

VISCOTAQ



**THE ULTIMATE
VISCIOUS ELASTIC PIPELINE COATING**



kleiss & co b.v.

Unique viscous-elastic technology

VISCOTAQ is a unique viscous-elastic amorphous a-polar polyolefin for the protection against corrosion of underground and aboveground substrates in the pipeline industry, (petro-) chemical industry and water industry. VISCOTAQ has been developed in cooperation with leading companies in the oil and gas industry and polymer engineering companies and meets the demand for new viscous elastic coating products with unique and better properties for the protection of shaped and non-shaped substrates. The result is a product that offers the pipeline industry an unrivaled technology when it comes to corrosion prevention.

It has been the goal during the development of VISCOTAQ, to combine all main desirable properties of a viscous-elastic material in one product like an immediate adhesion to the substrate without primer, a 100% impermeability to water and oxygen, self healing characteristics, the filling in of voids and anomalies of the substrate as well as an easy failure free application.

The philosophy behind VISCOTAQ

The philosophy behind the development of VISCOTAQ is that - unlike other coatings - VISCOTAQ always has a permanent and intimate contact with the surface of a substrate. The viscous modulus and the elasticity modulus of the material are designed in such a way that the viscosity modulus gives permanent wetting characteristics hence forcing the material to flow into the pores and anomalies of the substrates whereas the elasticity modules gives the strength and elasticity of a solid. Moreover VISCOTAQ eliminates typical problems that occur during pipeline rehabilitation in the field and the problems of different phenomena that occur in practice.

Elimination of salt and osmosis problems

With VISCOTAQ the presence of salt particles on a substrate is no issue :

1. VISCOTAQ is impermeable for water and has no selective character.
2. VISCOTAQ is a-polar and rejects water.
3. VISCOTAQ has an extreme good adhesion and a very intimate permanent contact with the surface of a substrate. Its permanent wetting and low viscous characteristics prevent pressure to build up and the coating to disbond.
4. Salt particles eventually will be absorbed in the coating.

Due to its impermeable character to moisture and the permanent wetting properties, the phenomenon of osmosis does not occur. Combined with the self healing characteristics of Viscotag, minor pinholes are dealt with easily and damages may heal automatically over time.



Elimination of adhesion problems

The intimate contact between VISCOTAQ and the substrate's surface, essential for a perfect adhesion, is extremely good as VISCOTAQ has excellent permanent wetting and flexible characteristics. Volume changes in the coating due to physical forces are not an issue anymore. Due to the characteristics of the coating a perfect surface preparation is not necessary anymore. A surface preparation of ST-2 or SSPC-3 is sufficient although it is advised to always clean to a level SA-2-1/2 or SSPC-10. VISCOTAQ can be considered as a solid coating but has a permanent cold flow and a low surface tension.

VISCOTAQ has a cohesive fracture : when peeled off, the material will show an internal fracture and a protective film is left on the pipe. The material flows into the pores of the pipe and is pushed to the substrate by means of air pressure. This process is a continuous process that will accelerate due to the pressure of soil and/or a mechanical outer wrap. Due to the wetting characteristics, adhesion will take place rather quickly and remain for decades. Due to the use of a 100% inert formulation, VISCOTAQ does not contain any reactive groups and will not deteriorate in the course of time. VISCOTAQ will not crack, nor become brittle and remains in its semi solid state.



Elimination of Microbiological Induced Corrosion (MIC)

With VISCOTAQ the phenomenon of MIC does not occur. The permanent viscous elastic material consist of an organic polymeric composition with inorganic filler material. No water and no nitrogen nutrients are available in and under the coating and it is therefore impossible for micro-organism to grow on this material under anaerobic conditions. VISCOTAQ is hydrophobic and water repellent and permeation of water can be neglected. It is clear: if no water is present, bacterial life is impossible.

With VISCOTAQ MIC does not occur because :

- No water is present at the boundary of metal/coat wrap.
- No nitrogen is available in the coat wrap.
- No initial bacterial activity is present in the coat wrap.
- The wrap coating intimates with the substrate due to its viscous characteristics. There is a real adhesion with no space for any substance to creep between the layer and the substrate and a cohesive failure.
- Coat wrap is under permanent pressure.
- Coat wrap is impermeable for water and oxygen.
- No permeability for ionic species from soil e.g. nitrate, nitrite, ammonium.
- No water available and the ions are insoluble in the a-polar material.
- VISCOTAQ is water repellent.
- Material is slightly alkaline (pH8, which is unfavourable for Sulphate Reducing Bacteria).

