



# Elastoseal EPDM Geomembrane System

**Landfill Capping, Leachate- and  
Wastewater Reservoirs**



**TRELLEBORG**  
BUILDING SYSTEMS

# EPDM rubber

*– a superior geomembrane in waste landfills and wastewater reservoirs.*

**A landfill is a San Francisco in miniature. Everyone knows that earth movements and large settlements will come. The question is only when and how serious. Therefore, the waterproofing layer over a landfill must be flexible enough to accommodate all movements and settlements in the substrate without rupture, irregardless of temperature, age, mechanical loads or chemical and biological influence. One material can withstand deformation better than all others. Rubber!**

Elastoseal EPDM Geomembrane is a vulcanised rubber sheet that belongs to the product group polyolefines. The long rubber molecules have been cross-linked to an elastic and chemically stable membrane. Strength and elasticity are not affected by high or low temperatures and physical properties are practically unchanged over decades of service, without becoming brittle, cracking or shrinking.

## **Viscoelastic properties**

Rubber membranes have no yield point under elongation whereas thermoplastic materials become thinner, uncontrolled and will break at a low tensile force. Rubber membranes elongate in a linear fashion to maximum 300 % and can be elongated in all directions at the same time (multiaxial response). Rubber membranes are not subjected to stress cracking, whereas semicrystalline materials will break even at a low stress, in points where the surface is scratched, contains defects or exhibit other weaknesses. Stress cracking occurs already at elongations of 20-30 % of the yield point of thermoplastic materials, i.e. at 2-4 % elongation. The risk of stress cracking on thermoplastic, semicrystalline materials increase upon installation or service at low temperatures.

A rubber membrane has viscoelastic properties, which means that the product can withstand an almost unlimited pressure load. At low loads the elastic properties are dominating and at high loads the viscose properties dominate. The material



**EPDM membranes can be elongated in all directions at the same time, and to over 300 percent of elongation.**

can be deformed to extreme limits and still return to its original size and shape. The opposite is true for the semicrystalline thermoplastic materials, where a concentration of load or force results in a permanent deformation or thickness reduction. EPDM is highly resistant to microbiological attack, root penetration. EPDM resists leachates and acids, alkalies, nitrates and phosphates in solution. The membrane is UV resistant and can be installed both exposed or earth covered. The service life and performance is exceptional, as the strength and elasticity remains virtually unchanged even after decades of service.



## Superior characteristics Elastoseal EPDM Geomembrane

- Elasticity and strength – irrespective of temperature the membrane will perform well under maximum working load.
- Multidimensional Strain – superior resistance to earth settlements and movements.
- Puncture resistant with full flexibility up to the maximum tensile strength.
- Lay flat characteristics – adheres to and provides close contact to any substrate.
- Unaffected by low temperatures and fully thermally seamable even in freezing temperatures.
- Optimal surface friction characteristics – soft textured rubber surface provides high interface friction.
- Excellent UV and ozone resistance – superior service life also in exposed installations.
- High resistance to chemicals – the membrane provides chemical resistance needed in landfills, wastewater reservoirs and ponds.

- Large panels fabricated to specified sizes according to site drawings. The result is reduced field seaming and short installation times.

- The Thermobond seaming technique with hot wedge allows for maximum installation control and quality.

- The Thermobond seaming with dual hot wedge allows for conventional air channel QC testing on site.

- Can easily be adhered to substrates of concrete, wood or metal. All details and anchoring with conventional methods that are quality controlled.

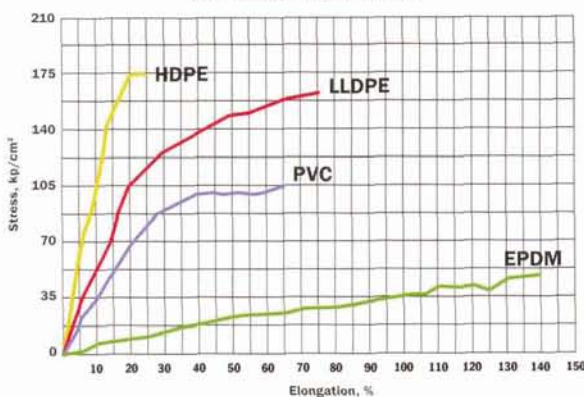
- Protrusions and pipes are easily attached with prefabricated boots and hot air seaming.

- Damage is easily repaired, even after long service life and exposed installations.

