

## EXPANSION JOINTS – Large Movements

### GRANOR® / ETIC Steel Finger Joints - “Series SFEJ”

The Granor ETIC® SFEJ series Steel Finger joints are robust Bridge deck expansion joints that accommodate larger movements ranging from 150mm up to 600mm total capacity.

These joints should be adopted where the structure gap will open beyond 85mm ULS, in which case the use of a ‘stripseal’ type single seal element joint will transgress the maximum 85mm open gap criterion nominated in AS5100.4

The SFEJ series joints meet all the criterion of AS5100.4 and can be designed for any skew orientation required.

The SFEJ joints utilise as a standard detail an underside draped PVC ‘trough’ gland that locates into separate extruded aluminium retainers that are cast into the blockout during the joint systems installation process. This gland drains to a suitable underside of structure collection point at the low side of the joint.

#### Design Features

The SFEJ series joints consist of three main elements :

##### Galvanised steel finger joint plates.

These manufactured galvanised steel elements have ‘tooth comb’ shaped slender fingers in plan, which interlock with the opposing element, thereby providing a smooth unencumbered transition over the large underside structure gap. Skid resistance on the steel finger plate joint elements is provided by the standard detailing of a raised X patterned surface or by the use of purpose applied high PSV grit epoxy coating, applied post galvanising

##### Tensioned – High tensile fixings

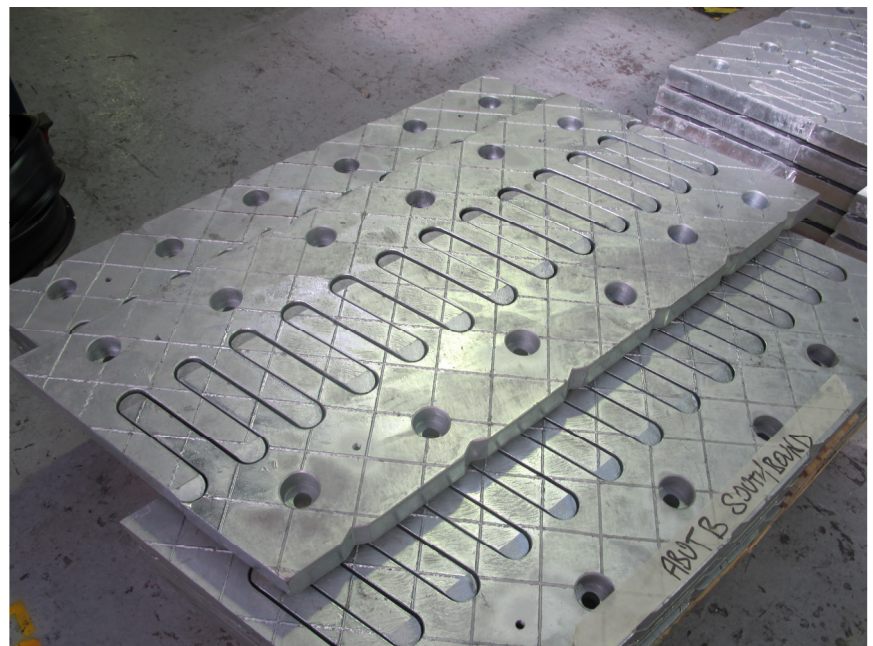
The joints metallic galvanised steel finger plate elements are strongly fixed to the structure by way of tensioned tie-bolts. This provides for a superior retention mode whereby fixings undergo minimal load fluctuation and do not suffer from fatigue based failure.

