



HEL-03-3151
5130584
HOJO

DET NORSKE VERITAS

SURVEY REPORT

Requested by Messrs Lacol Oy, the undersigned attended their works in Helsinki, Finland on 28 May 2003 in order to witness procedure testing of t-piece manufacturing.

General :

T-Collar Oy, Helsinki, Finland, is a manufacturer of stainless steel T-pieces using methods called "Cylincollar", "Cylinweld" and saddle welding. T-pieces are produced using welding machines manufactured by Lacol Oy. "Cylincollar" is a method where a mandrel is pressed through a pre-machined round / elliptic hole in a pipe to form a collar in the pipe. The size and form of "priming" holes used are shown in T-Collar drawing no I-008. "Cylinweld" method indicates that a pipe is further welded to the collar to form T-piece with a longer branch. "Cylincollar" and "Cylinweld" methods are used at T-Collar Oy to produce T-pieces with OD 18-70mm ($t=1-2\text{mm}$) and OD 76-219mm ($t=2-4\text{mm}$). Saddle welding is used to produce T pieces with OD 6-18 mm ($t=1-3\text{mm}$). All welding operations are performed using orbital fully mechanized GTAW-welding, welded from the inside. Welding takes place inside a shielding gas chamber, and no filler metal is used. Welding parameters cannot be affected during welding. Welding operators load the cassette containing the workpieces, and assess the finished welds.

Scope of work :

Purpose of testing was to verify that manufacturing of T-pieces at T-Collar Oy is in accordance with pressure equipment directive 97/23/EN. For this purpose welding procedure testing was performed in accordance with EN-288-3 and welding operators were qualified in accordance with EN-1419.

Similar production tests have previously been performed by Dockweiler GmbH, 19306 Neustadt-Glewe, Germany, using similar welding equipment manufactured and sold by Lacol Oy. The pipe pressing procedure ("Cylincollar") has been assessed with satisfactory results by TÜV Nord e.V, Hamburg according to report TÜV-Az.: 0121W105700 on 14 March 2000. The "Cylinweld" procedure has been assessed satisfactorily according to TÜV Nord e.V, Hamburg, certificate no 07 202 3037Z0066/2/V01 dated 17 September 2002. Therefore laboratory testing of the test pieces was performed to a somewhat reduced extent. The test program for T-Collar Oy does however cover also the material thickness range 2,3-4,0 mm that is not covered by the TÜV Nord reports.

For test piece dimensions, materials used and subsequent technological testing see annex 1. All materials were delivered with works certificates EN 10204 - 3.1 B.

Test results :

Cold forming ratio - Wall thickness diminution (Test 1.1.1) :

Results are presented in Metlab test report no(s): 1346/03, 1347/03, 1348/03, 1349/03, 1350/03, 1351/03, 1352/03 and 1361/03. Wall thickness diminution of up to 25 % was recorded.

If any person suffers loss or damage which is proved to have been caused by any negligent act or omission of Det Norske Veritas, then Det Norske Veritas shall pay compensation to such person for his proved direct loss or damage. However, the compensation shall not exceed an amount equal to ten times the fee charged for the service in question, provided that the maximum compensation shall never exceed USD 2 million. In this provision "Det Norske Veritas" shall mean the Foundation Det Norske Veritas as well as all its subsidiaries, directors, officers, employees, agents and any other acting on behalf of Det Norske Veritas.

Dye Penetrant testing (Test 1.1.2) :

Results are presented in test report from Inspecta Oy, ref. Inspecta work no. 161559 - 007.
All results were found satisfactory.

Intergranular corrosion testing (Test 1.1.3) :

Results are presented in Metlab test report no(s): 1354/03 and 1360/03. All results were found satisfactory.

Hardness testing (Test 1.1.5) :

Results are presented in Metlab test report no(s): 1353/03, 1361/03 and 1384/03. Hardness of weld metal and HAZ are within acceptable limits.

Radiographic testing (Test 1.1.6) :

Results are presented in test report from Inspecta Oy, ref. Inspecta work no. 161559 - 001-006. As one of the test pieces (85x2/85x2, report 003) did not fulfil requirements testing was extended to cover two further test pieces (85x2/54x2 and 85x2/28x1,5). As these tests revealed no defects, results can be found acceptable.

Macro- / Microscopic examination (Test 1.1.7) :

Macro- and microstructure of welds are shown in test report no(s). 1354/03 and 1360/03. Macro-examination shows satisfactory weld structure, and regular austenite and delta ferritic structures as expected were found on all examined microstructure pictures.

Conclusion

All weld tests with the exception of 85x2/85x2 test piece ¹ (HEL-03-3155a) were completed with satisfactory results. Reference is made to WPAR certificates HEL-03-3155-3159 and approval test certificates for welding operators no(s). HEL-03-3160-3165.

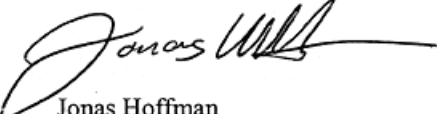
It is hereby confirmed that as all above test results were satisfactory, the manufacturing of T-pieces is found to be in compliance with chapter 3.1 of annex 1 of the pressure equipment directive 97/23/EN.

Remarks

1. The required dimension range is covered by satisfactory results for test piece 101x3,6/60,3x3,6.
2. Compliance with relevant parts of the directive is dependant of the final application of the T-pieces.
3. Wall thickness diminution that the pressing process brings should be considered when selecting piping design category. Extent of non-destructive testing should also be evaluated with respect to actual design parameters and design category of the piping system where these components are to be used.

Helsinki, Finland
03.07.2003




Jonas Hoffman
Surveyor