



# WATERWALLS - WW

INSTRUCTION FOR USE

**Rubena**

THE POWER OF FLEXIBILITY

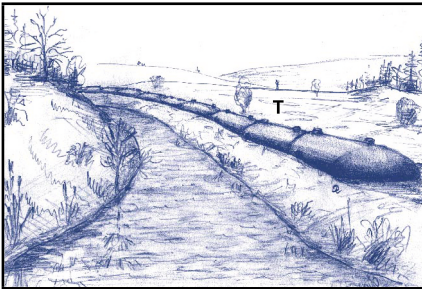
## CAUTION

Before using the waterwalls read this instruction with care. The user of waterwalls is obliged to follow the guidelines of this instruction. If the user disregards this instruction, the producer of waterwalls will not bear any responsibility for damages due to their improper use, which may damage the products and cause serious hurts to the user or even his death.

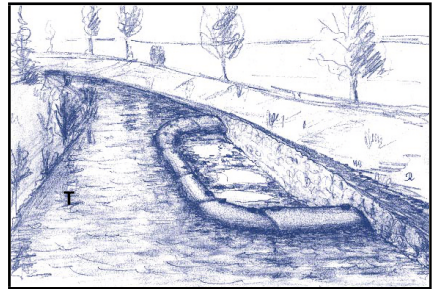
The waterwalls are produced in accordance with manufacturer's specification TPD 262. The manufacturer does not deliver standardly this specification together with every product, it is provided only on customer's request.

## APPLICATION EXAMPLES OF WATERWALLS – WW

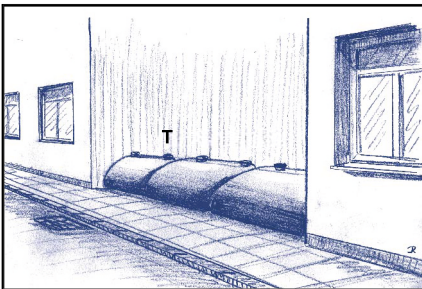
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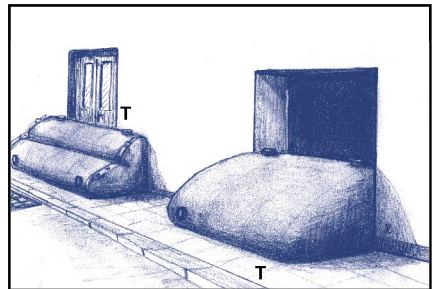
Bank raising of the river



Cofferdam building



Impounding of flood water at diffusion in the streets



Protection of doors, passages, freight ramps and others

# PREPARATION FOR APPLICATION OF WATERWALLS (HEREINAFTER REFERRED TO AS WW)



Transport WW in the stand-by position to the action site (see Figure 1) and unwind WW as necessary (see Figure 2 and 3).

It is necessary before actual WW application to check at first their consistency and completeness with respect to possible damage during transport. It is especially necessary to check the surface integrity of WW (cut-outs, punctures, stripped fabric) and condition of the necks. Such defects are considered to be a ground for putting WW out of service.

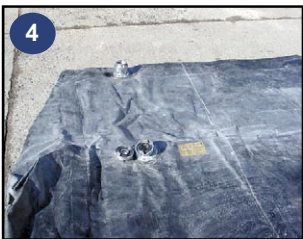


**During all WW handling (except for storage) make sure, that covers close all the necks of every WW.**

## DISPOSITION AND ASSEMBLY OF WW

All WW are equipped with vulcanised bonded rubber-textile grips with metal loops for carrying and handling. For facilitation of handling, it is possible to pass an anchor cable (cord), which constitutes an integral part of the delivery, through the metal loops. Having adjusted WW in the required position, it is possible to remove the cable and use it e.g. for anchorage or linkage of WW in dependence on expected dynamic range of the flood wave.

For raising banks alongside a river in larger lengths the longest WW types A are always used, in other cases the desirable protective effect will be obtained by using a combination of WW with suitable length and design. The manufacturer's standard delivery range includes WW from 2 to 5 m long.



If a WW is used as a protection of brittle or less compact objects (e.g. glass door panels), it is suitable to support them by inserting e.g. boards, plates, etc. between WW and the protected object, in order to prevent any damage caused by the water pressure.

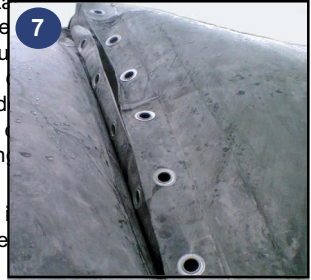
It is in principle possible to locate WW almost on any basement. Especially suitable is emplacement on a consolidated background – cement concrete, pavement, asphalt and the like. If the flood conditions allow, it is strongly recommended to clear the area for WW of sharp and similar dangerous objects. If not necessary, do not position the WW on too slippery surfaces without anchorage, in order to prevent their displacement, or on a sandy or chiselly background where WW underwashing might come about. The individual WW are spaced on the designated place side by side in such a way that they lie on the underside (with their filling and venting necks above and with the discharge spout (neck) towards water (see Figure 4 and 5).



