

Installing GEOfabrics' protectors & LFX composites

Introduction

This document covers the general installation of *GEOfabrics'* non-woven geotextiles & the LFX composites. Further attention may be required to address site-specific requirements and conditions.

These guidelines are intended for the installer and to promote the most efficient and effective installation, whilst maintaining quality, maximising the geotextiles' performance, and without compromising health and safety.

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Geotextile characteristics and properties

- All HPS/MPS non-woven geotextiles are manufactured from polypropylene staple fibre and quality assured by a UKAS accredited laboratory to comply with the published data within a prescribed tolerance range.
- The HPS/MPS products are typically delivered to site as 6m wide rolls within the UK and 5.9m wide rolls outside the UK. Narrower roll widths can be manufactured.
- The core of each roll comprises a cardboard tube with an internal diameter of 120mm and an external diameter of 136mm.
- All products are delivered to site in protective plastic packaging. Shipping labels are placed both on the inside and outside of the packaging. Shipping labels include product details such as product name, length, width, roll number, roll weight and date of manufacture. This information should be retained for the Resident Engineer and cross-referenced with quality control certificates supplied separately.

Product	HPS2	HPS3	HPS4	HPS5	HPS6	HPS7	HPS8	HPS9
Approx. roll weight (kg)	298	357	370	460	532	513	610	544
Roll size (m)	200 x 6	175 x 6	150 x 6	150 x 6	150 x 6	125 x 6	125 x 6	100 x 6

Product	HPS11	HPS12	HPS14	HPS17	HPS19	HPS25	HPS30	HPS35	HPS40
Approx. roll weight (kg)	496	537	627	816	848	754	937	1120	1210
Roll size (m)	75 x 6	75 x 6	75 x 6	50 x 6	50 x 6	50 x 5.9	50 x 5.9	50 x 5.9	50 x 5.9

Product	MPS 300	MPS 400
Approx. roll weight (kg)	280	370
Roll size (m)	150 x 5.9	150 x 5.9

Standard shipping information

Unloading, handling and storage

- Roll weights can be between 300kg (660lbs) and 1320kg (2904lbs) and hence appropriate equipment is required for unloading and handling e.g. front-end loader, back hoe, forklift (pole truck) or crane.
 - Rolls should be lifted by using one of the following:
 - lifting straps capable of lifting twice the anticipated load. Straps should be located 1/3 of the way in from the roll ends.
 - a spreader beam attached, by lifting chains, to a core bar inserted through the centre of the roll.
 - a forklift truck and a *stinger bar*.
- Note: GEOfabrics does not supply lifting equipment; please see suppliers' list later in this document.
- It should be noted that, in general, deliveries within Europe are made by flatbed trailer allowing them to be unloaded by any of the above methods. Deliveries outside Europe are made by freight container, which should be unloaded by forklift truck fitted with a *stinger* attachment. A strap should be wrapped around the top, centre roll in the container (the first roll to be removed) before unloading the by forklift. The strap should then be used to gently slide the roll from the container (the plastic packaging should allow the roll to slide) as the rolls may have settled during transit. The remaining rolls can then be removed using the forklift.
 - The products will be delivered to site in plastic packaging that protects them from physical damage and the effects of weathering, notably degradation by ultra violet light (UV). This packaging should not be removed until immediately prior to installation. Removal of this packaging can result in damage from UV as well as the geotextile absorbing moisture, creating the potential for further degradation and an increase in the products' weight.

- If it is necessary for the geotextiles to be stored prior to their installation, they should be stacked on level dry ground, not more than five rolls high, and no other material should be stacked on top of the rolls.