Elimination of surface preparation problems

VISCOTAQ has a very low surface tension and due to its viscous properties and the characteristics of the main components, the material shows a perfect adhesion to all materials, even to polyethylene and polypropylene. As soon as VISCOTAQ is applied on a substrate it will start wetting the substrate's surface and a perfect adhesion will exist.

The critical issue of a perfect surface preparation, especially in the field, is not an issue with VISCOTAQ. Here is the advantage of VISCOTAQ : the minimum surface preparation is ST-2 or SSPC-3. Sand- or gritblasting up to a level SA-2.1/2 or SSPC-10 however is recommended but not strictly necessary. Removal of sand, debris, loose parts and grease is always required.

No permeation of moisture and gases

Due to the water repellent properties of the components and the low surface tension VISCOTAQ is impermeable to moisture and gases. Moreover the low surface tension of the material and permanent low viscous characteristics will prevent any moisture to penetrate the coating or to creep under the coating.

OTHER ADVANTAGES AND CHARACTERISTICS

40 years guarantee

If applied according to the manufacturer's instructions a 40 years warranty is issued for all VISCOTAQ products.

Cohesive failure

Unlike other coating materials, VISCOTAQ has a cohesive failure. When peeled off a layer will always remain on the pipeline with enough wetting properties for corrosion protection.

No curing time

VISCOTAQ has an immediate adhesion to the substrate's surface. There is no curing time and back fill of the trench can take place immediate after application of the material. Risk of pinholes due to sand particles, mosquitos or other materials is eliminated.

Low cathodic disbondment values.

Due to the permanent wetting characteristics VISCOTAQ has very low cathodic disbondment values.

Low glass transition temperature

VISCOTAQ has a glass transition temperature of $-42^{\circ}\text{C}/-43,6^{\circ}\text{F}$ or lower and can be applied in cold areas as well as in hot areas. As long as it is applied above the dew point it will always have a perfect adhesion to the pipeline's substrate.

Self healing characteristics

Due to the viscous elastic properties of the material VISCOTAQ is self healing. Minor pinholes and damages in the coating may automatically seal especially in buried circumstances.

Heavy Duty applications

VISCOTAQ can be combined with a variety of specially designed VISCOTAQ outer wraps for mechanical protection. For regular applications we recommend the VISCOTAQ heavy duty PVC or PE outer wrap. In case of heavy horizontal or vertical shear loads in underground application VISCOTAQ PE-shrink-tape can be applied on top of the corrosion protective layer. In rocky areas or in areas where back fill material contains heavy stones VISCOSHIELD will protect the coating against the heaviest impact. This UV curing polyester comes on a roll and can be cut to size and applied on top of the VISCOTAQ coating.

High yield point

Although VISCOTAQ has permanent wetting characteristics, from a physical point of view the material can be considered as a solid. In contrast to a typical fluid it has a higher yield point and it will not show any dripping behaviour at temperatures of for instance $71^{\circ}\text{C}/159^{\circ}\text{F}$.

Easy application

Although special trainings and certificates are part of the VISCOTAQ program, the application of VISCOTAQ products does not require any special tools. A complete application manual is supplied to each customer with application instruction for VISCOTAQ materials in all situations.



Separation between corrosion prevention and mechanical protection

VISCOTAQ is protected by an outer wrap for mechanical protection. In this way the main goal -corrosion prevention- is separated from the mechanical protection whereas many coating systems try to combine both characters in one material. From a physical point of view this is difficult and it usually leads to a sacrifice of one or more properties.

Stable material

VISCOTAQ is made of low molecular weight amorphous a-polar polyolefin components with no reactive groups nor free radicals. Due to the amorphous structure the coatings has no crystalline behaviour. VISCOTAQ is 100% inert and with absence of free radicals VISCOTAQ remains stable for decades. No deterioration of the material takes place.

