

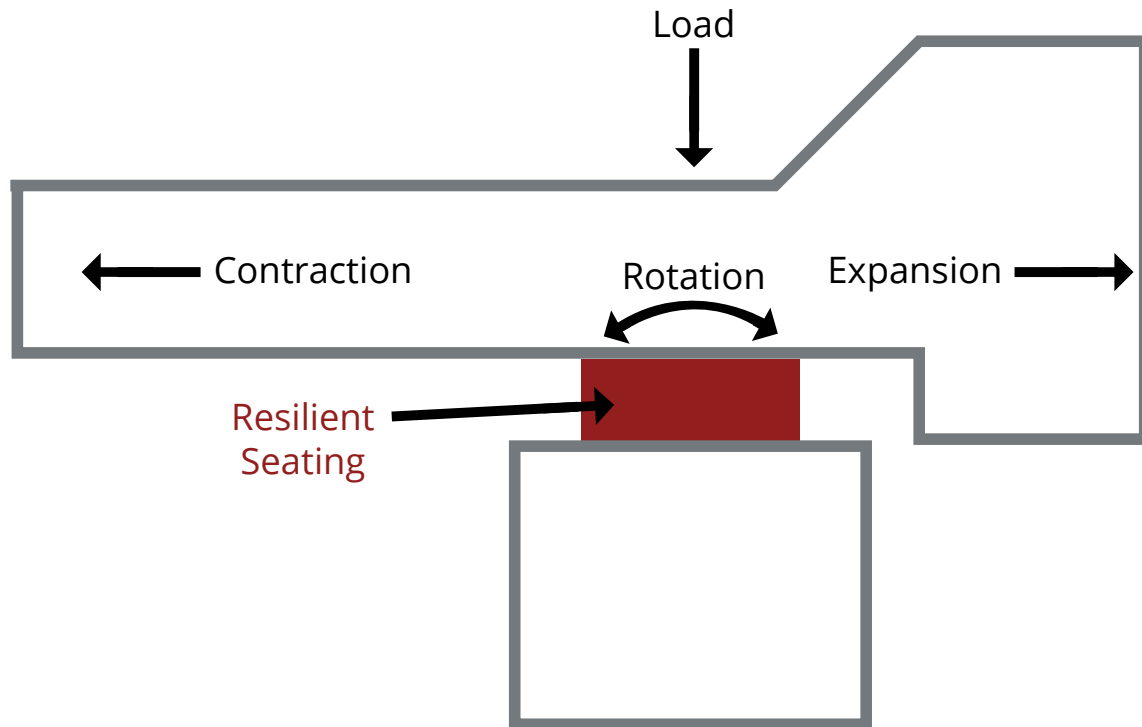
Anti-Vibration & Noise Isolation Solutions



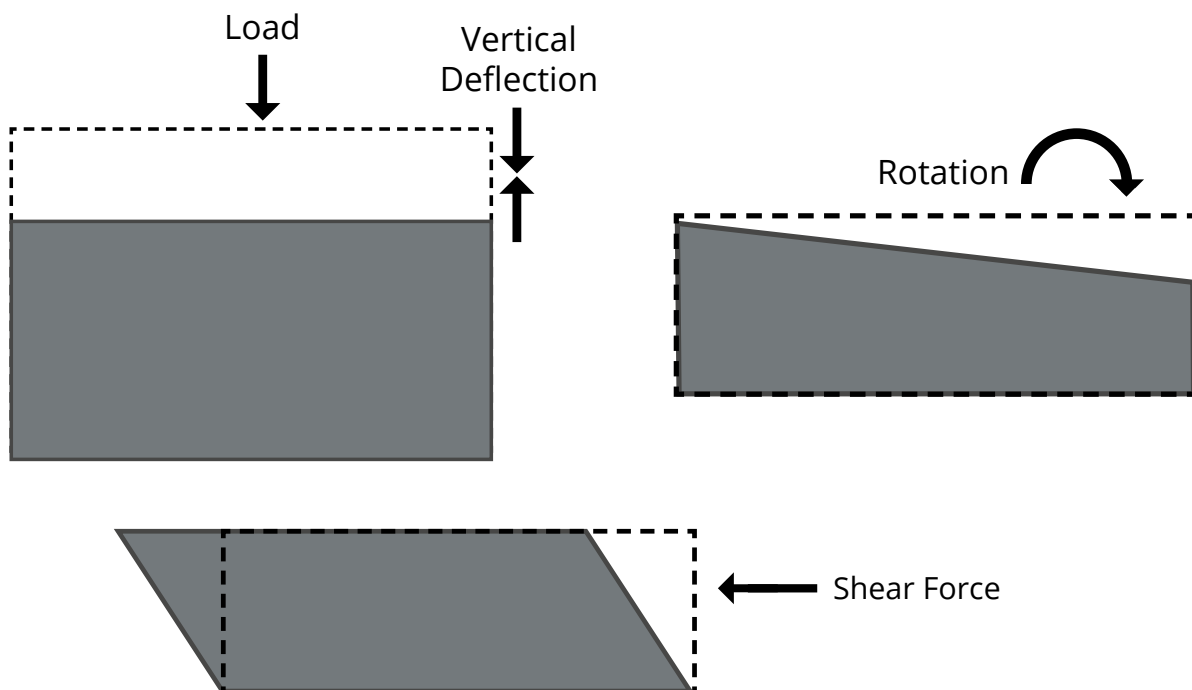
RESILIENT SEATINGS

TICO - Resilient Seatings

For both architectural and structural reasons, modern structures are commonly built from a wide variety of building materials. These materials have differing physical properties which often result in the potential for a variety of movements within the structure, both during and after construction. These movements can be predicted in theory but the actual movements observed in practice are seldom as expected.



