HAPAS

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HAPAS Certificate
16/H249
Product Sheet 1 Issue 4

LINEAR COMPOSITES SOIL REINFORCEMENT PRODUCTS

PARAGRID, PARAGRID HF AND PARADRAIN GEOCOMPOSITES

This Product Sheet(1) is issued by the British Board of Agrément (BBA). The Highways Authorities Product Approval Scheme (HAPAS) is supported by National Highways (NH) (acting on behalf of the Overseeing Organisations of the Department for Transport; Transport Scotland; the Welsh Government; and the Department for Infrastructure, Northern Ireland), the Association of Directors of Environment, Economy, Planning and Transport (ADEPT), the Local Government Technical Advisers Group and industry bodies.

(1) Hereinafter referred to as 'Certificate'.

This Certificate relates to Paragrid, Paragrid HF and Paradrain Geocomposites, comprising an open network of integrally connected straps of high tenacity polyester (PET) yarn coated with polyethylene, for use as reinforcement in embankments with slope angles up to 70°, in accordance with the *Manual of Contract Documents for Highway Works* (MCHW), Volume 1 *Specification for Highway Works* (SHW), Series 600, and designated Standards BS EN 13251 : 2016, BS 8006-1 : 2010, PD ISO/TR 20432 : 2007, CIRIA SP123 : 1996 and BS EN 14475 : 2006.

The BBA has awarded this Certificate to the company named above for the products described herein. These products have been assessed by the BBA as complying with the requirements of the BBA HAPAS Certification Scheme according to the assessments set out in this Certificate.

On behalf of the British Board of Agrément

Date of Fourth issue: 2 July 2024
Originally certified on 7 June 2016

Hardy Giesler
Chief Executive Officer

This BBA HAPAS Certificate is issued under the BBA's accreditation to ISO/IEC 17065 (UKAS accredited Certification Body Number 0113).

Clauses marked † are additional information outside the scope of accreditation.

Readers MUST check the validity and latest issue number of this BBA HAPAS Certificate by referring to the BBA website or contacting the BBA directly.

The Certificate should be read in full as it may be misleading to read clauses in isolation.

Any photographs are for illustrative purposes only, do not constitute advice and should not be relied upon.

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1 Product Description

1.1 The Certificate holder specifies the products under assessment, Paragrid, Paragrid HF and Paradrain Geocomposites, comprising an open network of integrally connected straps of high tenacity polyester (PET) yarn coated with polyethylene, for use as reinforcement in embankments with slope angles up to 70°, in accordance with the MCHW, Volume 1 SHW, Series 600, and designated Standards BS EN 13251 : 2016, BS 8006-1 : 2010, PD ISO/TR 20432 : 2007, CIRIA SP123 : 1996 and BS EN 14475 : 2006.

1.2 Paragrid, Paragrid HF and Paradrain Geocomposites are planar structures, consisting of a biaxial array of composite geosynthetic straps which comprise cores of polyester tendons encased in a polyethylene sheath.

1.3 The Paragrid, Paragrid HF and Paradrain Geocomposites grades covered by this Certificate are listed in Tables 1 to 3. The configuration of the geocomposites is illustrated in Figure 1.

Figure 1 Paragrid, Paragrid HF and Paradrain Geocomposites

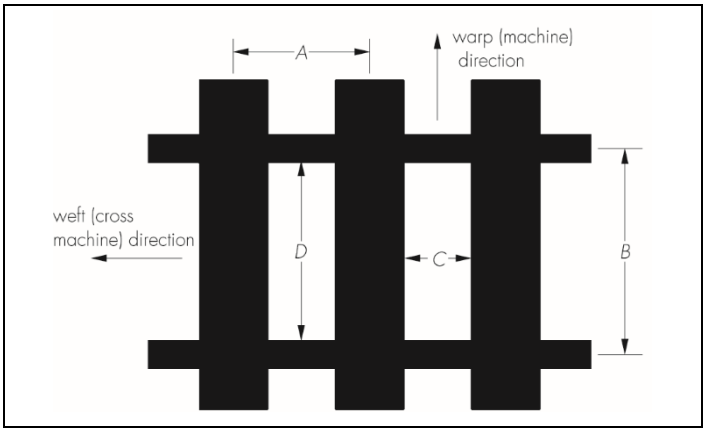


Table 1 General specifications for Paragrid Geocomposites

Grade	Nominal mass[1] ($g \cdot m^{-2}$)	Grid size[2] warp/weft A x B (mm)	Aperture size[2] warp/weft C x D (mm)	Nominal roll weight (3.9 m width) (kg)	Standard roll length (m)
30/5	213	75 x 450	51 x 426	93	100
40/5	218	75 x 450	51 x 426	95	100
50/5	244	75 x 450	51 x 426	105	100
65/5	312	75 x 450	51 x 426	108	80
80/5	362	75 x 450	51 x 426	123	80
90/5	397	75 x 450	51 x 426	134	80
100/5	416	75 x 450	51 x 426	140	80
110/5	441	75 x 450	51 x 426	148	50
120/5	452	75 x 450	42 x 426	99	50
135/5	510	75 x 450	42 x 426	110	50
150/5	567	75 x 450	42 x 426	121	50
160/5	604	75 x 450	42 x 426	128	50
175/5	656	75 x 450	42 x 426	138	50
200/5	705	75 x 450	42 x 426	147	50
30/15	328	75 x 225	51 x 201	73	50
50/15	367	75 x 225	51 x 201	79	50
50/50	568	75 x 75	51 x 51	117	50
100/100	811	75 x 75	51 x 51	164	50
80/15	435	75 x 225	51 x 201	93	50
100/15	488	75 x 225	51 x 201	103	50
120/15	547	75 x 225	42 x 201	108	50
150/15	671	75 x 225	42 x 201	130	50
160/15	700	75 x 225	42 x 201	138	50
200/15	781	75 x 225	42 x 201	156	50

(1) Mass/unit area measured in accordance with BS EN ISO 9864 : 2005.
(2) Mean measured dimensions (see Figure 1 for reference).

Table 2 General specifications for Paragrid HF Geocomposites

Grade	Nominal mass[1] ($g \cdot m^{-2}$)	Grid size[2] warp/weft A x B (mm)	Aperture size[2] warp/weft C x D (mm)	Nominal roll weight (4.5 m width) (kg)	Standard roll length (m)
90/5	314	180 x 1000	135 x 940	200	100
100/5	327	180 x 1000	135 x 940	280	150
125/5	365	180 x 1000	134 x 940	270	130
150/5	408	180 x 1000	134 x 940	330	150
175/5	465	180 x 1000	134 x 940	370	150
200/5	505	180 x 1000	133 x 940	410	160
250/5	603	180 x 1000	132 x 940	430	140

(1) Mass/unit area measured in accordance with BS EN ISO 9864 : 2005.
(2) Mean measured dimensions (see Figure 1 for reference).

Table 3 General specifications for Paradrain Geocomposites

Grade	Nominal mass[1] ($g \cdot m^{-2}$)	Grid size[2] warp/weft A x B (mm)	Aperture size[2] warp/weft C x D (mm)	Nominal roll weight (3.9 m width) (kg)	Standard roll length (m)
50/5	358	75 x 450	51 x 426	82	50
80/5	441	75 x 450	51 x 426	96	50
100/5	489	75 x 450	51 x 426	105	50
150/5	685	75 x 450	42 x 426	144	50
200/5	781	75 x 450	42 x 426	160	50

(1) Mass/unit area measured in accordance with BS EN ISO 9864 : 2005.
(2) Mean measured dimensions (see Figure 1 for reference).

2 Requirements

Requirements for the products are outlined in the BBA HAPAS Certification Scheme and Technical Specifications Documents, and have been established from the following specification documents:

- the MCHW[1], Volume 1 SHW, Series 600
- BS EN 13251 : 2016
- BS 8006-1 : 2010
- PD ISO/TR 20432 : 2007
- CIRIA SP123 : 1996
- BS EN 14475 : 2006.

(1) The MCHW is operated by National Highways (NH) (acting on behalf of the Overseeing Organisations of the Department for Transport; Transport Scotland; the Welsh Government; and the Department for Infrastructure, Northern Ireland).

3 Summary of Product Assessment

The products were assessed on the basis of the following characteristics in accordance with HAPAS requirements.

3.1 Short-term tensile strength

3.1.1 The assessment showed that the products comply with HAPAS requirements for short-term tensile strength characteristic.

