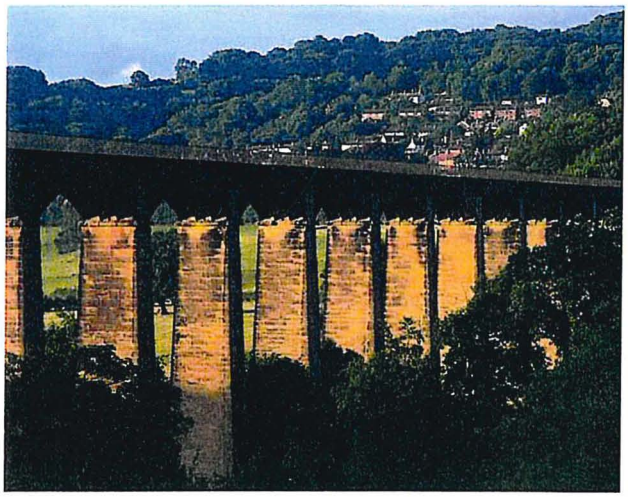
101202

British Waterways
Dyfrffyrdd Prydain



PONTCYSYLLTE AQUEDUCT REFURBISHMENT

APPLICATION FOR SCHEDULED MONUMENT CONSENT: SUPPORTING INFORMATION

Appendix 3
Surface preparation and painting of the cast iron sections of the Aqueduct

JULY 2003

Contents **Page**

Appendices

1. Introduction

1.1 British Waterways have undertaken a comprehensive research project into the question regarding the historical painting of the Aqueduct in a jointly funded project with Cadw.

1.2 The "Report on the Documentary sources for the history of Pontcysyllte Aqueduct, with particular reference to the ironwork of the Aqueduct" is included in the supporting information documents as Appendix 1.

1.3 The report concludes that although the documentary evidence for the painting of the Aqueduct during the 19th century is inconclusive the author believes that the iron trough was painted in 1813, in accordance with Telford's recommendation.

1.4 There is definite evidence that the Aqueduct was repainted in 1886, probably with coal tar, which also tends to suggest that it must have been painted at some point earlier.

1.5 The Aqueduct has been repainted twice in the 20th century (1936 and 1965). The latter repainting exercise consisted of wire brushing the surface and coating the cast iron with "Wailes Dove Bitumastic Super Service Black Solution".

1.6 In view of the difficult access to the soffit and internal arch ribs it is believed that the underside was not painted or at most poorly painted in 1965. As a result the soffit and internal ribs have suffered extensive surface corrosion and are in poorer condition than the rest of the structure (see figures 1.1 and 1.2).

Figure 1.1 Corrosion to the soffit

Figure 1.2 Corrosion to rib arch

1.7 The existing paint system consists of a red lead primer, with a bitumastic topcoat (see Appendix A for analysis details).

1.8 The life span of the existing paint system on the other elevations of the structure has expired and corrosion is present although with minor loss of section.

1.9 The existing paint system has served the Aqueduct well although it is now in need of a new coating system as it is in poor condition.

1.10 The Aqueduct is one of the Jewels in the Crown of British industrial heritage and a suitable protective coating to preserve the Aqueduct and prevent further deterioration and corrosion of the castings is important for the long term future of the structure.

1.10 The proposed method of surface preparation takes into account the concerns regarding the removal of the hard protective chill and fire-skin corrosion protection, or 'patina' that exists on sand castings.

1.11 The Aqueduct is a strategic link in the water supply route to Hurleston Treatment works. The paint system applied to the inside of the trough must therefore be suitable for potable water applications.

1.12 The preferred coating system will be based on the paints used in the 1965 refurbishment and will consist of a bitumastic coating.

1.13 It was noted during a recent site visit that paint splashes, probably from the 1965 painting work, were evident on the masonry piers. The proposed

access scaffold and encapsulation system will incorporate a foam sealer to prevent any further paint splashes.

2. Surface preparation and protective coating – Option 1 (Preferred)

Surface preparation – Internal and External

2.1 The hard chill protective chill and fire skin covering the cast iron will be preserved by adopting mechanically wire brushing techniques. The surface will be prepared to ISO85011: (1988), BS7079: A1(1989) to Standard D St 2 to remove all loose and flaking rust and paint.

Coatings – Primer coats

2.2 Environmental considerations make it difficult to warrant the use of a red lead primer, particularly over the River Dee Water Protection Zone and especially when more environmentally frinedly products are available.

2.3 Health and safety legislation, particularly the Construction, Design and Management Regulations, place special duties and responsibilities on designers to minimise the risks associated with construction work especially when alternatives are available.

2.4 A primer Leigh Metagrip L489 (red oxide) will be brush-applied to a Dry Film Thickness of 40 microns (See Appendix C Ref – L489 for technical data). The primer will be applied in localised areas, at corrosion hot-spots.

2.5 The coating applied in 1965 was "Wailes Dove Super Service Black Bitumastic Solution." Spencer Coatings now own and produce the Wailes Dove products. The proposed top-coating system closely resembles the 1965 application, which has protected the cast iron for nearly 40 years.

Coatings – Internal and external

2.6 The proposed coating for the internal and external elevations is INTEX No. 2 B1106 to a Dry Film Thickness of 300 microns.

2.7 This product is suitable for potable water conditions and is proposed for both internal and external elevations.

2.8 The finish will be matt black.

2.9 The technical data sheets are included as Appendix B.

3. Surface preparation and protective coating – Option 2

3.1 During the trial refurbishment trials (2000) different surface preparation and paint systems were tested. The system included in this option was applied to a 1m2 area located within the most northerly span and appears to be in good condition showing no signs of cracking or crazing.

Surface preparation – Internally and externally

3.2 The hard chill protective chill and fire skin covering the cast iron will be preserved by adopting mechanically wire brushing techniques. The surface will be prepared to ISO85011: (1988), BS7079: A1(1989) to Standard D St 2 to remove all loose and flaking rust and degraded paint.

Protective Coatings - Internal

3.3 The primer Leigh Metagrip L489 (red oxide) will be brush-applied in 2 coats to a Dry Film Thickness of 40 microns (See Appendix C Ref – L489 for technical data).

3.4 The top coat will be Leigh L524 bituminous replacement coating brush-applied in 2 coats to a total Dry Film Thickness of 300 microns. The finish will be matt black. (See Appendix C Ref – L524 for technical data).

Protective Coating - External

3.5 AmerCoat 4185 (bitumen coating) will be applied as a primer to the prepared surface to a Dry Film Thickness of 40 microns. (See Appendix C Ref AmerCoat 4185 for technical data).

3.6 The top coat will be AmerCoat 4186 brush-applied in 2 coats to a total Dry Film Thickness of 300 microns. The finish will be matt black. (See Appendix C Ref – AmerCoat 4186 for technical data).

4. Surface preparation and protective coating – Option 3

Internal and External Sections – surface preparation

4.1 Protective coverings will be located over all cast iron joints to prevent damage to the tar/hemp sealant during grit blasting.

4.2 Grit blast internal and external elevations to Swedish Standard SA 2.5 BS7079 Pt A1:1989 (ISO 8501-1-1988).

4.3 The protective coverings will be removed from the joints and the surfaces prepared by wire brushing.

Internal and External Sections – protective coating

4.4 The prepared surfaces will be primed with two coats of Zinga to a Dry Film Thickness of 40 microns (See Appendix D – Ref Zinga).

4.5 The top coat will consist of two coats of Polyurethane to a Dry Film Thickness of 300 microns (See Appendix D – Ref SteelGuard 3392).

