





• DARWIN BRIDGE, EAST FLYOVER - PADUA, ITALY  
installation of RAN and GPE series expansion joints

# INTRODUCTION

Thanks to its Research & Development Department, **FIP Industriale** can boast of a wide range of expansion joints. Here, standard models are proposed, however tailor made solutions can be studied on project basis. Fifty years of experience in design, production, testing and installation of expansion joints have made **FIP Industriale** a market leader. Maintenance is required only after years, contributing towards a simple, cost saving management of infrastructures.

## DESCRIPTION

**FIP Industriale** expansion joints come in a wide range of formats, each format having a certain movement range to accommodate, with only the types of materials used remaining constant. Based on a design of reinforced rubber modular elements, **FIP Industriale** expansion joints offer the following advantages:

- simple installation
- simple and cost-effective inspections and maintenance
- minimal noise and vibration
- ultimate comfort for passengers in transit
- smooth running surface
- optimum functioning and durability of all components
- minimal interference with the structure
- format easily adjusted to many shapes to accommodate layout of structure and design engineers' preference
- several different types of anchorage to suit customer requirement.

## PRODUCTS

### 1) ROAD BRIDGE EXPANSION JOINTS

*Reinforced rubber:*

- ▶ **RAN** movement range up to 100 mm
- ▶ **GPE** movement range from 50 to 400 mm
- ▶ **RAN P** movement range from 400 to 1000 mm

*Strip seal:*

- ▶ **J80** movement range up to 80mm
- ▶ **JF80** movement range up to 80 mm

*Finger:*

- ▶ **SFE 90/65** movement range up to 40 mm
- ▶ **GP** movement range from 50 to 300 mm
- ▶ **FE C** movement range from 400 to 800 mm

### 2) RAILWAY BRIDGE EXPANSION JOINTS

- ▶ **BETA** movement range from 100 to 600 mm

- Final positioning and possible presetting to be confirmed by the Engineer at the moment of installation
- Please note that the general arrangement of the joints in this catalogue make no provision for bedding mortar and/or final bedding level adjustment. Should bedding mortar be required, Contractor to inform **FIP Industriale**, upon confirmation of the order, on the necessary exact quantity. **FIP Industriale** to confirm relevant associated costs.

## CERTIFICATIONS

The certification ISO 9001, since 1992, guarantees that the same quality level is kept from the design stage through manufacture to installation, while the Certificate OHS 618800 guarantees that **FIP Industriale** operates an Occupational Health and Safety Management System which complies with the requirements of BS OHSAS 18001:2007. **FIP Industriale's** quality system is also certified to perform welding activities in accordance with EN ISO 3834-2 and DIN 18800-7.



# REINFORCED RUBBER EXPANSION JOINTS

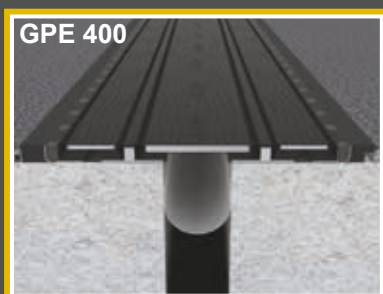
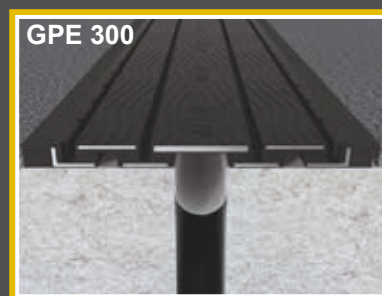
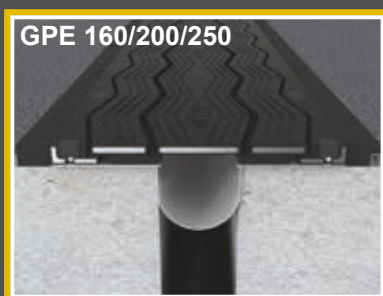
## DESCRIPTION

These joints are normally made up of an elastomeric structure in which, by means of a process of vulcanization, suitable metal profiles are inserted properly positioned in order to ensure the required stiffness or bearing capacity. There are two main sub-groups depending on the mechanism which is used to obtain the expansion/shrinkage capacity of the joint, namely:

- by elastic deformation, with shear stress, of appropriately prepared suitable elastomeric areas;
- by elastic deformation of the elastomeric profiles the designed geometry of which is changed by normally flexural stresses.

A characteristic of this type of joints is the presence, at the level of the congested surface, of a series of transverse gaps required for the development of the necessary elastic deformations.

Types:





## ► RAN

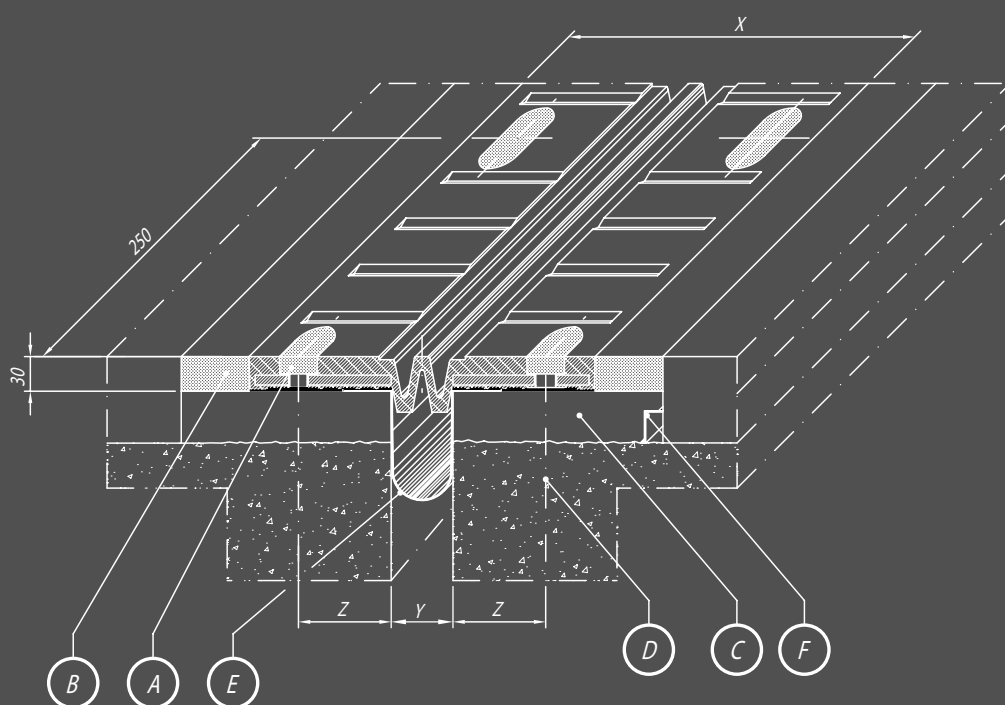
Expansion joint made of:

- CNR 10018/85-compliant modular reinforced rubber pads consisting of two plates vulcanized to a rubber gap cover of seal and disposal of surface waters;
- mechanical anchoring system made of steel rawl bolts or multidirectional sockets and anchor hooks or threaded bars, depending on site requirements;
- hypalon gutter;
- **perfil de drenaje a "L"**;
- epoxy mortar strips connecting the joint elements and the bituminous pavement.

