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BBA APPROVAL INSPECTION TESTING CERTIFICATION
TECHNICAL APPROVALS FOR CONSTRUCTION

Roads and Bridges
Agrément Certificate
No 01/R125
Product Sheet 3

FORTRAC GEOSYNTHETICS

FORTRAC T AND R-T GEOGRIDS

The Highways Agency requirements to which this Certificate is subject are detailed on page 2

PRODUCT SCOPE AND SUMMARY OF CERTIFICATE

This Certificate relates to Fortrac T and R-T Geogrids, polymeric geogrids for use as reinforcement in embankments with slope angles up to 70°.

AGRÉMENT CERTIFICATION INCLUDES:

- factors relating to compliance with Highways Agency requirements where applicable
- factors relating to compliance with Regulations where applicable
- independently verified technical specification
- assessment criteria and technical investigations
- design considerations
- installation guidance
- regular surveillance of production
- formal three-yearly review.

KEY FACTORS ASSESSED

Mechanical properties — short-term tensile strength and elongation and long-term tensile strength properties of geogrids (see section 6).

Material safety factors — safety factors for manufacture and extrapolation of data (f_m), installation damage (f_d) and environmental effects (f_e) have been established (see section 7).

Soil/geogrid interaction — coefficients relating to direct sliding and pull-out resistance have been evaluated (see section 8).

Durability — geogrids have good resistance to chemical degradation, biodegradation, temperature, and weathering, and are used in fills normally encountered in civil engineering practice (see section 10).

The BBA has awarded this Agrément Certificate to the company named above for the products described herein. These products have been assessed by the BBA as being fit for their intended use provided they are installed, used and maintained as set out in this Certificate.

On behalf of the British Board of Agrément

Date of First issue: 22 January 2009
Originally certificated on 18 October 2001

Brian Chamberlain
Head of Approvals — Engineering

Greg Cooper
Chief Executive

The BBA is a UKAS accredited certification body — Number 113. The schedule of the current scope of accreditation for product certification is available in pdf format via the UKAS link on the BBA website at www.bbacerts.co.uk

Readers are advised to check the validity and latest issue number of this Agrément Certificate by either referring to the BBA website or contacting the BBA direct.

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Highways Agency Requirements

Approval procedures shall be in accordance with HA Standard HD 22/02 (DMRB 4.1.2).

The products are for use in the following situation:

- embankments with an effective slope of up to 70°.

The design, materials specification and construction methods adopted shall be in accordance with HA Advice Note HA 68/94 (DMRB 4.1.4) and Manual of Contract Documents for Highway Works (MCHW)[1], Volumes 1 and 2, August 1998 (as amended)

(1) The MCHW is operated by the Overseeing Organisations: the Highways Agency, the Scottish Executive, the Welsh Assembly Government and the Department for Regional Development, Northern Ireland.

Regulations

Construction (Design and Management) Regulations 2007

Construction (Design and Management) Regulations (Northern Ireland) 2007

Information in this Certificate may assist the client, CDM co-ordinator, designer and contractors to address their obligations under these Regulations.

See sections: 1 Description (1.3), 2 *Delivery and site handling* (2.2) and 11 *General*.

General

This Certificate relates to Fortrac T and R-T Geogrids, polymeric geogrids for use as reinforcement in embankments with slope angles up to 70°.

The products provide lateral restraint to suitable cohesive or frictional soils in embankments, with stability achieved by the interaction and interlocking of the soil particles with the Fortrac T and R-T Geogrids.

The design and construction of embankments must be in accordance with the requirements of the Highways Agency (HA); acting on behalf of the Department for Transport, the Scottish Executive, the Welsh Assembly Government, and the Department for Regional Development, Northern Ireland and the conditions set out in the *Design Considerations* and *Installation* parts of this Certificate.

Technical Specification

1 Description

1.1 Fortrac T and R-T Geogrids are planar structures consisting of a regular open network of integrally-connected tensile elements of yarn. The yarn is made from high modulus polyester fibres of polyethylene terephthalate (PET).