- Rubber membranes have been used for over 50 years in lining applications and have the longest history of all geomembranes.

- Trelleborg has over 30 years of experience with rubber membranes in geotechnical applications.

Multiaxial Stress-Strain



The stress and strain response for four common geomembranes.

EPDM membranes have superior multiaxial elongation properties.

# Thermobond seaming technique

– *the deciding difference*

**The Thermobond seaming technique provides a fast, easy method for producing quality thermally welded seams. All site seaming is performed with a thermal hot wedge. Details like pipe connections, penetrations, overflows and flashings are seamed with a hot air gun. The combination of an elastic, vulcanised rubber membrane, prefabricated boots, engineered details and reliable, uncomplicated thermal welding in all types of weather provides a maximum of security and a homogenous, elastic waterproofing membrane.**

During production, a thin layer of a thermoplastic rubber (TPE) is laminated to one side of the membrane resulting in a vulcanised EPDM membrane which can be heat seamed. This technique offers the best of two worlds, giving the advantages of both elastomers and thermoplastics. The combination of Elastoseal EPDM and Thermobond seaming gives the superior service life and performance of vulcanised EPDM rubber and the thermal seaming performance of thermoplastic membranes.

## **A good choice for the environment**

EPDM membranes are also a good environmental choice. The membrane contains no environmental pollutants and no chemicals are emitted or released throughout its life-time. EPDM membranes can be burned (energy production), dumped or re-cycled with very little affect on the environment.

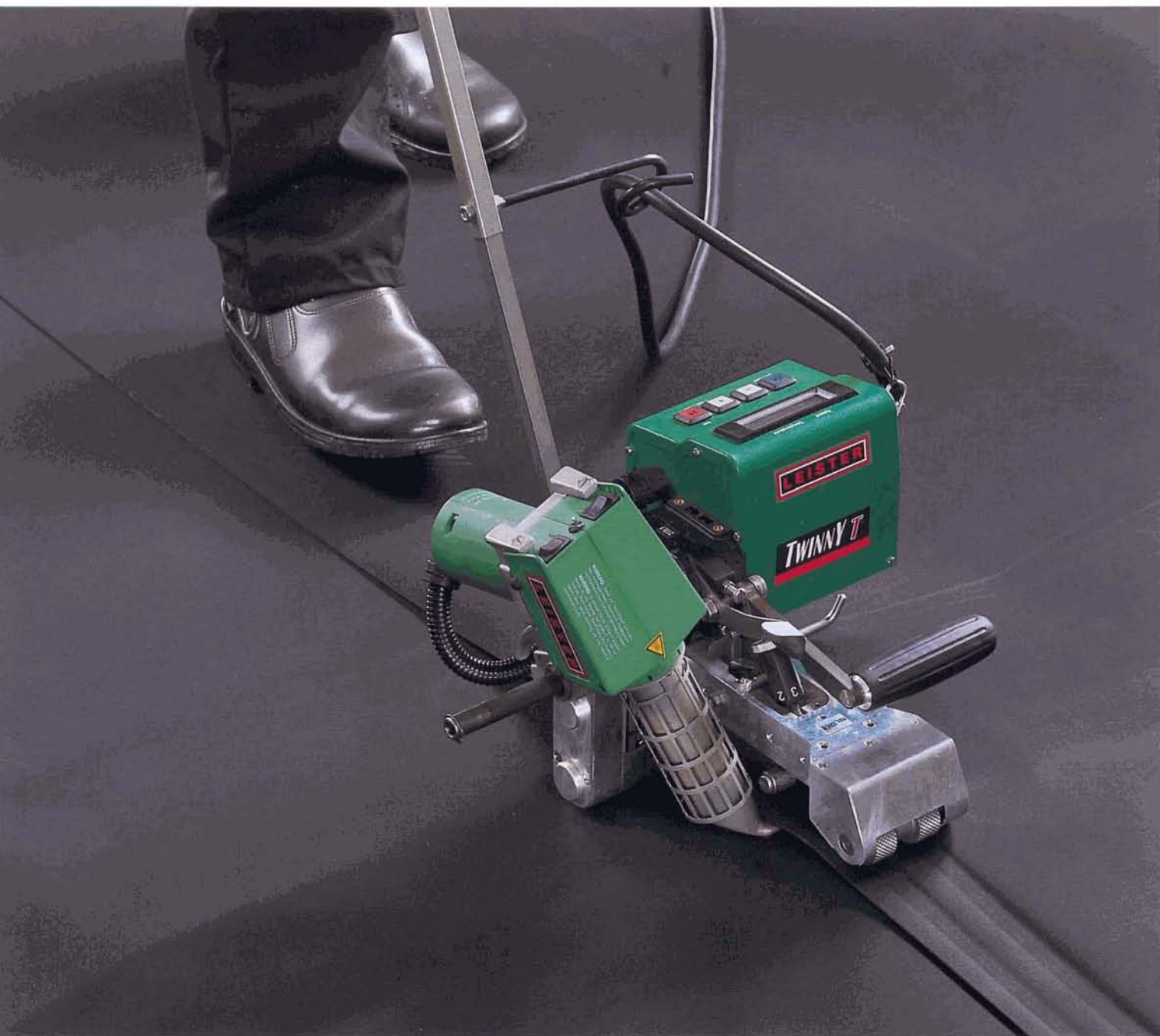
## **The engineered system – panels made to size**

