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www.sanfieldindia.in



A VISION UNITED

Sanfield [India] Limited.



AN ISO 9001 - 2008 and CE CERTIFIED COMPANY

**SANFIELD (INDIA) LIMITED**, a company serving the requirements of the Construction & Infrastructure sector since 1994 is now a Group Company of **MAURER SE** Germany, an **ENGINEERING** Group of Companies in existence since 1876.

**SANFIELD (INDIA) LIMITED** is the exclusive designers, manufacturers and installers of a wide range of **HIGH PERFORMANCE, SPECIALIZED CONSTRUCTION RELATED PRODUCTS**, manufactured in Technical collaboration with various **world renowned Companies**.

**SANFIELD (INDIA) LIMITED** with the assistance of its parent Company and backed by the vast experience and expertise of various leading Companies of the world provides a single source responsibility from **DESIGN, MANUFACTURING, TESTING, MATERIAL SUPPLY, INSTALLATION AND AFTER SALES SERVICES** for all its product range.

**SANFIELD (INDIA) LIMITED** is approved by **MORT & H (Ministry of Road transport and high ways)** for all types of Expansion joints and Structural bearings without any restrictions on their movement capabilities. We also have **RDSO (Research Design and Standards Organization)** Ministry of Railways (GOI) Approval for **BRIDGE BEARINGS, EXPANSION JOINTS, STEEL GIRDER FABRICATION**.

**WE OFFER BELOW PRODUCTS AND SERVICES :**

- ⊙ Movement Joints and Bearings for application in Bridges and Buildings.
- ⊙ MSM Spherical Bearings (with Modified Low Friction Sliding Element), Fatigue Resistant Anti Uplift Spherical Bearings, Sliding Isolation Pendulum (SIP) Bearings.
- ⊙ Structural Protection Systems (STU/LUD, Dampers, Snubbers, Anti-seismic Devices) for use in Bridges & Buildings.
- ⊙ Architectural Expansion Joint System for use in Buildings and other Applications.
- ⊙ POT/POT-cum-PTFE Bearings, Elastomeric and Side Stopper Bearings.
- ⊙ Repair and Rehabilitation of Structures, Replacement of failed Joints and Bearings.
- ⊙ Pre-Stressing Systems for Bridges and Buildings. (Bonded & Un-bonded Post-Tensioned Slabs)
- ⊙ Post Tensioned Inclined and Vertical Anchors.
- ⊙ Mechanical Rebar Splicing Systems (Bar Couplers) for use in Building and other infra projects.
- ⊙ Fabrication of Steel Girders (approved from Indian Railways / RDSO).
- ⊙ Advanced Waterproofing Systems.
- ⊙ Gas Pressure Welding in association with DAIA Corporation, Japan.
- ⊙ Ecobox, FRP Bar, PT Bar.
- ⊙ Lifting Anchor, Single wire loop box.
- ⊙ Sonic Tubes For Metro construction.



**SIL ECOBOX & COUPLER BOX**

**Sanfield Ecobox** System is a smart and easy to install method of maintaining continuity of reinforcement at construction joints in concrete. It consists of a galvanised steel casing and pre-bent bars that are housed within the casing and are enclosed by a protective cover.

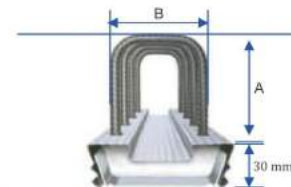
**ADVANTAGES OF ECOBOX**

- Unique shape guarantees a tongue and groove connection between the two concreting phase.
- The edges on the side prevent displacement of the casting when the lid is removed, improving the quality of the anchoring.
- Cardboard insert, perfectly adapts to the shape of the casing, preventing the penetration of cement slurry along the sides of the casing.
- More safe installation supported by the cardboard lid (no more hand cutting).
- No unfriendly waste of material.
- Ecobox saves cost, time and eventually money.

**ADVANTAGES OF COUPLER BOX**

Unique Solution for future Coupler Reinforcement.  
Smart work suitable for Slip & Jump Form works.  
Ideal for precast connecting structures.

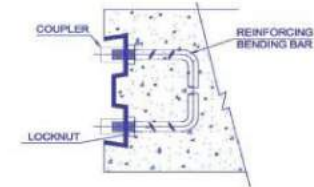
**TECHNICAL PROPERTIES**



The lengths of the steel casings are 1.20 and 2.40Mtr. respectively.

(Dimensions A and B) are available to order.

