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FIRE PERFORMANCE EVALUATION OF FIRE MAIN VALVES IN ACCORDANCE WITH UK DOT APPENDIX D, *FIRE TEST REQUIREMENTS FOR FIRE MAINS AND FITTINGS*

FINAL REPORT
Consisting of 9 Pages

SwRI® Project No. 01.13537.01.407
Test Date: January 28, 2008
Report Date: February 22, 2008

Prepared for:

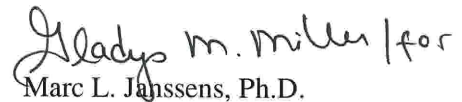
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ABSTRACT

A fire performance evaluation test of an 8-in. butterfly valve was conducted by Southwest Research Institute's (SwRI) Fire Technology Department, located in San Antonio, Texas, on January 28, 2008, for Wouter Witzel Eurovalve B.V., located in the Netherlands. Testing was conducted in accordance with UK DOT Appendix D, *Fire Test Requirements for Fire Mains and Fittings*, found in Appendix 2, of ABS Guide for Building and Classing Facilities on Offshore Installations, 2000.

One 8-in. butterfly valve identified as a Symmetric EV Valve, PN10 / PN16 rubberlined valve (DN200) was tested. The valve included a lever actuator.

The 8-in. butterfly valve was tested in SwRI's small horizontal furnace for 20 min at a furnace temperature of 540°C (1000°F). During the 20-min furnace exposure, the internal water pressure was maintained at 8.3 bars (120 psi). The 8-in. butterfly valve was allowed to cool back to ambient temperature while being monitored for leaks. The 8-in. butterfly valve did not leak any measurable water during the exposure and cool down. The valve met the requirements of UK DOT Appendix D, *Fire Test Requirements for Fire Mains and Fittings*.

1.0 INTRODUCTION

This report describes the fire performance evaluation test of an 8-in. butterfly valve manufactured by Wouter Witzel Eurovalve B.V., and includes a description of the test procedure followed, sample description, and test results obtained. The test was performed in accordance with UK DOT, Appendix D, *Fire Test Requirements for Fire Mains and Fittings*, found in Appendix 2, of ABS Guide for Building and Classing Facilities on Offshore Installations, 2000. The test was conducted at Southwest Research Institute's (SwRI's) Fire Technology Department, located in San Antonio, Texas, on January 28, 2008.

UK DOT, Appendix D, is intended to evaluate fire mains and fittings ability to withstand a fire exposure for 20 min and not allow leaks in excess of 22.7 l (5 gal) per minute. The results presented in this report apply only to the assemblies tested, in the manner tested, and not to any similar assembly or assembly combinations.

This standard should be used to measure and describe the properties of materials, products, or assemblies in response to heat and flame under controlled laboratory conditions and should not be used to describe or appraise the fire hazard or fire risk of materials, products, or assemblies under actual fire conditions. However, results of this test may be used as elements of a fire risk assessment, which takes into account all the factors that are pertinent to an assessment of the fire hazard of a particular end-use.

2.0 TEST PROCEDURE

SwRI's small horizontal furnace is used to subject the 8-in. butterfly valve to the fire test for 20 min.

The small horizontal furnace is equipped with four premixed air/natural gas burners, one placed on each wall of the furnace. The burners are controlled by a variable ratio gas/air regulator. Regulated natural gas enters the furnace at the nozzle of each burner, and a constant supply of air is provided to the nozzle by a blower unit. The gaseous products of combustion exit the furnace through an exhaust duct and flow through an exhaust fan into the atmosphere.

The conduct of the fire test is controlled to 540 °C (1000 °F), as indicated by the average temperature obtained from the readings of four thermocouples located within the furnace. Each furnace thermocouple is a 1.02-mm diameter (18-ga), Type K (Chromel-Alumel) wire, housed in a 12.5-mm diameter protective Inconel® pipe with ceramic inserts. Each furnace thermocouple has a welded junction at one end of the thermocouple wire. The welded junction is 25 mm from the end of the ceramic insert and 75 mm from the end of the Inconel® pipe. The time constant for this type of thermocouple is less than 20 s.

A water pressure of 8.3 bars (120 psi) is maintained within the valve throughout the fire test.

Following the fire test, the valve was allowed to cool to ambient temperature while being monitored for leaks by changes in pressure and visual observation.