JOINT TYPE	TOTAL MOVEMENT	HEIGHT H (mm)	WIDTH X (mm)	GAP Y (mm)	ANCHOR Z (mm)
RAN 50	50	30	280	55	72
RAN 100S	100	30	295	75	70

The length of modular element is equal to 2000 mm

### RAN 50



### RAN 100S

POS.	DESCRIPTION	MATERIAL
A	Sealant	ResinFIP MALTA E440 (A+B)
B	Transition strip	ResinFIP MALTA E440
C	Bedding mortar	According to FIP technical drawings
D	M12 Anchoring system	
E	Gutter	Hypalon
F	"L"-shaped drainage profile	X5CrNi18-10 - EN 10088

# REINFORCED RUBBER EXPANSION JOINTS

## ► GPE

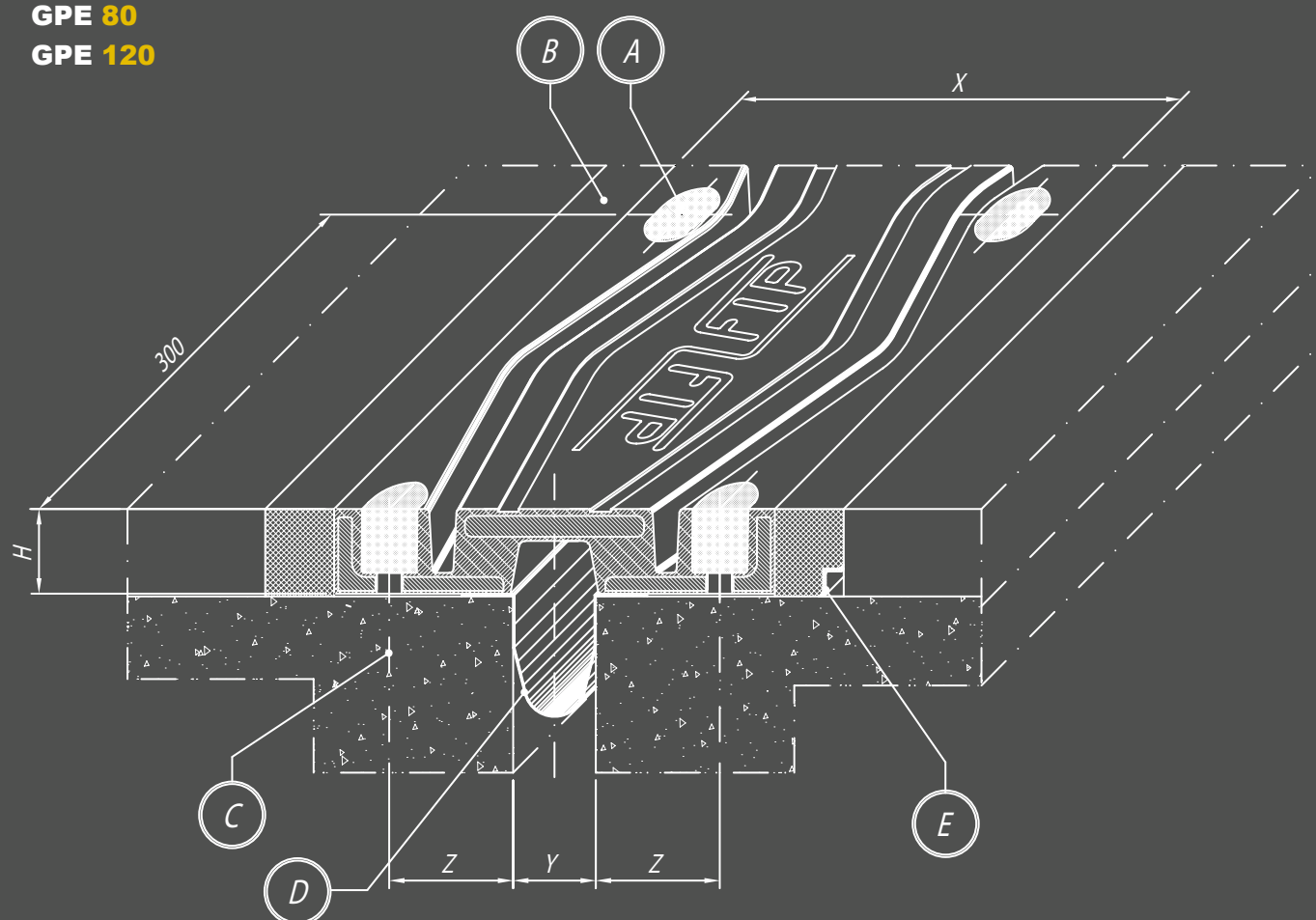
Expansion joint made of:

- CNR 10018/85-compliant modular reinforced rubber pads consisting of a central bridging plate and side bearing elements vulcanized to steel plates;
- mechanical anchoring system consisting of threaded bars or, as an alternative, multidirectional sockets and anchor hooks, depending on site requirements;
- hypalon gutter;
- epoxy mortar strips connecting the joint elements and the bituminous pavement.

JOINT TYPE	TOTAL MOVEMENT	HEIGHT	WIDTH	GAP	ANCHORS
		H (mm)	X (mm)	Y (mm)	Z (mm)
GPE 80	80	61	320	60	90
GPE 120	120	78	372	80	106

The length of modular element is equal to 900 mm

### GPE 80 GPE 120

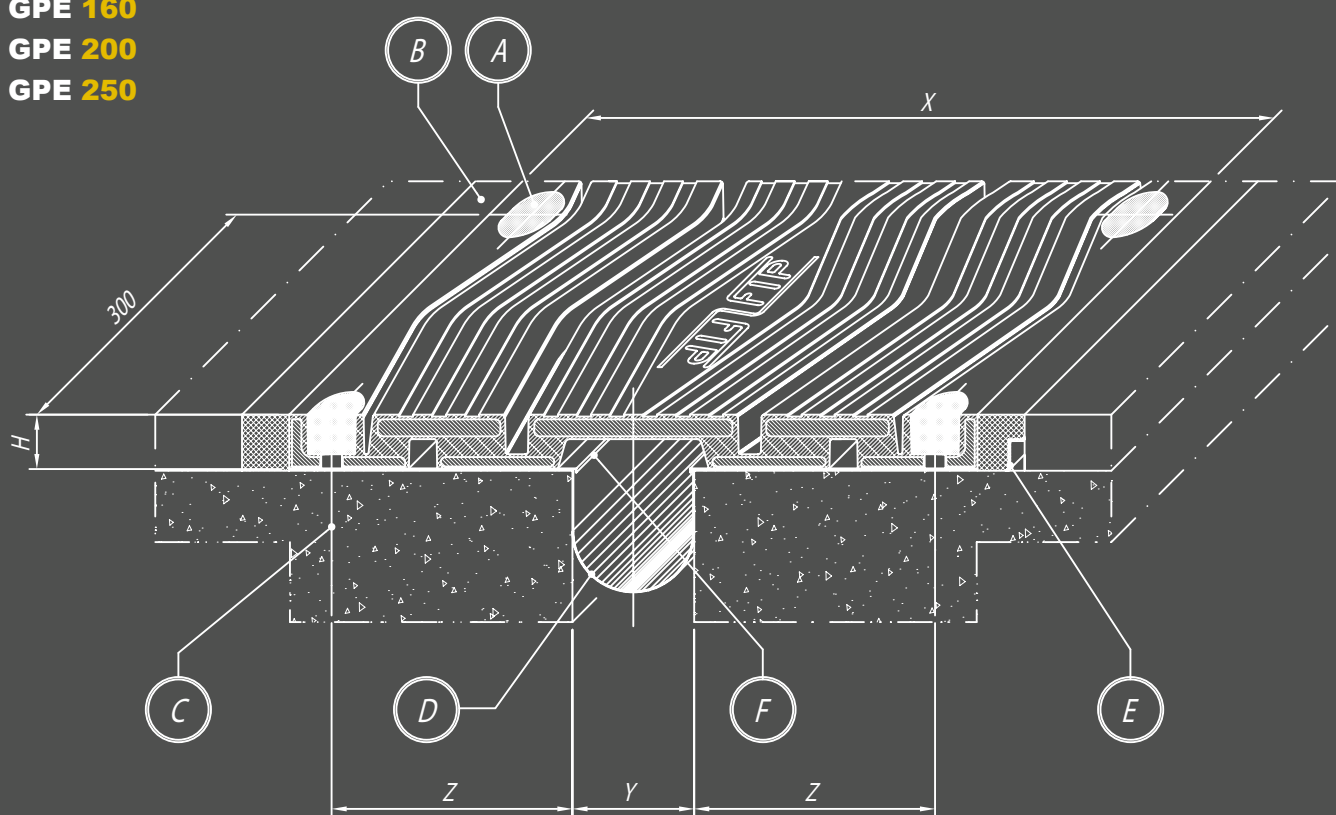


POS.	DESCRIPTION	MATERIAL
A	Sealant	ResinFIP MALTA EG450 or ResinFIP MALTA E440 (A+B+RUBBER)
B	Transition strip	ResinFIP MALTA E440
C	M16 Anchoring system	
D	Gutter	Hypalon
E	"L"-shaped drainage profile	X5CrNi18-10 - EN 10088

