

Hercules Engineering single element joints are used where a robust, water-tight expansion joint is required in highway bridges, parking stations, access ramps and a variety of other applications. Our Engineers are available at both design and construction stages to assist with the design and installation details of the joints.

1. MAIN DESIGN FEATURES

- 1.1 Compliance with local design standards where applicable (such as NAASRA/AUSTROADS)
- 1.2 Proven worldwide service record
- 1.3 Excellent continuity in the road surface with strength at potential trouble-spots.
- 1.4 Ease of installation, using simple procedures familiar to site personnel.
- 1.5 Avoidance of bolts (cast-in or post-drilled), resins, etc.
- 1.6 Manufactured entirely in steel with comprehensive corrosion protection system.
- 1.7 Waterproof barbed sealing element in high grade Neoprene with excellent ozone and ultraviolet resistance allowing simple positive insertion and future removal.
- 1.8 Available in up to 6 m lengths, with a joining detail for longer lengths with bolted-dowelled and end plates with gaskets in the steelwork, and continuous seal elements.

2. EXPANSION JOINT TYPES & SERIES

2.1 Single Element Series 13

The series 13 joints are fabricated from steel angles or blades and supplied in two main anchorage configurations depending on whether they are required for heavy or light traffic. Any design of anchors should be integrated with the concrete reinforcement provide maximum resistance to traffic loads.

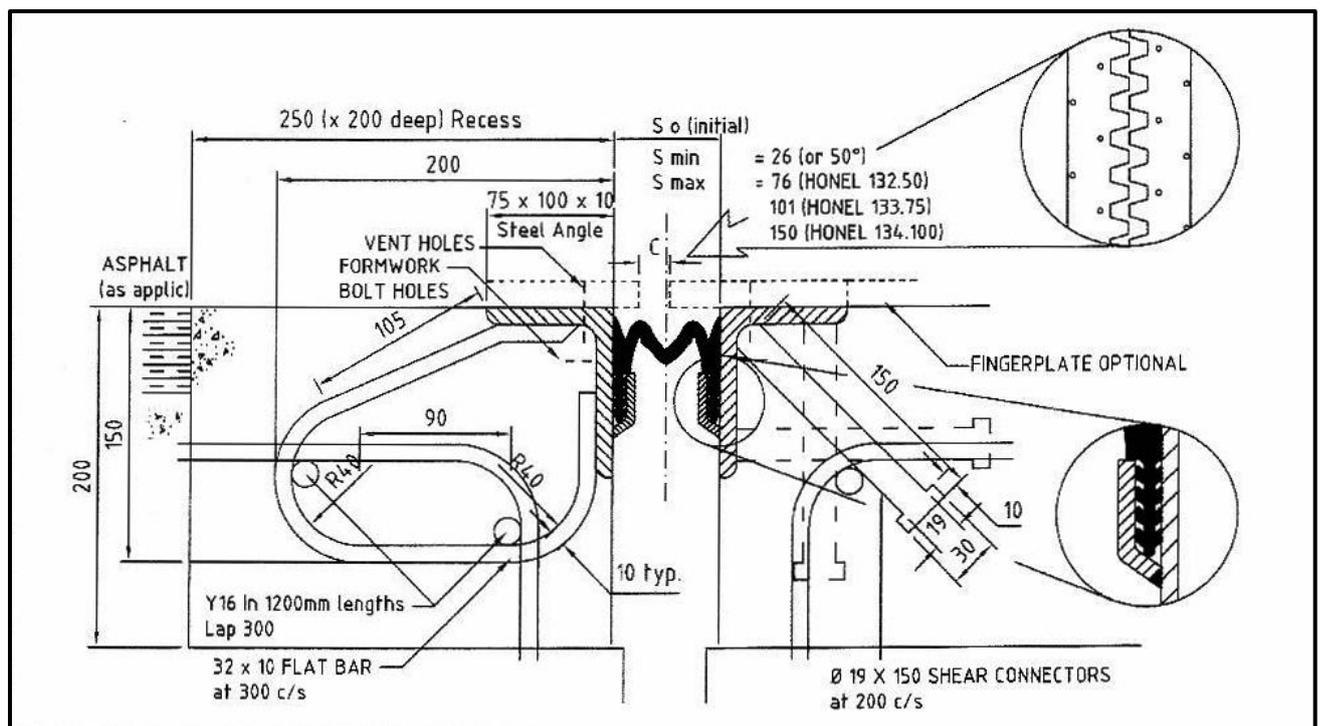


Table 9.1 - Different size sealing elements in this series cater for movement up to 100mm.

