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Guidelines for Securing by Welding of Chain Cable Studs in Service

1. General

1.1 This document gives the guidelines for the securing by welding of studs found loose during survey of chain cables links in service.

1.2 The proposal for repair is to be submitted to the Surveyor for evaluation and approval. The approval will be based on the conditions of the link to be repaired and of remaining links (see para. A1.6 Permissible Wear-down of Stud Link Chain Cable for Bower Anchors in URA1).

2. Welding procedure specification

2.1 Welds are to be made in accordance with a qualified welding procedure approved by the Surveyor.

2.2 Welding consumables used are to be approved with grading 3 or 3Y. For Grades 1 and 2 chain cables consumables should have low hydrogen grading H15 or better and for Grade 3 chain cables a very low hydrogen grading of H5 or better.

2.3 A preheating temperature suitable to limit hardness and to prevent the risk of cold cracks is to be applied. In general the following applies:

- Grade 1 and 2 : 100°C
- Grade 3 : 175°C

2.4 The welding practice and the welding parameters are to be selected to permit a large single weld deposit to be made. A temper bead at the stud side is allowed and may be advisable depending on the link grade.

2.5 After welding, links should be wrapped to allow a slow cooling.

3. Welding procedure approval tests

3.1 The approval test procedure should be representative of the actual welding conditions. The scope of testing of the test sample should include macrosection test specimens and hardness measurements.

3.2 The hardness of the weld metal and of the heat affected zone should not exceed:

- 380 Hv10 for Grade 1 and Grade 2 chain cables and for Grade 3 chain cables in the normalized and normalized and tempered conditions.
- 420 Hv10 for Grade 3 chain cables in the quenched and tempered condition.



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4. Repair procedure

- 4.1 The abutting surfaces of the link and stud to be welded are to be ground to produce a good fit with an acceptable root gap to prevent cracking. The surfaces are to be free from moisture, grease, rust etc., just prior to welding.
- 4.2 Magnetic particle examination to check that the link is free from cracks is to be performed before welding at Surveyor satisfaction.
- 4.3 Welding is to be performed by qualified welders.
- 4.4 Welding consumables are to be dried adequately prior to welding in accordance with manufacturer's recommendation.
- 4.5 In general the stud should be welded at the end opposite to the flash butt weld of the link and it should be welded completely around the circumference.
- 4.6 All weld stop-starts shall be grounded to remove any defects and to blend smoothly with the base material.

5. Examination

- 5.1 All welds are to be subjected to visual and magnetic or liquid particle examination. In the case of Grade 3 chain cables, inspection is recommended to be delayed for at least 48 hours after the weld has cooled to ambient temperature.
- 5.2 Studs should be located in the links centrally and at right angles to the sides of the link.