5. Surface preparation and protective coating – Option 4

Internal and External Sections – surface preparation

5.1 Protective coverings will be located over all cast iron joints to prevent damage to the tar/hemp sealant during grit blasting.

5.2 Grit blast internal and external elevations to Swedish Standard SA 2.5 BS7079 Pt A1:1989 (ISO 8501-1-1988).

5.3 The protective coverings will be removed from the joints and the surfaces prepared by wire brushing.

Internal and External Sections – protective coating

5.4 The prepared surfaces will be coated with Coal Tar Epoxy to 400 microns (See Appendix E - Ref Amercoat 78HBB.)

Appendix A - Existing paint – analysis report

PATTINSON
SCIENTIFIC SERVICES

Public Analyst for City of Newcastle upon Tyne, Metropolitan Districts of Gateshead, North Tyneside, South Tyneside, Tyne and Tees Port Health Authorities

Ronald Otte, Ph.D., M.Chem.A., C.Chem., F.R.S.C. N. John Scown, B.Sc., C.Chem., M.R.S.C.

Scott House, Penn Street
Scotswood Industrial Estate
Newcastle upon Tyne NE4 7BG

Tel: (0191) 226 1300
Fax: (0191) 226 1266

DURABLAST SURFACE TREATMENTS LIMITED
LABORATORY REFERENCE: 2000336

DATE: 1 February 2000

Introduction

On the 26 January 2000 we were contacted by Mr Garth Hudson of Durablast Surface Treatments Ltd, Deakins Lane, Wharton, Winsford, Cheshire, CW7 3BG.

We were asked to carry out analysis of Paint Flakes for assessment under the Special Waste (Amendment) Regulations 1997.

Sample(s) received on: 26.01.00

Analysis completed: 31.01.00

Sample Marked: Material

Analysis

	Concentration %
Lead (Pb)	0.39
Chromium (Cr)	0.01

PATTINSON
SCIENTIFIC SERVICES

Laboratory Reference: 2000336

Comments

The compounds judged to be most applicable to this assessment were:

Lead and Chromium Compounds

These compounds would be judged to be Toxic if present in excess of prescribed levels as indicated in "The Chemicals (Hazard Information and Packaging for Supply) (Amendment) Regulations 1999" and "Special Waste (Amendment) Regulations 1997".

For Waste Disposal Purposes the threshold for Special Waste Status would appear to be 3% of total toxic substances.

Lead in paint is covered primarily by the "Control of Lead at Work Regulations 1998" and the "Approved Code of Practice - COP2.

"An employer shall not carry on any work which is liable to expose any employees to lead at work unless he has made a suitable and sufficient assessment of whether the exposure of any employees is liable to be significant".

Thus, whenever Lead based compositions containing a "significant" quantity of Lead are to be removed from a structure, then the Statutory Regulations apply.

Examination of "The Chemicals (Hazard Information and Packaging for Supply) (Amendment) Regulations 1999" would tend to suggest that a level in excess of 0.5% should be judged significant.

Conclusion

Based upon the information, as indicated above, I would not classify the submitted paint sample as Special Waste.

If this paint is to be removed from a structure, then the Lead content should not be judged "significant".

Ian Muir

Appendix B – Option 1 - Technical data sheets – INTEX No. 2

SPENCER
COATINGS

Reference:
Issue Number: 0
Issue Date: April 2003
Supersedes Issue:

INTEX No.2 – B1106

PRODUCT DESCRIPTION

A thixotropic high build WRc approved fast drying coating formulated using selective bitumens and high quality mineral fillers giving a tough flexible and attractive matt finish. Key benefits are:

WRc approved and listed in the Water Byelaws Scheme
dwi 25 (1) (c) compliant
Tough flexible film
High build application of 100 microns per coat
Good general purpose corrosion protection
Fast drying giving quick handling times
Can be applied by brush, roller, conventional or airless spray

USES

Typical uses are:

- Pipeline interior or exterior for use in drinking water applications
- Fixtures and fittings used in the water industry
- Manhole covers, tanks etc
- To prevent water loss on masonry surfaces
- Waterproofing for buried metallic objects e.g. Lampposts, Guardrails etc

TECHNICAL PROPERTIES

Colour	Black
Finish	Matt
Curing Agent	Not applicable
Mix Ratio	Single pack
Specific Gravity	1.06 typical
Volume Solids	43% typical
Recommended Film Thickness	200-233 microns wet / 86-100 microns dry
Theoretical Spreading Rate	4.3-5.0 m2 / litre
Application Method	Brush, roller, conventional or airless spray
Flash Point	34°C (Abel closed cup)
VOC	470 g/l

Drying Times

	15°C	25°C	35°C
Touch Dry	45 minutes	30 minutes	20 minutes
Hard Dry	3 hours	1 hours	45 minutes
Minimum Overcoat	24 hours	16 hours	12 hours
Maximum Overcoat	Indefinite	Indefinite	Indefinite

HEAD OFFICE: SPENCER COATINGS GROUP LIMITED • FROGHALL TERRACE • ABERDEEN • AB24 3JN
TEL 01224 788400 • FAX 01224 648116 • EMAIL info@spencercoatings.co.uk • WEB www.spencercoatings.co.uk

CERTIFICATION/APPROVALS

WRc approved for Factory application under the Water Byelaws Scheme (WBS), for "items which have passed Full Tests of Effect on Water Quality – BS6920" Test Certificate No. 9812505

RECOMMENDED SYSTEMS

SURFACE PREPARATION

Steel : Remove all loose paint, rust etc. Degrease to a minimum standard of SSPC-SP1. Either abrasive blast clean to ISO8501:1988 Sa2.5 or power tool clean to a minimum standard of ISO8501:1988 St2. The performance of the coating is directly related to the level of surface preparation.

Concrete: Ensure the surface is clean and free from atmospheric pollution which may require washing with clean fresh water. Allow the surface to dry.

Masonry: Remove laitance by washing with fresh water and allow to dry. The first coat should be thinned 25% with thinner X98 to allow for good penetration and sealing of the substrate.

PRODUCT APPLICATION

Mixing	Stir well before use.
Thinners	Thinner X98
	Use as supplied
Roller	Use as supplied
Conventional Spray	Pot pressure 2.5-5.0 bar, Atomisation pressure 1.5-2.5 bar
Airless Spray	Use tip size 0.015"-0.019" (0.38mm-0.48mm) and pressure 2000 – 2400 psi (145 – 170 bar)
Air Assisted Airless Spray	
Cleaner	Thinner X98
Cleanup Considerations	All equipment should be cleaned immediately after use with Thinner X98.
	It is advisable that equipment should be cleaned/flushed during the course of application, the frequency of which will depend on the volume of material used and timescale over which applied.
	Ensure all waste materials (including packaging) are disposed of in accordance with local regulations.

HEALTH, SAFETY & ENVIRONMENTAL

This product must be used in accordance with the Material Safety Data Sheet supplied by Spencer Coatings Limited.

The user must observe local health, safety and environmental regulations when using this product.

Consult Spencer Coatings Limited if there are any concerns over the suitability of this product.

