MODERN STORM WATER DRAINAGE SYSTEM

Underground holding tanks from HelCor® helically corrugated steel pipes

ViaCon

Tanks made from HelCor® helically corrugated steel pipes manufactured by ViaCon can be used as:

- holding tanks in a gravity storm water drainage systems
- fire water tanks
- process water tanks (pH in the range from 3 to 12)
- settlement tanks for waste water pre-treatment (removal of suspended matter)
- coalescence separators for removal of petroleum derivatives from storm water

As a part of the system there are also produced:

- pumping stations
- wells
- interceptors and pipelines

High strength parameters of HelCor® pipes allow building the system under a road or a car park — the minimum earth cover over the tank in vehicle traffic areas is 0.6 m, including structural layers of the pavement. The maximum installation depth of tanks is a dozen or so meters.

A drainage system made from HelCor® pipes obtained a positive opinion of the Central Mining Institute in the scope of use in areas affected by mining damage of category I-IV.

The tanks are manufactured with internal diameters ranging from 1000 to 3600 mm, while the maximum length of a single element is 16 m. This means that it is possible to manufacture a single tank with a volume of over 150 m3 without a necessity of assembling it from elements at the construction site. In other arrangements, individual elements are joined together with the use of flange connections that ensure complete leak tightness of the system.

All tank elements are protected against corrosion in the factory through hot dip galvanizing with a coating thickness of 42 µm, and additionally by the Trenchcoating™ polymer coating with a minimum thickness of 250 µm. The protection ensures resistance of coatings to corrosive action of waste water in the pH range from 3 to 12. There is no need to make additional protection of the tank surface.

Detailed data are presented in the table showing the chemical resistance of the Trenchcoating™ polymer coating.

Test	Test method	Result	
Resistance to 10-percent concentration of HCl	ASTM D1308	No reduction in the coating thickness	
Resistance to HNO_3	ASTM D1308	No reduction in the coating thickness	
Resistance to NH4OH	ASTM D1308	No reduction in the coating thickness	
Resistance to NaOH	ASTM D1308	No reduction in the coating thickness	
Resistance to 30-percent concentration of H_2SO_4	ASTM D543, A742	No reduction in the coating thickness	
Resistance to NaOH	ASTM D543, A742	No reduction in the coating thickness	
Resistance to 10-percent concentration of NaCl	ASTM D543, A742	No reduction in the coating thickness	
Resistance to SO_2 vapours	DIN 50018, 2.0L	No reduction in the coating thickness	
Resistance to chloroform (trichloromethane $CHCl_3$)	ISO 175, 28 days, 23°C	No reduction in the coating thickness	
Resistance to DMSO (dimethyl sulfoxide) $(CH_3)_2SO$	ISO 175, 28 days, 23°C	No reduction in the coating thickness	
Resistance to $MeCl_2$ (methylene chloride)	ISO 175, 28 days, 23°C	No reduction in the coating thickness	
Resistance to THF (tetrahydrofuran) C_4H_8O	ISO 175, 28 days, 23°C	No reduction in the coating thickness	
Resistance to 20-percent concentration of NaOH in water	ISO 175, 90 days	23°C	No reduction in the coating thickness
		80°C	8% reduction in the coating thickness
Resistance to 10-percent concentration of urea $CO(NH_2)_2$ in water	ISO 175, 90 days	23°C	No reduction in the coating thickness
		80°C	No reduction in the coating thickness
Resistance to 25% concentration of NH_4OH	ISO 175, 90 days	23°C	3% reduction in the coating thickness
		80°C	*
Resistance to 25% concentration of H_2SO_4	ISO 175, 90 days	23°C	No reduction in the coating thickness
		80°C	*
Resistance to 20% concentration of HNO_3	ISO 175, 90 days	23°C	No reduction in the coating thickness
		80°C	*
Resistance to isopropanol $(CH_3)_2CHOH$ (isopropyl alcohol)	ISO 175, 90 days	23°C	4% reduction in the coating thickness
		80°C	**
Resistance to acetone $CO(CH_3)_2$ (propanone)	ISO 175, 90 days	23°C	No reduction in the coating thickness
		80°C	**
Resistance to ethyl acetate $CH_3CO\text{-}O\text{-}C2H_5$	ISO 175, 90 days	23°C	3% reduction in the coating thickness
		80°C	**
Resistance to toluene $C_6H_5(CH_3)$ (metylobenzen)	ISO 175, 90 days	23°C	4% reduction in the coating thickness
		80°C	Complete destruction of the coating
Resistance polyethylene glycol $C_{2n}H_{4n}+2O_n+1$	ISO 175, 90 days	23°C	No reduction in the coating thickness
		80°C	4% reduction in the coating thickness

* – the test has not been carried out due to the emission of hazardous gases when heating NH4OH, H2SO4, HNO3 to the temperature of 80°C;

** – the test has not been carried out due to exceeding the boiling point when heating $(CH_3)_2CHOH$, $CO(CH_3)_2$, $CH3CO\text{-}O\text{-}C_2H_5$ to the temperature of 80°C;

Production of the tanks includes manufacture of the tank body, bottoms, inspection shafts with ladders, inlet and outlet stub pipes, and connections between tanks. The tanks are manufactured in sections with a length up to 16 m and are joined at the construction site with the use of a flange connection with a gasket.

Tank bottoms are made of flat metal plates reinforced with ribs depending on the depth of tank foundation and the surcharge loads (earth pressure on the bottom). Both steel flanges and bottoms are made and welded to the pipe in the factory of the tank manufacturer. After passing the leak tightness test, they are protected against corrosion by painting with high-zinc paint and additionally with a sealing agent. The anti-corrosion protection of welded joints allows obtaining the same durability as that of HelCor® pipes. The connection system guarantees 100-percent leak tightness of the tank.

Tanks should be installed on an aggregate foundation with a minimum thickness of 30 cm, on a 10 cm thick sand bed — in order to sink the pipe corrugation. In the case of a high level of groundwater, the state of equilibrium should be checked, considering the uplift of the tank caused by hydrostatic pressure of groundwater. If necessary, additional anchoring or loading of the tank should be provided for.

The backfill of the tank should be laid symmetrically on both its sides in layers with a thickness of 30 m, and then compacted to a degree of compaction Is ≥ 0.98 according to the standard Proctor test (Is ≥ 0.95 is allowed in close proximity of the tank).

Because of a low weight and large lengths of individual elements, as well as due to the fact that no reinforced concrete foundations are required, the proposed technology of building underground holding tanks from HelCor® pipes can significantly shorten the construction times, which is important in the case of a high level of groundwater. Thanks to high strength parameters and the proposed anticorrosion protection, tanks made from HelCor® pipes can be built practically in all groundwater conditions.

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Our goal is to improve products and to cooperate closely with customers, scientific and research centres, public administration and suppliers.

That's why our motto is:

"Let's Create a Better Future Together"

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edycja 01/2013