

Amsterdam, 12th March, 1940.

With reference to our Amsterdam report 15832 on the starboard after boiler of the s.s. "MONTFERLAND", I beg to report the following.

A leakage was observed in way of lagging in the outer butt straps on SB side of the longitudinal shell joint. This joint is in the water space. After the lagging had been removed, leakage of a rivet was found.

After the rivet had been taken out a crack was found in the rivet hole in the outer butt strap and shall plate.

A piece of the outer strap was burned out as per photograph 1 and plate B as per sketch and it also appeared that there were several cracks in the shell plating as per photograph 2 and plate A on the sketch.

A closer examination was made and cracks were also found in way of connections shell plating and fronts as per plate C & D and photographs 3 & 4. Different pieces for tests were cut out.

As the boiler in question has been condemned by the Board of Trade and ourselves no further investigation was made by the Owners as per Amsterdam report and the different tests made are carried out through the willingness of Messrs. Werkspoor N.V. and Gebr. Stork & Co.

Samples of the boiler water of this boiler could not be obtained, but from outside information it appeared that for years soda had been used in these boilers. Same has now been stopped.

The cracking of the plating begins at rivet holes and in way of shell plating is running through, but in way of the butt straps which are cracked at the inner side and which fact could not be observed by an internal examination with the exception of the connections fronts & shell plating.

The straps themselves were rather heavily caulked and have been recaulked most probably several times.

Different mechanical tests have been made on this material:-

4 longitudinal tensile tests	L1-L4
4 transverse	D1-D4
4 impact tests	KL1-KL4
4 impact tests tranverse	KD1-KD4
2 bend tests	B1-B2

From the outer straps

2 longitudinal tensile tests	1-2
8 impact tests	1-8

A number of microphotograph samples have been made out of S1-S6.

The tests were made to prove whether obsolescence or caustic embrittlement had taken place.



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The results of the tensile tests did not vary much neither longitudinal nor transverse.

The results vary (D=15 L=75) and are about.

Longitudinal	Transverse Yield point 30 kgs.
Yield point 28	Tensile 48,8 kg
Tensile 49.5 kgs.	Elongation 27%
Elongation 28%	Contraction 51%
Contraction 56%	
Impact tests(Gharpy)	
Longitudinal 6.2 kg/cm ²	
Transverse 4.9	

The bend tests 180° were in all cases without cracks and good.

Material fine perlite (see microphotograph 2)

In addition impact tests 1-8 were taken.

1-2 normal.

3-4 four hours annealed at 600° C.

5-8 artificial obsoleted (10% deformed and afterwards 1 hour annealed at 200° C.

The results were

1-2 = 6.3 kg/cm²

3-4 = 7.7 kg/cm²

5-8 = 1.7 kg/cm²

The results prove that there was no obsolescence in this case as the impact tests could have run down to 1.7 kg/cm²

As there was no boiler water available Chemical embrittlement could only be proved by means of microscopical investigation to prove intercrystalline corrosion.

In microphotograph 2 is a small crack which runs through the crystals and as better microphotograph is the one made by Messrs. Stork & Co., Hengelo, no.18535.

No.1 unetched, no.2 etched.

After etching it appears that as well at the branches as at the ends the cracks are intercrystalline and are filled with corrosion products (no.2).

The different tests and more special the microphotographs prove in my opinion that the cracks are due to intercrystalline fracturing due to chemical action.

Burgdorff



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