PACK SIZES	5, 25 litre
PACK WEIGHTS	5l : 5.7kg , 25l : 26.5kg
STORAGE CONDITIONS	Store in a cool, dry, shaded area and ensure good ventilation. Shelf life 12 months. If stored for more than 6 months it is advisable to upend the products after this time.
LIMITATIONS	Do not apply this product if the relative humidity exceeds 90% or if the substrate is within 3°C of the dew point.
DISCLAIMER	The information given in these specifications and technical advice - whether verbal, in writing or by way of trials is for guidance and is given in good faith, but without warranty. This also applies where propriety rights or third parties are involved. Any person using Spencer products without first making further enquiries as to the suitability of the products for the intended purpose and testing the products to assess their fitness for the purpose does so at their own risk. The application, use and processing of the products are beyond our control and are therefore your own responsibility, and we can accept no liability for the performance of the products arising out of such use, beyond the value of the goods delivered by us. The information contained in these data sheets is liable to modification from time to time in the light of experience and our policy of continuous development. It is the user's responsibility to ensure that this sheet is current prior to using the product.

Appendix C – Option 2 - Technical data sheets – Leigh Paints and Ameron Coatings

LEIGH'S PAINTS

LEIGHS L489
PRODUCT TECHNICAL DATA

FULL DESCRIPTION	:	LEIGH'S L489 ZINC PHOSPHATE PRIMER
		Highly protective alkyd anticorrosive primer pigmented with minimum 40% zinc phosphate.
		Anticorrosive spraying or brushing primer for steel.
		1998 COMPLIANT - 1990 EPA-PG6/23(95) Clause 20(d) - **Industrial** - when used as a protective finish. Complies with BS5493:1977 - **Table 4F Type FP3A.** BS476 Part 7 - Surface Spread of Flame Material - for details of substrate/scheme, consult Leigh's Customer Service Department.
RECOMMENDED APPLICATION METHODS		Airless Spray. Conventional Spray. Brush. Roller.
COLOUR AVAILABILITY	:	**Grey, red oxide and limited range of shades.**
		38°C
	:	**58 ± 3% (ASTM-D2697-86)**
	:	333* grammes/litre * *Calculated from solids by volume determination*

TYPICAL THICKNESS

	Dry film thickness	**Wet film Thickness**	**Theoretical coverage**
:	75 microns	129 microns	7.7 m^2/ltr*

* *This figure makes no allowance for surface profile, uneven application, overspray or losses in containers and equipment. Film thickness will vary depending on actual use and specification.*

PRACTICAL APPLICATION RATES - microns per coat

	Airless Spray	**Conventional Spray**	**Brush**	**Roller**
Dry	75*	75	50	45
Wet	129	129	86	78

* *Maximum sag tolerance with overlap typically 100µ dry by airless spray.*

AVERAGE DRYING TIMES

	At 15°C	**At 23°C**	**At 35°C**
To touch	4 hours	2 hours	1½ hours
To recoat	24 hours	16 hours	12 hours
To handle	24 hours	16 hours	12 hours

These figures are given as a guide only. Factors such as air movement and humidity must also be considered.

RECOMMENDED THINNER	:	**Leigh's Cleanser/Thinner No. 1**
		Moisture - Good Aliphatic solvents - Moderate Abrasion - Good Weather - Good
RECOMMENDED TOPCOATS	:	Indefinitely overcoatable with itself or a wide range of white spirit based undercoats and finishes.
PACKAGE		Single component material.
Pack Size		20 litre and 5 litre units.
Weight		1.38 kg/litre (may vary with shade).
Shelf Life		Minimum 2 years.

Leigh's Paints, Tower Works, Kestor Street, Bolton BL2 2AL England Tel: +44(0)1204 521771 Fax: +44(0)1204 382115
email: enquiries@wjleigh.co.uk website: www.wjleigh.co.uk

SURFACE PREPARATION:

Blast clean to Sa.2½ BS7079:Part A1:1989 (ISO 8501-1:1988). Average surface profile in the range 30-75 microns.

Manually prepared surfaces should be prepared to a minimum standard of St.3 BS7079:Part A1:1989 at the time of coating.

Ensure surfaces to be coated are dry and free from all visible traces of surface contaminants.

APPLICATION EQUIPMENT:

Airless Spray

Nozzle Size	:	0.46mm (18 thou)
Fan Angle	:	65°
Operating Pressure	:	140kg/cm² (2000 psi)

The airless spray details given above are intended as a guide only. Details such as fluid hose length and diameter, paint temperature and job shape and size all have an effect on the spray tip and operating pressure chosen. However, the operating pressure should be the lowest possible consistent with satisfactory atomisation. As conditions will vary from job to job, it is the applicators' responsibility to ensure that the equipment in use has been set up to give the best results. If in doubt Leigh's Customer Service Department should be consulted.

Conventional Spray

Nozzle Size	:	1.27mm (50 thou)
Atomising Pressure	:	3.5kg/cm² (50 psi)
Fluid Pressure	:	0.7kg/cm² (10 psi)

The details of atomising pressure, fluid pressure and nozzle size are given as a guide. It may be found that slight variations of pressure will provide optimum atomisation in some circumstances according to the set up in use. Atomising air pressure depends on the air cap in use and the fluid pressure depends on the length of line and direction of feed i.e. horizontal or vertical.

Brush

The material is suitable for brush application. Application of more than one coat may be necessary to give equivalent dry film thickness to a single spray applied coat.

Roller

The material is suitable for roller application. Application of more than one coat may be necessary to give equivalent dry film thickness to a single spray applied coat.

APPLICATION CONDITIONS AND OVERCOATING:

In conditions of high relative humidity, i.e. 80-85% good ventilation conditions are essential. Substrate temperature should be at least 3°C above the dew point.

Application at temperatures below 5°C is not recommended.

The maximum air and substrate temperature for application is 50°C providing conditions allow satisfactory application and film formation. If the air and substrate temperatures exceed 50°C and coatings are applied under these conditions, paint film defects such as dry spray, bubbling and pinholing etc, can occur within the coating. If for any reason it is desired to apply at a higher temperature, please seek advice of Leigh's Customer Service Department.

For full notes, see data sheet entitled 'Spreading Rates and Overcoating Times'.

ADDITIONAL NOTES:

Any skin that may form on the surface of the paint in the container should be removed carefully to avoid the necessity of sieving the paint.

Numerical values quoted for physical data may vary slightly from batch to batch.

HEALTH AND SAFETY:

Consult Product Health and Safety Data Sheet for information on safe handling and application of this product.

