

Bayu Undan / Darwin LNG Facilities Technical Delivery Terms

Material Description:		Bolting Components for Structural Applications	
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1 SCOPE

This document outlines the general technical requirements for the supply of both carbon steel and stainless steel structural bolting for the Santos Bayu-Undan and Darwin LNG Facilities.

Specifically, bolting materials shall be manufactured under the general requirements of the following codes and standards:

ASTM A193	Alloy Steel and Stainless Steel Bolting Materials for High Temperature Service
ASTM A194	Carbon and Alloy Steel Nuts for Bolts for High Pressure and High Temperature Service
ASTM A153	Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A325	Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
ASTM A563	Carbon and Alloy Steel Nuts
ASTM F436	Hardened Steel Washers
ASTM A700	Packaging, Marking and Loading Methods for Steel Products for Domestic
AS CK13	Code of Recommended Practice for Preparation of Metal Surfaces for Electroplating
AS 1214	Hot-Dip Galvanised Coatings on threaded fasteners
AS 1897	Electroplated Coatings on Threaded Components
AS 2331	Methods of Test for Metallic and Related Coatings
EN 10204	Metallic Products – Types of inspection documents

2 MATERIALS

2.1 Bayu Undan

Bolts and nuts for which the nominal diameter is less than 12mm shall be made of stainless steel AISI Type 316 to ASTM A193 (B8M Class 2) and ASTM A194 (8M).

Isolation washers for these bolts shall be Santos approved rigid polyurethane, PTFE or similar.

For applications where a significant risk of galvanic corrosion is present and where extra strength is required, bolts and nuts for nominal diameters 12mm – 14mm shall be made of carbon steel ASTM F568 Class 8.8.

Bolts, nuts and washers for which the nominal diameter is 16mm or larger shall be made of carbon steel, quenched and tempered and cadmium plated, sherardised or galvanised, all in accordance with ASTM A325 (Bolts), ASTM A563 (Nuts) and ASTM F436 (Washers). Property class shall not exceed ASTM F568 Class 8.8 strength level.

2.2 Darwin LNG

Bolts, nuts and washers shall be made of carbon steel, quenched and tempered and galvanised, all in accordance with ASTM A325 (Bolts), ASTM A563 (Nuts) and ASTM F436 (Washers). Strength property class shall not exceed ASTM F568 Class 8.8 strength level.

3 CERTIFICATION

All materials shall be supplied with EN 10204 – 2.2 Test Certificates for each batch/heat.

In addition, the bolting materials shall also be supplied with EN 10204 – 2.1 Certificates of Conformity related to the coating requirements. These certificates shall relate batches of bolts to typical test results obtained (i.e. EN 10204 – 2.2 Test Certificates). The Supplier shall retain all specific coating test results on file which may be subject to audit by Santos.

All the documents relating to quality assurance and quality control including certifications shall be in English and readily legible. Documents provided in other languages or illegible shall not be accepted and shall be referred to Santos before clearing final inspection.

4 COATING OF BOLTING COMPONENTS

This section defines the technical requirements for the application of cadmium plating or galvanizing of bolting components in service up to 200°C.

The supplier shall verify that the manufacturing tolerance is adequate to accommodate the proposed coating thickness without interfering with the fit of the nut by a method of trial fitting. Thread accuracy shall be such that all plated nuts of a particular size can be hand threaded onto the full length of all plated bolts of that same size.

4.1 Requirements for Cadmium Plating

The plating shall be carried out in accordance with the “Barrel Method”. The surface of all bolting components which require plating shall be prepared and conform to the requirements of Code of Practice AS CK13.

The plating applied to the bolting components shall contain not less than 98.5% cadmium and shall be free from all mercury. The total impurities excluding zinc and nickel shall not exceed 0.5%.

The bolting components shall be heavy cadmium plated in accordance with AS 1897 Service Condition 3 (severe). After plating, all bolting components shall be chromate treated in accordance with AS 1897 Type C – (yellow iridescent). The passivated cadmium plated components shall not be handled for 24 hours to allow for hardening of the chromate conversion plating.

4.2 Requirements for Galvanising

Galvanising shall be carried out in accordance with the “Hot Dip Galvanising Process”, as defined in Australian Standard AS1214 Paragraph 4, and per this TDT. The surface of all bolting components which require galvanising shall be prepared and conform to the requirements of AS1214 and AS4680.

4.3 INSPECTION AND TESTING

4.3.1 Cadmium Plating

Sampling for visual examination and plating thickness testing shall be carried out in accordance with the recommended sampling procedure given in Appendix E of AS 1897. If the maximum number of defective products is above the specified amount, then the Supplier shall advise Santos of the corrective action they propose. Santos reserves the right to reject the batch until corrective action has been approved.

The plating shall be free from misses, high spots or other defects likely to compromise plating performance. Any misses and high spots which, after final coating, would affect the ability of carrying out the thread fit shall be unacceptable.

The required number of samples shall be tested to verify the plating thickness. The plating thickness tests shall be determined by one of the methods described in AS 2331.1. The testing shall be carried out on bolt ends and nut faces. The plating thickness shall not be less than that required by code. In the event of dispute, the micro sectioning method shall be used in accordance with AS 2331.1.1.

Plating adhesion tests shall be carried out in accordance with the burnishing test method described in AS 2331.4.1. The test shall be carried out on the bolt ends and nut faces of test bolts or on test plates for each batch. The plating shall remain adherent to the substrate.

4.3.2 Galvanising

Sampling for visual examination and plating thickness testing shall be carried out in accordance with the recommended sampling procedure given in Appendix B of AS1214. If the maximum number of defective products is above the specified amount, then the Supplier shall advise Santos of the corrective action they propose. Santos reserves the right to reject the batch until corrective action has been approved.

5 PACKING, SUPPLY AND DOCUMENTATION

The stud bolts and nuts shall be preserved, packed and supplied in accordance with good industry practice.

Each material and each size shall be packed separately.

Minimum preservation requirements shall be met as specified in Export Packing Specification ALL/SUP/LOG/PRO/2000 Rev3.

Packing information details as specified during the procurement stage shall be met.