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TS SEAL CO., LTD



PROTECT & JOINT RELIEF



Feb. 2013
Certified & Registered:
Disaster-Related Products of
Kochi Prefecture

**ELASTIC SPECIAL RUBBER
FOR PIPE JOINT EFFECT OF
CUSHION & COMPLETE
WATERTIGHTNESS**

TS SEAL

Certified & Registered
Disaster-related Seal Materials
by Kochi Prefecture, Japan



3D mesh form reacted by Hydroxyl-terminated liquefied polybutadiene & liquefied prepolymer

What is TS SEAL?

TS Seal Rubber's outstanding property is to maintain a strong adhesive strength and superior elasticity semi-permanently. TS Seal Rubber allows it to absorb pressure and function as a flexible cushion that is able to maintain waterproofing connection.



PERFECT WATER PROOF

TS Seal Rubber deformed by the jacking pressure, it spreads out and fills all the space in the joint, preventing seepage of methane and ground water. This increases the efficiency of the work by eliminating the need to stop the seepage before finishing the joint after jacking work is completed. Preventing corrosion of steel collar of the joint and increasing durability of the steel collars.

Test Result

Confirmation on Water tightness. Put Special Rubber of 3mm-thick & 70mm width into the space of 30mm from cushion material. **No water leak is found on level, curve, and both conditions.**

Based on watertight test of Japan Sewage Works Association for joint rules.

WEATHERABILITY

Maintaining high reliability and durability for prolonged period.

Test Result

After 100 hours, no change of adhesiveness and physicality are found under 25% extension and under over 3,000 hour 60 degree C temperature of Xenon lamp (Weather meter), 60% of moisture. **The volume deformation is only 1%.**

(The test is based on Polysulfide sealing material for architecture by Foundation of Architectural Material Testing Center)

QUAKE-RESISTANT

Preventing the breaking of lines under jacking and allows it to execute stable jacking work. Maintaining a perfect seal even under severe ground vibration and quake induced stresses.



Characteristics of High Quality Sealing Material for Civil Structure

COMPARISON TS SEAL WITH SEALING MATERIAL

(By the study & check laboratory of TOWA Industrial Co., Ltd.)

	Main Polymer	Characteristics
TS SEAL	<ul style="list-style-type: none"> Hydroxyl-terminated polybutadiene is the base polymer of TS SEAL. Cure agent contains isocyanato compound. By blending it with the base, they make polybutadiene polyurethane of 3D texture. 	<ul style="list-style-type: none"> TS SEAL is designed as the sealing material just for civil structure, and it has many results and records. <ol style="list-style-type: none"> Hardened TS SEAL shows stable Hydrolysis because of Hydroxyl-terminated polybutadiene with isocyanato cure agent. Superior in Heat and Cold resistances. Strong Resistibility in Cold/Hot water, Acid, Alkali, and Sea water. Excellent electrical Insulation and dielectric property, and less temperature dependency.
Polyurethane Sealing material	<ul style="list-style-type: none"> In general urethane, the base main polymer is polyether or polyester, or polyol like polyether and polyester. Cure agent contains isocyanato compound. By blending it with the base, they make 3D texture polyurethane of polyether and polyester having main structure of polyether and polyester. 	<ul style="list-style-type: none"> General urethane is designed for architecture. It has used in masonry joint designed for civil structure. <ol style="list-style-type: none"> Superior in heat/temp. resistance, exerting stable performance all through a year. Good cold resistance because of low rigid temperature. Excellent electrical insulation and dielectric property, and less temperature dependency. Polyester polyurethane undergo hydrolysis in wet condition.
Epoxy Sealing Material (Elastic)	<ul style="list-style-type: none"> In general epoxy resin, the main base polymer is bisphenol A epoxy resin (elastic). Cure agent contains polyamine, and by blending with the base, it makes epoxy resin (high molecular) of 3D structure. 	<ul style="list-style-type: none"> Epoxy Resin is widely used in civil engineering because of excellent adhesion to wet face. But because of less elasticity, it often happens breakage of adhesion part and epoxy rupture. Recently, epoxy having elastic to some extent have been developed and used to masonry joint of less movement.