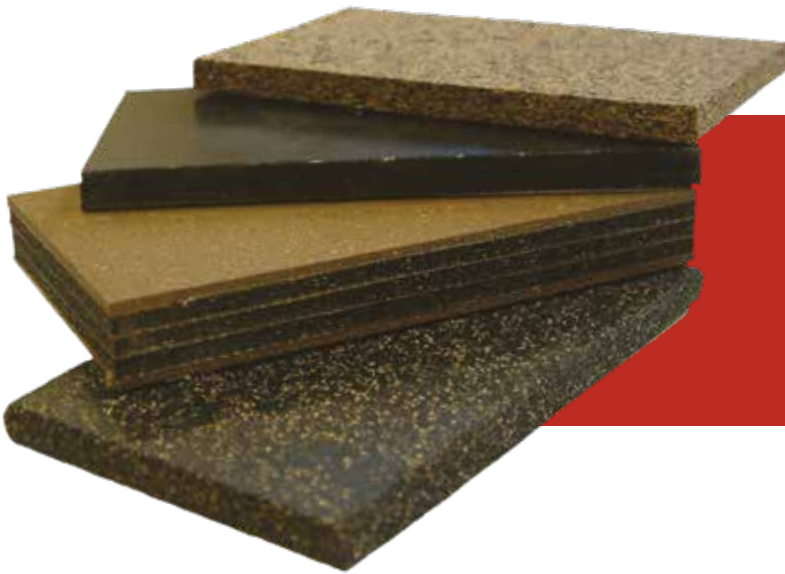
There are many different types of movement that can occur in a construction. Incorporation of resilient elements, which are able to deform into structures, can help control these movements and provide greater flexibility of design.



TICO - Resilient Seatings

TICO Resilient Seatings have been developed and used over many years for the control of relatively small movements within a structure. The high quality pad materials can be simply installed between virtually any combination of building material and provide an effective and economical means of separating mating surfaces to prevent damage from shrinkage, differential settlement, creep, rotation and thermally induced movements.

These materials are dimensionally stable under widely varying atmospheric conditions and have been formulated from the highest quality constituents to ensure that they maintain designed movement and damping properties, and are durable and age resistant over many decades with a load bearing life expectancy in excess of the normal life of the structure.



Can help control these movements and provide greater flexibility

TICO Resilient Seatings can be used to introduce a resilient discontinuity in a structure for the control of structure borne vibration, and can compliment other wider ranging vibration control measures such as floating floors. Flanking transmission of vibration within a structure can be a particular annoyance. Flanking transmission is generally described as the transmission of vibration through parts of a structure other than direct transmission through a particular partition. This may for instance be a 'short circuit' of a floating floor by transmission of vibration through the walls and ceiling from one room to another.

TICO Resilient Seatings can play an important role in the damping and attenuation of footfalls and other impact noises in lightweight buildings and dwellings. They can thus help to achieve the stringent requirements of the Building Regulations Part E (2003).

TICO Resilient Seatings are simple to install, contain no mechanical parts, and are maintenance free.

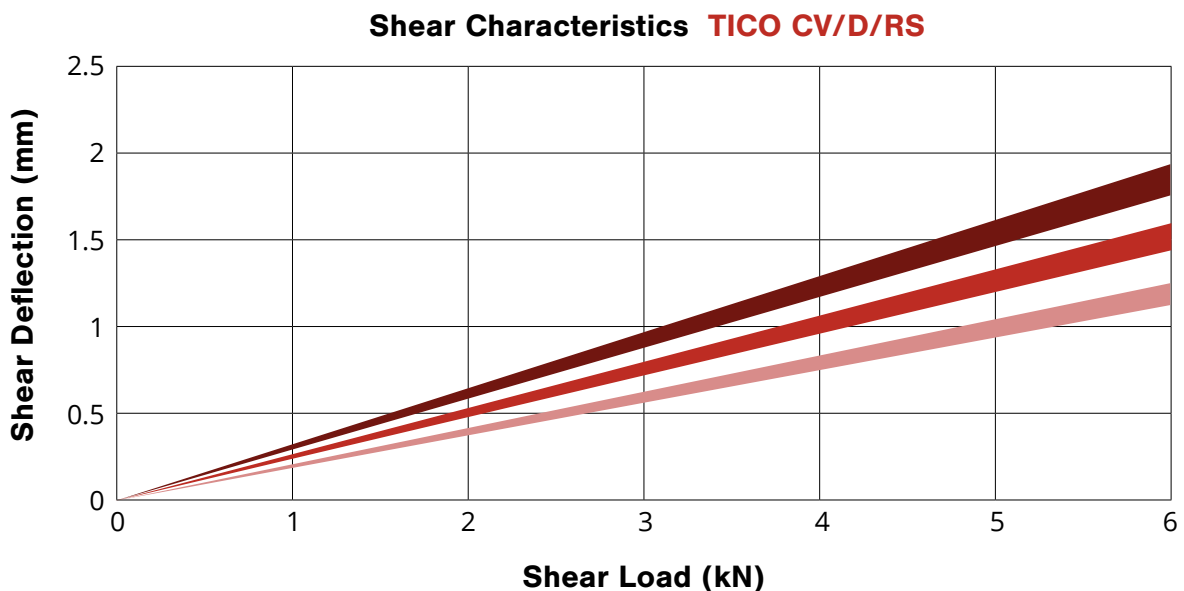
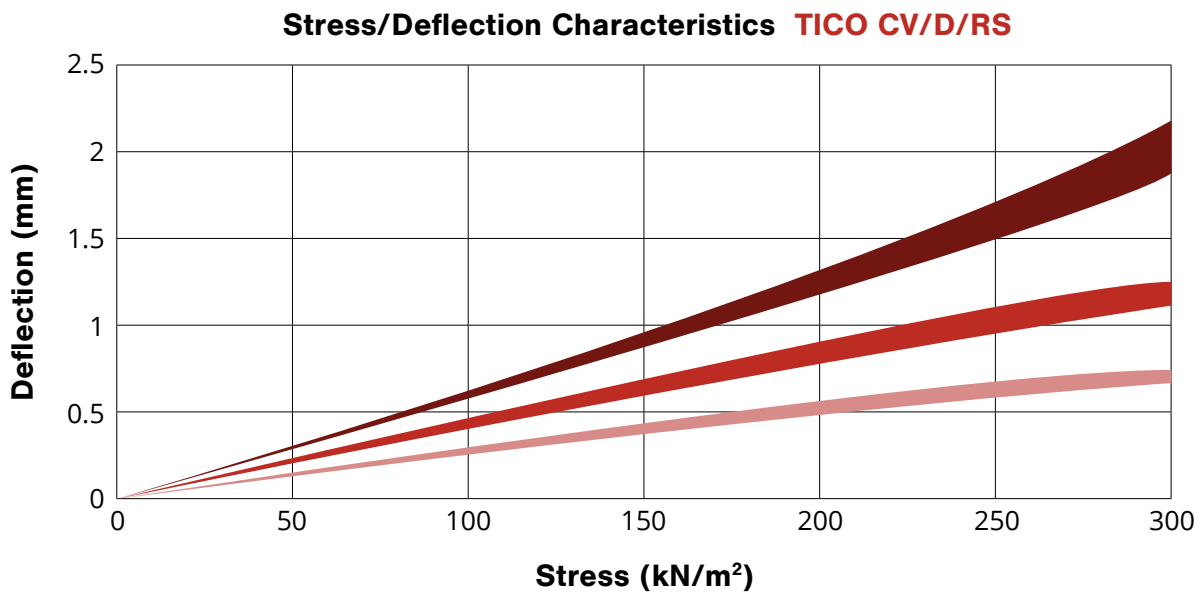
There are four grades of TICO Resilient Seating which collectively cater for all bearing loads commonly found in modern structural applications:

- **TICO CV/D/RS** - Low Stress Seatings.
- **TICO CV/M/RS** - Medium Stress Seatings.
- **TICO CV/CA/RS** - High Stress Seatings.
- **TICO CV/PF/RS** - Very High Stress Seatings.

CV/D/RS - Low Stress

Graph Colour Key: 6mm pad: 25mm pad:

TICO CV/D/RS is a low stress resilient seating material composed of a polyisoprene elastomer enhanced with cellular cork. This material is designed to accept normal construction surface irregularities under low load conditions of up to 300 KN/m². Due to its high damping properties, TICO CV/D/RS is ideally suited for use between floors, joists and support beams to reduce the transmission of footfalls and other impact noises, particularly in domestic structures, offices, gymnasium floors, theatres etc.



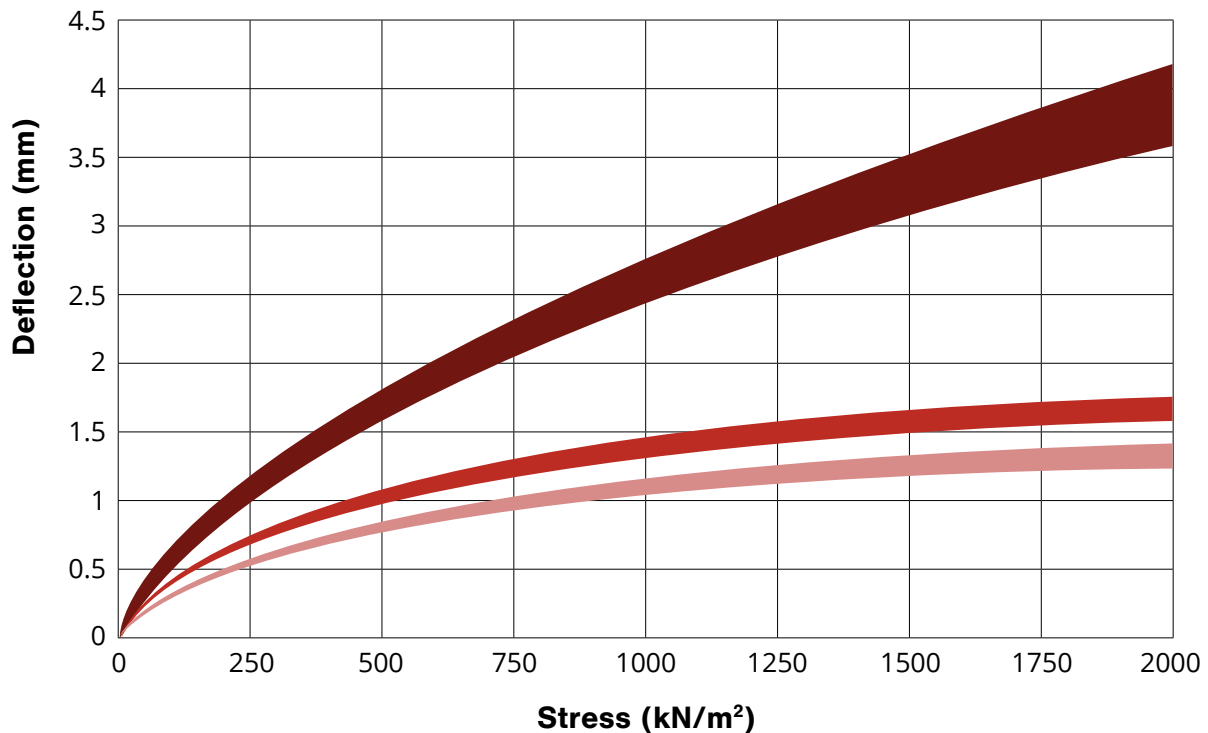
Maximum Recommended Working Stress (KN/m ²)	300
Ultimate Breakdown	In excess of 3 times the maximum recommended working stress
Density (kg/m ³)	600
Hardness (IRHD)	68 ± 5
Coefficient of Friction: to concrete	0.65
to Steel	0.64
Durable Temperature Range (°C)	-40 to +70

