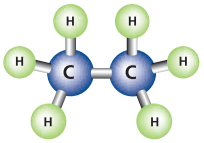
technical datasheet

corden tm
environmental protection systems

Corden EPS Hydrocarbon Membrane (CH)

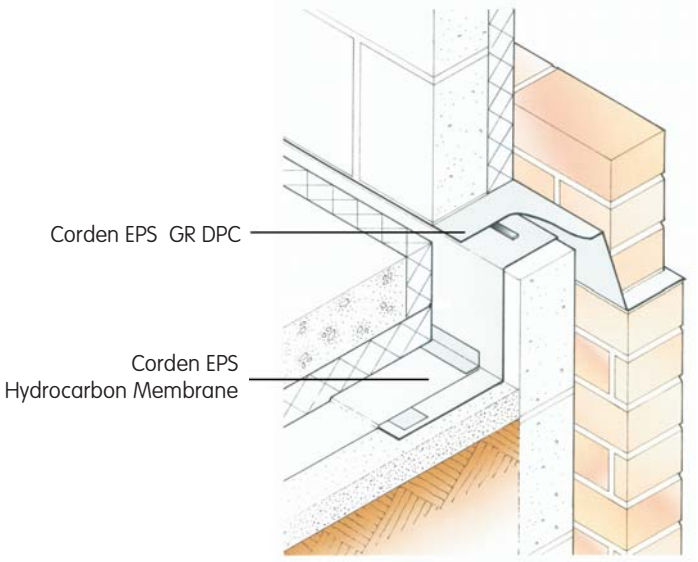


Hydrocarbons are colourless gases formed as a by-product of decomposing organic matter.

It is crucial that when gas protection is required, the site conditions, design and application are all taken into consideration to provide an impermeable membrane capable of surviving installation and subsequent traffic, to protect the most valuable asset "the building" against harmful gases that can cause future problems.

The Corden EPS Hydrocarbon Membrane is a high quality, high density polyethylene (HDPE) produced from specially formulated, proprietary virgin polyethylene resin designed specifically for flexible geomembrane applications.

The Corden EPS Hydrocarbon Membrane has outstanding chemical resistance, mechanical properties, environmental stress crack resistance, dimensional stability and thermal ageing characteristics. The Corden EPS Hydrocarbon Membrane also has excellent resistance to UV radiation and is suitable for exposed conditions.



Product Specification

Physical Description	Test method	Value/Units
Thickness	ASTM D 5199	1mm
Density	ASTM D 792/1505 A	0.94g/cm^3(min)
Colour		Black
Standard roll width		5.9/2.95m
Technical Performance		
Elongation at break	G.L.(50mm)	700%
Puncture resistance	ASTM D 4833	320N
Tear Resistance	ASTM D 1004	125N
Hydrocarbon permeability		2.0x10^{-6}ml/cm^3.s

The Corden EPS Hydrocarbon membrane is available in standard roll sizes of 5.9m x 50m or 2.95m x 50m. Several denominations of these sizes are available.

Advantages

- Suitable for use on hydrocarbon contaminated sites
- Excellent weld characteristics
- Very high resistance to puncture and tear
- Available 5.9m wide
- Compatible with vented systems
- Excellent resistance to chemicals and UV radiation
- Can be taped (Consult technical department)
- Low permeability to hydrocarbon gases (Consult separate data sheet)
- All sundries available

Installation Details

Corden EPS HM is designed to exhibit superior welding properties, therefore, we recommend factory welding or on-site welding methods of jointing when the membrane is to be installed below a ground floor construction.

Placing

Although the Corden EPS Hydrocarbon Membrane is a very robust material, it is advised that it should be laid on a blinded or smooth surface allowing adequate overlap for jointing between the sheets and avoiding bridging i.e. areas of unsupported membrane. A final floor covering should be installed above it and care should be taken to ensure the membrane is not damaged prior to this.

Inspect for damage and repair tears/holes with a piece of membrane sealed down with double sided tape and secured down with lap tape. Seal onto Corden EPS GR DPC to maintain integrity.

In certain applications, where the membrane is to be installed above a suspended in-situ concrete slab or block and beam suspended floor, the sealing of laps can be achieved using the EPS Jointing Tape system. In these instances, Corden EPS Jointing Tape should be applied approximately 50mm from the edge. The next width of Corden EPS HM should then be overlapped. For effective protection, all laps must be a minimum of 150mm and the joint should be secured with Corden EPS Girth Jointing Tape, a single sided tape which provides added security against any potential leakage paths. Always ensure that the membrane is clean, dust free and dry at the time of jointing.

Corden EPS HM and ancillary components must be installed in accordance with the recommendations of Building Research establishment BRE 414 "Protective measures for housing on gas contaminated land", Ciria Report 149 "Protecting development from methane", together with codes of practice CP102 and BUS 8102.

To avoid slip or shear planes, it is not recommended to take membranes through the wall. In order to provide a continuous barrier across the cavity, Corden EPS DPC should be sealed to the membrane, taken through the blockwork, up the wall and incorporated below the damp proof course on the outer leaf.

Corden EPS DPC should be installed in accordance with BUS 8215: 1991, BUS 8000: Part 3, 1989 and BUS 5628: Part 3: 1985. All horizontal DPC's must be bedded on both sides with fresh mortar. All DPC's must project through the full width of the wall, including any externally applied rendering and project 5mm beyond the finished external face.

