

Multilayer expansion joints

These consist of one or more superimposed insulating layers, a chemically resistant sealing film, and an external skin that ensures that the expansion joint maintains its shape under pressure. For simple applications, single-layer expansion joints are used. In general, these consist of a thin rubber or PTFE film with a fabric reinforcement.

Insulating layers

The function of the internal insulating layers is to dissipate the medium temperature out to the sealing films located further to the outside. Insulating layers consist of a glass fibre fabric or glass felt, ceramic fabrics or ceramic fibre mats, or of a combination of these materials.

Sealing films

For almost all applications, these consist of PTFE film, and take over the actual sealing function of the expansion joint. The PTFE film may also be laminated onto glass fibre fabric on one or both sides, and ensures the necessary pressure tightness of the expansion joint for this material design as well. PTFE is chemically resistant to almost all media. In rare cases with extreme temperature requirements or high ambient temperatures in addition, stainless steel films are used. As opposed to PTFE film, which is welded to be gas-tight, stainless steel films are simply clinched tight and are only sufficient for low impermeability requirements.

External layer

The external layer is usually a silicon-based glass fibre fabric or, in the event of harsh environmental conditions, a PTFE-coated glass fibre fabric. This layer is the pressure carrier and provides mechanical protection against external damage and weather effects. The choice of the external layer also depends on whether the expansion joint can be delivered in a closed state and thus already made "endless" at the factory, or if it needs to be designed with an installation seam.

Materials		
Insulating layers:	up to 400 °C:	Glass fibre fabric, glass mat
	up to 800 °C:	High temperature-resistant glass fibre fabric
	up to 1050 °C:	Silicate fabric
	up to 1200 °C:	Ceramic felt
Sealing layer:	up to 220 °C:	PTFE film
	up to 450 °C:	V4A film
	up to 900 °C:	Alloy film
External layer:	up to 100 °C:	EPDM film with polyester fabric
	up to 200 °C:	Silicon film with glass fibre fabric insert
	up to 220 °C:	Glass fibre fabric with PTFE coating

Tightness

Expansion joints with a wall thickness of up to 6 mm and for an operating pressure of up to 0.3 bar are elastomer expansion joints. These are gas-tight and drip-proof. Rubber expansion joints are used at higher pressure.

In multilayer expansion joints, the inner insulating layers in the clamping area lead to marginal diffusion. The bellows itself is gas-tight as a result of its sealing layer. Multilayer expansion joints are therefore only considered impermeable to flue gas, whereas elastomer expansion joints are impermeable to nekal.

Multilayer expansion joints are not impermeable to drips, and precautions may have to be taken in the design phase. Up to 220°C, multilayer expansion joints can be manufactured for relative high gas-tightness requirements. These are furnished with an inner layer of PTFE-coated glass fibre fabric that is then sealed using a PTFE sealing belt or a temperature-resistant rubber seal against the duct flange. In this case, these seals are attached to the expansion joint at the factory.