3.0 TEST SAMPLES

The valve was received by SwRI on November 26, 2007. The valve was an 8-in. butterfly valve with an integral gasket. The 8-in. butterfly valve was identified as a symmetric EV Valve, DN200, Class 150 / PN10 / PN16 rubber-lined valve. The valve body was made of cast iron (EN1561) and the disc was made of bronze aluminum alloy (EN1982). The valve body included an integral neoprene gasket. The 8-in. butterfly valve assembly was wafer style designed to install between two 150 lb class flanges without any additional gaskets. The valve included a hand lever actuator.

The 8-in. butterfly valve was installed between two spool-piece pipes that were approximately 1.2 m (4 ft) in length. The flange to valve bolts were tightened to a torque of 275 N-m in the sequence specified in the drawing located in Appendix A of this report. The valve was tested in the closed position. One spool piece opposite end was capped with blind flanges and was located outside the furnace environment. Taps were included on the capped spool piece to maintain the internal water pressure. A flash tank was connected to the spool piece taps to maintain the required pressure and keep water in the pipe. The opposite end of the other spool piece was left open to monitor and measure any leaks. Figure 1 is a schematic illustration of the test set-up.

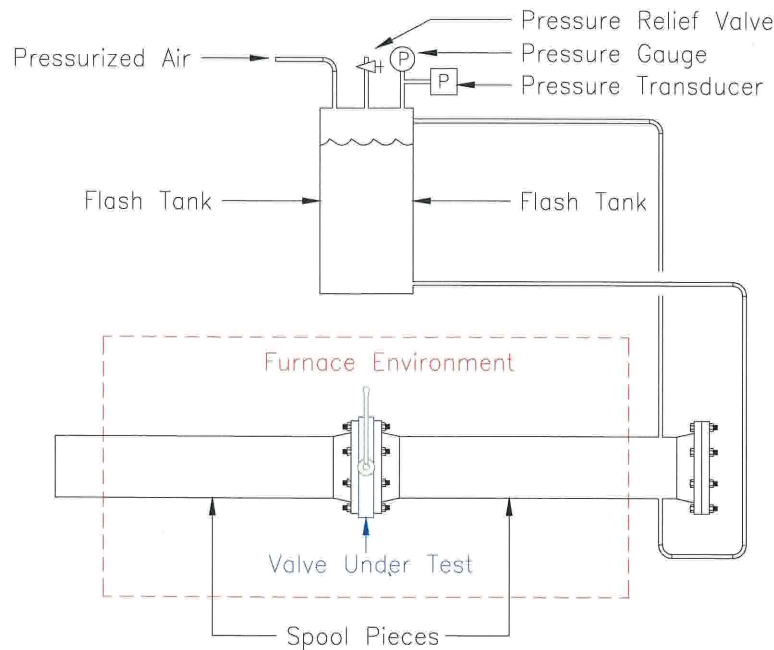


Figure 1. Schematic of Test Set-up.

4.0 TEST RESULTS

The 8-in. butterfly valve was tested on January 28, 2008. The valve and spool piece assembly was placed in the furnace and data acquisition connections were verified. The furnace burners were ignited to begin the fire exposure. Once the furnace reached 540 °C (1000 °F), the 20 min duration was started. At the end of the 20 min fire test, the furnace lid was removed and the valve was observed for leaks at the valve and at the open pipe outside the furnace. There was no water leakage from the valve during the fire exposure and cool down to ambient temperature. Once the 8-in. valve had cooled, it was verified to still be operational. The recorded furnace temperature and pipe pressure is illustrated in Figure 2. Photographs of the valve before and after the test are located in Appendix B.

CLIENT: Wouter Witzel Eurovalve B.V.
 SwRI PROJECT NO.: 01.13537.01.407
 DATE: January 28, 2008
 TEST ID: 08-028Eur1.csv