Hercules Part No.	Total Movement (mm)	Transverse Movement (mm)	Vertical Movement (mm)	Smin (mm)	Smax (mm)

132.50	50(±25)	±30	±30	26	76
133.75	75(±35)	±35	±35	26	101
134.10	100(±50)	±50 or ±2	±50 or 5	50*	150*

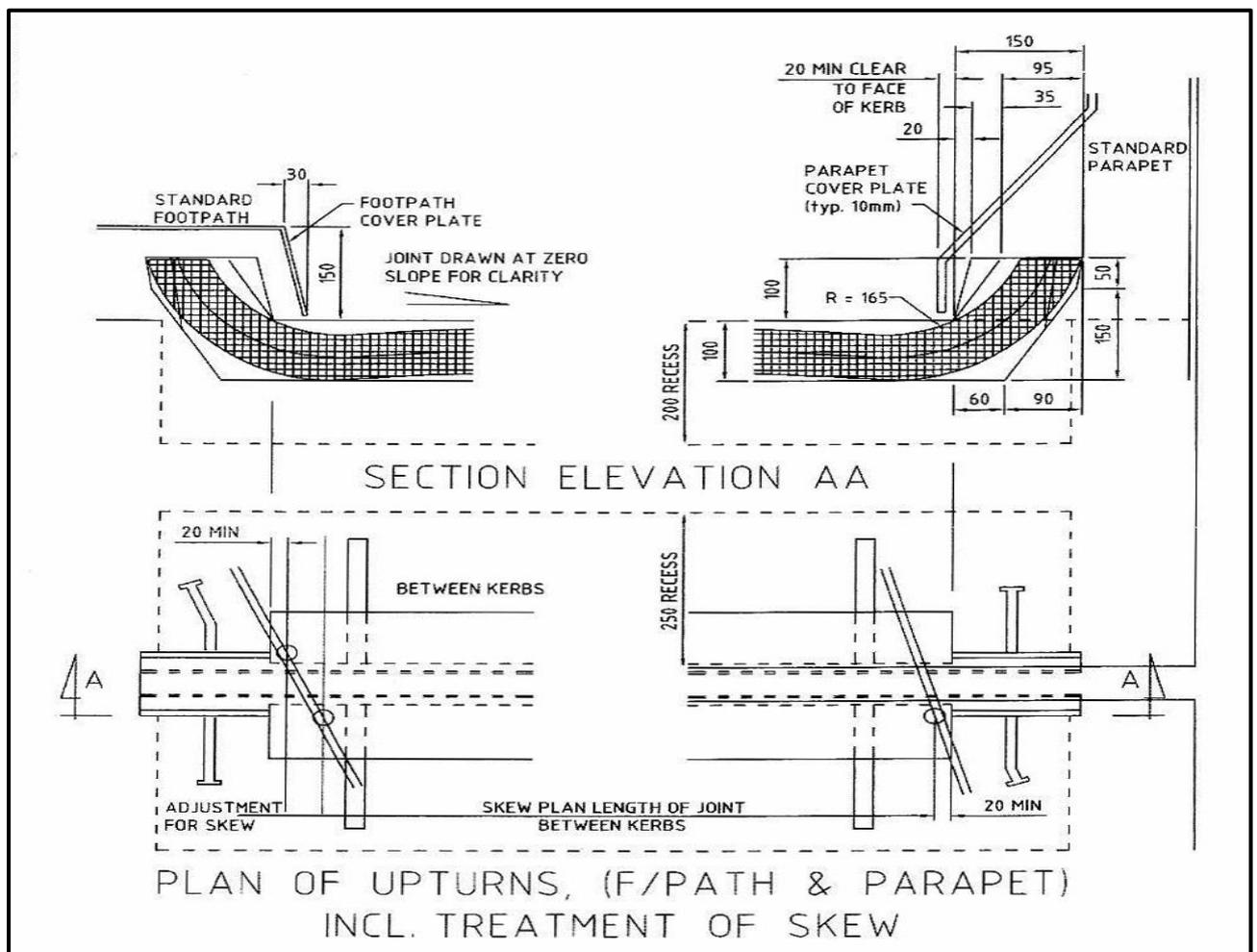
* Fingerplate optional, giving max effective gap at surface, G of 50 mm

2.1.1 Miscellaneous Details

Series 13 joints can be supplied to cater for curb, footpath and median details. Typical installations are as shown below (Fig 2.)

