Design Data

2 General

2.1 Master*flex* 14 mm Thin Surfacing System for Highways is satisfactory for use as a thin surfacing system on highways.

2.2 The product can be designed and laid to give an initial texture depth which exceeds the minimum requirement of 1.5 mm for high speed trunk roads.

2.3 The product is suitable for use on existing bituminous or concrete surfaces at a minimum temperature of −1°C, measured on a rising thermometer, provided the substrate is free from standing water or ice and that the minimum specified rolling temperature can be maintained.

2.4 The product, when manufactured and laid in accordance with the provisions of this Detail Sheet, can be designed to achieve the Performance Levels given in Table 1.

Table 1 Performance Levels achieved on trial installations

Test parameter	Performance Level[1]	Requirement
Texture depth	3	
untrafficked (mm)		≥1.5
after two year trafficking (mm)		≥1.0
loss between first and second year (%)		≤40
Wheel tracking	3	
rate (mean/max individual) (mm h^{-1})		≤5.0/≤7.5
rut depth (mean/max individual) (mm)		≤7.0/≤10.5

(1) Performance Levels are defined in Appendix B of the Guidelines Document.

3 Durability

3.1 The product has been used in the United Kingdom since 1998 and available evidence suggests that it will provide a durable surface course, suitable for use on all classes of road.

3.2 A monitored installation leading to HA Type Approval showed that Master*flex* 14 mm has the required properties to meet Performance Level 3[1] requirement for retained texture.

3.3 The results of this trial, when assessed in accordance with Appendix C of the Guidelines Document, indicate that Master*flex* 14 mm is suitable for use to achieve Performance Levels 1, 2, and 3[1] retained texture on sites with Traffic Levels of C_{max}:

Site Stress Level 1 and 2	>5000 cv/l/d[2]
Site Stress Level 3 and 4	>2500 cv/l/d[2]

(1) Performance Levels are defined in Appendix B of the Guidelines Document.

(2) Traffic Levels (cv/l/d) are defined as commercial vehicles/lane/day.

Technical Investigations

The following is a summary of the technical investigations carried out on the Master*flex* 14 mm Thin Surfacing System for Highways.

4 Tests

Mandatory laboratory and road tests

4.1 A series of tests were carried out on the Master*flex* 14 mm system laid on the M65 motorway and a trial site in Newbury. The results of the tests are given in Tables 2, 3 and 4.

Table 2 Mandatory laboratory tests carried out on the coarse aggregate, cores taken from the M65 motorway installation trial or on laboratory-prepared samples of the same mixture recipe

Test	Method	Result	Performance Level
Coarse aggregate properties:			
PSV	BS 812-114 : 1989	65	n/a
AAV	BS 812-113 : 1990(1995)	3.2	n/a
Wheel tracking at 60°C[1]:	Appendix A.1 draft Guidelines Document		
rate (mm h^{-1})		0.65	3
rut depth (mm)		2.0	
Sensitivity to water: retained stiffness ($ITSM_{c3}$)[2] (%)	Appendix A.2 draft Guidelines Document	>100	n/a

(1) Mean core thickness = 48 mm.

(2) Retained indirect tensile stiffness modulus at 20±0.5°C after three water conditioning cycles carried out on laboratory-prepared samples.

n/a = Not applicable.

Table 3 Mandatory road tests carried out on the M65 motorway installation

Test	Method	Result	Specification
Texture depth (sand patch) (mm)	BS 598-105 : 2000		
initial (untrafficked)[1]		1.6	≥1.5
after two years trafficking[1]		1.0	≥1.0
Visual observations		Good uniform surface with no significant faults or abnormalities noted	

(1) Minimum texture depth recorded from all sections measured.

Table 4 Torque bond strength, cores taken from trial site in Newbury

Test	Method	Result[1]	Performance Level
Torque bond strength at 20±2°C on 152 mm diameter cores (kPa)	Appendix A.3 draft Guidelines Document	>240[2]	n/a

(1) Result relates to Master*flex* 14 mm, polymer-modified binder and Mastertack bond coat.

(2) No failure was recorded at the bond interface.

Additional tests

4.2 A series of characterisation tests was carried out on the binders used in Masterflex. See Table 5 for details.

Table 5 Binder characterisation tests

Test	Method
Softening point (°C)	BS 2000-58 : 1993
unaged	
after RTFOT[1]	
after HiPAT[2]	
Penetration (dmm)	BS 2000-49 : 1993
unaged	
after RTFOT[1]	
after HiPAT[2]	
Rheology G* at 25°C and 0.4 Hz (Pa)	IPPM CM/99[3]
unaged	
after RTFOT[1]	
after HiPAT[2]	
ageing index[4]	

(1) Rolling thin film oven test (RTFOT) in accordance with ASTM D 2872 : 1997.

(2) High pressure ageing test in accordance with the test method developed under the HAPAS scheme for modified binders, Draft 1.0 (October 1997).

(3) IPPM CM/99 Test Method — Determination of the complex shear modulus and phase angle of bituminous binders.

(4) Ageing index is defined as the ratio of complex modulus (G*) at 25°C and 0.4 Hz after and before HiPAT (High Pressure Ageing Test) conditioning.

4.3 Wheel tracking test data on laboratory-prepared samples indicate that Masterflex 14 mm can maintain Performance Level 3 for wheel tracking at thicknesses up to 50 mm. See Table 6 for results.

Table 6 Wheel tracking test results

Test	Method	Result[1]	Performance Level
Wheel tracking at 60°C[2]	BS 598-110		
rate (mmh^{-1})		0.43	3
rut depth (mm)		3.0	

(1) Mean of two results.

(2) Mean core thickness = 50 mm.

4.4 A series of tests was carried out on Masterflex 14 mm to evaluate the suitability of the various constituents proposed for use in the system. The results, when assessed in accordance with the Guidelines Document, showed that, where applicable, the Performance Levels detailed in Tables 1 to 6 can be maintained.

5 Investigations

5.1 An installation trial was carried out to assess the practicability of the installation and on-site quality control procedures. A visual inspection of the site concluded that it was free from significant abnormalities. Results from the installation confirmed that it complied with the contractual requirements.

5.2 A user/specifier survey relating to existing sites that were at least two years old was carried out to confirm the products performance in use.

5.3 The manufacturing process was examined by inspection of a typical coating plant, including the methods adopted for quality control, and details were confirmed of the quality and composition of materials used. The inspection confirmed that the plant operated in accordance with the requirements of the Quality Plan and Quality System agreed with the BBA.

Bibliography

BS 598-105 : 2000 *Sampling and examination of bituminous mixtures for roads and other paved areas — Methods of test for the determination of texture depth*
BS 598-110 : 1998 *Sampling and examination of bituminous mixtures for roads and other paved areas — Methods of test for the determination of wheel-tracking rate and depth*

BS 812-113 : 1990 *Testing aggregates — Method for determination of aggregate abrasion (AAV)*
BS 812-114 : 1989 *Testing aggregates — Method for determination of the polished-stone value*

BS 2000-49 : 1993 *Methods of test for petroleum and its products — Determination of needle penetration of bituminous material*
BS 2000-58 : 1993 *Methods of test for petroleum and its products — Determination of softening point of bitumen — Ring and ball method*

ASTM D 2872 : 1997 *Standard Test Method for Effect of Heat and Air on a Moving Film of Asphalt (Rolling Thin-Film Oven Test)*

Guidelines Document for the Assessment and Certification of Thin Surfacing Systems for Highways

BBA BRITISH BOARD OF AGRÉMENT
TECHNICAL APPROVALS FOR CONSTRUCTION

On behalf of the British Board of Agrément

[redacted]

Date of issue: 19th December 2002

Chief Executive

British Board of Agrément
P O Box No 195, Bucknalls Lane
Garston, Watford, Herts WD25 9BA
Fax: 01923 665301

e-mail: mail@bba.star.co.uk
website: www.bbacerts.co.uk

CI/SfB
12 Y

HAPAS

Roads and Bridges
Certificate No 00/H042

DETAIL SHEET 4

Tarmac Limited

MASTER*flex* 6 mm THIN SURFACING SYSTEM FOR HIGHWAYS

Product

- *THIS DETAIL SHEET RELATES TO THE MASTERflex 6 mm THIN SURFACING SYSTEM FOR HIGHWAYS.*
- *The system is for use as a thin road surface course, laid at nominal thicknesses between 15 mm and 40 mm, covering the Classifications A, B and C defined in Table 1 of the* Guidelines Document for the Assessment and Certification of Thin Surfacing Systems for Highways.

This Detail Sheet must be read in conjunction with the Front Sheets which give additional information on the HAPAS Requirements, Regulations *and* Conditions of Certification.

Technical Specification

1 Description

1.1 Master*flex* 6 mm Thin Surfacing System for Highways comprises a mixture consisting of a polymer-modified binder, limestone filler and graded fine and coarse aggregates.

1.2 The bitumens approved for use in Master*flex* 6 mm include Cariphalte M, Cariphalte TS and Nypol TS.

1.3 The system can be used in conjunction with either a K1-40, K1-60 or a K1-70 bitumen emulsion bond coat, or Mastertack, Aquagrip 60 or Colbond 50 polymer-modified bond coats[1].

(1) Bond coats must be selected in accordance with procedures detailed in the current Tarmac Ltd Quality Plan for the Manufacture and Laying of Master*flex*.

2 General

2.1 Masterflex 6 mm Thin Surfacing System for Highways is satisfactory for use as a thin surfacing system on highways.

2.2 The product can be designed and laid to give an initial texture depth which meets the minimum requirements for Performance Level 2.

2.3 The product is suitable for use on existing bituminous or concrete surfaces at a minimum temperature of −1°C, measured on a rising thermometer, provided the substrate is free from standing water or ice and that the minimum specified rolling temperature can be maintained.

2.4 The product, when manufactured and laid in accordance with the provisions of this Detail Sheet, can be designed to achieve Performance Levels given in Table 1.

Table 1 Performance Levels achieved

Test parameter	Performance Level achieved[1]	Requirement
Texture depth	2	
untrafficked (mm)		≥1.2
after two year trafficking (mm)		≥0.8
loss between first and second year (%)		≤40
Wheel tracking	3	
rate (mean/max individual) (mm h^{-1})		≤5.0/≤7.5
rut depth (mean/max individual) (mm)		≤7.0/≤10.5

(1) Performance Levels are defined in Appendix B of the Guidelines Document.

3 Durability

3.1 The product has been used in the United Kingdom since 1999 and available evidence suggests that it will provide a durable surface course, suitable for use on all classes of road.

3.2 Results from an installation on the A473 Penybont Road, Pencoed, showed that, when laid at a nominal thickness of 30 mm on a road of Stress Level 1[1] and an estimated Traffic Level of 352 cv/l/d[2], the product will meet Performance Level 2[3] requirements for retained texture.

3.3 The results from this installation, when assessed in accordance with Appendix C of the Guidelines Document, indicate that Masterflex 6 mm is suitable for use to achieve Performance Level 2[2] (see Table 2) retained texture on sites with Traffic Levels C_{max}:

Table 2 Maximum Traffic Levels (cv/l/d) maintaining Performance Level 1

Site Stress Level	C_{max} (cv/l/d)[3]
1	3500
2	1500
3	1000
4	800

(1) Site Stress Levels are defined in Appendix C of the Guidelines Document.
(2) Performance Levels are defined in Appendix B of the Guidelines Document.
(3) Traffic Levels (cv/l/d) are defined as commercial vehicles/lane/day.

The following is a summary of the technical investigations carried out on the Masterflex 6 mm Thin Surfacing System for Highways.