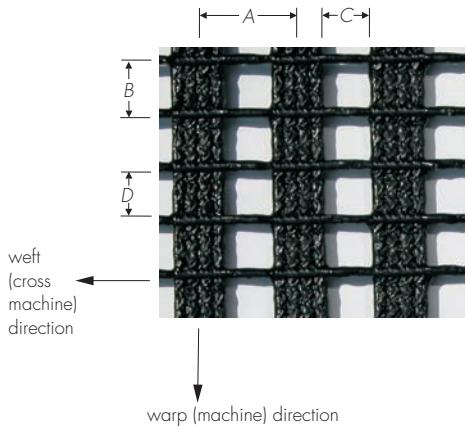
1.2 The yarn is woven or knitted into grids and coated with a protective layer of plastic dispersion, by the Certificate holder.

1.3 The geogrids are manufactured in nine standard grades of various strengths and mesh sizes. A typical geogrid is illustrated in Figure 1 and the range and specification of the geogrids assessed by the BBA are listed in Tables 1 and 2.

1.4 The warp (machine) direction is along the roll length and is indicated by a paper tape (see Figure 1).

1.5 Factory production control is exercised throughout all stages of manufacture. The specification of the incoming yarn is checked and tested against the Certificate of Conformity from the supplier. Checks made on the woven or knitted grid and the polymer protective coating include visual examination, dimensional checks and batch performance tests.

Figure 1 Fortrac T Geogrids



A and *B*: average grid size
C and *D*: average aperture size

Fortrac classification is by warp/weft tensile strength and aperture size:
eg Fortrac R 200/50-30T = 200 kNm^{-1} warp tensile strength.
30 kNm^{-1} weft tensile strength, 30 mm nominal aperture size

Table 1 General specification

Grade[1]	Mass[2] (gm^{-2}) ± 9%	Average grid size[3] warp/weft (mm) *A* x *B*	Average aperture size[3] warp/weft (mm) *C* x *D*	Roll weight of 5 m width rolls (kg ± 10%)	Standard roll length (m) ± 1%
35/20-20T	210	23.1 x 23.0	21 x 18	230	200
55/30-20T	280	23.0 x 25.5	20 x 20.5	300	200
80/30-20T	350	25.0 x 23.0	20 x 18	370	200
110/30-20T	420	25.1 x 22.8	20 x 18	480	200
R 150/30-30T	580	41.7 x 32.8	33 x 27	630	200
R 200/30-30T	700	40.0 x 32.5	31 x 27	750	200
R 400/50-30T	1200	67.0 x 33.5	37 x 27.5	650	100
R 600/50-30T	1700	50.0 x 33.0	30 x 28	900	100
R 800/100-30T	2400	90.0 x 30.0	30 x 25	1250	100

(1) R denotes the yarn is knitted.
(2) Mass/unit area measured in accordance with BS EN ISO 9864 : 2005.
(3) Reference dimensions (see Figure 1).

Table 2 Performance characteristics

Grade	Short-term tensile strength[1] warp (machine)/weft (cross machine) P_{char} (kN per m width)		α_s[2]	Ratio of bearing[3] surface to plan area α_b x B/2S	Strain at maximum tensile strength[4] warp/weft (%)	
35/20-20T	35 –0	20 –0	0.29	0.014	10 +0/–3	10 +0/–3
55/30-20T	55 –0	30 –0	0.30	0.014	10 +0/–3	10 +0/–3
80/30-20T	80 –0	30 –0	0.37	0.017	10 +0/–3	10 +0/–3
110/30-20T	100 –0	30 –0	0.37	0.016	10 +0/–3	10 +0/–3
R 150/30-30T	150 –0	30 –0	0.35	0.014	11 +0/–3	11 +0/–3
R 200/30-30T	200 –0	30 –0	0.36	0.016	11 +0/–3	11 +0/–3
R 400/50-30T	400 –0	50 –0	0.55	0.013	10 +0/–3	10 +0/–3
R 600/50-30T	600 –0	50 –0	0.49	0.015	10 +0/–3	10 +0/–3
R 800/100-30T	800 –0	100 –0	0.72	0.017	10 +0/–3	10 +0/–3