CV/M/RS - Medium Stress

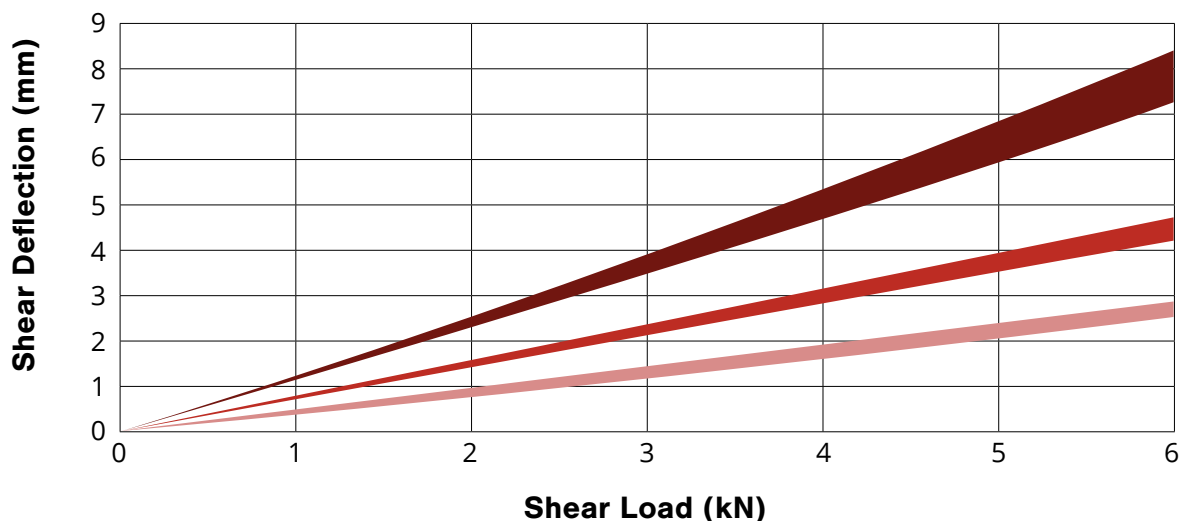
12.5mm pad:

TICO CV/M/RS is a medium stress resilient seating composed of cork and polychloroprene elastomers. Of all four grades of resilient seating, TICO CV/M/RS can be considered as general purpose; with a maximum working stress of 1400kN/m² it is suitable for use in most seating applications. TICO CV/M/RS can absorb high surfaces irregularities and accommodate a greatly extended range of movement in comparison to TICO CV/D/RS. Common uses for TICO CV/M/RS are supporting floor slabs, fixed end bridge seatings, roof supports and beam/column connections within steel framed structures.

Stress/Deflection Characteristics TICO CV/M/RS



Shear Characteristics TICO CV/M/RS



Maximum Recommended Working Stress (kN/m ²)	1400
Ultimate Breakdown	In excess of 3 times the maximum recommended working stress
Density (kg/m ³)	1100
Hardness (IRHD)	50 ± 5
Coefficient of Friction: to concrete	0.6
to Steel	0.5
Durable Temperature Range (°C)	-40 to +70

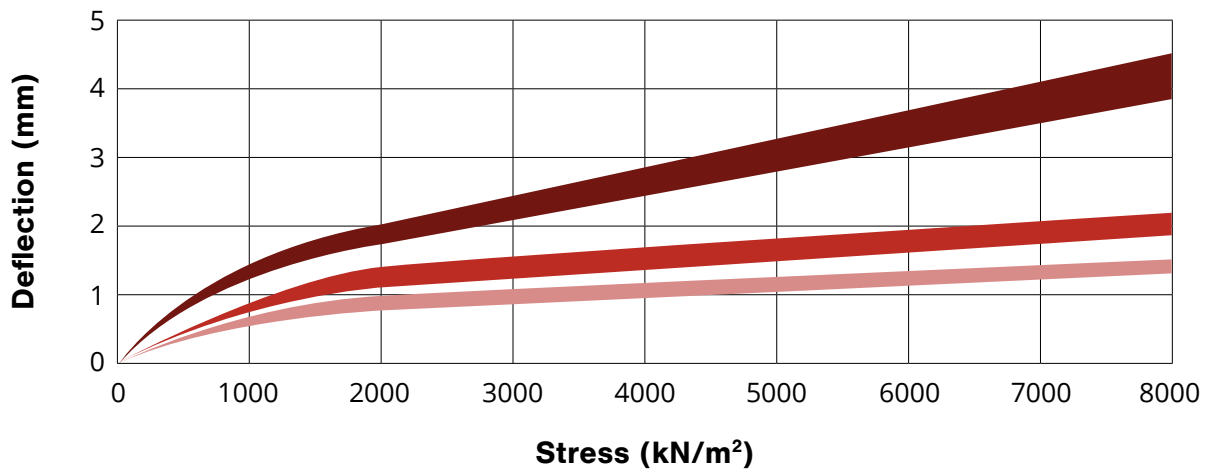
CV/CA/RS - High Stress

Graph Colour Key: 6mm pad: 25mm pad:

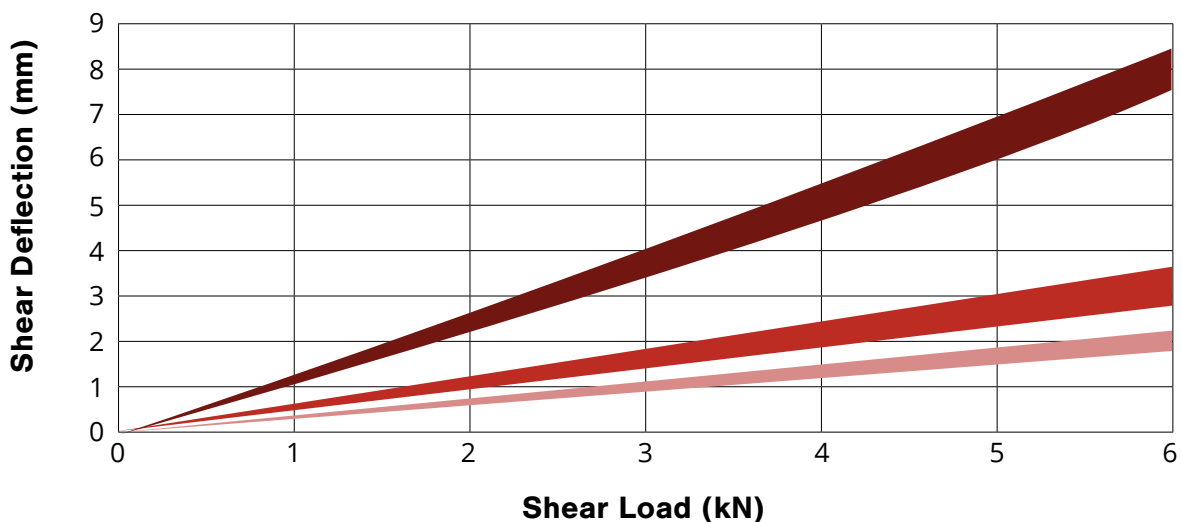
TICO CV/CA/RS is a high stress resilient seating material composed of vulcanized laminates of the highest quality neoprene elastomer, modified by the inclusion of cellular cork, and reinforcing layers of high tensile fabric. The bearing surfaces are of a special formulation created to accept irregularities in bearing surfaces.

TICO CV/CA/RS is suitable in applications where stresses can reach up to 7000 kN/m². Its special sandwich construction and cork enhanced surfaces allow considerable surface irregularity to be absorbed under high stress without a high rate of creep. Common uses of TICO CV/CA/RS material include bridge abutments, large span concrete floors, main support beams and tall chimney corbel seatings.

Stress/Deflection Characteristics TICO CV/CA/RS



Shear Characteristics TICO CV/CA/RS



Maximum Recommended Working Stress (kN/m ²)	7000
Ultimate Breakdown	In excess of 3 times the maximum recommended working stress
Density (kg/m ³)	1150
Hardness (IRHD)	76 ± 5
Coefficient of Friction: to concrete	0.65
to Steel	0.5
Durable Temperature Range (°C)	-40 to +70

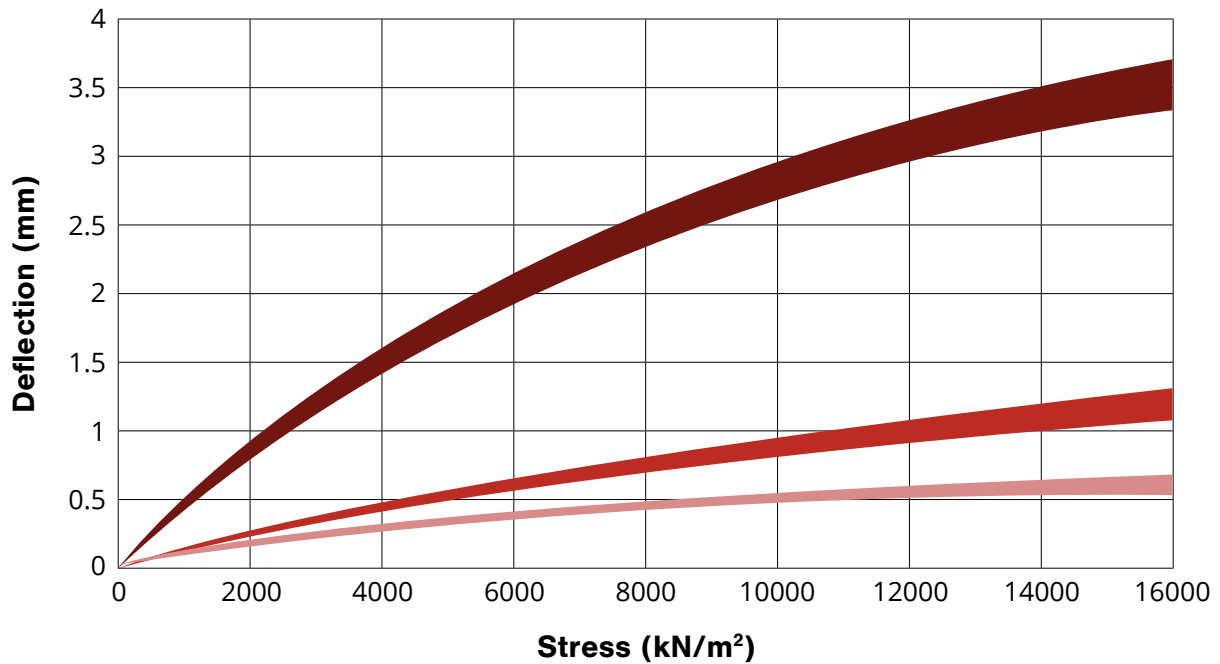
CV/PF/RS - Very High Stress

12.5mm pad:

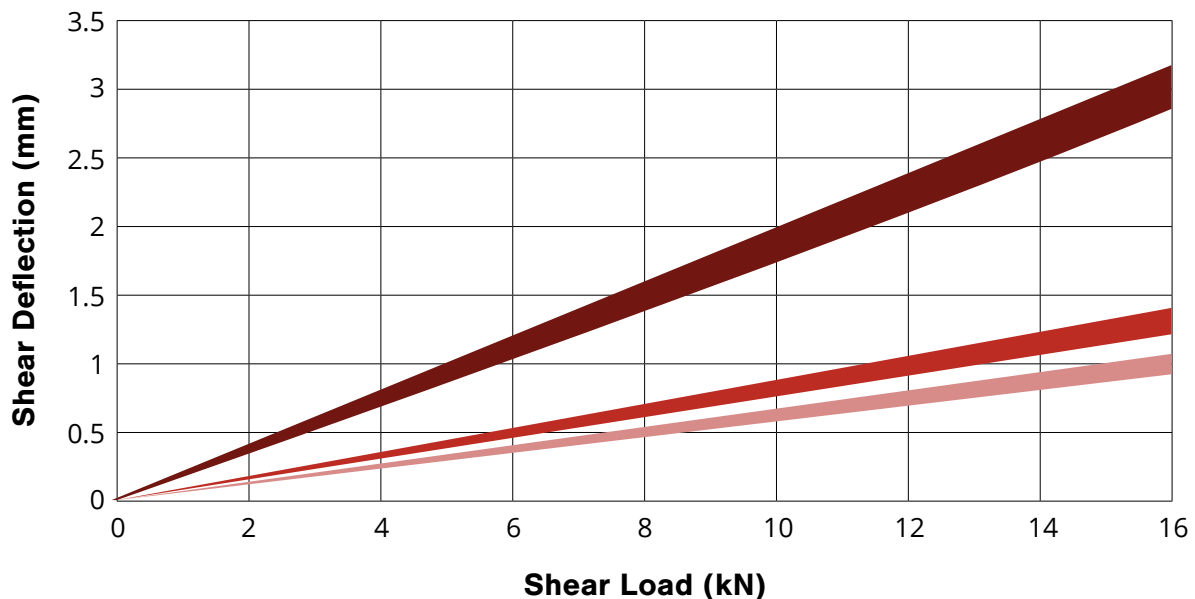
TICO CV/PF/RS is a very high stress resilient seating material composed of densely packed laminates of high tensile fabric and high quality synthetic rubbers.

TICO CV/PF/RS is used in applications where generated stresses preclude the use of other types of material, commonly where seating area is restricted in some manner. Typical applications include high load flexible supports in bridges and roof/beam mountings.

Stress/Deflection Characteristics TICO CV/PF/RS



Shear Characteristics TICO CV/PF/RS



Maximum Recommended Working Stress (KN/m²)	15,500
Ultimate Breakdown	In excess of 3 times the maximum recommended working stress
Density (kg/m³)	850
Hardness (IRHD)	93 ± 5
Coefficient of Friction: to concrete	0.8
to Steel	0.6
Durable Temperature Range (°C)	-40 to +70

Design Considerations

The selection of a particular seating material and thickness depends on a number of factors including:

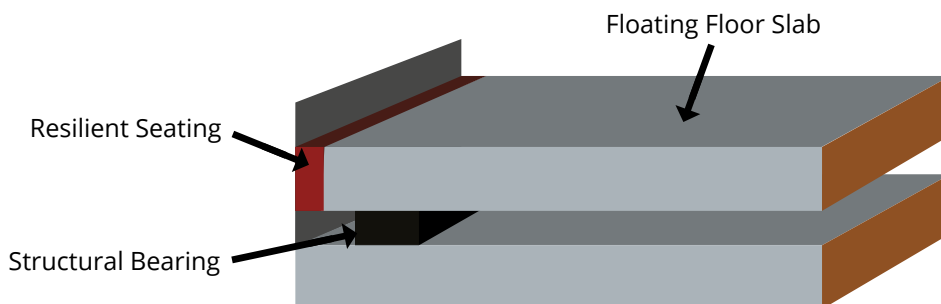
- **Operating loads (unfactored dead loads and unfactored live loads)**
- **Available space to incorporate bearings**
- **Space of bearing**
- **Degree and direction of movement required**
- **Degree of rotation required (if any)**

The first step in design is to establish a likely grade of material based on the generated stress caused by the applied load over the bearing area. For example, if a strip seating 100 mm wide is required to support a slab with an associated line load of 50 kN per linear metre of pad:

$$\begin{aligned}\text{Pad Stress (kN/m}^2\text{)} &= \frac{\text{Applied Load (kN)}}{\text{Lower Member Area (m}^2\text{)}} \\ &= \frac{50}{1 \times 0.1} \\ &\quad \text{(Area of pad 1m x 100mm)} \\ &= 500 \text{ kN/m}^2\end{aligned}$$

In this instance, TICO CV/M/RS would appear to be a suitable material (maximum recommended working stress of 1400 kN/m²). Requirements for shear, vertical deflection and rotation can be checked against performance data to select a suitable thickness or indeed a different material (e.g. TICO CV/CA/RS) if required.

