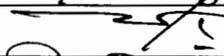
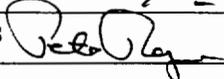


## Bayu Undan / Darwin LNG Facilities Technical Delivery Terms

<b>Material Description:</b> Relief Valves	
<b>Doc No:</b> TDT 05	<b>Rev:</b> 1
<b>Prepared By:</b> S. MacKenzie 	<b>Date:</b> 30 January 2006
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<b>Approved By:</b> P. Rogers 	

### 1 SCOPE

This document outlines the general technical requirements for the supply of Safety Valves, Relief Valves and Safety Relief Valves for the ConocoPhillips (COP) Bayu-Undan and Darwin LNG Facilities.

Data sheets will accompany this document identifying each application. This document applies to both direct acting/spring loaded valves and pilot operated valves.

Specifically, the following codes and standards shall apply to all relief valves purchased for these facilities:

AS 1210	Unfired Pressure Vessel Code.
AS1271	Safety valves, other valves, liquid level gauges and other fittings for boilers and unfired pressure vessels.
ASME Boiler and Pressure Vessel Code – Section VIII, Divisions 1 and 2.	
API Std 526	Flanged Steel Safety Relief Valves.
EN 10204	Metallic Products – Types of inspection documents.
NACE MR 0175	Sulfide stress cracking resistant metallic materials for oil field equipment.

### 2 DEFINITIONS

#### 2.1 Safety Valve

A safety valve is defined as an automatic relieving device, characterised by the rapid full opening or “pop action” upon opening to relieve pressure.

#### 2.2 Relief Valve

A relief valve is defined as an automatic pressure relieving device, characterised by the valve opening in proportion to the increase in pressure over the set pressure.

#### 2.3 Safety-Relief Valve

A safety-relief valve is an automatic pressure relief device suitable for use as either a safety or relief valve, depending on the application.

- 2.4 Set Pressure**  
The inlet pressure at which the relief device opens. For a safety or relief valve, it is defined as the point at which the valve commences to lift under operating conditions.
- 2.5 Overpressure**  
Overpressure is defined as the pressure increase over the set pressure at rated flow.
- 2.6 Back Pressure**  
Back pressure is defined as the pressure on the discharge side of the relieving device before and after the device opens. (Constant, variable and Superimposed).
- 2.7 Blowdown**  
Blowdown is defined as the difference between the set pressure and the reseating pressure, expressed as a percentage of the set pressure.
- 2.8 Accumulation**  
Accumulation is defined as the maximum permitted pressure increase over the maximum allowable working pressure (MAWP) of the protected equipment.

### **3 GENERAL REQUIREMENTS**

Safety, relief and safety relief devices covered by this document shall be direct spring loaded or pilot operated types, designed, manufactured and identified in accordance with the relevant Pressure Vessel Code specified on the datasheets.

For valves already approved by COP, existing datasheets will be issued with the purchase order. For new design or alternative valves, the Supplier shall ensure that valves shall be of adequate size to relieve the capacity, as specified on the data sheet, at the specified pressure and temperature conditions and fluid physical properties.

In addition, the Supplier shall provide certified calculations to verify the valve orifice selection together with noise calculations. Where the estimated discharge noise level exceeds 110 dBA the Supplier shall offer and separately price a downstream noise attenuation device to limit the noise to 110 dBA, without impairing the performance of the relieving device.

Nozzles shall be of one piece construction with integral seat smooth on the inside surface for the full length.

The seat against which the disc will close shall be designed to ample proportions so as to allow several lapping or machining operations.

Plain lifting levers shall be provided on all valves for hot water and air service unless specified otherwise on the datasheet.

Caps shall be provided over the spring adjusting screws on all valves except as required by codes. The cap and bonnet shall be provided with a wire seal, unless otherwise specified, to prevent unauthorised adjustment.

#### **3.1 Spring Loaded Valves**

Valves subject to variable back pressure exceeding 10% of set pressure shall be provided with a corrective feature to provide a balanced valve.

A capacity correction shall be made for the specified back pressure.

For special corrosion and toxic applications a bellows shall be installed in top guided valves, when specified, to prevent all parts except body, disc, nozzle, blowdown ring and pin from coming into contact with the process fluid.