EPIGRIP L524
PRODUCT TECHNICAL DATA

FULL DESCRIPTION	EPIGRIP L524 MODIFIED EPOXY COATING	
MATERIAL TYPE	: A high build 2-pack modified epoxy coating.	
RECOMMENDED USE	: Hard wearing abrasion resistant coating with excellent resistance to immersion in salt and fresh water and crude oil. : For the protection of ships bottoms and cargo tanks, and submerged and splash zone areas of marine structures, jetties etc. : For the external protection of buried and other pipelines. : Particularly useful where coal tar pitch containing materials are prohibited.	
ENDORSEMENTS	: **1998 COMPLIANT** - 1990 EPA-PG6/23(97) Clause 20(d) - as a topcoat - **Industrial** : **1998 COMPLIANT** - 1990 EPA-PG6/23(97) Clause 20(e) - **Marine** : Approved by Lloyds Register of Shipping : Approved by MOD/DRA AFS No. 1950 : Railtrack - RT98 Item No. 5.4.1 / 5.4.2	
RECOMMENDED APPLICATION METHODS	: Airless Spray : Brush	
COLOUR AVAILABILITY	: Limited range including off-white and aluminium.	
FLASH POINT	: Base : 32°C	Additive : 39°C
% SOLIDS BY VOLUME	: 64 ± 3% (ASTM-D2697-91)	
V.O.C.	: 296* grammes/litre * *1990 EPA-PG6/23 (97) modified Appendix 3.*	
TYPICAL THICKNESS	: **Dry film thickness**	**Wet film thickness** / **Theoretical coverage**
	: 125 microns	195 microns / 5.1 m^2/ltr*
	* *This figure makes no allowance for surface profile, uneven application, overspray or losses in containers and equipment. Film thickness will vary depending on actual use and specification.*	
PRACTICAL APPLICATION RATES- microns per coat	:	**Airless Spray** / **Brush**
	: Dry	125* / 85
	: Wet	195 / 133
	* *Maximum sag tolerance with overlap typically 225µm dry by airless spray.*	
AVERAGE DRYING TIMES	:	**At 15°C** / **At 23°C**
To touch	:	8 hours / 6 hours
To recoat	:	24 hours / 16 hours
To handle	:	24 hours / 16 hours
	These figures are given as a guide only. Factors such as air movement and humidity must also be considered.	
RECOMMENDED THINNER	Leigh's Cleanser/Thinner No. 5 (for thinning) Leigh's Cleanser/Thinner No. 9 or No. 13 (for cleaning)	
RESISTANCE TO	Moisture - Excellent	Abrasion - Excellent
	Acid spillage - Moderate	Weather - Excellent (subject to chalking)
	Alkali spillage - Excellent	Salt water immersion - Excellent
	Petroleum solvents - Excellent	Fresh water immersion - Excellent
	Aliphatic solvents - Excellent	Crude oil immersion - Excellent
RECOMMENDED PRIMERS	: Epigrip L425HS Zinc Phosphate Primer.	
RECOMMENDED TOPCOATS	Indefinitely overcoatable with epoxy systems provided the surfaces to be coated have been suitably cleaned. Where a high degree of gloss and colour retention is required, overcoat with Resistex C137, Resistex C237, Resistex K651 within 7 days at a minimum dft of 50 microns or in the case of C750 overcoat within 4 days. These overcoating times refer to achievement of optimum adhesion at 23°C and will vary with temperature. For overcoating with alkyd systems, consult Leigh's Customer Service Department for advice.	
POT LIFE	: 8 hours at 15°C	6 hours at 23°C
	A two component material supplied in separate containers to be mixed prior to use.	
Pack Size	20 litre and 4 litre units when mixed.	
Mixing Ratio	3 parts base to 1 part additive by volume.	
Weight	1.35 kg/litre (may vary with shade).	
Shelf Life	Minimum 2 years.	

Leigh's Paints, Tower Works, Kestor Street, Bolton BL2 2AL England Tel: +44(0)1204 521771 Fax: +44(0)1204 382115
email: enquiries@wjleigh.co.uk website: www.wjleigh.co.uk

SURFACE PREPARATION:

Blast clean to Sa.2½ BS7079:Part A1:1989 (ISO 8501-1:1988). Average surface profile in the range 30-75 microns.

Ensure surfaces to be coated are dry and free from all visible traces of surface contaminants.

APPLICATION EQUIPMENT:

Airless Spray

Nozzle Size	:	0.38mm (15 thou)
Fan Angle	:	80°
Operating Pressure	:	155kg/cm² (2200 psi)

The airless spray details given above are intended as a guide only. Details such as fluid hose length and diameter, paint temperature and job shape and size all have an effect on the spray tip and operating pressure chosen. However, the operating pressure should be the lowest possible consistent with satisfactory atomisation. As conditions will vary from job to job, it is the applicators' responsibility to ensure that the equipment in use has been set up to give the best results. If in doubt Leigh's Customer Service Department should be consulted.

Brush

The material is suitable for brush application. Application of more than one coat may be necessary to give equivalent dry film thickness to a single spray applied coat.

APPLICATION CONDITIONS AND OVERCOATING:

Epoxy paints should preferably be applied at temperatures in excess of 10°C. In conditions of high relative humidity, i.e. 80-85% good ventilation conditions are essential. Substrate temperature should be at least 3°C above the dew point and always above 0°C.

At application temperatures below 10°C, drying and curing times will be significantly extended, and spraying characteristics may be impaired.

Application at ambient air temperatures below 5°C is not recommended.

In order to achieve optimum water and chemical resistance, temperature needs to be maintained above 10°C during curing.

If it is desired to overcoat outside the times stated on the data sheet, please seek advice of Leigh's Customer Service Department.

For full notes, see data sheet entitled 'Spreading Rates and Overcoating Times'.

ADDITIONAL NOTES:

Drying times, curing times and pot life should be considered as a guide only.

The curing reaction of epoxies commences immediately the two components are mixed, and since the reaction is dependent on temperature, the curing time and pot life will be approximately halved by a 10°C increase in temperature and doubled by a 10°C decrease in temperature.

Due to the nature of this product, some variation in colour between batches of certain shades may be experienced, which is beyond our control. This colour difference does not in any way affect the performance of the material.

Epoxy Coatings - Colour Stability

Variable colour stability is a feature of epoxy materials which tend to yellow and darken with age particularly when used on internal areas. Therefore any areas touched-up and repaired with the same colour at a later date may be obvious due to this colour change.

When epoxy materials are exposed to ultra-violet light a surface chalking effect will develop. This phenomenon results in loss of gloss and a fine powder coating at the surface which may give rise to colour variation depending on the aspect of the steelwork. This effect in no way detracts from the performance of the system.

Epoxy Coatings - Tropical Use

Epoxy paints at the time of mixing should not exceed a temperature of 35°C. At this temperature the pot life will be approximately halved. Use of these products outside of the pot life may result in inferior adhesion properties even if the materials appear fit for application. Thinning the mixed product will not alleviate this problem.

The maximum air and substrate temperature for application is 50°C providing conditions allow satisfactory application and film formation. If the air and substrate temperatures exceed 50°C and epoxy coatings are applied under these conditions, paint film defects such as dry spray, bubbling and pinholing etc. can occur within the coating.

Numerical values quoted for physical data may vary slightly from batch to batch.

HEALTH AND SAFETY:

Consult Product Health and Safety Data Sheet for information on safe handling and application of this product.

Product Data / A4185
Application Instructions

- **Single pack low build bituminous coating**
- **EPA compliant (1998) as a top coat to PG6/23**
- **Corrosion inhibiting**
- **Excellent water and humidity resistance**
- **Quick and easy to apply**

Typical Uses
Protective coating for steel in enclosed spaces such as cavity walls and structures subjected to aqueous attack, such as tank internals, pipes and gutters. Not suitable for use in service conditions above 55°C, exposure to direct sunlight or solvent attack.

Surface Preparation
All surfaces must be dry and free of dust, salts, grease and other contaminants immediately before coating. Performance will be dependent upon the degree of surface preparation. For optimum performance abrasive blast clean to ISO 8501-1 Sa2 $^1/_2$. Alternatively manually prepare the surface to a minimum standard conforming to ISO 8501-1 St2. May also be applied over a suitably primed surface.

Application Methods
AIRLESS SPRAY - Tip size 13-17 thou (0.33-0.43mm). Minimum pressure at tip 2800 psi (200kg/cm^2).
CONVENTIONAL SPRAY - Use a compressed air spray gun with 40 - 60 psi supply.
BRUSH/ROLLER - Apply evenly using a clean, well loaded brush or roller.

Environmental Conditions
Amercoat 4185 should only be applied within the limits of temperature and humidity set out below.

Relative humidity:	up to 90%.
Surface temperature:	minimum 5°C
	maximum 30°C

The surface temperature must also be at least 3°C above the dew point.