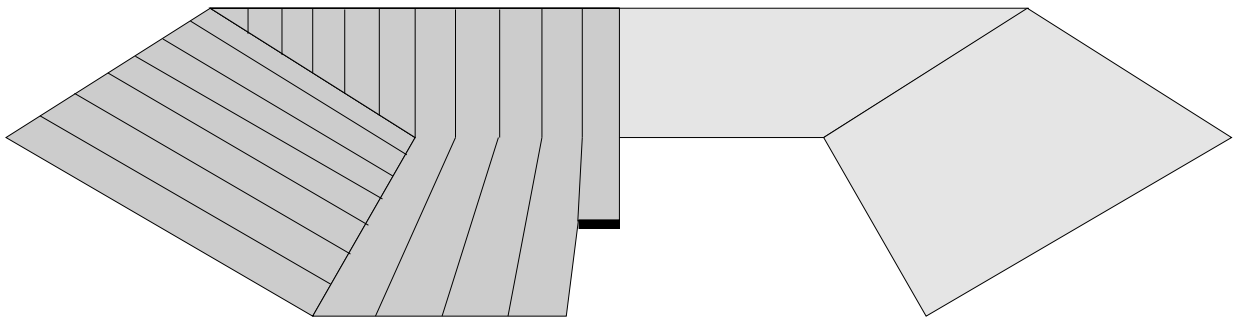
Installation

Equipment

In addition to conventional personal protective equipment (PPE) when working on site (hard hat, work boots and high visibility coat), the following equipment should be considered for use during installation:

- Gloves
- Safety glasses
- Carpet cutting knife (or Stanley knife)
- Hot air welding gun and hand roller
- Mobile electrical generator
- Sand bags or tyres

Laying HPS/MPS geotextiles



Method of laying

- Rolls can be transferred to the working area of the site and the packaging removed without causing damage to the geotextile.
- Unroll by hand on level ground.
- Unroll down slopes with the assistance of the appropriate plant. Laying along slopes is not recommended, as this could lead to down-slope migration.
- Place rolls with offsets to allow for longitudinal and transverse overlaps.
- Once laid, the geotextile can be weighted with sandbags or tyres to prevent it being disturbed by wind.

Overlaps for HPS/MPS geotextiles

Overlap widths are site specific and generally at the discretion of the on-site engineer. However, the following may be used as a guideline for landfill and general membrane protection applications:

Bonded overlaps	150mm (minimum recommended)
Unbonded loose overlaps	300mm

- Transverse overlaps (between subsequent rolls/lengths) should be located at least 1m from the toe and crest of slopes.
- Longitudinal overlaps (between adjacent roll lengths) should be formed down (not along) slopes.
- Overlap widths should be increased on steep slopes to 200mm, to allow for creep, and should be bonded with a hot air gun (see [Joining](#)).
- Transverse overlaps should not be formed/jointed on slopes greater than 18° (1:3).

Joining HPS/MPS geotextiles



- Jointed overlaps should be formed using a hot air gun such as a Leister, fitted with a wide slot nozzle (see list of equipment suppliers for details), in conjunction with a hand roller.

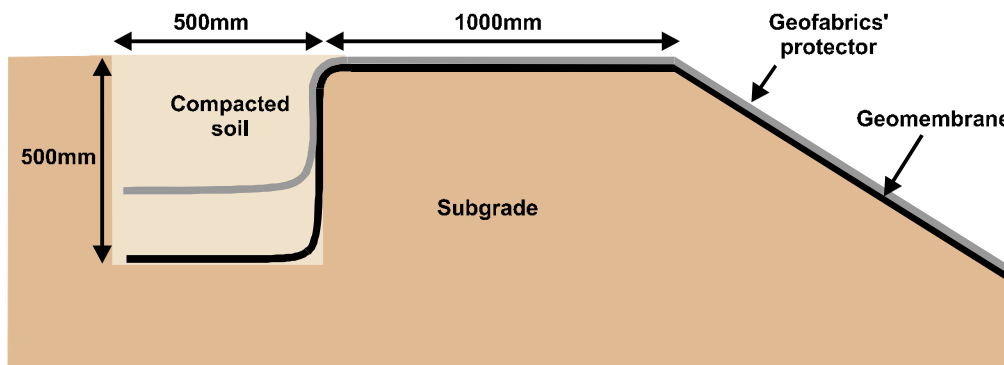
These guns are available different voltage ratings. Operators should consult the relevant section in the manufacturer's guidelines for the appropriate electrical generator. The welding gun should be set for the correct heat output.