Aggressive soils

VISCOTAQ is excellent for application in aggressive soils, like Subkha areas in the Gulf Cooperating Countries and on the Subcontinent. High contents of chlorides or sulphur products will not affect the coating and the presence of salt particles can be neglected as they will not affect the performance of the coating.

VISCOTAQ in a nutshell

- Viscous-elastic amorphous a-polar polyolefin
- Impermeable to moisture and gases
- Immediate adhesion to a substrate without primer
- Remaining plastic and flexible characteristics
- Permanent wetting characteristics
- Cold flow
- Glass transition temperature -42° C/-43,6° F
- Self healing characteristics
- Eliminates the risk for Microbiological Induced Corrosion
- No curing time
- Surface preparation minimum ST-2 (commercial brush) or SSPC-3
- Surface preparation SA-2.1/2 or SSPC-10 however is recommended.
- No problems with salts and osmosis
- Inert material. No deterioration in the course of time
- Cohesive fracture
- 100% inert formulation. No reactive groups and no deterioration in the course of time. VISCOTAQ will not crack, nor become brittle and remains in its semi solid state .
- 40 years written warranty



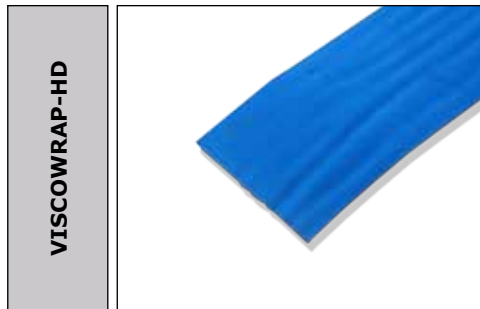
VISCOTAQ PRODUCT REVIEW



VISCOSEALANT is a viscous-elastic corrosion preventive and sealing paste for the sealing all type of openings and holes against the filtration of moisture and gases. ViscoSealant may be used to seal flange apertures, tank chimes, pipe conduits, cable conduits, holes in transformer chambers, swimming pools, sewage treatment plants et cetera. ViscoSealant is a 100% inert material and has an immediate adhesion to wet and dry surfaces and to all underground and aboveground substrates.



VISCOWRAP-HT is viscous-elastic self healing coat wrap for the protection of under- and aboveground substrates against corrosion. The material can be used in environments or on substrates with an ambient or surface temperature up to +71° C/+160° F. The material is available in several width/length combinations.



VISCOWRAP-HD is a viscous-elastic self healing coat wrap for the protection of under- and aboveground substrates against corrosion and is very suitable for long distance over-the-ditch applications according to EN-12068-C50 class. The material is available in several width/length combinations. Unlike other VISCOTAQ products, a surface preparation of SA-2.1/2 or SSPC-10 is required.



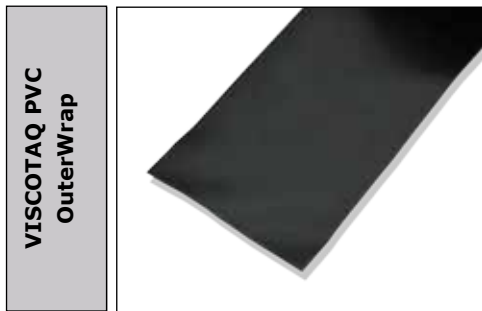
VISCOPASTE-HT is viscous-elastic self healing paste for the protection of under- and aboveground substrates against corrosion. The material can be used in environments or on substrates with an ambient or surface temperature up to +71° C/+160° F. The material is available in a roll that can be cut to size.



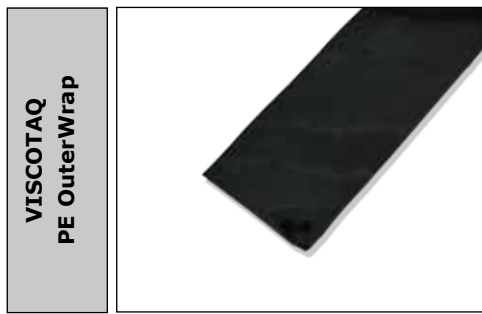
EZ WRAP-ST is viscous-elastic self healing coat wrap for the protection of under- and aboveground substrates against corrosion and water filtration. Unlike ViscoWrap, which has a polyethylene top coat, EZ-Wrap has a polyester top coat that can be painted. The material can be used in environments or on substrates with an ambient or surface temperature up to +65° C/+149° F. The material is available in rolls of different width/length combinations. EZ-Wrap has been originally developed for the protection of tank chimes where it is combined with ViscoSealant.



