



PT. TARUMAJAYA ADI GEMILANG

(d/h PD Union Jaya Rubber)

RUBBER AND POLYURETHANE PART SOLUTION

ELASTOMERIC BEARING & EXPANSION JOINT



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GENERAL INFORMATION

- * TAG, Elastomeric Bridge Bearings consist of individual layers of Rubber, reinforced by steel plates.
- * The Elastomer is normally a natural rubber compound.
If required, different kinds of Synthetic Rubber, such as chloroprene often called "NEO-PRENE" may be used.
- * The steel plates are either completely embedded by the rubber or protected by a specially developed coating.
- * Perfect bonding between plates and elastomer is obtained under high pressure during the vulcanization process.
- * The TAG standard range of elastomeric bridge bearings offers a logical progression in both load bearings and shear movement or rotation capacity to the Bridge design Engineer.
- * Standard Bearings are manufactured from a nominal 55 IRHD Natural Rubber Compound with protection additives to ensure the quality.
- * In this Technical Data describes the Indonesian, American & British Standard. Our products can meet these and any others International Standard or requirements.
- * In accordance with normal commercial practice and in the absence of any other information. TAG will supply Bridge Bearings to customers specification under the assumption that bearing design approval for a particular load condition or environment has been granted by the responsible bridge design engineer.

INSTALLATION

REINFORCED BEARINGS

In general, the bearing is simply plated on the surface provided at the right level. The lower and upper concrete surfaces, between which the bearing is placed must be horizontal, parallel, clean and flat.

Sometimes, the bearings is installed on a mortar bed which will have a thickness of 2-3 cm and exceed the bearing sizes by some centimeters in each direction.

The sides of the bearing should not be prevented from deforming. The framework for in-situ concrete superstructure must be constructed so as to prevent concrete flowing between the framework and the sides of the bearing. The framework surrounding the bearing should be soft and easy to remove later (WE RECOMMEND TO USE TAG EVA HEAVY DUTY JOINT FILLER).

Care should be taken to avoid all contact of bearings oil, solvents.....

The Engineer should design the location of bearings in order to facilitate their future replacement (jack recess).

TECHNICAL DATA

The total height of Bearing is determined by the number of elementary rubber layers each of thickness t ($= 8, 10, 12$ etc.), a corresponding Number of Intermediate Steel Plates of variable thickness depending on the elementary layer, and two rubber surface layers $t/2$ thick.

In usual cases the values of t and t_s are as follow :

ELEMENTARY LAYERS (t)	INTERMEDIATE STEEL PLATES (ts)
8	2
10	3
12	3
etc	

The total height is thus a multiple of $t + t_s$

For example (Size of Bearing 200x300x30 mm)

- * 2 Surface special coatings of rubber 4 mm thick.
- * 2 Intermediate layer of rubber 8 mm thick.
- * 3 Intermediate plates of steel 2 mm thick.

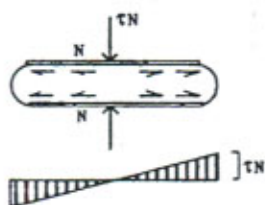
CALCULATION OF DIMENSION

Symbols :

- n : Number of Elementary Rubber Layers
- ab : Bearings dimensions in plan area ($a \leq b$)
- t : Thickness of elementary rubber layer
- T : Total thickness of n Elementary Rubber Layers
- t_s : Thickness of elementary intermediate steel plate
- N : Vertical load
- H : Horizontal Force
- U : Horizontal slow displacement of Bearing
- αT : Rotation of Bearing
- αt : Rotation of elementary layer
- G : Shear modulus
- σ_m : Average Compressive stress
- τ_N : Shear strain due to compressive stress
- τ_H : Shear strain due to horizontal force
- τ_α : Shear strain due to rotation
- τ : Total shear strain due to combined effect of $\tau_N + \alpha H + \tau_\alpha$



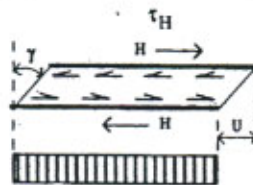
LIMITATION OF SHEAR STRAINS



$$\tau_N = \frac{1.5 \sigma_m}{\beta}$$

$$\beta = \frac{a b}{2 t (a+b)}$$

$$\sigma_m = \frac{N}{a b}$$

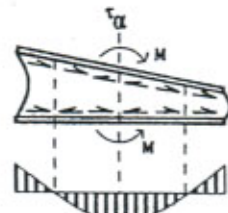


Slow deformation

$$\tau_{H_1} = G \frac{U_1}{T}$$

Slow/fast deformation

$$\tau_H = G \frac{U_1}{T} + \frac{H_2}{2 a b}$$



$$\tau_{\alpha} = \frac{G}{2} \frac{(a)^2}{(t)^2} \frac{\alpha_T + \alpha_o}{n}$$

