Linear Composites Ltd
Vale Mills
Oakworth
Keighley
West Yorkshire BD22 0EB
Tel: 01535 643363 Fax: 01535 643605
e-mail: mail@linearcomposites.com
website: www.linearcomposites.com

BBA APPROVAL INSPECTION TESTING CERTIFICATION
TECHNICAL APPROVALS FOR CONSTRUCTION

Roads and Bridges
Agrément Certificate
No 09/R146
Product Sheet 1

PARAWEB STRAPS FOR REINFORCED SOIL RETAINING WALLS AND BRIDGE ABUTMENTS

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 Paraweb Straps for Reinforced Soil Retaining Walls and Bridge Abutments.

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 — the following key areas have been evaluated:

- short-term tensile strength and elongation and long-term tensile strength and elongation properties of Paraweb straps (see sections 6.1 to 6.8)
- safety factors for consistency of manufacture, assessment and extrapolation of available test data, short-term and long-term effects of installation damage and environmental degradation (see sections 6.9 to 6.16)
- Paraweb/fill interaction (see section 6.27).

Durability — Paraweb straps have good resistance to hydrolysis, chemical corrosion, microbial attack, UV exposure and temperature used in fills normally encountered in civil engineering practice (see section 7.1).

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

Brian Chamberlain
Head of Approvals — Engineering

Greg Cooper
Chief Executive

Certificate amended on 25 November 2011 to amend sections 1.8, 5.2 to 5.4, 6.7, 6.13, 6.15 to 6.27, Figures 1 and 3, and Tables 2 and 5.

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.

British Board of Agrément
Bucknalls Lane
Garston, Watford
Herts WD25 9BA
tel: 01923 665300
fax: 01923 665301
e-mail: mail@bba.star.co.uk
website: www.bbacerts.co.uk

Highways Agency Requirements

All proposals for adopting the systems shall comply with current HA design and certification procedures and relevant design data shall be submitted in accordance with the requirements of section 5 of this Certificate.

The design, materials specification and construction methods adopted shall be in accordance with HA Technical Standard BD 70/03 (DMRB 2.1.5) 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 (HA), Transport Scotland, 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: 2 *Delivery and site handling* (2.1 to 2.3) and 8 *Procedure* (8.1).

General

This Certificate relates to Paraweb Straps for Reinforced Soil Retaining Walls and Bridge Abutments.

The structures are based on the use of Paraweb straps consisting of polyethylene-coated polyester multicoils acting as frictional reinforcement connected to precast concrete facing units.

The design and construction of the reinforced soil structure shall 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.

Paraweb straps are manufactured by the Certificate holder.

Technical Specification

1 Description

1.1 Paraweb straps are used in conjunction with precast concrete facing units, attachment loops and toggles, temporary anchorage bars and clamps and fill materials to construct reinforced soil retaining walls and bridge abutments.

Paraweb straps

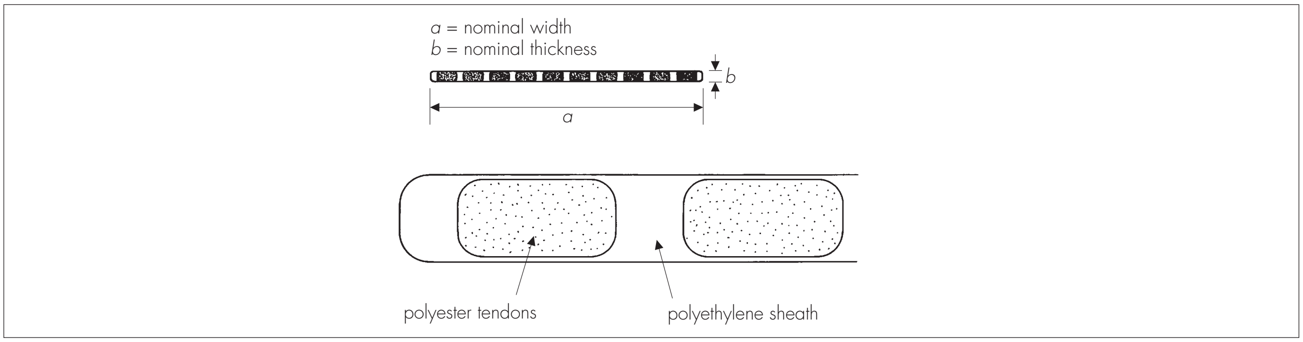
1.2 The Paraweb straps comprise polyester tendons encased in a polyethylene sheath, and are manufactured in many grades of differing thicknesses (see Table 1). The composite is passed through rollers, to give a knurled finish on the sheath, cooled, cut to length and coiled.

1.3 The tendon is made from high-tenacity polyester fibre, concentrated into separate bundles and coated with polyethylene using a vacuum die-coating process.

1.4 Factory production control is undertaken throughout all stages of manufacture. Checks include:

- incoming materials
- yarn feeds
- manufacturing temperatures.

