



**TYPE APPROVAL OF TECHLOK X8”  
CLAMP CONNECTOR FOR THE JADE PROJECT  
HIGH PRESSURE / HIGH TEMPERATURE**



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### 1. PURPOSE

- 1.1 To test a Techlok X8 connector to comply with the design requirements of the Jade project

### 2. SCOPE

- 2.1 The basic scope is as follows, the detailed procedures are on the following pages 6 of 7
- 2.2 Gas and Hydrotest test the components shown on Drawing SCH001
- 2.3 Gas test 12100 lb/in. at - 50° C
- 2.4 Gas test 12100 lb/in. at 160° C
- 2.5 Gas test 12100 lb/in. apply maximum bending moment of 18000 ft/lb (25000 nm)
- 2.6 Proof test at 33523 lb/in. ambient temperature

### 3. WITNESS

- 3rd Party inspection
- All tests witnessed by Lloyds Register

### 4. TEST HOUSE

The tests were carried out at the independent test house Vaseco Cheshire

### 5. EQUIPMENT

Vector test assembly as shown on SCH001  
Vaseco Gas and Hydro test equipment with calibrated data logger



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Jade Test Procedures and Design conditions

### 6.0 Design Conditions

6.1 Design Pressure 11000 lb/in<sup>2</sup>

6.2 Design Temperature 160 ° C , and - 50° C

6.3 Components to be tested

Techlok X8 in 62 37.5 mm W.T. Hub  
X8 Clamp  
62 size seal ring

6.4 Bending moment

18000 ft lb ( 25000 nm) see attached sheets for calculations

### 6.5 Material

Hub :- ASTM A182 F51

Clamp :- AISI 4140

Seal Ring :- ASTM A564 - 630 Stainless

### 7.0 Procedure for testing

7.1 Pressure test (proof test) to the requirements of ASME B31.3 chapter IX Para K304 .7.2

7.2 Type approval to the requirements of AMEC Technical specification 4.1.20

### 8.0 Test Requirements

8.1 Proof test to ASME B31.3 chapter IX Para K304 .7.2  
Pressurise the Techlok X8 assembly as shown on the attached drawing SCH001

8.2 The pressure test is based on the following requirements of the Code ASME B31.3 chapter IX Para K304 .7.2

8.3  $2 * \text{design pressure} = 11000 \text{ lb/in}^2 * 2 = 22000 \text{ lb/in}^2$

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- 8.4 Ratio of allowable stress at test temperature to the allowable stress at design temperature

Allowable stress at test temperature 20° C is 2/3 of specified yield  
Specified yield from ASTM A182 F51 - 65000 lb/in<sup>2</sup>

A/ Allowable stress for materials not listed in Section 2 Part D are taken from ASME B31.3 chapter IX Para K302.3.2 (3) (a)

∴ 2/3 of yield 65000 lb/in<sup>2</sup> \* 2/3 = 43333 lb/in<sup>2</sup>

B/ Allowable stress at design temperature 160° C - 47800 lb/in<sup>2</sup>  
(Yield at 160°C from Avesta data ) \* 2/3 = 32466 lb/in<sup>2</sup>

therefore 43333/ 32466 = 1.33 ratio

1.33 \* 22000 lb/in<sup>2</sup> = 29260 lb/in<sup>2</sup>

- 8.5

Ratio of actual yield to specified yield

Actual yield from test certificate 74500 lb/in<sup>2</sup>

Specified yield from A182 - F51 = 65000 lb/in<sup>2</sup>

74500/ 65000 = 1.146 ratio

1.146 \* 29260 lb/in<sup>2</sup> = **33532 lb/in<sup>2</sup> Proof Test Pressure**

- 9.0 Bending moment/pressure test

- 9.1 The bend test will be carried out at the design pressure \*1.1

11000 lb/in<sup>2</sup> \*1.1 = 12100 lb/in<sup>2</sup>

And the maximum allowable bending moment of 18000 ft lb

- 9.2 The test fixture is schematically shown on drawing SCH001

The bending beams are 5'-0" between centre line of fixture and centre line of hydraulic ram

Required bending moment 18000 ft lb / 5ft = 3600 lb load The load will be calculated from the hydraulic area of the ram and the hydraulic pressure on the ram.



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### Sequence of tests

- 10.00 Low temperature  
Connect hydrotest equipment and temperature probe to test fixture.
- 10.1 Test fixture to be cooled to  $-50^{\circ}\text{C}$
  - 10.2 Pressurise test fixture to  $11000\text{ lb/in}^2 * 1.1 = 12100\text{ lb/in}^2$
  - 10.3 Hold for 15 minutes
  - 10.4 Release pressure
- 11.00 High Temperature /High Pressure
- 11.1 Heat test fixture to  $160^{\circ}\text{C}$
  - 11.2 Pressurise test fixture to  $11000\text{ lb/in}^2 * 1.1 = 12100\text{ lb/in}^2$
  - 11.3 Hold for 15 minutes
  - 11.4 Release pressure
- 12.00
- 12.1 Maintain test temperature at  $160^{\circ}\text{C}$
  - 12.2 Pressurise test fixture to  $11000\text{ lb/in}^2 * 1.1 = 12100\text{ lb/in}^2$
  - 12.3 Apply bending moment of 18000 ft lb
  - 12.4 Hold for 15 minutes
  - 12.5 Release bending moment
  - 12.6 Release pressure
- 13.0 Allow test fixture to return to ambient temperature
- 13.1 Pressurise test fixture to  $33520\text{ lb/in}^2$
  - 13.2 Hold
  - 13.3 Release pressure

Remove test fixture and return to Vector for inspection

### Note

1. Tests to be witnessed by 3<sup>rd</sup> party inspector
2. Pressure and temperature will be recorded on a calibrated chart recorder.

### 14.0 Test Results

All tests were completed successfully and witnessed by Lloyds Register



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### 15.0 Additional Tests

The opportunity to carry out a leak test was also taken during the gas test, with the introduction of Helium into the gas test medium of Nitrogen

A leak detector was inserted into the test pit and readings taken around and the pressure assembly.

1. At initial pressurisation 500 lb/in<sup>2</sup>
2. At test pressure of 12100 lb/in<sup>2</sup>

There was no recordable leakage

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Test rig at  $-50^{\circ}\text{C}$

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General view of test rig in test pit