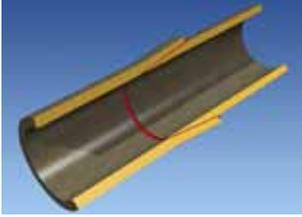




Quick-Lock® adhesive-bonded Joint



Taper/Taper adhesive-bonded Joint



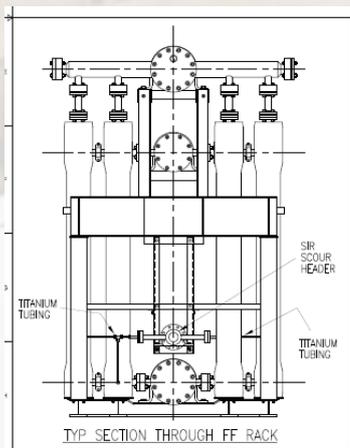
## Fine filtration package for FPSO Pazflor using Bondstrand® GRE pipe

The Pazflor project is located in deepwater, offshore Angola, approx. 40 km. east of the DALIA FPSO and 150 km. from shore. The project is owned by TOTAL E&P Angola (40%), Esso (20%), BP (16.67%) and Statoil Hydro (23.33%). The project will target development of hydrocarbons in two independent reservoir structures.

### Technical requirements

Headers were built in accordance with Total Spec. GS EP PVV 178 and GS EP PVV 148 and suitable for for an offshore marine environment in West Africa.

Each header set included a 10" x 3" x 2" Top Header, 8" x 2" Mid Header, 10" x 2" Bottom header and 3" x 1" Air Scour Header. In total 14. Header sets were fabricated.



Section of Filter Unit showing Header orientation

The order included the design and manufacture of a jig to ensure the best possible fit between vessels and headers. The jig, representing a filter unit, was built and approved by client to carry out a four-point dimension check of each header set.



Alignment Jig to simulate the filter units

### Project

GRE Headers for Seawater Fine Filtration Units

### Client

VWS Westgarth Ltd, East Kilbride, Scotland (Head Office)

### Operator

Total E&P Angola

### EDC contractor

Deawoo Shipbuilding and Marine Engineering

### Location

Deepwater Offshore Angola, Block 17

### Pipe system

Bondstrand 2400 lined pipe and fittings with taper adhesive bonded joints

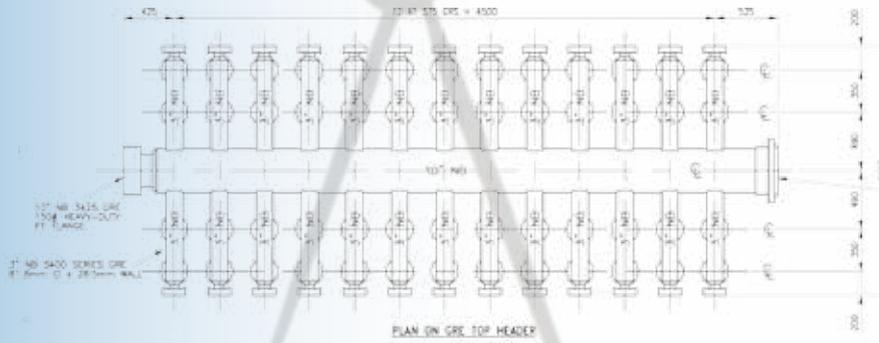
Joint type	Diameter
Quick-Lock adhesive bonded joints	2 inch
Taper/Taper adhesive bonded joints	3 - 10 inch

### Operating Conditions

Fluid: Sea water  
 Operating pressure: 16.6 barg minimum rating

### Installation date

2009



The headers were also manufactured on a jig, labelled and shipped in matching sets. Each jig was QA checked and approved by the client before fabrication commenced. Allowable tolerances for the flange positions was  $\pm 3\text{mm}$  and flange plates were used to ensure each inlet and outlet flange was two-hole square.



Headers assembled in the jig, with the branches bonded and ready to wheel into the oven.

A purpose-built drilling rig complete with non-contact laser distance measuring equipment was constructed to drill the tapered holes into the header pipe. The laser ensured pinpoint accuracy and repeatability of the branch spacing.



Purpose built drilling Rig with non contact laser distance measuring equipment

Drilling accuracy using Industrial laser

### 100 bar Weep Test Requirements

The project requirement was for prototype burst tests to be carried out in accordance with customer requirements and specifications (Total GS EP PVV 148 Sect 5.2.1.2.2, ASTM 1599 Sect 9.2 Procedure B). Five test spools were fabricated in order to test the various joint combinations to 100 bar as per the procedure.

Joint combinations tested were 10"x3", 10"x2", 8"x2", 3"x2" & 3"x1". The tests were witnessed by the client.

### Lloyd's Approval

A representative from Lloyd's Register EMEA, witnessed the tests and approval has been given for the spigot to body joints mentioned above.



100 Bar Weep Test, Witnessed by Lloyd's

Test output using calibrated digital temp/pressure recorders