Table 1 Dimensions and short-term tensile strength



Grade	Coil length (m)	Weight (±0.2) (kg)			Nominal width (a) (mm)			Nominal thickness (b) (mm)			Characteristic short-term tensile strength[2] (T_{char}) (kN)	
		Sheath type[1]										
		2E	2D	2S	2E	2D	2S	2E	2D	2S	2E/2D	2S
30	100	8.7	12.7	14.8	83	83	85	1.5	1.9	2.2	30.16	33.75
40	100	10.9	16.7	18.5	83	84	85	1.7	2.2	2.5	40.20	45.00
50	100	12.4	19.5	23.0	87	90	90	2.0	2.5	3.5	50.27	56.25
70	100	16.7	24.1	28.6	90	90	90	2.5	3.0	4.0	70.38	78.78
75	100	17.9	25.6	30.0	90	90	90	2.6	3.1	4.1	75.40	84.35
100	100	24.1	31.1	37.7	90	90	90	3.1	3.7	6.0	100.54	112.5
		Sheath type[1]										
		ME	MD	MS	ME	MD	MS	ME	MD	MS	ME/MD	MS
27	100	6.4	8.5	9.4	46	47	48	1.8	2.2	2.5	27.14	27.14
36	100	8.1	10.8	12.0	47	49	49	2.2	2.8	3.0	36.18	36.18
37.5	100	8.2	10.9	12.1	47	49	49	2.3	2.9	3.1	37.70	37.70
45	100	10.1	13.2	14.5	48	48	49	2.7	3.3	3.6	45.22	45.22
54	100	12.7	17.4	21.4	63	65	65	2.5	3.2	3.6	54.27	54.27
63	100	14.4	20.4	22.7	63	65	66	2.8	3.7	3.9	63.31	63.31

(1) Sheaths in increasing order of thickness are 2E, 2D and 2S (equivalent to sheaths indicated by ME, MD and MS).

(2) Short-term tensile strength of virgin material in accordance with BS EN ISO 10319 : 1996.

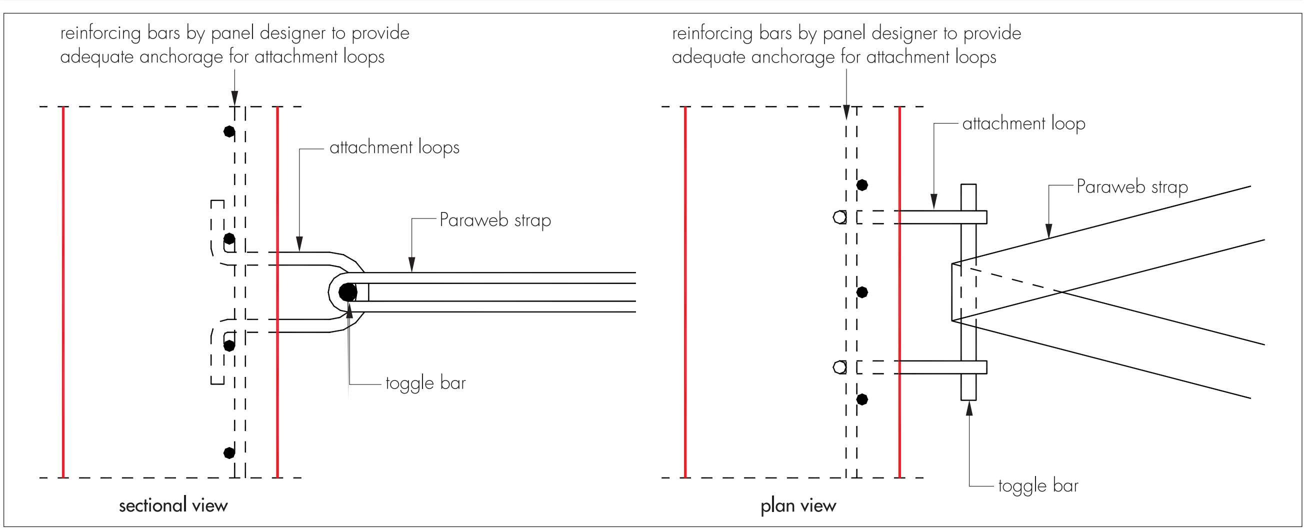
Specification for precast concrete facing units

1.5 The precast concrete facing units used in conjunction with Paraweb straps must be designed to HA requirements BD 24/92 (DMRB 1.3.1) and BD 57/01 (DMRB 1.3.7). The reinforced concrete shall comply with series 1700 of MCHW, Volume 1, and has to meet the requirements of exposure class XF2 in accordance with BS 8500-1 : 2006.

