

## Bayu Undan / Darwin LNG Facilities Technical Delivery Terms

<b>Material Description:</b>		Gaskets	
<b>Doc No.</b>	TDT 01	<b>Livelihood Ref:</b>	ALL/CMP/SPE/001

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6	Approved for Purchase	28/03/18	T. Betterton	S. Wilson	A. Gibson
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### 1 SCOPE

This document outlines the general technical requirements for the supply of gaskets required for the Santos Bayu-Undan and Darwin LNG Facilities. Specifically, the nominated codes and standards shall apply to all gaskets purchased for these facilities.

The description Gaskets includes the following components:

ASME B16.5	Pipe, Flanges and Flange Fittings.
ASME B16.20	Metallic Gaskets for Pipe Flanges – Ring Joint, Spiral Wound, Jacketed and grooved metal gaskets with covering layers.
ASME B16.21	Non Metallic Flat Gaskets for Pipe Flanges.
ASME B16.47	Large Diameter Steel Flanges
API 6A	Specification for Wellhead and Christmas Tree Equipment
ASTM F336	Non Metallic Enveloped Gaskets for Corrosive Service.
EN 10204	Metallic Products – Types of inspection documents.

### 2 FLAT RING SYNTHETIC FIBRE GASKETS

The design and dimensions shall be in accordance with ASME B16.21.

The gasket shall consist of high quality compressed synthetic fibre jointing with glass/aramid fibres and NBR binder.

The surface shall have a roughness of 0.4Ra.

Thickness of gasket shall be 1.5 mm up to DN 600(24") and 3 mm for DN 650 (26") and larger.

Sizes DN 15 (½") up to and including DN 600 (24") to match either raised face or full face (as specified on the purchase order) according to ASME B16.5.

Sizes above DN 60 (24") shall be in accordance with ASME B16.47 Series B for Bayu Undan and ASME B16.47 Series A for DLNG unless noted otherwise on the purchase order.

*(The use of Asbestos is prohibited)*

### **3 SPIRAL WOUND GASKETS**

This specification only applies to spiral wound gaskets in the range ASME Class 150-2500.

The design and dimensions of the gaskets shall be in accordance with ASME B16.20 (except as detailed below).

Austenitic Stainless Steel gaskets spiral windings shall be of a grade 316 or 316L stainless steel (SS), with chevron graphite or mica filler as specified on the purchase order, complete with outer and inner 316 or 316L SS rings, 4.5 mm thick.

Alloy 825 gaskets spiral windings to be 4.5 mm thick complete with Alloy 825 outer and inner ring and windings to ASTM B423 UNS N09925, chevron graphite filler.

For Category "M" fluid service only – the specification is as above for stainless steel and alloy 825 but inner ring to have graphite facings.

Sizes DN 15(½") up to and including DN 600(24") to match raised face (RF) flange according to ASME B16.5. Sizes above DN 60 (24") shall be in accordance with ASME B16.47 Series B for Bayu Undan and ASME B16.47 Series A for DLNG unless noted otherwise on the purchase order.

Colour coding shall be in accordance with the requirements of ASME B16.20.

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## **4 RING TYPE JOINT GASKETS**

Ring Type Joint gaskets shall be manufactured to API 6A Type "R" oval in section and shall confirm to ASME B16.20.

Austenitic 316 or 316L Stainless Steel ring joints shall have a Brinell hardness of less than 160 HBW.

Sizes DN 15(½") up to and including DN 600(24") shall conform dimensionally to ASME B16.5.

Sizes above DN 600(24") shall be in dimensional accordance with ASME B16.47 Series "A" RTJ.

## **5 FULL FACE NEOPRENE RUBBER GASKETS**

The design and dimension shall be in accordance with ASME B16.21.

Rubber for gaskets shall comply with ASTM D1330 Gr 1 or 2. Hardness shall be between 60-65 Shore A.

Sizes DN 15(½") up to and including DN 600(24") to match Full Face (FF) flange according to ASME B16.5.

Sizes above DN 60 (24") shall be in accordance with ASME B16.47 Series B for Bayu Undan and ASME B16.47 Series A for DLNG unless noted otherwise on the purchase order.

Total thickness of gasket shall be 3.0 mm unless otherwise noted on the purchase order.

## **6 PTFE ENVELOPE GASKETS (AT1)**

The design and dimension shall be in accordance with ASME B16.21.

Gasket construction shall be in accordance with ASTM F336, compressed fibre gasket, PTFE reinforced together with PTFE envelope.

Total thickness of gasket shall be 1.5mm.

*(The use of Asbestos is prohibited)*

## **7 GASKETS FOR GRE SYSTEMS (KROLL & ZILLER TYPE)**

The design and dimension shall be in accordance with ASME B16.21.

Kroll and Ziller gasket types specified below are “qualified” for use with Glass Reinforced Epoxy Piping systems on Bayu Undan. No alternatives are permitted.

Sizes DN 80(3”) up to and including DN 600 (24”) shall be type G-ST-P/S NBR outer with steel core to suit ASME B16.5 Class 150 or Class 300 Flanges as applicable.