- The two commercial\* standard length of Ecobox are 1.20 and 2.4 Mtr respectively.
- The width of the casing depends on the type of casing suitable to slab width
- The height of the metal casing is 30 mm approx



**SIL LIFTING ANCHORS**

**Sanfield®** Lifting Anchors are engineered and rigorously tested under the strictest quality assurance policy, providing the safest, yet cost competitive solution to the building industry.

**Our extensive range of Lifting Anchors includes:**

- Face Lifting Anchors
- Eye Anchors
- Edge Lift & Hairpin Anchors
- Lifting Clutches our wide range of Lifting Anchors are able to cater for the most demanding technical, design and application requirement.



Facelift Anchors



Clutches

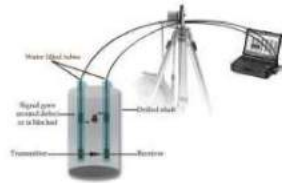


Recess Formers



**SIL SONIC TUBES**

The Crosshole sonic logging (CSL) was originally developed by the French National Construction Industry Research Centre (CEBTP) during the late 1960's. The CSL method is a method to verify the structural integrity of drilled shafts and other concrete piles. CSL tubes are usually attached to the reinforcement cage along the full length of the shafts. After concrete has been poured, the tubes are filled with water. In CSL, a transmitter emits an ultrasonic signal in one tube. Poor concrete between the tubes will delay or disrupt the signal.



SIL sonic tubes are Push-fit type CSL tubes are made by thin steel tube, with an enlarge end in a bell mouth shape. Specially designed rubber gasket for the bell mouth ensures quick installation and perfect sealing to keep the tube integrity and avoid the entry of other materials.

**ADVANTAGES**



1. Fast and easy installation by labours.
2. Push-fit assembly.
3. No welding required at job site.
4. No equipment required.

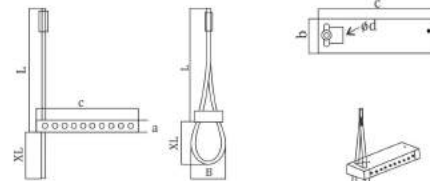
5. Easy fixing to rebar cage.
6. Push-fit mark to ensure full engagement.

**SIL SINGLE WIRE LOOP BOX**

**SIL-S-80/100/120 Product Advantages**



- High Strength Galvanized Wire Loop
- Pre-punched nail holes for easy fixing to formwork
- Galvanized steel casing ensuring stability during fixing and concreting
- For construction junction between precast segments
- The loops pop-up automatically ensuring time saving; no rebending is required
- 1870 Mpa wire rope, zinc plated
- Color coded plastic clips
- Ideal for butt junction between wall to wall and wall to column
- Product dimension ideal for logistics and storage



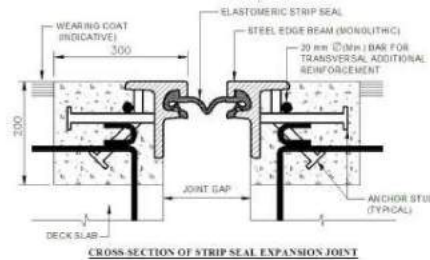
Product	Dimensions (mm)							Color Code
	A	B	C	D	L	XL	B	
SIL-S-80	20	50	160	3	212	80	60	Black
SIL-S-100	20	50	160	3	212	100	65	White
SIL-S-120	20	50	160	3	212	120	70	Blue

**MOVEMENT JOINTS**

Sanfield (India) Limited is engaged in the design and production of Movement Joints since 1992 and has a vast experience of over 25 years in the field. Our parent Company Maurer Sohne is in the field for over a century. Our joints are used in Bridges, Flyovers, Expressways, pavements, Buildings, Dams, Jetty's and variety of other Structures. We have already produced and supplied more than 2,50,000 RM of Bridge Movement Joints to various projects in India and Abroad.

**STRIP (SINGLE) SEAL JOINTS**

MAURER Strip Seal system is a unique concept for effectively sealing expansion joints in bridges and structures with movements up to 70 mm.



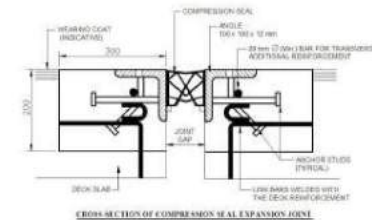
Single-Seal Expansion Joints are available in different versions for constructive systems exposed to traffic. In all types of constructive systems there is clear distinction between the two main functions "inflexible anchoring" and "watertight connection". This allows for best possible adjustment of the two components sealing profile and edge construction to the conditions of the traffic.