Specification for connections

1.6 The precast concrete facing units must be designed to incorporate suitable provision for the attachment of Paraweb straps. A typical detail (see Figure 1) utilises galvanized steel attachment loops cast into the concrete and galvanized steel toggle bars (minimum diameter 25 mm) to span between attachment loops. The Paraweb strap is wrapped around the toggle bars during installation. All metallic components must be designed to BS 8006 : 1995, section 6.8, as amended by BD 70/03 (DMRB 2.1.5) and must have a minimum zinc coating of 1000 gm^{-2}.

Figure 1 A typical schematic connection detail



Temporary anchorage bars and clamps

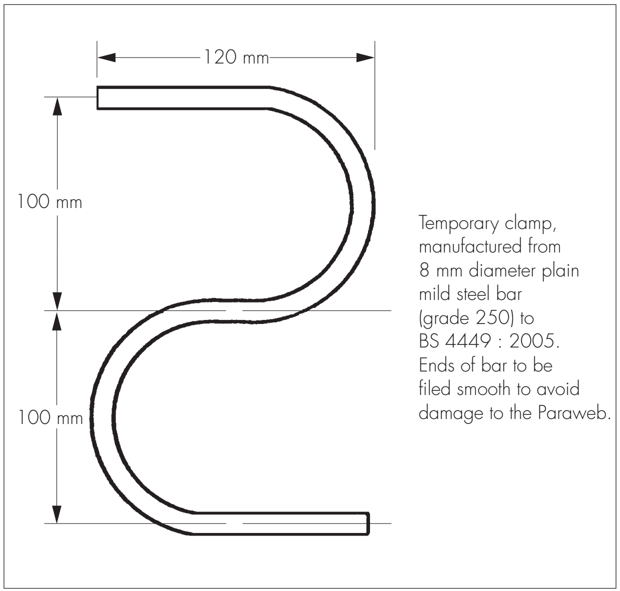
1.7 Temporary clamps used for connection between the straps are manufactured from 8 mm diameter plain mild steel bar (grade 250) to BS 4449 : 2005 (see Figure 2). Ends of bar to be filed smooth to avoid damage to the Paraweb straps.

1.8 12mm to 20 mm diameter horizontal steel anchorage bars and 12 mm to 20 mm diameter vertical steel pins are used for holding the Paraweb straps flat and taut temporarily prior to further fill being placed (see Figure 3).

Fill

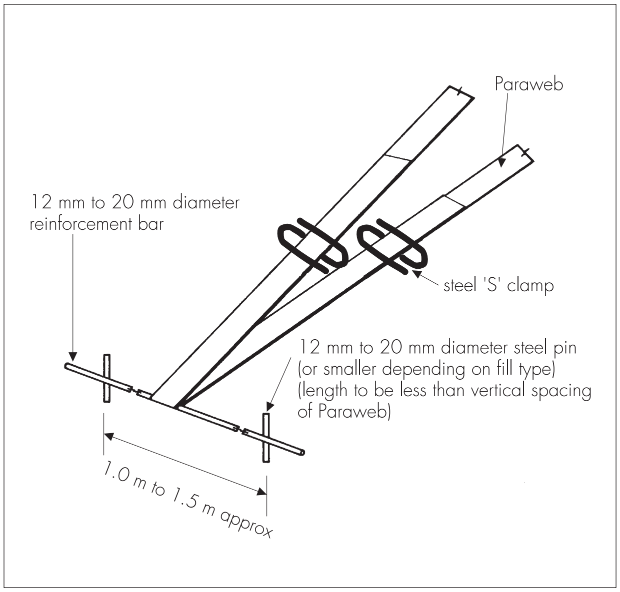
1.9 Fill materials shall meet the requirements included in section 3.1.2 of BS 8006 : 1995 as amended by BD 70/03 (DMRB 2.1.5).

Figure 2 Steel 'S' clamp(1)



(1) Dimensions shown are to suit grade 100 Paraweb strap.

Figure 3 Anchorage bars



2 Delivery and site handling

Paraweb straps

2.1 The straps are delivered to site in batches of coils, each batch carrying a label bearing the grade, length, nominal breaking load and manufacturer's date code. Each strap is impressed on one side at intervals of approximately 200 mm, with a mark denoting the grade.

2.2 To prevent damage, care should be taken in transit and handling. During storage the straps should be kept under cover in clean, dry conditions and should be protected from damage and extreme temperatures.

Other components

2.3 Other components should be handled, and stored, generally in accordance with HA requirements.

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on Paraweb Straps for Reinforced Soil Retaining Walls and Bridge Abutments.

Design Considerations

3 General

3.1 Paraweb straps are satisfactory for use in providing reinforced soil structures. Structural stability is achieved through frictional interaction of the soil particles and the Paraweb straps.

3.2 The BBA has not assessed the structures for supporting parapet loading caused by vehicle collision at the top of the facing units. When applicable, this aspect of a design would require separate consideration and approval by the HA.

3.3 Where appropriate, the reinforced soil structure should be protected against horizontal impact loads caused by possible vehicle collision with the lower facing units of the wall.