(1) Short-term tests in accordance with BS EN ISO 10319 : 1996, the values given are characteristic values of ultimate short-term tensile strength (P_{char}).
(2) α_s is the proportion of the plane sliding area that is solid and is required for the calculation of the bond coefficient f_b and the direct sliding coefficient f_{ds} (see sections 8.1 and 8.4).
(3) The ratio is required to calculate bond coefficient in accordance with CIRIA SP123 : 1996 *Soil Reinforcement with Geotextiles* (see section 8.4).
α_b is the proportion of the grid width available for bearing.
B is the thickness of a transverse member of a grid taking bearing.
S is the spacing between transverse members taking bearing.
(4) Tests in accordance with BS EN ISO 10319 : 1996, the values given are the mean and tolerance values (±) of strain in accordance with BS EN 13251 : 2001.

2 Delivery and site handling

2.1 The geogrids are delivered to site in rolls of 0.5 to 0.9 m diameter, approximately 5 m wide and 100 m or 200 m long. Each roll is wrapped for transit and site protection in a black polyethylene bag. Each bag is labelled with geogrid grade and identification (see Figure 2). Packaging should not be removed until immediately prior to installation.

Figure 2 Label

2.2 Rolls should be stored in clean, dry conditions. The rolls should be protected from mechanical or chemical damage and extreme temperatures. Toxic fumes are given off if the geogrids catch fire and therefore the necessary precautions should be taken as given in the instruction included in the material safety data sheet for the products.

2.3 When laid horizontally, the rolls may be stacked up to five high. No other loads should be stored on top of the stack.

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on Fortrac T and R-T Geogrids.

Design Considerations

3 General

3.1 Fortrac T and R-T Geogrids are satisfactory for use as polymeric reinforcement to embankments with maximum slope angles of 70°. Structural stability is achieved through the frictional interaction and mechanical interlocking of soil particles with the woven or knitted grid.

3.2 Prior to the commencement of the work, the designer shall satisfy the HA geotechnical certification requirements.

3.3 The geogrids may be used in combination with soil types having an effective angle of shearing resistance in the range of 15° to 50°, and where the design is in accordance with the procedures given in HA Advice Note HA 68/94 (DMRB 4.1.4).

3.4 Prior to, during and after installation, particular care should be taken to ensure:

- site preparation and embankment construction is as detailed in sections 11 to 13
- fill properties satisfy the design specification
- drainage is adequate at all stages of construction, as required by the contract documents
- the geogrids are protected against damage from site traffic and installation equipment
- the stability of existing structures is not affected.

4 Practicability of installation

4.1 The products are easily installed by trained ground engineering contractors in accordance with the specifications and construction drawings (see the *Installation* part of this Certificate).

5 Design

Reinforced soil structure

5.1 For reinforced embankment projects in the UK, when designs are carried out by, or on behalf of, the manufacturer, these are in accordance with the procedures given in HA Advice Note HA 68/94 (DMRB 4.1.4).

5.2 The design strength of the reinforcement (P_{des}) should be derived from the unfactored long-term characteristic strength (P_c) (see section 6.5) using the formula:

$P_{des} = P_c / f_m \times f_d \times f_e$

where f_m, f_d and f_e are safety factors (see section 7).

5.3 Guidance on the soil/geogrid interaction coefficients applied in the calculations to derive the direct sliding and pull-out resistance is given in section 8.

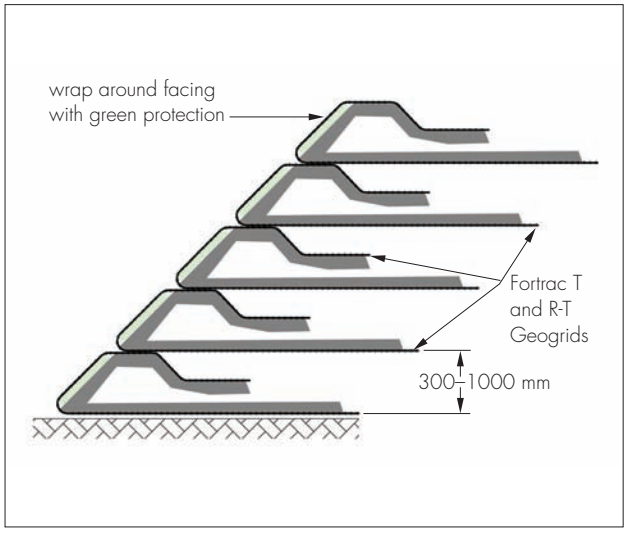
5.4 Working drawings should show the correct orientation of the geogrids. Each layer of reinforcement must be continuous in the direction of load, ie no overlaps.

