



Rubber Waterstop

Rubber waterstop is made of synthetic rubber, which has good elasticity and tear resistance. Under various loads, elastic deformation will occur to adapt to the ability of concrete telescopic joints to deform, and it is suitable for the construction joints, complete shrinking joints, incomplete contraction joints, telescopic joints, etc. Rubber waterstop is widely used in waterproof treatment in roads, bridges and other projects, which can prevent water leakage and extend the life of roads and bridges.

Rubber waterstop is made by adding various additives and fillers to synthetic rubber with good weather resistance and corrosion resistance, and undergoing processes such as plasticization, mixing, pressing, and molding. Rubber waterstop is a waterproof material used in buildings, water conservancy, tunnels, underground engineering, etc. It can be classified into buried rubber waterstop, back attached rubber waterstop, and steel edge rubber waterstop.



[Rubber Waterstop]



[Rubber Waterstop]

The advantages of rubber waterstops are durability, corrosion resistance, good elasticity and tear resistance, easy to install and maintain, and can adapt to the seams of various shapes and sizes. At the same time, it can also be used with other waterproof materials such as waterproof coatings and coils to improve the overall waterproof effect of the building.

Rubber Waterstop Features:

- Excellent elasticity and flexibility;
- High elongation;
- Excellent high movement accommodation;
- Capable to withstand high hydrostatic head;
- Adjust for subsidence and seismic movements;
- Resistant to abrasion and tearing;
- Resistant to corrosion and chemicals;
- Resistant to weather and aging;
- Excellent sealing effect.

Advantages:

High elasticity, high elongation, excellent corrosion resistance, good durability and great adaptability to terrain changes.

Disadvantages:

When used for a long time, it is easy to aging and lose the original waterproof performance. Moreover, welding can only be conducted at a higher temperature and pressure.

APPLICATION

(1) The rubber waterstop is used for water conservancy projects. For example: reservoir, hydropower stations, large water pipes, channels, etc. In these water conservancy projects, rubber water stops can be used for slope projects such as dams, flood discharge channels, and water plenty of water tunnels to ensure the safe and stable operation of water conservancy projects.

(2) The rubber waterstop is used for underground engineering. Underground engineering includes underground tunnels, underground garages, underground malls, etc. The rubber water antipitrimating belt has good flexibility and corrosion resistance, which can effectively prevent groundwater leakage and improve the operating efficiency and safety of the project.

(3) The rubber waterstop is used for waterproof projects. For example: roof waterproof, basement waterproof, bathroom waterproof, pool waterproof, etc. The rubber water stop has strong durability and anti-seepage performance, which can become an important part of waterproof materials.

SPECIFICATIONS OF RUBBER WATERSTOP**TECHNICAL STANDARD FOR RUBBER WATERSTOP GB**

No	Item		Index			Applicable test entry
			B、S	J		
				JX	JX	
1	Hardness (Shar A) /degree		60±5	60±5	40-708	5.3.2
2	Stretching strength /MPa ≥		10	16	16	5.3.3
3	Pulling elongation /% ≥		380	400	400	
4	Compression set /%	70℃×24h, 25% ≤	35	30	30	5.3.4
		23℃×168h, 25% ≤	20	20	15	
5	Tear intensity KN/M		30	30	20	5.3.5
6	Crispy temperature °C		-45	-40	-50	5.3.6
7	Hot air aging (70℃×168h)	Hardness changes (Shar A) /degree ≤	+8	+6	+10	5.3.7
		Tensile StrengthMPa ≥		13	13	
		Stretch stretch % ≥	300	320	300	
8	Ozone aging 50×10 ⁻⁸ : 20%, (40±2)℃×48h		Crackless			5.3.8
	Rubber and metal bonding ^b		Rubber inter -rubber destruction	/	/	5.3.9
10	The strength of rubber and curtain adhesion ^c (N/mm)			/	/	5.3.10

TECHNICAL STANDARD FOR RUBBER WATERSTOP ASTM

Physical properties	Test methods	SBR	High tensile neoprene rubber	Natural rubber
Water absorption 2 days at 70°C (% change)	ASTM D-471	5% (max)	5% (max)	5% (max)
Hardness shore A	ASTM D-2240	65	65	65
Tensile strength	ASTM D- 412	3000 psi (min)	2500 psi (min)	3500 psi (min)
Tensile strength at 300% Modulus	ASTM D-412	1150 psi (min)	1150 psi (min)	1450 psi (min)
Ultimate elongation	ASTM D-412	450% (min)	450% (min)	500% (min)
Compression set 22 hours at 70°C (% original deflection)	ASTM D-395	30% (max)	40% (max)	30% (max)
Accelerated aging 96 hours at 70°C (% of tensile strength before aging)	ASTM D-573	80% (min)	80% (min)	80% (min)
Accelerated aging 96 hours at 70°C (% of elongation before aging)	ASTM D-573	80% (min)	80% (min)	80% (min)
Ozone resistance 7 days at 50 PPHM at 70°C, 20% elongation	ASTM D-1149	No crack	No crack	No crack

COMPARISON OF MEDIUM-BURIED, BACK STICKERS, AND STEEL-EDGED WATERSTOPS:

Middle buried rubber waterstop is a type of waterstop product mainly used for setting up inside concrete deformation joints, expansion joints, and other concrete structures. It has the ability to adapt to concrete expansion deformation through the elasticity and structural form of rubber materials.