The best tightness among individual WW can be obtained in such a way that the bottom edge of the lateral end at one of the adjoining WW will be moved by about 20 cm under the edge of the adjacent WW and both lateral ends will be folded back (see Figure 6). In such a manner it is possible to obtain a certain “pre-tension” when setting individual WW together. The more tightly WW are set together, the greater tightness will be obtained.



Individual WW are equipped at their top part with grips having metal loops. These grips are intended to tie individual WW to each other. The tying itself should be done after seating and filling up individual WW walls, if dynamic impact of the flood wall is expected, by means of a rope passed through the metal loops (see Figure 7). This provides better stability of joined WW, however, as a rule, at the expense of less tightness among individual WW. For final watertight sealing, e.g. mounting foam, cotton, rags, clay, etc. can be used.



For a restricted area where only a larger WW than the area is available, this can be „bent“ upwards and its tightness adjusted by „squeezing“ (making an angle).

## FILLING WITH WATER

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It is possible to use for filling WW essentially any water source – various pump models for river water or water from other sources for fire fighting or other tanks, fire hydrant connections, water supply lines, and others (see Figure 8). Connection to the WW filling neck can be done by a fire hose C 52 (alternatively B75, if WW is fitted with these necks and connections).



In case of emergency it is possible to fill the WW even by the help of a thinner hose, without connection coupling, inserted through the filling neck directly in the WW.

It is possible to fill several segments at once (according to the technical equipment available) or in turn one segment after another (see Figure 9). When using this method it is always necessary to move next segments as carefully as possible under the sidewalls of adjacent already full, WW (as described above in the paragraph “Disposition and assembly of WW”).



After filling up, correctly assembled WW exhibit a very good tightness between the two adjacent WW segments (see Figures 10 and 11).



## **IMPORTANT NOTICE No. 1 (related to all types)**

When using WW for contact protection of objects, it is necessary to secure the rubber-textile WW material from coming into direct contact with sharp or too rough object edges, e.g. sharp corners of sheet-metal drips and so forth. The WW during filling gradually rise and rub against the edges and it is necessary to prevent them from damage. The thoroughly protection is carried out by wrapping the sharp or too rough edge with suitable fabric, PE or PVC sheeting of sufficient thickness, alternatively by inserting boards or other smooth plates.



In such a manner it is possible to reach long lifetime of products even at frequently repeated application.

WW type "B" are applied as a rule for protection of objects as individual pieces. The design of the bag type "B" is not quite self-supporting, therefore it is necessary to base it upon the protected object (see Figure 12).

In order to obtain the maximum sealing effect when using WW type "B", it is necessary to position the WW by its bottom edge exactly to the protected wall and during filling operation to check, or possibly adjust the position of rising sidewalls.

Whith WW filled at maximum, maximum stability is also obtained. At filling to between 80 and 90 % of total volume, maximum packing effect is achieved. It is valid in this case too that in the event of necessity (when expecting a strong dynamic impact - including a lateral one), it is possible to anchor the WW (see Figures 13 to 16).



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## **IMPORTANT NOTICE No. 2:**

**WW of all types are only filled with water, without applying any pressure!**

**For compliance with this requirement it is necessary, when filling WW, to strictly follow the following instruction:**



- | **Check if all the discharge spouts are closed with covers (caps).**
- | **Connect the water source hose to the filling neck by means of coupling C 52 (or B 75). It is possible to use for filling any of the two upper necks. The other one will then serve as venting (air escape) neck (see Figure 17).** In case of WW positioned on a sloping ground (in the lengthwise direction, WW is always filled through the neck which is under these circumstances lower.

1 | **Open the venting neck and turn on the filling water source** (see Figure 18). During filling keep the orifice of venting neck above water level in WW in such a manner that water will not flow out.

1 | During filling it is necessary to monitor the behaviour of WW in order to detect the defects, which could be omitted at the initial visual inspection.

The manufacturer admits minor water leakage on the WW surface, in particular at seams. This minor water leakage does not constitute any functional defect of WW.

1 | As soon as the WW is full of water (water spontaneously flows out of the venting neck), turn off the water source, disconnect the hose and quickly close both upper necks with covers (see Figure 19-21).



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1 | Use the same procedure for the next WW.

**It is very important that the venting neck is opened especially when finishing the filling operation. This prevents possible generation of high pressure in the WW, which could result in its destruction!**

1 | **The WW is fully fail-proof (depending on its position in the field) at maximum up to the height of retained water column.** In case of other conditions WW stability may be lost.