**COMPRESSION SEAL JOINTS**

Compression Seal Bridge Series seals are elastomeric compression seals which allow you to effectively seal expansion joints. The elastomeric element is highly resistant to deterioration from exposure to weather, sunlight, oils and impact. Compression Seal Bridge Series seals are available in a variety of cross sections and sizes for heavy duty traffic.

**Features:**

- Multi web Preformed Elastomeric Seal
- Armoured Block-out nosing
- Watertightness



**MODULAR EXPANSION JOINTS**

Modular Joint is capable of simultaneously allowing movement in the longitudinal, transverse and vertical directions while accommodating the structures service and seismic movements. It is designed to be functional after seismic excitation as well. The design of the modular consists of supporting edge and center beams along with support bars, which span the open joint. Sealing elements are utilized to ensure the integrity of a watertight system.

**Features:**

- Mechanically Locked Seals
- Seismic 3-dimensional Movement Ability
- Counter Force Control Mechanism/ Unique Swiveling arrangement for equal opening and closing of Gaps
- Resilient Support Structure
- Each and every component replaceable without breaking concrete and removing the entire Joint thus minimizing the replacement cost and most importantly the down time



### FINGER JOINTS

Simple yet robust Joint System offering quick solution to structures with varying structural gaps and for applications in Structures having larger Structural gaps but nominal movements.



### JOINTS WITH LOW NOISE EMISSION

Everyone knows the "click-clack" sound when you drive across a roadway transition on a bridge. This pulsating sound is increased by unevenness of the surface diagonal to the driving direction. Successful noise reduction for our Modular Expansion Joints is achieved by welded **rhombic elements**, **Downward noise** radiation can be absorbed by closing the gap in the construction by means of a folding construction. Since both of these systems are suited for **retrofitting**, they can be **installed at any time**.



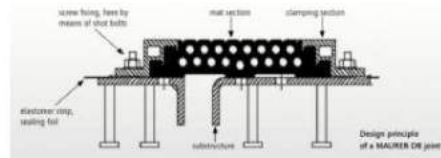
### RAILWAY JOINTS

Railway bridges are different, because the trains that pass bridges bring about different requirements as compared to road bridges. When trains pass, the traffic loads are higher, and in case of High Speed Railways the passing traffic is considerably faster than conventional road traffic.

### DB MAT JOINTS

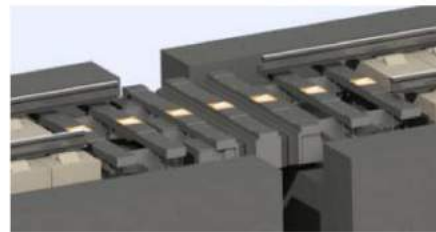
Various products cater for various needs, from the low cost elastoblock expansion joint to our flagship, the DB mat series. Whereas the former Two varieties are designed for ballasted tracks, **MAURER** also offers a conventional type of expansion joint for ballast less tracks.

All types ensure absolute water tightness.



### GUIDED TIE BEAM RAIL MOVEMENT JOINTS

This particular joint is uniquely capable of handling both the structural movement to the tune of **1500-2000 mm** yet offering freedom of the movement in rails supported on it. Thus provides a single solution for both structural and rail movement requirements saving significantly on cost.



### RDSO DESIGNED JOINTS

Sanfield india Ltd is an RDSO approved Expansion Joint Manufacturer, we have complete knowledge of RDSO testing procedures, drawings and Design. We have a vast experience in supply of RDSO Designed Expansion Joints. We are always ready to innovate and develop new joints for the Railways.

### REBAR SPLICING SYSTEM



**Sanfield (India) Limited** is active in the field of Slicing Systems and has in its portfolio not only threaded (parallel & taper both) but metal and grout filled splicing system solutions to fulfill any construction site requirement.

In a short span of time, **Sanfield (India) Limited** has been able to bag and execute projects from all facets of Civil Engineering starting from Bridges, Flyovers, High Rise Buildings, Residential & Commercial Complexes to Airports and even Dam Structures as well.

Technically Superior : **SANFIELD** reber Coupler performs like continuous reinforcement, develops strength mechanically, independent of condition of concrete. Proven cyclic performance of reber offer strength during man-made, seismic or other natural event.

### BENEFITS

- ⊙ Practical and economical alternative to laps.
- ⊙ Fast cycle time : 30 second per thread.
- ⊙ One standard coupler for all splicing requirements (Standard | Position).
- ⊙ Easy installation, no torque required.
- ⊙ Shortens construction cycle times.
- ⊙ Manufactured under strict quality assurance plan ISO 9001.