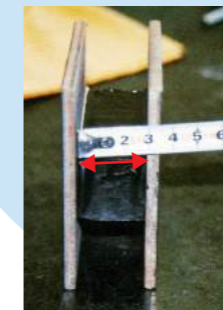
Over 60 years of durability A Chart of Physical Features

*Tested based on Polysulfide adhesive Sealing Material for Architecture * By the laboratory of Tobishi Building Materials Co., Ltd

Mechanical Characteristic	Slump	less than 3mm		
	Contamination	Nil. - Mortar Joint, no primer, 7days dipped in 10mm depth of water.		
	Solidity (JIS)	Beginning 34(20°C x 14days) After Heat Processing 42(20°C x 14days)(70°C x 96hours)		
	Restoration against Tension	18mm Standard Condition 14days, 50°C x 4days, 150% - 5 minutes elongation, Elongation Speed 50mm/min.		
Chemical Resistance	1 month dipped into Saturated calcium Hydroxide/ 5% Sodium Hydrate/5% Hydrochloric acid/ 5% Nitric acid/5% Sulfuric acid 80°C Hot water/ except for Hot water, Room Temp By Tobishi Kenzai Testing Center			
Volume Change	Less than 1% in 1 month with room temp. Less than 1%—1 month of 80°C			
Abrasion Test	Abrasion test with concrete (Room temp. 24)			
	Test item	Move 10 times	Move 20 times	Move 40 times
	Mass Change(mg)	+2mg	-1mg	-1mg
	Mass Change(%)	+0.02%	+0.01%	+0.01%
Test Method		Putting 8kg concrete rectangular column onto a fixed sample(50mm x 13mm), and move the rectangular column by 10cm to a direction at a speed of 5cm/sec. (loading: 1.32kg/m ²)		
By Chemical Inspection & Testing Institute, Japan (CITI)				

TS SEAL - HIGH CUSHION PERFORMANCE

About **5 times** Extension Percentage in Tensile Test



It shows this great Extension **25 years after** construction



(by Kochi Prefectural Industrial Technical Center)

PIPES FOR WATER & SEWERAGE

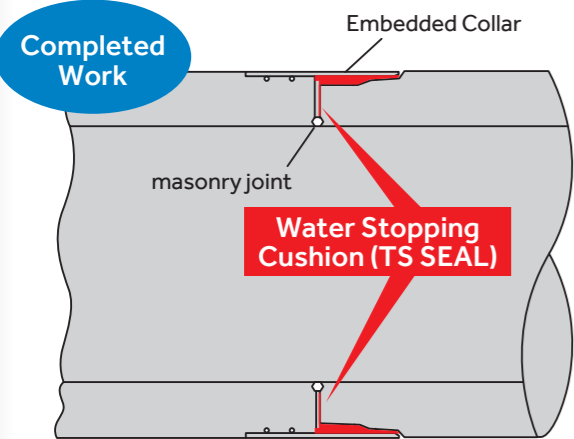
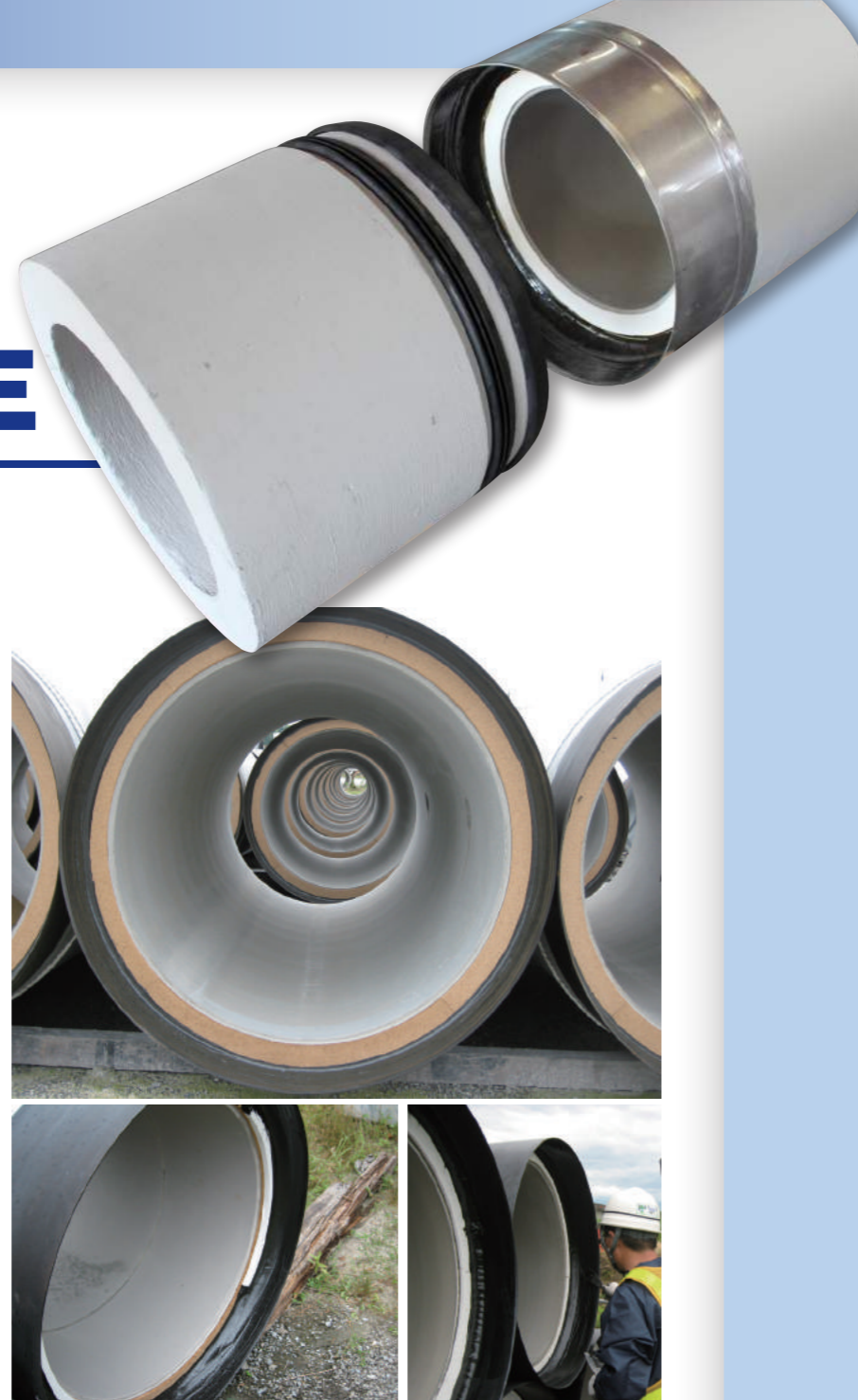
Pipes for water & sewerage are essential for the supply of drinking water and gas, and drainage of sewerage.