8-IN. BUTTERFLY VALVE FURNACE TEMPERATURES VS. TIME AND PIPE PRESSURE VS. TIME

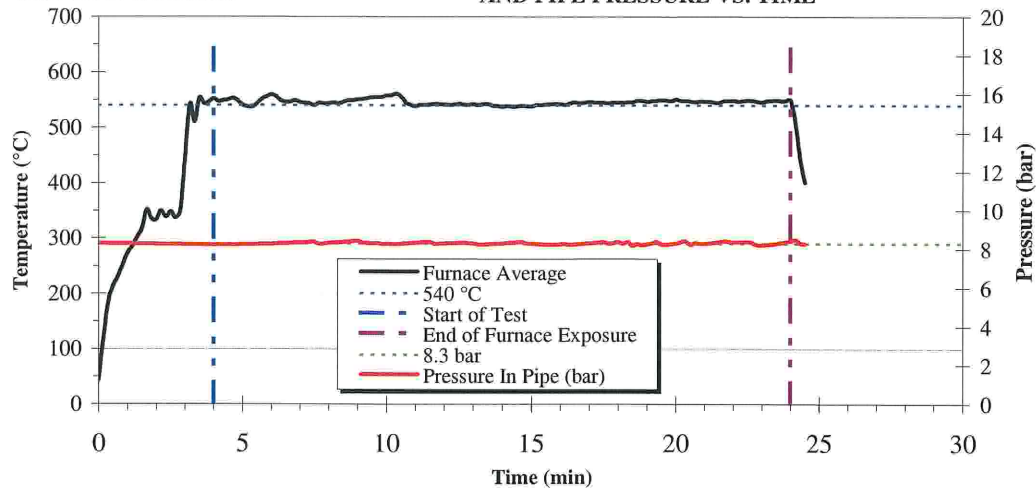
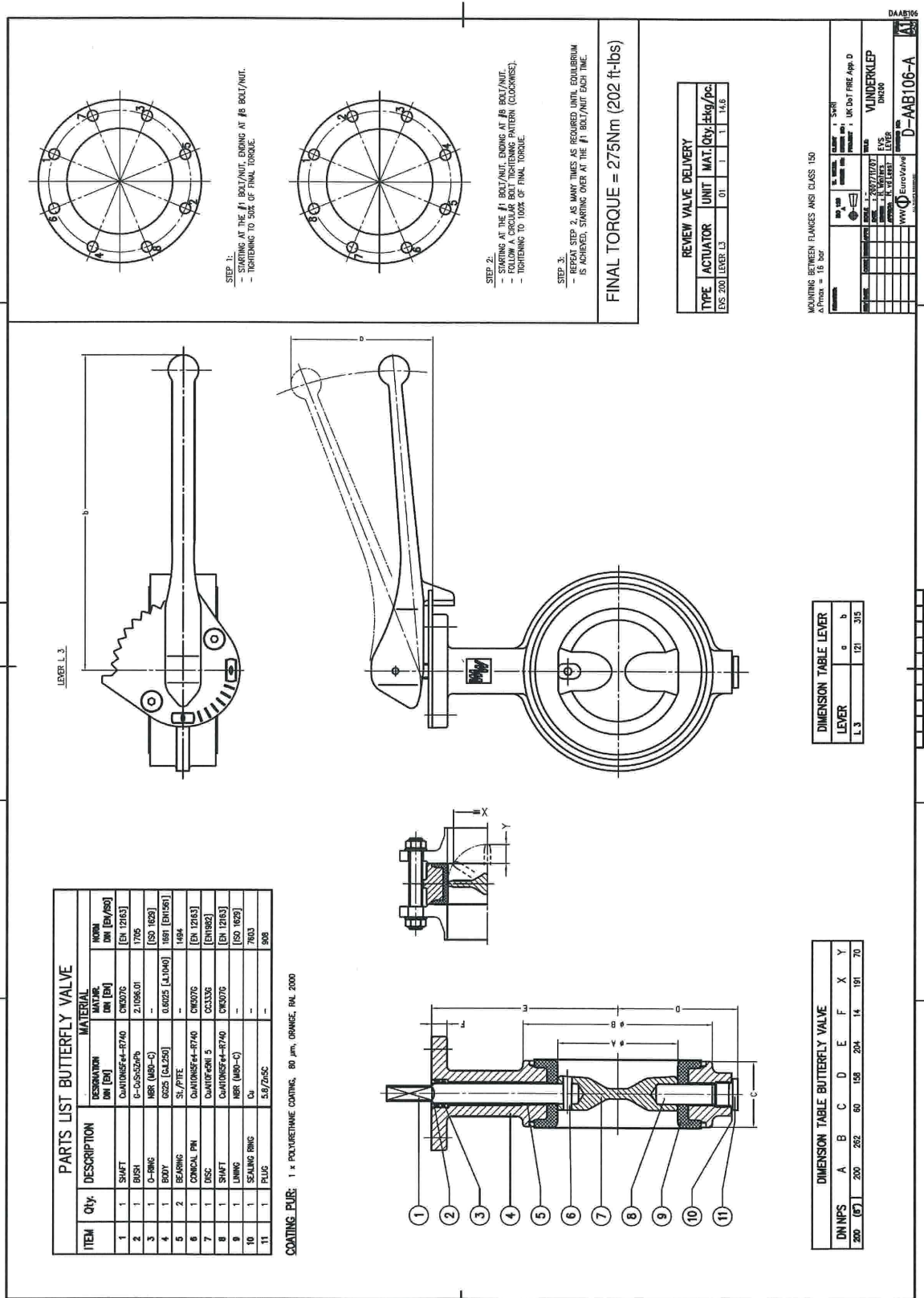