Table 4 Machine direction mean tensile strength characteristics of Paragrid Geocomposites

Product Grade assessed	Assessment method	Requirement	Result
30/5	Short-term tensile strength test to BS EN ISO 10319 : 2015	Value achieved	37 $kN \cdot m^{-1}$
40/5			46 $kN \cdot m^{-1}$
50/5			57 $kN \cdot m^{-1}$
65/5			70 $kN \cdot m^{-1}$
80/5			86 $kN \cdot m^{-1}$
90/5			96 $kN \cdot m^{-1}$
100/5			106 $kN \cdot m^{-1}$
110/5			116 $kN \cdot m^{-1}$
120/5			125 $kN \cdot m^{-1}$
135/5			141 $kN \cdot m^{-1}$
150/5			160 $kN \cdot m^{-1}$
160/5			170 $kN \cdot m^{-1}$
175/5			185 $kN \cdot m^{-1}$
200/5			212 $kN \cdot m^{-1}$
30/15			37 $kN \cdot m^{-1}$
50/15			57 $kN \cdot m^{-1}$
50/50			57 $kN \cdot m^{-1}$
100/100			106 $kN \cdot m^{-1}$
80/15			86 $kN \cdot m^{-1}$
100/15			106 $kN \cdot m^{-1}$
120/15			130 $kN \cdot m^{-1}$
150/15			160 $kN \cdot m^{-1}$
160/15			170 $kN \cdot m^{-1}$
200/15			212 $kN \cdot m^{-1}$

Table 5 Machine direction mean tensile strength tolerance characteristics of Paragrid Geocomposites

Product Grade assessed	Assessment method	Requirement	Result
30/5	Short-term tensile strength test to BS EN ISO 10319 : 2015	-7	Pass
40/5		-6	Pass
50/5		-7	Pass
65/5		-5	Pass
80/5		-6	Pass
90/5		-6	Pass
100/5		-6	Pass
110/5		-6	Pass
120/5		-5	Pass
135/5		-6	Pass
150/5		-10	Pass
160/5		-10	Pass
175/5		-10	Pass
200/5		-12	Pass
30/15		-7	Pass
50/15		-7	Pass
50/50		-7	Pass
100/100		-6	Pass
80/15		-6	Pass
100/15		-6	Pass
120/15		-10	Pass
150/15		-10	Pass
160/15		-10	Pass
200/15		-12	Pass

Table 6 Machine direction mean strain at maximum tensile strength characteristics of Paragrid Geocomposites

Product Grade assessed	Assessment method	Requirement	Result
30/5	Short-term tensile strength test to BS EN ISO 10319 : 2015	11 (±1) %	Pass
40/5		11 (±1) %	Pass
50/5		11 (±1) %	Pass
65/5		11 (±1) %	Pass
80/5		11 (±1) %	Pass
90/5		11 (±1) %	Pass
100/5		11 (±1) %	Pass
110/5		11 (±1) %	Pass
120/5		11 (±1) %	Pass
135/5		11 (±1) %	Pass
150/5		11 (±1) %	Pass
160/5		11 (±1) %	Pass
175/5		11 (±1) %	Pass
200/5		11 (±1) %	Pass
30/15		11 (±1) %	Pass
50/15		11 (±1) %	Pass
50/50		11 (±1) %	Pass
100/100		11 (±1) %	Pass
80/15		11 (±1) %	Pass
100/15		11 (±1) %	Pass
120/15		11 (±1) %	Pass
150/15		11 (±1) %	Pass
160/15		11 (±1) %	Pass
200/15		11 (±1) %	Pass

Table 7 Machine direction characteristic strength (T_{char}) values used for design of Paragrid Geocomposites

Product Grade assessed	Assessment method	Requirement(1)	Result
30/5	BS EN 13251 : 2016	≥ 30 kN·m^{-1}	Pass
40/5		≥ 40 kN·m^{-1}	Pass
50/5		≥ 50 kN·m^{-1}	Pass
65/5		≥ 65 kN·m^{-1}	Pass
80/5		≥ 80 kN·m^{-1}	Pass
90/5		≥ 90 kN·m^{-1}	Pass
100/5		≥ 100 kN·m^{-1}	Pass
110/5		≥ 110 kN·m^{-1}	Pass
120/5		≥ 120 kN·m^{-1}	Pass
135/5		≥ 135 kN·m^{-1}	Pass
150/5		≥ 150 kN·m^{-1}	Pass
160/5		≥ 160 kN·m^{-1}	Pass
175/5		≥ 175 kN·m^{-1}	Pass
200/5		≥ 200 kN·m^{-1}	Pass
30/15		≥ 30 kN·m^{-1}	Pass
50/15		≥ 50 kN·m^{-1}	Pass
50/50		≥ 50 kN·m^{-1}	Pass
100/100		≥ 100 kN·m^{-1}	Pass
80/15		≥ 80 kN·m^{-1}	Pass
100/15		≥ 100 kN·m^{-1}	Pass
120/15		≥ 120 kN·m^{-1}	Pass
150/15		≥ 150 kN·m^{-1}	Pass
160/15		≥ 160 kN·m^{-1}	Pass
200/15		≥ 200 kN·m^{-1}	Pass

(1) The characteristic short-term tensile strength (Tchar) values are the mean short-term tensile strength minus 1 x the tolerance value.

Table 8 Machine direction nominal strain at (T_{char}) load values used for design of Paragrid Geocomposites

Product Grade assessed	Assessment method	Requirement	Result
30/5	BS EN 13251 : 2016	9 %	Pass
40/5		9 %	Pass
50/5		9 %	Pass
65/5		9 %	Pass
80/5		9 %	Pass
90/5		9 %	Pass
100/5		9 %	Pass
110/5		9 %	Pass
120/5		9 %	Pass
135/5		9 %	Pass
150/5		9 %	Pass
160/5		9 %	Pass
175/5		9 %	Pass
200/5		9 %	Pass
30/15		9 %	Pass
50/15		9 %	Pass
50/50		9 %	Pass
100/100		9 %	Pass
80/15		9 %	Pass
100/15		9 %	Pass
120/15		9 %	Pass
150/15		9 %	Pass
160/15		9 %	Pass
200/15		9 %	Pass

Table 9 Machine direction mean tensile strength characteristics of Paragrid HF Geocomposites

Product Grade assessed	Assessment method	Requirement	Result
90/5	Short-term tensile strength test to BS EN ISO 10319 : 2015	Value achieved	96 $kN \cdot m^{-1}$
100/5			106 $kN \cdot m^{-1}$
125/5			135 $kN \cdot m^{-1}$
150/5			160 $kN \cdot m^{-1}$
175/5			185 $kN \cdot m^{-1}$
200/05			212 $kN \cdot m^{-1}$
250/05			265 $kN \cdot m^{-1}$

Table 10 Machine direction mean tensile strength tolerance characteristics of Paragrid HF Geocomposites

Product Grade assessed	Assessment method	Requirement	Result
90/5	Short-term tensile strength test to BS EN ISO 10319 : 2015	-6	Pass
100/5		-6	Pass
125/5		-10	Pass
150/5		-10	Pass
175/5		-10	Pass
200/05		-12	Pass
250/05		-15	Pass

Table 11 Machine direction mean strain at maximum tensile strength characteristics of Paragrid HF Geocomposites

Product Grade assessed	Assessment method	Requirement	Result
90/5	Short-term tensile strength test to BS EN ISO 10319 : 2015	10.5 (±1) %	Pass
100/5		10.5 (±1) %	Pass
125/5		10.5 (±1) %	Pass
150/5		10.5 (±1) %	Pass
175/5		10.5 (±1) %	Pass
200/05		10.5 (±1) %	Pass
250/05		10.5 (±1) %	Pass

Table 12 Machine direction characteristic strength (T_{char}) values used for design of Paragrid HF Geocomposites

Product Grade assessed	Assessment method	Requirement[1]	Result
90/5	BS EN 13251 : 2016	≥ 90 kN·m^{-1}	Pass
100/5		≥ 100 kN·m^{-1}	Pass
125/5		≥ 125 kN·m^{-1}	Pass
150/5		≥ 150 kN·m^{-1}	Pass
175/5		≥ 175 kN·m^{-1}	Pass
200/05		≥ 200 kN·m^{-1}	Pass
250/05		≥ 250 kN·m^{-1}	Pass

(1) The characteristic short-term tensile strength (Tchar) values are the mean short-term tensile strength minus 1 x the tolerance value.