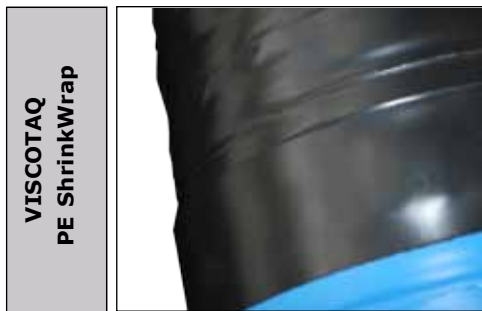
VISCOSLEEVE is a viscous-elastic self healing heat shrink sleeve for the protection of field welded joints in pipeline systems. The ViscoSleeve can be applied without a primer. Pre-heating of the field joint is not necessary. ViscoSleeve is wrapped around the joint without leaving space underneath and is shrunk by the application of a moderate flame.



VISCOTAQ PVC OuterWrap is used for the mechanical protection of ViscoWrap or ViscoPaste material. The material is available in rolls of different width/length combinations.



VISCOTAQ PE OuterWrap is used for the mechanical protection of ViscoWrap or ViscoPaste material. The material is available in rolls of different width/length combinations.



VISCOTAQ PE ShrinkWrap is used for the Heavy Duty mechanical protection of ViscoWrap or ViscoPaste material. The material is available in rolls of different width/length combinations. The material is wrapped hand tight around the InnerWrap and is shrunk by the application of a moderate flame. PE ShrinkWrap is applied in situations where heavier horizontal or vertical shear loads can be expected or where back fill material may contain larger (sharp) stones.



VISCOSHIELD is used for Heavy Duty mechanical protection of ViscoWrap or ViscoPaste material. The material is available in rolls of different width/length combinations. The material is wrapped hand tight around the InnerWrap and is cured by the application of UV light. VISCOSHIELD is applied in situations where extremely heavy horizontal or vertical shear loads can be expected for instance in the case of horizontal drilling (HDD) jobs.

Product	Size	Temperature	Article number
VISCOWRAP-HD*	5 cm x 10 m	-30° C > +50° C	850.00.050
VISCOWRAP-HD*	10 cm x 10 m	-30° C > +50° C	850.00.051
VISCOWRAP-HD*	15 cm x 10 m	-30° C > +50° C	850.00.052
VISCOWRAP-HD*	20 cm x 10 m	-30° C > +50° C	850.00.053
VISCOWRAP-HD*	20 cm x 20 m	-30° C > +50° C	850.00.057
VISCOWRAP-HT	5 cm x 10 m	-42° C > +71° C	850.00.030
VISCOWRAP-HT	10 cm x 10 m	-42° C > +71° C	850.00.031
VISCOWRAP-HT	15 cm x 10 m	-42° C > +71° C	850.00.032
VISCOWRAP-HT	20 cm x 10 m	-42° C > +71° C	850.00.033
VISCOWRAP-HT	20 cm x 20 m	-42° C > +71° C	850.00.037
EZ WRAP	5 cm x 7,2 m	-42° C > +65° C	850.00.080
EZ WRAP	10 cm x 7,2 m	-42° C > +65° C	850.00.081
EZ WRAP	15 cm x 7,2 m	-42° C > +65° C	850.00.082
EZ WRAP	20 cm x 7,2 m	-42° C > +65° C	850.00.083
VISCOPESTE-HT	3 m x 30 mm x 37 mm	-42° C > +71° C	851.00.020
PVC OUTER WRAP	50 mm x 30 m		853.00.010
PVC OUTER WRAP	75 mm x 30 m		853.00.011
PVC OUTER WRAP	100 mm x 30 m		853.00.012
PVC OUTER WRAP	400 mm x 40 m		853.00.013
PE OUTER WRAP	50 mm x 30 m		853.00.020
PE OUTER WRAP	75 mm x 30 m		853.00.021
PE OUTER WRAP	100 mm x 30 m		853.00.022
PE OUTER WRAP	200 mm x 20 m		853.00.023
PE SHRINK TAPE	50 mm x 30 m		853.00.030
PE SHRINK TAPE	75 mm x 30 m		853.00.031
PE SHRINK TAPE	100 mm x 30 m		853.00.032
PE SHRINK TAPE	200 mm x 20 m		853.00.033
VISCOSHIELD	90 mm x 10 m		854.00.010
VISCOSHIELD	180 mm x 10 m		854.00.011
VISCOSHIELD	600 mm x 10 m		854.00.012
VISCOSLEEVE ROLL	450 mm x 30 m	≤ 80° C	855.00.027
VISCOSLEEVE ROLL	600 mm x 30 m	≤ 80° C	855.00.327
VISCOSLEEVE UNIT	450 mm x 4"	≤ 80° C	855.00.010
VISCOSLEEVE UNIT	450 mm x 6"	≤ 80° C	855.00.011
VISCOSLEEVE UNIT	450 mm x 8"	≤ 80° C	855.00.012
VISCOSLEEVE UNIT	450 mm x 10"	≤ 80° C	855.00.013