In general TICO CV/M/RS and TICO CV/CA/RS best satisfy the requirements of most applications, the selection being made on the basis of applied stress. TICO CV/PF/RS is normally specified for high load applications only, whereas CV/D/RS is used in low stress applications, particularly those where vibration damping is a prime requirement.



Flanking Transmission mitigation for floating floor isolation.

Our Technical department is pleased to assist in recommendations at any stage in the design process, and can advise and assist when design considerations call for a resilient seating other than the four outlined in this literature. If you require further assistance, please provide as much information regarding the application as possible including if available design loads, available support area and required movements.

Typical Resilient Seating Applications

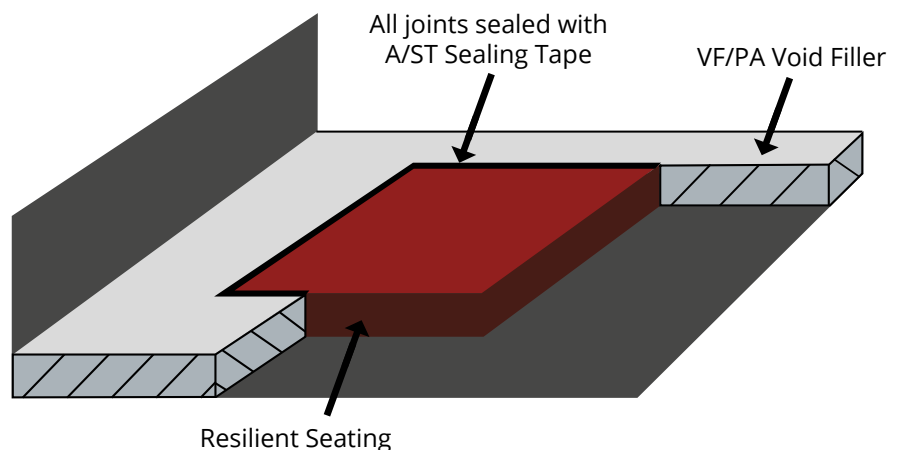
Bearings highlighted in red



TICO Resilient Seatings can be installed in a variety of different ways depending on the requirements of the application. We recommend, where possible, bonding the resilient seating into position. The surface onto which it is to be bonded should be level, clean and reasonably flat. A suitable adhesive should be used, we recommend either Tiflex Contact S Adhesive or Tiflex Marine Epoxy Adhesive. The directions for use of such adhesives should be followed carefully. In all instances it is important that the seating is held firmly in place until the adhesive has cured and the full bond strength has been achieved. Resilient seatings are usually bonded to one surface only to hold them in place during construction of the remaining structure. However, different applications may require that both surfaces are bonded e.g. when a bearing is required to act in shear.

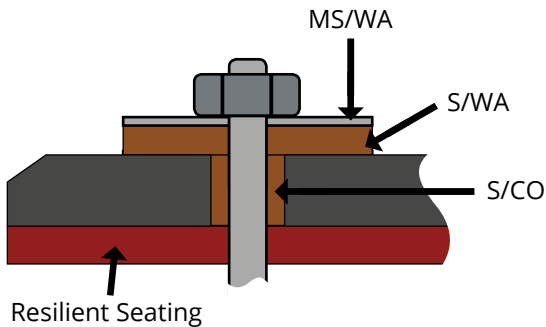
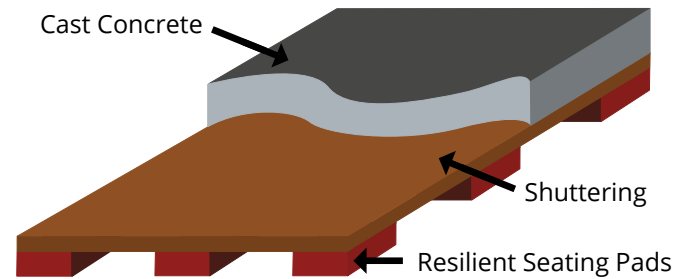
Pre-cast beams or slabs can be placed directly onto the resilient seating material. Alternatively if joints or slabs are to be cast in-situ it is important to ensure that no concrete or other rigid material bridges the resilient layer. Such bridging would impair the movement of the joint possibly resulting in structural damage, and also severely reduce the vibration damping benefits by 'short circuiting' the pads. For cast in-situ work, suitable void filler or formwork should be used, e.g. TICO VF/PA Void Filler or permanent shuttering.

When TICO VF/PA is to be used as permanent filler, it should be packed around the seating and all joints sealed with TICO A/ST Sealing Tape to prevent any ingress of wet concrete during the casting process.



Installation

Alternatively, permanent shuttering in the form of marine ply or chipboard, or steel plate, may be laid on top of the bearing to create a void between bearings and prevent the ingress of concrete during casting, any such shuttering should be sufficiently rigid to ensure that the pads are not differentially compressed and overstressed.



In some cases it is necessary to provide a positive fixing, for example by bolting through the pad. In these cases it is necessary to ensure that the bolt is also isolated from the surrounding structure. This will reduce the transmission of vibration from one side of the resilient seating to the other via the bolt itself. Bolt isolation is easily achieved by using TICO Resilient Washers (TICO S/WA and TICO MS/WA) and collars (TICO S/CO) as in the details on the left.