Physical Data

Appearance when dry	glossy
Colour	black
Substrate	steel
Components	1
Volume solids	49 ± 2%
VOC	393 g/l
Curing mechanism	solvent release

	typical	minimum	maximum
Dry film thickness (µm)	35	25	50
Wet film thickness (µm)	71	51	102

(Wet film thicknesses quoted are theoretical for one brush coat)

Theoretical coverage	14.0 m²/l (at typical dft)
Application methods	airless and conventional spray, brush, roller
Potlife (at 20°C)	not applicable
Thinner	Amercoat 15
Cleaner	Amercoat 15
Specific gravity	1.0 kg/l
Flashpoint (Closed cup)	
Amercoat 4185	39°C
Amercoat 15	38°C
Pack size	5 litres
Shipping weight	approx. 6 kg
Shelf life	1 year from shipment date or as indicated on label when stored indoors in unopened, original containers at 5 to 40°C.

Drying Characteristics

Temperature	**20°C**
Touch dry	2 hours
Hard dry	4 hours
Overcoating (minimum)	16 hours
Overcoating (maximum)	-

NOTE: drying and curing times are dependent on air and steel temperature, applied film thickness, ventilation and other environmental conditions. Times are shorter at higher temperatures and longer at lower temperatures

Overcoating
Can be overcoated with itself to increase the coating thickness and also Amercoat 4186. Do not overcoat with other generic types of coating.

Application procedure

1. Flush equipment with recommended cleaner before use.
2. Stir the contents of the can to an even consistency with a power mixer.
3. Thinning is normally not required.
4. Stir during application to maintain uniformity of material. When spraying apply a wet even coat in parallel passes. Overlap each pass 50% to avoid bare areas, pinholes or holidays.
5. Double coat all welds, rough spots, sharp edges and corners, rivets, bolts, etc.
6. Application at 71 µm wet film thickness will normally provide 35 µm dry film.
7. Check thickness of dry coating with a non- destructive dry film thickness gauge, such as Mikrotest or Elcometer. If less than specified thickness, apply additional material as needed.
8. Small damaged or bare areas and random pinholes or holidays can be touched up by brush. Repair larger areas by spray.
9. In confined areas ventilate with clean air during application and drying until all solvents are removed. Temperature and humidity of ventilating air must be such that moisture condensation will not form on surface.
10. Clean all equipment with recommended cleaner immediately after use or at least at the end of each working day or shift

Before using the product, read the label on the can and consult the material safety data sheet.

Product Data / A4186
Application Instructions

- **Single pack high build bituminous coating**
- **EPA compliant (1998) as a top coat to PG6/23**
- **Excellent water and humidity resistance**
- **Quick and easy to apply**
- **Brush, roller and spray application**

Typical Uses
Protective coating for steel in enclosed spaces such as cavity walls; structures subjected to aqueous attack, such as tank internals, pipes and gutters; and buried structures, for example roots of lighting columns, masts and towers. Also suitable for application to concrete structures such as pipes and other applications where an economical waterproofing system is required. Not suitable for use in service conditions above 55°C, exposure to direct sunlight or solvent attack.

Surface Preparation
All surfaces must be dry and free of dust, salts, grease and other contaminants immediately before coating. Performance will be dependent upon the degree of surface preparation.
STEEL: - For optimum performance abrasive blast clean to ISO 8501-1 Sa2$^{1}/_{2}$. Alternatively manually prepare the surface to a minimum standard conforming to ISO 8501-1 St2. May also be applied over a suitably primed surface.
CONCRETE: - Any surface laitance must be removed by abrading and any dust and debris cleaned away.

Mixing
Stir thoroughly before use until the product is uniform throughout.

Application Methods
BRUSH/ROLLER - Apply evenly using a clean, well loaded brush or roller. More then one coat may be required to achieve the specified film thickness.
AIRLESS SPRAY – Tip size 18-21 thou' (0.46-0.53mm). Minimum pressure at the tip 2800 psi (200kg/square centimetre).

Physical Data

Appearance when dry	low sheen
Colour	black
Substrate	steel, concrete
Components	1
Volume solids	53 ± 2%
VOC	420 g/l
Curing mechanism	solvent release

	typical	minimum	maximum
Dry film thickness (µm)	150	100	225
Wet film thickness (µm)	283	189	425

(Wet film thicknesses quoted are theoretical for one brush coat)

Theoretical coverage	3.5 m²/l (at typical dft)
Application methods	airless spray, brush, roller
Potlife (at 20°C)	not applicable
Specific gravity	1.10 kg/l
Thinner	Amercoat 15
Cleaner	Amercoat 15
Flashpoint (closed cup)	
Bitumen 2512	38°C
Amercoat 15	38°C
Pack size	5 litres
Shipping weight	approx. 6 Kg
Shelf life	1 year from shipment date or as indicated on label when stored indoors in unopened, original containers at 5 to 40°C.

Environmental Conditions

Amercoat 4186 should only be applied within the limits of temperature and humidity set out below.

Relative humidity:	up to 90%.
Surface temperature:	minimum 5°C
	maximum 35°C

The surface temperature must also be at least 3°C above the dew point.

Drying Characteristics

Temperature	**20°C**
Touch dry	6 hours
Hard dry	16 hours
Overcoating (minimum)	48 hours
Overcoating (maximum)	-

NOTE: drying and curing times are dependent on air and steel temperature, applied film thickness, ventilation and other environmental conditions. Times are shorter at higher temperatures and longer at lower temperatures

Overcoating

Can be overcoated with itself if necessary to increase the coating thickness. Do not overcoat with other generic types of coating.

Application procedure

1. Flush equipment with recommended cleaner before use.
2. Stir the contents of the can to an even consistency with a power mixer.
3. For airless spray, thin only as needed for workability, with up to 10% by volume of the recommended thinner
4. Stir during application to maintain uniformity of material. When spraying, apply a wet even coat in parallel passes. Overlap each pass 50% to avoid bare areas, pinholes or holidays.
5. Double coat all welds, rough spots, sharp edges and corners, rivets, bolts, etc.
6. Application at 283 µm wet film thickness will normally provide 150 µm dry film.

7. Check thickness of dry coating with a non-destructive dry film thickness gauge, such as Mikrotest or Elcometer. If less than specified thickness, apply additional material as needed.
8. Small damaged or bare areas and random pinholes or holidays can be touched up by brush. Repair larger areas by spray.
9. In confined areas ventilate with clean air during application and drying until all solvents are removed. Temperature and humidity of ventilating air must be such that moisture condensation will not form on surface.
10. Clean all equipment with recommended cleaner immediately after use or at least at the end of each working day or shift

Before using the product, read the label on the can and consult the material safety data sheet.

Appendix D – Option 3 – Technical data sheets – Zinga and Steelguard 3392

SIB

Vu !