Table 13 Machine direction nominal strain at (T_{char}) load values used for design of Paragrid HF Geocomposites

Product Grade assessed	Assessment method	Requirement	Result
90/5	BS EN 13251 : 2016	9.5 %	Pass
100/5		9.5 %	Pass
125/5		9.5 %	Pass
150/5		9.5 %	Pass
175/5		9.5 %	Pass
200/05		9.5 %	Pass
250/05		9.5 %	Pass

Table 14 Machine direction mean tensile strength characteristics of Paradrain Geocomposites

Product Grade assessed	Assessment method	Requirement	Result
50/5	Short-term tensile	Value achieved	57 kN·m^{-1}
80/5	strength test to		86 kN·m^{-1}
100/5	BS EN ISO 10319 : 2015		106 kN·m^{-1}
150/5			160 kN·m^{-1}
200/5			212 kN·m^{-1}

Table 15 Machine direction mean tensile strength tolerance characteristics of Paradrain Geocomposites

Product Grade assessed	Assessment method	Requirement	Result
50/5	Short-term tensile	-7	Pass
80/5	strength test to	-6	Pass
100/5	BS EN ISO 10319 : 2015	-6	Pass
150/5		-10	Pass
200/5		-12	Pass

Table 16 Machine direction mean strain at maximum tensile strength characteristics of Paradrain Geocomposites

Product Grade assessed	Assessment method	Requirement	Result
50/5	Short-term tensile	11 (±1) %	Pass
80/5	strength test to	11 (±1) %	Pass
100/5	BS EN ISO 10319 : 2015	11 (±1) %	Pass
150/5		11 (±1) %	Pass
200/5		11 (±1) %	Pass

Table 17 Machine direction characteristic strength (T_{char}) values used for design of Paradrain Geocomposites

Product Grade assessed	Assessment method	Requirement[1]	Result
50/5	BS EN 13251 : 2016	≥ 50 kN·m^{-1}	Pass
80/5		≥ 80 kN·m^{-1}	Pass
100/5		≥ 100 kN·m^{-1}	Pass
150/5		≥ 150 kN·m^{-1}	Pass
200/5		≥ 200 kN·m^{-1}	Pass

(1) The characteristic short-term tensile strength (Tchar) values are the mean short-term tensile strength minus 1 x the tolerance value.

Table 18 Machine direction nominal strain at (T_{char}) load values used for design of Paradrain Geocomposites

Product Grade assessed	Assessment method	Requirement	Result
50/5	BS EN 13251 : 2016	9 %	Pass
80/5		9 %	Pass
100/5		9 %	Pass
150/5		9 %	Pass
200/5		9 %	Pass

Table 19 Cross machine direction mean tensile strength characteristics of Paragrid Geocomposites

Product Grade assessed	Assessment method	Requirement	Result
30/5	Short-term tensile strength test to BS EN ISO 10319 : 2015	Value achieved	6 $kN \cdot m^{-1}$
40/5			6 $kN \cdot m^{-1}$
50/5			6 $kN \cdot m^{-1}$
65/5			6 $kN \cdot m^{-1}$
80/5			6 $kN \cdot m^{-1}$
90/5			6 $kN \cdot m^{-1}$
100/5			6 $kN \cdot m^{-1}$
110/5			6 $kN \cdot m^{-1}$
120/5			6 $kN \cdot m^{-1}$
135/5			6 $kN \cdot m^{-1}$
150/5			6 $kN \cdot m^{-1}$
160/5			6 $kN \cdot m^{-1}$
175/5			6 $kN \cdot m^{-1}$
200/5			6 $kN \cdot m^{-1}$
30/15			17 $kN \cdot m^{-1}$
50/15			17 $kN \cdot m^{-1}$
50/50			57 $kN \cdot m^{-1}$
100/100			106 $kN \cdot m^{-1}$
80/15			16 $kN \cdot m^{-1}$
100/15			16 $kN \cdot m^{-1}$
120/15			17 $kN \cdot m^{-1}$
150/15			17 $kN \cdot m^{-1}$
160/15			17 $kN \cdot m^{-1}$
200/15			17 $kN \cdot m^{-1}$

Table 20 Cross machine direction mean tensile strength tolerance characteristics of Paragrid Geocomposites

Product Grade assessed	Assessment method	Requirement	Result
30/5	Short-term tensile	-1	Pass
40/5	strength test to	-1	Pass
50/5	BS EN ISO 10319 : 2015	-1	Pass
65/5		-1	Pass
80/5		-1	Pass
90/5		-1	Pass
100/5		-1	Pass
110/5		-1	Pass
120/5		-1	Pass
135/5		-1	Pass
150/5		-1	Pass
160/5		-1	Pass
175/5		-1	Pass
200/5		-1	Pass
30/15		-2	Pass
50/15		-2	Pass
50/50		-7	Pass
100/100		-6	Pass
80/15		-1	Pass
100/15		-1	Pass
120/15		-2	Pass
150/15		-2	Pass
160/15		-2	Pass
200/15		-2	Pass

Table 21 Cross machine direction mean strain at maximum tensile strength characteristics of Paragrid Geocomposites

Product Grade assessed	Assessment method	Requirement	Result
30/5	Short-term tensile	11 (±1) %	Pass
40/5	strength test to	11 (±1) %	Pass
50/5	BS EN ISO 10319 : 2015	11 (±1) %	Pass
65/5		11 (±1) %	Pass
80/5		11 (±1) %	Pass
90/5		11 (±1) %	Pass
100/5		11 (±1) %	Pass
110/5		11 (±1) %	Pass
120/5		11 (±1) %	Pass
135/5		11 (±1) %	Pass
150/5		11 (±1) %	Pass
160/5		11 (±1) %	Pass
175/5		11 (±1) %	Pass
200/5		11 (±1) %	Pass
30/15		11 (±1) %	Pass
50/15		11 (±1) %	Pass
50/50		11 (±1) %	Pass
100/100		11 (±1) %	Pass
80/15		11 (±1) %	Pass
100/15		11 (±1) %	Pass
120/15		11 (±1) %	Pass
150/15		11 (±1) %	Pass
160/15		11 (±1) %	Pass
200/15		11 (±1) %	Pass

Table 22 Cross machine direction characteristic strength (T_{char}) values used for design of Paragrid Geocomposites

Product Grade assessed	Assessment method	Requirement[1]	Result
30/5	BS EN 13251 : 2016	≥ 5 kN·m^{-1}	Pass
40/5		≥ 5 kN·m^{-1}	Pass
50/5		≥ 5 kN·m^{-1}	Pass
65/5		≥ 5 kN·m^{-1}	Pass
80/5		≥ 5 kN·m^{-1}	Pass
90/5		≥ 5 kN·m^{-1}	Pass
100/5		≥ 5 kN·m^{-1}	Pass
110/5		≥ 5 kN·m^{-1}	Pass
120/5		≥ 5 kN·m^{-1}	Pass
135/5		≥ 5 kN·m^{-1}	Pass
150/5		≥ 5 kN·m^{-1}	Pass
160/5		≥ 5 kN·m^{-1}	Pass
175/5		≥ 5 kN·m^{-1}	Pass
200/5		≥ 5 kN·m^{-1}	Pass
30/15		≥ 15 kN·m^{-1}	Pass
50/15		≥ 15 kN·m^{-1}	Pass
50/50		≥ 50 kN·m^{-1}	Pass
100/100		≥ 100 kN·m^{-1}	Pass
80/15		≥ 15 kN·m^{-1}	Pass
100/15		≥ 15 kN·m^{-1}	Pass
120/15		≥ 15 kN·m^{-1}	Pass
150/15		≥ 15 kN·m^{-1}	Pass
160/15		≥ 15 kN·m^{-1}	Pass
200/15		≥ 15 kN·m^{-1}	Pass

(1) The characteristic short-term tensile strength (Tchar) values are the mean short-term tensile strength minus 1 x the tolerance value.