Vibration is prevented from being transmitted into the main shaft of the bolt by the TICO S/CO Collar and through the head of the bolt by the TICO S/WA Washer. A TICO MS/WA mild steel washer is used under the holding nut to tighten against. With this arrangement, the main TICO pad works effectively and performance is not reduced by transmission of the vibration through the bolt. TICO collars are tube shaped with a wall thickness of 3 or 6 mm. It is necessary to ensure that the hole in the structure through which the bolt passes is large enough to accommodate the OD of the collar - a 2mm clearance overall will ensure a comfortable and easy fit. The collar is simply inserted into the hole, no adhesive is required.

Bolts should be tightened until the joint is secure but care should be taken not to over-tighten as this will induce additional stress on the pad resulting potentially in over-compression leading to a reduction in allowable movement and/or vibration attenuation. When using bolts it is not normally necessary to use TICO adhesives.

For applications where a maintained tension is critical we suggest the use of Rotabolts. These specialist bolts have unique tension control devices and heads which provide an 'at glance' indication of whether the bolt is at the required tension. Further details on these products are available on request.

Storage & Handling

On arrival on site, TICO Resilient Seatings should be stored away from direct sunlight, excessive heat, chemicals or any liquid media. They should be kept in a safe, secure location where they are unlikely to be damaged or tampered with, become immersed in water, or have other building materials stacked on top of them.

Seatings should be handled with care during installation to ensure that they are not dropped or in any other way damaged. Damaged seatings should never be incorporated in the works and should be brought to the attention of the resident engineer or consultant.

On no account should welding be carried out on, or adjacent to a seating either during or after installation.

Safe Handling data sheets are available for all TICO Resilient Seating materials on request.

Supply Details

Tiflex recognises that in civil applications Resilient Seatings often have to be custom sized to meet the project requirements and thus we are happy to supply custom sizes up to the maximum sheet size available. Resilient Seatings are also available in other non-standard thicknesses.

If the Resilient Seatings are to be situated in an area subject to severe weather conditions it is recommended that all exposed faces are given additional protection with a hypalon based coating applied during manufacture.

Grade	Standard Thicknesses (mm)	Standard Sizes (mm) (Load Carrying Capacity (kN)*)
CV/D/RS	6, 12.5, 25	1200 x 50 (18), 1200 x 100 (36), 1200 x 200 (72), 1200 x 500 (180), 1200 x 1000 (360)
CV/M/RS	6, 12.5, 25	1200 x 50 (84), 1200 x 100 (168), 1200 x 200 (336), 1200 x 500 (840), 1200 x 1000 (1680)
CV/CA/RS	12.5, 25	1200 x 50 (420), 1200 x 100 (840), 1200 x 200 (1680), 1200 x 500 (4200), 1200 x 1000 (8400)
CV/PF/RS	6, 12.5, 25	1200 x 75 (1395), 1200 x 150 (2790), 1200 x 300 (5580), 1200 x 600 (11,160), 1200 x 1200 (22,320)

*Load carrying capacities are based on the maximum recommended working stress of each material under normal conditions and are intended for guidance only.

TICO Resilient Collars (TICO S/CO) and Washers (TICO S/WA and MS/WA) are available in standard sizes. Note: TICO S/CO Collars are supplied in packs of standard 50 mm lengths. These should be cut on site to suit the application - this can be done easily with a sharp knife.

Grade	Size	Dimensions
S/CO Collars 3mm all thickness Pack of 6 (also available with 6mm wall thickness on request).	M10	ID 10mm, OD 16mm, 50mm lg.
	M12	ID 12mm, OD 18mm, 50mm lg.
	M14	ID 14mm, OD 20mm, 50mm lg.
	M16	ID 16mm, OD 22mm, 50mm lg.
	M18	ID 18mm, OD 24mm, 50mm lg.
	M20	ID 20mm, OD 26mm, 50mm lg.
	M24	ID 24mm, OD 30mm, 50mm lg.
	M26	ID 26mm, OD 32mm, 50mm lg.

Grade	Size	Dimensions
MS/WA Mild Steel Washers	M10	ID 10mm, OD 30mm, 3mm thick
	M12	ID 12mm, OD 36mm, 3mm thick
	M14	ID 14mm, OD 42mm, 3mm thick
	M16	ID 16mm, OD 48mm, 3mm thick
	M18	ID 18mm, OD 54mm, 3mm thick
	M20	ID 20mm, OD 60mm, 3mm thick
	M24	ID 24mm, OD 72mm, 3mm thick
	M26	ID 26mm, OD 78mm, 3mm thick

Grade	Size	Dimensions
S/WA Washers	M10	ID 10mm, OD 30mm, 6mm thick
	M12	ID 12mm, OD 36mm, 6mm thick
	M14	ID 14mm, OD 42mm, 6mm thick
	M16	ID 16mm, OD 48mm, 6mm thick
	M18	ID 18mm, OD 54mm, 6mm thick
	M20	ID 20mm, OD 60mm, 6mm thick
	M24	ID 24mm, OD 72mm, 6mm thick
	M26	ID 26mm, OD 78mm, 6mm thick

TICO VF/PA void filler is available in packs in the following standard sizes.

Grade	Length	Width	Thickness	Sheets Per Pack
Void Filler	1200mm	600mm	12.5mm	4
	1200mm	600mm	25mm	4

The following standard adhesives are available for use with TICO Resilient Seatings.

Grade	Weight	Coverage (approx.)
2 Part Epoxy Contact S	600g	2m ²
	1 Litre	4m ²
	5 Litres	20m ²



Tiflex Limited, Tiflex House, Liskeard, Cornwall, UK. PL14 4NB

Email: tico@tiflex.co.uk Tel: +44 (0) 1579 320808

Web: www.anti-vibration.solutions



A member of the
James Walker
Group