JOINT TYPE	TOTAL MOVEMENT	HEIGHT	WIDTH	GAP	ANCHORS
		H (mm)	X (mm)	Y (mm)	Z (mm)
GPE 160	160	64	735	100	272
GPE 200	200	64	850	120	320
GPE 250	250	74	914	145	352

The length of modular element is equal to 900 mm

**GPE 160**  
**GPE 200**  
**GPE 250**



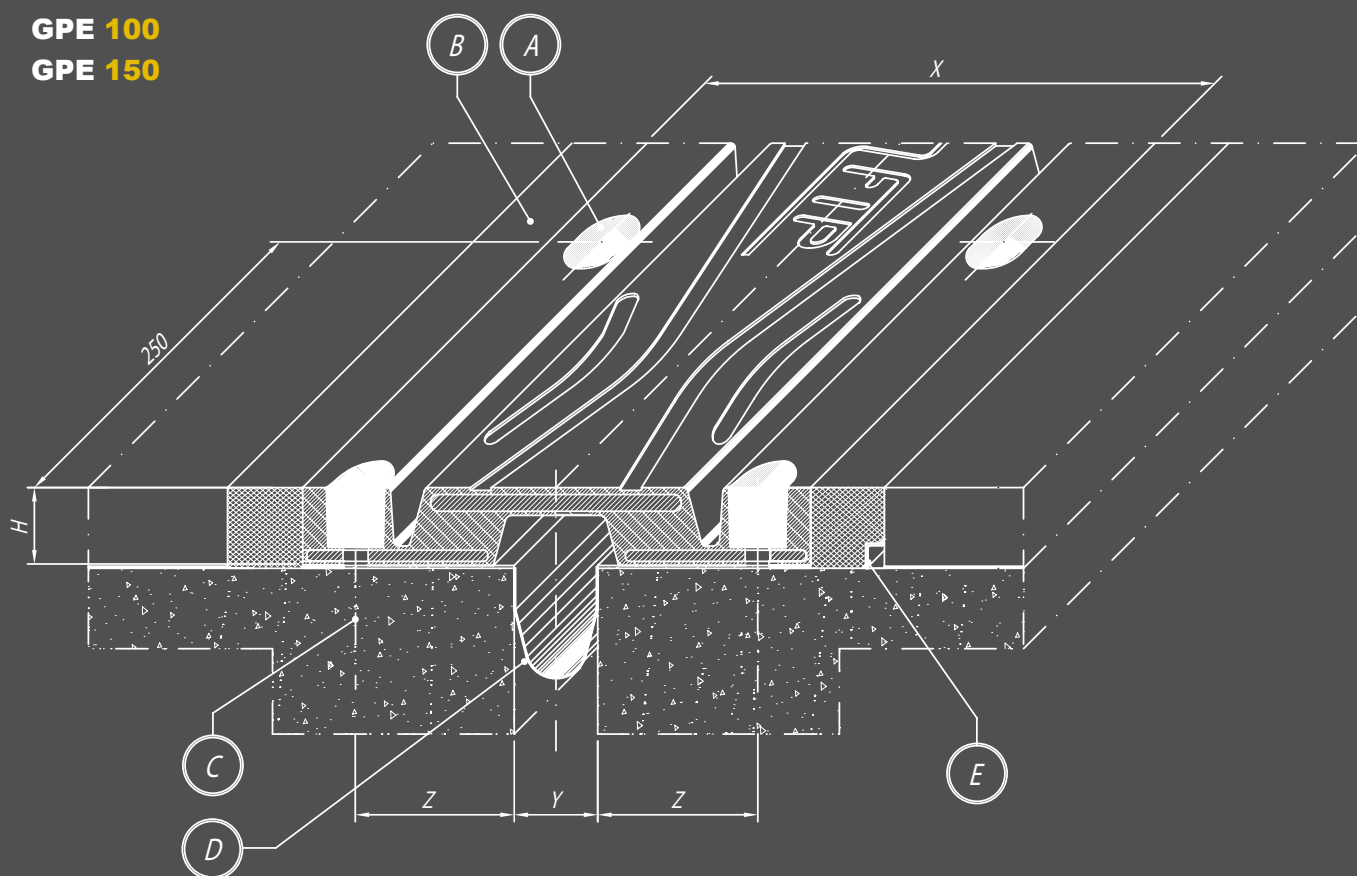
POS.	DESCRIPTION	MATERIAL
A	Sealant	ResinFIP MALTA EG450 or ResinFIP MALTA E440 (A+B+RUBBER)
B	Transition strip	ResinFIP MALTA E440
C	M20 Anchoring system	
D	Gutter	Hypalon
E	"L"-shaped drainage profile	X5CrNi18-10 - EN 10088
F	Sliding elements	X5CrNi18-10 - EN 10088

# REINFORCED RUBBER EXPANSION JOINTS

JOINT TYPE	TOTAL MOVEMENT	HEIGHT	WIDTH	GAP	ANCHORS
		H (mm)	X (mm)	Y (mm)	Z (mm)
GPE 50	50	42	250	50	70
GPE 100	100	56	366	85	102
GPE 150	150	83	555	195	135

The length of modular element is equal to 2000 mm

**GPE 50**  
**GPE 100**  
**GPE 150**



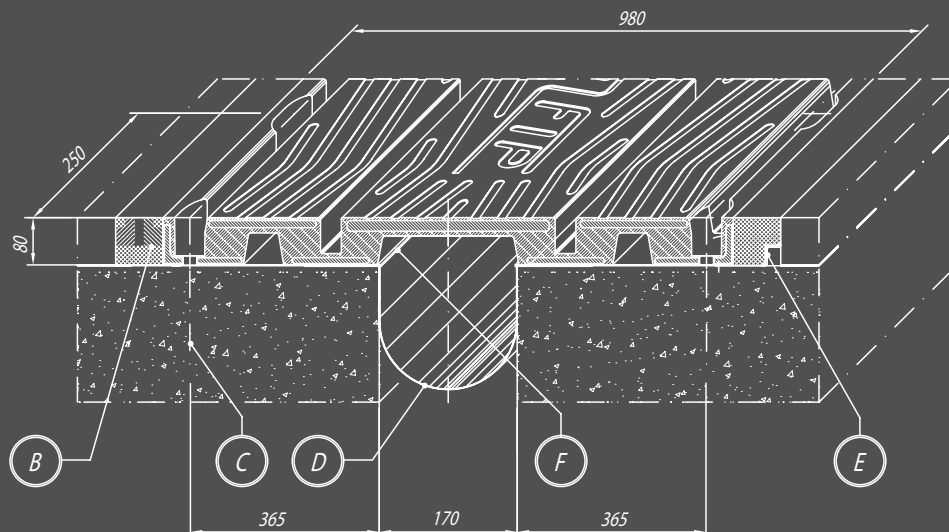
POS.	DESCRIPTION	MATERIAL
A	Sealant	ResinFIP MALTA EG450 or ResinFIP MALTA E440 (A+B+RUBBER)
B	Transition strip	ResinFIP MALTA E440
C	M16 Anchoring system	
D	Gutter	Hypalon
E	"L"-shaped drainage profile	X5CrNi18-10 - EN 10088