α_o = additional rotation due to placing defect

- in situ concreting : 0,003 rd
- metal : 0,003 rd
- prefabricated concrete : 0,010 rd

FOLLOWING MUST BE CHECKED

$$\tau = \tau_N + \tau_H + \tau_{\alpha} \leq 5 G \leq 40 \text{ Kg/cm}^2$$

$$\tau_{H_1} \leq 0,5 G \quad \tau_H \leq 0,7 G \quad \tau_{\alpha} < \tau_N$$

LIMITATION OF AVERAGE COMPRESSIVE STRESSES $\sigma_m \leq 150 \text{ Kg/cm}^2$

NO MOVING AND NO SLIDING CONDITION $\sigma_{\min} \geq 20 \text{ Kg/cm}^2$

$$H < f N \quad \text{with } f = 0.10 + \frac{6}{\sigma_m}$$

If these conditions are not respected, bearing be glued.

CONDITION OF NO BUCKLING $T \leq \frac{a}{5}$ and check $T \geq \frac{a}{10}$

DIMENSION REFERENCE TABLE

In order to facilitate the bearing design, the dimension list has been calculated for various dimensions. It gives the following values :

- N = vertical load
- n = maximum number of elementary neoprene layers
- $\alpha \cdot t$ = maximum rotation for elementary layer

Calculation have been done with following shear strain limitations :

$$\tau_N \leq 3 G \leq 24 \text{ Kg/cm}^2 \quad \& \quad \tau_m \leq 150 \text{ Kg/cm}^2$$

$$\tau_{\alpha} \leq 1,5 G \leq 12 \text{ Kg/cm}^2$$

The Technical Bulletin n°4 restricts only the total shear strain ($\tau_N + \tau_H + \tau_{\alpha} \leq 5 G$)

Consequently it is possible to increase one of the values here above if another one is reduced.

EXAMPLE OF USE OF THE DIMENSION REFERENCE TABLE

PLAN AREA DIMENSION AND SURFACE			N = VERTICAL LOAD (tons) n = MAXIMUM NUMBER OF LAYERS						MAXIMUM ROTATION 1/1000 rd		
a mm	b mm	a x b cm ²	t = 8 N	(ts = 2) n	t = 10 N	(ts = 3) n	t = 12 N	(ts = 3) n	t = 8	t = 10	t = 12
350	350	1225	183,7	8	171,5	7	143	5	1,5	2,4	3,5

N max ($\sigma_m = 140 \text{ Kg/cm}^2$)
($\tau_N = 24 \text{ Kg/cm}^2$)

height max
7 (10 + 3)

$\alpha t + \frac{\alpha_o}{n}$ maximum
 $\tau_{\alpha} = 12 \text{ Kg/cm}^2$

REMARK

As indicated above :

Other values are possible : N = 184 t ($\sigma_m = 150 \text{ Kg/cm}^2$) $\tau_N = 25,7 \text{ Kg/cm}^2 > 3 G$

$\alpha t = 2^{10-3}$ ($\tau_{\alpha} = 9,8 \text{ Kg/cm}^2$) because $\tau_N + \tau_{\alpha} \leq 4,5 G$