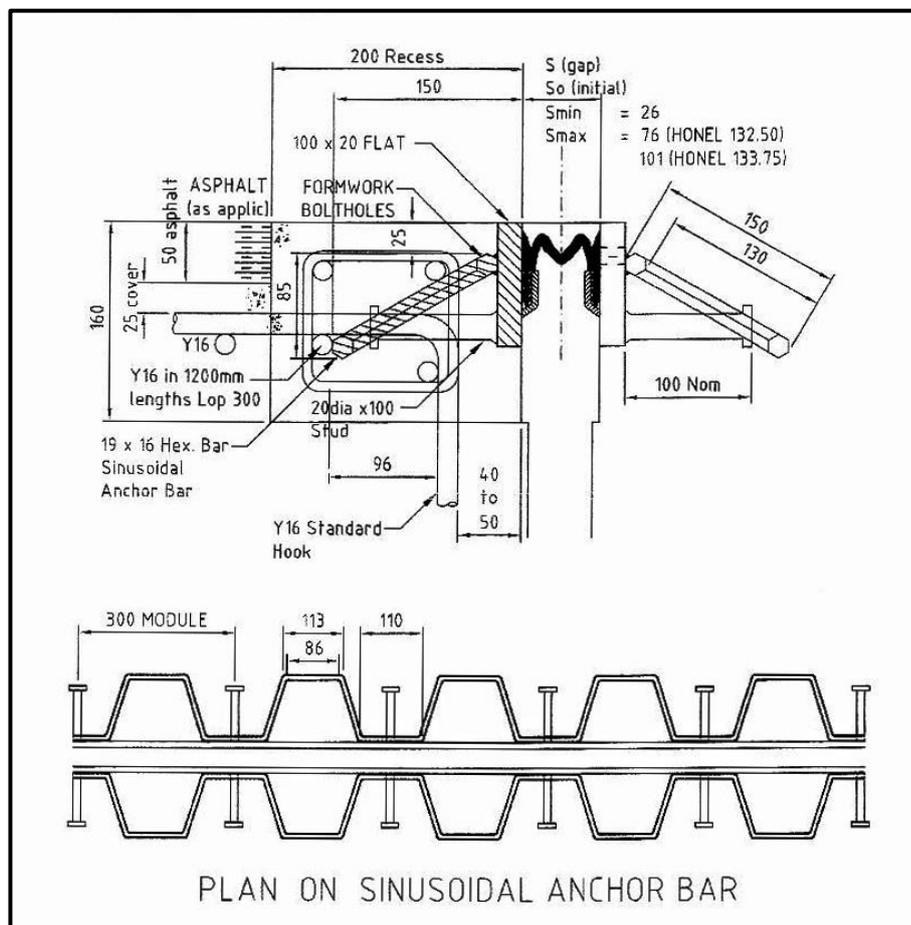
Treatment of a skewed joint is also indicated; where an adjustment to the skew length of the joint is necessary to ensure that the joint is long enough to clear the cover plates. While this detail minimizes the encroachment into the parapet, the designer should pay particular attention to this area in the case of high skew angles.

* If in doubt, please contact us for advice.

