

SFX EXPANSION JOINT

Data sheet n°: FT En CV1 12 V04 – 03/24

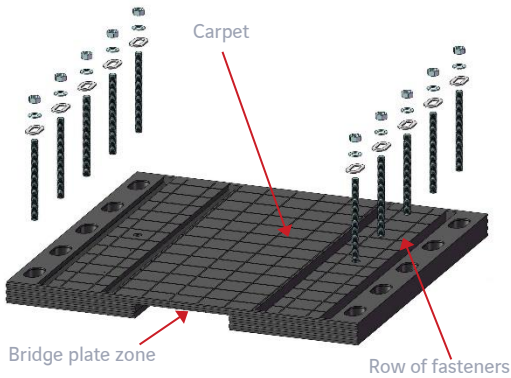
- High seismic movement capacity regardless of the direction
- Easy installation and maintenance
- Suitable for all seismically isolated structures
- Noise reduction
- Excellent durability
- User comfort

Introduction

Expansion joints for road bridges are used to ensure the continuity of the running surface and its load bearing capacity (safety and comfort of the users) while guaranteeing the structure freedom of movement. ISOSISM® SFX joints are designed with the focus to be structurally stable during a seismic event and immediately operable after.

Description

The SFX joint is a supported mat joint in which movement imposed by the main structure is absorbed by deformation of the elastomeric sections. SFX joint consists of moulded elastomeric elements, vulcanized to steel inserts, designed to accommodate traffic loads, and distribute them to the fasteners.



ISOSISM® SFX overview

Applications

SFX joints can be used for all types of structures:

- Concrete, steel, and composite structures
- Slab, cable-stayed, suspension, lifting or tilting bridges
- New build or repair works



ISOSISM® SFX inspection on Sentul Selatan viaduct (Indonesia)



ISOSISM® SFX under heavy traffic loads – Puebla Viaduct (Mexico)

Advantages

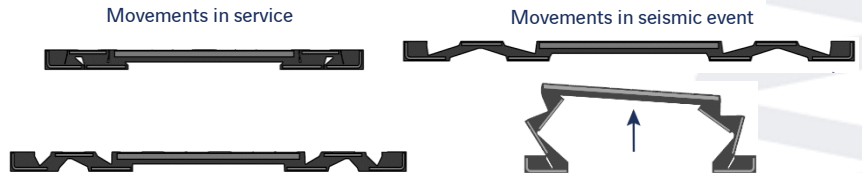
- **Robustness** using optimised shapes and thicknesses for the high-grade steel plate elements
- **High durability**, using simple and linear design with few, simple, but highly effective elements
- **Adaptability to movements**, very effectively accommodates transverse, vertical and rotational movements of the main structure even in the seismic phase, thanks to the generous dimensions of the bridge plates and its ability to blow up for important movements in Seismic / Accidental limit states (over Service movements). After a seismic event, the joint can grant the transit of the vehicles, such as for emergency.
- **Adaptability to different average gap sizes** simply by reassessment of the movements' capacity accordingly
- **Perfect road surface continuity** upper surface has anti-skid grooves for optimum user safety. The elastomer contact enables absorption of wheel impact and road surface irregularities, thereby providing an excellent level of user comfort
- **Easy maintenance** and **reduced traffic disruption** due to the easily accessible anchor bolts and maximum two-meter-long sections for removal of the joint, if necessary, without interrupting traffic except on the affected lane
- **Corrosion protection** Steel inserts entirely elastomer coated, fully protected against corrosion and chemical attack (oil, grease, hydrocarbons and de-icing salts)
- **Waterproofing** ensured by a continuous membrane underneath the elements
- **Simple installation**, can be installed directly without recesses in the main structure

Movement range

The movement capacities of the ISOSISM® SFX range are expressed separately for Service limit state and Seismic or Accidental limit state. Moreover, these will not vary according to the skew angle, i.e. the angle between the traffic direction and the longitudinal axis of the joint (α).

| State | Service | | | Seismic / Accidental (*) | | |
|---------------------|-------------------|------------------|-----------------------------|--------------------------|------------------|-----------------------------|
| | Longitudinal [mm] | Transversal [mm] | Combined any direction [mm] | Longitudinal [mm] | Transversal [mm] | Combined any direction [mm] |
| SFX 340/250 | ± 125 | ± 125 | ± 125 | ± 170 | ± 170 | ± 170 |
| SFX 400/320 | ± 160 | ± 160 | ± 160 | ± 200 | ± 200 | ± 200 |
| SFX 700/320 | ± 160 | ± 160 | ± 160 | ± 350 | ± 350 | ± 350 |
| SFX 1000/320 | ± 160 | ± 160 | ± 160 | ± 500 | ± 500 | ± 500 |

(*) According to Eurocode 8 – Part 2, after an extreme event, joint remains operational