3.4 Prior to the commencement of the work, the designer shall satisfy the HA technical approval requirements.

3.5 Where appropriate to specific projects, the designer should provide the main contractor with details of:

- working drawings
- calculations
- specification for fill material
- acceptable moisture content of fill material at time of placement
- method of tensioning Paraweb straps prior to fill placing
- sequence of placing fill material
- estimated movements of facing units during filling and compaction operations
- tolerance on the position of finished line of the wall.

4 Practicability of installation

4.1 Paraweb straps are installed easily by trained ground engineering contractors in accordance with the specifications and construction drawings and are able to withstand the forces imposed by compaction plant, provided:

- composition of the fill and the compaction methods are in accordance with HA requirements
- straps are laid and anchored correctly.

4.2 The connection between the straps is made easily using the temporary mild steel 'S' clamp (see Figures 2 and 3).

4.3 To prevent damage, the straps must be protected from the passage of site traffic between applications of the layers of fill material. Fill should be placed to ensure that a minimum post-compaction depth of 150 mm will be achieved after each pass of the compaction plant, except when compacted by the method described in section 8.6.

5 Design

5.1 Reinforced soil structures incorporating Paraweb straps must be designed in accordance with BD 70/03 (DMRB 2.1.5).

5.2 Values of the partial material factors to be used in design are given in sections 6.11 to 6.16.

5.3 Guidance on determining the design strength, T_D, of the Paraweb straps for ultimate and serviceability limit states is given in sections 6.24 to 6.26.

5.4 Guidance on soil/Paraweb interaction coefficients can be found in section 6.27.

5.5 Particular attention should be paid to changes in direction of walls where overlapping of the straps may occur.

5.6 Adequate consideration must be given to the provision of drainage to the wall in accordance with HA requirements.

5.7 The straps must be used in conjunction with precast concrete facing units designed to conform to HA requirements of BD 24/92 (DMRB 1.3.1) and BD 57/01 (DMRB 1.3.7). The reinforced concrete shall comply with series 1700 of MCHW, Volume 1, and has to meet the requirements of exposure class XF2 in accordance with BS 8500-1 : 2006. A typical sectional and plan view of a structure is shown in Figures 4 and 5. Adequate provision must be made in accordance with BD 70/03 for the forward and other movements of the facing which will take place both during and after construction.

Figure 4 Typical diagrammatic sectional view

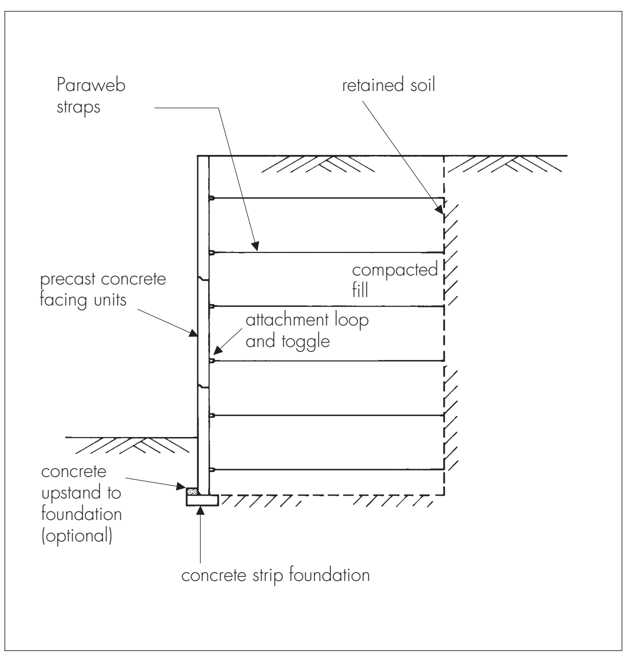
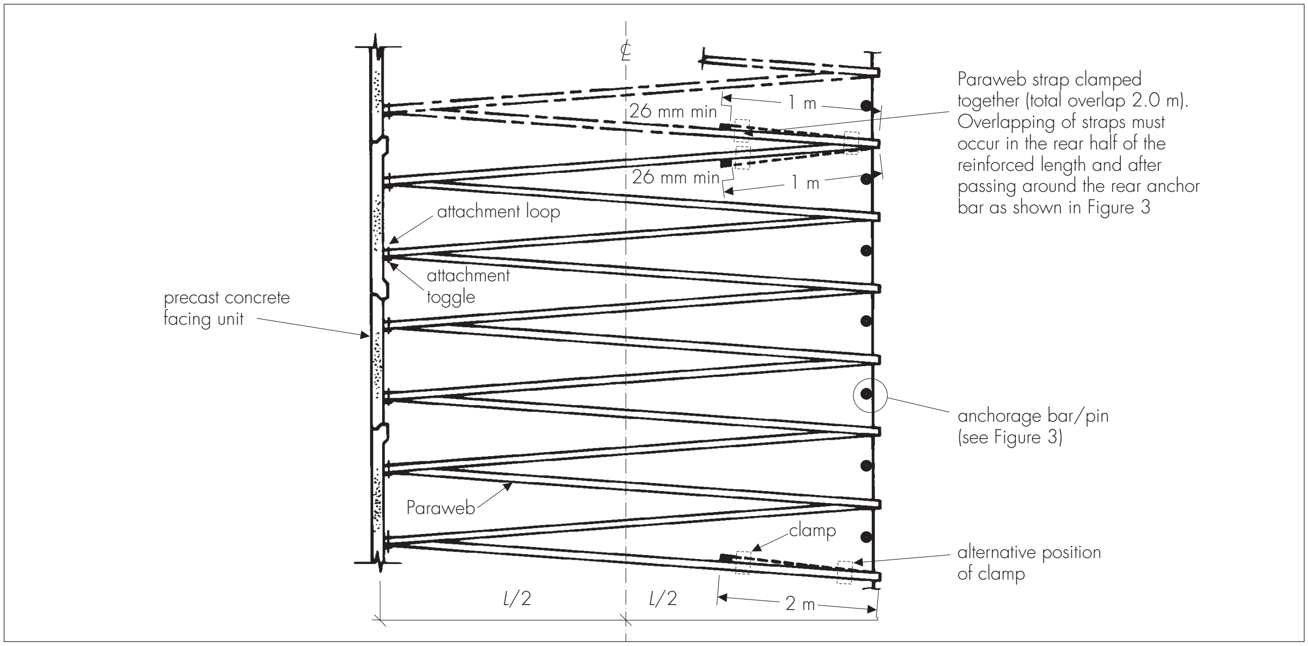