Table 23 Cross machine direction nominal strain at (T_{char}) load values used for design of Paragrid Geocomposites

Product Grade assessed	Assessment method	Requirement	Result
30/5	BS EN 13251 : 2016	9 %	Pass
40/5		9 %	Pass
50/5		9 %	Pass
65/5		9 %	Pass
80/5		9 %	Pass
90/5		9 %	Pass
100/5		9 %	Pass
110/5		9 %	Pass
120/5		9 %	Pass
135/5		9 %	Pass
150/5		9 %	Pass
160/5		9 %	Pass
175/5		9 %	Pass
200/5		9 %	Pass
30/15		9 %	Pass
50/15		9 %	Pass
50/50		9 %	Pass
100/100		9 %	Pass
80/15		9 %	Pass
100/15		9 %	Pass
120/15		9 %	Pass
150/15		9 %	Pass
160/15		9 %	Pass
200/15		9 %	Pass

Table 24 Cross machine direction mean tensile strength characteristics of Paragrid HF Geocomposites

Product Grade assessed	Assessment method	Requirement	Result
90/5	Short-term tensile strength test to BS EN ISO 10319 : 2015	Value achieved	6 $kN \cdot m^{-1}$
100/5			6 $kN \cdot m^{-1}$
125/5			6 $kN \cdot m^{-1}$
150/5			6 $kN \cdot m^{-1}$
175/5			6 $kN \cdot m^{-1}$
200/05			6 $kN \cdot m^{-1}$
250/05			6 $kN \cdot m^{-1}$

Table 25 Cross machine direction mean tensile strength tolerance characteristics of Paragrid HF Geocomposites

Product Grade assessed	Assessment method	Requirement	Result
90/5	Short-term tensile strength test to BS EN ISO 10319 : 2015	-1	Pass
100/5		-1	Pass
125/5		-1	Pass
150/5		-1	Pass
175/5		-1	Pass
200/05		-1	Pass
250/05		-1	Pass

Table 26 Cross machine direction mean strain at maximum tensile strength characteristics of Paragrid HF Geocomposites

Product Grade assessed	Assessment method	Requirement	Result
90/5	Short-term tensile strength test to BS EN ISO 10319 : 2015	2.7 (±1) %	Pass
100/5		2.7 (±1) %	Pass
125/5		2.7 (±1) %	Pass
150/5		2.7 (±1) %	Pass
175/5		2.7 (±1) %	Pass
200/05		2.7 (±1) %	Pass
250/05		2.7 (±1) %	Pass

Table 27 Cross machine direction characteristic strength (T_{char}) values used for design of Paragrid HF Geocomposites

Product Grade assessed	Assessment method	Requirement(1)	Result
90/5	BS EN 13251 : 2016	≥ 5 $kN \cdot m^{-1}$	Pass
100/5		≥ 5 $kN \cdot m^{-1}$	Pass
125/5		≥ 5 $kN \cdot m^{-1}$	Pass
150/5		≥ 5 $kN \cdot m^{-1}$	Pass
175/5		≥ 5 $kN \cdot m^{-1}$	Pass
200/05		≥ 5 $kN \cdot m^{-1}$	Pass
250/05		≥ 5 $kN \cdot m^{-1}$	Pass

(1) The characteristic short-term tensile strength (Tchar) values are the mean short-term tensile strength minus 1 x the tolerance value.

Table 28 Cross machine direction nominal strain at (T_{char}) load values used for design of Paragrid HF Geocomposites

Product Grade assessed	Assessment method	Requirement	Result
90/5	BS EN 13251 : 2016	3 %	Pass
100/5		3 %	Pass
125/5		3 %	Pass
150/5		3 %	Pass
175/5		3 %	Pass
200/05		3 %	Pass
250/05		3 %	Pass

Table 29 Cross machine direction mean tensile strength characteristics of Paradrain Geocomposites

Product Grade assessed	Assessment method	Requirement	Result
50/5	Short-term tensile strength test to BS EN ISO 10319 : 2015	Value achieved	6 $kN \cdot m^{-1}$
80/5			6 $kN \cdot m^{-1}$
100/5			6 $kN \cdot m^{-1}$
150/5			6 $kN \cdot m^{-1}$
200/5			6 $kN \cdot m^{-1}$

Table 30 Cross machine direction mean tensile strength tolerance characteristics of Paradrain Geocomposites

Product Grade assessed	Assessment method	Requirement	Result
50/5	Short-term tensile strength test to BS EN ISO 10319 : 2015	-1	Pass
80/5		-1	Pass
100/5		-1	Pass
150/5		-1	Pass
200/5		-1	Pass

Table 31 Cross machine direction mean strain at maximum tensile strength characteristics of Paradrain Geocomposites

Product assessed	Assessment method	Requirement	Result
50/5	Short-term tensile strength test to BS EN ISO 10319 : 2015	11 (±1) %	Pass
80/5		11 (±1) %	Pass
100/5		11 (±1) %	Pass
150/5		11 (±1) %	Pass
200/5		11 (±1) %	Pass

Table 32 Cross machine direction characteristic strength (T_{char}) values used for design of Paradrain Geocomposites

Product assessed	Assessment method	Requirement(1)	Result
50/5	BS EN 13251 : 2016	≥ 5 $kN \cdot m^{-1}$	Pass
80/5		≥ 5 $kN \cdot m^{-1}$	Pass
100/5		≥ 5 $kN \cdot m^{-1}$	Pass
150/5		≥ 5 $kN \cdot m^{-1}$	Pass
200/5		≥ 5 $kN \cdot m^{-1}$	Pass

(1) The characteristic short-term tensile strength (Tchar) values are the mean short-term tensile strength minus 1 x the tolerance value.

Table 33 Cross machine direction nominal strain at (T_{char}) load values used for design of Paradrain Geocomposites

Product assessed	Assessment method	Requirement	Result
50/5	BS EN 13251 : 2016	9 %	Pass
80/5		9 %	Pass
100/5		9 %	Pass
150/5		9 %	Pass
200/5		9 %	Pass

Table 34 Typical short-term strain against load (as percentage of the ($T_{(char)}$) of Paragrid and Paradrain Geocomposites

Product assessed	Assessment method	Requirement	Result
Paragrid and Paradrain Geocomposites	BS EN 13251 : 2016 and BS 8006-1 : 2010	Strain at 2%	21 %
		Strain at 3%	32 %
		Strain at 4%	42 %
		Strain at 5%	53 %
		Strain at 6%	66 %

Figure 2 Typical short-term stress/strain curve for Paragrid and Paradrain Geocomposites