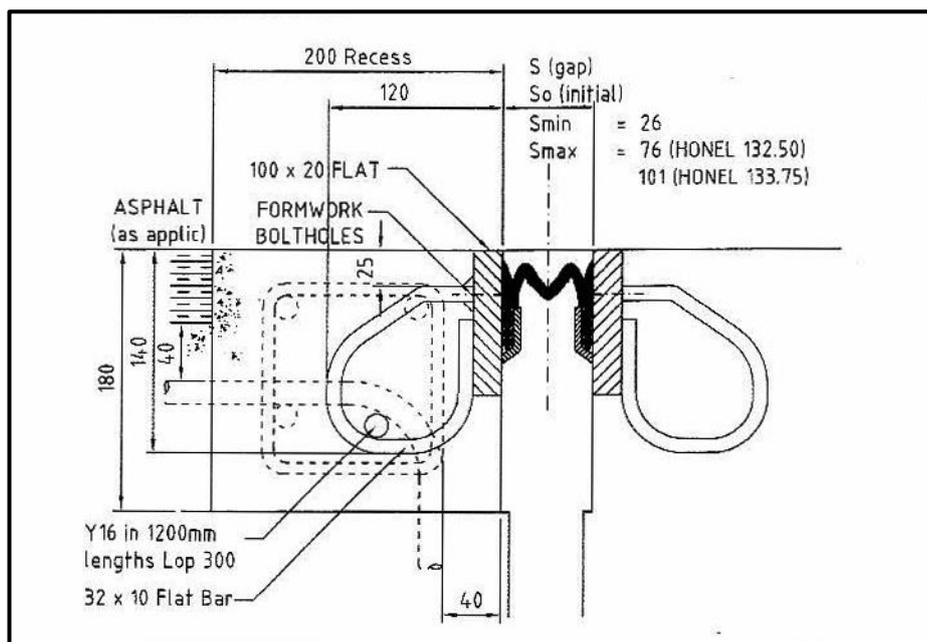


2.1.2 -Alternative Designs

The design of the edge beams can be varied to suit local preferences and particular applications. Two of such options are shown below. These are slightly less rigid to install but have the advantage of easier concreting.



SINUSOIDAL ANCHOR BLADE DESIGN



COMPACT CLOSED LOOP BLADE DESIGN

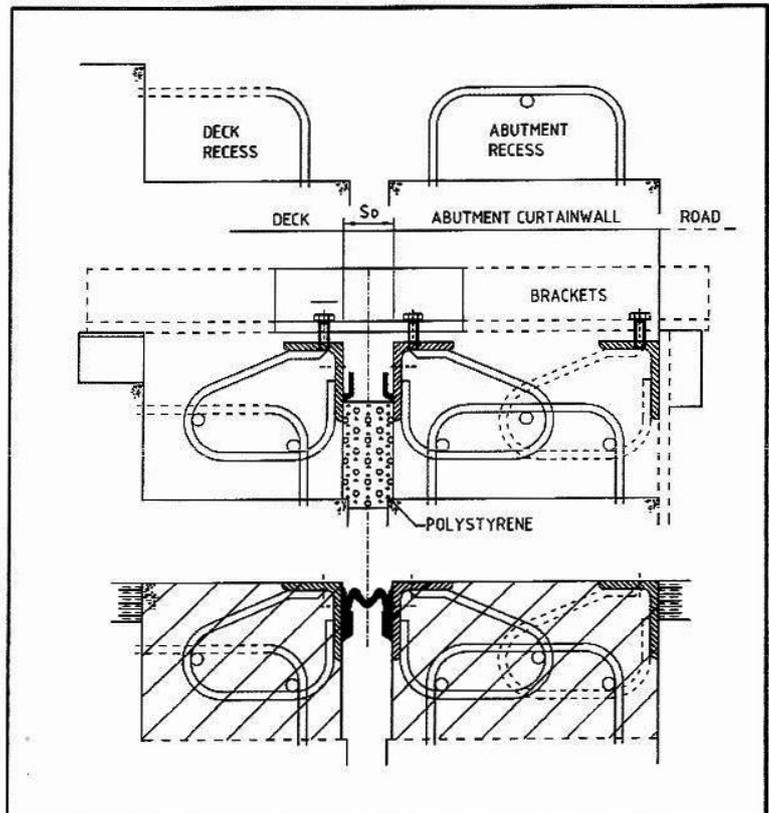
2.1.3 Installation Details

The steel angles of the joint leave our factory fully assembled (typically in 6 m lengths). Two alternative methods are available for installation, depending on the construction sequence and ease of providing recesses in the deck and abutment.

In the following examples we have indicated an additional protection angle in the abutment, which is a common detail and is best installed with the expansion joint.

