

DTI's Technical Report #23

Accelerated corrosion tests on high strength bolts & 'Coronet' Load Indicators

Introduction

A feature of the 'Coronet' Load Indicator, as describes in Leaflet 61/1A, is the gap left between the underside of the bolt head and the face of the Indicator to permit the insertion of a feeler gage. The correct bolt tension is produced when the gap is reduced to an average of 1.015" in exposed positions there appeared to be a possibility that moisture would enter through the gap and corrode the bolt and plates.

An independent Laboratory undertook to investigate the susceptibility of the assembly to corrosion.

Preparation

A number of specimens were prepared, each comprising two Mild Steel plates 6" x 6" x 3/4" thick, shot blasted and drilled with four 15/16" holes for 7/8" bolts with centers 1-1/2" from each edge. The plates were clamped together with 7/8" black High Strength Bolts using the following bolt and washer assemblies:

- (a) Pairs 1 and 2. Plain hardened washer under the bolt heads and tightened to 480 ft-lbs. On a torque wrench.
- (b) Pairs 4 and 5. 'Coronet' Load Indicators and tightened to give an average gap of 0.015"
- (c) Pair 6. 'Coronet' Load Indicators and tightened to give an average gap of .015".

The edges of the plates were then sealed with waterproof Denso tape to prevent moisture entering between them, and in order to observe the effect of painting, some specimens were given different treatment on each quarter:

- 1st quarter No paint.
- 2nd quarter 1 coat Red Lead.
- 3rd quarter 2 coats Red Lead.
- 4th quarter 2 coats Red Lead. 2 coats Micaceous Iron Oxide.

Test procedure

The specimens were exposed for 2 months in an atmosphere of 100% humidity at 40° - 45°C. into which for 5 days a week sulphur dioxide was introduced for one hour, to simulate industrial atmospheres. For

a further 7 months, the specimens were left in an enclosed space, high humidity being maintained by the presence of an open topped water reservoir. Temperature and humidity were allowed to fluctuate according to prevailing climatic conditions.

This treatment may be expected to reproduce the effects of a 20 year exposure under normal service conditions.

On completion of the test, the plates were dismantled and the condition of each bolt and thread within the joint carefully observed.

Results

Light rusting was apparent on specimens assembled with 'Coronet' Load Indicators without painting, and on those with only one coat of Red Lead. Specimens with two coats of Red Lead or the full paint treatment showed no sign of corrosion.

Conclusion

The normal thickness of paint film applied to structural steelwork is sufficient to seal the 0.015" gap of a 'Coronet' Load Indicator and prevent corrosion of the bolt.

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