5.5 If the geogrids are cut or punched to allow for the placing of vertical drains, ducts or planting, only weft strands should be cut. The integrity of the reinforcing length (warp) must not be interfered with in any way.

Facings

5.6 Where the geogrids are used to form the facing, natural or artificial protection should be provided for the geogrids and the fill material (see Figure 3), to protect the geogrids against damage from ultraviolet light (UV), fire and vandalism, and the fill material from erosion. Other facing covers or panels may be used but these are beyond the scope of this Certificate.

Figure 3 Facings



Fill properties

5.7 The designer should specify the relevant properties of a fill material deemed 'acceptable' for the purpose of the design. 'Acceptable' materials should meet the requirements of the Manual of Contract Documents for Highway Works (MCHW1), Volume 1, and HA Advice Note HA 68/94 (DMRB 4.1.4).

6 Mechanical properties

Tensile strength — short-term

6.1 The short-term values of tensile strength and strain for the geogrids are given in Table 2.

Tensile strength — long-term

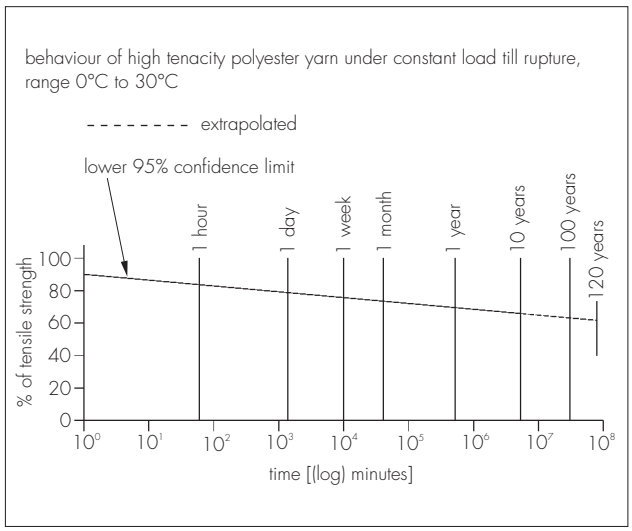
6.2 Long-term creep rupture testing, generally in accordance with the principles of BS EN ISO 13431 : 1999, has been carried out for periods in excess of 10 years and at varying test temperatures, to cover the range of geogrids detailed in this Certificate.

6.3 Real time data for an equivalent yarn has been extrapolated by less than one log cycle to allow the characteristic long-term strength (P_c) for design lives of up to 120 years to be determined.

6.4 Using principles of the Stepped Isothermal Method, predicted long-term strengths for a design life of 60 years and 120 years at design temperatures of 20°C have been obtained from the measured data without the need for direct extrapolation. Such predictions correlate well with extrapolated values using traditional techniques.

6.5 For ultimate limit state for a 120-year design life, P_c is 60% of the characteristic short term tensile strength (P_{char}) and for a 60-year design life 64% of P_{char} (see Figure 4). The design life for reinforced slopes should be taken as 60 years in accordance with HA 68/94 (DMRB 4.1.4). The values of P_{char} are given in Table 2.

Figure 4 Time to rupture



7 Material safety factors

7.1 In establishing the permissible tensile strength of the product and ensuring that during the life of the embankment the geogrid will not fail in tension, the BBA recommends that, in line with the method given in HA Advice Note HA 68/94, a set of partial material safety factors should be applied to P_c. Conditions of use outside the scope for which partial safety factors are defined (see also sections 7.2 to 7.4) are not covered by this Certificate and advice should be sought from the manufacturer.