BBA BRITISH BOARD OF AGRÉMENT
ASSESSMENT OF PRODUCTS FOR CONSTRUCTION

Designated by Government to issue European Technical Approvals

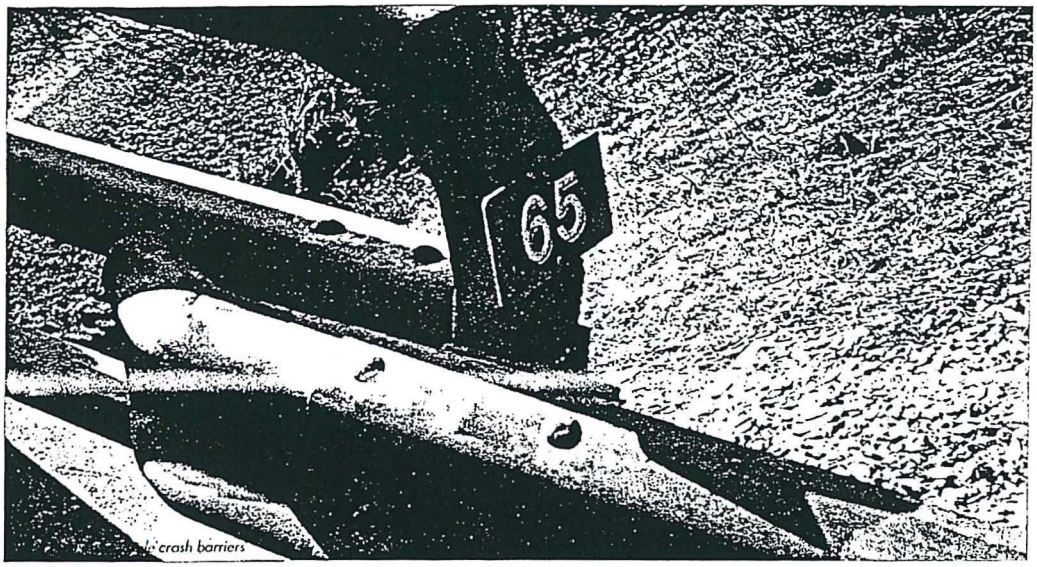
Galvatech Ltd
211 Heyford Park
Upper Heyford
Bicester
Oxon OX6 3HE
Tel: 01869 232800 Fax: 01869 232900

Agrément Certificate No 94/3042
*Second issue**

ZINGA

Enduit métallique à haute teneur en zinc
Zinkbeschichtung

Product



crash barriers

• THIS CERTIFICATE RELATES TO ZINGA, A ZINC-RICH COATING APPLIED TO STRUCTURAL STEEL BY SUITABLY EQUIPPED AND EXPERIENCED STRUCTURAL ENGINEERING COMPANIES OR BLASTING/PAINTING APPLICATORS

• The product is applied in one or two coats to give a minimum dry film thickness (dft) of 60 µm.

Regulations

1 The Building Regulations 1991 (as amended) (England and Wales)

In the opinion of the British Board of Agrément, the use of Zinga is not subject to these Regulations.

2 The Building Standards (Scotland) Regulations 1990 (as amended)

In the opinion of the BBA, the use of Zinga is not subject to these Regulations.

3 The Building Regulations (Northern Ireland) 1994 (as amended)

In the opinion of the BBA, the use of Zinga is not subject to these Regulations.

4 Construction (Design and Management) Regulations 1994

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

See sections 6 *Delivery and site handling* and 10 *Welding*

5 Description

5.1 Zinga is a single pack, zinc-rich coating suitable for internal or external use as a primer and/or final corrosion protection for structural steel and as a repair for suitably prepared eroded or damaged galvanized or zinc-coated steel.

5.2 The product is applied to surfaces previously prepared by abrasive blasting to grade Sa 2½, or to a rusted surface to grade C, both to BS 7079 : Part A1 : 1989(1994) (ISO 8501-1 : 1988).

5.3 Zinga contains zinc dust, an organic binder and aromatic solvents.

5.4 Zingasolv is a mixture of aromatic solvents used for diluting Zinga prior to spray application and for cleaning equipment.

5.5 The product is manufactured by a batch blending process. Regular quality control is exercised over the raw materials and the finished product.

6 Delivery and site handling

6.1 The product is delivered in 1 kg, 5 kg, 10 kg, 25 kg and 35 kg metal containers or in 200 kg drums. Each container carries a label bearing the manufacturer's name, product name, batch code and the BBA identification mark incorporating the number of this Certificate.

6.2 Zinga and Zingasolv are flammable, with a flashpoint above 32°C, and must be stored and used in a cool place, away from sources of ignition.

6.3 Operators should wear gloves and facial protection. A suitable HSE approved respirator should be worn for spray applications.

6.4 The shelf life of the product exceeds one year under normal conditions.

7 General

7.1 The Zinga zinc-rich coating is satisfactory for internal or external use as anti-corrosive protection for structural steel, and as a repair system for suitably prepared, damaged, galvanized or zinc-coated steel.

7.2 The product is applied in one or two coats, to give a minimum total dry film thickness of 60 µm.

8 Effect on water quality

The product meets the requirements of BS 6920 Part 1 : 1990, and may be used in contact with potable water.

9 Properties in relation to fire

When tested to BS 476 : Part 6 : 1989, a sample of Zinga coated steel had an index of performance (I) of 0.0 and when tested to BS 476 : Part 7 : 1987 had a Class 1 surface. It therefore has a Class 0 surface as defined in the various national Building Regulations.

10 Welding

10.1 Welding or flame cutting should not be conducted until the zinc-rich film is fully cured and free from solvent.

10.2 Prior to welding Zinga coated steel, an assessment must be made of the dangers posed to the welder's (and others') health under the Control of Substances Hazardous to Health Regulations 1994. Reference should be made to HSE Guidance Note EH54 *Assessment of exposure to fume from welding and allied processes 1990.*

10.3 Proper conditions of ventilation must be provided to ensure that the concentrations of toxic products produced during welding or flame cutting of steel with a 60 µm coating of Zinga do not exceed the values stated in HSE Guidance Note EH40 *Occupational Exposure Limits 1998.*

10.4 Welding through this thickness of Zinga will have no detrimental effect on the quality of the weld.

11 Resistance to abrasion

11.1 The resistance of the finished coating to continual abrasion is limited, but any damage is easily repaired. Where continual abrasion is likely, an abrasion resistant top-coat should be applied.

11.2 In the event of surface damage, under-film corrosion of the steel will not occur immediately. The damage should be repaired by the further application of Zinga as part of a planned maintenance programme (see section 12 of this Certificate).

12 Maintenance

12.1 Maintenance painting using the techniques described in section 14, should be conducted before the steel substrate has become exposed, within the periods stated in section 13 of this Certificate.

12.2 Localised repairs (of damaged or eroded areas) may also be made with Zinga when necessary, using the same techniques.

13 Durability

13.1 Zinga applied to abrasive blasted steel at 60 µm minimum dft (above the maximum peak height) is suitable for internal use in conditions free from chemical contamination, and will remain effective with an ultimate life in excess of 20 years. When applied for external use, it will remain

effective with an ultimate life in excess of the following (but see also section 12.1):

(a) 10 years in polluted coastal conditions

(b) 12 years in inland industrial conditions

(c) 20 years in rural conditions.

13.2 The life of the coating can be extended proportionately by applying additional coats to achieve a greater thickness.

13.3 In chemically corrosive conditions this performance may not be achieved and the advice of the manufacturer should be sought.

14 Application

14.1 Zinga is applied either under factory conditions or on site to either abrasive blasted or rusted steel to grade Sa 2½ or rust grade C as defined by BS 7079 : Part A1 : 1989(1994) (ISO 8501-1 : 1988).

14.2 During application, adequate ventilation must be provided, and care must be taken to avoid inhalation of spray and solvent vapour. Naked flames, or other sources of ignition, must be excluded during application and curing.

14.3 The product may be applied to damp substrates, but not to surfaces running with water.

14.4 The product is applied in one or two coats by brush or airless or conventional spray, or in two coats by roller, to give a minimum total dry film thickness of 60 µm. During application, the ambient temperature must be at least 5°C.

14.5 The product may be diluted by up to 5% of Zingasolv for spray application. The manufacturer can advise on suitable spray equipment.

14.6 Where abrasive cleaning is required, the first coat is applied to the abraded substrate before the surface has oxidised, normally within 4 hours of blasting. The surface must be kept free from contamination between blasting and coating.