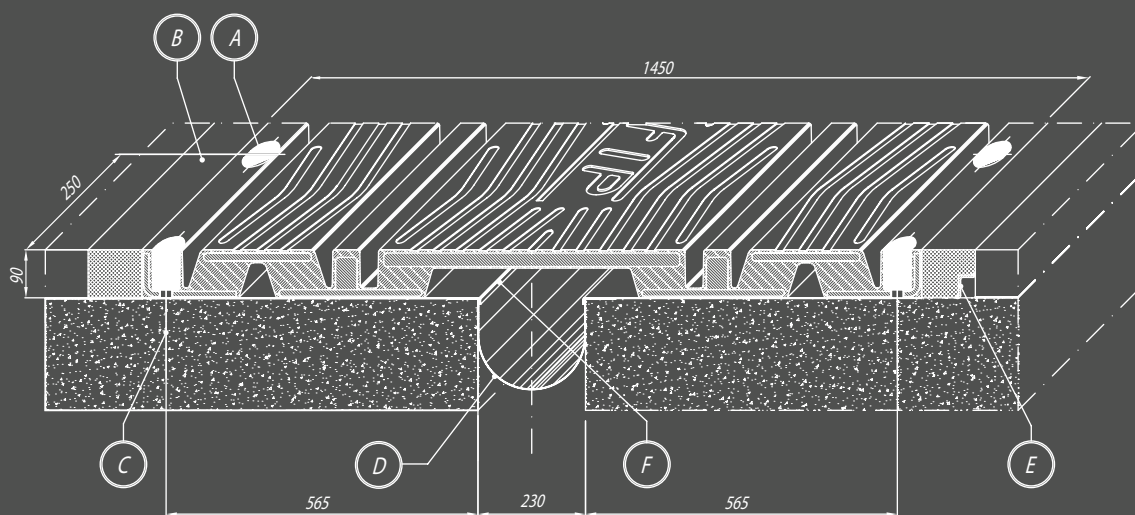
JOINT TYPE	TOTAL MOVEMENT	HEIGHT	WIDTH	GAP	ANCHORS
		H (mm)	X (mm)	Y (mm)	Z (mm)
GPE 300	300	80	980	170	365
GPE 400	400	90	1450	230	565

The length of modular element is equal to 1000 mm

### GPE 300



### GPE 400



POS.	DESCRIPTION	MATERIAL
A	Sealant	ResinFIP MALTA EG450 or ResinFIP MALTA E440 (A+B+RUBBER)
B	Transition strip	ResinFIP MALTA E440
C	M20 Anchoring system	
D	Gutter	Hypalon
E	"L"-shaped drainage profile	X5CrNi18-10 - EN 10088
F	Sliding elements	X5CrNi18-10 - EN 10088

# REINFORCED RUBBER EXPANSION JOINTS

## ► RAN-P

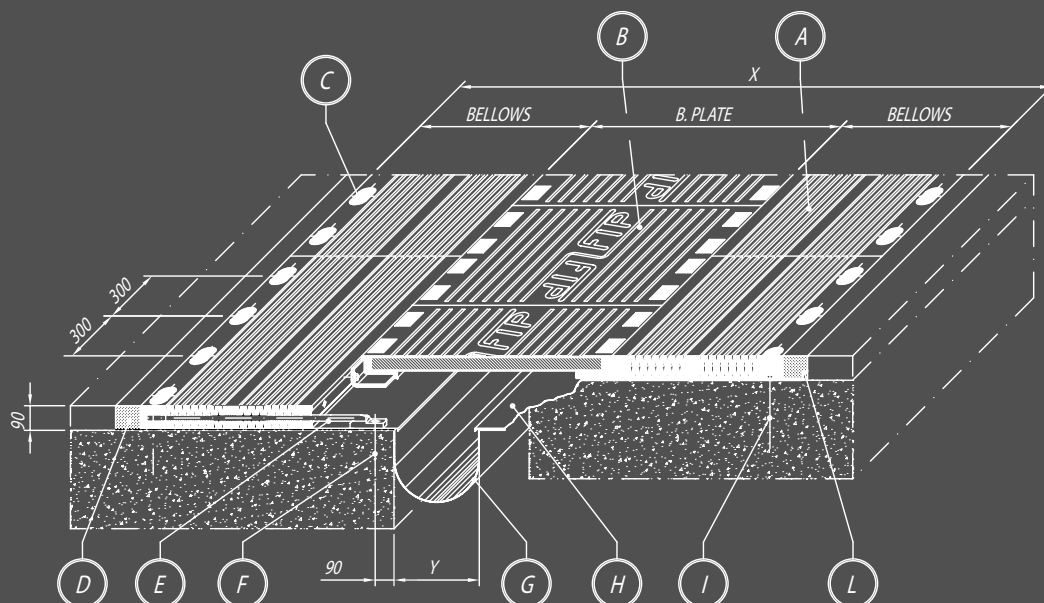
Water-proof expansion joint consisting of:

- CNR 10018/85-compliant modular reinforced rubber pads consisting of a central bridging plate and two side bellows equipped with anti-lift bar, free to move along stainless steel plates, assembled in situ;
- mechanical anchoring system consisting of threaded bars, or anchoring sockets, or multidirectional sockets and anchor hooks, depending on site requirements;
- stainless steel gutter;
- epoxy mortar strips connecting the joint elements and the bituminous pavement.

Upon request, the bridging plates can be treated with the “anti-skid” surface treatment.

JOINT TYPE	TOTAL MOVEMENT	WIDTH X (mm)	GAP Y (mm)	B. PLATE	BELLOW
		min-max	medium	(mm)	
RAN-P 400	400	1720 - 2120	50 - 450	800	DOUBLE + SINGLE
RAN-P 500	500	2060 - 2560	50 - 550	900	DOUBLE + DOUBLE
RAN-P 600	600	2160 - 2760	50 - 650	1000	DOUBLE + DOUBLE
RAN-P 700	700	2500 - 3200	50 - 750	1100	TRIPLE + DOUBLE
RAN-P 800	800	2840 - 3640	50 - 850	1200	TRIPLE + TRIPLE
RAN-P 1000	1000	2540 - 3540	50 - 1050	1400	TRIPLE + TRIPLE

## RAN P



POS.	DESCRIPTION	MATERIAL
A	Bellows	Steel S235JR EN 10025 - Rubber shore A 70±5
B	Bridging plate	Steel S235JR EN 10025 - Rubber shore A 70±5
C	Sealant	ResinFIP MALTA EG450 or ResinFIP MALTA E440 (A+B+RUBBER)
D	Transition strip	ResinFIP MALTA E440
E	Anti-lift bar	X5CrNi18-10 - EN 10088
F	M20 Anchoring system	
G	Gutter	Hypalon or X5CrNi18-10 - EN 10088
H	Sliding sheet	X5CrNi18-10 - EN 10088
I	M24 Anchoring system	
L	"L"-shaped drainage profile	X5CrNi18-10 - EN 10088

# STRIP SEAL EXPANSION JOINTS

## ► J80

“Strip seal” joint type J80 has been designed to accommodate displacements of up to 80 mm.