The remaining 0,5 G are reserved to σ_H shear strain which must be checked

PLAN AREA - DIM AND SURFACE			N - VERTICAL LOAD (Tons) n - MAXIMUM NUMBER OF LAYERS						MAXIMUM ROTATION 1/1000 rd		
a b		a x b cm ²	t = 8 (ts = 2)		t = 10 (ts = 3)		t = 12 (ts = 3)		t = 8	t = 10	t = 12
mm	mm		N	n	N	n	N	n			
100	150	150	9	2	7	2	6	1	19,2	30	43,2
125	150	187,5	12,8	3	10,2	2	8,5	2	12,3	19,2	27,6
100	200	200	14	2	11	2	9,3	1	19,2	30	43,2
100	230	230	16	2	12,8	2	10,7	1	19,2	30	43,2
125	200	250	19,2	3	15,4	2	12,8	2	12,3	19,2	27,6
125	225	281,2	22,6	3	18	2	15,1	2	12,3	19,2	27,6
150	200	300	25,7	3	21	3	17	2	8,5	13,3	19,2
125	250	312,5	26	3	20,8	2	17,4	2	12,3	19,2	27,6
175	200	350	32,6	4	26,1	3	21,7	2	6,3	9,8	14,1
125	300	375	33,1	3	26,5	2	22	2	12,3	19,2	27,6
150	250	375	36,5	3	29,2	3	24,3	2	8,5	13,3	19,2
200	225	450	47,7	5	38,1	4	31,8	3	4,8	7,5	10,8
225	250	562,5	66,6	5	53,3	4	44,4	3	3,8	5,9	8,5
200	300	600	70	5	60	4	50	3	4,8	7,5	10,8
175	350	612,5	71,4	4	57,1	3	47,6	2	6,3	9,8	14,1
200	350	700	89	5	71,2	4	59,3	3	4,8	7,5	10,8
250	300	750	100	6	85	5	70	4	3,1	4,8	6,9
230	350	805	111,7	5	89,4	4	74,5	3	3,8	5,7	8,1
200	450	900	124,6	5	99,7	4	83,1	3	4,8	7,5	10,8
300	330	990	148,5	7	124	6	104	5	2,1	3,3	4,8
250	450	1125	168,7	6	144,6	5	120,5	4	3,1	4,8	6,9
350	350	1225	183,7	8	171,5	7	143	5	1,5	2,4	3,5
330	450	1485	222,7	8	222,7	6	188,5	5	1,8	2,7	4
300	500	1500	225	7	225	6	180	5	2,1	3,3	4,8
350	500	1750	262,5	8	262,5	7	240,2	5	1,6	2,4	3,4
350	525	1837	275,6	8	275,6	7	257,2	5	1,6	2,4	3,9
280	700	1960	294	7	294	5	261,3	4	2,4	3,8	5,5
425	500	2125	318,7	10	318,7	8	318,7	7	1,1	1,7	2,4
450	500	2250	337,5	11	337,5	9	337,5	7	0,9	1,5	2,1
350	700	2450	367,5	8	367,5	7	367,5	5	1,5	2,4	3,5
465	650	3022	453	11	453	9	453	7	0,9	1,4	2
450	1000	4500	675	11	675	9	675	7	0,95	1,48	2,13
500	900	4500	675	12	675	10	675	8	0,8	1,2	1,7
700	700	4900	735	17	735	14	735	11	0,4	0,6	0,8
900	1000	9000	1350	22	1350	18	1350	15	0,2	0,4	0,5
700	1400	9800	1470	17	1470	14	1470	11	0,4	0,6	0,9

REPORT OF TEST RESULT TAG ELASTOMERIC BRIDGE BEARINGS

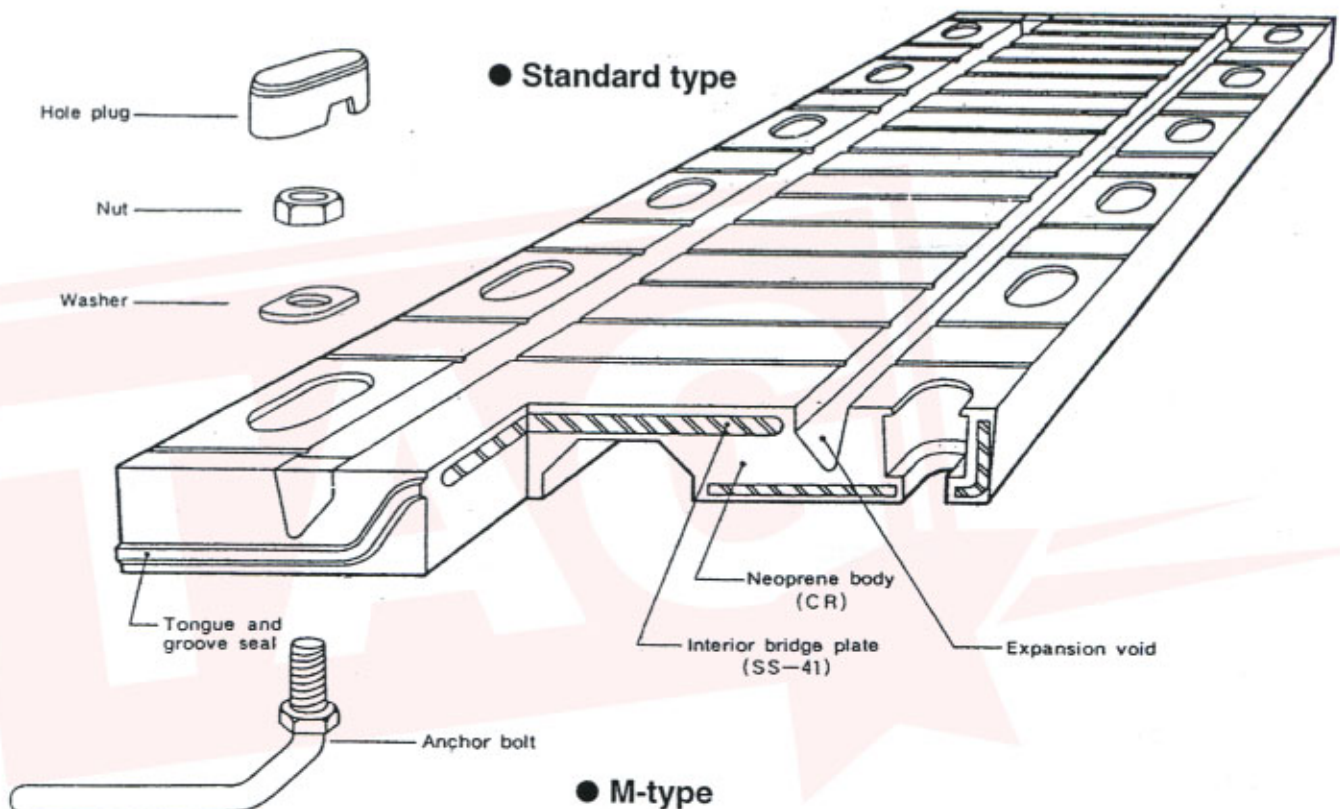
NO.	DESCRIPTION	TEST RESULT	AMERICAN STANDARD AASHTO ; HIGHWAYS BRIDGE, SECTION 25	
			FOR NATURAL RUBBER	FOR NEOPRENE
1	Hardness, Shore A	60	60 ± 5	60 ± 5
2	Tensile Strength psi	2972	Min 2500	Min 2500
3	Elongation at Break ; %	480	Min 400	Min 350
4	Tear Strength ; KN / m	50	-	-
5	Compression Set 25 % ; %	13,72	Max 25	Max 35
6	Adhesion to Metal ; Kg / m	796	Min 40	Min 40
7	Creep 12 ; 168 Hrs	8.2	-	-
8	Ozone resistance 25 pphm 20% strain, $40 \pm 2^{\circ}\text{C}$; 100 Hrs	No Crack	No Crack	No Crack
9	Ozone resistance pphm 20% strain, $40 \pm 2^{\circ}\text{C}$; 100 Hrs	No Crack	No Crack	No Crack
10	Ageing at 70°C ; 70 Hrs - Hardness, Shore A - Tensile Strength, psi - Elongation at break %	60 $\Rightarrow$ 0 % 2787 $\Rightarrow$ 6,2 % 450 $\Rightarrow$ 6,3 %	Max + 10 Max - 25 % Max - 25 %	Max + 15 Max - 15 % Max - 40 %