Manufacture and extrapolation of data — partial safety factor (f_m)

6.7 To allow for variation in manufacture and product dimensions and to account for extrapolation of data the value for the safety factor (f_m) is given in Table 3.

Table 3 Partial material safety factor — manufacture and extrapolation of data

Design life[1] (years)	Partial safety factor (f_m)
120	1.10
60	1.05

(1) The design life for reinforced slopes should be taken as 60 years in accordance with HA Advice Note HA 68/94.

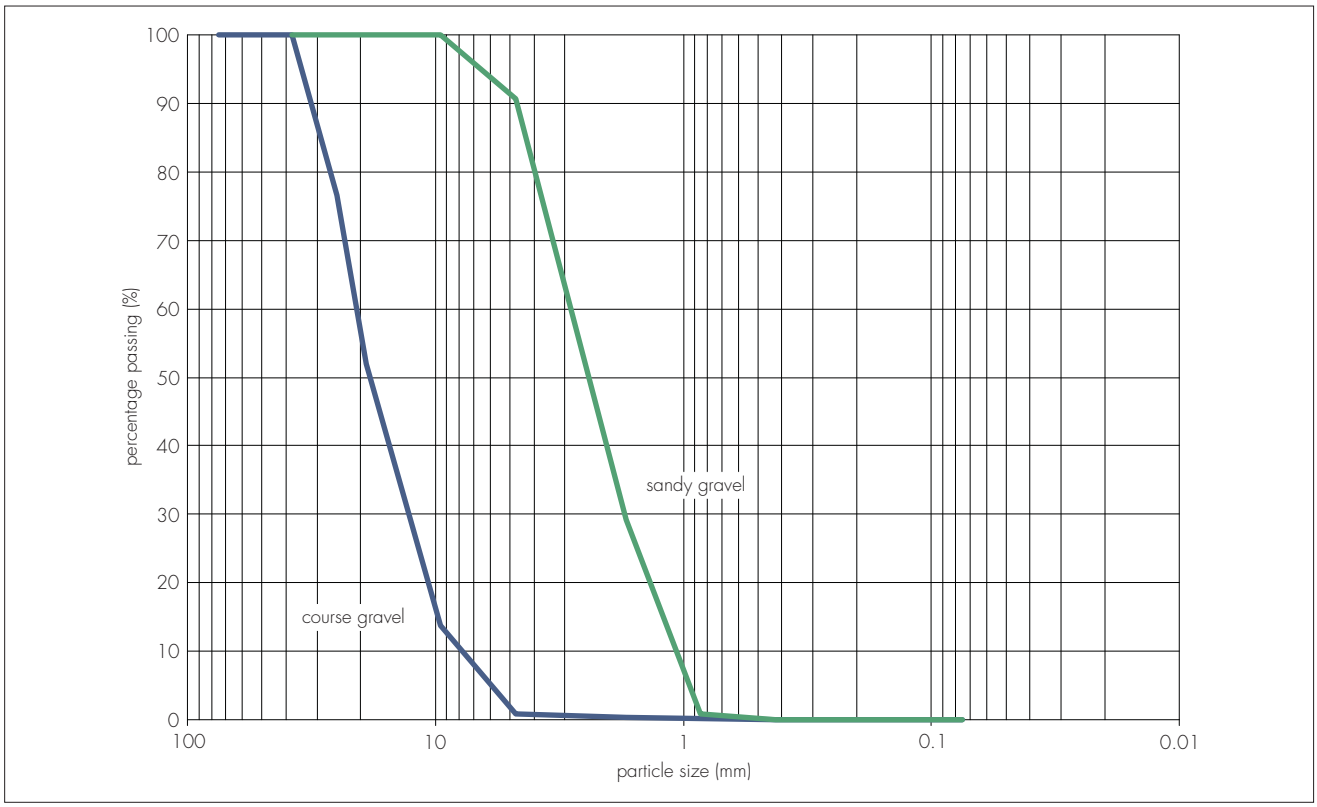
Installation damage — partial safety factors (f_d)

7.3 To allow for loss of strength due to mechanical damage that may be sustained during installation, the appropriate value for f_d may be selected from Table 4. These partial safety factors were established from full-scale installation damage tests using a range of materials whose gradings can be seen in Figure 5 with a minimum compacted depth of 200 mm and using a 4550 kg vibratory roller. For fills not covered by Table 4, appropriate values of f_d may be determined from site specific trials or the engineer may exercise engineering judgement to interpolate between the values given.

