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A reinforced MRR Series Expansion Joint of 5200mm diameter and 9,35 barg design pressure has been successfully designed, manufactured and tested for ExxonMobil in Scotland.

This expansion joint combines all the elements to make it a very critical unit, as much in its construction as in all the tests and examinations carried out.

Main mechanical design, parameters and features of the expansion joint supplied are:

- Design Code: ASME VIII div.1 / EJMA / PED 2014/68/EU with CE marking module G.
- Design Pressure Shell side: 9,35 barg.
- Design Temperature Shell side: 518/-9°C (max./min.).
- Materials for shell weld ends: ASME SA-387 Gr.91.
- Material for reinforcing rings: ASME SA-240 TP 304H.

Due to the welding of the 304H convolutions to the Gr.91 weld ends, the heat-affected zones are susceptible to relaxation cracks. This weld requires PWHT as well together with the longitudinal seams in the Gr.91 weld ends. 100% NDE (RT) before and after PWHT have been carried out.
High-Tech Expansion Joints for Geothermal Project in New Zealand

We have successfully designed, manufactured and tested several high-tech expansion joints for Ngawha Extension Geothermal Project in New Zealand.

The expansion of the Ngawha geothermal power station will increase security and reliability of the power supply for Northland. Construction is underway to expand the Ngawha geothermal power station and more than double the power station’s generation capacity to 53 megawatts by June 2021.

Using ‘state of the art’ technology, geothermal fluids are passed through a heat exchanger where energy (heat) is transferred to a working fluid (pentane). The pentane then boils to form a high-pressure vapour which then drives the turbines, turning the generator. After the vapour has passed through the turbines, it is condensed back to a liquid and returned to the heat exchanger in a continuous cycle. The pentane is not consumed as a fuel, but is simply used as a working medium to extract energy from the geothermal water and steam.

Mechanical design, parameters and features of the expansion joint supplied are:

2 Units Pressure Balanced Expansion Joint, MPB-E Series, DN 1650 (66”) and 6800 mm long.
- Bellows in SB443 N06625 with 2 ply testable leak detector.
- Design Pressure: 8.3 barg.
- Design Temperature: +120 / -29°C.
- Medium: Pentane.

4 Units Universal Tied EXPANSION JOINT, MFL Series, DN 400 (16”) and 2000 mm long.
- Two multiply bellows in SB443 N06625, with 2 ply testable leak detector.
- Design Pressure: 30 barg.
- Design Temperature: +200 / -29°C.
- Medium: Pentane.
The plant site is located approximately 23km north of the town of Boa Vista, State of Roraima and 770km from Manaus, State of Amazonas. This Complex is in the northern portion of the Brazilian Highlands, region of the Amazonas.

The Jaguatirica II Project basically consists in the Power Plant with 120 MW capacity which has the 2 x 1 configuration (two (2) Gas Turbine GT11/GT12, two (2) Heat Recovery Steam Generator – HRSG11/HRSG12, one (1) Steam Turbine ST18, one (1) Air Cooler Condenser.

For this power project we have designed, manufactured, tested and shipped the following expansion joints:

- One Turbine to Condenser In-Line Pressure Balanced MPB-I DN 3200 (126”) and 2800mm long.
- Two Universal Tied MWL Series DN 2200 (86”) and 4500mm long.
- Two Hinged MWP Series DN 2200mm and 1100mm long.
High Pressure In-Line Rubber Pressure Balanced Expansion Joints for Refinery in South America

A pressure balanced expansion joint accommodates axial and lateral movements and counteracts the bellows pressure thrust. An additional bellows is incorporated into the unit and is subject to the line pressure to generate a force equal and opposite to that on the main bellows. Tying these bellows together neutralizes the pressure load on the unit.

The only loads on the equipment are the sum of the forces required to move the line bellows and balancing bellows of the expansion joint.

This type of Joint can be fitted between intermediate fixed points so main anchoring of the pipe or adjacent equipment is not required.

This time we have successfully designed, manufactured, tested, packed and shipped four 56” In-Line Rubber Pressure Balanced Expansion Joints for Refinery in South America.

Main design parameters and features of the expansion joints supplied are:

**Design Codes**
- Pressure Equipment Directive PED 97/23 / EC for the specified operating conditions.
- FSA (Fluid Sealing Association) Non-Metallic Expansion Joints Division.

**Design and/or Operation Conditions**
- Design Pressure = 12.60 bar.
- Design Temperature = 50°C.
- Test pressure: 18.90 bar.
- Medium: Sea Water.
We have successfully designed, manufactured and tested one Spent Catalyst Standpipe Expansion Joint for a Refinery in the UK.