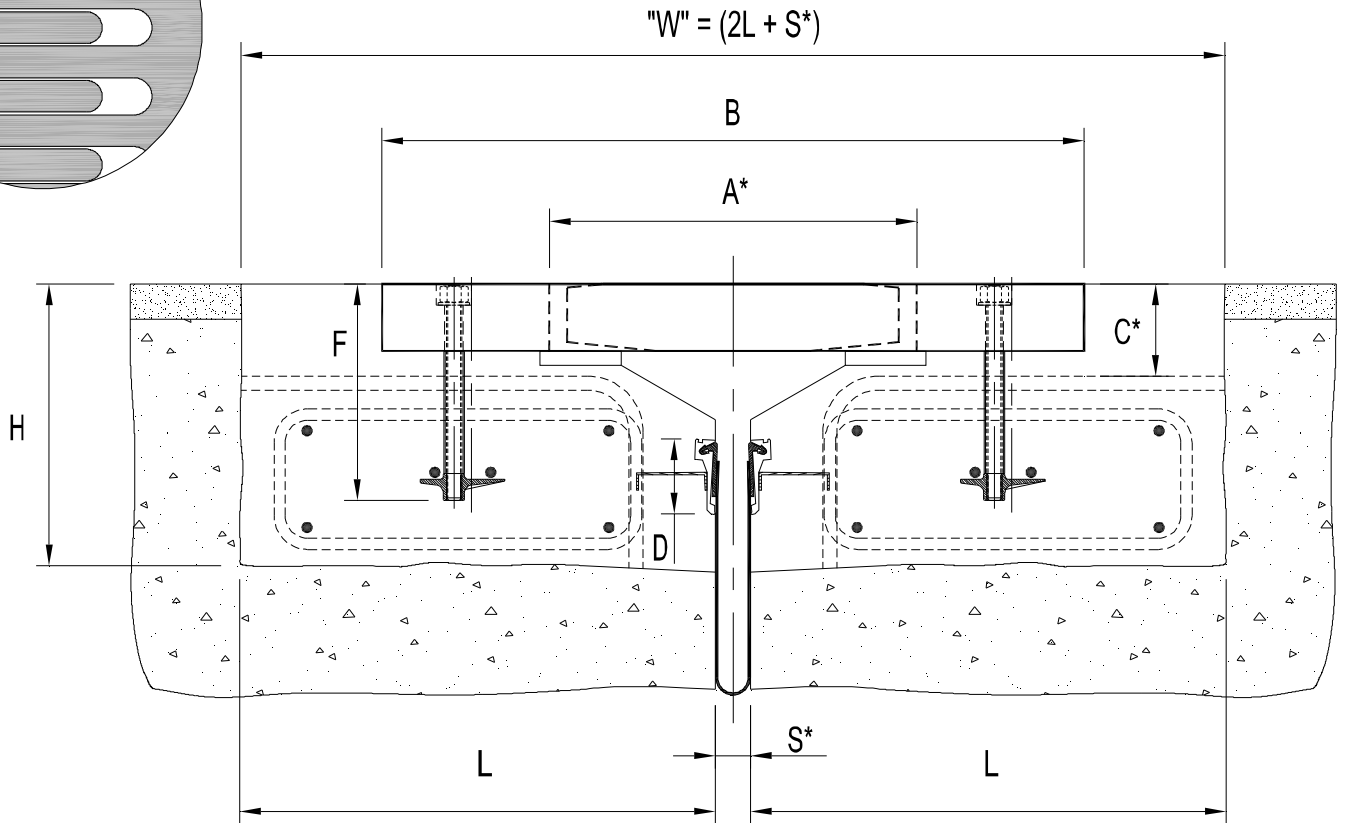
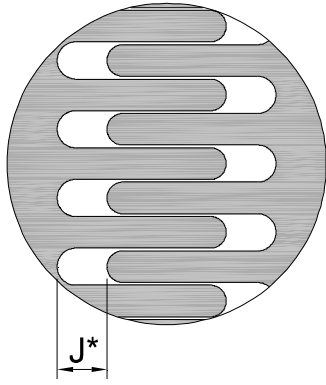
##### Elastomeric sealing profile

This sealing element in the standard system configuration is a trough shaped PVC seal membrane with a male prong end that locates positively into the female recess of a purpose extruded aluminium retainer. These elements are independent of the Finger plate joint elements and are located underside of the main joint system.

#### Skew Orientation

The SFEJ joint system is the large movement joint of choice for locations where skews are required and in particular where these skews are not conducive to using the Granor ETIC® EJ series cast aluminium saw tooth expansion joints.