### SAFETY WARNING:

If the height of retained water acting on WW should exceed the maximum height of retained water column for the given WW type, the WW stability may be lost resulting in a consequent water outflow in the protected zone!

In extreme situations, it is possible to obtain higher WW stability by loading a burden on its upper surface (e.g. stacking of sandbags on the WW upper surface). This way higher blocking height can be also obtained (See Figure 22).

Considering the WW design and kind of surface on which WW are placed, may under operating conditions come to minor water leakage through the built-up WW barrier, especially in places where individual WW contact each other. However, such water leakage at time of flood situation is negligible and it is possible to minimise it by exact assembly of the barrier from individual WW.

Nevertheless, if it should be necessary to eliminate completely such water leakage, then the above-mentioned recommendation for final sealing is valid.



## DISCHARGES

If no more needed, the WW are simply disassembled. The discharge or possibly upper necks of individual WW will be opened and water will be let to flow out (see Figures 23 to 25). If connecting ropes have been used, they will be untied and removed from the WW for easier discharge.



It is suitable for instance to make use of a ground slope for optimal discharge. If this is not the case, we recommend the so called "fold discharge". We take up one corner at the side where we have no open neck and gradually pull it across to the opposite corner with an open neck (see Figure 26).



We support this way expulsion of water from the area in front of the flexure (see Figure 27).



By rolling the WW we force out the residual water, after that we unroll WW again and prepare for storage (see Figure 28).

It is possible to use also a mobile motor fire pump for discharge, for instance PS 8 or PS 12.

- | The pumping unit must be equipped with fire couplings C 52 (B 75) or with a reducer B 75 / C 52.
- | For PS 8, PS 12 and analogous types it is necessary to select (adjust) the minimum pumping power, in order to prevent leeching onto the WW face and consequent damage of the wall.

To remove the water inside WW, a high-lift truck or another similar handling equipment may be used. Put WW centrally on the high-lift truck fork and begin to lift it slowly upwards. This will cause further discharging the water remaining inside WW. Doing this discharging operation, great care must be taken with respect to the amount of the water remained inside WW to prevent the WW damage.

## FURTHER PRODUCT APPLICATION

It is possible to use WW also as an industrial water reservoir for various purposes, or as a collecting bag for contaminated water. WW relatively well resist solutions of various chemical agents. For these agents it is possible to use WW as emergency collecting bags in the short run.

The following table indicates principal resistance to individual aggressive fluids for rubber and fittings, used for to the fabrication of WW.

The resistance of WW to chemical agents may be tailored to the customer's requirements by using; special materials of WW rubber parts and various fitting materials is available at the manufacturer.

## Orientalional resistance of the product

CHEMICAL	Condition A max. 5% solutions of chemicals	Condition B max. 30% solutions of chemicals	Condition A max. 5% solutions of chemicals		Condition B max. 30% solutions of chemicals		Neutralisation we suggest to dilute at first
	EPDM	EPDM	aluminium	brass	aluminium	brass	
Sulphuric acid	1	2	4	2	4	2	rinse by a water flash + neutralise by a 3% solution of soda
Hydrochloric acid	1	2	4	4	4	4	
Nitric acid	2	2	1	3	2	4	
Hydrofluoric acid	1	3	4	4	4	4	
Phosphoric acid	1	2	2	3	3	3	rinse by a water flash + neutralise by 2% vinegar solution*
Sodium hydroxide	1	1	4	1	4	1	
Potassium hydroxide	1	1	4	2	4	2	
Calcium hydroxide	1	1	4	2	4	2	rinse by a water flash
Sodium carbonate	1	1	4	1	4	1	
Potassium carbonate	1	1	4	3	4	3	
Calcium carbonate	1	1	4	2	4	2	
Sodium hypochlorite	1	2	4	4	4	4	
Calcium hypochlorite	1	2	4	2	4	2	
Benzene	2	4	2	1	2	1	wash with detergent and rinse by water
Xylene	2	4	1	1	1	1	
Naphtha (fuel oil)	2	4	1	1	2	2	
Antifriction agents	2	4	1	1	2	2	
Aliphatic hydrocarbons	2	4	1	1	2	2	
Aromatic hydrocarbons	2	4	1	1	1	2	
Cyclic hydrocarbons	2	4	1	1	2	1	

Note: \* acetic acid.



## MAINTENANCE OF WW

After application of WW, clean out major water part of them. Minor water residues will evaporate during storage, it is not a fault.

Remove mechanical and other impurities from the WW surface. The best way is to splash WW surface by a water stream.

If oil products have contaminated the WW surface, it is necessary to remove the greasy skin with the help of a suitable detergent and then rinse (splash) with clean water, after such application the WW surface must be re-inspected and if some damage to WW is found, the WW must be repaired at the manufacturer or discarded.