**SANFIELD** RE-BAR couplers are pre-approved for use in Metro Rail, Thermal and Nuclear Power Projects etc.

#### TAPER COUPLERS



#### END ANCHORS



### SIL GROUT-IT

**Sanfield** GROUT-IT provides an economic, effective solution for design of precast elements in Construction. Precast concrete construction is gaining popularity worldwide, The same is because of faster turnaround time and precise executions. GROUT-IT compliments this need. **Sanfield** is a Leading construction solution provider, We have developed GROUT-IT system to create rebar continuity between precast concrete elements.

### GROUT-IT Benefits

1. Structural Integrity between the precast sections.
2. Load Path Continuity, Reinforcement acts as a continuous bar.
3. Helps overcoming misalignment issues.
4. Eliminates field welding damage to concrete.
5. Faster Execution
6. Freedom of using mortar best suited to application.

### GROUT-IT Applications

GROUT-IT coupler is designed to connect wall or column precast elements either horizontally and vertically.

### GROUT-IT Specs



### COUPLER DIMENSION (in mm)

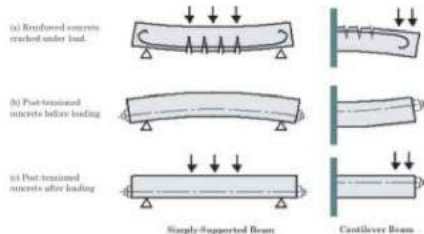
Bar size	A	B	C	D	E	Min rebar Engagement length	Max rebar Engagement length
12	61	44	150			110	125
16	61	44	182			140	155
20	65	48	260	20	25	200	225
25	68	50	285			225	235
32	81	62	290			230	245
40	95	72	340			270	290



**PRE STRESSING SYSTEMS**

**BUILDING POST TENSIONED SLAB**

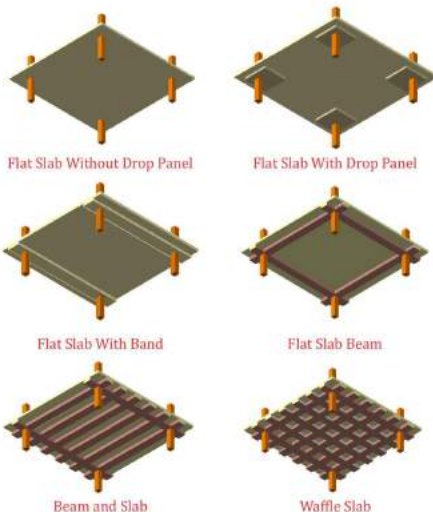
**BASIC CONCEPTS OF PRE-STRESSING**



"Prestressed concrete is basically concrete in which internal stresses of a suitable magnitude and distribution are introduced so that the stresses resulting from external loads are counteracted to a desired degree. In reinforced concrete members, the pre-stress is commonly introduced by tensioning the steel reinforcement."

Sanfield offers following range of products and services under this Vertical

**PT FLOOR SLAB SYSTEM**



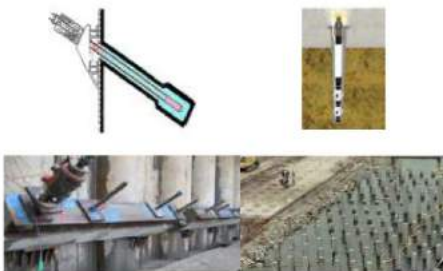
**Sanfield Bonded Strand System**



**Sanfield Un-Bonded Strand System**



**Sanfield Post-Tensioned Anchor System**



**Post-Tensioned Anchor :**

Ground Anchors are basically devices used to transmit the forces to the soil by means of Pre-Stressed tendon to anchor the Structure to the ground or to retain the slopes from collapsing.

**Landmark Projects executed by Sanfield**  
 DLF Commanders Court, Chennai  
 Hotel Horizon site Mumbai  
 Marathon Mafatlal, Lower Parel, Mumbai  
 Parinee Developers BKC Bandra.  
 I-Gate Airoli

**STRUCTURAL BEARINGS**

Sanfield (India) Limited initially started Pot Bearings with technology transfer from Granor Rubber and Engineering Pty. Limited Australia, the state-of-the-art Spherical Bearings with the Maurer developed **Special Sliding Material (MSM) UHMWPE**.

We are supplying Bearings not only to Projects in India but also successfully exporting to various prestigious projects worldwide.