TAG EXPANSION JOINT

Structure of TAG JOINT

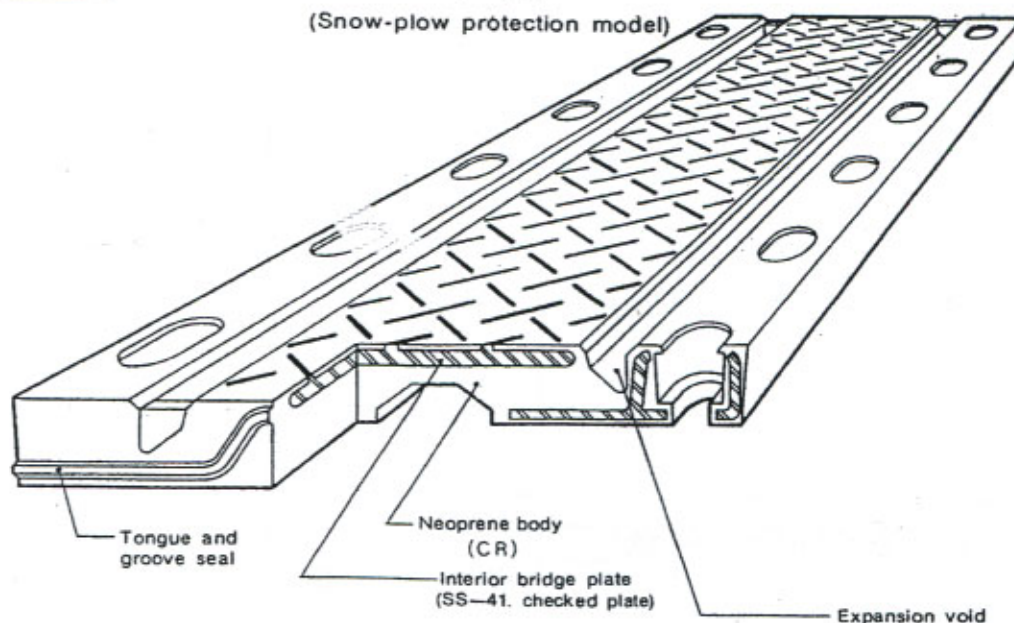
Basic structure consists of a Neoprene rubber body reinforced with a steel bridge plate (SS-41). Taking advantage of characters of both materials, high elasticity of rubber and stiffness of steel. TAG JOINT is designed to absorb and/or disperse all anticipated load-impact caused by the passing of vehicles of TAG JOINT. Expansion and shrinkage of a girder results in movement of TAG JOINT, which can be easily realized by shear deformation of rubber.