Product	Size	Temperature	Article number
VISCOSLEEVE UNIT	450 mm x 12"	≤ 80° C	855.00.014
VISCOSLEEVE UNIT	450 mm x 16"	≤ 80° C	855.00.015
VISCOSLEEVE UNIT	450 mm x 18"	≤ 80° C	855.00.016
VISCOSLEEVE UNIT	450 mm x 20"	≤ 80° C	855.00.017
VISCOSLEEVE UNIT	450 mm x 24"	≤ 80° C	855.00.018
VISCOSLEEVE UNIT	450 mm x 28"	≤ 80° C	855.00.019
VISCOSLEEVE UNIT	450 mm x 30"	≤ 80° C	855.00.020
VISCOSLEEVE UNIT	450 mm x 32"	≤ 80° C	855.00.021
VISCOSLEEVE UNIT	450 mm x 36"	≤ 80° C	855.00.022
VISCOSLEEVE UNIT	450 mm x 40"	≤ 80° C	855.00.023
VISCOSLEEVE UNIT	450 mm x 42"	≤ 80° C	855.00.024
VISCOSLEEVE UNIT	450 mm x 48"	≤ 80° C	855.00.025
VISCOSLEEVE UNIT	450 mm x 56"	≤ 80° C	855.00.026
VISCOSLEEVE UNIT	600 mm x 4"	≤ 80° C	855.00.310
VISCOSLEEVE UNIT	600 mm x 6"	≤ 80° C	855.00.311
VISCOSLEEVE UNIT	600 mm x 8"	≤ 80° C	855.00.312
VISCOSLEEVE UNIT	600 mm x 10"	≤ 80° C	855.00.313
VISCOSLEEVE UNIT	600 mm x 12"	≤ 80° C	855.00.314
VISCOSLEEVE UNIT	600 mm x 16"	≤ 80° C	855.00.315
VISCOSLEEVE UNIT	600 mm x 18"	≤ 80° C	855.00.316
VISCOSLEEVE UNIT	600 mm x 20"	≤ 80° C	855.00.317
VISCOSLEEVE UNIT	600 mm x 24"	≤ 80° C	855.00.318
VISCOSLEEVE UNIT	600 mm x 26"	≤ 80° C	855.00.319
VISCOSLEEVE UNIT	600 mm x 30"	≤ 80° C	855.00.320
VISCOSLEEVE UNIT	600 mm x 32"	≤ 80° C	855.00.321
VISCOSLEEVE UNIT	600 mm x 36"	≤ 80° C	855.00.322
VISCOSLEEVE UNIT	600 mm x 40"	≤ 80° C	855.00.323
VISCOSLEEVE UNIT	600 mm x 42"	≤ 80° C	855.00.324
VISCOSLEEVE UNIT	600 mm x 48"	≤ 80° C	855.00.325
VISCOSLEEVE UNIT	600 mm x 56"	≤ 80° C	855.00.326

VISCOWRAP-HD will resist higher temperatures than 50° C however has been tested for a Mechanical Class C-50 certification according to EN 12068/DIN 30672. For higher temperatures applications we commit ourselves to (assist you) in further testing.



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