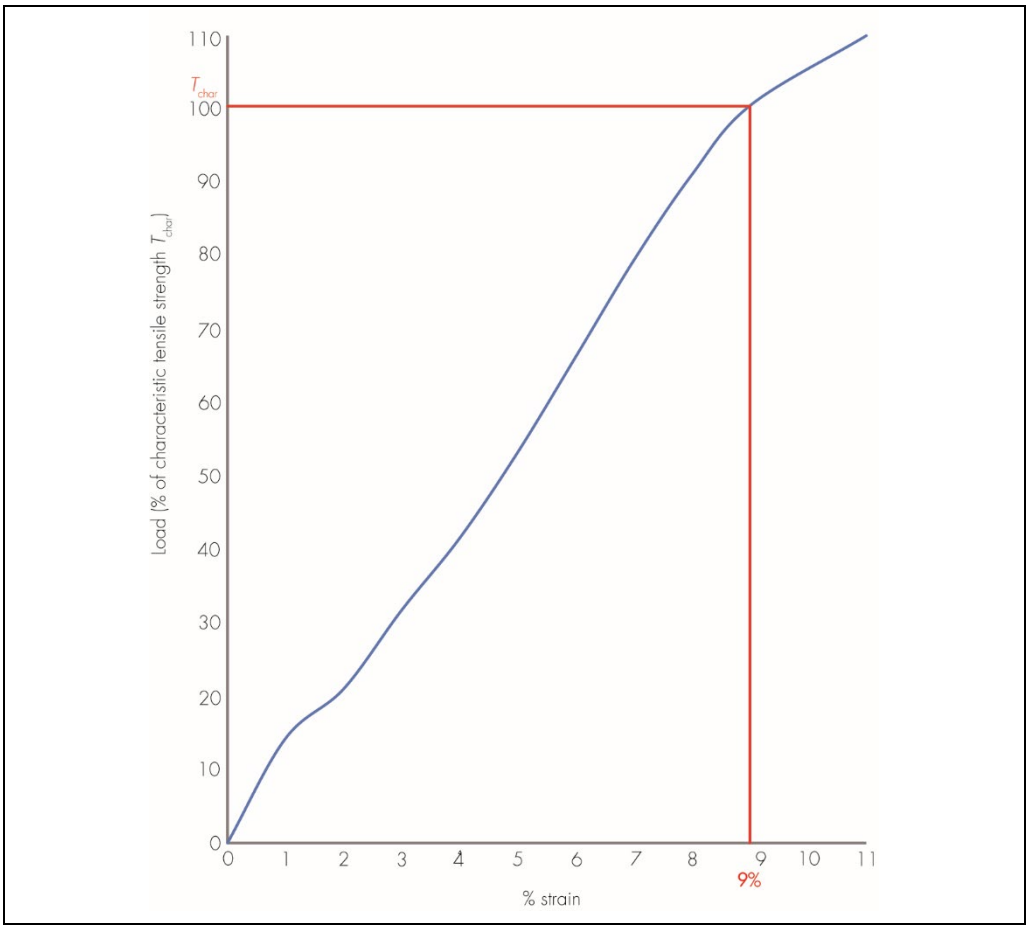
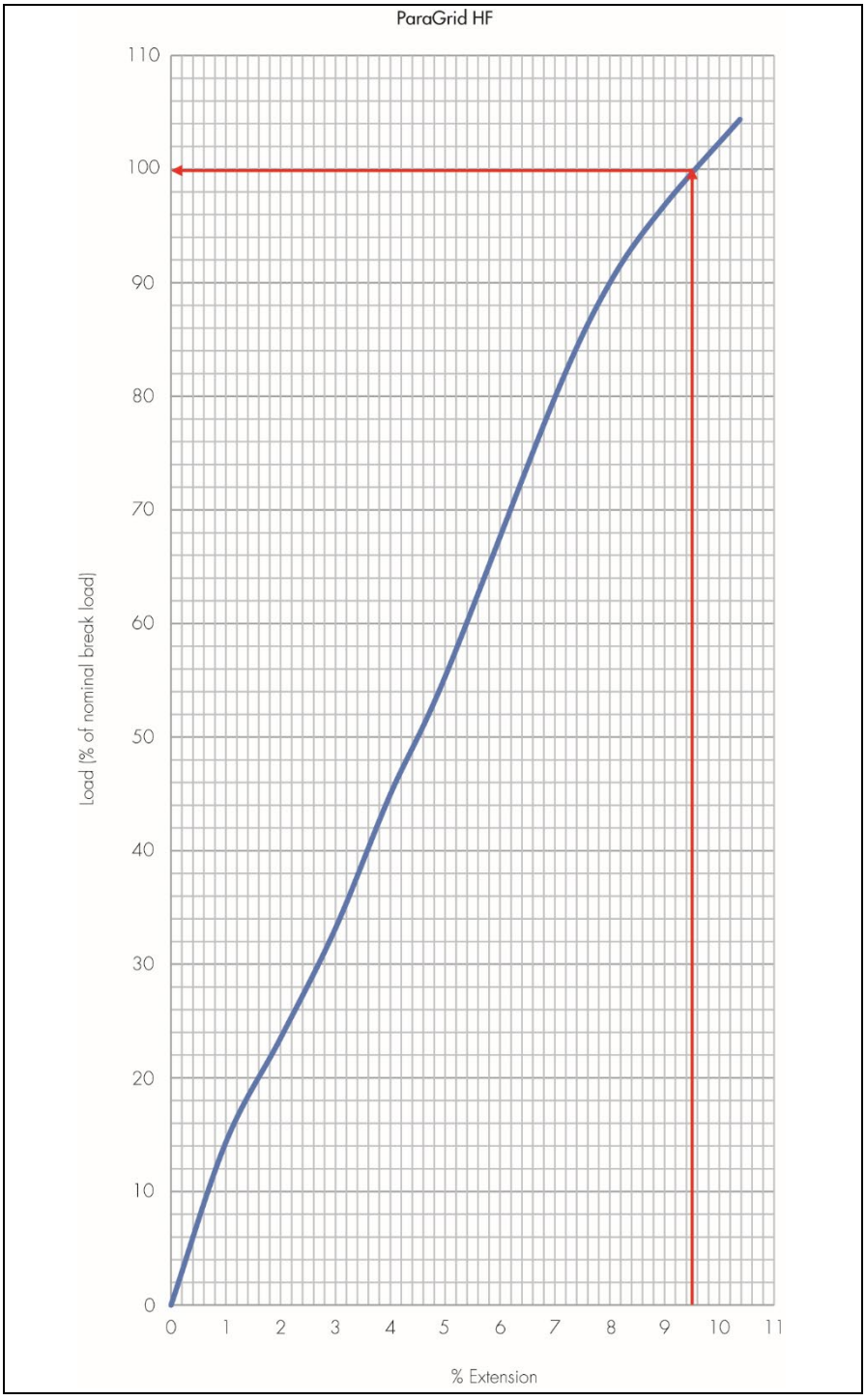


Table 35 Typical short-term strain against load (as percentage of the ($T_{(char)}$) of Paragrid HF Geocomposites

Product assessed	Assessment method	Requirement	Result
Paragrid and Paradrain Geocomposites	BS EN 13251 : 2016 and BS 8006-1 : 2010	Strain at 2 %	23 %
		Strain at 3 %	34 %
		Strain at 4 %	45 %
		Strain at 5 %	55 %
		Strain at 6 %	69 %

3.1.2 Short-term tensile strength values for Paragrid, Paragrid HF and Paradrain Geocomposites are presented in Tables 4 to 35.

Figure 3 Typical short-term stress/strain curve for Paragrid HF Geocomposites



3.2 Long-term tensile strength

3.2.1 The long-term tensile creep rupture strength performance of Paragrid, Paragrid HF and Paradrain Geocomposites has been determined in accordance with the principles of PD ISO/TR 20432 : 2007. A stress rupture line (see Figure 4) has been determined using conventional long-term creep rupture test data (up to 41,945 hours) and time-shifted stepped isothermal method (SIM) test data (up to 7.8 x 106 hours) for a design temperature of 20°C. From this graph the value of the tensile creep rupture strength (T_{CR}) can be determined for the appropriate design life. By applying temperature shift factors determined for Paragrid, Paragrid HF and Paradrain Geocomposites, tensile creep rupture strength values (T_{CR}) can be determined for other design temperatures.

Figure 4 Regression line for life expectancy at constant stress defined by percentage of characteristic short-term strength at 20°C

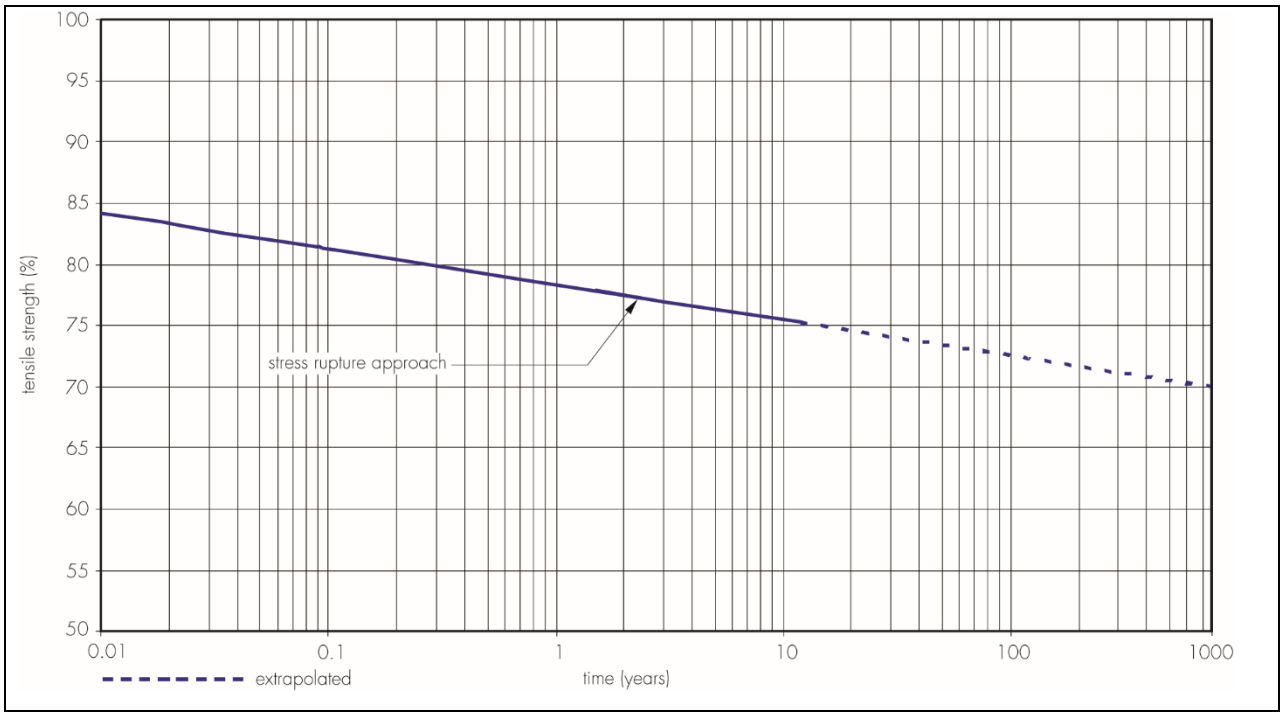


Table 36 Long-term creep reduction (RF_{CR}) for Paragrid, Paragrid HF and Paradrain Geocomposites at various temperatures and design life

