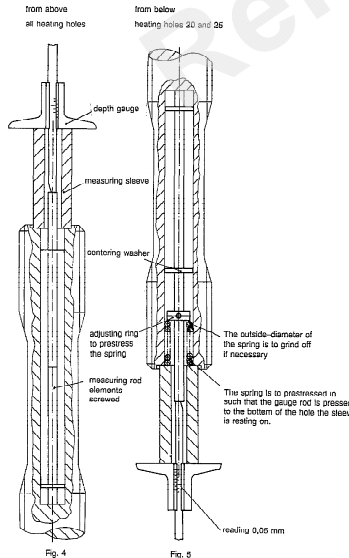


Fig. 4

Fig. 5

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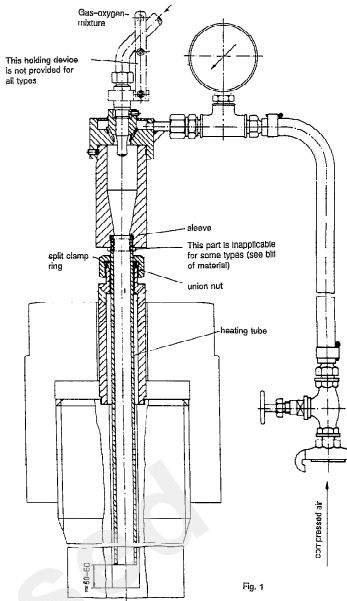


Fig. 1
Clamping device by entering the heating device from above when assembly space is sufficient.

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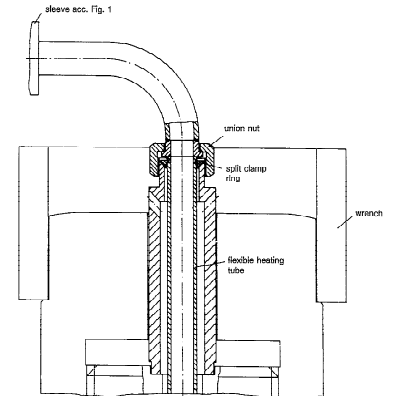


Fig. 2
Clamping device by entering the heating device from above, when assembly space is restricted.

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COMMON PARTS FOR HEATING BORE (HOLE) 20, 25 & 32

C.B.O.M. No.				STATUS OF DRS				TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT				STEAM TURBINE			
APPROVED				NAME				DATE				DATE			
M/CG- AA0230208				WELDING-AA02104				GAS CUTTING-TS-AA061104				REV			
DATE				ALTERED				CHECKED				REV			
DATE				ALTERED				CHECKED				REV			
DEPT STE				SCALE				WEIGHT (KG)				REF. TO ASSY. DRG.			
CODE 4011				N.T.S.				70.0				ITEM NO.			
TITLE 1				STUD HEATING AND MEASURING DEVICE				CARD CODE				DRAWING NO. 1-12015-56600			
SHEET No. 03				No. OF SHEETS: 13				AL SIZE							