Table 4 Partial safety factor — mechanical installation damage (f_d)

Soil type	D_{90} particle size (mm)	Grade	f_d
Sandy gravel	⩽10	35/20-20T	1.15
		55/30-20T	1.15
		80/30-20T	1.15
		110/30-20T	1.10
		R 150/30-30T	1.10
		R 200/50-30T	1.10
		R 400/50-30T	1.10
		R 600/50-30T	1.05
		R 800/100-30T	1.05
Coarse gravel	⩽35	35/20-20T	1.20
		55/30-20T	1.20
		80/30-20T	1.15
		110/30-20T	1.10
		R 150/30-30T	1.10
		R 200/50-30T	1.10
		R 400/50-30T	1.05
		R 600/50-30T	1.05
		R 800/100-30T	1.05

Figure 5 Particle size distributions of fills used in installation damage testing



7.4 To account for environmental conditions the appropriate value for f_e should be selected from Table 5.

Table 5 Partial safety factor — environmental effects (f_e)

Soil pH level	Design life[1] (years)	Partial safety factor(f_e)	
		Product covered on day of installation	Product covered within one month[2] of initial exposure to natural daylight
4.0 – 9.0	120	1.06	1.20
4.0 – 9.0	60	1.03	1.16

(1) Design life for reinforced slopes should be taken as 60 years in accordance with HA Advice Note 68/94.
(2) Exposure of up to four months may be acceptable depending on the season and location.

8 Soil/geogrid interaction

Direct sliding

8.1 The direct sliding resistance of geogrid reinforcement may be expressed as:

$f_{ds}\tan \phi'$ where f_{ds} is a direct sliding coefficient(1)

$f_{ds} = \alpha_s(\tan \delta/\tan \phi') + (1-\alpha_s)$

where: $(\tan \delta/\tan \phi')$ is the coefficient of skin friction (f_{sf}), and

α_s is the proportion of plane sliding area that is solid (see Table 2).

(1) Synonymous with the term 'interface sliding factor (∝)' defined in HA Advice Note 68/94.

8.2 For the geogrids, the coefficient of skin friction $(\tan \delta/\tan \phi')$ may be assumed, for routine design purposes, to be 0.6 for compacted frictional fill. This is a conservative value. Where more precise values are required, for use in design, suitable soil and geogrid specific site testing should be carried out.

Formulae notation

δ = angle of friction between soil and plane reinforcement surface

ϕ' = effective angle of friction of soil.

Bond strength (*Pull-out resistance*)

8.3 The theoretical expression for bond is:

$f_b\tan \phi'$ here f_b is the bond coefficient(1).

(1) Synonymous with the term 'pull-out bearing factor (∝')' defined in HA Advice Note 68/94.

8.4 The use of laboratory pull-out testing to determine the value of the bond coefficient (f_b) is not recommended at present. For routine design purposes, values may be estimated using the theoretical method of Jewell (CIRIA SP123, 1996, section 4.6). For the geogrids, for routine design purposes, the coefficient of skin friction $(\tan \delta/\tan \phi')$ may be assumed to be 0.6 for compacted frictional fill and the ratio of bearing surface to plane area can be taken from Table 2. The BBA recommends that site specific pull-out testing is carried out to confirm the value of bond coefficient (f_b) used in the final design.

9 Maintenance

As the product is confined within the soil and has suitable durability (see section 10), maintenance is not required.

10 Durability

10.1 The geogrids may be used in fills normally encountered in civil engineering practice (see section 5.7).

10.2 Evidence from tests show that the geogrids have good resistance to chemical degradation, biodegradation, temperature, and weathering (see sections 10.3 to 10.8).