Sizes DN 650(26”) up to and including DN 1000(40”) shall be type G-ST-P/S NBR outer with steel core to suit ASME B16.47 Series B, Class 150 Flanges.

For DLNG, NBR gaskets shall be used as per Section 5.

## **8 GROOVED METAL GASKETS WITH COVERING LAYERS (KAMMPROFILE)**

This specification only applies to gaskets in the range ASME Class 150-2500.

Sizes above DN 60 (24”) shall be in accordance with ASME B16.47 Series B for Bayu Undan and ASME B16.47 Series A for DLNG unless noted otherwise on the purchase order.

Total thickness of gasket shall be 3.0 mm unless otherwise noted on the purchase order.

Gaskets shall have a 3mm thick 316L Stainless Steel core with parallel faces and graphite facing.

Colour coding shall be in accordance with the requirements of ASME B16.20.

*(The use of Asbestos is prohibited)*

## **9 TRACEABILITY AND CERTIFICATION REQUIREMENTS**

All certificates shall be originals or certified copies in conformance with EN 10204 as follows:

- Ring type gaskets shall be certified to 3.1 requirements and traceable to product grade.
- Spiral wound gaskets and grooved metal gaskets with covering layers shall be certified to 2.1 requirements and traceable to product grade.
- All other gaskets shall be certified to 2.1 and traceable to product type.

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.

## 10 MARKING REQUIREMENTS

As a minimum each gasket shall show size rating and material(s). The following additional markings shall apply:

**Table 1: Marking Requirements**

ITEM TYPE	MARKING LOCATION	MARKING TYPE
Spiral Wound	Round nose low stress stamp	On the outer centring ring
Grooved Metal with Covering Layers	Round nose low stress stamp	On the outer centring ring
RTJ Gaskets	Vibro-etching	RTJ Gaskets: On the outer rim
Fibre gasket	Waterproof paint or ink stencil	On the label attached to gasket
Rubber gaskets	Waterproof paint or ink stencil	On the label attached to gasket
Gaskets for GRE Systems	Waterproof paint or ink stencil	On the label attached to gasket

## 11 PACKING AND TRANSPORT REQUIREMENTS

Packing and transport shall meet requirements as per **Table 2**.

**Table 2: Protection and Packing Requirements**

PRODUCT	SIZE RANGE	MAXIMUM PACKING QUANTITY	METHOD	LOCAL DELIVERY
Spiral Wound Gaskets CR, CRIR, RIR	<2" (100 mm )	10	Plastic Shrink Wrap	Double ply cardboard box OR if thin cardboard box -Fill with suitable packing protection to prevent movement
	2" to 6" (100 to 300mm OD)	10	Plastic Shrink Wrap	Double ply cardboard box OR if thin cardboard box - Fill with suitable packing protection to prevent movement
	8" to 12" (300 to 500mm OD)	2	Cardboard backing, Strapped across, minimum 3 straps	Wrapped crosswise with cardboard
	> 12" (>500 mm OD)	1	Cardboard backing, Taped across section.	Wrapped crosswise with cardboard
Spiral Wound Gaskets Style R	< 80 mm OD	10	Plastic Shrink Wrap	Cardboard box lined with bubble wrap - Fill with suitable packing protection to prevent movement
	80 to 250 mm OD	5	Cardboard tube	Cardboard box lined with bubble wrap - Fill with suitable packing protection to prevent movement
	> 250MM OD	1	Cardboard backing, Taped across section.	Cardboard box lined with bubble wrap - Fill with suitable packing protection to prevent movement
MRG T108 Kammprofile T109 Graphited gaskets	All	1	Bubble wrap both sides across whole gasket. Cardboard both sides taped together on edge.	As is. Large quantities in cardboard box.
Insulation Sets	All	1	Gasket flat packed on Cardboard. Tubes and Washers to be Packed in Plastic Bag	Cardboard Box

PRODUCT	SIZE RANGE	MAXIMUM PACKING QUANTITY	METHOD	LOCAL DELIVERY
Soft Cut Gaskets KSIL, Rubber, PTFE, Envelope Ring and Full Face	< 12" ( <500 mm OD )	25	Strap across section 2,4 or 8 places depending on size. Carboard between gaskets.	Cardboard box
	> 12" ( >500 mm OD )	10 max	Taped across section. Carboard between gaskets.	Cardboard box
Preformed Gaskets Solid Graphite	< 150 mm OD	5	Bubble wrap	Carboard box
	> 150 mm OD	1	Bubble wrap across section	Cardboard box
Ring Joint Gaskets	All	As received	Leave in suppliers packaging	Carboard box
Sheeting KSIL, PTFE, Rubber	< 3mm thk	5	Roll and strap	Wrap in plastic bubble wrap
	> 3 mm thk	1	Roll and strap	Wrap in plastic bubble wrap

## **12            PRESERVATION REQUIREMENTS**

Preservation shall be such that if the packaging is disturbed, then negligible degradation is permitted for a minimum period of 12 months from dispatch from the vendor's works. Crating and packages shall be marked with clear handling, storage and warning instructions to protect against damage to the preservation applied.