Schematic diagrams (in service and during a seismic event)



Skew angle definition

ROAD JOINTS

SFX EXPANSION JOINT

Installation

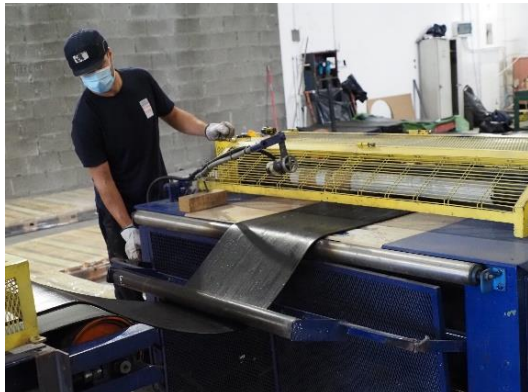
The SFX joints are installed on site by our specialized Freyssinet teams. The lateral steel elements of the joint are securely anchored to the structure using robust chemical anchors. Installation of the complete line can be done in one phase or lane by lane to avoid traffic disruptions. To guaranty perfect levelling with the road surface, we strongly suggest joint installation after the asphalt has been applied.



Installation of ISOSISM® SFX joints by specialized Freyssinet teams in Jakarta (Indonesia)

Manufacturing

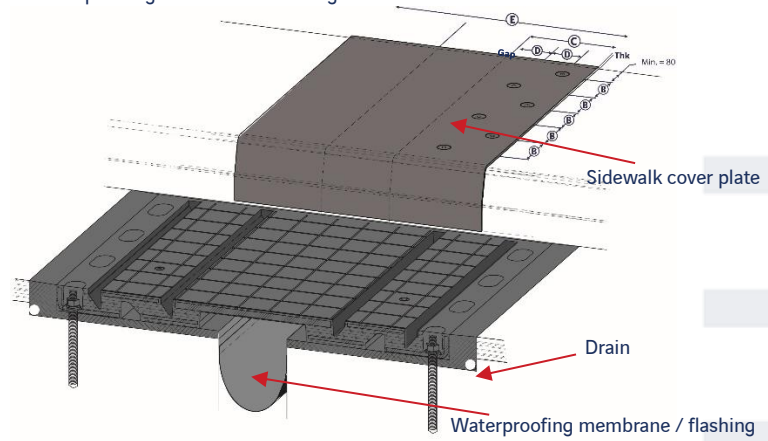
ISOSISM® SFX joints are manufactured in-house in our factory.



Add-ons

To complete the overall waterproofing of the carriageway joint and to ensure continuity of the joint treatment on non-traffic areas, the following add-ons are available:

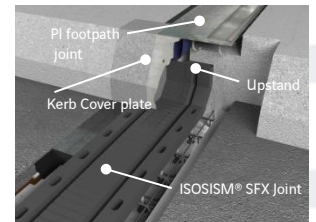
- Sidewalk cover plate
- Drain
- Waterproofing membrane / flashing



Axonometric view of the sidewalk cover plate details

| Type | E [mm] | Thk* [mm] | B [mm] | C [mm] | D [mm] |
|--------------|--------|-----------|--------|--------|--------|
| SFX 340/250 | 630 | 3+2 | 250 | 200 | 80 |
| SFX 400/320 | 670 | 3+2 | 250 | 200 | 80 |
| SFX 700/320 | 980 | 3+2 | 250 | 200 | 80 |
| SFX 1000/320 | 1250 | 3+2 | 250 | 200 | 80 |

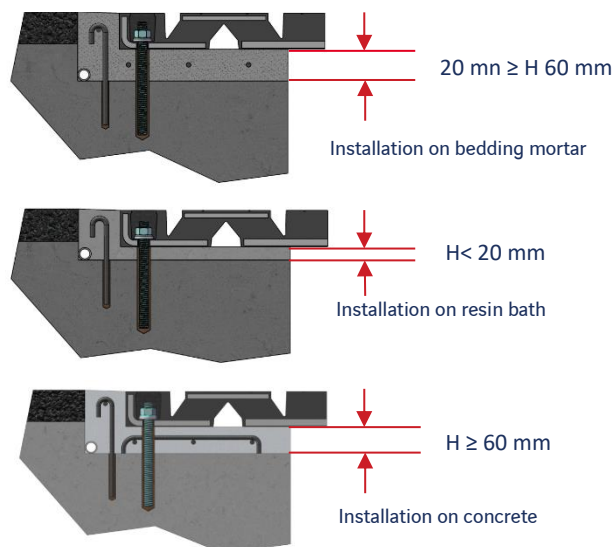
*Aluminium tear plate



Installation type

Here are below the installation schemes suggested by Freyssinet depending on the available slab recess.

Consulting your local Freyssinet representative for advice on most suitable installation methods and selection of bedding products.