14.7 The product is allowed to cure for two hours prior to application of subsequent coats. If the product is to be overcoated with a different top-coat, a longer curing period is allowed. Galvatech Ltd can advise on suitable top coats and overcoating times.

14.8 During the curing period, good ventilation is essential to remove solvent vapour. On any surface where natural ventilation is restricted, an air blower should be installed to ensure complete removal of solvent vapour. If heaters are used they should provide efficient air circulation to remove vapours and avoid local hot spots.

14.9 When a significant delay occurs between coats, the first coat must be cleaned. Any dirt or water-soluble deposits must be removed by thorough washing with water. Any grease or oil must be removed by swabbing with Zingasolv and clean rags (taking appropriate precautions to avoid inhalation and skin contact).

14.10 Any steel coated with the product and welded on-site will have suffered some coating damage. Weld spatter must be removed by chipping and/or grinding. Slag, charred coating, and abraded areas caused by mechanical damage during transit and erection, must be blast cleaned to restore the original condition of the steel substrate, and a further one or two coats of Zinga applied to a minimum dry film thickness of 60 µm.

The following is a summary of the technical investigations carried out on the Zinga zinc-rich coating.

15 Tests

15.1 Samples of the product were tested for:

flashpoint to BS 3900 : Part A14 : 1986(1991)
solids content to BS 3900 : Part B2 : 1970(1991).

15.2 Samples of the product coated on abrasive blasted steel were tested for:

resistance to artificial weathering to MOAT No 33 : 1986 3.3.2.1
cross-hatch adhesion to BS 3900 : Part E6 : 1974(1989)
resistance to salt spray to BS 3900 : Part F4 : 1968(1991)
resistance to sulphur dioxide to BS 3900 : Part F8 : 1976(1991)
effect of substrate preparation.

15.3 A sample of Zingasolv was tested for flashpoint to BS 3900 : Part A14 : 1986(1991).

16 Other investigations

16.1 Independent test data were examined relating to the following aspects of performance of Zinga:

galvanic protection offered to a steel substrate
intercoat mixing of successive coating layers
resistance to humidity, salt spray, salt water and artificial weathering
chemical resistance
effect of overcoating
effect of low temperature storage
bend and impact resistance
adhesion and effect of substrate preparation
effect on strength of welding.

16.2 Independent test reports were examined on the performance of the product when coated on a steel plate and tested to BS 476 : Part 6 : 1989 and BS 476 : Part 7 : 1987.

16.3 Reports were examined from a number of users with experience of the product in service.

16.4 Visits were made to existing sites where the product had been in use for periods of up to 11 years.

16.5 A visit was made to a site in progress in order to assess the practicability of application.

16.6 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.

BS 476 *Fire tests on building materials and structures*
Part 6 : 1989 *Method of test for fire propagation for products*
Part 7 : 1987 *Method for classification of the surface spread of flame of products*

BS 3900 *Methods of test for paints*
Part A14 : 1986(1991) *Determination of flashpoint (rapid equilibrium method)*
Part B2 : 1970(1991) *Determination of volatile matter and non-volatile matter*
Part E6 : 1992 *Cross-cut test*
Part F4 : 1968(1991) *Resistance to continuous salt spray*
Part F8 : 1976(1991) *Determination of resistance to humid atmospheres containing sulphur dioxide*

BS 6920 *Suitability of non-metallic products for use in contact with water intended for human consumption with regard to their effect of the quality of water*
Part 1 : 1990 *Specification*

BS 7079 *Preparation of steel substrates before application of paints and related products*
Group A *Visual assessment of surface cleanliness*
Part A1 : 1989(1994) *Specification for rust grades and preparation grades of uncoated steel substrates and of steel substrates after overall removal of previous coatings*

MOAT No 33 : 1986 *The assessment of masonry coatings*

AMERON
INTERNATIONAL

Steelguard 3392

Two pack polyurethane finish

Product Data/Application Instructions

Semi-Gloss polyurethane topcoat
EPA compliant
Outstanding weather resistance with excellent colour and gloss retention
Highways Agency approved
Cures over a wide temperature range
Re-coatable finish
Suitable for application by either brush, roller or spray

Typical Uses

A highly durable topcoat for protective coating systems used on general structural steel operating in a wide range of environmental conditions such as bridges, marine structures, petroleum processing and storage facilities, chemical and power plants and other heavy industrial facilities.

Approvals

Steelguard 3392 is approved and registered to Highways Agency specification item 169.

Surface preparation

Apply over a suitable epoxy primer or intermediate coats such as Steelguard 3905 or Steelguard 3373. The substrate should be prepared in accordance with the product data instructions of the primer or intermediate being used. The surface must be dry and free of dust, salts, grease and other contaminants immediately before coating.

Mixing

Stir the resin component thoroughly, then add the cure and continue mixing until the product is uniform throughout. A powerful mixer should be used.

Application

AIRLESS SPRAY: Use standard airless spray equipment capable of producing a minimum pressure at the tip of 2800 psi (200 kg/cm²). Tip size range 15-17 thou (0.38-0.43mm). Adjustments to pressure and tip size/angle may be necessary to obtain spray characteristics required for specific substrate configurations.
BRUSH/ROLLER- Apply evenly using a clean, well-loaded brush or roller. With this application more than one coat may be necessary to achieve the required dry film thickness.

Environmental conditions

Steelguard 3392 should only be applied within the limits of temperature and humidity set out below.
Relative humidity: Up to 90%
Surface temperature: Minimum 2°C
Maximum 40°C
The surface temperature must also be at least 3°C above the dew point.

Physical Data

Finish	Semi-Gloss
Colour	Ral and BS 4800
Substrate	primed steel
Components	2
Curing mechanism	solvent release and reaction between components.
Volume solids :	60+/-3%
VOC	350 g/l
Dry film thickness	40-125 µm per coat

	typical	minimum	maximum
Dry film thickness (µm)	50	40	125
Wet film thickness (µm)	83	67	208

(wet film thicknesses quoted are typical for one airless spray coat, maximum d.f.t. by airless spray application)

Number of coats	1*
Calculated coverage	12.0 m²/l at 50 µm

Allow for application losses, surface irregularities, etc.

Application methods	airless spray, brush or roller**
Potlife (at 20°C)	4 hours
Drying time (at 20°C)	
dry to handle	3 hours
dry to recoat	8 hours

Potlife and drying time are dependent on prevailing temperatures.

Induction time (at 20°C)	not applicable
Mixing ratio (by volume)	
resin	6 parts
cure	1 part
Thinner	Amercoat 920
Cleaner	Amercoat 65
Specific gravity	1.42 kg/l (white) mixed product
Flash points (Closed Cup)	
resin	30°C
cure	47°C
Amercoat 920	24°C
Amercoat 12 cleaner	24°C
Packaging	5 and 20 litres in two part units
resin for 20 l unit	17.14 l in 20 l can
resin for 5 l unit	4.29 l in 5 l can
cure for 20 l unit	2.86 l in 5 l can
cure for 5 l unit	0.71 l in 1 l can

Shipping weight (approx)	20 l unit	5 l unit
resin	26 kg	6.5 kg
cure	4 kg	1 kg

Shelf life	1 year from shipment date or as indicated on label when stored indoors in unopened, original containers at 5 to 40°C.

* On tanks and other large structures previously coated with contrasting primer or intermediate coats, uniform appearance may require two coats of Steelguard 3392. Use only a light coloured primer or intermediate coat when only one finish coat of Steelguard 3392 in a light colour is specified.
** Brush or roller application may require additional coats.