Sanfield India Ltd is providing following products in this category:

**MSM SPHERICAL BEARINGS**



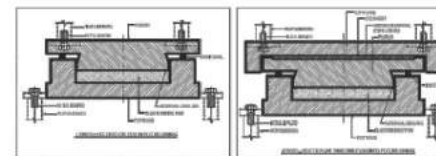
The latest **invention** and **developments** in the field of Bridge support and protection system "**MSM Spherical Bearing**" have been certified to have **longer durability, enhanced service** and performance life when compared with conventional Steel, Elastomeric or even Pot Bearings as they have limitation in satisfying higher & repetitive rotation and translation requirements especially required in case of Highways, Rail Bridges, long Span, Continuous, Cable Stay and Suspension Bridges.

Sanfield's state of the art **production facility** at Bhopal (India) exercise strict quality control, 3<sup>rd</sup> party supervision, **Factory Production Control (FPC) certification EN1090**, different Welding qualifications as per EN & AWS and above all **CE certification for MSM Spherical Bearings and Pot Bearings**.

**MAURER MSM®** is a patented, high-performance sliding material for structural bearings. In comparison to usual PTFE, **MAURER MSM®** is characterized by substantially higher durability, absorption of twice as high pressure and therefore compact dimensions as well as lower friction resistances.

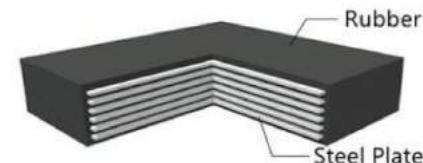
**POT AND PIN BEARINGS**

A shallow steel cylinder, called as POT is inserted with a thinner, neat fitting, disc of Elastomer which has a recess to accept the Sealing Rings. A steel Piston is then inserted into the POT and bears against the Elastomeric disc. The resulting assembly is frequently perceived as being similar to that of an hydraulic fluid sealed within the POT and the PISTON arrangement but is free to rotate about any horizontal axis with minimum resistance which is a highly desirable feature of bridge bearing. By keeping rotational resistance to a minimum, a uniform distribution of load into the structure is ensured.



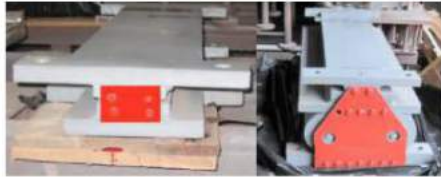
**ELASTOMERIC BEARINGS**

Consists of a number of Elastomer Layers sandwiched between steel laminates. Reinforcement of Steel laminate in between elastomer layers provides Load bearing ability while Translational and Rotational requirements are fulfilled by internal Elastomer layers deflection.



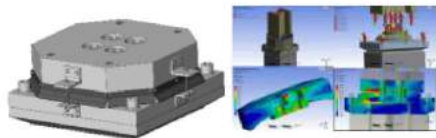
**STEEL BEARINGS**

A typical Roller Bearing consists of a base plate, two or more rollers and a top plate. While the Rocker & Roller Bearing is made by providing a saddle and knuckle plate on top of the rollers. For the Rocker Bearings, the same arrangement except the rollers is provided. While the Rocker & Roller Bearing permits translation as well as rotation, whereas the Rocker Bearing permits only rotation. Similarly the Roller Bearing provides only the translation but no rotation.



**Anti Uplift Bearings**

Requirement for design and manufacturing of Anti-uplift Bearings is influenced greatly by the fact whether Uplift is in Service or Seismic only. Up-Lift Load Bearings enable the transfer and support of vertical compressive and tractive forces in every state of twist and shift. Due to the use of high-performance sliding materials – even on contact surfaces of uplifting forces – structural deformations can be absorbed repeatedly and without constraints. Up-Lift Load Bearings are particularly suitable for complex roof and bridge constructions with high changing loads and deformations, e.g. railroad bridges.



Sanfield (India) Limited is capable of designing and producing fatigue resistant Uplift Bearings

**HEAVY STEEL FABRICATION**

Sanfield India Ltd. having full fledged Heavy Fabrication facilities is approved by RDSO for fabrication of Steel Bridge & Composite Bridge Steel Girders. The Workshop is fully equipped having all the latest equipment and facilities for Girder Fabrication and has completed and supplied steel composite Girders for number of our valued Clients/organizations and many more are under fabrication.