The Elastoseal Geomembranes are prefabricated to large, homogenous panels, often in sizes of 500–1500 sqm:s. The topography of the site, conditions and equipment will dictate the size and weight of each panel. Size and shape of each panel is individual, depending on shape, depth and size of the landfill cap or containment.

Engineered technical solutions can be prefabricated in advance in the factory, providing ready-made sections, pipe boots and special attachments.



**Prefabricated pipe boots, flashings and details are spliced with hot air guns. Quality control is made by means of air lance testing.**



Seams with air pressure test channels are produced with dual hot wedges. Seaming speed can be estimated to 3 m per min. The dual wedge provides easy air pressure testing of seams, both immediately after installation and after many years of service.



# Trelleborg Geomembrane QAS

*– a waterproof quality assurance system*



On site the Thermobond dual track seams are tested with air pressure.



Each delivery is tested for tensile strength, elongation and other properties, including seam strength.

**The Elastoseal EPDM Geomembrane is a complete engineered geomembrane system, where product, seaming, details, installation technique and on site quality assurance system guarantees a maximum of safety and performance.**

**The EPDM Membrane is produced using state-of-the-art modern equipment and exacting quality control. The production is completely traceable from a specific panel or roll on site back to individual product data compound properties of the actual rubber mix used in production.**