Product assessed	Assessment method	Requirement	Result
Paragrid, Paragrid HF and Paradrain Geocomposites	Long term creep rupture to PD ISO/TR 20432 : 2007 using conventional test data to BS EN ISO 13431 : 1999 and SIM test data to ASTM D6992 : 2016	60 Years' design Life Design Soil Temperature 0°C	1.28
		120 Years' design Life Design Soil Temperature 0°C	1.30
		60 Years' design Life Design Soil Temperature 20°C	1.37
		120 Years' design Life Design Soil Temperature 20°C	1.38
		60 Years' design Life Design Soil Temperature 25°C	1.39
		120 Years' design Life Design Soil Temperature 25°C	1.40
		60 Years' design Life Design Soil Temperature 30°C	1.41
		120 Years' design Life Design Soil Temperature 30°C	1.43
		60 Years' design Life Design Soil Temperature 40°C	1.46
		120 Years' design Life Design Soil Temperature 40°C	1.48

Table 37 Factor R_1 for Paragrid, Paragrid HF and Paradrain Geocomposites

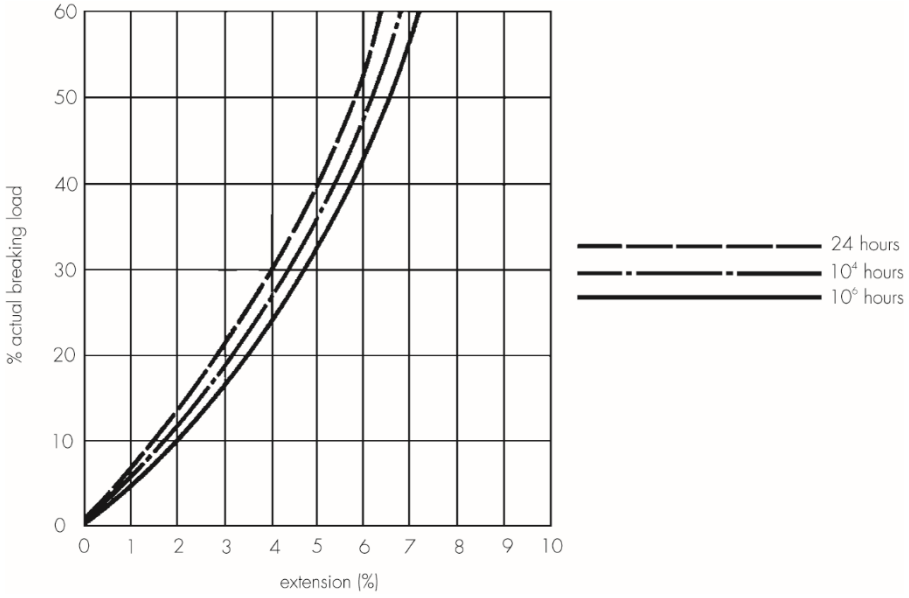
Product assessed	Assessment method	Requirement	Result
Paragrid, Paragrid HF and Paradrain Geocomposites	Extrapolation of creep rupture data PD ISO/TR 20432 : 2007	60 Years' design Life	1.00
		120 Years' design Life	1.00

3.2.2 The assessment showed that the products comply with HAPAS requirements for long-term tensile strength characteristic.

3.3 Creep Strain

3.3.1 Creep strain is not normally considered an issue for the design of embankments and slopes. However, for situations where creep strain is applicable, the isochronous curves for Paragrid, Paragrid HF and Paradrain Geocomposites are shown in Figure 5.

Figure 5 Load extension curve



3.3.2 The assessment showed that the products comply with HAPAS requirements for creep strain characteristic.

3.4 Installation damage

Table 38 Reduction factors for installation damage (RF_{ID}) for Paragrid and Paradrain Geocomposites

Product assessed	Assessment method	Requirement	Result
Paragrid and Paradrain Geocomposites	Installation damage to BS 8006-1 : 2010, Annex D	Silty sand 1[2]	
		D_{50} particle size[1]	
		0.15 mm	
		D_{90} particle size[1]	
		0.70 mm	
		Paragrid and Paradrain Geocomposites grade	
		30/5	1.04
		80/5	1.01
		150/5	1.01
		Silty sand 2[3]	
		D_{50} particle size[1]	
		0.09 mm	
		D_{90} particle size[1]	
		0.45 mm	
		Paragrid and Paradrain Geocomposites grade	
		30/5	1.05
		50/5	1.04
		80/5	1.03
		100/5	1.02
		Concrete sand 1[2]	
		D_{50} particle size[1]	
		0.70 mm	
		D_{90} particle size[1]	
		4 mm	
		Paragrid and Paradrain Geocomposites grade	
		30/5	1.08
		50/5	1.02
		150/5	1.01

Table 38 Reduction factors for installation damage (RF_{ID}) for Paragrid and Paradrain Geocomposites (continued)

Product assessed	Assessment method	Requirement	Result
Paragrid and Paradrain Geocomposites	Installation damage to BS 8006-1 : 2010, Annex D	Concrete sand 2[3]	
		D_{50} particle size[1]	
		0.09 mm	
		D_{90} particle size[1]	
		0.45 mm	
		Paragrid and Paradrain Geocomposites grade	
		30/5	1.05
		50/5	1.04
		80/5	1.03
		100/5	1.02
		Coarse gravel 1[2]	
		D_{50} particle size[1]	
		13 mm	
		D_{90} particle size[1]	
		23 mm	
		Paragrid and Paradrain Geocomposites grade	
		30/5	1.10
		50/5	1.03
		150/5	1.02
		Coarse gravel 2[3]	
		D_{50} particle size[1]	
		22 mm	
		D_{90} particle size[1]	
		28 mm	
		Paragrid and Paradrain Geocomposites grade	
		30/5	1.16
		50/5	1.15
		80/5	1.12
		100/5	1.10

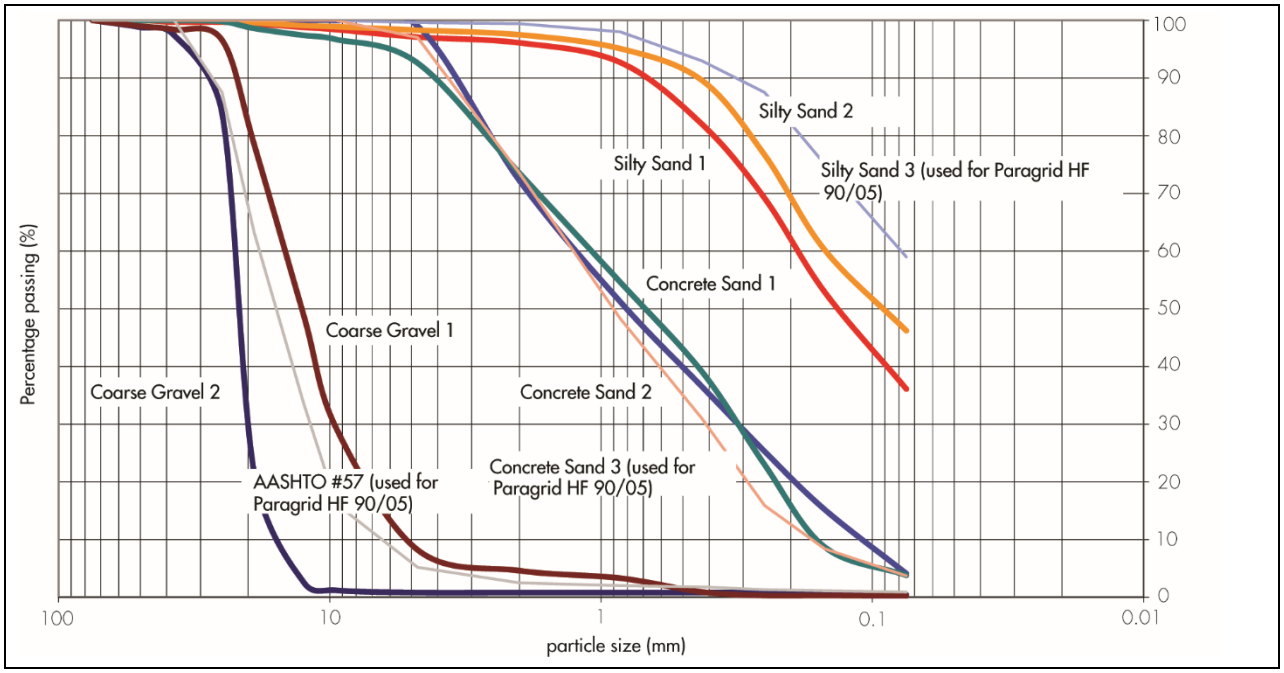
(1) Detailed particle size distributions are shown in Figure 6.
(2) Depth of soil layer before compacting: 200 mm; weight of vibrating roll: 1600 kg·m–1 ; number of passes: 8.
(3) Depth of soil layer before compacting: 200 mm; weight of vibrating roll: 2030 kg·m–1 ; number of passes: 10.