4 Tests

Mandatory laboratory and road tests

4.1 A series of tests was carried out on the Masterflex 6 mm system. The results of the tests are given in Table 3.

Table 3 Mandatory laboratory tests carried out on the coarse aggregate, cores taken from an installation on the A1066 Diss or on laboratory-prepared samples of the same mixture recipe

Test	Method	Results	Performance Level
Coarse aggregate properties:			
PSV	BS 812-114 : 1989	55	n/a
AAV	BS 812-113 : 1990(1995)	4.2	n/a
Wheel tracking at 60°C[1]:	Appendix A.1 draft Guidelines Document		
rate (mm h^{-1})		1.75	3
rut depth (mm)		4.70	
Torque bond strength at 20±2°C (kPa)	Appendix A.3 draft Guidelines Document	>453 (no failure at max test load of 400 Nm)	n/a
Sensitivity to water: retained stiffness ($ITSM_{c3}$)[2] (%)	Appendix A.2 draft Guidelines Document	93	n/a

(1) Mean core thickness = 51 mm.
(2) Retained indirect tensile stiffness modulus at 20±0.5°C after three water conditioning cycles carried out on laboratory-prepared samples.
n/a = Not applicable.

Texture depth

4.2 Sand patch texture depth measurements made at an installation on Fairfield Road, North Cornelly, showed that Masterflex 6 mm can be designed and laid to achieve initial texture depths of ≥1.2 mm. The results are given in Table 4.

Table 4 Sand patch texture measurements carried out on Fairfield Road, North Cornelly

Test	Method	Result (mean)	Specification
Initial texture depth (sand patch) (mm)	BS 598-105 : 2000		
untrafficked		1.2	≥1.2
after two years of trafficking (mm)		1.1	≥0.8

Additional tests

4.3 A series of characterisation tests was carried out on the binders used in Masterflex. See Table 5 for details.

Table 5 Binder characterisation tests

Test	Method
Softening point (°C) unaged after RTFOT[1] after HiPAT[2]	BS 2000-58 : 1993
Penetration (dmm) unaged after RTFOT[1] after HiPAT[2]	BS 2000-49 : 1993
Rheology G* at 25°C and 0.4 Hz (Pa) unaged after RTFOT[1] after HiPAT[2] ageing index[4]	IPPM CM/99[3]

(1) Rolling thin film oven test (RTFOT) in accordance with ASTM D 2872 : 1997.

(2) High pressure ageing test in accordance with the test method developed under the HAPAS scheme for modified binders, Draft 1.0 (October 1997).

(3) IPPM CM/99 Test Method – Determination of the complex shear modulus and phase angle of bituminous binders.

(4) Ageing index is defined as the ratio of complex modulus (G*) at 25°C and 0.4 Hz after and before HiPAT (High Pressure Ageing Test) conditioning.

4.4 A series of tests was carried out on Master*flex* 6 mm to compare the suitability of the various constituents proposed for use in the system. The results, when assessed in accordance with the Guidelines Document, showed that, where applicable, the Performance Levels detailed in Tables 1 to 5 can be maintained.

5 Investigations

5.1 The manufacturing process was examined by inspection of a typical coating plant, including the methods adopted for quality control, and details were confirmed of the quality and composition of materials used. The inspection confirmed that the plant operated in accordance with the requirements of the Quality Plan and Quality System agreed with the BBA.

5.2 Master*flex* 6 mm and Master*flex* 10 mm share common binder, aggregate sources and bond coats. Test data relating to Master*flex* 10 mm and 14 mm, where applicable, has been used as supporting evidence to complete technical investigations on Master*flex* 6 mm.

Bibliography

BS 598-105 : 2000 *Sampling and examination of bituminous mixtures for roads and other paved areas — Methods of test for the determination of texture depth*

BS 2000-49 : 1993 *Methods of test for petroleum and its products — Determination of needle penetration of bituminous material*

BS 2000-58 : 1993 *Methods of test for petroleum and its products — Determination of softening point of bitumen — Ring and ball method*

ASTM D 2872 : 1997 *Standard Test Method for Effect of Heat and Air on a Moving Film of Asphalt (Rolling Thin-Film Oven Test)*

Guidelines Document for the Assessment and Certification of Thin Surfacing Systems for Highways (working draft 4, dated 10 January 2000)

On behalf of the British Board of Agrément

[redacted]

Date of issue: 19th December 2002

Chief Executive

British Board of Agrément
P O Box No 195, Bucknalls Lane
Garston, Watford, Herts WD25 9BA
Fax: 01923 665301

e-mail: mail@bba.star.co.uk
website: www.bbacerts.co.uk

For additional information about the Certificate, tel: 01923 665300. For information about Agrément Certificate validity and scope, tel: Hotline 01923 665400, or check the BBA website.

BBA APPROVAL INSPECTION TESTING CERTIFICATION
TECHNICAL APPROVALS FOR CONSTRUCTION

Installer Number 5021

FM Conway
Conway House
Rochester Way
Dartford
Kent
DA1 3QY

This certificate has been issued to confirm that the above company has been accepted as an Approved Installer for the HAPAS HIGH FRICTION SURFACING SYSTEM defined on the BBA website - www.bbacerts.co.uk

Signed: [redacted]

Date: 10th January 2011

Expiry Date: 31st March 2011

To confirm validity please check the website or contact the BBA at Bucknalls Lane, Watford, Hertfordshire, England. WD25 9BA
Tel. +44(0)1923 665 300 fax +44 (0) 1923 665 301

Certificate

EC Certificate of Factory Production Control

Certificate No. 0086 - CPD – 574708

In compliance with the Directive 89/106/EEC of the Council of European Communities of 21 December 1988 on the approximation of laws, regulations and administrative provisions of the Member States relating to construction products (Construction Products Directive – CPD), as amended by the Directive 93/68/EEC of the Council of European Communities of 22 July 1993, it has been stated that the construction products

Bituminous mixtures

characterised as

Asphalt concrete, Hot rolled asphalt, Stone mastic asphalt

intended for use as bituminous mixtures and produced by

F M Conway Limited

at the factory location
Erith Wharf, Church Manor Way, Erith DA8 1DF, United Kingdom

is submitted by the manufacturer to initial type testing of the products and factory production control, and that the approved body BSI has performed the initial inspection of the factory and of the factory production control and performs the continuous surveillance, assessment and approval of factory production control.

This certificate attests that all provisions concerning the attestation of factory production control described in Annex ZA of the harmonised European Standards

EN 13108-1:2006; EN 13108-4:2006; EN 13108-5:2006

and in accordance with the procedures given, were applied.

[redacted]

David W Ford, Executive Director, Healthcare and Testing Services

Date 26 May 2011

This certificate first issued 26 May 2011

This certificate remains valid as long as the conditions laid down in the harmonised technical specification in reference or the manufacturing conditions in the factory or the factory production control itself are not modified significantly.

raising standards worldwide™

BSI

CE

Whitemountain

0120

Whitemountain Quarries Limited

26 Ballycarngannon Road, Lisburn, BT27 6YA. Tel: + 44 (0) 28 9263 9750 Fax: + 44 (0) 28 9263 0751

Date CE mark affixed	**01 / 2011**
Certificate number	**GB04/61574**

Conforms to EN 13043

Aggregates for bituminous mixtures
4/10mm Single sized aggregate
Ballystockart Quarry

Properties	Value	
Aggregate Type	Silurian Gritstone (Sandstone)	
Particle Shape	FI_{20}	Category
Particle Size	d/D 4/10 Gc85/20	Designation
Particle Density	2.70 Mg/m^3	Declared Value
Cleanliness	MB_{F10}	Category
Affinity to bituminous binders	$95\%_{NR}$	Declared Value
Percentage of crushed particles / broken surfaces	C_{NR}	Category
Resistance to fragmentation / crushing	LA_{30}	Category
Resistance to polishing	PSV_{68}	Category
Resistance to abrasion	AAV_{10}	Category
Resistance to wear	$M_{DE\ NR}$	Category
Abrasion from studded tyres	$A_{N\ NR}$	Category
Resistance to thermal shock	$V_{LA\ NR}$	Declared Value
Durability against freeze-thaw	WA_{24} 1	Category
Durability against weathering	SB_{NR}	Category

DET NORSKE VERITAS

MANAGEMENT SYSTEM CERTIFICATE

Certificate No. 59848-2009-AQ-SWE-UKAS

This is to certify that

Nynas UK AB

Eastham Plant and Distribution
North Road
Ellesmere Port
South Wirral
Cheshire
CH65 1AJ
United Kingdom

Dundee Refinery
East Camperdown Street
Dundee
DD1 3LG
United Kingdom

has been found to conform to the Management System Standard:

BS-EN-ISO 9001:2008 & National Highways Sector Scheme 15

This Certificate is valid for the following product or service ranges:

Production and supply of paving grade bitumen in accordance with the requirements of the National Highways Sector Scheme 15 in the UK.

Initial Certification date:
4 March 2004

This Certificate is valid until:
30 September 2012

The audit has been performed under the supervision of:
Mats Nilsson
Lead Auditor

013

Place and date:
London, 20 August 2009

for the Accredited Unit:
DET NORSKE VERITAS CERTIFICATION B.V.,
THE NETHERLANDS

K.S. Cheung
Management Representative

Lack of fulfilment of conditions as set out in the Certification Agreement may render this Certificate invalid.

BUREAU VERITAS
Certification

Certificate

awarded to

J. RETTENMAIER & SÖHNE GMBH+CO.KG JRS Fibers designed by Nature

Holzmühle 1

73494 Rosenberg (Germany)

Bureau Veritas Certification certifies that the Management System of the above organisation has been assessed and found to be in accordance with the requirements of the standards detailed below.

Standard

DIN EN ISO 9001:2008

Scope of supply

Development, production, processing and sales of organic fibre materials based on wood, cellulose, one-year-plants, cereal and fruit components as well as processing of external customer products.

Original approval date: 06.10.1994

Date of the audit: 06.11.2009 Date of next recertification: 06.11.2012

Subject to the continual satisfactory operation of the organisation's Management System, this certificate is valid from:

Date of certification: 19.01.2010 Valid until: 29.11.2012

To check this certificate validity you may contact Bureau Veritas Certification. Further clarifications regarding the scope of this certificate and the applicability of the Management Systems requirements may be obtained by consulting the organisation.

[redacted]

Deutscher Akkreditierungs Rat DAR

Date: 20.01.2010

Certificate number: **DE10000047-A**

Bureau Veritas Certification Germany GmbH
Veritaskai 1 · 21079 Hamburg

NYNAS

FM Conway Ltd
Conway House
Rochester Way
Dartford
Kent
DA3 3QY

LABORATORY TEST REPORT - Project 10-0010

INTRODUCTION
Asphalt mixture design verification of SMA 10 surf incorporating 40-60 pen binder.
Aggregate used is from ballystockart

1. Determination of bulk density BS EN 12697-6 (method A)
2. Water Sensitivity (Indirect Tensile Strength) Method A – BS EN 12697-12
3. Wheel tracking rate BS EN 12397-22 small device.
4. Indirect Tensile Stiffness Modulus - BS DD 213: 1993.