● Standard type

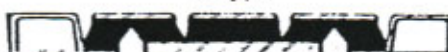


● M-type

(Snow-plow protection model)



■ Model Selection Chart

RALICO JOINT MODEL		Total Travel (mm)	Dimension			Weight (kg/m)
			Width (mm)	Thickness (mm)	Unit Length (mm)	
No. 35	Standard Type  M-type 	35	240	32	1,800	18,1
						23,7
No. 45		45	280	36	1,800	22,6
						30,1
No. 50		50	300	40	1,800	27,2
						35,8
No. 60		60	340	46	1,800	34,7
						40,7
No. 70		70	380	50	1,800	41,1
						49,5
No. 80		80	430	54	1,800	48,6
						58,7
No. 100	100	510	70	1,800	87,5	
No. 160	Standard Type  M-type 	160	706	76	1,800	141,0
						156,0
No. 230		230	875	93	1,800	203,0
						223,0
No. 330		330	1,185	127	900	395,0
						396,0

■ FEATURES

* Varied Models

We have eleven models of TAG JOINT including TF.S model (refer to separate catalogue), which can be well applied for short span bridges to long span bridges.

Therefore situationally appropriate selection of one out of many models of different expansion capability is possible. And because of this, economical installation can be guaranteed.

* Smooth Riding Guaranteed

TAG JOINT is designed to absorb load-impact caused by the passing of vehicles on JOINT. It can support traffic loads across space between slabs. It is easy to install with no vertical misalignment. Therefore, smoother riding and less noise are provided with no practical bump.

* Adaptable to Any Direction

TAG JOINT can be well applied for skew bridges and curved bridges as well as right bridges. Property installed, TAG JOINT can accommodate irregular movements, vertical, horizontal, skew, rotary and straight, due to its own characteristic pf adaptability to any direction.

* Remarkable Long Lasting Durability

TAG JOINT can long-lastingly function as pressure relief joint as well as expansion joint seals. Because of its unique structure, traffic loads to the end of slabs are effectively dispersed.

* Easy to Install

TAG JOINT is easy to install because of its simple shape, and easy to repair for longer maintenance.

* High Resistance to Water Leakage

One body products are prepared for curb and gutter units. Tangle and groove seal and sealant for the joining section of TAG JOINT effectively protect water leakage.

* Adaptable to Any Bridge Types

TAG JOINT can be well adapted for all bridges types, which are for example PC and RC bridges, steel girder bridges and steel plate floor bridges.

INDONESIAN STANDARDS OF ELASTOMERIC BEARING

The Following specifications are taken form the SII 2081-87

* HARDNESS SHORE A 60 ± 10

* TENSILE STRENGTH Min 15N/mm²

* ELONGATION MIN 400%

* AGEING RESISTANCE

Maximum change from initial values

Tensile strength 15%

Elongation 20%

* COMPRESSION SET MAXIMUM 15%

OZONE

25 PPHM Ozone in air by volume

20% strain 40°C, 48 hours no cracks



RUBBER WATERSTOP & PVC WATERSTOP



■ PENDAHULUAN

TAG waterstop adalah senyawa yang terdiri dari bahan baku karet yang direaksi dengan material tambahan lain yang berkualitas tinggi. Untuk memenuhi kebutuhan dan keinginan pemakai, TAG waterstop diproduksi sedemikian rupa untuk memenuhi kebutuhan.

TAG waterstop digunakan oleh sebagian besar dari proyek-proyek besar di Indonesia. Oleh karena nya, TAG waterstop sudah dikenal baik oleh kontraktor dan konsultan lokal maupun luar negeri.

Untuk meyakinkan kualitas TAG waterstop, produk ini dites secara rutin oleh laboratorium riset milik negara. Riset dan penyelidikan yang terus menerus dilakukan juga, dimaksudkan agar memperoleh metode produksi yang terbaik serta komposisi produk yang terbaik agar menghasilkan produk dengan kualitas yang optimal.

■ KEUNTUNGAN

Banyak keuntungan yang dapat diperoleh apabila menggunakan produk lokal seperti TAG waterstop. Ini antara lain, order dan pengiriman dapat dilakukan dalam waktu yang relatif singkat.