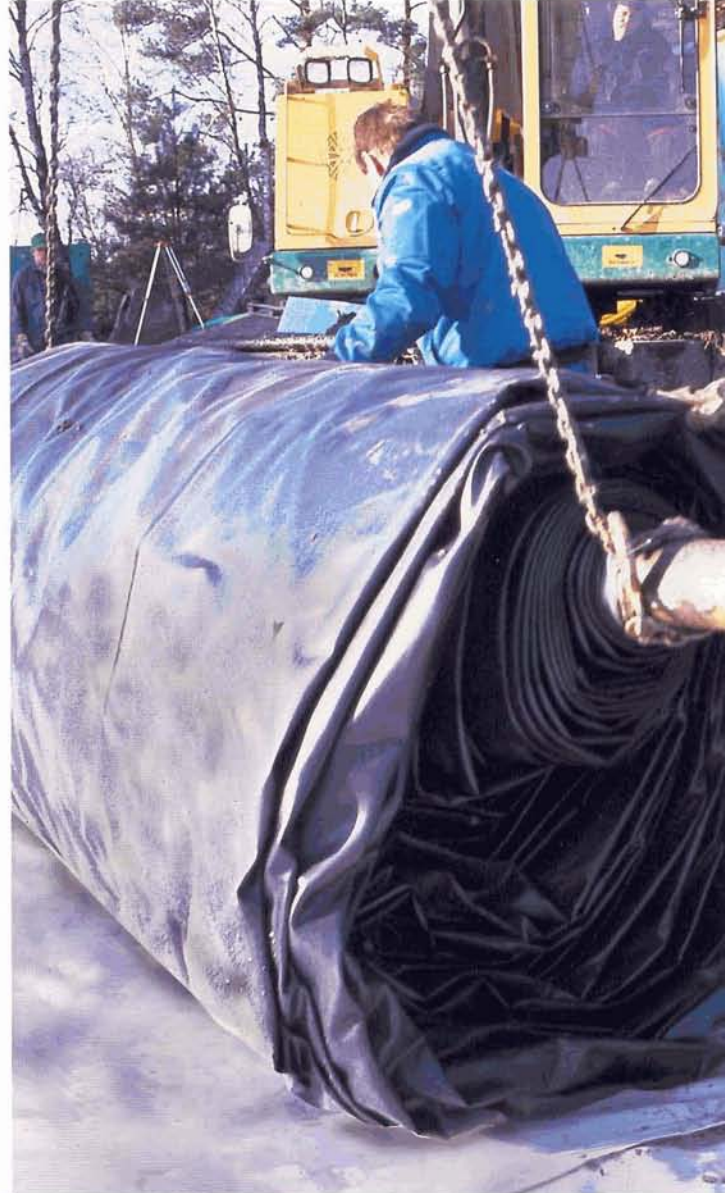
# Installation

– of the *Elastoseal EPDM Geomembrane*

Prefabricated panels are unrolled, positioned and seamed with automatic hot wedge machines, always producing double tracks for air testing. The seaming speed is approx. 2-3 meter per minute. With large 1000 sqm panels a three man crew can install 2-3 panels per working day. At uneven substrates a hard board is roped under the membrane and machine. All seaming work requires dry and clean conditions.

## The installation is planned

With design drawings and site inspections as a base a panel layout drawing is provided, which specifies the location and size of the panels. The plan specifies number, position, unfolding point and direction for each individual panel. At this time, a detailed discussion with the contractor is necessary in order to specify the quality of the installation surfaces as well as need for protective geotextiles, gas and ground water drainage etc.

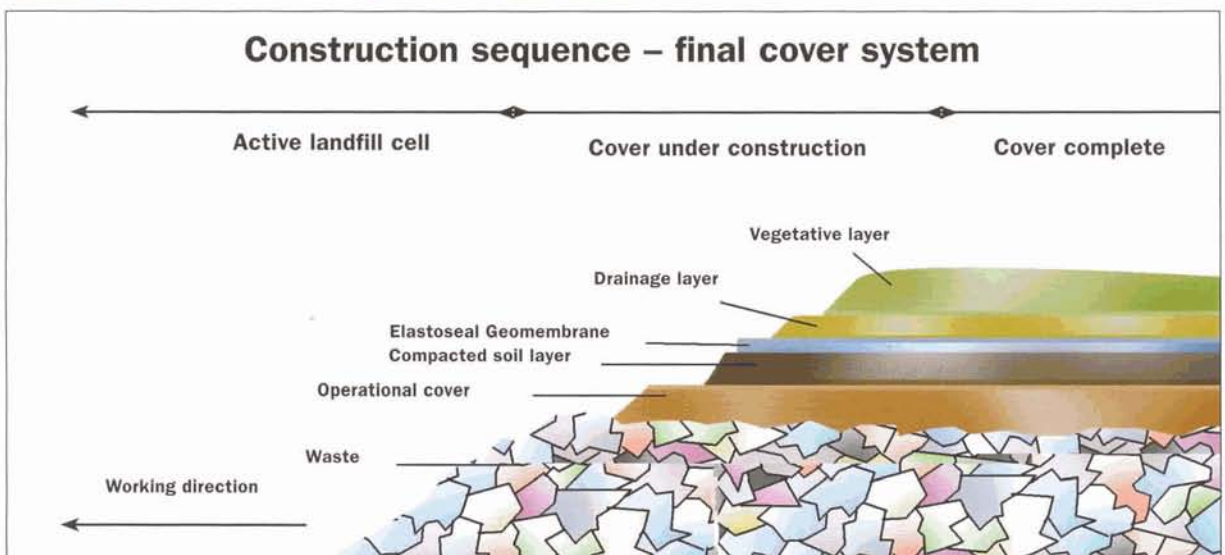
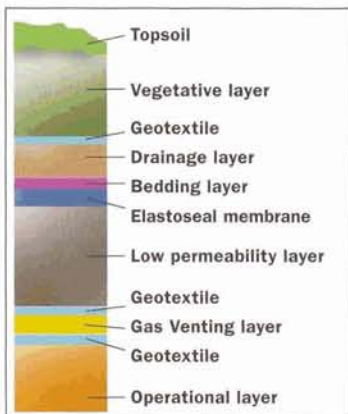


Factory made pipe boots, collars or flashing details with Thermobond hot air seams.