Mechanical design, parameters and features:

- Spent catalyst standpipe untied universal expansion joint.
- Pantograph design - Cold wall.
- O.D. 1242 mm - Length: 4000 + 100 mm.
- Inconel 625 LCF bellows – 2 ply testable – With reinforcing rings.
- Refractory lining RESCO RS 17 EC.
- Hexagonal Mesh 410S as per UOP 3-25.
- Design Pressure: 4.97 barg.
- Medium: Catalyst.
FCCU Regenerator Spent Catalyst Expansion Joint for a Refinery in the United States

A highly sophisticated FCCU Regenerator Spent Catalyst Expansion Joint has been positively designed, manufactured, tested and shipped to a refinery in the United States.

Design Codes and Specifications:
- UOP specifications.
- ASME Code.

Main mechanical design, parameters and features are:
- Universal Expansion Joint – Pantograph design.
- DN 1500mm (42”) - Length: 5029 mm.
- 2 ply testable bellows in SB-443 N06625 Gr.1 LCF.
- Pipe line made in SA516 Gr. 70N.
- Hexagonal mesh in Grade 304H.
- Refractory lining type Resco RS-17 EC.
- Internal bellows packing system.
- Design conditions: 5.76 BARg (83.5 PSIg).
- 343°C / 650°F (Shell Design Temperature).
- 1450/650°F (Process), 1000°F (Bellows) & 100/20°F (ambient).
- 788/343°C (process), 538°C (bellows) & 38/-29°C (ambient).
- Medium: Catalyst.
Rabigh-3 Independen Water Project which will generate 600,000 m³/day – making it one of the largest SWRO desalination projects in the world to be built in the Kingdom of Saudi Arabia.

This desalination plant will ensure the supply of drinking water to the cities of Makkah Al-Mokarramah, Jeddah and Mastorah, which will provide this resource to approximately three million people.

MACOGA has been awarded the design, fabrication, testing and delivery of a high pressure In-Line Pressure Balanced Expansion Joint, DN700 for 25 bar design pressure and a set of MAC-FT Series DN400 moulded Expansion Joints.
We have successfully completed the manufacturing and testing of a High-Tech FCC Expansion Joint for a large European Refinery located in the North of Europe.

Every year, the refinery processes up to 11 million tons of crude oil into diesel, petrol, methanol, aviation fuel and many other products.

The Recirculation Catalyst Standpipe Expansion Joint has been manufactured as per UOP Specifications that describe expansion joint design and fabrication requirements for the Fluid Catalytic Cracking Process Unit.

Main mechanical design, parameters and features of the expansion joint supplied are:

- Recirculation Catalyst Standpipe Expansion Joint ND1200.
- Universal Untied – Pantograph Design.
- Bellows SB-443 N06625 LCF – 2 ply testable – Sealed system.
- Refractory lining RESCO 17EC.
- Abrasion lining RESCO AA22S.
- Hexagonal Mesh SA 240 304H.
- Design Pressure: 4.74 barg.
- Design Temperature: 538°C for bellows.
- Medium: Catalyst.

Design Codes and Specifications:

- UOP specifications.
- ASME Code.
- Pressure Equipment Directive PED 97/23/EC.
Expansion Joints for Combined-cycle Power Plant in Brittany, France

We are highly specialised in manufacturing expansion joints for the power generation sector and for all types of power plants used to generate energy: Nuclear, Hydroelectric, Coal-fired, Natural gas, Diesel-fired, Geothermal, Combined-cycle, Solar power plants, etc.

This time we have designed, manufactured, tested and shipped a set four Universal Tied MWL Series DN2900 and 5500 mm long and a set of four Hinged MWP Series DN2900 mm and 1100 mm long Expansion Joints for a Combined-cycle Power Plant in Brittany, France.

The plant is expected to begin operations in the second half of 2021 and the power generated by the plant will be sold to Electricité de France (EDF).

The combined-cycle power plant will utilise natural gas as the primary fuel to generate power. It will include a SGT5-4000F gas turbine, a SST5-3000 steam turbine, a SGen5-2000H generator, a heat-recovery steam generator (HRSG), and a SPPA-T3000 control system.
Twizzle is a 57.49 m luxury yacht, built by Royal Huisman and delivered in 2010. Its top speed is 14.0 kn and boasts a maximum cruising range of 4000.0 nm at 11.0 kn with power coming from a 1318.0 hp Caterpillar C-32-ACERT diesel engine.

This time we have manufactured, with our Premium Service, the completely made stainless steel expansion joints that are installed in the exhaust gas lines of its Caterpillar engines.

Even by superyacht standards Twizzle is standout at over 57 meters long and 60 meters tall, it one of the tallest boats around.
GLOBAL PRESENCE
World-Class Commitment

Our expansion joints are present in more than 90 countries across all continents performing demanding tasks. MACOGA is always ready to provide support exceeding customer expectations.

We are conveniently located in NW Spain near two international airports (SCQ and LCG) and two deepwater oceanic sea ports (Vigo and La Coruña).

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