This type of joint is composed of two steel edge profiles and a central rubber seal covering the gap.

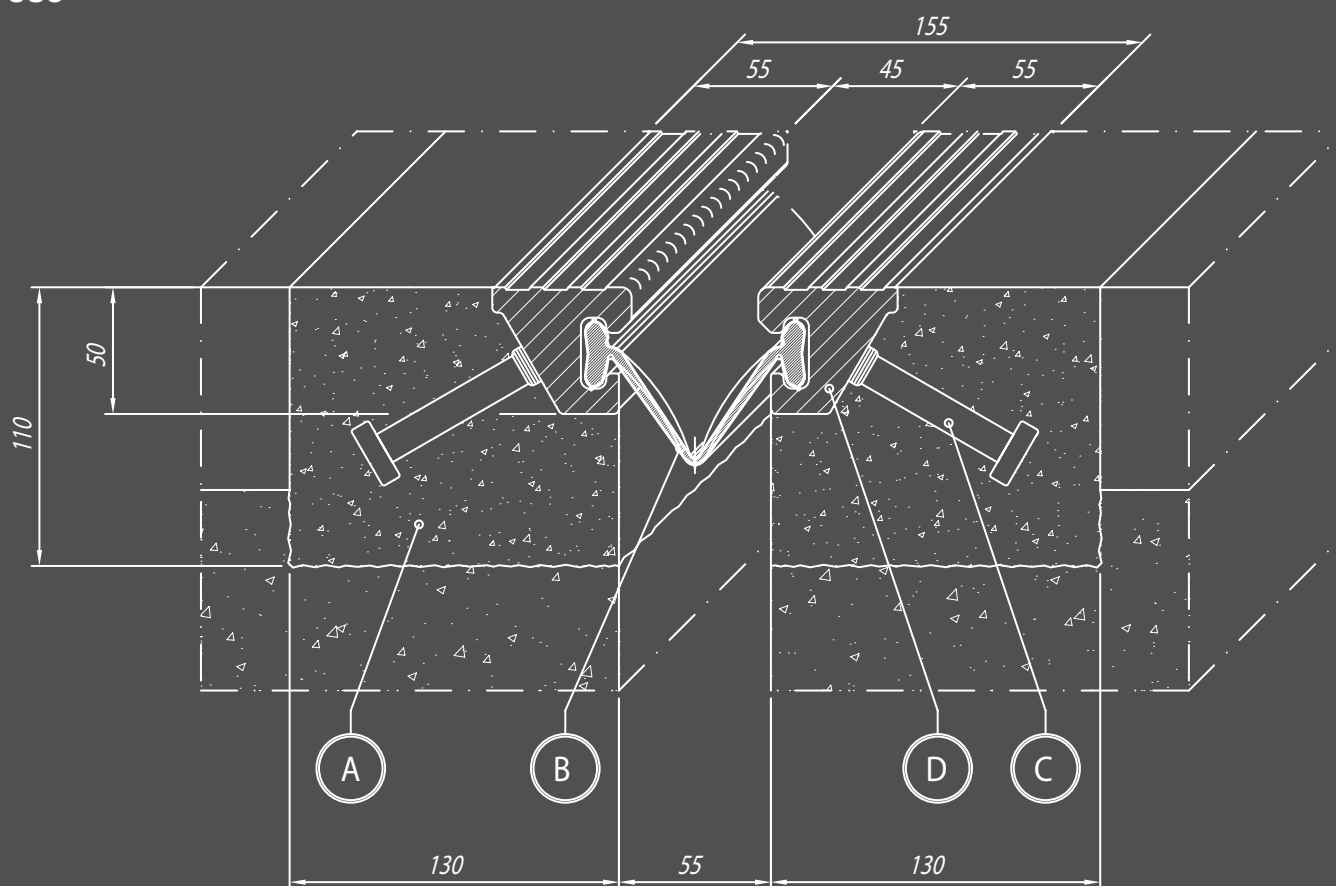
This rubber element ensures the joint's watertightness. The anchorage to the bridge deck is ensured by cast in place Nelson studs. In case of specific requests, provision can be made for additional steel rebars in addition to the standard anchorage system.

Standard edge profiles are extruded steel profiles made of S355J2 according to EN10025. The grooves on their upper surface prevent any possible skid hazard.

In order to protect the connection between the rubber seal and the steel elements, the steel profiles have a small protrusion towards the inner side.

Standard joint modules are manufactured with an overall length of up to 12 m. For specific project requirements longer *tailor-made* modules can be provided. Upon request, protective coatings can be applied to the steel elements, in order to satisfy corrosion protection requirements.

## J80



POS.	DESCRIPTION	MATERIAL
A	Block-out grout	According to FIP technical drawings
B	Rubber seal	
C	Nelson stud	S235J2 +C450
D	Edge beam profile	S355J2 - EN10025

# STRIP SEAL EXPANSION JOINTS

## ► JF80

“Strip seal” joint type JF80 has been designed to accommodate displacements of up to 80 mm.

This type of joint is composed of two steel edge profiles and a central rubber seal covering the gap.

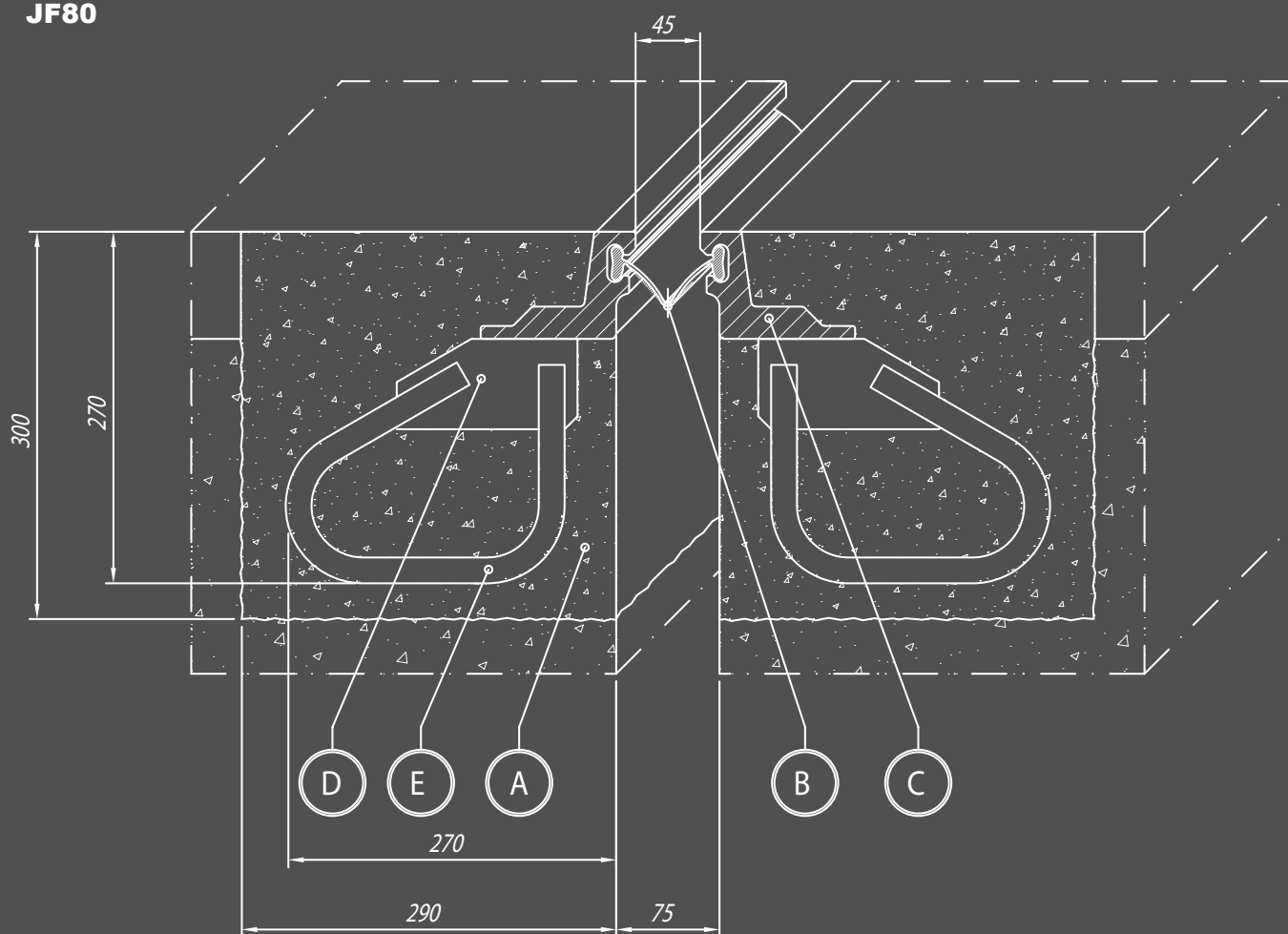
This rubber element ensures the joint’s watertightness. The anchorage to the bridge deck is ensured by cast in place anchors (steel plates and anchor loops) made of S275JR according to EN10025.