Table 39 Reduction factors for installation damage (RF_{ID}) for Paragrid HF Geocomposites

Product assessed	Assessment method	Requirement	Result
Paragrid HF	Installation damage to BS 8006-1 : 2010, Annex D	Silty sand 3[2]	
		D_{90} particle size[1]	
		0.30 mm	
		Paragrid HF Geocomposites grade	
		90/5	1.01
		Concrete sand 3[2]	
		D_{50} particle size[1]	
		0.90 mm	
		D_{90} particle size[1]	
		3.7 mm	
		Paragrid HF Geocomposites grade	
		90/5	1.02
		Coarse gravel 3[2]	
		D_{50} particle size[1]	
		17 mm	
		D_{90} particle size[1]	
		28 mm	
		Paragrid HF Geocomposites grade	
		90/5	1.04

(1) Detailed particle size distributions are shown in Figure 6.
(2) Depth of soil layer before compacting: 200 mm; weight of vibrating roll: 3750 kg·m–1 ; number of passes: 10.

Figure 6 Particle size distributions of soils used in installation damage testing



3.4.1 The assessment showed that the products comply with HAPAS requirements for installation damage characteristic.

3.5 Weathering (including exposure to UV light)

3.5.1 Further investigation is required for exposure periods exceeding one month.

Table 40 Reduction factors for Weathering (RF_W) for Paragrid, Paragrid HF and Paradrain Geocomposites

Product assessed	Assessment method	Requirement	Result
Paragrid, Paragrid HF and Paradrain Geocomposites	Weathering to BS EN 12224:2000 and PD ISO /TR 20432 : 2007	Periods of exposure are limited to a maximum of 1 month	1.00

3.5.2 The assessment showed that the products comply with HAPAS requirements for weathering (including exposure to UV light) characteristic.

3.6 Chemical/environmental effects

3.6.1 The polyethylene sheath used on Paragrid, Paragrid HF and Paradrain Geocomposites acts as a chemical barrier which, if not broken or damaged, will reduce the risk of chemical attack on the polyester fibres. It should be noted that the most aggressive fills are usually of fine particle sizes which cause little or no damage to the polyethylene sheath. Where appropriate, site and soil specific testing should be carried out to verify the reduction in the pH of the soil.

Table 41 Reduction factors for Hydrolysis (RF_{CH}) for Paragrid, Paragrid HF and Paradrain Geocomposites

Product assessed	Assessment method	Requirement	Result
Paragrid, Paragrid HF and Paradrain Geocomposites	PD ISO/TR 20432 : 2007	Design temperature 20°C	
		60 year service life	
		4<pH<9	1.02
		9.1<pH<9.5	1.03
		9.6<pH<11	1.07
		120 year service life	
		4<pH<9	1.03
		9.1<pH<9.5	1.05
		9.6<pH<11	1.12
		Design temperature 25°C	
		60 year service life	
		4<pH<9	1.03
		9.1<pH<9.5	1.05
		9.6<pH<11	1.09
		120 year service life	
		4<pH<9	1.07
		9.1<pH<9.5	1.09
		9.6<pH<11	1.15
		Design temperature 30°C	
		60 year service life	
		4<pH<9	1.06
		9.1<pH<9.5	1.10
		9.6<pH<11	1.14
		120 year service life	
		4<pH<9	1.15
		9.1<pH<9.5	1.17
		9.6<pH<11	1.25

Table 42 Factor R_2 for Paragrid, Paragrid HF and Paradrain Geocomposites

Product assessed	Assessment method	Requirement	Result
Paragrid, Paragrid HF and Paradrain Geocomposites	Extrapolation of chemical data PD ISO/TR 20432 : 2007	60 Years' design Life	1.02
		120 Years' design Life	1.05

3.6.2 The assessment showed that the products comply with HAPAS requirements for chemical/environmental effects characteristic.

3.7 Microbiological degradation

Table 43 Microbiological degradation for Paralink Geocomposites

Product assessed	Assessment method	Requirement	Result
Paralink Geocomposites	Microbiological degradation to BS EN 12225 : 2000	No considerable loss of retained tensile strength	Pass

3.7.1 The assessment showed that the products comply with HAPAS requirements for microbiological degradation characteristic.

3.8 Factor of safety for the extrapolation of data (f_s)

Table 44 Factor of safety for the extrapolation of data (f_s) for *Paralink Geocomposites*

Product assessed	Assessment method	Requirement	Result
Paralink Geocomposites	The values calculated in accordance with PD ISO/TR 20432 : 2007, using the R_1 and R_2 values given in Tables 38 and 43 of this Certificate	60 Years' design Life 120 Years' design Life	1.02 1.05

3.8.1 The assessment showed that the products comply with HAPAS requirements for factors of safety for the extrapolation of data (f_s) characteristic.

3.4 Durability

3.4.1 When designed and installed in accordance with the requirements of BS 8006-1 : 2010, BS EN 14475 : 2006 and this Certificate, Paragrid, Paragrid HF and Paradrain Geocomposites will have a service life of up to 120 years, exceeding the typical design life required for reinforced soil embankments.

4 Summary of Process Assessment

Manufacturing process and quality control	Complies with HAPAS requirements
Delivery and site handling	Complies with HAPAS requirements
Installation	Complies with HAPAS requirements

4.1 Manufacture

4.1.1 The BBA has undertaken the following tasks for the assessment of product manufacture and has established that the manufacture complies with BBA HAPAS Certification Scheme requirements:

- the BBA has recorded and evaluated the manufacturer's documentation of the methods adopted for quality control procedures and product testing against HAPAS requirements
- the BBA has assessed the quality control operated over batches of incoming materials and formulations against HAPAS Requirements
- the BBA has evaluated the process for management of non-conforming work
- the BBA has audited the production process and verified that it is in accordance with the documented process
- the BBA has checked that equipment has been properly tested and calibrated.

4.1.2 The BBA has undertaken to review the above measures on a regular basis through a surveillance process, to verify that the specifications and quality control operated by the manufacturer are being maintained.

† 4.1.3 The management system of the manufacturer has been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2015 by Lloyd's Register Quality (Certificate 10070947).

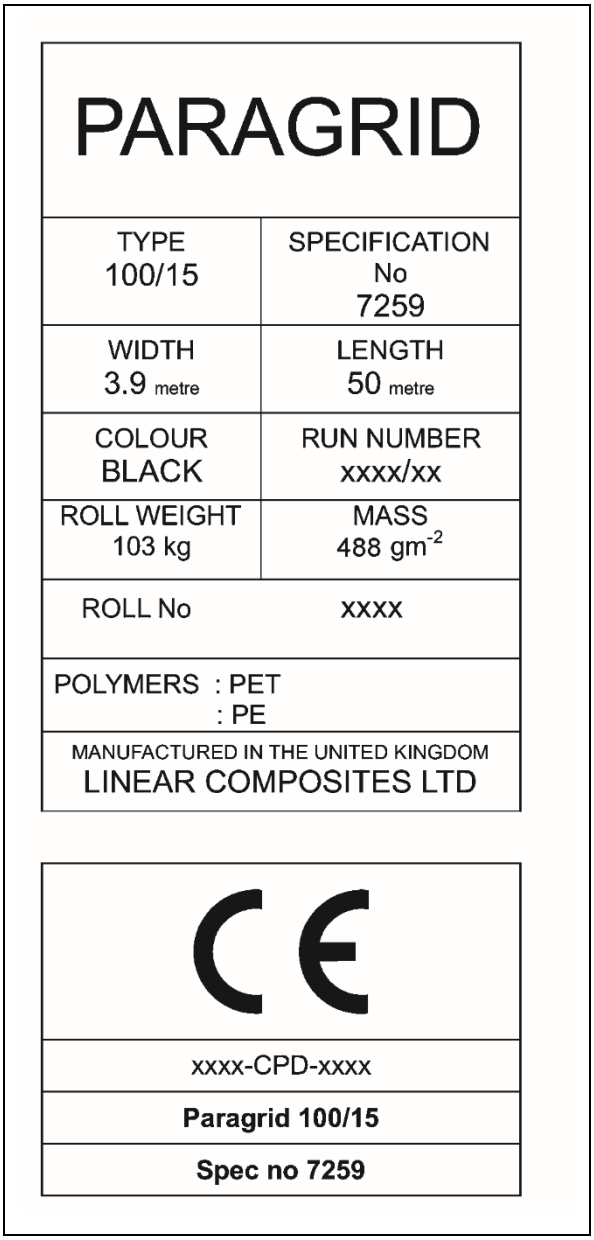
4.1.4 The products comprise an open array of geocomposite straps, pressure and heat bonded together at specified centres to give the required performance characteristics. The geocomposite straps are made from tendons of high tenacity PET yarn coated in polyethylene using a vacuum die-coating process, then passed through rollers to give a knurled finish on the sheath. An impressed mark denoting the product grade is applied on one side of the straps at intervals of approximately 180 mm.