Figure 5 Typical diagrammatic plan view



5.8 Attachment loops and toggles must be designed as described in section 1.6 of this Certificate. The anchorage of the attachment loops into the concrete facing panels must be designed in such a way that adequate resistance to the pull-out force will be provided.

5.9 The designer should specify the relevant properties of the fill material for the reinforced soil structure deemed acceptable for the purpose of the design. Acceptable materials shall meet the requirements included in BS 8006 : 1995, section 3.1.2, amended by BD 70/03 (DMRB 2.1.5).

6 Mechanical properties

Tensile strength — short term

6.1 Paraweb straps have the characteristic short-term strengths given in Table 1. A typical short-term stress/strain curve is shown in Figure 6.

6.2 The actual strain at nominal breaking load 12% ±2%.

Tensile strength — long term

6.3 The method used by the BBA to assess the long-term strength of Paraweb straps is based on a traditional stress rupture line for the load-carrying polyester as shown in Figure 7. From this graph, for the ultimate limit state, the value of the tensile creep rupture strength (T_{CR}) can be determined for the appropriate design life and design temperature.

6.4 For a 120-year design life, the value of (T_{CR}) is a percentage of T_{char} at various design temperatures as shown in Table 2.

Table 2 Percentages of T_{char} to determine T_{CR} at various temperatures

Design temperature (°C)	Percentage of T_{char}
20	72
25	71
30	69

Figure 6 Typical load/extension curve

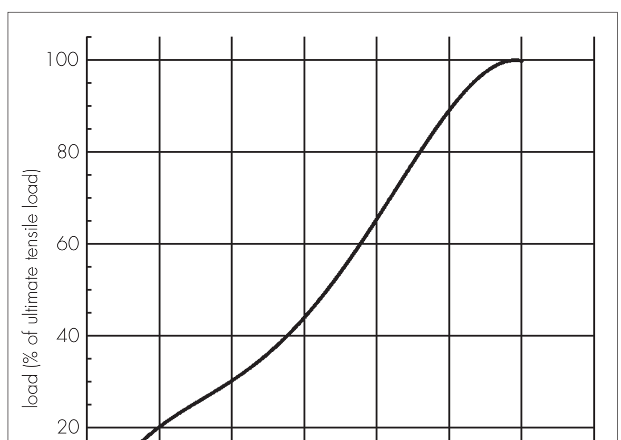
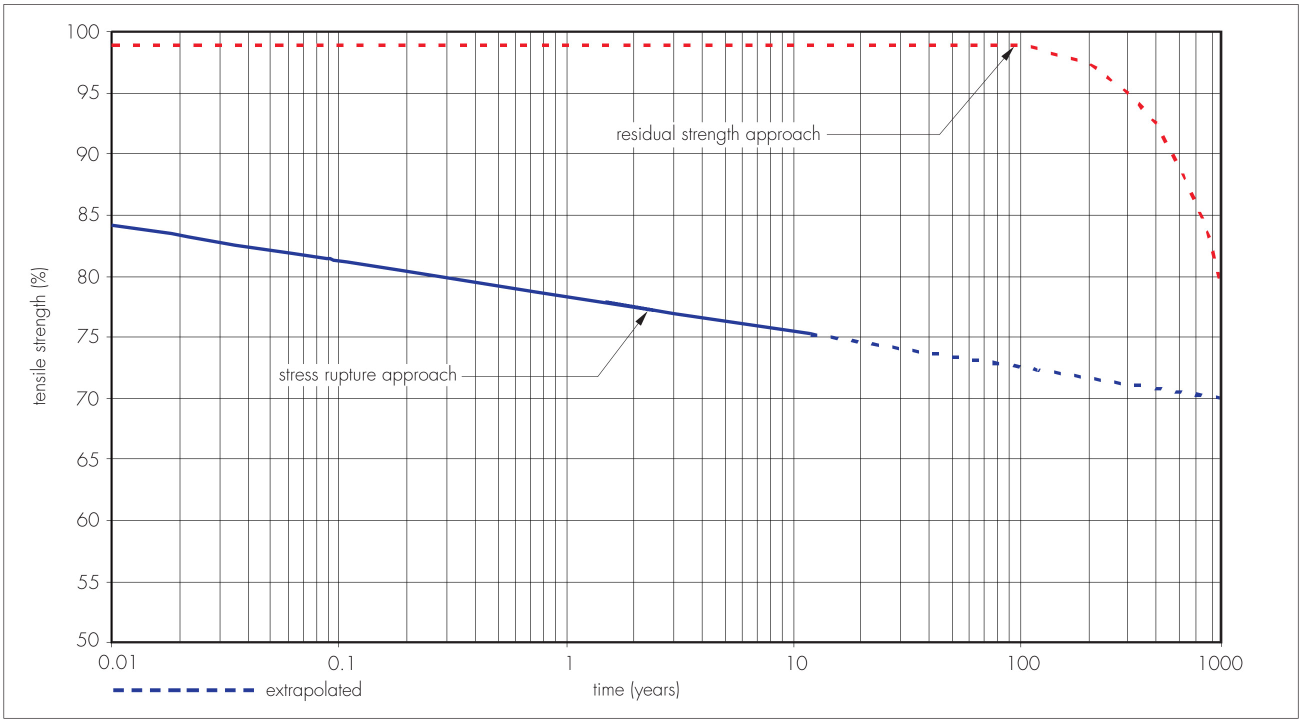


Figure 7 Regression line for life expectancy at constant stress defined by percentage of characteristic short-term strength at 20°C