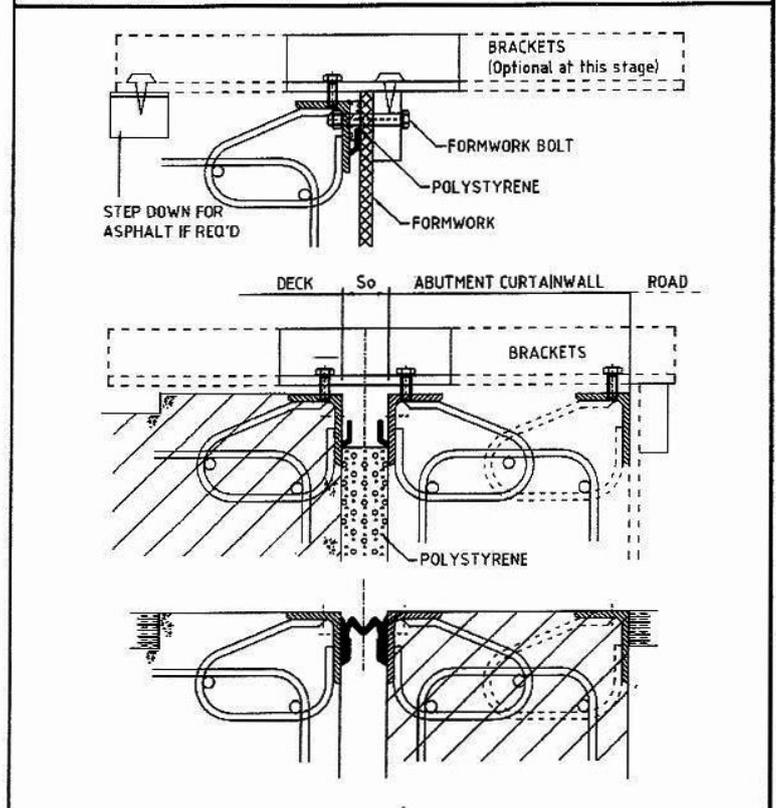
Method 1 – Two Recesses

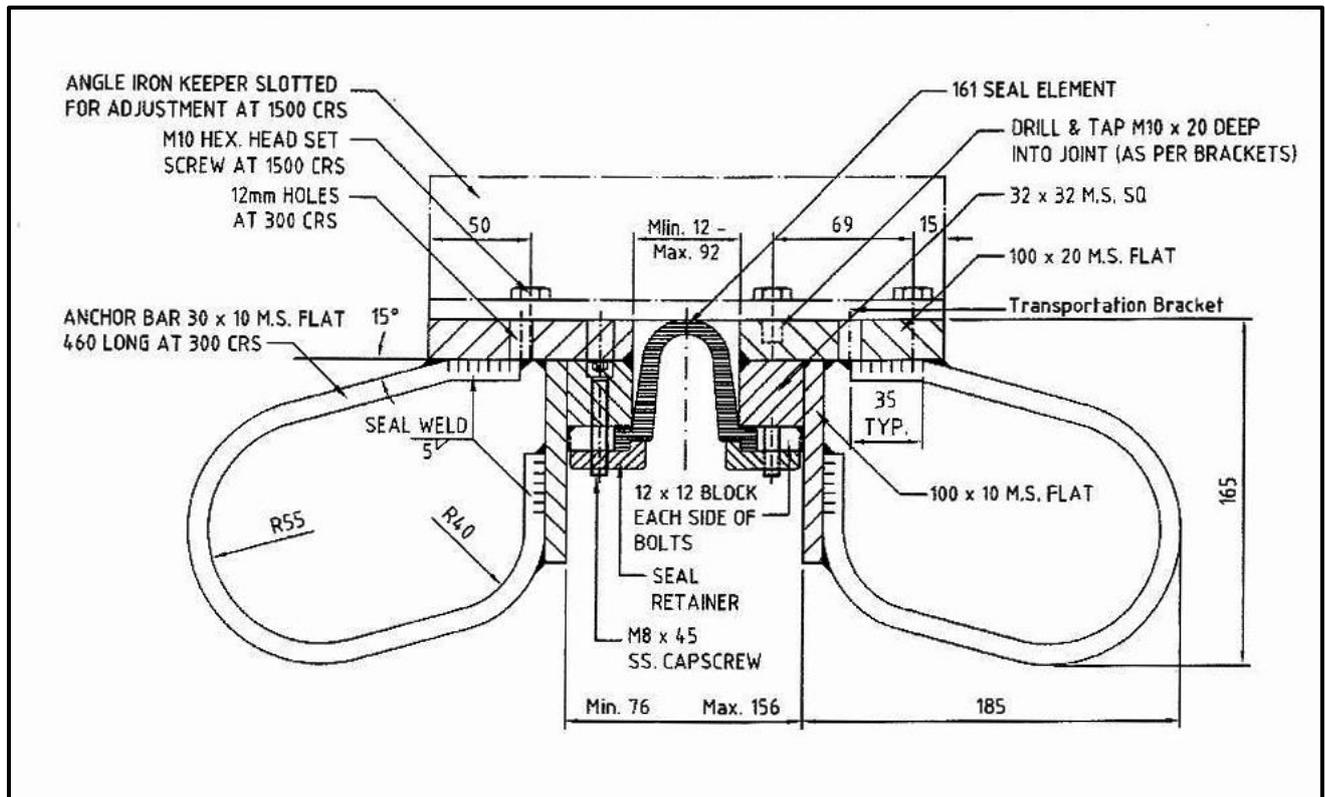
- Form recesses both sides of the joint
- Secure the steelwork in place, with polystyrene between. Adjust so as necessary
- Pour the recess concrete
- Remove brackets at first set
- Install seal element
- Place asphalt (as applicable)