1. **Density / Air voids Data Maximum Theoretical Density 2.454 Mg/m³**

Sample number	Bulk density Mg / M³	Air voids%
1	2.377	3.63
2	2.370	3.41
3	2.393	2.48
4	2.377	3.13
5	2.355	4.05
6	2.380	3.02
Mean	2.373	3.29

NYNAS

2. Water Sensitivity (Indirect Tensile Strength) Method A – BS EN 12697-12

Test temperature 15°C

Sample no	Thickness mm	Diameter mm	Bulk density Mg / M³	Peak Load (N)	Peak load (kN)	Tensile Strength (GPa)
4 wet	59.5	101.6	2.377	21230	21.23	22.4
5 wet	59.2	101.6	2.355	21830	21.83	23.1
6 wet	59.0	101.6	2.380	22400	22.40	23.8
Average			2.370			23.1
1 dry	59.2	101.6	2.365	24310	27.31	28.9
2 dry	58.6	101.6	2.370	29380	29.38	31.4
3 dry	58.5	101.6	2.393	27940	27.94	29.9
Average		101.6	2.376	27210	27.21	31.0
ITS (r/R)						0.77

3. Wheel tracking rate BS EN 12397-22 small device

Test Conditions
Test temperature: 60 +/- 1°C
Test duration: 10000 cycles
Load: 700 +/- 5 N

Sample number	A	B
Date tested	03/02/2011	04/02/2011
Specimen thickness (mm)	40 mm	40 mm
Proportional rut depth @ 10000 cycles	3.9 mm	2.07 mm
Mean proportional rut depth @ 10000 cycles	3.0 mm	

NYNAS

4. Indirect Tensile Stiffness Modulus - BS DD 213: 1993

Sample no.	Bulk Density (Mg/M^3)	ITSM (Mpa)
1	2.377	6326
2	2.370	6555
3	2.393	6145
4	2.377	6664
5	2.355	6489
6	2.380	6348
Mean	2.373	6421

21st February 2011

Our Ref: HA027/008/103

AGD Systems Limited
White Lion House
Gloucester Road
Staverton
Cheltenham
Gloucestershire
GL51 0TF

Highways Agency
Zone 2/17E
Temple Quay House
2, The Square
Temple Quay
BRISTOL
BS1 6HA

Tel: 0117 372 8227
Fax: 0117 372 8810

Date: 9 July 2007

Dear M[redacted]

AUTHORISATION OF AGD202 - 5XX - XXX VEHICLE DETECTOR DESIGN AUTHORITY'S SIGNED DECLARATION OF CONFORMITY - LETTER OF ACCEPTANCE

Thank you for providing your signed Declaration of Conformity dated 9 July 2007, referenced **AGD AP52/762** and affirming that the above Product meets each of the Secretary of State's requirements as set out in Technical Requirements Specification **TR 2504A** in accordance with the Highways Agency procedures defined in TRG 0600A.

Accordingly, this letter and the appended copy of the signed Declaration of Conformity together, formally confirms the Secretary of State's approval, in accordance with the Traffic Signs Regulations and General Directions (2002), for the purposes of allowing lawful use of the above referenced Product forthwith on the public highway.

The Product is approved for the purpose of detecting the presence and passage of vehicles at portable traffic signals when used in accordance with relevant Traffic Advice and/or Traffic Directions.

Yours sincerely,

[redacted] (signed by the authority of the Secretary of State)

Safe Roads Operations Group
Email: [redacted]

DECLARATION OF CONFORMITY

Registered Form Number	AGD	AP52	762

THE PRODUCT

Product Title: ..... Vehicle Detector for use at Portable Traffic Signals

To Highways Agency Technical Requirements Specification: TR2504A

Unique Product Identifier: AGD202-5xx-xxx

Options incorporated: .....12/24vacdc operation

Product & Software build number (version): MI-082

Design Authority Technical File reference: .....AGD202 TCF Iss 1

Quality Management System certificate No: .....NQA 16438

The term "Product" refers to the item and all component parts and executable instructions of which it comprises.

Design Authority: AGD Systems Limited
Address: White Lion House
Gloucester Road
Staverton
Cheltenham
Gloucestershire
GL51 0TF

I/we hereby declare under my/our sole responsibility that the Product as referred to above, to which this Declaration of Conformity relates, meets all the requirements defined in the above Technical Requirements Specification and TRG 0600.

I/we understand that the Secretary of State for Transport is entitled to rely on the Design Authority's expertise and I/we indemnify the Secretary of State for any losses or liability he may occur in the event that the Product fails to meet any requirement defined in the above Technical Requirements Specification or TRG 0600.

I/we understand that the Product may only be used on public highways when this Declaration of Conformity has been completed, signed and the original submitted to the Approval Authority and that Approval Authority issues an Approval Letter of Acceptance on behalf of the Secretary of State.

I/we certify that all supporting design and test documentation is retained in the Design Authority's Technical File under an appropriate quality management system and will be made available for inspection by the Secretary of State or his representative, subject to a reasonable notice period.

I/we certify that the design and construction ensures that the Product is safe and fit for purpose and compliant with health and safety legislation.

I/we understand that any modification to the Product specified above or a change of legal entity of the Design Authority shall require re-submission of this Declaration of Conformity.

Signed for and on behalf of the Design Authority.

Signed:.[redacted]..... Name (Capitals): [redacted]

In the capacity of: [redacted]..... Date: 29 June 2007

Our Ref: HA027/008/289

Hollco Limited
1 Overfield
Thorpe Way
Banbury
Oxfordshire
OX16 4XR

Highways Agency
Zone 2/17E
Temple Quay House
2, The Square
Temple Quay
BRISTOL
BS1 6HA

[redacted]

Date: 16 February 2007

Dear Mr Holland,

AUTHORISATION OF MULTI PHASE RADIOCONNECT PORTABLE TRAFFIC SIGNALS EQUIPMENT
DESIGN AUTHORITY'S SIGNED DECLARATION OF CONFORMITY - LETTER OF ACCEPTANCE

Thank you for providing your signed Declaration of Conformity dated 16 February 2007 reference **HOLL AP02/752** and affirming that the above Product meets each of the Secretary of State's requirements as set out in Technical Requirements Specification **TR 2502A** in accordance with the Highways Agency procedures defined in TRG 0600A.

Accordingly, this letter and the appended copy of the signed Declaration of Conformity together, formally confirms the Secretary of State's approval, in accordance with the Traffic Signs Regulations and General Directions (2002), for the purposes of allowing lawful use of the above referenced Product forthwith on the public highway.

The Product is approved for the purpose of controlling traffic signals at roadworks, except on motorways, when used in accordance with relevant Traffic Advice and/or Traffic Directions.

Yours sincerely,

[redacted]

(signed by the authority of the Secretary of State)

Safe Roads Operations Group
Email: [redacted]

FT electronics

Abtest

TEST CERTIFICATE

Environmental Test Report No : ENV709

This certifies that the following product :-

SOLIDHEAD ™ : LED Road Traffic Signal Head : CW668-23 series

has been tested in accordance with the tests detailed below :-

Test	Specification	Unit Tested	Result
Dry Heat	BS EN 12368 2006 & EN 60068-2-2 Test Bb	Green	Pass
Cold	BS EN 12368 2006 & EN60068-2-1	Red	Pass
Dust Ingress	BS EN 12368 2006 & EN60529 IP55	Green	Pass
Water Ingress	BS EN 12368 2006 & EN60529 IP55	Green	Pass
Damp Heat Cyclic	BS EN 12368 2006 & EN 60068-2-30 Test Db	Red	Pass
Random Vibration	BS EN 12368 2006 & EN 60068-2-64 Test Fh	Red/Amber/Green	Pass
Impact	BS EN 12368 2006 & EN 60598-1	Amber	Pass

Issued to : Coyds Limited
9 Pondwood Close
Moulton Park Industrial Estate
Northampton
NN3 6RT

Issued By : Abtest Limited
Abercynon
Mountain Ash
CF45 4SF

Date of Issue : 20 March 2007

Tested By [redacted]
(Test Technician)

Approved By : ([redacted] -
(Business Development Manager)

UKAS TESTING

0042

CERTIFYING ORGANISATION: BRITISH STANDARDS INSTITUTION

TEST LABORATORY: BUILDING RESEARCH ESTABLISHMENT

BSI Product Services

PRODUCT SUBMITTED FOR ROAD TRIALS TO BS EN 1824 - AUGUST 2007
PERFORMANCE ASSESSMENT TO BS EN 1436 CLASSES - AUGUST 2008

PRODUCT DETAILS

Product type and reference:	Preformed : Premark 20501#010
Product colour	White
Manufacturer:	LKF Vejmarkering A/S
Line Number	37
Date of application:	Aug-07
Date of final measurement:	Aug-08

APPLICATION DETAILS

Method of application:	Gas Burner
Rate of application (g/m²) :	
Non drop-on materials	5810
Drop-on materials	400

SITE DETAILS

Location:	M4 Junction 37 (Eastbound)
Road Surface:	Bituminous
Texture depth mm :	0.9

APPLICATION CONDITIONS

Road surface temperature: ºC	17.8
Air temperature: ºC	16.6
Wind speed: m.sec⁻¹	0.50
Relative humidity: %	70.1

NOTE: This product may be marketed as PREMARK® Vizibility – White

BS EN 1436 PERFORMANCE CLASSIFICATION

		RL Dry	RL Wet	β	x y co-ord	SRT	Qd
WHEEL PASSAGES					White		
RESULTS @ 1,000,000 ± 20%	:	R4	RW1	B3	PASS	S3	Q4

Rollover Class : P5
HGV % : 20

Key:

RL	-	Retroflectivity
β	-	Luminance
x y co-ordinates	-	Colour
SRT	-	Skid resistance
Qd	-	Luminance diffuse

Colin Bywater
BSI Product Services
Maylands Avenue, Hemel Hempstead
Hertfordshire HP2 4SQ

Road Trial Certificate
Issue 2 November 2008

CERTIFYING ORGANISATION: BRITISH STANDARDS INSTITUTION

TEST LABORATORY: BUILDING RESEARCH ESTABLISHMENT

BSI Product Services

PRODUCT SUBMITTED FOR ROAD TRIALS TO BS EN 1824 - AUGUST 2007
PERFORMANCE ASSESSMENT TO BS EN 1436 CLASSES - AUGUST 2008

PRODUCT DETAILS

Product type and reference:	Preformed : Premark 20502#002
Product colour	Yellow
Manufacturer:	LKF Vejmarkering A/S
Line Number	38
Date of application:	Aug-07
Date of final measurement:	Aug-08

APPLICATION DETAILS

Method of application:	Gas Burner
Rate of application (g/m²) :	
Non drop-on materials	5760
Drop-on materials	400

SITE DETAILS

Location:	M4 Junction 37 (Eastbound)
Road Surface:	Bituminous
Texture depth mm :	0.9

APPLICATION CONDITIONS

Road surface temperature: ºC	18
Air temperature: ºC	14.3
Wind speed: m.sec⁻¹	0.00
Relative humidity: %	87.1

NOTE: This product may be marketed as PREMARK® Vizibility – Yellow

BS EN 1436 PERFORMANCE CLASSIFICATION

		RL Dry	RL Wet	β	x y co-ord	SRT	Qd
WHEEL PASSAGES					Yellow		
RESULTS @ 1,000,000 ± 20%	:	R1	RW0	B1	PASS	S2	Q3

Rollover Class : P5
HGV % : 20

Key:

RL	-	Retroflectivity
β	-	Luminance
x y co-ordinates	-	Colour
SRT	-	Skid resistance
Qd	-	Luminance diffuse

Colin Bywater
BSI Product Services
Maylands Avenue, Hemel Hempstead
Hertfordshire HP2 4SQ

Road Trial Certificate
Issue 2 November 2008

HAPAS
Roads and Bridges

Stirling Lloyd Polychem Ltd
Union Bank
King Street
Knutsford
Cheshire WA16 6EF
Tel: 01565 633111 Fax: 01565 633555
e-mail: info@stirlinglloyd.com
website: www.stirlinglloyd.com

BBA APPROVAL INSPECTION TESTING CERTIFICATION
TECHNICAL APPROVALS FOR CONSTRUCTION

Agrément Certificate
11/H170
Product Sheet 1

ELIMINATOR (ONE COAT) BRIDGEDECK WATERPROOFING SYSTEM

This Certificate is issued under the Highway Authorities' Product Approval Scheme (HAPAS) by the British Board of Agrément (BBA) in conjunction with the Highways Agency (HA) (acting on behalf of the overseeing organisations of the Department for Transport; the Scottish Executive; the Welsh Assembly Government; the Department for Regional Development, Northern Ireland), the Association of Directors of Environment, Economy, Planning and Transport (ADEPT), the Local Government Technical Advisers' Group and industry bodies. HAPAS Agrément Certificates are normally each subject to a review every five years

PRODUCT SCOPE AND SUMMARY OF CERTIFICATE

This Certificate relates to the Eliminator (One Coat) Bridgedeck Waterproofing System for use as a bridgedeck waterproofing system for concrete decks of highway bridges.