**DIAGRAM INDICATES JOINT FULLY CLOSED UP.**  
(INSTALLATION IS REPRESENTATIVE)

**EXPANSION JOINT PERFORMANCE TABLE**

TYPE	A		B		J*		S*		C*	D	F	H	L
	min.	max.	min.	max.	min.	max.	min.	max.					
SFEJ-150	165	315	435	585	0	150	50	200	80	105	250	350	390
SFEJ-200	215	415	415	615	0	200	50	250	105	105	250	350	380
SFEJ-250	265	515	475	725	0	250	50	300	105	105	250	350	410
SFEJ-300	315	615	525	825	0	300	50	350	105	105	250	350	440
SFEJ-350	365	715	585	935	0	350	50	400	105	105	250	350	465
SFEJ-400	415	815	685	1085	0	400	50	450	105	105	250	350	520
SFEJ-450	465	915	735	1185	0	450	50	500	110	105	250	350	540
SFEJ-500	515	1015	785	1285	0	500	50	550	120	105	250	350	570
SFEJ-550	565	1115	835	1385	0	550	50	600	120	105	250	350	590
SFEJ-600	615	1215	885	1485	0	600	50	650	120	105	250	350	620

**A\* (min.)** - Is when the fingers are fully closed up. **A\* (max.)** - Is when the fingers are fully open.

**J\*** - Is the critical metal to metal gap between the ends of respective assembled joint components, at the time of installation, as determined by the engineer after consideration of future opening and closing of the fingers.

**S\* (min.)** - Is the minimum acceptable gap when fingers are fully closed up.

**S\* (max.)** - Is the minimum acceptable gap when fingers are fully open.

**C\*** - Is the minimum clearance to the uppermost deck reinforcement beneath the joint (subject to AS5100.5 clause 4.10). Reinforcement that is adjacent to joint is unaffected.

### Trough Seal

All the above models in the SFEJ series utilise a continuous central draped PVC 'trough' gland, which locates into extruded aluminium retainer profiles. The PVC trough gland will need to drain to a suitable collection point at the low side of the joint.

As the aluminium retainers and trough are independent from the finger joint plates installed above, they can be cast into the blockout at a steeper slope than the joint above in order to enhance self drainage. Alternatively the draped seal itself can be produced in our workshop such that its invert is on a steeper incline than the joint to achieve an enhanced drainage outcome.

The underside PVC trough gland can also be eliminated from the design and a purpose designed steel gutter and shedding plate arrangement incorporated into the underside of the structure by the consulting Engineer.

SFEJ series joints can also be configured as an 'open joint' by eliminating the central gland elements entirely if this is preferred.

### Installation

The SFEJ series expansion joints are cast into appropriately formed blockouts, per the minimum dimensions in the above tabulations.

Removable formwork is placed underside in the expansion joint gap to the appropriate gap set "S" at the time of installation. To this formwork is connected the continuous aluminium extrusion profiles that eventually accommodate the draped PVC 'trough' gland. It should be noted that the important dimension set at time of installation is the gap "J" at the top of the joint system between the end of the finger and the invert of the opposing plate's finger slot. The underside gap set "S" is set to the as found structure gap

Form release is applied to the underside of the galvanised steel plates.

The total system is preassembled above the blockout and suspended with purpose steel suspension arms and brackets (Granor Installation Kit) to the correct level and "J" gap set width.

The system's fixings are placed such that they locate perfectly normal to underside plane of the joint system and the required reinforcement placed and tied.

The top of the joint is protected from concrete slurry ingress and the blockout infill concrete is placed with thorough vibration practices. The suspension brackets are loosened once the concrete has solidified in order to allow structure movement to occur without pulling and shifting the joint system prior to full concrete cure.

Upon achievement of minimum 30Mpa concrete strength the SFEJ steel plates are lifted and the formwork is removed exposing the cast-in aluminium retainers. The PVC seal membrane is installed. The exposed concrete surface is cleaned and a suitable epoxy paste is applied to the surface to fill any air voids and imperfections. This epoxy paste is applied just prior to the steel finger plates being reattached. The epoxy paste ensures full surface contact of the reinstated finger plates.

The joint fixings are immediately tensioned to the advised torque setting and re-torqued 24 hours latter, after which a bituminous compound is placed in the bolt well recesses. The joint is now ready for full trafficking.