







Expansion joint technology > Vacuum and support rings

Rubber expansion joints can be equipped with internal vacuum spirals, vacuum rings and/or external support rings/ropes to protect against deformation of the expansion joint bellows depending on the operating pressure. The diameters of the rings are individually designed and calculated against deformation under full vacuum respectively against test pressure considering extra safety margins.

Vacuum rings / spirals can be placed inside of the arch apex and are in contact with the medium flow. Special grades of stainless and super duplex steel with suitable corrosion resistance are used for the corresponding application. More and more common is the design of expansion joints with steel rings embedded in the rubber. It has no media contact, is not washed around by flow

turbulence and a cost-effective standard carbon steel grade with high tensile strength and therefore reduced diameter can be embedded. The movement capability of an expansion joint with embedded vacuum ring in the top of the arch is approx. 25% lower than a loose ring inside of the arch. Large bore rubber expansion joints at high design pressures and vacuum are mostly furnished with loose internal vacuum ring which is supplied in several parts. Because of design limits for the ring diameter and transportation issues embedded vacuum rings are in this case uneconomically.

External carbon or stainless steel support rings and ropes are only applicable for multiple arch expansion joint types. Carbon steel support rings are hot-dip galvanized or rubber coated to resist environmental impacts.

Design		Vacuum ring	Support ring	Pressure
1 With internal vacuum ring		Medium contact, inside the arch apex	Without	Depending on the diameter up to 40 bar, for vacuum up to 0.05 bar absolute
2 With embedded vacuum ring		No medium contact, embedded into the arch apex of the rubber bellows	Without	Depending on the diameter up to 40 bar, for vacuum up to 0.05 bar absolute
3 No vacuum ring, with support ring in the arch trough		Without	External in the arch trough	Depending on the diameter up to 40 bar, slight vacuum
4 With internal vacuum ring and external support ring in the arch trough		Medium contact, inside the arch apex	External in the arch trough	Depending on the diameter up to 40 bar, for vacuum up to 0.05 bar absolute
5 With embedded vacuum ring and external support ring in the arch trough		No medium contact, embedded into the arch apex of the rubber bellows	External in the arch trough	Depending on the diameter up to 40 bar, for vacuum up to 0.05 bar absolute
6 With embedded support rings in the arch foot		No medium contact, embedded into the arch foot of the rubber bellows		Depending on the diameter up to 16 bar, for vacuum up to 0.5 bar absolute
Materials				
Stainless steel		Carbon steel, rubberised		Carbon steel, embedded