The facilities available with us include the following:

- Workshop measuring more than 12000 sq. meters.
- SAW welding Machine
- E. O. T. Cranes of capacity 5 MT to 20 MT - 6 nos.
- Radial Drilling Machines
- Nelson Stud Welding facilities.
- Metalizing facilities.
- Portable Magnetic Drilling Machines
- Team of qualified & experienced person to monitor the fabrication activities & to check the QA / QC



**ARCHITECTURAL JOINTS**



The SIL Architectural Expansion Joints are economical & attractive floor, wall & Ceiling joints system. The multi - cellular seals in these system snaps and locks into aluminium edge retainers

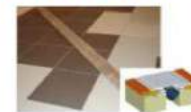
**Advantages**

Multi - Cellular design support pedestrian traffic & accommodates multidirectional movement. Economical snap & lock seal system for years of proven performance. Seals available in custom colors to match or compliment surrounding area.

**Applications**

Walls ceiling & floors in :-  
 Parking Decks, Commercial & Institutional Buildings.  
 Educational Facilities.  
 Hotels.  
 Health care and Pharmaceutical Industries.

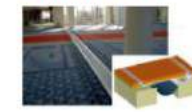
**SAPX - SYSTEM**



**SFJX - SYSTEM**



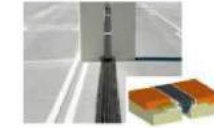
**SDPS - SYSTEM**



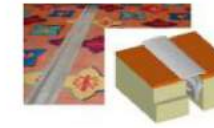
**SDPK - SYSTEM**



**SLPF - SYSTEM**



**SA-90 : RIGHT JOINT**



**SNPG - SYSTEM**



**AIRSEAL - SYSTEM**



**PARKING / LANDSCAPE AREA EXPANSION JOINT SYSTEMS**

- AIRSEAL SYSTEM
- COMPRESSION SEAL SYSTEM - WA SERIES
- COMPRESSION SEAL SYSTEM - WG SERIES

**WALL/COLUMN EXPANSION JOINT SYSTEMS**

- SLPP SYSTEM
- SNPK SYSTEM
- SNPG SYSTEM
- SCTR SYSTEM

**ROOF EXPANSION JOINT SYSTEMS**

- SRFL SYSTEM

Besides this, full range of Architectural Expansion Joint Systems are also available for corner locations with flexibility to adopt directional changes where transition occurs. Also, the above categories and classifications are in general and can be modified and combined with other Joint models for Specific Requirements.



**Sanfield (India) Limited** has to its credit the first ever application of shock transmission units in any Indian bridge structure which dates back to the year 1999. Being the pioneer in the technology of structural protection devices and specially for seismic protection, we are constantly updating ourselves with the state of art technology and products to service our customers better.

### HYDRAULIC DAMPERS (MHD)

Hydraulic Dampers dissipate energy by using varying fluid viscosities. These safety devices are therefore different from usual linear-viscous dampers. **MAURER** Hydraulic Dampers enable a reaction force when fast motions occur which is almost entirely independent of velocity. Optimal damping can thus be achieved and limit exceeds be avoided.

### ELASTOMERIC DAMPERS

Elastomeric Dampers work with specially developed elastomeric mixtures of different damping properties and are used in building construction and to damp component assemblies. The effect of these safety devices relies on deformation and is characterized by good recentring properties and a reduction in constraints.

Other than the standard STU and Dampers, **Sanfield** range of Structural Protection Systems includes

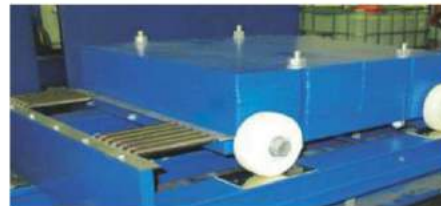
- RIGID CONNECTION DEVICES**
- PREDETERMINED BREAK-AWAY FORCE RESTRAINTS**
- DISSIPATORS**
- RECENTRING STEEL-HYSTERESIS-DAMPERS (MRSD)**
- SEMI-ACTIVE DAMPERS**
- ISOLATORS**
- LEAD RUBBER BEARINGS**

### DAMPERS APPLICATION

#### OLYMPIC TORCH IN SOCHI

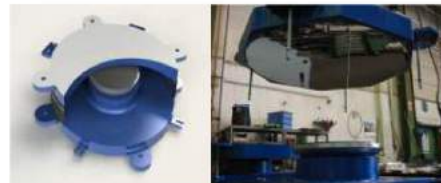
Minich . Until February 23rd, the world is looking Sochi .While to sportsmen where in their final training, the know how of some engineers from Munich was concentrated onto the Olympic fire : it burns by way of a 45 m high torch in the Sochi-

Olympic park , and so almost at the windy coast of the Black Sea. In order that the tower - like torch structure will not vibrate too much , three dampers were installed. Their special characteristic ; they could be calibrated on site to the occurring frequencies of vibration.