Ancillary Products

- Corden EPS Geovent
- Corden EPS Geovent Connectors
- Corden EPS Pervients
- Corden EPS Gas Collector Pipe
- Corden EPS Gas Tape
- Corden EPS Lap Tape
- Corden EPS Top Hats
- Corden EPS GR DPC
- Corden EPS Vent Boxes
- Corden EPS Vent Stack and Cowl
- Corden EPS GRM and Prime

Separate data sheets available on request for all the above ancillary products.

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Corden EPS Hydrocarbon Membrane (cont)

Polythene Geomembranes

Polyethylene has proved to be the most popular geomembrane lining material. This popularity is due to polyethylene's high UV and chemical resistance in addition to its flexibility. Through developments in resin technology, today's polyethylene geomembranes exhibit outstanding resistance to stress cracking and thermal aging.

Crude oil is the primary source for a wide range of intermediate organic products including gases and liquid mixtures. One of the products obtained from the refinement of crude oil is ethylene. The ethylene molecule is two carbon atoms bonded with a double bond and two hydrogen atoms attached to each carbon.

Ethylene molecules are able to participate in a chemical reaction called "polymerisation". polymerisation is the process by which small molecules are combined to form large molecules called polymers. The polymerisation of ethylene molecules occurs in a stepwise fashion. First, two ethylene molecules are bonded together, then another is added and so on until the reaction terminates. In this way, long molecules that fold, bend and intermingle are formed.

The reaction occurs in large reactors that can be pressurised and heated. A catalyst is typically required and a comonomer is often employed. Selection of pressure, temperature, catalyst and comonomer determine the particular grade of polyethylene that is produced. Pressure and elevated temperatures force the gaseous ethylene molecules together in close proximity. A comonomer can be used to further control the molecular structure of the finished product.

A comonomer is commonly added in small amounts during polymerisation to control or alter the molecular structure, in particular the branching, and performance of the polymer. With the great number of variations and combinations, there can be a great number of unique types of polyethylene materials.

The finished product is characterised primarily by: molecular weight, molecular weight distribution and degree of branching. Molecular weight is a quantitative measure of a single molecule's mass. polymerisation reactions do not result in molecules that all demonstrate the same moleclar weight. As a result, the finished product contains a range of molecular weights; that is quantified by the molecular weight distribution. Since the molecules exist as discrete chains, the way those chains are ordered is important. The degree of crystallinity is closely related to density and has an effect on the material's stress crack resistance. Variations of these polymer characteristics may have a significant effect on both the processing characteristics and the life expectancy of the finished product.
There are two primary types of extrusion processes used to manufacture polyethylene into sheet goods, those with a round die and those with a flat die. Each method requires the polyethylene resin used to exhibit some range of properties. The world's polyethylene geomembrane manufacturers are charged with the responsibility of bridging the gap between resin processing characteristics and long term survivability as a containment liner.

Considerations for environmental projects include resistance to chemical, UV and thermal degradation. Polyethylene's stress crack resistance is not always a concern to resin suppliers since they supply so many different markets. This is in strong contrast to the environmental market where long term performance is of the utmost importance. As a result, polyethylene geomembrane manufacturers must work closely with their resin supplier(s) to achieve the longest life span of the material. Since the finished product is only as good as the raw material, special relationships between the resin supplier and the geomembrane manufacturer must be established and maintained.

Permeability for Geomembranes

Due to its chemical structure, polyethylene is an (essentially) impermeable substance. The material is made up of very long molecules. There does exist, however, molecular voids (sometimes referred to as "free space") among the individual polyethylene chains. The existence of these spaces is recognised when we say polyethylene is essentially impermeable. Permeation may exist when, for instance, the pressure behind the permeant is very high or the permeant's molecular size is very small. However, the degree of permeation exhibited is difficult to determine using currently available test procedures. As a result, test results frequently reflect the inaccuracy of the procedure rather than the permeation of the material. Testing of Corden EPS HDPE performed by an independent laboratory produced the following results.

Test	ASTM Method	Results
Methane Permeability	D 1434	2.0x10-6 mL/cm2·s
Water Vapour Permeability	E 96	1.7x 10-9 mL/cm2·s

It must be emphasised that different chemicals will permeate at different rates due to differences in molecular shape, polarity and phase (gas or liquid). For example, the relatively small water molecule (atomic weight 18) will more easily permeate the polyethy ene matrix as compared to a large molecule such as cyclohexanol (atomic weight 94).

The molecules' polarity must also be considered (recall the adage "like dissolves like"). Polyethylene is a non-polar molecule, therefore other non-polar molecules will permeate the matrix better. Examples of these molecules are hydrocarbons - especially those such as octane, pentane and hexene. The permeation of these are therefore greater than for polar molecules such as water.

A sometimes overlooked factor when reviewing permeation data is that most permeameters apply pressure to encourage permeation. In geotechnical and environmental applications, geomembranes are not subjected to the high pressures of potential permeants as they are in a permeation laboratory test. The lack of a driving force greatly diminishes actual permeation since the gaseous molecules find an easier path to follow than through the polyethylene liner. Also, because of the high pressures required to force permeants through polyethylene, failure of the permeameter is common. This is commonly in the form of a test apparatus leak. Such leaks can result in erroneous results.

Venting

Open voids beneath the ground floor with cross ventilation through the external walls will normally be required. Corden EPS Geocomposite void formers or block & beam suspended floors supported on load bearing walls will dilute and disperse gases. Please contact the Corden Technical Support Team for more information.

Technical Support

Due to the wide variety of hydrocarbon contaminants found, we strongly recommend the use of the Corden EPS Building Products Technical Support Team at an early design stage so that the most appropriate detailing and material specification are adopted.

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