AGRÉMENT CERTIFICATION INCLUDES:

- factors relating to compliance with HAPAS requirements
- 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 five-yearly review.

KEY FACTORS ASSESSED

Performance — the system meets the requirements of the *Guidelines Document for the Assessment and Certification of Waterproofing Systems for Use on Concrete Decks of Highway Bridges* (see section 5).

Durability — the system will provide an effective waterproof layer to the concrete bridgedeck, provided it is not damaged during subsequent resurfacing (see section 8).

The BBA has awarded this Agrément Certificate to the company named above for the system described herein. This system has been assessed by the BBA as being fit for its intended use provided it is installed, used and maintained as set out in this Certificate.

On behalf of the British Board of Agrément

[redacted]

Head of Approvals — Materials

[redacted]

Chief Executive

Date of First issue: 26 January 2011

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

HAPAS Requirements

Requirements

The Highways Technical Advisory Committee (HiTAC) and HAPAS Specialist Group 7 (Bridgedeck Waterproofing) have agreed with the BBA the aspects of performance to be used by them in assessing the compliance of Bridgedeck Waterproofing Systems with the Guidelines Document. In the opinion of the BBA, the Eliminator (One Coat) Bridgedeck Waterproofing System when applied to concrete decks of highway bridges, in accordance with the provisions of this Certificate, will meet the relevant requirements.

Additional requirements of the overseeing organisations are given in the Manual of Contract Documents for Highway Works (MCHW)[1], Volumes 1 and 2, Series 900.

(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: *3 Delivery and site handling* (3.1, 3.2) and *10 Precautions*.

Technical Specification

1 Description

The Eliminator (One Coat) Bridgedeck Waterproofing System comprises:

- PA1 Primer — a single component, solvent-based, methyl methacrylate resin solution, for use at temperatures above 5°C
- PAR1 Primer — a single component, solvent-free, highly-reactive methacrylate resin, for use at temperatures above 0°C
- Eliminator (Spray Grade) Waterproofing — a two-part, solvent-free, methyl methacrylate resin, comprising Part A and Part B pigmented white, yellow or grey
- Eliminator Patch Repair (HG) Waterproofing — a single component, solvent-free, methyl methacrylate resin, for repair work and use in inaccessible areas
- Tack Coat No 2 — a single component, solvent-based, methyl methacrylate resin solution, red pigmented tack coat, for use with additional protective layer (APL) of sand asphalt
- Bond Coat SA1030 — a polymer-modified, bituminous-based, hot melt adhesive, for use with hot-rolled asphalt (HRA) surfacing
- Hardener Powder — 50% benzoyl peroxide with a solid plasticiser, for use in PAR1 Primer, Eliminator (Spray Grade) Waterproofing Part B and Eliminator Patch Repair (HG) Waterproofing.

2 Manufacture and quality control

The components of the system are manufactured by a batch-blending process. Quality control checks are carried out on the incoming materials, during production and the finished components.

3 Delivery and site handling

3.1 The components of the system are delivered as detailed in Table 1.

Table 1 Weights and packaging

Component	Weight	Container	Shelf-life[1] (months)
PA1 Primer	5, 20, 190, 950 kg	Metal containers	6
PAR1 Primer	5 kg kit		
	4.85 kg (Primer)	Metal containers	6
	150 g (Hardener Powder)	Plastic bags	6
	20 kg kit		
	19.4 kg (Primer)	Metal containers	6
	600 g (Hardener Powder)	Plastic bags	6
Eliminator (Spray Grade) Waterproofing	48 kg kit		
	24 kg (Part A)	Metal containers	6
	23.04 kg (Part B)	Metal containers	6
	960 g (Hardener Powder)	Plastic bags	6
	400 kg kit		
	200 kg (Part A)	Metal containers	6
	192 kg (Part B)	Metal containers	6
	8 kg (Hardener Powder)	Plastic bags	6
Eliminator Patch Repair (HG) Waterproofing	5 kg kit		
	4.85 kg	Metal containers	6
	150 g (Hardener Powder)	Plastic bags	6
Tack Coat No 2	5, 20, 190 kg	Metal containers	6
Bond Coat SA1030	22.7 kg	Cardboard tubs	12

(1) When unopened.

3.2 The components are classified under *The Chemicals (Hazard Information and Packaging for Supply)* Regulations 2009 (CHIP4) and all containers bear the appropriate hazard warning label(s). Flashpoints and hazard classification are given in Table 2.

Table 2 Flashpoint and hazard classification

Component	Flashpoint (°C)	Classification
PA1 Primer	11	Highly flammable[1]/Irritant
PAR1 Primer	12	Highly flammable[1]/Irritant
(Spray Grade) Waterproofing (Part A)	16	Highly flammable[1]/Irritant
(Spray Grade) Waterproofing (Part B)	16	Highly flammable[1]/Irritant
Patch Repair (HG) Waterproofing	16	Highly flammable[1]/Irritant
Hardener Powder	>55	Oxidising/Irritant
Tack Coat No 2	1	Highly flammable[1]/Irritant
Bond Coat SA1030	>200	Not classified as hazardous

(1) The product should be stored in accordance with the *Highly Flammable Liquids and Liquefied Petroleum Gases Regulations* (1972).

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on the Eliminator (One Coat) Bridgedeck Waterproofing System.

Design Considerations

4 Use

The Eliminator (One Coat) Bridgedeck Waterproofing System is suitable for use on highway concrete bridgedecks as part of new and maintenance applications with APL or HRA surfacing. The deck surface should have a Class U4 (in accordance with *Specification for Highway Works*, Volume 1, Clause 1708.4), formed or tamped surface finish and be at least 28 days old (or minimum 7 days where agreed in consultation with the client) with a maximum surface moisture content of 6% and shall be visually dry for application to proceed.

5 Performance

The system meets the requirements of the *Guidelines Document for the Assessment and Certification of Waterproofing Systems for Use on Concrete Decks of Highway Bridges* (see section 15).

6 Practicability of installation

The system should only be installed by installers who have been trained and authorised by the Certificate holder (see section 9.2).

7 Maintenance

The system is not subject to any routine maintenance requirements but any damage must be repaired before being overlaid (see section 13).

8 Durability

8.1 The system will provide an effective waterproof layer to the concrete bridgedeck, provided it is not damaged during subsequent resurfacing work.

8.2 The durability of the system is dependent on the surfacing and this will vary on a number of factors; including traffic load, location and environmental conditions.

Installation

9 General

9.1 Installation of the Eliminator (One Coat) Bridgedeck Waterproofing System must only be carried out by contractors trained and authorised by the Certificate holder.

9.2 The Certificate holder is responsible for training and monitoring its authorised contractors to ensure that the system is installed in accordance with the BBA Agreed Method Statement and this Certificate.

10 Precautions

Health and Safety Data Sheets and the *Control of Substances Hazardous to Health Regulations 2002* (COSHH) risk assessments for the works should be deposited with the client and maintained on site.

11 Preparation

11.1 Imperfections in the concrete deck should be reinstated by the client with a material agreed in consultation with the authorised contractor.

11.2 The concrete deck must be clean, dry, and free from ice, frost, laitance, loose aggregate, oil, grease, moss, algae growth, dust and other debris, and where the adhesion to the concrete would be impaired, free from curing liquids, compounds and membranes.

11.3 The air and substrate temperature together with relative humidity should be recorded and the installation of the waterproofing system only carried out on concrete bridgedecks when either:

- the minimum air and substrate temperature is at 0°C and rising with the bridgedeck temperature above the dew-point for decks which are a minimum of 28 days old when using PAR1 Primer, or
- the minimum air and substrate temperature is at 4°C and rising with the bridgedeck temperature above the dew-point for decks which are a minimum of 7 days old when using PA1 Primer or and PAR1 Primer.

12 Application

Primer

12.1 PA1 Primer or PAR1 Primer should be applied by spray, roller or brush, at a coverage rate of 0.15 $kg \cdot m^{-2}$ to 0.25 $kg \cdot m^{-2}$ for PA1 Primer and 0.2 $kg \cdot m^{-2}$ to 0.3 $kg \cdot m^{-2}$ for PAR1 Primer dependent on the porosity of the concrete deck.

12.2 The primer used will depend upon site conditions and the application must be carried out in accordance with the BBA Agreed Method Statement.

12.3 The primer can be over-sprayed with Eliminator Waterproofing membrane provided the primer is fully cured and the surface is clean and dry.

Waterproofing membrane

12.4 The Eliminator (Spray Grade) Waterproofing membrane is applied by spray at a coverage rate of 2.8 $kg \cdot m^{-2}$ on a U4 surface. The coverage rate will increase with surface irregularity.

12.5 The Eliminator (Spray Grade) Waterproofing is supplied as Part A and Part B. Immediately before use the hardener powder is stirred into Part B and mixed thoroughly. Part B component is either pigmented yellow, white or grey. The two components Parts A and B are metered and mixed in an airless spray unit at a ratio of 1:1 by volume during application.

12.6 The Eliminator (Spray Grade) Waterproofing membrane pigmented yellow, white or grey is spray applied in one coat, at a minimum wet film thickness of 2.2 mm to ensure a minimum dry film thickness of 2.0 mm overall, including peaks, arrises and irregularities in the concrete deck.

Lapping

12.7 Where a new waterproofing membrane is to be joined to an existing Eliminator (Spray Grade) Waterproofing membrane and at day joints, the new application should be lapped onto the existing by a minimum of 50 mm.

12.8 Where the existing membrane is clean, no additional preparation is necessary.

12.9 Where the existing membrane is dirty or contaminated, the surface should be cleaned using a suitable solvent, eg acetone.

Sealing into parapet chase

12.10 The Eliminator (Spray Grade) Waterproofing membrane should be terminated into a primed chase when provided.

Tack coat

12.11 The appropriate tack coat should be applied to the fully cured waterproofing membrane only in areas due to receive the APL or HRA surfacing.

12.12 When APL surfacing is to be applied directly onto the system, the Tack Coat No 2 is applied by spray, roller or brush at a coverage rate of 0.1 kg·m^{-2} to 0.3 kg·m^{-2}.

12.13 When HRA surfacing is to be applied directly onto the system, the Bond Coat SA1030 is preheated to between 175°C and 200°C, and applied by squeegee at a coverage rate of 1.25 kg·m^{-2} to 1.75 kg·m^{-2}.

12.14 The applied tack coat should be dry prior to the application of the APL or HRA surfacing. Drying time of the tack coat will depend upon site conditions. Typical drying time for the Tack Coat No 2 is 60 minutes at 23°C. The Bond Coat SA1030 must be allowed to cool for a minimum of 30 minutes.

12.15 The APL or HRA surfacing should be applied without undue delay and preferably no more than seven days after the tack coat application. Should this period be exceeded or the tack coated areas become contaminated or damaged, the Certificate holder should be contacted for advice.

13 Repair of defects

Pin/blow holes

13.1 After application of the waterproofing membrane, any identified pin/blow holes must be over-coated with Eliminator (Spray Grade) or Patch Repair (HG) Waterproofing membrane at an additional minimum wet film thickness of 2.2 mm.

Blisters and damage

13.2 Any blisters or damage must be made good by cutting back to sound material, the periphery prepared if necessary as for lapping and a repair coat of Eliminator (Spray Grade) or Patch Repair (HG) Waterproofing membrane applied as in section 12.6, ensuring a minimum peripheral lap of 50 mm around the repair.

13.3 Where the damage is through to the concrete deck, the exposed concrete must first be cleaned and then re-primed.

14 Surfacing

The rolling temperature of the surfacing must not fall below the minimum reactivation temperature of 85°C required for the Tack Coat No 2 and 90°C required for Bond Coat SA1030.