Method 2 – No Recesses

- Fix one side of the joint to the formwork with bolts
- Pour the first side
- Fix the second side to the first with polystyrene between. Adjust so as necessary
- Pour the second side
- Remove brackets at first set
- Install the seal element
- Place asphalt (as applicable)





Notes

CORROSION PROTECTION

- All welds are 5mm.
- Joints are supplied in fully fabricated and assembled condition.
- Joint gap is preset to the engineer's specification prior to dispatch.
- Changes can be made to suit specific customer requirements.

SPECIFICATIONS

Movement	Longitudinal	80mm
	Transverse	60mm
	Vertical	±40mm
Reaction Forces	Fully Closed	400N/m Compression
	Fully Opened	900n/m Tension
	Weight	76 kg/m

2.1.4 Hercules Single Element Expansion Joints - Suggested Specification

- a. Deck joints shall be fabricated from steel to AS 3679 Grade 250 (steel angles or flat bar blades, closed loop anchor bars and seal slot retainer) Hex bar anchors, Wherever applicable, shall be to AS 1443 Gr. S1214. These shall be hot forged at 1000°C-1300 °C, Followed by normalizing for 2 hours between 900 °C-940 °C and slow-cooling.
- b. Steel angles, where provided, shall be drilled with vent holes at 300 crs to provide venting of air and moisture during concreting to permit adequate compaction of concrete behind the joints. Steel anchors (32x10 flat bar) shall be provided at 300 crs minimum in traffic areas.
- c. Unless otherwise mentioned in the drawings, upturns shall be provided at the junctions between curbs (or barriers) and deck which are usually the lowest point of the joint and hence the most likely point of leakage. At these points, the seal retainer shall be turned from solid to a uniform internal radius of 200mm nominal. This permits the seal element to be inserted without any cuts to the seal element which will reduce the joint's water-tightness.
- d. Welding shall be carried out to AS 1554 and, prior to galvanizing, all weld splatter shall be removed and the steelwork shall be grit blasted (to AS 1627.4 Grit Blast Class 2.5)
- e. Galvanizing shall be carried out to AS 1650 but with a minimum zinc mass of 700g per m (approximately 100m thickness) after which all dags shall be removed and the individual lengths straightened to a tolerance of ±5mm over the entire length.
- f. Joints shall be provided in (typically) six (6) metre modules, with bolted and dowelled water-tight connections.
- g. Elastomeric seal elements shall be continuously extruded from CHLOROPRENE rubber, and shall be supplied and fitted in one continuous length (without joins) Material shall conform to the following specification:

Tensile Strength	13.8 MPa min	AS 1683.11
Elongation at Break	250% min	AS 1683.11
Hardness	56 ⁰ ±6 ⁰	AS 1683.15 Type A Duro
Compression set	10% max	AS 1683.11 (23°C)
Accelerated Aging		AS 1180.3 (70hrs @100 °C)
Δ tensile strength	-30% to 0	AS 1683.11
Δ elongation at break	-40% to 0	AS 1683.11
Δ hardness	0 to+10%	AS 1683.15 (Type A)
Ozone resistance	no cracking	AS 1683.24
	(ozone concentration 30pphm 20% strain, 70grs @ 40 °C)	
Low Temp Stiffening		
Δ hardness	0 to+15	AS 1683.15 (Type A)
Wt Change in Oil	+50% max	ASTM D.471, Oil 3, 70 hrs

- h. Before dispatch, the joints shall be fully assembled in the shop to confirm correct manufacturing drawings.
- i. Angle-nosing joints shall be installed with the top leg of the angle parallel to the grade. Concrete (or asphalt) adjacent to the joint shall be 0 to 5mm higher than the joint.
- j. Completed joints shall be warranted against anchorage failure or dislodgment of the seal element for a period of 5 years from installation.