6.5 An alternative approach to determining the long-term strength of Paraweb straps is one of residual strength (see Figure 7), particularly in respect of the strength available during seismic events. Such an approach is outside the scope of this Certificate and would require separate evaluation and justification of the partial material factor (f_m) components.

Creep performance

6.6 For the serviceability limit state, the prescribed allowable post-construction strains are:

- bridge abutments 0.5% (2 months to 120 years)
- retaining walls 1.0% (1 month to 120 years).

6.7 The definitions of prescribed post-construction strain limit and T_{cs}, the tensile load that would create the prescribed post-construction strain, are explained in Figure 8..

6.8 Values of T_{CS} derived from long-term creep tests are given in Table 3.

Figure 8 Definition of T_{CS}

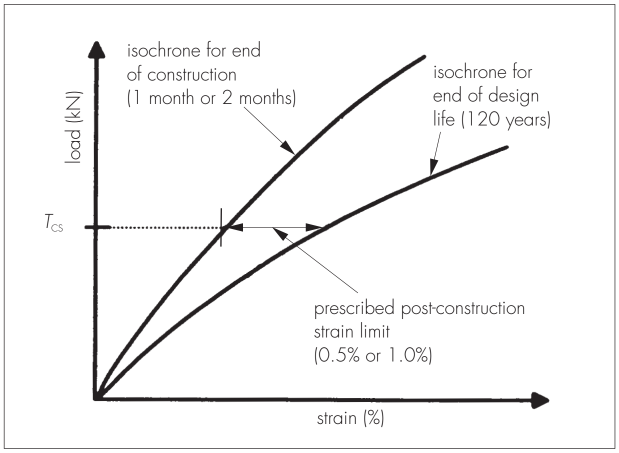


Table 3 Maximum tensile load (T_{CS}) inducing prescribed post-construction strain limits

Paraweb grade	Sheath type	T_{CS} (kN) Prescribed post-construction strain limits 0.5%	1.0%
30	2E/2D	15.1	19.6
	2S	16.9	21.9
40	2E/2D	20.1	26.1
	2S	22.5	29.3
50	2E/2D	25.1	32.7
	2S	28.1	36.6
70	2E/2D	35.2	45.7
	2S	39.4	51.2
75	2E/2D	37.7	49.0
	2S	42.2	54.8
100	2E/2D	50.3	65.4
	2S	56.3	73.1
27	ME/MD/MS	13.6	17.6
36	ME/MD/MS	18.1	23.5
37.5	ME/MD/MS	18.9	24.5
45	ME/MD/MS	22.6	29.4
54	ME/MD/MS	27.1	35.3
63	ME/MD/MS	31.7	41.2

6.9 To determine the reinforcement design strength (T_D), values are required for the partial material factor (f_m) for both the ultimate (ULS) and serviceability (SLS) limit states. In the opinion of the BBA, the values given below for the various components of f_m are conservative, assuming a traditional stress rupture approach (see Figure 7) when calculating T_{CR}. Conditions of use outside the scope for which partial material factor components are defined are not covered by this Certificate.