4.2 Delivery and site handling

† 4.2.1 The Certificate holder states that Paragrid and Paradrain Geocomposites are delivered in rolls 3.9 m wide(1) . Paragrid HF is delivered in rolls 4.5 m wide(1). Each roll is wrapped in a black polythene bag for transit and site protection, and labelled with the grade and identification (see Figure 7). The packaging should not be removed until immediately prior to installation. Each roll has the product grade printed at regular intervals.

(1) Other sizes are available on request.

Figure 7 Label



4.2.2 To achieve the performance described in this Certificate, delivery and site handing must be performed in accordance with the Certificate holder's instructions and this Certificate, including:

- rolls should be stored in clean, dry conditions and protected from mechanical or chemical damage and site temperatures in excess of 30°C. When laid horizontally, the rolls may be stacked up to five high. Other loads must not be stored on top of the stack
- toxic fumes are given off if the geocomposites catch fire and, therefore, the necessary precautions should be taken, according to the instructions of the material safety data sheet for the products.

4.3 Design

4.3.1 Reinforced soil embankments constructed using Paragrid, Paragrid HF and Paradrain Geocomposites should be designed in accordance with BS 8006-1 : 2010 and the MCHW, Volume 1 (SHW), Series 600.

4.3.2 The design tensile strength of reinforcement (T_D), the long-term tensile creep rupture strength (T_{CR}), extrapolated tensile load based on creep strain at the end of the design life (T_{CS}) and the material safety factor (f_m) is calculated in accordance with the methodology set out in BS 8006-1 : 2010.

4.3.3 Recommended values for RF_{CR}, RF_{ID}, RF_W, RF_{CH} and f_S are given in section 3. Conditions of use outside the scope for which the reduction factors are defined are not covered by this Certificate, but such advice is outside the scope of this Certificate.

4.3.4 CIRIA SP123 : 1996, Sections 4.5 and 4.6, describes the methods for determining resistance to direct sliding and maximum available bond, to which the appropriate partial factors should be applied in accordance with BS 8006-1 : 2010. For detailed design, the resistance to direct sliding should be determined from soil and Paragrid, Paragrid HF and Paradrain Geocomposites specific shear box testing.

4.3.5 The designer should specify the relevant properties of fill and the thickness and compaction of the fill material deemed acceptable for the purpose of the design. Acceptable materials should satisfy the requirements of BS 8006-1 : 2010 and the MCHW, Volume 1 (SHW), Series 600 and in line with those conditions used to determine the installation damage partial safety factors in the design.

4.4 Installation

4.4.1 The Certificate holder's instructions for installation of the product were confirmed as meeting the BBA HAPAS Certification Scheme requirements.

4.4.2 To achieve the performance described in this Certificate, the products must be installed by competent ground engineering contractors, familiar with these types of products in accordance with the specifications and construction drawings.

4.4.3 To achieve the performance described in this Certificate, Installation of reinforced soil embankment incorporating Paragrid, Paragrid HF and Paradrain Geocomposites should be in accordance with the Certificate's holder's installation instructions, BS 8006-1 : 2010, BS EN 14475 : 2006 and the MCHW, Volume 1 (SHW), Series 600 and HAPAS requirements.

† 4.4.4 The Certificate holder's instructions advise the following:

4.4.4.1 Care should be taken to ensure that the products are laid with the warp (longitudinal) direction parallel to the direction of principal stress. Design drawings should indicate orientation of the product.

4.4.4.2 The products are laid by unrolling manually or mechanically to the length required and cutting with a sharp knife or scissors.

4.4.4.3 Lengths of Paragrid, Paragrid HF and Paradrain Geocomposites are laid flat without folds, parallel to each other and with widths in contact. Each reinforcement layer must be continuous in the direction of loading without overlapping of adjacent strip; adequate connections must grant the Tdesign value, and must be provided when such continuity cannot be achieved. Strip misalignment must not exceed 50 mm over a distance of 5 metres. Pins or a stretching device may be used to control alignment and also to induce a small pre-stressing load prior to filling.

4.4.4.4 Fill material is placed to a minimum compacted depth of 150 mm, with particular care being taken to ensure that the products are adequately covered before compaction or trafficking. Construction traffic will damage the unprotected products.

4.4.4.5 The maximum thickness of compaction layers depends on the design, type of fill material and compaction equipment employed, but depths should not exceed 500 mm.

4.4.4.6 The products must be covered with fill within the time specified in the design to prevent degradation caused by UV light (see section 3.5).

4.4.4.7 Facings are positioned as detailed on the engineer's design drawing and, where the products are used for this purpose, they must be wrapped around and anchored back into the fill. Formwork is used to assist in maintaining the shape of the facing but, whether prefabricated or otherwise, such facings are outside the scope of this Certificate.

4.5 Maintenance

As the products are confined within the soil and have suitable durability, maintenance is not required.

5 Fulfilment of Requirements

5.1 The conclusion of this BBA assessment is that Paragrid, Paragrid HF and Paradrain Geocomposites, when used in accordance with the provisions of this Certificate, complies with the BBA HAPAS Certification Scheme requirements.

5.2 In order for the products to continue to meet Scheme requirements, they must be installed, used and maintained as per the Certificate holder's instructions and as detailed in this Certificate.

6 Validity of Certificate

Continuing validity of this Certificate is dependent on the following factors:

- continuing compliance with product or process requirements, as described in the HAPAS Scheme document, and the specification documents referred to therein
- ongoing BBA surveillance of factory production control, to verify that the specifications and quality control being operated by the manufacturer are being maintained
- acceptable results from long-term exposure monitoring
- acceptable data to confirm durability
- formal triennial Review of the Certificate, and Reissue for required technical or non-technical updates
- compliance with ongoing Certificate obligations by the Certificate holder and manufacturer(s).

†7 Additional Regulations

Construction (Design and Management) Regulations 2015
Construction (Design and Management) Regulations (Northern Ireland) 2016

Information in this Certificate may assist the client, designer (including Principal Designer) and contractor (including Principal Contractor) to address their obligations under these Regulations.

CE marking

The Certificate holder has taken the responsibility of CE marking the products in accordance with harmonised European Standard BS EN 13251 : 2016.

8 Bibliography

ASTM D6992 : 2016 *Standard Test Method for Accelerated Tensile Creep and Creep-Rupture of Geosynthetic Materials Based on Time-Temperature Superposition Using the Stepped Isothermal Method*

BS 8006-1 : 2010 + A1 : 2016 *Code of practice for strengthened/reinforced soils and other fills*

BS EN 13251 : 2016 *Geotextiles and geotextile-related products — Characteristics required for use in earthworks, foundations and retaining structures*

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

BS EN ISO 9001 : 2015 *Quality management systems — Requirements*

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 : 2015 *Geosynthetics — Wide-width tensile test*

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

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

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

CIRIA SP123 : 1996 *Soil Reinforcement with Geotextiles,* Jewell R.A

Manual of Contract Documents for Highway Works, Volume 1 *Specification for Highway Works*

PD ISO/TR 20432 : 2007 *Guidelines for the determination of the long-term strength of geosynthetics for soil reinforcement*

9 Conditions of Certification

9.1 This Certificate:

- relates only to the product/system that is named and described on the front page
- is issued only to the company, firm, organisation or person named on the front page – no other company, firm, organisation or person may hold or claim that this Certificate has been issued to them
- 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.

9.2 Publications, documents, specifications, legislation, regulations, standards and the like referenced in this Certificate are those that were current and/or deemed relevant by the BBA at the date of issue or reissue of this Certificate.

9.3 This Certificate will remain valid for an unlimited period provided that the product/system and its manufacture and/or fabrication, including all related and relevant parts and 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.

9.4 The BBA has used due skill, care and diligence in preparing this Certificate, but no warranty is provided.

9.5 In issuing this Certificate the BBA is not responsible and is excluded from any liability to any company, firm, organisation or person, for any matters arising directly or indirectly from:

- 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
- actual installations of the product/system, including their nature, design, methods, performance, workmanship and maintenance
- any works and constructions in which the product/system is installed, including their nature, design, methods, performance, workmanship and maintenance
- any loss or damage, including personal injury, howsoever caused by the product/system, including its manufacture, supply, installation, use, maintenance and removal
- any claims by the manufacturer relating to UKCA marking and CE marking.

9.6 Any information relating to the manufacture, supply, installation, use, maintenance and removal 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, maintained and removed. It does not purport in any way to restate the requirements of the Health and Safety at Work etc. Act 1974, or of any other statutory, common law or other duty which may exist at the date of issue or reissue 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.

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