### SLIDING ISOLATION PENDULUM BEARINGS

**MAURER** Sliding Isolation Pendulum Bearings combine the outstanding features of spherical bearings with the recentring effect according to the pendulum principle. This effect is achieved by using a curved main sliding surface. When friction occurs on the sliding surface, energy is directly dissipated in the sliding isolation pendulum bearing. Using the sliding material **MSM®** - lubricated and unlubricated - customers can choose from a wide range of friction coefficients. **MAURER** Sliding Isolation Pendulum Bearings meet all requirements on sliding bearings during usage according to the standards.



### REPAIRS & REHABILITATION

**SANFIELD (INDIA) LIMITED** with an integrated Design and Project Divisions also undertake Repair and Rehabilitation of Bridges, Buildings and other structures of any complex nature such as:

Lifting of Bridge Superstructures, Realignment and Replacement of Bearings, Replacement of Failed Expansion Joints, Spray Waterproofing System, CFRP Applications, Epoxy Injection, Guniting, Repairs of Leaching, Honeycombing, Spalling, Concrete Protection etc.



### REPLACEMENT OF BEARINGS

BEFORE

AFTER



### REPLACEMENT OF EXPANSION JOINTS

BEFORE

AFTER



### STRUCTURAL PROTECTION SYSTEMS

#### Seismic Control Devices

About 20 years ago, we started protecting constructions from risk of seismic damage and has advanced development ever since. The business is getting more important every day: settlement in seismic-prone metropolitan areas is getting denser and buildings are rising higher and higher. Seismic control devices efficiently help to avoid damages on bridges, superstructures and, especially, sensitive installations such as tanks for liquefied gas storage, nuclear plant waste fuel etc. At the same time our devices minimize the negative effects of normal everyday strain. **MAURER** Seismic Control Devices - that means numerous technological and structural engineering in-house developments that effectively protect structural systems by means of isolation and/or dissipation in the interplay of forces and motions.

### SHOCK TRANSMISSION UNITS (STU) / LOCK UP DEVICES (LUD)

Shock Transmission Units are hydraulic safety devices that lock at strong impulses, such as earthquake shocks or sudden braking on bridge constructions, and therefore clamp the construction. However, they are designed to allow shifting without much resistance if slow movements occur as in everyday usage. **MAURER** Load Limiters are hydraulic-safety devices that limit the reaction force upward by velocity-based control of oil flow. By using such elements, construction damage caused by extreme shifting velocities can be efficiently avoided.



Sanfield has to its credit the first ever application of STU in Indian Bridges i.e. Bassein Creek Bridge. In Mumbai in the year 1999-2000.



**GAS PRESSURE WELDING**

**SANFIELD (INDIA) LIMITED** in association with **DAIA CORPORATION JAPAN** provides Gas Pressure Welding Services in the Subcontinent, Gas Pressure Welding is used to join rebar at construction.

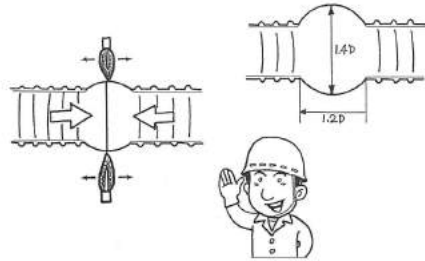
**WHAT IS GAS PRESSURE WELDING**

Heat each reinforce bar at cross section by acetylene and oxygen Mixture gas at about 1,200 - 1,300 degree and put pressure then Join each bar firmly. Reinforce bar is steel which is mixed by atom of iron and carbon. Atom of them in steel are stable at normal temperature and they are Making regular arrangement. Gas pressure welding stick each reinforce bar by their join of Crystal. Then we use heat to make re-arrangement of each atom easily at each Reinforce bar joining. Both atom start to move actively by heating at once and also change Structure of crystal as before then diffuse. It means they start to be mixed of each atom.



Clean up at cross section. Rust, cement, paint, sand, etc. Like foreign article on surface are strictly prohibited.

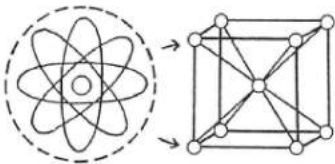
Joining by habayaki (heat right and left side About 1d distance) by Chuusei-en (medium flame)



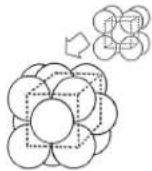
Completed join Swell size is about 1.4d to Outer diameter and 1.2d to length

**MECHANISM OF GAS PRESSURE WELDING**

**HEAT AND PRESSURE**



**HEATING**



**PROCESS OF GAS PRESSURE WELDING**

At first heating, use kangen-en (strong flame) and avoid oxidation on each join surface



Cut reinforce bar By daia saw Surface should be Right angle. Heat / pressure Start.