It is suitable to let the surface to dry before storage (not necessary).

Coating with agent Resistin ML or a similar one should preserve metallic parts.

## STORAGE OF WW

For storage of WW we recommend to follow the specification of ČSN 63 0001 (analogous to DIN 7716):

1. To store in a cold, dry and dark space. Storage temperature should be +25 °C up to -10 °C. The temperature in this interval should not be changed suddenly.
2. The stockroom relative humidity should be 60 – 65 %.
3. The WW should not be exposed to heat of radiation.
4. It is impossible to store in the stockroom simultaneously solvents, motor fuels, lubricants, disinfectants, acids and hydroxides or other chemicals.
5. It is not allowed to work in the stockroom with electric apparatus generating ozone (for instance by sparking).
6. A long-term contact with copper or corrosive objects exhibits a detrimental effect on WW.

Individual WW should be stored empty, unrolled to the full length.

It is possible to stack WW of the same length upon one another up to 10 pieces. In order to prevent damage in the bent parts, it is necessary to re-laid the WW once a year. The down stored WW should be placed atop and vice versa. At the same time with re-laying, it is necessary to place every WW in another way, then it was lying before – that means to shift by this transfer the folds and laps, that have been formed on the empty WW to another place.

It is necessary to let all the neck covers open, so as the WW interior could gradually dry up.

## TECHNICAL DATA

The textile ply is made of a high strength PES fabric with a double-sided rubber coat. The applied rubber based on EPDM is resistant to climatic influences, ozone, U-V-radiation in the long term and it features good abrasion resistance.

The connecting and fixing polypropylene cable (rope) is characterised by sufficient tensile strength, it is moisture-proof and long term resistant to atmospheric influence.

The material of which WW are manufactured withstands for a long time standard climatic conditions in the limiting interval -10°C up to +60°C. If a risk of frozen water in WW exists, it is necessary to reduce the water filling to 80 %.

## Condition A

It is presumed that contaminated waste water shall contain a small quantity of chemicals, that means up to 5% concentration, relating to the total volume of contaminated waste water.

## Condition B

Possibility of WW application as collecting bags for chemicals up to 30% concentration. The application is more limited – consult the table.

Degree of resistance	Rubber section defined by time	Metallic section defined by decrement
1 excellent	several weeks	< 0,05 mm / year
2 good	1 to 2 weeks	< 0,5
3 low	several days	0,5 – 1,3
4 bad	several hours, max. 24 hours and thereafter disposal of the bag	> 1,3

### Warning notice:

**The manufacturer calls your attention to the necessity to know chemical reactions in case of neutralisation directly in the bag. For instance generation of gases is concerned, which might cause destruction in case of the closed bag.**

## **IMPORTANT NOTICE No. 3:**

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The holding time of aggressive chemical agents in WW should be minimal and in any case may not, depending on category and concentration, exceed the times, which are listed in the table as a framework. In case of aggressive fluids (acids, hydroxides) at which the process of simple chemical neutralisation is well known, it is possible to carry out the neutralisation by application of a suitable chemical directly into WW. It is important particularly considering the metallic parts, which may, depending on concentration of acids and hydroxides, exhibit substantially shorter resistance period than actual rubber-fabric bag.

In case of WW application as a collecting bag, the best-fit use is directly on the spot with subsequent consequent withdrawal into a final collecting tank or cistern.

The WW are not constructionally designed in such a manner, that it would be possible to handle with full WW (for instance to load them on an automobile platform). A situation may come round, that it will be necessary (e.g. for safety reasons or serious damage to the environment) to carry the full WW away from the casualty locality to a safer place. In such a case it is necessary to fill the WW by means of a suitable pump directly on automobile platform. The transport itself must be realised with care. It is necessary to secure the full WW on the automobile platform against movement by manifold belting with the help of suitable clamping straps, which are available from the manufacturer. It is necessary to eliminate to maximum extent dynamic forces, arising from the movement of transported liquid in order that no WW destruction or even car crash may come about!

If the WW have been used at an accident, e.g. for short-term draining of aggressive fluids, it is necessary to follow the current antipollution environmental protection regulations at discharging, to apply such used WW no more and to arrange for its environment-friendly disposal.

## IT IS FORBIDDEN DURING APPLICATION OF WW

- m to fill WW with water in such a way that arises inside, any overpressure,
- m to use a damaged or incomplete WW,
- m to apply WW for filling with petrolic or other aggressive chemicals in other way, than accordingly to this instruction,
- m to clean WW with the help of organic solvents (toluene, benzine, etc.),
- m to stay in the area behind WW if in case of flood a risk of increased water level above the maximum protective height for the given WW type exists. WW might be displaced or turned over.

## MANUFACTURER'S ADDRESS

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