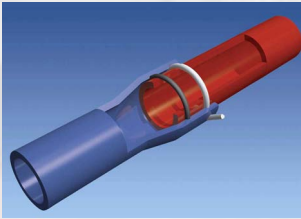


Taper/Taper adhesive-bonded Joint



Key-Lock® mechanical Joint



Shell Ethylene Cracker Complex using Bondstrand® GRE pipe

The facility consists of an Ethylene Cracker Unit, including an Olefins Cracker Complex; Pygas Hydrogenation/Benzene Extraction Unit; a C4 Selective Hydrogenation Unit and associated utilities, off-sites and general facilities. The ECC is the core part of the ECC Project, which will link the Shell Refinery and downstream chemical units to form an integrated world-scale petrochemical super site in Singapore.

A significant portion of the ECC facility will be located on land reclaimed from the sea between the islands of Pulau Busing, Pulau Kechil and Pulau Ular. As the islands are not connected to the mainland; all travel in and out is by sea.

The following GRE pipe systems were designed/engineered by NOV Fiber Glass Systems:

- Accidental Oil Contaminated Sewer
- Oil Contaminated Sewer
- Non Contaminated Water Sewer
- Fire Water (FM approved)
- Potable & NEWater

Scope of supply

- Review of EPCM Contractor's Design
- Water Hammer Calculation
- AWWA M45 / Buckling Calculation
- CAESAR II Stress Analysis
- Preparation of spool drawings
- Spool prefabrication
- Supply of loose pipe and fittings
- Supply of flange hardware
- DDP delivery to jobsite
- Installation training

Project

Ethylene Cracker Complex (ECC) for Shell Eastern Petroleum (Pte) Ltd, Pulau Ular, Singapore.

Client

CB&I – Lummus, The Netherlands / Toyo Engineering Corporation (TEC) JV - Japan

Pipe system

Bondstrand® 2400 with Taper/Taper adhesive-bonded and Key-Lock® mechanical joints

Diameter: 1-40 inch (25 mm-1000 mm)

Quantity: 25.000 meter

Operating conditions

| | Fire water (FM approved) | Sewer | Potable water | NEWater |
|-----------------------|-----------------------------|-----------|------------------|---------|
| Design pressure (bar) | 16 | ATM | 15 | 7 |
| Design temp (°C) | 60 | 65 | 60 | 55 |
| Test pressure (bar) | 24 | Leak test | 22.5 | 15 |

Installation date

Completion 2009