- It is recommended that appropriate work gloves and safety glasses should be worn when operating hot-air welding equipment.
- The wide slot nozzle should be placed between the two layers of geotextile at the overlap long enough to slightly melt the fibres. Sufficient pressure should then be applied to the upper layer, using a roller, to press the two heated surfaces together.

On cooling, the two layers will be bonded together. The gun should be steadily drawn along, with one hand, whilst simultaneously moving the roller across the joint at right angles.

- Care should be taken not to overheat the geotextile thus causing damage and increasing the risk of fire.
- **Hot air welding equipment should only be used in conjunction with manufacturer's guidelines.**
- **When working on landfill caps, it should be verified that electrical equipment is intrinsically safe and that a safe working method is followed if gas is present.**

Anchoring HPS/MPS geotextiles

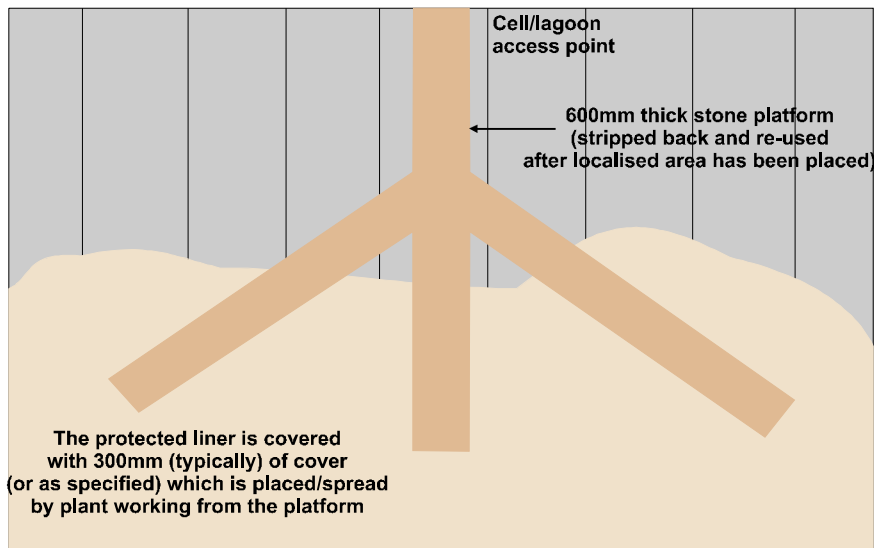


Typical anchor trench detail

- Specific requirements for anchorage are dependent upon site specific conditions such as slope length and angle, weight of geotextile, and type of membrane (rough or smooth).
- Anchorage requirements should be in accordance with the project drawings, or be carried out under the guidance of the site engineer.
- It is recommended that the front profile of an anchor trench is rounded and smooth to reduce stress on the geotextile.
- The anchor trench should be backfilled with soil and compacted on completion of the geotextile installation.

Backfilling

- *GEOfabrics'* HPS (black) products contain 1% carbon black to provide UV resistance. However, it is recommended that these products should be covered within 1 month of installation to avoid any risk of degradation.
- *GEOfabrics'* MPS (white) products are not UV protected and it is therefore recommended they should be covered within 24 hours to avoid any risk of degradation.
- Site or other equipment should never be driven directly on any geosynthetic product.
- When covering a large area of geotextile from a central point it is recommended that a temporary platform be constructed in a herringbone pattern. This should be a minimum thickness of 600mm of drainage stone. This platform should avoid the possibility of installation damage being caused by repeated trafficking. The stone can be stripped off and re-used once the area local to the platform has been covered.