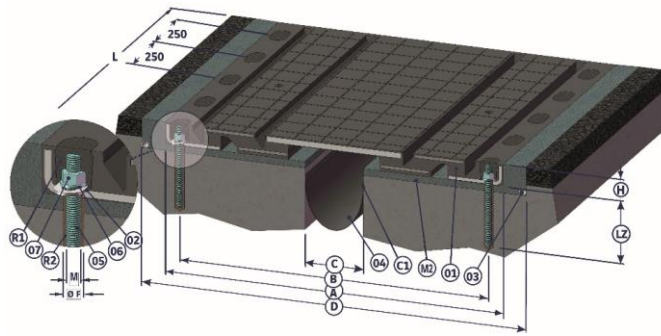
Turn-key approach

- Specification and design services
- Complete in-house manufacturing
- Full installation or replacement technical support
- Inspection and maintenance along the lifetime of the structure

ROAD JOINTS

SFX EXPANSION JOINT

Dimensions and materials



| Group | Item | Designation | Material |
|----------------------|------|---|--|
| Construction details | 01 | Carpet | Natural Rubber (NR/SBR)*+S275JR+S355JR |
| | 03 | Drainpipe | PVC with fabric sleeves |
| | 04 | Membrane | TNT+Silicon |
| Bolts and nuts | 02 | Oval washer | C40 (ISO 683-1) |
| | 05 | Anchor bolt or rod | Class 6.8 (ISO 898-1) |
| | 06 | Plain washer | grade A, 200 HV (ISO 7089) |
| | 07 | Hexagon nut | Class 6 (ISO 898-2) |
| Mortars and resins | C1 | Epoxy adhesive for gluing of the membrane | Freyssinet TigiepoX T01 |
| | M2 | Fibro reinforced reoplastic mortar | Freyssinet Tigigrout 102 FR |
| | R1 | Resin for slot | Freyssinet Tigitar A resin |
| | R2 | Resin for anchor bolt | Freyssinet TigiepoX grout |

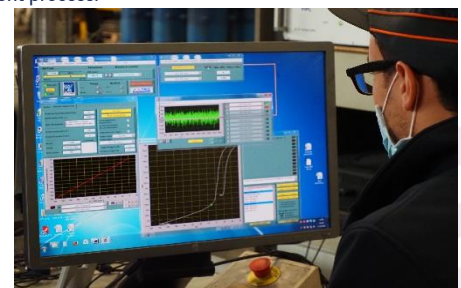
* CR rubber compound available on request

| Type | A [mm] | H [mm] | L [mm] | B [mm] | C* [mm] | M [mm] | φF [mm] | L ₂ [mm] | D [mm] | W [kg/m] |
|--------------|--------|--------|--------|--------|---------|-----------|---------|---------------------|--------|----------|
| SFX 340/250 | 1040 | 69 | 2000 | 940 | 180 | M20 x 230 | 24 | 170 | 1220 | 195 |
| SFX 400/320 | 1275 | 82 | 2000 | 1165 | 220 | M24 x 300 | 27 | 235 | 1450 | 244 |
| SFX 700/320 | 1490 | 82 | 2000 | 1380 | 360 | M24 x 300 | 27 | 235 | 1670 | 335 |
| SFX 1000/320 | 1620 | 82 | 1500 | 1510 | 510 | M24 x 300 | 27 | 235 | 1800 | 428 |

* In average position for the installation

Testing

The ISOSISM® SFX joint has undergone numerous tests to guide and validate Freyssinet's technical development process.



ISOSISM® SFX joint testing

Rubber properties

| Rubber | NR/SBR elastomer compound | CR elastomer compound | Standard |
|---|--|--|-----------------------------------|
| Hardness | 60±5 Shore A3 | 60±5 Shore A3 | ISO 48 / ISO 7619-1 / ASTM D 2240 |
| Tensile strength | ≥ 16 MPa | ≥ 16 MPa | ISO 37 type 2 / ASTM D 412 |
| Elongation at break | ≥ 425% | ≥ 350% | |
| Compression set | ≤ 25%, after 24h at 70°C | ≤ 25%, after 24h at 100°C | ISO 815-1 / ASTM D 395 Method B |
| Resistance to ozone: 30% elongation, 96h at 40±2 °C | Ozone concentration: 25 pphm No visible cracks | Ozone concentration: 100 pphm No visible cracks | ISO 1431-1 / ASTM D 1149 |
| Ageing tests | Ageing in 168h in 70°C Change in hardness shA3 -5/+10 Change in tensile strength ± 15% Change in elongation ± 25% | Ageing in 72h in 100°C Change in hardness shA3 -5/+10 Change in tensile strength ± 15% Change in elongation ± 25% | ISO 188 / ASTM D 573 |

SEISMIC EXPERTISE ACROSS THE GLOBE