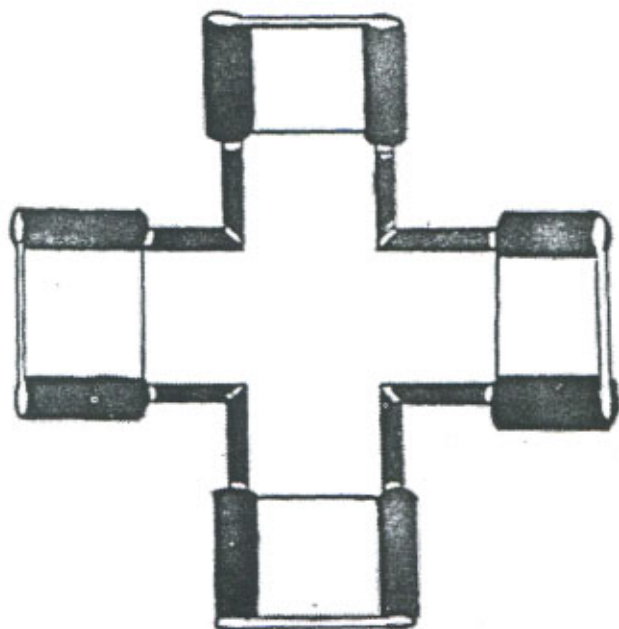
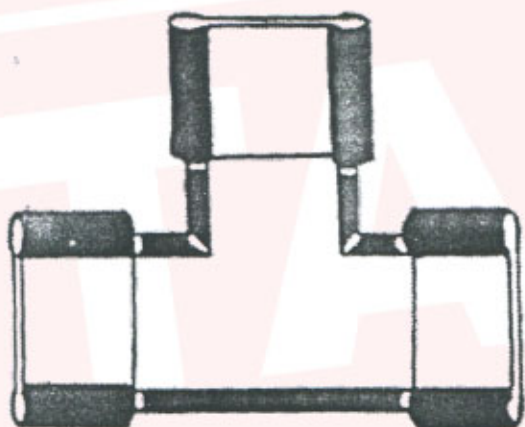
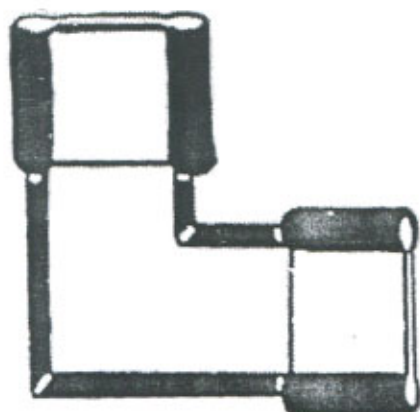
Belum lagi komponen harga. Seperti kita ketahui, Indonesia adalah salah satu produsen karet yang terbesar di dunia, sehingga barang-barang yang di produksi dari bahan baku karet selalu lebih murah daripada bahan baku tersebut diimpor.



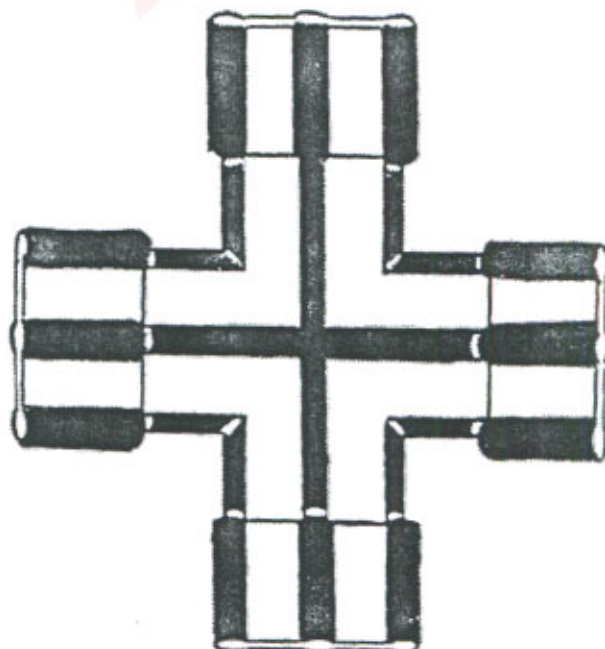
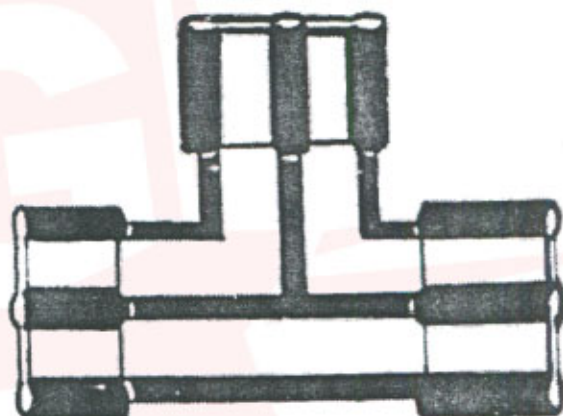
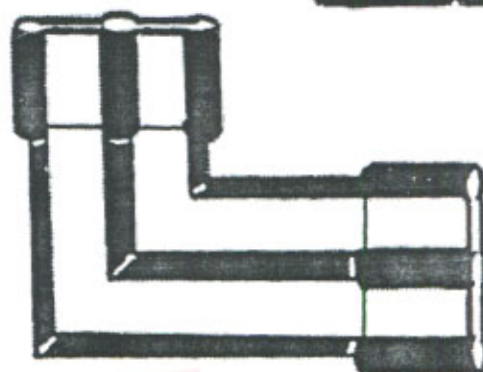
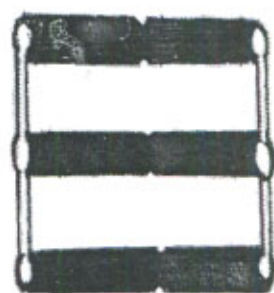
STANDARD SIZE AND SHAPE RUBBER WATERSTOP