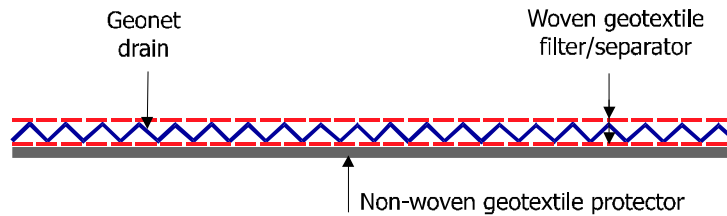


Sequence of backfilling (plan view)

Installing Protexia LFX geocomposites

An LFX geocomposite comprises (from top to bottom):

- Woven geotextile filter/separator
- Geonet drainage core
- Woven geotextile filter/separator
- HPS non-woven protector

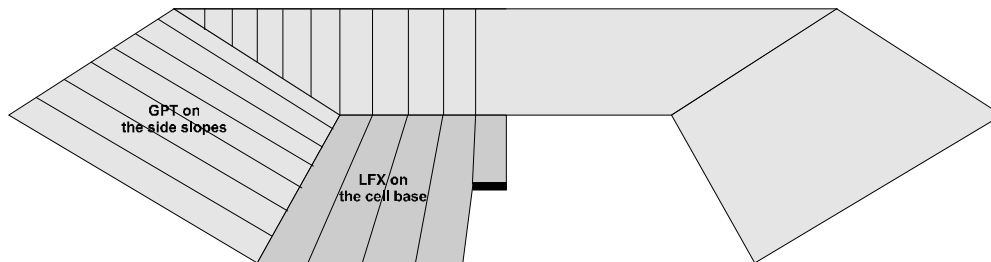


Unloading, handling and storage (see page 2)

Rolls should be stacked on level dry ground, not more than four rolls high, and no other material should be stacked on top of the rolls.

Method of laying

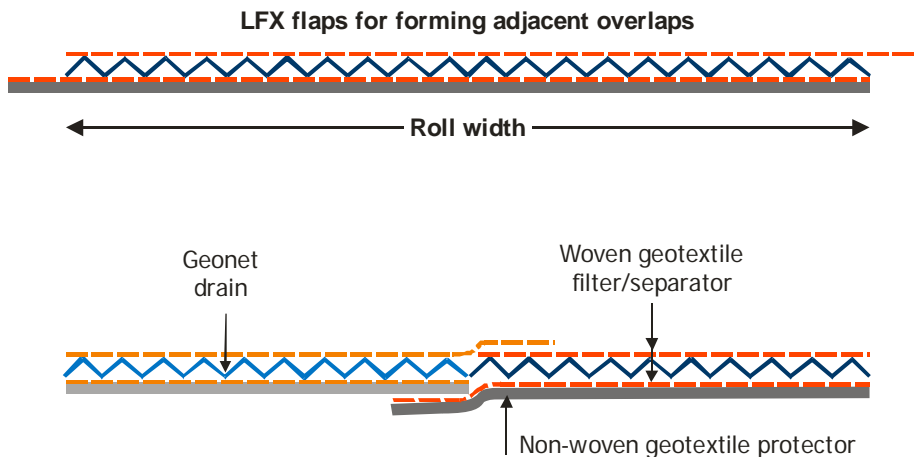
LFX rolls are 4.15m wide with the upper woven geotextile filter/separator providing a 250mm wide flap on one edge. LFX products are intended for basal cell drainage/protection & are not used on side slopes.



Rolls should be transferred to the working area of the site and the packaging removed without causing damage to the geocomposite.

Installation should be directly on to a clean geomembrane surface free from any foreign objects.

Unroll by hand on level ground with the black HPS non-woven protector face down. Adjacent rolls should be placed with the geonet and protector butt jointed at the roll edges. This will leave a 250mm wide flap of the upper woven filter/separator which should be laid across the top of the adjacent roll.



Once laid, the geocomposite can be ballasted with sandbags to prevent being disturbed by the wind.

See the *Joining HPS/MPS geotextiles* section on page 4 for welding techniques and appropriate equipment.

This installation technique will help maintain a high speed of installation, and ensure the LFX product functions effectively, whilst providing a secure surface for the granular drainage material to be placed on.

Equipment Suppliers:

- **Leister hot air welding tools and hand rollers**
Barnes Plastic Welding Equipment Ltd, Lancashire – 01254 888861
- **Lifting Equipment (spreader bars)**
Invicta, Leeds (Peter Sharpe) 0113 277 1222
RSU Lifting Services, Milton Keynes (Candy Scott) 01908 649202
- **Lifting Equipment (straps/slings)**
Euroweb Lashing Systems, Eastbourne (Terry Butchers) – 01323 646 925
- **Cutting knives**
Europa Machines Ltd, Cheshire – 01625 536314

Further information can be found at www.geofabrics.com
or enquiries can be e-mailed to info@geofabrics.com.