Springs shall be corrosion resistant and suitable for the relieving temperatures given on the data sheet. Tungsten steel springs shall be used for temperatures greater than 230°C

### 3.2 **Pilot Operated Valves**

Modulating pilots shall be used.

Pressure pilots shall be non-flowing design and provided with a field test connection. Pilot operated pressure relief valves shall be provided with a means for connecting and applying pressure to the pilot adequate to verify that the moving parts critical to proper operation are free to move.

Where dual pressure pilots are specified either of the pressure pilots shall be removable from service with the active pressure pilot protecting the system.

Isolation for each pressure pilot shall be in the form of a double block and bleed valving arrangement on the sensing and dome connected sides.

A method of secure interlocking/ganging of the double block and bleed valving arrangement shall be provided to allow the operator to isolate only one pilot while the other remains active. It shall not be possible to close either the sensing or the dome connected sides on opposite pilots at the same time.

### 3.3 **Materials**

Materials of construction shall be as specified on the data sheets.

The Supplier is to furnish his standard gasket material compatible with the process fluid and operating conditions, unless otherwise specified. Materials containing asbestos shall not be used.

For direct spring loaded devices the trim shall include the nozzle, the disc and disc holder, stem, guide, blowdown ring, ring pin and all internal parts, except the body, in contact with the process fluid.

For pilot operated devices the trim shall include the nozzle, the disc and piston assembly, the internal trim for the pilot valve assembly including the relief and blowdown seats, except the body, in contact with the process fluid.

### 3.4 **Connections**

Flange dimensions and drilling shall conform to ANSI B16.5 and connection sizes detailed on the data sheets. Flanges shall be integral with the body.

Valve body flanged connections shall have pressure-temperature ratings as per ANSI B16.34 as a minimum.

Connections on screwed bodies shall conform to the pressure rating and thread form specified on the data sheets.

### 3.5 **Identification**

A permanently attached stainless steel tag, stamped with the following information shall be provided on each relief valve device:

- Tag Number
- Manufacturer's name or Trademark
- Model Number
- Serial Number
- Certified Capacity
- Nominal Size (DN) of valve
- Body and Trim material
- Flange rating
- Set Pressure
- Back Pressure
- Cold Set Pressure
- Orifice Designation
- Designation Number
- Limiting Temperature
- Code Stamp

### 3.6 **Testing**

Each valve shall be factory set and tested in accordance with the appropriate code procedure.

When the valve is subjected to the specified set pressure and back pressure, destructive chattering shall not occur when raising the pressure to the popping point and then lowering to below the closing pressure.

The set pressure tolerances shall be as required by the appropriate code.

Operational tightness test – the valve shall be bubble tight when tested at 90% of set pressure in accordance with AS 1271.

Blowdown shall not be less than that stated on the data sheets.

### 3.7 **Certification**

Material certification shall be provided in accordance with the requirements of EN 10204 as follows:

- Test reports and certificates – certificates to 3.1. (see note)
- Pressure retaining components – material certificates to 3.1.
- Bolting – material certificates to 3.1.
- Trim materials – certificate of compliance to 2.1.

Note – The format of test reports and certificates shall follow the examples set down in AS 1271. Alternative forms should be submitted for approval by COP.

The certificates shall be in the English language or in other languages if they are accompanied by an endorsed and dated English translation of the contents.

All certificates shall be originals or certified copies of the originals.

### 3.8 **Packaging and Shipping**

Relief Valves are classed as instruments, and are Safety Critical Elements used to safeguard lives and property. Every care should therefore be taken to minimize physical damage and alterations to test settings. They should be transported and stored in a vertical position and packed to minimize shock, impact and vibration.

Material used for packaging, packing, wrapping, sealers, moisture resistant barriers and corrosion preventatives shall be recognized brands and grades and shall conform to the best world standards. Timber material shall be treated/fumigated to prevent infestation by insects or similar for all material destined for Darwin (Australia). This is to meet quarantine regulations and prevent impounding by customs in addition to preserving the timber whilst in tropical storage at the delivery point.

Supplier shall ensure that standard packaging meets recognized International standards for the requirements for the applicable specification. Proposed non standard packaging shall be reviewed by COP and approved prior to assembly of packaging. There shall be no defects, imperfections or omissions which would tend to impair the protection afforded by the package as a whole.