**GAS PRESSURE WELDING EQUIPMENT**



**GFRP BAR**

Reinforced concrete is a common building material for construction of facilities and structures. While concrete has high compressive strength, it has limited tensile strength. To overcome these tensile limitations, reinforcing bars (rebar) are used in the tension side of concrete structures.

Product Part No.	Diameter (mm)	Bolt Ultimate load(kN)	Thread ultimate load(kN)		Cross section (mm <sup>2</sup> )	Ultimate tensile strength (MPa)	Tensile (N)	Weight (g/m)	Modulus of elasticity (GPa)	Ultimate shear strength (MPa)	Bending strength (MPa)	Elongation at break (%)	Adhesive value
			Steel	GFRP									
SIL60-16-ER	16	165	/	45	165	1000	50	350	50	150	600	25	3x10 <sup>10</sup> H
SIL60-18-ER	18	214	/	50	214	1000	60	460					
SIL60-20-ER	20	269	80	60	260	1000	80	560					
SIL60-22-ER	22	330	100	60	330	1000	100	690					
SIL60-24-ER	24	360	150	70	390	900	120	860					
SIL60-25-ER	25	390	180	70	411	900	140	1030					
SIL60-27-ER	27	435	200	80	511	850	150	1050					
SIL60-29-ER	29	470	200	80	552	850	160	1200					
SIL60-30-ER	30	540	220	80	638	850	200	1350					
SIL60-32-ER	32	620	250	90	711	850	250	1550					
SIL60-38-ER	38	890	420	100	1046	850	/	2250					
SIL60-40-ER	40	930	420	100	1164	800	/	2490					
SIL60-51-ER	51	1540	/	/	1924	800	/	4100					

**SIL60 Standard GFRP Polyester Anchor Bolt Series.**

Product Part No.	Diameter (mm)	Bolt Ultimate load(kN)	Thread ultimate load(kN)		Cross section (mm <sup>2</sup> )	Ultimate tensile strength (MPa)	Tensile (N)	Weight (g/m)	Modulus of elasticity (GPa)	Ultimate shear strength (MPa)	Bending strength (MPa)	Elongation at break (%)	Adhesive value
			Steel	GFRP									
SIL60-16	16	152	/	/	165	800	25	250	45	150	600	25	3x10 <sup>10</sup> H
60-18	18	171	/	/	214	800	35	340					
SIL60-20	20	215	80	60	269	800	60	560					
60-22	22	264	100	60	330	800	60	690					
SIL60-24	24	318	150	70	398	800	100	860					
60-25	25	347	180	70	414	800	120	1030					
SIL60-27	27	409	200	80	511	800	140	1050					
60-29	29	442	200	80	552	800	160	1200					
SIL60-30	30	510	220	80	638	800	200	1350					
60-32	32	585	250	90	711	800	230	1550					
SIL60-38	38	837	420	100	1046	800	/	2250					
60-40	40	873	420	100	1164	750	/	2490					
SIL60-51	51	1443	/	/	1924	750	/	4100					

**SIL61-SP High Performance GRP Polyester Reber SP Series.**

Product Part No.	Diameter (mm)	Bolt Ultimate load (kN)	Cross section (mm <sup>2</sup> )	Ultimate tensile strength (MPa)	Weight (g/m)	Modulus of elasticity (GPa)	Ultimate shear strength (MPa)	Elongation at break (%)
SIL61-18-SP	18	238	227	1050	500			
SIL61-20-SP	20	298	234	1050	610			
SIL61-22-SP	22	363	346	1050	740			
SIL61-24-SP	24	463	415	1050	890			
SIL61-25-SP	25	475	452	1050	970			
SIL61-28-SP	28	544	573	950	1230			
SIL61-30-SP	30	627	660	950	1420			
SIL61-32-SP	32	717	755	950	1620			
SIL61-34-SP	35	770	855	900	1840			
SIL61-36-SP	36	866	962	900	2050			
SIL61-38-SP	38	960	1071	900	2320			
SIL61-40-SP	40	1016	1195	850	2570			
SIL61-45-SP	45	1292	1520	850	3270			
SIL61-50-SP	50	1603	1868	850	4035			
SIL61-54-SP	54	1765	2296	800	4750			

**High Performance GFRP Polyester Reber SP Series.**