Chemical degradation

10.3 Evidence from tests in accordance with BS EN 12447 : 2001 shows that within a soil environment, where pH ranges from 4.0 to 9.0 and temperatures are typical of those normally found in embankments in the United Kingdom, the strength of the products are not adversely affected by hydrolysis, for applications where sustained soil temperatures are not higher than 20°C. A partial safety factor due to hydrolysis should be applied in the design (see section 7.4).

10.4 Evidence from tests in accordance with BS EN 14030 : 2001 shows that the geogrids have a high resistance to acidic and alkaline liquids. To predict long-term durability of the geogrids for a design life of 60 years or 120 years where the pH level of the soil is below 4.0 or above 9.0, further investigation will have to be undertaken.

Microbial attack

10.5 Evidence from tests in accordance with BS EN 12225 : 2000 shows that the geogrids are highly resistant to microbial attack.

Effects of temperature

10.6 The long-term creep performance of the products are not adversely affected by the range of soil temperatures typical of embankments in the UK for service loads up to the design tensile load.

10.7 Where the geogrids may be exposed to temperatures higher than 20°C or lower than 0°C for significant periods of time, consideration should be given to the temperature levels, the range of temperatures, period of exposure and stress levels at the location in question.

10.8 Sustained temperatures of greater than 20°C can increase the rate of hydrolysis of polyester and further reduction factors may be necessary.

Resistance to weathering

10.9 Evidence from tests in accordance with BS EN 12224 : 2000 shows that the geogrids have adequate resistance to weathering. A partial material factor of 1.13 should be applied when the maximum exposure time during installation is one month. Exposure up to four months may be acceptable depending upon the season and location. If

the geogrids are exposed to ultraviolet light for a maximum of one day, a partial safety factor of 1.0 can be applied (see section 7.4).

Installation

11 General

In general, the execution of reinforced soil structures should be carried out in accordance with BS EN 14475 : 2006. Care should be exercised to ensure Fortrac T and R-T Geogrids are laid with the warp (longitudinal) direction parallel to the direction of principal stress. Design drawings should indicate geogrid orientation (see section 5.4).

12 Preparation

The formation is prepared by levelling and compacting the subgrade in accordance with MCHW1 and MCHW2. The surface must be free of root growth, logs, frozen matter and any other obstacles that may damage the geogrids.

13 Procedure

13.1 The geogrid is laid by unrolling the grid to the length required and cutting with a sharp knife or scissors. The unrolling of the grid may be carried out manually or mechanically.

13.2 The grids should be laid flat without folds, parallel to each other and with widths in contact. Each reinforcing layer must be continuous in the direction of loading and there should be no overlapping of the grids. Strip misalignment must not exceed 50 mm over a distance of 5 m. Pins or a stretching device may be used to control alignment and also to induce a small prestressing load prior to filling.

13.3 Particular care should be taken to ensure that the grids are adequately covered before compaction or trafficking. Construction traffic will damage unprotected geogrids.

13.4 Fill materials and the thickness and compaction of the fill should be in accordance with the MCHW, Volume 1, and in line with those conditions used to determine the installation damage partial safety factors in design (see section 7.3).

13.5 Facings are positioned as detailed on the engineer's design drawing. Where the geogrids are used as facings, the geogrid must be wrapped around and anchored back into the fill. Formwork is used to assist in maintaining the shape of the facing. Facings, prefabricated or otherwise, are beyond the scope of this Certificate. A typical example is shown in Figure 3.

Technical Investigations

14 Investigations

14.1 The manufacturing process of the geogrids was examined, including the methods adopted for quality control, and details were obtained of the quality and composition of the materials used.

14.2 An examination was made of data relating to:

- evaluation of long- and short-term tensile properties
- resistance to mechanical damage and installation
- resistance to biological attack
- chemical degradation
- resistance to weathering
- effects of temperature
- assessment of the proposed design method in relation to the recommendations HA Advice Note HA 68/94 (DMRB 4.1.4)
- coefficients of interaction between the product and the fill.

14.3 The practicability and ease of handling and installation were assessed.

Additional Information

The management systems of Huesker Synthetic GmbH have been assessed and registered as meeting the requirements of EN ISO 9001 : 2000 by TÜV, Germany (Certificate No 041007084).