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on the Eliminator (One Coat) Bridgedeck Waterproofing System.

15 Tests

Laboratory performance tests were carried out on the system by the BBA in accordance the requirements of the *Guidelines Document for the Assessment and Certification of Waterproofing Systems for Use on Concrete Decks of Highway Bridges*, the results were satisfactory The tests (which were also part of an assessment resulting in the previous Certificate 99/R111) carried out on the system achieved the Guidelines Document requirements as detailed in Tables 3 and 4.

Table 3 Tests on waterproofing membrane

Test	Requirement	Method[1]
Resistance to water penetration	satisfactory	Section 3.2.2.10

(1) *Guidelines Document for the Assessment and Certification of Waterproofing Systems for use on Concrete Decks of Highway Bridges* March 2005.

Table 4 Tests on waterproofing membrane/system bonded to concrete

Test (units)	Requirement	Method[1]
Tensile adhesion ($N \cdot mm^{-2}$)		Section 3.3.2.1
at −10°C	0.3 min	
at 23°C	0.3 min	
at 40°C	0.2 min	
Resistance to chloride ion penetration (%)	0.04 max	Section 3.3.2.2
Resistance to freeze/thaw		Section 3.3.2.3
tensile adhesion ($N \cdot mm^{-2}$)	0.3 min	
chloride ion penetration (%)	0.04 max	
Resistance to heat ageing		Section 3.3.2.4
tensile adhesion ($N \cdot mm^{-2}$)	0.3 min	
chloride ion penetration (%)	0.04 max	
Resistance to chisel impact		Section 3.3.2.5
at −10°C		
chloride ion penetration (%)	0.04 max	
at 23°C		
chloride ion penetration (%)	0.04 max	
at 40°C		
chloride ion penetration (%)	0.04 max	
Resistance to aggregate indentation		Section 3.3.2.6
at 40°C	satisfactory	
chloride ion penetration (%)	0.04 max	
Resistance to aggregate indentation		Section 3.3.2.7
at 80°C	satisfactory	
chloride ion penetration (%)	0.04 max	
Thermal shock, heat ageing and crack cycling	satisfactory	Section 3.3.2.8
at −10°C		
chloride ion penetration (%)	0.04 max	
at 23°C		
chloride ion penetration (%)	0.04 max	
at 40°C		
chloride ion penetration (%)	0.04 max	
Sand asphalt surfacing to waterproofing system interface shear adhesion ($N \cdot mm^{-2}$)		Section 3.3.2.9
Tack Coat No 2		
at −10°C	0.2 min	
at 23°C	0.2 min	
at 40°C	0.1 min	
Sand asphalt surfacing to waterproofing system interface tensile bond ($N \cdot mm^{-2}$)		Section 3.3.2.10
Tack Coat No 2	0.1 min	
Surface finish of concrete substrate		Section 3.3.2.11
tensile adhesion ($N \cdot mm^{-2}$)		
tamped	0.3 min	
timber formed	0.3 min	
Age of concrete substrate (7 days)		Section 3.3.2.12
tensile adhesion ($N \cdot mm^{-2}$)	0.3 min	
Overlapping time (6 months)		Section 3.3.2.13
tensile adhesion ($N \cdot mm^{-2}$)		
covered	0.3 min	
uncovered	0.3 min	
Resistance to aggregate indentation		Section 3.3.3.1
at 125°C		
chloride ion penetration (%)	0.04 max	
HRA surfacing to waterproofing system interface shear adhesion ($N \cdot mm^{-2}$)		Section 3.3.3.2
Bond Coat SA1030		
at −10°C	0.2 min	
at 23°C	0.2 min	
at 40°C	0.1 min	
HRA surfacing to waterproofing system interface tensile bond ($N \cdot mm^{-2}$)		Section 3.3.3.3
Bond Coat SA1030	0.1 min	
Installation temperature test (0°C)		Section 3.3.3.4
tensile adhesion ($N \cdot mm^{-2}$)	0.3 min	

(1) *Guidelines Document for the Assessment and Certification of Waterproofing Systems for use on Concrete Decks of Highway Bridges* March 2005.

16 Investigations

An evaluation of existing data from the previous Certificate 99/R112 was undertaken and includes:

- an assessment of the practicability of the installation and quality control/assurance procedures at an installation site trial
- examination of the manufacturing process, including the methods adopted for quality control, and details of the quality and composition of materials used.

Bibliography

Guidelines Document for the Assessment and Certification of Waterproofing Systems for use on Concrete Decks of Highway Bridges March 2005

Manual of Contract Documents for Highway Works, Volume 1 *Specification for Highway Works, Series 900 Road pavements — bituminous bound materials*

Manual of Contract Documents for Highway Works, Volume 2 *Notes for Guidance on the Specification for Highway Works,* Series 900 *Road pavements — bituminous bound materials*

17 Conditions

17.1 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.

17.2 Publications and documents referred to in this Certificate are those that the BBA deems to be relevant at the date of issue or re-issue of this Certificate and include any: Act of Parliament; Statutory Instrument; Directive; Regulation; British, European or International Standard; Code of Practice; manufacturers' instructions; or any other publication or document similar or related to the aforementioned.

17.3 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 Highway Authorities' Product Approval Scheme.

17.4 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.

17.5 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

HIGHWAYS AGENCY

System for the Registration
of Bridge Expansion Joints

Statement of Registration

Number: 029

This is to confirm that the Highways Agency of the DfT, on behalf of the four Overseeing Organisations has registered the following bridge expansion joint.

Manufacturer's Name & Address	Product Type	Product Name/Description
Walker Sealants Ltd Outland Head Bradwell Hope Valley Derbyshire S33 9JP	Asphaltic Plug Joint	Armourjoint

This Registration is required by the Manual of Contract Documents for Highway Works, Volume I, Clauses 104.13 and 2301.2 and remains valid provided the product is either listed in the current edition of Departmental Advice Note SA1 : Lists of Compliant/Approved/ Registered Products or the product has been registered with the Highways Agency since the previous publication of Departmental Advice Note SA1. The Registration is conditional upon the materials, method of manufacture and installation procedure complying with the details as registered with the Highways Agency. In addition it is expected that an appropriate standard of workmanship shall be maintained.

The Highways Agency
Woodlands
Manton Lane
Bedford
MK41 7LW

[redacted]

Group Manager
Technical Services Division

Date: 24/7/08

CI/SfB
(58) In6

BBA BRITISH BOARD OF AGRÉMENT
TECHNICAL APPROVALS FOR CONSTRUCTION

Designated by Government to issue European Technical Approvals

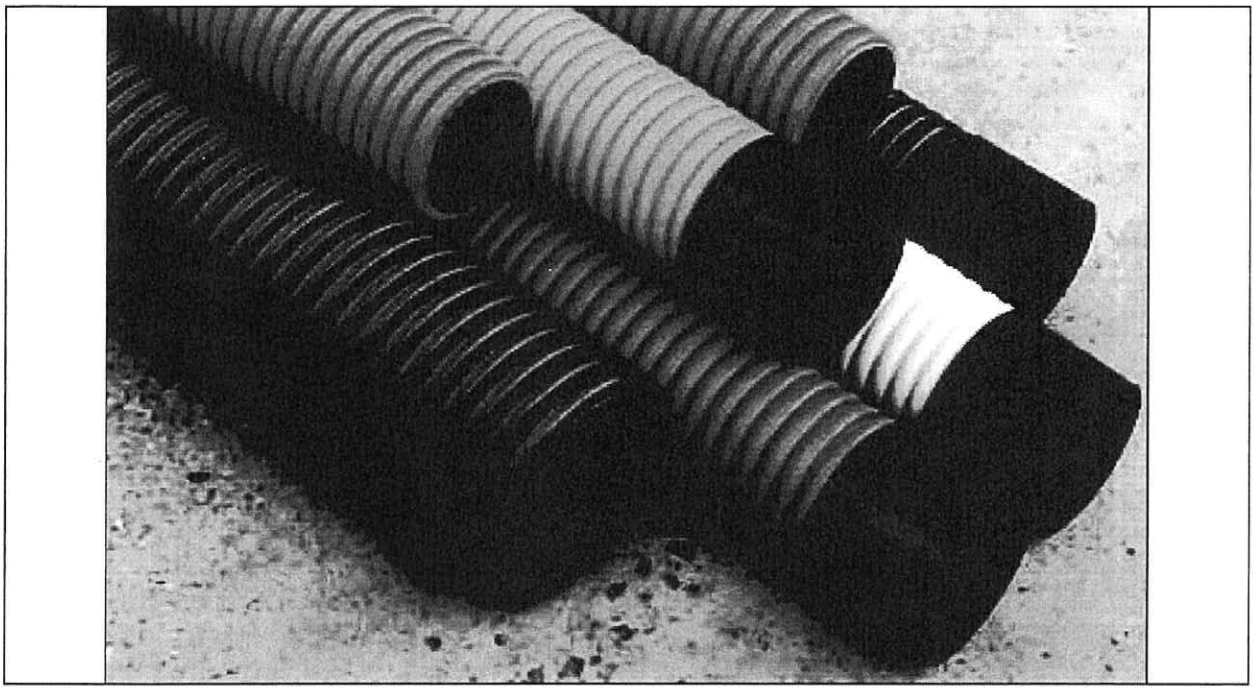
Polypipe Civils Ltd
Union Works
Bishop Meadow Road
Loughborough LE11 5RE
Tel: 01509 615100 Fax: 01509 265945

Roads and Bridges Agrément Certificate No 90/R049
*Fifth issue**

RIDGIDUCT DUCTING SYSTEM

Conduite pour l'alimentation en eau, gaz et éléctricité
Leitungsrohr für Wasser-, Gas-, und Electrizitatsversorgungen

Product



- *THIS CERTIFICATE RELATES TO THE RIDGIDUCT DUCTING SYSTEM.*
- *The system is for use in highways as an underground ducting for electricity, gas and water supply services, and for street lighting cables and fibre optic cabling for telecommunications.*
- *The product must be in accordance with the requirements of the Highways Agency (HA); acting on behalf of the Department for Transport, the Scottish Executive Development Department, the Welsh Assembly Government, and the Department for Regional Development; Northern Ireland and the conditions set out in this Certificate.*

This Front Sheet must be read in conjunction with the accompanying Detail Sheet, which provides information specific to the system.

Highways Agency Requirements — Detail Sheet 1

1 Requirements

1.1 The requirements for ducting are contained in the Manual of Contract Documents for Highway Works (MCHW), Volumes 1 and 2, including any amendments.

1.2 Further requirements are contained in MCHW Volume 3, including any amendments.

1.3 Additional site requirements may be included on particular contracts.

2 Construction (Design and Management) Regulations 1994 (as amended) Construction (Design and Management) Regulations (Northern Ireland) 1995 (as amended)

Information in this Certificate may assist the client, planning supervisor, designer and contractors to address their obligations under these Regulations.

See sections: 2 *Delivery and site handling* (2.1), and 9 *Installation — General* (9.1).

Additional Information

The management systems of Polypipe Civils Ltd have been assessed and registered as meeting the requirements of BS EN ISO 9002 : 1994 by the British Standards Institution Quality Assurance.

Bibliography

BS EN ISO 9002 : 1994 *Quality systems. Model for quality assurance in production, installation and servicing*

Manual of Contract Documents for Highway Works, Volume 1 : *Specification for Highway Works* : May 2001 edition

Manual of Contract Documents for Highway Works, Volume 2 : *Notes for Guidance on the Specification for Highway Works* : 2001

Manual of Contract Documents for Highway Works, Volume 3 : *Highway Construction Details* : 2001, Drawing Nos F1 and F2 (1991)

Conditions of Certification

3 Conditions

3.1 This Certificate:

(a) relates only to the product that is described, installed, used and maintained as set out in this Certificate;

(b) is granted only to the company, firm or person identified on the front cover — no other company, firm or person may hold or claim any entitlement to this Certificate;

(c) has to be read, considered and used as a whole document — it may be misleading and will be incomplete to be selective;

(d) is copyright of the BBA.