Back stick rubber waterstop refers to a rubber waterstop with waterproof vertical reinforcement on one side, and external adhesive rubber waterstop is also known as back adhesive rubber waterstop. Commonly used on the outer side (upstream) of concrete deformation joints and settlement joint wall panels.

Steel edge rubber waterstop is a moisture-proof and waterstop material at the joint made of rubber, mixed rubber, and galvanized steel strip. The two wings of the steel edge rubber waterstop are equipped with galvanized steel strips, with a rubber thickness of 6-10mm.



COMPARISON OF THREE KINDS OF RUBBER WATER STOP CHARACTERISTICS:

- The working principle of medium buried rubber waterstops is to utilize the high elasticity and compressive deformation of rubber waterstops to generate elastic deformation under various loads, thereby tightening and sealing, preventing water leakage and seepage of building components, and playing a role in shock absorption and buffering, ensuring the service life of engineering buildings.
- Back sticks rubber waterstops have high durability and can resist natural environmental erosion and physical damage, thereby extending the service life of buildings. The external rubber waterstop adopts self-adhesive technology, which only requires the waterstop to be adhered to the surface of the building to ensure a clean and dust-free surface, achieving reliable waterproof effect.
- The rubber main material used for steel edge rubber waterstop is natural rubber with excellent aging resistance and various anti-aging agents, which has strong self-adhesiveness. Its special steel edge design can enhance the compressive strength and stability of the waterstop, ensuring its sealing effect under water pressure.

COMPARISON OF THREE TYPES OF WATERSTOP APPLICATIONS:

- Medium buried rubber waterstops is mainly used in permanent deformation joints that must be set up during cast-in-place concrete pouring, such as water channels, tunnel outlets, retaining dams, water conveyance aqueducts, etc.
- Back sticks rubber waterstop is mainly used for foundation engineering, underground facilities, tunnel culverts, water conveyance aqueducts, water retaining dams, etc., which are installed in construction joints and deformation joints during cast-in-place concrete pouring, and integrated with concrete structures to ensure the service life of engineering construction.
- Steel edge rubber waterstop is suitable for waterproofing projects in buildings, tunnels, and reservoirs that require high compressive strength and high water pressure, such as basements, underground parking lots, underground trenches, tunnels, etc. Its reliable sealing performance and excellent compressive strength can effectively prevent leakage, and it also has explosion-proof characteristics, which have important applications in certain special projects.

Overall, rubber waterstops are an extremely practical building material with a wide range of applications and diverse fields of application. It can have a good sealing effect, ensure the stability and safety of the project, and is an indispensable part of construction engineering. It is suitable for the temperature range of -45°C to $+60^{\circ}\text{C}$. Rubber waterstop cannot be used when the temperature exceeds $+70^{\circ}\text{C}$ and in the conditions where rubber waterstop is oxidized or corroded seriously by organic solvents.



PROJECTS CASE OF RUBBER WATERSTOP



[Swimming Pool Construction in Gambia]



[Tunnel Construction in Mozambique]

CONSTRUCTION OF RUBBER WATERSTOP

(1) According to the construction drawings, the rubber waterstop can be first laid straight and then installed in the correct position, which can be glued or mechanically fixed.

(2) It is also important to fix the rubber waterstop during construction. Glue can be used to firmly bond the rubber waterstop to the components, ensuring that there are no gaps between the rubber waterstop and the components. Rubber waterstops can also be fixed in the installation position using materials such as bolts and steel wires.

(3) When using rubber waterstops, they can be cut according to a certain size and shape to ensure the fit and sealing with the components.

(4) For the corner position of rubber waterstops, connection treatment is required. Joint connections can be made using adhesive bonding, hot melt welding, and other methods to ensure the sealing and firmness of the connection.

Precautions for construction of rubber waterstops:

- When pouring and positioning during construction, attention should be paid to the impact force of pouring to avoid puncturing the rubber waterstop due to excessive force.
- When positioning the rubber waterstop, it is necessary to maintain balance at its interface and not let the waterstop roll or twist.
- When positioning the rubber waterstop, it is necessary to prevent the waterstop from shifting to avoid shortening on one side and affecting the waterstop effect.
- When pouring and compacting concrete, it is necessary to allow for vibration to avoid poor bonding between the water stop strip and the concrete, which may affect the water stop effect.
- The joint of the waterstop must be well bonded. If the construction site conditions are available, the hot vulcanization connection method can be used.

- Rubber waterstop is suitable for water containments;
- Rubber waterstop is suitable for tunnels and civil engineering structures;
- Rubber waterstop is suitable for dams, reservoirs, diversion tunnels, and spillway;
- Rubber waterstop is suitable for chemical areas;
- Rubber waterstop is suitable for irrigation canals, sea walls and culverts;
- Rubber waterstop is suitable for sewage treatment plant;
- Rubber waterstop is suitable for swimming pools;
- Rubber waterstop is suitable for reservoirs;
- Rubber waterstop is suitable for water tank;
- Rubber waterstop is suitable for basement areas;
- Rubber waterstop is suitable for underground car park;
- Rubber waterstop is suitable for retaining walls.