Bibliography

BS EN 12224 : 2000 *Geotextile and geotextile-related products — Determination of the resistance to weathering*

BS EN 12225 : 2000 *Geotextile and geotextile-related products — Method for determining the microbiological resistance by a soil burial test*

BS EN 12447 : 2001 *Geotextiles and geotextile-related products — Screening test method for determining the resistance to hydrolysis in water*

BS EN 13251 : 2001 *Geotextiles and geotextile-related products — Characteristics required for use in earthworks, foundations and retaining structures*

BS EN 14030 : 2001 *Geotextiles and geotextile-related products — Screening test method for determining the resistance to acid and alkaline liquids*

BS EN 14475 : 2006 *Execution of special geotechnical works — Reinforced fill*

BS EN ISO 9864 : 2005 *Geosynthetics — Test method for the determination of mass per unit area of geotextiles and geotextile-related products*

BS EN ISO 10319 : 1996 *Geotextiles — Wide-width tensile test*

BS EN ISO 13431 : 1999 *Geotextiles and geotextile-related products — Determination of tensile creep and creep rupture behaviour*

EN ISO 9001 : 2000 *Quality management systems — Requirements*

HD 22/02 *Design Manual for Roads and Bridges : Volume 4, Geotechnics and Drainage, Section 1, Earthworks : Part 2, Managing Geotechnical Risk*

HA 68/94 *Design Manual for Roads and Bridges : Volume 4, Geotechnics and Drainage, Section 1, Earthworks : Part 4, Design Methods for the Reinforcement of Highway Slopes by Reinforced Soil and Soil Nailing Techniques*

Manual of Contract Documents for Highway Works, Volume 1 *Specification for Highway Works,* August 1998 (as amended)

Manual of Contract Documents for Highway Works, Volume 2 *Notes for Guidance on the Specification for Highway Works,* August 1998 (as amended)

15 Conditions

15.1 This Certificate:

- relates only to the product/system that is named and described on the front page
- is granted only to the company, firm or person named on the front page — no other company, firm or person may hold or claim any entitlement to this Certificate
- is valid only within the UK
- has to be read, considered and used as a whole document — it may be misleading and will be incomplete to be selective
- is copyright of the BBA
- is subject to English law.

15.2 References in this Certificate to any Act of Parliament, Statutory Instrument, Directive or Regulation of the European Union, British, European or International Standard, Code of Practice, manufacturers' instructions or similar publication, are references to such publication in the form in which it was current at the date of this Certificate.

15.3 This Certificate will remain valid for an unlimited period provided that the product/system and the manufacture and/or fabrication including all related and relevant processes thereof:

- are maintained at or above the levels which have been assessed and found to be satisfactory by the BBA
- continue to be checked as and when deemed appropriate by the BBA under arrangements that it will determine
- are reviewed by the BBA as and when it considers appropriate
- remain in accordance with the requirements of the Highways Agency.

15.4 In granting this Certificate, the BBA is not responsible for:

- the presence or absence of any patent, intellectual property or similar rights subsisting in the product/system or any other product/system
- the right of the Certificate holder to manufacture, supply, install, maintain or market the product/system
- individual installations of the product/system, including the nature, design, methods and workmanship of or related to the installation
- the actual works in which the product/system is installed, used and maintained, including the nature, design, methods and workmanship of such works.

15.5 Any information relating to the manufacture, supply, installation, use and maintenance of this product/system which is contained or referred to in this Certificate is the minimum required to be met when the product/system is manufactured, supplied, installed, used and maintained. It does not purport in any way to restate the requirements of the Health & Safety at Work etc Act 1974, or of any other statutory, common law or other duty which may exist at the date of this Certificate; nor is conformity with such information to be taken as satisfying the requirements of the 1974 Act or of any statutory, common law or other duty of care. In granting this Certificate, the BBA does not accept responsibility to any person or body for any loss or damage, including personal injury, arising as a direct or indirect result of the manufacture, supply, installation, use and maintenance of this product/system.

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