COFLEX®D

ANTI-SHOCK RUBBER EXPANSION JOINT

Coflex®D is a reinforced rubber single arch expansion joint (Coflex®D2 for double arch version), with extraordinary compensating functions and lightness: over 110mm of lateral offset at high velocity, achieved by accelerating connection flanges up to 150-200G (see Figure 1), according to MIL-S-901D [US.Navy] standard. Its incredible flexibility and strength allow it not only to withstand large deformations without damage, but also to keep efficiency under the heaviest conditions of misalignment (no fluid leakage during and after tests, under max working pressure).

**LATERAL SHOCK TESTED ACCORDING TO NAV 30-A001 IT. NAVY STANDARD**

This expansion joint is fire resistant for 30 minutes at 800°C (tested by RINA), thanks to the protection of our fiberglass flame protection cover, type Coflex®CF1 (see Figure 2).

Application range:

- Working Temperature min -10°C, max +90°C (+120°C with suitable rubber compound)
- Maximum Working Pressure (PN) 16 bar (safety factor = 4)
- Diameter starting from DN40 up to DN250

Coflex®D is a perfect elastic coupling for pipe elements, with several advantages: anti-shock action, insulation of noise and vibrations, absorption of thermal expansion and equalization of assembly mismatching.
This product is widely used by Navies for several applications, for example: flexible interface for machinery installed on elastic mountings (see Figure 3), like main engines, diesel generators and pump units; connection between onboard plant sections, for more or less critical systems with transport of a wide number of fluids: fire fighting, fuel, oil, sea or fresh water, compressed air, steam, sewage, fuel oil, JP-5, etc.

The joint structure is optimized to support high displacements and accelerations: the reinforced rubber body (composite/metallic/textile cord) withstands high pressure and conveyed fluid, steel counter-flanges provide an excellent seal. The seal system (overlapping steel and rubber flanges), ensures high mechanical resistance, together with perfect tightness (no slipping), also in extreme conditions of compensation.

The rubber part has a pointed arch corrugation, called “Ω-wave”, which gives lower stiffness and higher compensating functions; this solution offers higher elasticity compared with traditional joints (low camber arch), so it is able to absorb and withstand efficiently strains caused by instantaneous and multidirectional displacements.
Coflex®D is approved by RINA and certified in accordance with the following standards:

- EU Marine Equipment Directive (MED 96/98/CE)
  - EC Type Examination (Module B)
  - Product Quality Assurance (Module D)
- RINA Type Approval
- NAV-70-9999-0028-14-00B000 IT.Navy Standard
- NAV-30-A001 IT.Navy Standard (corresponding to MIL-S-901D [US.Navy])

Certification tests take place at the following laboratories:

- RINA Lab. (Genova) - Fire (800°Cx30’) and Burst Pressure Test (4xPN)
- CSSN Lab. (La Spezia) - Qualification Tests (Rubber Properties, Fatigue Resistance, Hydrostatic and Burst pressure) and Shock Tests

Simulated Shock Tests allow us to know Max Permissible Movements: compression, elongation, shear (lateral offset), angular, twist (torsion). The deformation values certified by CSSN laboratories are astonishing: 110mm of misalignment for even 200G acceleration (see Figure 4), with 16bar of test pressure, without leaks and keeping working efficiency after tests.

**SHOCK TEST**

![Shock Test Graph]

Figure 4: Shock Test Report, lateral offset
Test results encouraged us to develop finite element methods (F.E.M.) to study the joint dynamic behavior (see Figure 5), within the limits of error inherent in the experimental simulation and calculation.

Coflex®D is designed, tested and patented by COFI, to meet the needs of the naval military field, made more and more restrictive by the evolution of navy standards (NAV, Mil, etc.).

COFI s.r.l., founded in 1992, consists of staff with over 30 years of experience in the field of flexible hoses and compensators, which works together with young and highly motivated people. Our best qualities are the ability to manage emergency situations with efficiency and professionalism, to meet the client’s targets in extremely short times, keeping high quality standards for product and accessories. Our experience and ability to understand the technological needs of the customer, leads us to create innovative and high performance products, custom-designed according to the working conditions and functions.