Once the construction is made, they are left buried. So the high security are needed both in construction and in long run.

Applying TS SEAL, you can secure safer lifeline for easier maintenance and leakage.

CONSTRUCTION TECHNIQUE for TS SEAL

Possible safety & tight seal to fill joint according to pipe diameter



PERFECT WATER STOP

EASIER MAINTENANCE

BETTER RELIABILITY OF LIFELINE

Construction Achievement in 2015



Disaster Prevention for Farm Land in downstream of the YOSHINO River Major Waterway Construction of Northern Part of Kochi prefecture.

Working contents: New Jacking Method for explosion protection
Pipe Diameter: φ2,800mm
Construction points: 293points

JR Sikoku (Railway company) for Kotoku Line

Pipe Diameter: φ2,400mm
Construction points: 99 points



Rainwater protection construction in the Oboro River in 2013

Pipe Diameter: φ1,650mm
Construction points: 402 points
Ordered by Otu, Shiga Prefecture.

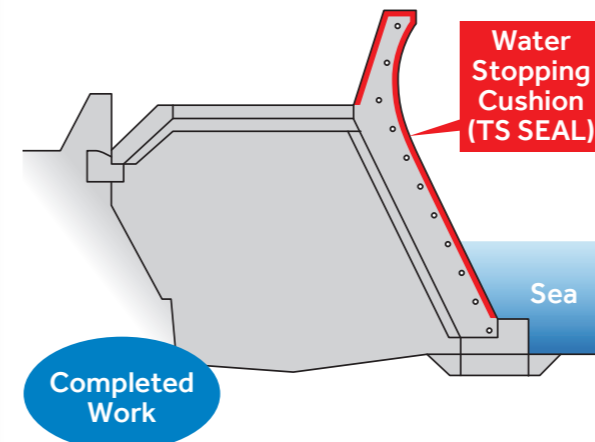
FLOOD BARRIER

Flood Barrier—to keep Tsunami damage to a bare minimum.

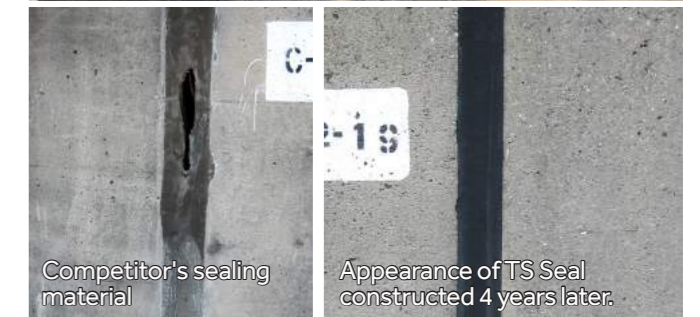
Leak from block joint will be the big trigger to Tsunami damage. To prevent such damage, TS SEAL is the most effective for this purpose, diminishing deterioration and stopping water at the masonry joint. TS SEAL plays the most important roll at the time of Tsunami disaster.

CONSTRUCTION METHOD for TS SEAL

Fill TS SEAL to masonry joints, deterioration parts, breakage points of Flood barrier. Even at the construction of newly built flood barrier.



After the TS Seal construction for flood barrier by the Ports and Harbors Bureau of Osaka city



Competitor's sealing material

Appearance of TS Seal constructed 4 years later.