**Compared to traditional thermoplastic membranes the Elastoseal EPDM Geomembrane offers a trouble free, secure installation process.**

- The seam quality and speed is independent of membrane thickness. Unlike thermoplastic materials which require surface melt, Elastoseal is heated to effect a bond. With large variations in thermoplastic membrane thickness, the required energy, and with that the correct speed of the hot wedge, can vary substantially from sheet to sheet when seaming thermoplastics.
- Elastoseal EPDM can be installed and seamed independent of season, with no effect on quality of workmanship. Fully seamable down to -15 degr. C.

- Elastoseal EPDM has low thermal expansion/ contraction characteristics and is a flexible product that conforms to the substrate. Folds or waves in the seaming area due to temperature variations from morning to afternoon or from sunshine to shadow are not a problem when seaming.
- Elastoseal EPDM has a textile surface finish offering high interface friction characteristics. Earth material will stay in place on slopes up to 24-27 degrees. Smooth thermoplastic membranes have typical friction angles of 16-18 degrees and less.
- Before ballasting a geomembrane, high winds often are a major problem causing uplift and damage. Unlike lighter thermoplastic geomembranes, Elastoseal EPDM lays flat and adheres to the soil surface preventing uplift.
- Penetrations or attachments to pipes are no problem with the Thermobond seaming technique and hot air guns. Pipe boots and collars can be made on site or factory produced in any size. There is no need to use extrusion welding for pipes or details.



# Applications

## Elastoseal EPDM Geomembranes

### – Areas of use. Environmental protection

- Capping of municipal landfills.
- Leachate reservoirs at municipal landfills.
- Surface water drainage from apartment block areas.
- Road Dams.
- Ground water protection.
- Dams, tanks and closed storage sites for industrial or agricultural waste and contaminated water.
- Liners under contaminated soils or chemical storage.

## Environmental improvements

- Ponds, creeks and ornamental lakes in parks and recreation areas.
- Ponds and water landscaping at hotels, zoo; sport arenas, golf courses.

# Membrane Properties

– and technical specification

Property	Standard	Unit	Typical value	Specification
Thickness	ASTM D5199	mm		1,00;1,20;1,50
Density	ASTM D792	g/ml		1,15-1,20
Tensile Strength	ASTM D882/ISO 37	MPa	8,2	7,0
Elongation at break	ASTM D882/ISO 37	%	450	300
Multiaxial Stress	ASTM D5617	KPa	2130	2000
Multiaxial Strain	ASTM D5617	%	120	100
CBR Puncture Resistance	EN ISO 12236	N	805	
CBR Puncture Resistance	EN ISO 12236	%	225	
Tear Resistance	ASTM D1004	N	45	40
Tear Resistance	ISO 32	N	40	35
<b>Properties after heat aging</b>	<b>121 C, 168 hrs</b>			
Tensile Strength	ISO 88/ISO 37	MPa		min 5,0
Elongation at break	ISO 88/ISO 37	%		min 250
Waterabsorption	ASTM D471	%	0,1	max 1,0
Cold Bend	ASTM D3786/ISO 812	C		min -30
Dimensional stability	ASTM D1204	%	0,5	max 1,0
Hydrostatic Burst	ASTM D751, proc. A	KPa	610	
Hydrostatic Puncture Resist.	ASTM D5514, proc B			
25 mm sharp rocks		KPa	620	
Critical Cone Height	ASTM D5514, proc A	mm	90	
Interface direct shear	ASTM D5321			
EPDM to sand		degr.	26	
EPDM to clay		degr.	25	
EPDM to geotextile		degr	12	
<b>Thermobond seam properties</b>				
Multiaxial Stress	ASTM D5617	KPa	2100	
Multiaxial Strain	ASTM D5617	%	100	
Shear Strength	ASTM D6392	kN/m	7,2	
Peel Strength	ASTM D6392	kN/m	3,0	

Specifications values are for membrane thickness 1,20 mm

**Elastoseal EPDM is not affected by sunlight, UV, ozone, organic earth conditions, water, heat, cold or permanent stress. Elastoseal has low thermal expansion/contraction characteristics, is not subject to stress cracking and exhibits no yield point.**

### Chemical Resistance

(1=Resistant, 2=Moderately resistant, 3=Not resistant)

Inorganic salts	1
Animal oils	1
Bases	1
Organic salts	1
Vegetable oils	1
Weak inorganic acids	1
Alcohols	1
Aldehydes	1
Amines	1
Esters	1
Ketones	1
Organic acids	1
Earth chemicals	1
Eulates	1
Ethers	2
Phenols	2
Petrol, hydrocarbons	3
Mineral oils	3
Chlorine	3