



Taper/Taper adhesive-bonded Joint



## PETRONAS AGO CO<sub>2</sub> GAS - 32 inch Bondstrand® pipe and fittings with Taper/Taper bonded joint (gas-tight)

PETRONAS Gas Berhad (PGB), a subsidiary of PETRONAS, operates a Gas Processing Plant, Natural Gas Distribution System and an Export Terminal and Central Utilities Facilities

Project Critical Design Considerations & Requirements:

- Resin suitable for CO<sub>2</sub> application
- Prevention of Static charge build-up
- GRE Composite piping installed about 15 meters above ground on pipe supports
- Long-term service life of 25 years
- Performance of qualification testing to verify the design of the piping system
- Review of CS 2 design and pipe support spacing
- Gas-tight, Taper/Taper bonded joints

NOV Fiber Glass Systems was awarded project based on design, qualification testing and supply on the 32 inch GRE anti-static piping system for an above ground low pressure CO<sub>2</sub> piping system to be installed at location GPP 2, 3, 4 AGO project.

### Containment Features

Gas applications are designed differently than less critical liquid applications (such as produced water or crude oil). The concerns for permeability of the gases and the high level of potential energy stored in compressed gas pose higher level engineering challenges. Bondstrand 2400 Gas Series is designed to handle gas applications with gas-tight containment features:

- **Reinforced Resin Matrix Inner Line**  
A heavy-duty corrosion resistant liner is incorporated for gas containment. This matrix is manufactured using aromatic amine cured epoxy and reinforced using C-veil.
- **Taper/Taper bonded, High Pressure Joints**  
Joints principles are based on bonded connections as per ASME 31.8. The Taper/Taper bonded joint is non-permeable, using a heat-cured epoxy adhesive system for pipe-to-pipe and pipe-to-fittings connections. To ensure high reliability, the joint connection is designed to be stronger than the pipe laminate.

### Location

PGB Gas Processing Plant 2, 3 & 4 Complex A  
Kirtih Malaysia

### Client

PETRONAS Gas Berhad

### Pipe system

Bondstrand 2400, 2410 C + 1 mm carbon inner liner

Diameter: 800 mm (32 inch). Quantity: 2900 m  
Epoxy Type: Full Aromatic Amine (MDA) cured Epoxy

### Design conditions

Pressure: 6.6 Bar

Temperature: 72 °C

Gas (Wet CO<sub>2</sub> - 88-99%. Hydrocarbon)

### Design standard

ISO 14692, ASME 31.8

### Installation date

2007 - 2008