3.2 References in this Certificate to any Act of Parliament, Regulation made thereunder, Directive or Regulation of the European Union, Statutory Instrument, Code of Practice, British Standard, manufacturers' instructions or similar publication, shall be construed as references to such publication in the form in which it was current at the date of this Certificate.

3.3 This Certificate will remain valid for an unlimited period provided that the product and the manufacture and/or fabricating process(es) thereof:

(a) are maintained at or above the levels which have been assessed and found to be satisfactory by the BBA;

(b) continue to be checked by the BBA or its agents;

(c) are reviewed by the BBA as and when it considers appropriate; and

(d) remain in accordance with the requirements of the Highways Agency.

3.4 In granting this Certificate, the BBA makes no representation as to:

(a) the presence or absence of any patent or similar rights subsisting in the product or any other product;

(b) the right of the Certificate holder to market, supply, install or maintain the product; and

(c) the nature of individual installations of the product, including methods and workmanship.

3.5 Any recommendations relating to the use or installation of this product which are contained or referred to in this Certificate are the minimum standards required to be met when the product is used. They do 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 or in the future; nor is conformity with such recommendations to be taken as satisfying the requirements of the 1974 Act or of any present or future 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 installation and use of this product.

In the opinion of the British Board of Agrément, the Ridgiduct Ducting System is fit for its intended use provided it is installed, used and maintained as set out in this Certificate. Certificate No 90/R049 is accordingly awarded to Polypipe Civils Ltd.

On behalf of the British Board of Agrément

Date of Fifth issue: 14th March 2003 **Chief Executive**

**Original Certificate issued 8th September 1989. This new Front Sheet includes addition of CDM Regulations, revised* Conditions of Certification *and the introduction of a Detail Sheet format.*

British Board of Agrément
P O Box No 195, Bucknalls Lane
Garston, Watford, Herts WD25 9BA
Fax: 01923 665301

e-mail: mail@bba.star.co.uk
website: www.bbacerts.co.uk

For additional information about the Certificate, tel: 01923 665300. For information about Agrément Certificate validity and scope, tel: Hotline 01923 665400, or check the BBA website.

BBA BRITISH BOARD OF AGRÉMENT
TECHNICAL APPROVALS FOR CONSTRUCTION

Polypipe Civils Ltd

RIDGIDUCT TWIN-WALLED HIGH DENSITY POLYETHYLENE DUCTING

Roads and Bridges
Certificate No 90/R049
DETAIL SHEET 2

Product

- *THIS DETAIL SHEET RELATES TO RIDGIDUCT TWIN-WALLED HIGH DENSITY POLYETHYLENE DUCTING.*
- *The product is for use in highways as underground ducting for electricity, gas and water supply services, and for street lighting cables and fibre optic cabling for telecommunications.*

This Detail Sheet must be read in conjunction with the Front Sheet, which gives, the Highways Agency (HA) requirements and the Conditions of Certification.

Technical Specification

1 Description

1.1 Ridgiduct Twin-Walled High Density Polyethylene Ducting is manufactured by a twin-extrusion process. Two pipes are extruded simultaneously, one inside the other, and heat-welded together in one continuous process.

1.2 The outer wall is corrugated and the inner wall is smooth finished. Details and dimensions are given in Table 1 and Figure 1.

Table 1 Dimensions

Manu-facturer's Code No	Internal dia (d_1) (mm)	External dia (d_2) (mm)	t_1 (mm)	t_2 (mm)	length (m)
RB 90	89	107	0.85	0.80	1, 2, 3 and 6
RB 94	94	110	0.70	0.60	1, 2, 3 and 6
RB 100	100	118	1.00	0.80	1, 2, 3 and 6
RB 125	125	148	1.00	0.90	1, 2, 3 and 6
RB 150	150	177	0.90	0.95	1, 2, 3 and 6

1.3 The product is available in a colour range of black, purple, orange, green, blue and yellow. The ducts are marked appropriately in accordance with the customer's requirements.

1.4 A black polypropylene coupler is used to join the ducts. A green coupler is used for green 90 mm duct. The couplers are manufactured by Polypipe Civils Ltd. Details of size are given in Table 2 and Figures 2, 3 and 4.

1.5 Jointing of the product with the couplers as described in section 2.4 produces a system with protection against penetration by solid foreign objects of 2.5 mm diameter or greater, ie an I.P rating of 3 (first characteristic numeral) to BS EN 60529 : 1992.

Figure 1 Ridgiduct

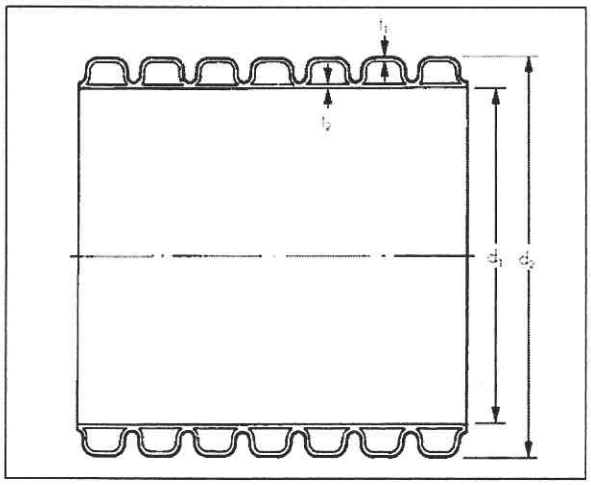


Table 2 Coupler dimensions

Coupler	External dia (d_3) (mm)	Internal dia (d_2) tapered end (mm)	Internal dia (d_1) (mm)	L (mm)	t (mm)
90	113.5	108.20	107.35	172.50	2.5
94	114.5	111.25	111.60	100.00	2.0
100	125	119.4	117.5	97.25	2.5
125	155	146.25	147.5	101.60	2.5
150	185	178.5	177.0	123.00	2.5

1.6 When used with an optional sealed coupling, available from the Certificate holder, and elastomeric seal, Ridgiduct RB 94, RB 100 and RB 150 are suitable for motorway communications applications as a sealed system to BS EN 50086-2.4 : 1994 IP67.

1.7 Quality control includes checks on raw materials, dimensional checks, impact tests, compression tests and checks on adhesion of printing and internal static friction coefficient.

Figure 2 100 mm, 125 mm and 150 mm couplers

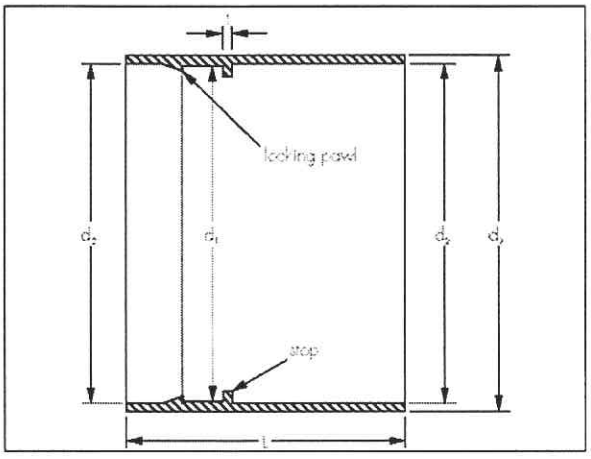


Figure 3 94 mm coupler

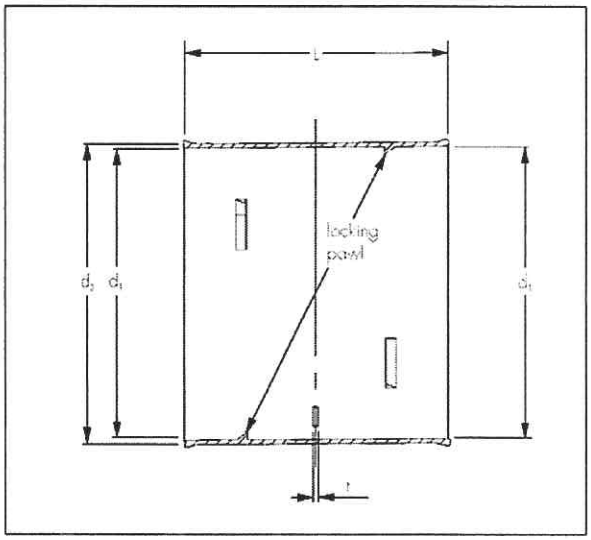
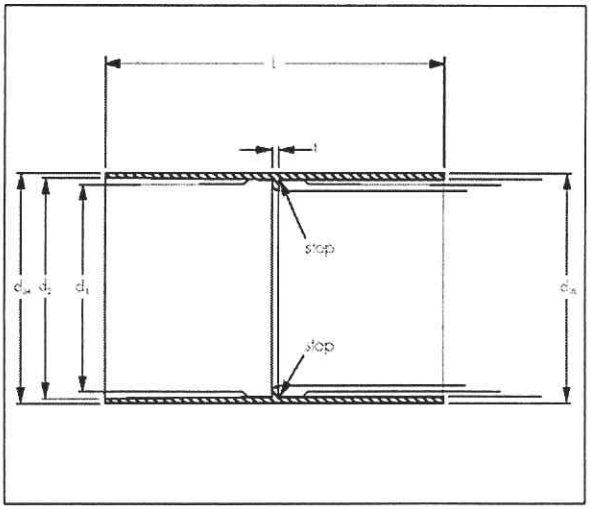


Figure 4 90 mm coupler



2 Delivery and site handling

2.1 The product is delivered to site strapped to pallets.

2.2 When used for electric cables, the ducts are marked with the legend 'electric cable duct'. The ducts are appropriately marked, in accordance with the customer's requirements.

2.3 The HDPE ducts and polypropylene couplers have good resistance to UV degradation but to avoid damage or deterioration in storage it is recommended that the ducts should be protected from direct sunlight. However, if this is unavoidable, the following mechanism of deterioration should be considered:

(1) Up to three months' daily exposure to direct sunlight will cause negligible UV degradation but extreme surface temperatures of up to 80°C are possible on exposed surfaces and may cause some localised distortion.

(2) Three to 12 months' daily exposure to direct sunlight may have a significant effect on the impact resistance and physical properties of the duct.

(3) Over 12 months' daily exposure to direct sunlight will damage the duct and should be avoided.

Design Data

3 General

Ridgiduct Twin-Walled High Density Polyethylene Ducting, when installed in accordance with the recommendations given in this Certificate, is suitable for use in highways as underground ducting for electricity, gas and water supply services, and for street lighting cables and fibre optic cabling for cable television and telecommunications.

4 Strength

4.1 The product has adequate strength to resist the loads likely to be encountered during service when used and installed in accordance with the recommendations given in this Certificate.

4.2 The ducts can be used as an alternative to the plastics pipes listed in MCHW, Volume 1, Table 5/2 *Pipes for Ducts*.

4.3 The ducts will have adequate resistance to the impact loads normally encountered during handling and installation. The ducts meet the resistance to impact requirements defined as 'normal duty' and the resistance to compression requirements defined in 'type 450' of BS EN 50086-2.4 : 1994.

4.4 The ducts have an adequate resistance to long-term deformation. When tested in accordance with BS 4962 : 1989 the ducts have an ultimate pipe stiffness (STES) value in excess of 1400 Nm^{-2}.

5 Resistance to elevated temperatures

5.1 The maximum temperature to which the ducts and couplers will be subject in service as an electrical cable duct is dependent on the ground thermal conductivity, depth of burial, ground temperature and the heat load imposed by the electrical cable.

5.2 In general, cables with a surface temperature of up to 60°C will not affect the integrity of the ducts. For example, in a typical installation with a 300 mm^2 copper cable carrying a current of 600 amps imposing a heat load of 25 Wm^{-1}, the cable would have a surface temperature of 60°C; this would result in a mean internal duct temperature of 45°C.