Diminishing natural deterioration (wave, wind, rain)

Anticipation of Tsunami Flood

Repairing Flood Barrier

Construction Achievements in 2014 & 2015



Before Construction

After Construction

High Tide Prevention for the Waterway in Kochi prefecture

Repairing joint of Flood Barrier
Working points: 12 points
(Civil Engineering Office of Kochi prefecture.)

High Tide Prevention for the Koda River

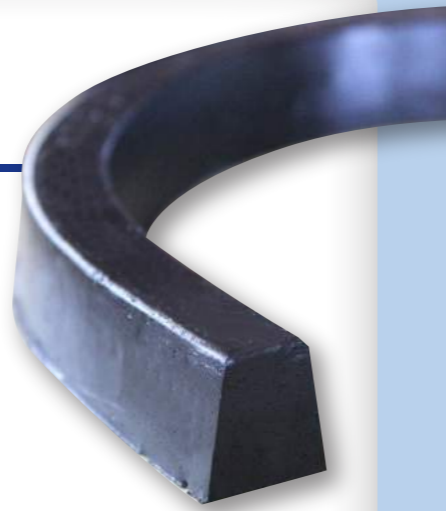
Joint repairing
Working points: 12 points



During Construction

After Construction

TS SEAL TAPE

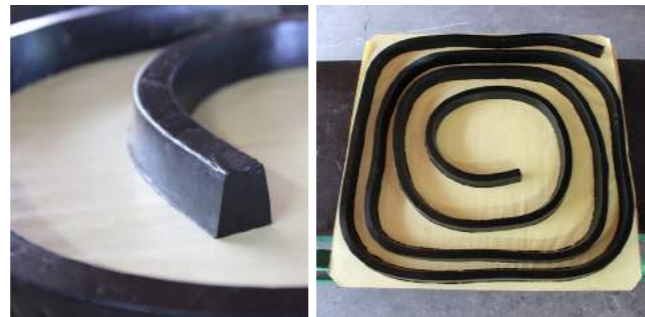
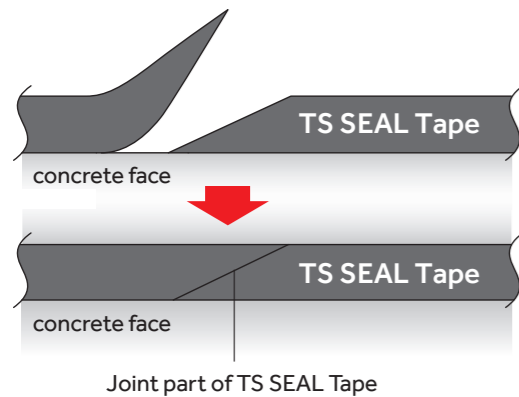


Recently in construction work, big box-culvert is mainly used in order to get perfect waterproof by fully-sealed joints. But water leakage had happened sometimes due to shear or gap in joint parts by underground vibration.

TS SEAL diminishes shear/gap and stops water leakage by high flexible elasticity. Also, TS SEAL makes construction work much faster because of easy cutting and easy connection.

CONSTRUCTION METHOD for TS SEAL

Laminate TS SEAL alongside the ditches of joint parts. It is easy to do so even in complicated shaped ditches because of tape. You can make perfect waterproof as shown below.



Test Result

Hydraulic pressure test is made after sealed testing container with TS SEAL Tape of 13mm thickness. In having pressured the seal down to 4.5mm thickness, no water leak is shown even under 0.30MPa water pressure.

(Done by water pressure test : Kochi Prefectural Industrial Technology Center.)

Shortening Time of Construction

Lightening Work Burden

Flexible Size for Usage

Construction Achievement



Joint: Before TS SEAL laminated



During TS SEAL Lamination



2013 - Huge Manhole /Box-Culvert

Shizuoka Plant of Zenith HANEDA Company

TS Seal Tape laminating onto Drop Manhole
Construction year : 2013 -
Construction spot : Many construction examples

Giken LTD

TS Seal Tape laminating onto box culvert
Construction year : 2013 -
Construction spot : Many construction examples

TS SEAL to any place like prevention of vibration, noise, sound, and necessity of tight seal.

COMMON DITCH

Maximum safety joining in long period to protect our lifeline



SOUND INSULATION OF CONCRETE FLOORING

Maintaining prevention of high noise insulation at roadside by car vibration



JOINT FOR READY-TO-ASSEMBLE TUNNEL

Keeping good products performance, effective sealing can be made even to/against curved joint area



JOINT FOR OIL BARRIER AND BRIDGE

Even at places at many rain, direct sunlight, and wind which are the elements of aging degradation, TS SEAL can prevent such aging and keep joint art safely.