Shape	Type-Code	Application
	FLAT DUMBBLE (FD 15)	CONSTRUCTION JOINT : Basement, Roof, Wall, Subway etc.
	FLAT DUMBBLE (FD 20)	
	FLAT DUMBBLE (FD 22,5)	
	CENTRE BULB CORRUGATED (CBC 15)	EXPANSION JOINT : Basement, Subway, etc.
	CENTRE BULB FLAT (CBF 20)	CONSTRUCTION EXPANSION JOINT : Basement, Swimming Pool Water Reservoir, Tunnel, Dam, Waterway, Syphon, for low pressure
	CENTRE BULB FLAT (CBF 23)	
	CENTRE BULB FLAT (CBF 25)	
	CENTRE BULB FLAT (CBF 30)	EXPANSION JOINT : Water tunnel, Water reservoir, for high pressure
	CENTRE BULB CORRUGATED (CBC 20)	
	CENTRE BULB CORRUGATED (CBC 23)	
	CENTRE BULB FLAT (CBC 25)	
	CENTRE BULB CORRUGATED (CBC 30)	

FLAT DUMBLE



CENTRE BULB FLAT



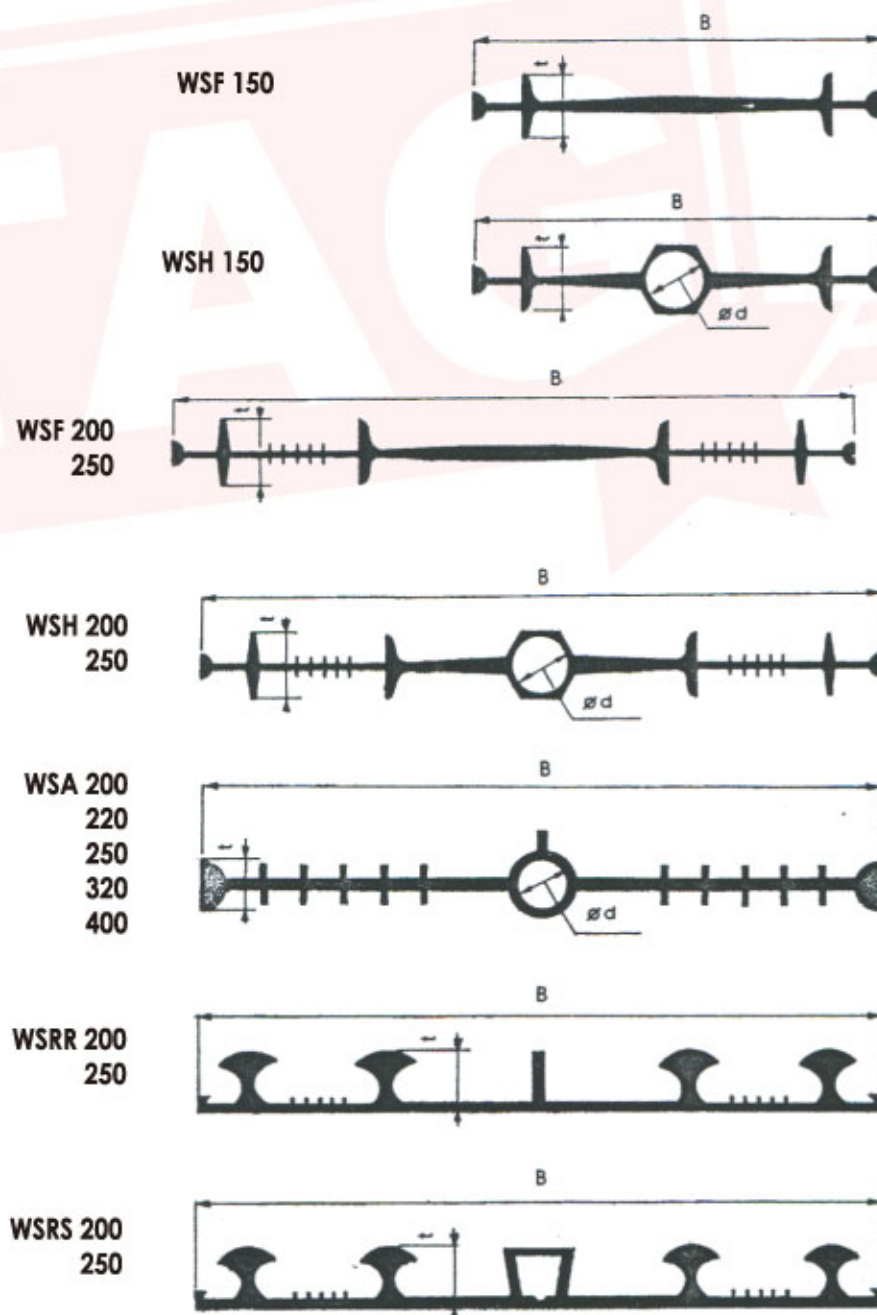
SOCKET

PVC WATERSTOP

PVC WATERSTOP merupakan andalan khusus dalam konstruksi beton bertulang, serta mempunyai peranan penting dalam perlingkungannya terhadap kebocoran air, akibat dari rembesan air yang masuk ke konstruksi beton, dampaknya akan berpengaruh besar. Dengan adanya **PVC WATERSTOP** ini, masalah yang timbul karena rembesan air terhadap konstruksi beton bisa teratasi.

Memang **PVC WATERSTOP** sangat dibutuhkan saat ini, karena keandalan nya dapat menahan tekanan akibat penyusutan beton sehingga terjadi tegangan tarik (tension-strength), serta tahan terhadap tegangan geser (Shear Strength) yang disebabkan perubahan sambungan beton karena turun nya permukaan tanah. Sebaliknya jika terjadi gangguan udara terhadap beton, pada saat itu kedua tegangan antara Shear dan tension terjadi, maka barulah gangguan tersebut akan menimbulkan pengaruh terputusnya perlindungan kebocoran (**PVC WATERSTOP**) air tersebut. Akhir-akhir ini **PVC WATERSTOP** telah digunakan secara luas dalam teknik konstruksi mesin, penampungan air, serta bangunan pabrik besar maupun kecil dan hasil yang diperolehnya sangat memuaskan.