In case of specific requests, provision can be made for additional steel rebars in addition to the standard anchorage system. Standard edge profiles are extruded steel profiles made of S355J2 or weathering steel according to EN10025. In order to protect the connection between the rubber seal and the steel elements, steel profiles have a small protrusion towards the inner side.

Standard joint modules are manufactured with an overall length of up to 12 m. For specific project requirements longer *tailor-made* modules can be provided.

Upon request, protective coatings can be applied to the steel elements, in order to satisfy corrosion protection requirements.

## JF80



POS.	DESCRIPTION	MATERIAL
A	Block-out grout	According to FIP technical drawings
B	Rubber seal	
C	Edge beam profile	S355J2 or weathering steel - EN10025
D	Anchor plate	S275JR - EN10025
E	Anchor loop	S275JR - EN10025

# FINGER EXPANSION JOINTS

## DESCRIPTION

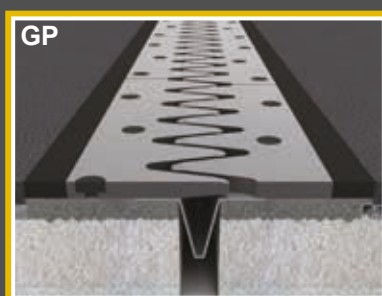
These joints are obtained by opposing two finger-shaped metal elements: each is fixed to its head, thus ensuring, thanks to a suitable interpenetration, continuity of the carriageway in case of expansion/shrinkage.

Their static layout can act as a beam on two bearings when the finger rests on both heads or as a shelf when it overhangs a head.

A specific device is needed, usually a gutter, to ensure the gap watertightness.

Special attention should be paid to the alignment during the installation phase and to the head anchoring, especially in the case of shelf layout.

Except for special arrangements, this type of joint permits limited transverse displacements.



### ► SFE 90/65

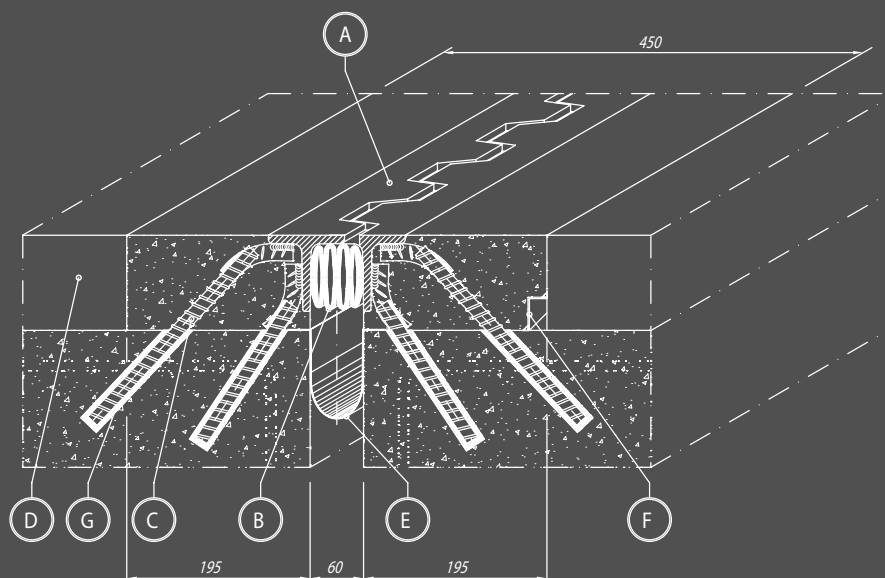
Expansion joint specifically designed for highway use within structures creating longitudinal movements of  $\pm 20$  (mm), vertical movements up to 10mm.

It consists of an extruded rubber bellows, vulcanized to two 80x80x9 mm "TEE"-profiles and anchored to the slab by clamps of suitable diameter, placed at a centre distance of 240 mm.

The extruded rubber, together with the steel profiles it is vulcanized to, makes up a water-tight system and seamlessly covers the entire width of the road bed.

Watertight capacity around the areas close to the joint is ensured by appropriate waterproof materials.

### SFE 90/65



POS.	DESCRIPTION	MATERIAL
A	Finger "T" profile	S235JR EN 10025
B	Vulcanized rubber profile	According to FIP technical drawings
C	Ø 16 Rebar anchor	B450 C (D.M. 14/01/2008)
D	Transition strip	Fibre reinforced mortar
E	Gutter	Hypalon
F	"L"-shaped drainage profile	X5CrNi18-10 - EN 10088
G	Anchoring resin	According to FIP technical drawings



# FINGER EXPANSION JOINTS

## GP

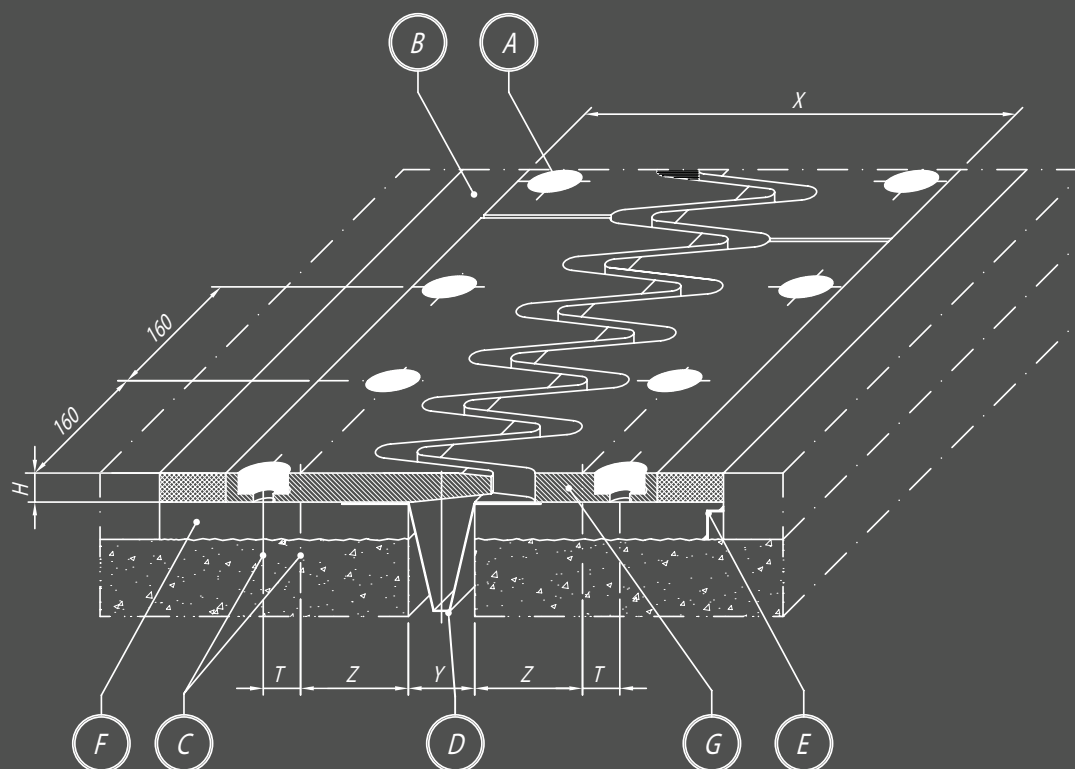
Waterproof expansion steel finger joints suitable to absorb deck displacements of up to 300 mm ( $\pm 125$ ) consisting of:

- anchoring/support system made of suitable anchor rods of suitable section and length;
- suitably dimensioned and shaped stainless steel gutter;
- active upper part consisting of an overhung metal finger system obtained by the processing of weathering steel plates equipped with bolts, nuts, washers etc.

JOINT TYPE	TOTAL MOVEMENT	HEIGHT	WIDTH	GAP	ANCHORS	
		H (mm)	X (mm)	Y (mm)	Z (mm)	T (mm)
GP 50	50	25	400	60	125	-
GP 100	100	30	480	80	110	45
GP 150	150	35	555	105	135	45
GP 200	200	40	630	130	160	45
GP 250	250	45	705	155	185	45
GP 300	300	45	780	180	210	45

The length of modular element is equal to 955 mm

## GP



POS.	DESCRIPTION	MATERIAL
A	Sealant	ResinFIP MALTA E440 (A+B)
B	Transition strip	ResinFIP MALTA E440
C	Anchoring system	
D	Gutter	X5CrNi18-10 - EN 10088
E	"L"-shaped drainage profile	X5CrNi18-10 - EN 10088
F	Mortar bedding	According to FIP technical drawings
G	Finger element	S355J2W - EN 10025

## ► FE C

Waterproof expansion steel finger joints suitable to absorb decks displacements up to 800 mm ( $\pm 400$ ) consisting of:

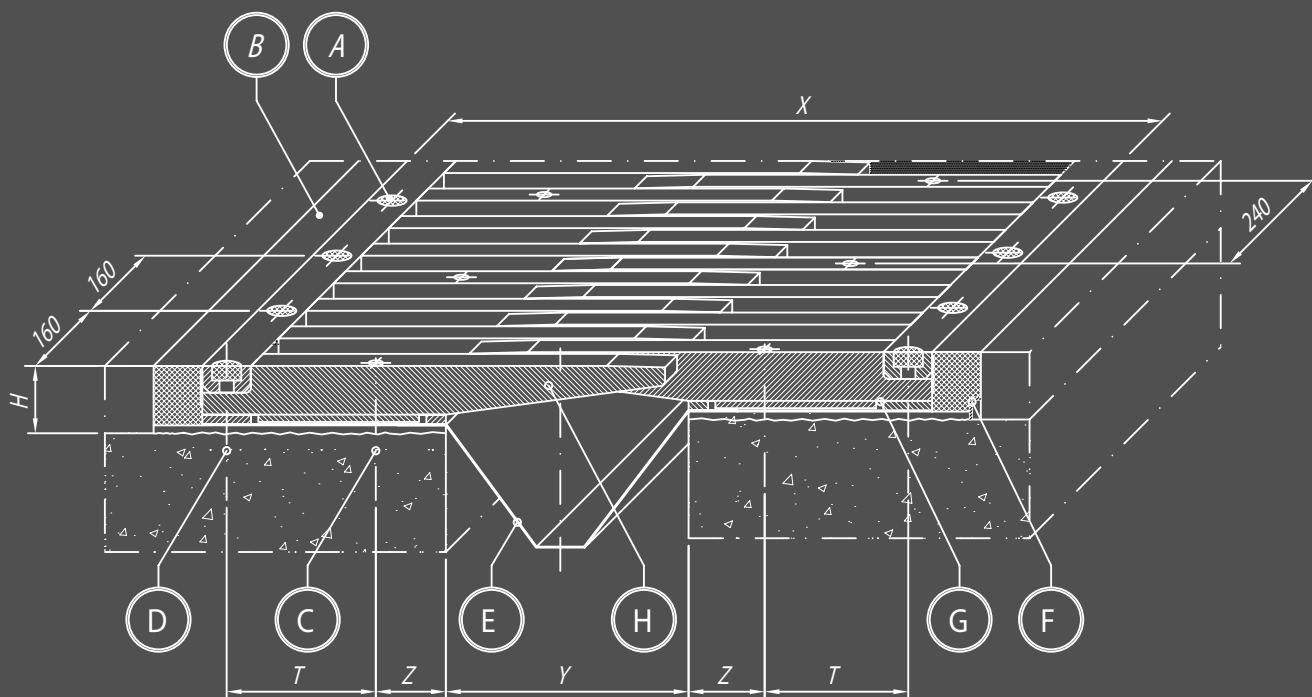
- overhung finger elements of weathering steel;
- mechanical anchoring system consisting of multidirectional sockets and anchor rods;
- stainless steel gutter.

Epoxy mortar strips connecting the joint elements and the bituminous pavement.

JOINT TYPE	TOTAL MOVEMENT	HEIGHT	WIDTH	GAP	ANCHORS	
		H (mm)	X (mm)	Y (mm)	Z (mm)	T (mm)
FE C 400	400	85	1010	260	100	145
FE C 500	500	79	1160	310	100	200
FE C 600	600	105	1310	360	100	250
FE C 700	700	115	1460	410	150	250
FE C 800	800	120	1760	460	150	300

The length of modular element is equal to 955 mm

## FE C



POS.	DESCRIPTION	MATERIAL
A	Sealant	ResinFIP MALTA E440 (A+B)
B	Transition strip	ResinFIP MALTA E440
C	M16 Anchoring system	
D	M24 Anchoring system	
E	Gutter	X5CrNi18-10 - EN 10088
F	"L"-shaped drainage profile	X5CrNi18-10 - EN 10088
G	Mortar bedding	According to FIP technical drawings
H	Finger element	S355J2W - EN 10025

# EXPANSION JOINTS FOR RAILWAY BRIDGES

## DESCRIPTION

Underballast railway expansion joint with waterproof and dielectric characteristics suitable to absorb longitudinal movements of the decks from 100 to 600 mm and vertical deformations up to  $\pm 50$  mm.

This type of joint is designed to prevent the ballast penetration in the gap or in any active part of the joint. The RFI-approved series (built according to instruction 44/e) is for displacements from 100 to 250 mm.

Consisting of:

- CNR 10018/85-compliant reinforced rubber dielectric modular pads consisting of a central bridging plate and two side elements;
- mechanical anchoring system consisting of threaded bars fixed with epoxy resin;
- stainless steel protection and sliding plates;
- hypalon gutter;
- side draining slats for under-ballast infiltration waters;
- epoxy mortar transition strip between the joint and the binder.