5.3 The ducts have adequate resistance to long-term deformation at an elevated temperature of 45°C.

6 Resistance to chemicals

The high-density polyethylene used to manufacture Ridgiduct pipe and the polypropylene used to manufacture couplers have an adequate resistance to attack from chemicals likely to occur in soils and groundwater. Details of chemical resistance of high density polyethylene and polypropylene are given in CP 312-1 : 1973.

7 Practicability of installation

Ducts

7.1 The ducts can be installed easily under normal site conditions.

Cables

7.2 The ducts have a smooth internal surface and, when tested in accordance with ESI 12-24, Test TT3 *Static friction coefficient*, have a static coefficient of less than 0.22. The ducts and their joints do not present any internal projection or impedance to the installation or withdrawal of cables through the duct run.

8 Durability

When used in the context of this Certificate, Ridgiduct will have adequate durability.

Installation

9 General

9.1 Ridgiduct Twin-Walled High Density Polyethylene Ducting must be installed in accordance with the general requirements and any additional site requirements (see section 1).

9.2 The general requirements are to be in accordance with MCHW, Volume 3, as shown in Figure 5.

9.3 Ducting laid in depths of cover other than those specified in Figure 5 must be laid in accordance with the procedures described in the contract with the Highways Agency (HA).

9.4 Ridgiduct must be adequately protected against damage from site construction traffic and from agricultural or similar operations.

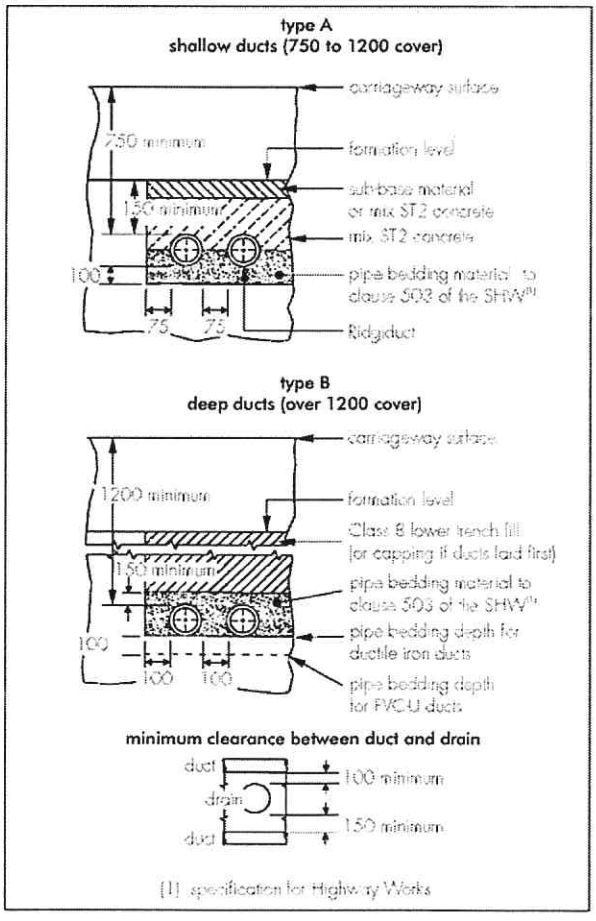
9.5 When used as ducts for fibre optic cabling the recommendations in BS 7718 : 1996 should be followed.

10 Procedure

10.1 Joints are made by a simple push-fit of one duct length into the coupler attached to the adjacent length, ensuring that the connection is fully made.

10.2 Inspection points can be made in the conventional manner depending upon the type of services to be installed.

Figure 5 Highway construction details



Technical Investigations

The following is a summary of the technical investigations carried out on Ridgiduct Twin-Wall High Density Polyethylene Ducting.

11 Tests

11.1 As part of the assessment leading to the issue of the previous versions of this Certificate, tests were carried out to determine:

dimensional accuracy
resistance to compression to BS EN 50086-2.4 : 1994
impact strength at −5°C to BS EN 50086-2.4 : 1994
Vicat softening temperature to BS 2782-1 : Method 120B : 1990
static friction coefficient to ESI (12-24), TT3
visual examination to ESI (12-24), ST1
adhesion of printing to ESI (12-24), ST2
resistance to long-term deformation to BS EN ISO 9967 : 1995
ease of jointing
resistance to penetration of simulated sharp aggregate
watertightness of joints to BS EN 60529 : 1992
degree of protection against foreign objects to BS EN 60529 : 1992, first characteristic numeral 3, Test condition 13.2.

11.2 Further tests have subsequently been carried out to determine:

dimensional accuracy to BS EN 50086-2.4 : 1994
creep ratio at 45°C to BS EN ISO 9967 : 1995
resistance to sharp objects to MCHW Volume 1 clause 518.13
resistance to compression to BS EN 50086-2.4 : 1994
degrees of protection by enclosure to BS EN 60529 : 1992 (an IP67 code was justified).

12 Investigations

12.1 An examination was made of data relating to:

chemical resistance
heat dissipation
effect of temperature
practicability of installation
material properties
durability.

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

Additional Information

The management systems of Polypipe Civils Ltd have been assessed and registered as meeting the requirements of BS EN ISO 9002 : 1994 by the British Standards Institution Quality Assurance.

Bibliography

BS 2782-1 : Method 120B : 1990 *Methods of testing plastics — Thermal properties — Determination of Vicat softening temperature of thermoplastics*

BS 4962 : 1989 *Specification for plastics pipes and fittings for use as subsoil field drains*

BS 7718 : 1996 *Code of practice for installation of fibre optic cabling*

BS EN 50086-2.4 : 1994 *Specification for conduit systems for cable management — Part 2-4 : Particular requirements for conduit systems buried underground*

BS EN 60529 : 1992 *Specification for degrees of protection provided by enclosures (IP code)*

BS EN ISO 9002 : 1994 *Quality Systems — Model for quality assurance in production, installation and servicing*

BS EN ISO 9967 : 1995 *Thermoplastics pipes — Determination of creep ratio*

CP 312-1 : 1973 *Code of practice for plastics pipework (thermoplastics material) — General principles and choice of material*

ESI (Electricity Supply Industry) 12-24 *Plastic ducts for buried electric cables*

Manual of Contract Documents for Highway Works, Volume 1 : *Specification for Highway Works* : May 2001 edition

Manual of Contract Documents for Highway Works, Volume 2 : *Notes for Guidance on the Specification for Highway Works* : 2001

Manual of Contract Documents for Highway Works, Volume 3 : *Highway Construction Details* : 2001, Drawing No F13 (1991)

BBA BRITISH BOARD OF AGRÉMENT
TECHNICAL APPROVALS FOR CONSTRUCTION

On behalf of the British Board of Agrément

Date of Fifth issue: 14th March 2003

Chief Executive

**Original Certificate issued on 12th January 1990. This amended version issued to include an additional product size (94 mm), a revised Table 1, reference to the Highways Agency, additional testing and MCHW requirements and the conversion of the Certificate into Detail Sheet format.*

British Board of Agrément
P O Box No 195, Bucknalls Lane
Garston, Watford, Herts WD25 9BA
Fax: 01923 665301

e-mail: mail@bba.star.co.uk
website: www.bbacerts.co.uk

CI/SfB
(58) In6

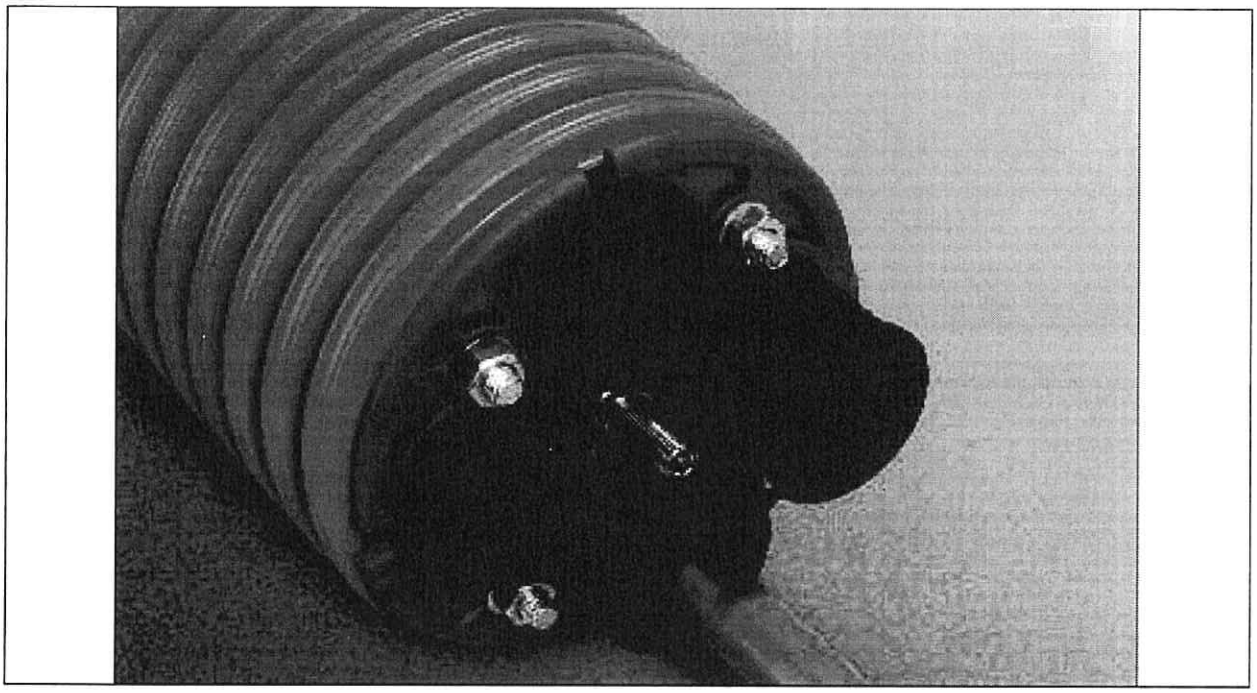
BBA BRITISH BOARD OF AGRÉMENT
TECHNICAL APPROVALS FOR CONSTRUCTION

Polypipe Civils Ltd

COMTITE DUCTING PLUG

Roads and Bridges
Certificate No 90/R049
DETAIL SHEET 3

Product



- *THIS DETAIL SHEET RELATES TO THE COMTITE DUCTING PLUG.*
- *The product is for use in highways as underground ducting for electricity, and for street lighting cables and fibre optic cabling for telecommunications.*

This Detail Sheet must be read in conjunction with the Front Sheet which gives the Highways Agency (HA) requirements and the Conditions of Certification.

Technical Specification

1 Description

1.1 The Comtite Ducting Plug is made from black EPDM rubber, constructed of two parts, a male and female, which interlock and are held together with a centre bolt. This bolt incorporates a valve to release any pressure which may build up in the ducting during installation. The valve is also used for carrying out the air pressure test with the core valve part removed. There are eight compression plates, made from blue Acytal. Four plates on the top and four on the bottom, held together in pairs with bolts.

1.2 The product is constructed with four holes in which a selection of grommets can be inserted. The range of grommets are given in Table 1.

1.3 The product is available in two sizes to suit the 94 mm and 100 mm Ridgiduct pipe. Details of the construction of the Comtite Ducting Plug are given in Figure 1, and Table 1.

1.4 Ending the ducting system with the Comtite Ducting Plug produces a system with protection against penetration by solid foreign objects of

1 mm diameter or greater and against ingress of water at 1 metre depth, ie an IP rating of IP47 to BS EN 60529 : 1992.