6.10 In line with BD 70/03, the partial factor (f_m) may be expressed as:

$$f_m = f_{m11} \times f_{m121} \times f_{m122} \times f_{m21} \times f_{m22}$$

Consistency of manufacture (f_{m11})

6.11 For Paraweb straps the following values may be used:

f_{m11} = 1.0 (ULS)
f_{m11} = 1.0 (SLS)

Assessment of available test data (f_{m121})

6.12 For Paraweb straps the following values may be used, based on the assumption of 120-year design life:

f_{m121} = 1.0 (ULS)
f_{m121} = 1.0 (SLS)

Extrapolation to 120-year design life (f_{m122})

6.13 For Paraweb straps the following values may be used:

f_{m122} = 1.0 (ULS)
f_{m122} = 1.0 (SLS)

Immediate and long-term effects of installation damage (f_{m21})

6.14 To allow for loss of strength due to mechanical damage sustained during installation, the appropriate value for f_{m21} for ultimate limit state (ULS) may be selected from Table 4. The partial factors given for site damage assume that well-graded material is used (coefficient of uniformity >5) with a minimum compacted depth of 150 mm. For soils not covered by Table 4, appropriate values of f_{m21} may be determined from site-specific trials. For the serviceability limit state (SLS), the value of f_{m21} may be taken as 1.0.

Environmental degradation (f_{m22})

6.15 The polyethylene sheath used on Paraweb 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. Compaction can reduce the high pH level of a fill. Tests have shown that, 48 hours after the compaction stage, the pH level of a soil-lime mix reduced from 12.5 to 11. Where appropriate, site- and soil-specific testing should be carried out to verify the reduction.

6.16 To account for environmental conditions the appropriate value at various temperatures for f_{m22} should be taken from Table 5 for a design life of 120 years.

Hydrolysis

6.17 Within most soil environments (pH between 4 and 9) and where temperatures are typical of those normally found in reinforced soil structures in the United Kingdom, the strength of the straps is not adversely affected by hydrolysis. The sheathing on Paraweb provides protection irrespective of temperature.

Table 4 Effects of installation damage (f_{m21})

Paraweb grade	Sheath type[1]	fm_{21} (ULS) particle size d_{50} (mm) <0.1	<1.0	<15	>15	fm_{21} (SLS)
27	ME/MD/MS	1.10	1.10	1.10	1.10	1.00
30	2E/2D/2S	1.05	1.05	1.10	1.10	1.00
36	ME/MD/MS	1.05	1.05	1.10	1.10	1.00
37.5	ME/MD/MS	1.05	1.05	1.10	1.10	1.00
40	2E/2D/2S	1.05	1.05	1.10	1.10	1.00
45	ME/MD/MS	1.05	1.05	1.10	1.10	1.00
50	2E/2D/2S	1.05	1.05	1.05	1.05	1.00
54	ME/MD/MS	1.05	1.05	1.05	1.05	1.00
63	ME/MD/MS	1.05	1.05	1.05	1.05	1.00
70	2E/2D/2S	1.05	1.05	1.05	1.05	1.00
75	2E/2D/2S	1.05	1.05	1.05	1.05	1.00
100	2E/2D/2S	1.05	1.05	1.05	1.05	1.00

(1) Sheath type 2E/ME is not used where particle size (d_{50}) is above 15 mm.

Table 5 Partial factor — environmental effects (f_{m22})

Soil pH level (pH)	Design temperature (°C)	f_{m22} (ULS)	f_{m22} (SLS)
4.0 – 9.0	20	1.08	1.00
4.0 – 9.0	25	1.12	1.00
4.0 – 9.0	30	1.21	1.00

Chemical resistance

6.18 The straps and other components have a high resistance to degradation from the types of chemicals typically found in soils.

Microbial attack

6.19 The straps and other components are highly resistant to microbial attack.

Effects of temperature

6.20 The long-term creep performance of the straps is not adversely affected by the range of soil temperatures typical to the UK.

6.21 The long-term creep performance for a range of soil temperatures is shown in Table 2. Where the straps may be exposed to temperatures higher than 30°C or lower than −20°C for significant periods, consideration should be given to temperature levels, range of temperature, period of exposure and stress levels at the location in question.

6.22 The long-term environmental effects factor for a range of soil temperatures is shown in Table 5. Sustained temperatures of greater than 30°C increase the rate of hydrolysis of polyester and further reduction factors may be required.

Resistance to UV light

6.23 The Paraweb has a high resistance to UV light. The product may be exposed to light for up to one month on site. Exposure of up to four months may be acceptable depending upon the season and location.