These notes are written in good faith and comprise several years' experience of a number of different installers. While it is intended to provide the best practice for installation these guidelines offer no guarantee for the quality and performance of the installation.

The Control of Substances Hazardous to Health, Regulation 1988 from 1 October 1989, (COSHH)

Introduction

This safety sheet outlines the precautions to be taken when handling and storing *GEOfabrics'* geotextiles.

GEOfabrics' geotextiles are manufactured from fibres, filaments and yarns formed by the extrusion of polypropylene or polyethylene, individually or in combination. The handling and storage of *GEOfabrics'* products presents little or no health hazard.

Raw materials

The polymers used to manufacture the fibres - polypropylene and polyethylene - are polyolefins derived from oil and are regarded as chemically and biologically inert.

A lubricant is applied to the fibres during their manufacture to aid the subsequent needlepunching process. This lubricant, a blend of fatty acid esters and diethanolamide, is added in extremely small quantities - 0.4% by weight. The ecological data from the lubricant supplier refers to the lubricant in concentrated form and even then, it is only considered to be moderately toxic to aquatic organisms.

In some situations a *forming* effect may appear on the surface of a geotextile. This is a physical interaction between water and this lubricant. It is a transient effect and has no harmful effects on the environment.

Contact our Quality Manager if you require evidence to support the above statement please who will provide the following data.

GEOfabrics' products do not contain:

- Chlorofluoro carbons (CFC)
- Pentachloro phenols (PCP)
- Urea formaldehyde or derivatives
- Any product capable of forming dioxin
- Any toxic substance

Potential Hazards

Toxicity: the products are regarded as chemically and biologically inert.

Inhalation: the products do not release any toxic or obnoxious fumes at ambient temperatures. The fibres are long, greater than 50 mm. They cannot normally be inhaled.

Ingestion: the fibres used are inert and regarded as harmless. Certain additives and lubricants may be harmful if ingested in significant quantities. *GEOfabrics'* products do not contain quantities of these materials considered to be significant.

Skin contact: the products will not cause skin irritation under normal conditions. However, precautionary measures must be taken and employees who have a history of skin disease or allergy should receive medical clearance prior to direct contact.

Eye contact: the products are unlikely to come into contact with eye. Loose fibres are not normally released from the products.

Flammability: the products will not ignite easily. Melting will occur when heated in air at 165 - 170°C and decomposition will commence at about 300°C with the release of volatile, lower molecular weight hydrocarbons; carbon monoxide, carbon dioxide, water and carbon. In addition, very low concentrations of oxidation and breakdown products, associated with the additives and lubricants, may be released but are

regarded as virtually insignificant. Combustion of *GEOfabrics'* products is similar to most organic materials e.g. wood, paper and cellulose, thus requiring similar precautions in the event of fire in particular in relation to the carbon monoxide.

Explosion: the products do not present an explosion hazard.

Preventative Measures:

Handling precaution: Operatives involved in normal handling and laying of *GEOfabrics'* products do not require special protective clothing or equipment. Operatives with sensitive skin or allergies are advised to wear gloves and seek medical advice.

Standard roll weights range from 235 to 650 kg. Mechanical handling and lifting should be used.

Storage: The products may be stored inside or outside without special precaution. No environmental impairment will be caused.

Emergency Action

Fire: Toxic fumes are not produced but breathing apparatus may be required to combat smoke and carbon monoxide particularly in confined spaces. Molten burning droplets require resistant clothing and footwear.

Spillage: Not applicable.

This guidance note was prepared in October 2003. *GEOfabrics'* specifications are subject to continuous review and variation in line with product improvement. However the raw materials used are unlikely to vary significantly.

Please contact *GEOfabrics* Limited if further information is required.

G Donald
Managing Director