Figure 1 Comtite

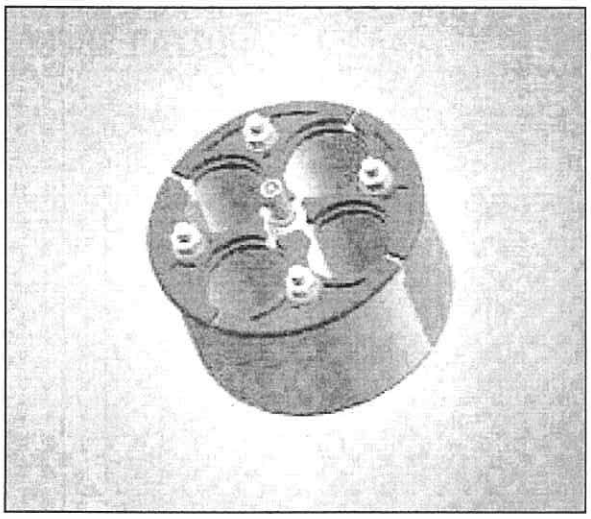


Table 1 Range of plugs and grommets

Product code	Description
DP 94	94 mm ducting plug
DP 100	100 mm ducting plug
DPG 0	blanking grommet
DPG 9	9 mm grommet
DPG 12	12 mm grommet
DPG 14	14 mm grommet
DPG 16	16 mm grommet
DPG 18	18 mm grommet
DPG 21	21 mm grommet
DPG 24	24 mm grommet
DPG 27	27 mm grommet
DPG 4 x 9	4 x 9 mm grommet
DPG 7 x 9	7 x 9 mm grommet

1.5 When using the Comtite Ducting Plug, the Ridgiduct RB 94 and RB 100 are suitable for motorway communications applications as a sealed system to BS EN 50086-2.4 : 1994.

1.6 Quality control includes checks on raw materials, dimensional checks, and air pressure test.

2 Delivery and site handling

2.1 The Comtite Ducting Plug is individually bagged and the grommets bagged in packs of five for each type of grommet.

2.2 The Comtite Ducting Plug has good resistance to UV degradation. When long term storage is envisaged, duct plugs must be stored away from direct sunlight.

Design Data

3 General

The Comtite Ducting Plug, when installed in accordance with the recommendations given in this Detail Sheet, is suitable for use in highways for underground ducting for electricity services, and for street lighting cables and fibre optic cabling for cable television and telecommunications.

4 Strength

4.1 The product has adequate strength to resist the loads likely to be encountered during service when used and installed in accordance with the recommendations given in this Detail Sheet.

4.2 The product has adequate resistance to the impact loads normally encountered during handling and installation.

5 Resistance to elevated temperatures

5.1 The maximum temperature to which the duct plug will be subject in service as part of an electrical cable ducting system is dependent on the ground thermal conductivity, depth of burial, ground temperature and the heat load imposed by the electrical cable.

5.2 In general, cables with a surface temperature of up to 60°C will not affect the integrity of the duct plug. For example, in a typical installation with a 300 mm^2 copper cable carrying a current of 600 amps imposing a heat load of 25 Wm^{-1}, the cable would have a surface temperature of 60°C.

6 Resistance to chemicals

The materials used to manufacture the Comtite Ducting Plugs have adequate resistance to attack from chemicals likely to occur in soils and groundwater. Details of chemical resistance of the materials are given in CP 312-1 : 1973.

7 Practicability of installation

The grommets have a high friction surface which would impede the installation or withdrawal of cables. To overcome this the grommets are split along their length to allow them to be clipped over the cable once it has been pulled through.

8 Durability

When used in the context of this Certificate, the Comtite Ducting Plug will have adequate durability.

Installation

9 General

9.1 The Comtite Ducting Plug must be installed in accordance with the requirements of the manufacturer's instructions, and any additional site requirements (see section 1).

9.2 The general requirements for a ducting system are to be in accordance with sections 10 and 11 of Detail Sheet 1.

Technical Investigations

The following is a summary of the technical investigations carried out on the Comtite Ducting Plug.

10 Tests

Tests were carried out to determine:

dimensional accuracy
airtightness to MCHW, Vol 1, Clause 509.2
watertightness of joints to BS EN 60529 : 1992
degree of protection against foreign objects to BS EN 60529 : 1992.

11 Investigations

11.1 An examination was made of data relating to:

chemical resistance
heat dissipation
effect of temperature
practicability of installation
material properties
durability.

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

Additional Information

The management systems of Polypipe Civils Ltd have been assessed and registered as meeting the requirements of BS EN ISO 9002 : 1994 by the British Standards Institution Quality Assurance.

Bibliography

BS EN 50086-2.4 : 1994 *Specification for conduit systems for electrical installations — Particular requirements — Conduit systems buried underground*

BS EN 60529 : 1992 *Specification for degrees of protection provided by enclosures (IP Code)*

BS EN ISO 9002 : 1994 *Quality systems. Model for quality assurance in production, installation and servicing*

CP 312-1 : 1973 *Code of practice for plastics pipework (thermoplastics material) — General principles and choice of material*

Manual of Contract Documents for Highway Works, Volume 1 : *Specification for Highway Works* : May 2001 edition

BBA BRITISH BOARD OF AGRÉMENT
TECHNICAL APPROVALS FOR CONSTRUCTION

On behalf of the British Board of Agrément

[redacted]

Date of issue: 14th March 2003

Chief Executive

British Board of Agrément
P O Box No 195, Bucknalls Lane
Garston, Watford, Herts WD25 9BA
Fax: 01923 665301

e-mail: mail@bba.star.co.uk
website: www.bbacerts.co.uk

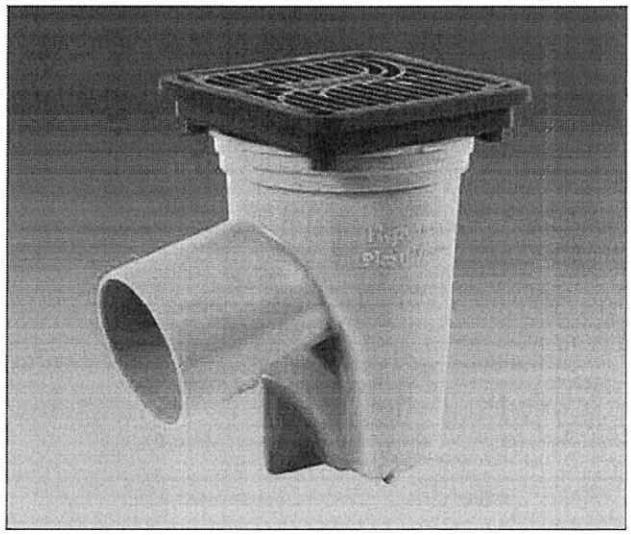
Hepworth Building Products
Edlington Lane
Edlington
Doncaster
South Yorkshire DN12 1BY
Tel: 01709 856300 Fax: 01709 856301
e-mail: customerservices@hepworth.co.uk
website: www.hepworth.co.uk

BBA APPROVAL INSPECTION TESTING CERTIFICATION
TECHNICAL APPROVALS FOR CONSTRUCTION

Agrément Certificate
09/4626
Product Sheet 1

PLASTIDRAIN UNDERGROUND DRAINAGE SYSTEM

PLASTIDRAIN SQUARE GULLY (4A12A)



This Certificate relates to PlastiDrain Square Gully (4A12A), for use to receive surface water or wastewater.

AGRÉMENT CERTIFICATION INCLUDES:

- factors relating to compliance with Building Regulations where applicable
- factors relating to additional non-regulatory information 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 gully has adequate stiffness for use in situations inaccessible to vehicular or intense foot traffic, including the loads normally encountered in handling, installation and backfilling. The gully has a loading strength class of H1.5 to BS EN 1253-1 : 2003 (see section 5).

Flow characteristics — the gully has satisfactory flow characteristics to minimise the risk of blockages (see section 7).

Tightness — the gully has adequate odour-tightness and watertightness, and the water seal of the gully has adequate depth and resistance to pressure to BS EN 1253-1 : 2003 (see section 8).

Resistance to elevated temperature — the gully has adequate resistance to the temperatures likely to be found in surface and wastewater (see section 10).

Durability — under the conditions given in this Certificate, the gully will have a service life equivalent to that of the system to which it is connected, ie in excess of 50 years (see section 13).

The BBA has awarded this Agrément Certificate to the company named above for the product described herein. This product has been assessed by the BBA as being fit for its intended use provided it is installed, used and maintained as set out in this Certificate.

On behalf of the British Board of Agrément

[redacted]
Head of Approvals — Engineering

[redacted]
Chief Executive

Date of First issue: 5 February 2009

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

Regulations

In the opinion of the BBA, the PlastiDrain Square Gully (4A12A), if used in accordance with the provisions of this Certificate, will meet or contribute to meeting the relevant requirements of the following Building Regulations:

The Building Regulations 2000 (as amended) (England and Wales)

Requirement:	H1	Foul water drainage
Comment:		The product will convey the flow of foul water and minimise the risk of blockages or leaks. See sections 3, 5, 6, 7, 8.1 to 8.3, 9, 10 and 11 of this Certificate.
Requirement:	H3(3)	Rainwater drainage
Comment:		The product will convey the flow of surface water and minimise the risk of blockages or leaks. See sections 3, 5, 6, 7, 8.1 to 8.3, 9, 10 and 11 of this Certificate.
Requirement:	Regulation 7	Materials and workmanship
Comment:		The product is acceptable. See section 13 and the *Installation* part of this Certificate.

The Building (Scotland) Regulations 2004 (as amended)

Regulation:	8(1)(2)	Fitness and durability of materials and workmanship
Comment:		The product can contribute to a construction satisfying this Regulation. See sections 12 and 13 and the *Installation* part of this Certificate.
Regulation:	9	Building standards — construction
Standard:	3.6(a)	Surface water drainage
Comment:		The product can meet the relevant requirements of this Standard, with reference to clauses 3.6.1[(1)(2)], 3.6.2[(1)(2)] and 3.6.3[(1)(2)]. See sections 3, 5, 6, 7, 8.1 to 8.3, 9, 10 and 11 of this Certificate.
Standard:	3.7(b)	Wastewater drainage
Comment:		The product can meet the relevant requirements of this Standard, with reference to clauses 3.7.3[(1)(2)] and 3.7.4[(1)(2)]. See sections 3, 5, 6, 7, 8.1 to 8.3, 9, 10 and 11 of this Certificate.
		(1) Technical Handbook (Domestic).
		(2) Technical Handbook (Non-Domestic).

The Building Regulations (Northern Ireland) 2000 (as amended)

Regulation:	B2	Fitness of materials and workmanship
Comment:		The product is an acceptable material. See section 13 and the *Installation* part of this Certificate.
Regulation:	B3(2)	Suitability of certain materials
Comment:		The product is an acceptable material. See section 12 of this Certificate.
Regulation:	N4	Underground foul drainage
Comment:		See sections 3, 5, 6, 7, 8.1 to 8.3, 9, 10 and 11 of this Certificate.
Regulation:	N5	Rain-water drainage
Comment:		See sections 3, 5, 6, 7, 8.1 to 8.3, 9, 10 and 11 of this Certificate.

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 and 2.2), 3 *General* and 14 *Installation* procedure (14.1).

Non-regulatory Information

NHBC Standards 2008

NHBC accepts the use of the PlastiDrain Square Gully (4A12A), when installed and used in accordance with this Certificate, in relation to *NHBC Standards*, Chapter 5.3 *Drainage below ground.*

Zurich Building Guarantee Technical Manual 2007

In the opinion of the BBA, the PlastiDrain Square Gully (4A12A), when installed and used in accordance with this Certificate, satisfies the requirements of the *Zurich Building Guarantee Technical Manual*, Section 3 *Substructure*, Sub-section *Drainage.*

General

This Certificate relates to the PlastiDrain Square Gully (4A12A).

The gully is for external use in areas inaccessible to vehicular or intense foot traffic, and for connection to the PlastiDrain 110 mm underground drainage system, or other PVC-U systems complying with BS EN 1401-1 : 1998.

The gully is for use to receive surface water from paved areas, surface water from roofs and/or wastewater from ground-floor domestic appliances.