Design strength (T_D)

6.24 For the ultimate limit state:

Design strength, $$T_D = \frac{T_{CR}}{f_n . f_m \text{ (ULS)}}$$

where f_n = partial factor for ramification of failure that shall be taken as 1.1 in accordance with BD 70/03.

Design load, T_j, to be calculated using prescribed load factors, recommended by BD 70/03.

In all cases T_j must be $\leqslant T_D$.

6.25 For the serviceability limit state:

Design strength, $$T_D = \frac{T_{CS}}{f_m \text{ (SLS)}}$$

The average design load, T_{avj}, to be calculated using prescribed load factors recommended by BD 70/03.

In all cases T_{avj} must be $\leqslant T_D$.

6.26 For the SLS, the average load in the J^{th} level, T_{avj}, is related to the maximum load in the reinforcements, T_j, by a factor k[1], where:

$$T_{avj} = \frac{T_j}{k}$$

(1) A value of k may be derived by consideration of the actual shape of the load distribution diagram along the loaded length of reinforcement.

6.27 For routine design purposes, the interaction coefficient, ∝', in accordance with BS 8006 : 1995 relating soil friction angle to soil/reinforcement bond (tan δ/tan ϕ) can be taken conservatively as 0.70. Significantly enhanced values of α' can be justified in design by carrying out soil and site-specific pull-out tests in accordance with BS EN 13738 : 2004.

7 Durability

7.1 In the opinion of the BBA, when used and installed in accordance with this Certificate, the Paraweb straps and other components can achieve a design life of 120 years as required by HA for permanent structures.

7.2 It is assumed that the exposure environment for the concrete is classified as XF2 to BS 8500-1 : 2006, where concrete facing units are to be embedded in soils which could be potentially aggressive; the guidance in BRE Special Digest 1 : 2005 *Concrete in aggressive ground* : Part C : *Assessing the aggressive chemical environment* should be followed.

7.3 Fill materials classified as 6I, 6J, 7B, 7C and 7D should comply with the limits of Table 6/3 of the 600 series of MCHW, Volume 1, regarding the content of maximum water soluble sulfates and maximum oxidizable sulfides.

Installation

8 Procedure

8.1 Installation shall be carried out in accordance with the Certificate holder's *Installation instructions*, BS EN 14475 : 2006 and the requirements of the MCHW1.

8.2 Formation levels are prepared by levelling and compacting subgrade in accordance with the MCHW1. Fill material is placed and compacted behind the facing to the level of the first layer of Paraweb straps (see Figure 4).

8.3 The straps are laid, attached to the facing units (see Figure 4), pulled and held flat and taut using a horizontal anchor bar and vertical pins as shown in Figure 3, prior to further fill being placed. Further courses of facing units as required are fixed and fill material is placed and compacted to specified heights. The sequence is repeated up to the formation level for the parapet base or finished level as appropriate.

8.4 Fill is placed to a depth of not less than 150 mm. The fill material should be placed from the anchor pin to within 2 metres of the facing units, and compacted thoroughly. The remaining 2 metres of fill should be placed and compacted using lighter compaction plant. However, the required compaction should be achieved.

8.5 Particular care should be taken to ensure the straps are adequately covered before compaction or trafficking. To avoid excessive movement of the facing units, heavy compaction plant must not be used within two metres of the face where the depth of fill before each pass may be less than 150 mm to suit the compaction plant used.

8.6 Joints in the strap are made adjacent to the steel pin bar and horizontal steel anchor bars or as shown in Figure 5. Lengths of strap are overlapped by a distance of two metres and clamped together as shown in Figure 3. Joints are made adjacent to the anchor bar. The clamp is a construction aid and is redundant once the fill has been placed and compacted.

8.7 The ends of the strap are treated with a bitumastic-based sealant to reduce ingress of moisture.

Technical Investigations

9 Investigations

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

9.2 An examination was made of data relating to:

- coefficient of friction between Paraweb straps and the fill
- resistance to damage caused during installation
- effects of temperature
- assessment of partial material factors
- assessment of fill/Paraweb interaction
- evaluation of long- and short-term tensile properties
- evaluation of long- and short-term load/strain characteristics
- resistance to ultraviolet light
- resistance to hydrolysis
- resistance to microbial attack.

Additional Information

The management systems of Linear Composites Ltd have been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2000 by Lloyds Register Quality Assurance, Certificate No 902157.

Bibliography

BS 4449 : 2005 *Specification for carbon steel bars for the reinforcement of concrete*

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10 Conditions

10.1 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.

10.2 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.

10.3 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.

10.4 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.

10.5 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.

British Board of Agrément
Bucknalls Lane
Garston, Watford
Herts WD25 9BA

tel: 01923 665300
fax: 01923 665301
e-mail: mail@bba.star.co.uk
website: www.bbacerts.co.uk