TYPE



SPESIFIKASI

TYPE	WIDTH B (mm)	THICKNESS t (mm)	BULB DIAMETER O d (mm)	LENGTH (M/Roll)
WSF - 150	150	20	-	25 - 50
WSH - 150	150	20	13	25 - 50
WSF - 200	200	20	-	25 - 50
WSH - 200	200	20	13	25 - 50
WSF - 250	250	24	-	25 - 50
WSH - 250	250	24	16	25 - 50
WSA - 200	200	11	13	25 - 50
WSA - 220	220	11	15	25 - 50
WSA - 250	250	14	18	25 - 50
WSA - 320	320	16	18	25 - 50
WSA - 400	400	18	18	25 - 50
WSRR - 200	500	20	-	25 - 50
WSRR - 250	250	22	-	25 - 50
WSRS - 200	200	20	-	25 - 50
WSRS - 250	250	22	-	

Bentuk dan spesifikasi lain : perusahaan kami dapat menciptakan model baru dalam memenuhi kebutuhan produksi

KEUNGGULAN

KATEGORI KHUSUS

Setiap bentuk dibuat secara teliti oleh para ahli, model-model dibuat sedemikian rupa sehingga selalu sesuai jika dipasang pada konstruksi yang berbeda, serta benar-benar sesuai dipasang pada beton dalam menahan pengaruh kebocoran air secara sempurna.

BAHAN BAKU SANGAT BAIK

PVC Waterstop dibuat dari salah satu bahan plastik dengan formula khusus yang tahan terhadap bahan-bahan perusak, mempunyai gaya pegas dan tahan terhadap korosi. Tidak akan rusak akibat pengaruh asam, alkali, serta garam dari logam walaupun ditanam dalam beton untuk jangka waktu yang lama.

RINGAN

PVC Waterstop mempunyai berat yang lebih ringan dibanding dengan material lain, sehingga sangat mudah untuk dikemas, dibawa, dan dipasang.

MUDAH DALAM PENYAMBUNGAN

PVC Waterstop dapat dipotong dengan menggunakan pisau pemotong dan mudah disambung dengan soft welding road dan welding gun biasa, sehingga sambungan mempunyai kualitas yang sama. Pengaruh dalam fungsinya sebagai saluran air selam pemakaian sangat baik dan tidak ada material lain yang menandinginya.





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