To complete the Beta railway joint the sidewalk and ballast joint is available, consisting of:

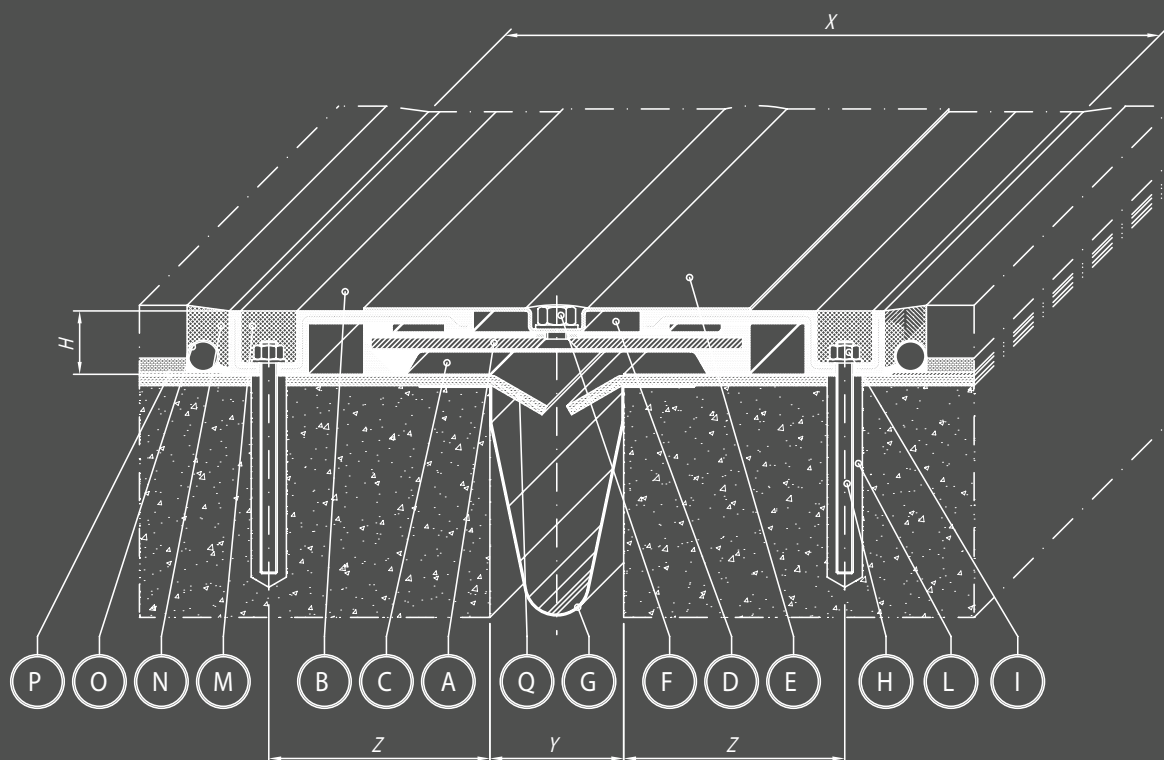
- reinforced dielectric rubber flange: flat for the sidewalk and shaped for the ballast joint fixed by expansion anchor rawl;
- hypalon gutter.



• RAILWAY CARACAS-TUYMEDIO, VENEZUELA  
supply of BETA series railway joints

JOINT TYPE	TOTAL MOVEMENT	HEIGHT	WIDTH	GAP	ANCHORS
		H (mm)	X( mm)	Y (mm)	Z (mm)
BETA 60/100	100	46	Min. 340 - Max. 440	Min. 20 - Max. 120	132
BETA 60/150	150	46	Min. 390 - Max. 540	Min. 20 - Max. 170	157
BETA 60/200	200	52	Min. 440 - Max. 640	Min. 20 - Max. 220	182
BETA 60/250	250	52	Min. 490 - Max. 740	Min. 20 - Max. 270	207
BETA 60/300	300	62	Min. 610 - Max. 910	Min. 20 - Max. 320	260
BETA 60/450	450	68	Min. 760 - Max.1210	Min. 20 - Max. 470	335
BETA 60/600	600	81	Min. 925 - Max.1525	Min. 20 - Max. 620	412

## BETA



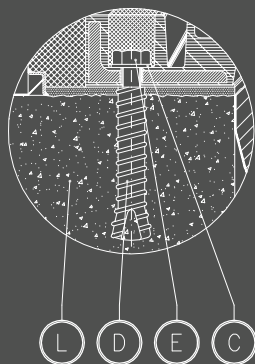
POS.	DESCRIPTION	MATERIAL
A	Bridging plate	Steel S355JR - EN 10025 - Rubber 70 ±5 Shore A
B	Side element	Steel S275JR - EN 10025 - Rubber 70 ±5 Shore A
C	Lower sliding sheet	X5CrNiMo 17-12-2 - EN 10088
D	Upper sliding sheet	X5CrNiMo 17-12-2 - EN 10088
E	Cover sheet	X5CrNiMo 17-12-2 - EN 10088
F	Cover sheet fixing nut	Stainless steel A4 - EN ISO 3506
G	Gutter	Hypalon
H	Threaded bar	Stainless steel A4 - EN ISO 3506
I	Threaded bar fixing nut	Stainless steel A4 - EN ISO 3506
L	Anchoring resin	According to FIP technical drawings
M	Sealant	ResinFIP MALTA EG450 or ResinFIP MALTA E440 (A+B+RUBBERA)
N	Transition strip	ResinFIP MALTA E440
O	Drainage element	
P	Deck waterproofing protection sheet	X5CrNiMo 17-12-2 - EN 10088
Q	Deck waterproofing membrane	



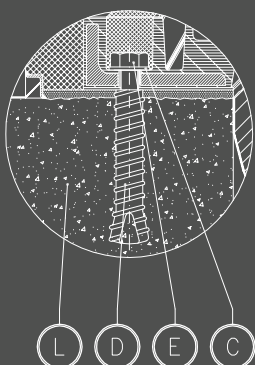
# ANCHORS

FIP Industriale joints are available with various types of anchors depending on site requirements.

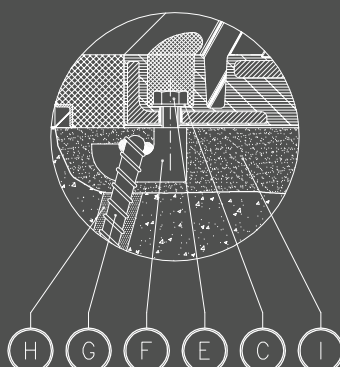
## ► THREADED BAR



## ► ANCHORING SOCKETS



## ► MULTIDIRECTIONAL SOCKETS



POS.	DESCRIPTION	MATERIAL
A	Threaded bar	ASTM A193 - grade B7 or Stainless steel A4 - EN ISO 3506
B	EN ISO 4032 nut	EN ISO 898 - grade 8 or Stainless steel A4 - EN ISO 3506
C	EN ISO 7089 and/or slotted washer	HV200/300 - C40 EN 10083 - S235JR EN 10025 or Stainless steel A4 - EN ISO 3506
D	Anchoring sockets	B450 C (D.M. 14/01/2008)
E	Hexagon head screw	EN ISO 898 - grade 8.8 or Stainless steel A4 - EN ISO 3506
F	Multidirectional sockets	Steel S355J2G3 EN 10025
G	Anchoring hook	B450 C (D.M. 14/01/2008)
H	Anchor resin	According to FIP technical drawings
I	Levelling grout	According to FIP technical drawings
L	Slab head	





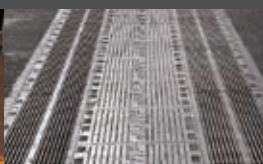
• VIADUCT SALAH BEY - COSTANTINE, ALGERIA  
installation of RAN-P and GPE series expansion joints



**BRIDGE  
BEARINGS**



**ANTI-SEISMIC  
DEVICES**



**EXPANSION  
JOINTS**



**FITTINGS  
FOR TUNNEL**



**NOISE  
BARRIERS**



**DAMPING  
SYSTEMS**



**FIP INDUSTRIALE**  
leading technologies



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