Figure 2. Recorded Test Data

5.0 SUMMARY

A fire performance evaluation test of an 8-in. butterfly main valve was conducted by SwRI Fire Technology Department, located in San Antonio, Texas, on January 28, 2008, for Wouter Witzel Eurovalve B.V., located in the Netherlands. The 8-in. butterfly valve met the requirements of UK DOT Appendix D, *Fire Test Requirements for Fire Mains and Fittings* found in Appendix 2, of ABS Guide for Building and Classing Facilities on Offshore Installations, 2000.

APPENDIX A
CLIENT SUPPLIED DRAWING
(CONSISTING OF 1 PAGES)



APPENDIX B
PHOTOGRAPHS
(CONSISTING OF 1 PAGE)



Figure B-1. Valve prior to Test

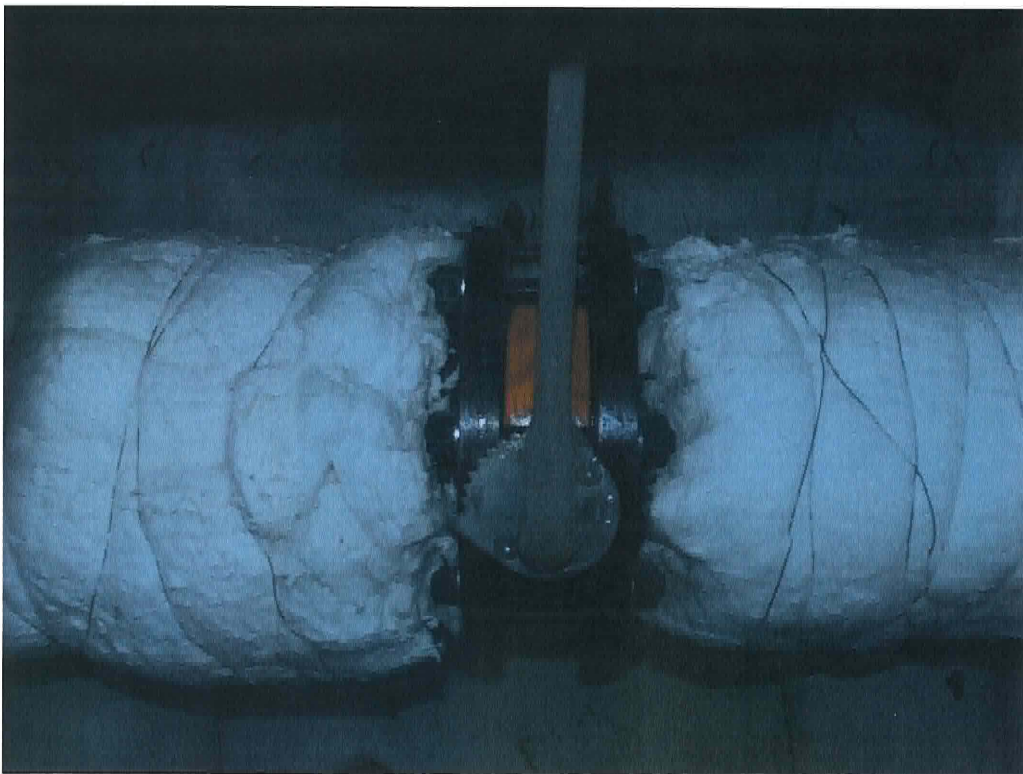


Figure B-2. Valve Following Test and Cool Down.