Drying characteristics

Temperature	5°C	10°C	20°C
Touch dry	6 hours	4½ hours	3 hours
Hard dry	16 hours	12 hours	8 hours
Overcoating (minimum)	16 hours	12 hours	8 hours
Overcoating (maximum)			

This product will cure down to 0°C, however drying times will be extended.

Note: All information relates to the typical dry film thickness.

Overcoating
Can be overcoated with itself to increase the coating thickness. There are no maximum overcoating restrictions with itself provided the Steelguard 3392 is clean, dry and free from contaminants before overcoating.

Application procedure

1. Clean the equipment with the recommended cleaning solvent before use.
2. Stir the resin component thoroughly, then add the cure and continue mixing until the product is uniform throughout. A powerful mixer should be used. Thinning is not required.
3. For airless spray, apply a wet even coat in parallel passes. Overlap each pass by 50% to avoid bare areas, pinholes or holidays.
4. Give special attention to welds, rough spots, sharp edges and corners, rivets, bolts, etc.
5. Application at 85µm wet film thickness will normally provide 50µm dry film.
6. Check thickness of dry coating with a non-destructive dry film thickness gauge, such as Mikrotest or Elcometer. If less than specified thickness, apply additional material as needed.
7. Small damaged or bare areas and random pinholes or holidays can be touched up by brush. Repair larger areas either by spray, brush or roller using Steelguard 3392.
8. In confined areas ventilate with clean air during application and drying. The humidity should be maintained below 90% and the temperature such that moisture condensation will not form on the surface.
9. Clean all equipment with fresh, clean solvent immediately after use.

Before using the product, read the label on the can and consult the material safety data sheet.

Safety
Since improper use and handling can be hazardous to health and cause fire or explosion, safety precautions included with application instructions must be observed during all storage, handling, use and drying periods. To avoid any confusion that may arise through translation into other languages, the English version of the Product Data/Application Instructions will be the governing literature and must be referred to in case of deviations with product literature in other languages.

Warranty
Ameron warrants its products to be free from defects in material and workmanship. Ameron's sole obligations and Buyer's exclusive remedy in connection with the products shall be limited, at Ameron's option, to either replacement of products not conforming to this warranty or credit to Buyer's account in the invoiced amount of the nonconforming products. Any claim under this warranty must be made by Buyer to Ameron in writing within five (5) days of Buyer's discovery of the claimed defect, but in no event later than the expiration of the applicable shelf life, or one year from the delivery date, whichever is earlier. Buyer's failure to notify Ameron of such nonconformance as required herein shall bar Buyer from recovery under this warranty.

Ameron makes no other warranties concerning the product. No other warranties, whether express, implied, or statutory, such as warranties of merchantability or fitness for a particular purpose, shall apply. In no event shall Ameron be liable for consequential or incidental damages.

Any recommendation or suggestion relating to the use of the products made by Ameron, whether in its technical literature, or response to specific enquiry, or otherwise, is based on data believed to be reliable; however, the products and information are intended for use by Buyer's having requisite skill and know-how in the industry, and therefore it is Buyer to satisfy itself of the suitability of the products for its own particular use and it shall be deemed that Buyer has done so, as its sole discretion and risk. Variation in environment, changes in procedures of use, or extrapolation of data may cause unsatisfactory results.

Limitation of Liability
Ameron's liability on any claim of any kind, including claims based upon Ameron's negligence or strict liability, for any loss or damage arising out of, connected with, or resulting from the use of the products, shall in no case exceed the purchase price allocable to the products or part thereof which give rise to the claim. In no event shall Ameron be liable for consequential or incidental damages.

Conditions of Sale
All our transactions are subject to our Terms and Conditions of Sale.

AMERON

Performance Coatings & Finishes Europe
+(31) 345 587 587
www.ameron-bv.com

Performance Coatings & Finishes/USA
+(1) 678 393 0653
www.ameroncoatings.com

Performance Coatings & Finishes/Australia
+(61) 2 9421 8000
www.ameron.com.au

Performance Coatings & Finishes/New Zealand
+(64) 9 573 1620
www.ameron.co.nz

Appendix E – Option 4 – Technical data sheet – Amercoat 78HBB

Amercoat 78HBB

Coaltar Epoxy

Amercoat 78HB is used in USA

Application Instructions

Amercoat 78HBB is an amine cured, high build, coaltar epoxy coating for non-immersion as well as immersion service, providing excellent corrosion and chemical resistance and full film thickness in only one coat. Refer to Amercoat 78HBB product data sheet for properties and use. To obtain the maximum performance for which Amercoat 78HBB is formulated, strict adherence to all application instructions, precautions, conditions and limitations is necessary. If conditions exist that are not within the requirements or limitations described, consult your Ameron representative.

Surface Preparation

STEEL - Welds should be continuous with no skipwelds on overlapping steel surfaces. Blast in accordance with Swedish Standard Sa 2½ SIS 05 5900 - 1967, ISO 8501-1 or Steel Structures Painting Council SP-10. NOTE: Blast to achieve a 50 to 100 µm profile, as determined with *Testex* Tape or similar instrument. Remove abrasive residues and dust from surface.

CONCRETE - Light abrasive blasting is best to remove all previous coatings, chalk and surface glaze or laitance. After blasting, small holes or voids in cast concrete wall or overhead surface should be filled with a suitable material such as Nu-Klad 114A epoxy filler compound before applying Amercoat 78HBB.

DIMETCOTE - Amercoat 71(TC) must be used as a tiecoat over Dimetcote prior to application of Amercoat 78HBB.

AMERCOAT 71(TC) - Surfaces coated with Amercoat 71(TC) must be dry and free of all contamination. Refer to application instructions of Amercoat 71(TC) for drying time and curing time limitations.

IMPORTANT - Apply Amercoat 78HBB as soon as possible after surface preparation to prevent any contamination. Do not leave blasted steel uncoated overnight. In case of contamination, remove contaminants. Spot blast steel if needed.

Application Equipment

The following equipment is listed as a guide and suitable equipment from other manufacturers may be used. Adjustments of pressure and change of tip size may be needed to obtain the proper spray characteristics.

AIRLESS SPRAY - Standard airless spray equipment, such as Graco, DeVilbiss, Nordson-Bede, Spee-Flo or others having a fluid tip with a 0.46 to 0.69 mm (0.018 to 0.027 inch) orifice.

CONVENTIONAL SPRAY - Industrial equipment such as DeVilbiss MBC or JGA or Binks No. 18 or 62 gun. Separate air and fluid pressure regulators and a mechanical pot agitator are recommended. A moisture and oil trap in the main air supply line is essential.

MIXER - Use power mixer powered by an air motor or an explosion proof electric motor.

Environmental Conditions

(during application)

Air temperature	0 to 50°C
Surface temperature	0 to 60°C
Material temperature	10 to 40°C

To prevent moisture condensation during application, surface temperature must be at least 3°C above dew point. Never apply coatings under adverse environmental conditions. Ensure good ventilation when applied in confined areas to assist evaporation and eliminations of solvents.

Recoat and Repair Schedule

When two coats are specified for repair of damaged, imperfect or thin areas, additional Amercoat 78HBB should be applied within the following drying times to ensure proper adhesion:

Surface temperature (°C)	7	15	21	30
Maximum drying time (hours)	72	48	32	16

NOTE: do not allow more than six hours of total sunlight exposure before applying repair coat and protect against rain, moisture, or condensation, otherwise intercoat adhesion may be impaired. If the maximum drying time has been exceeded, the surface must be roughened by brush blasting before applying repair coat.

Curing Time

The indicated drying and curing times are for a dry film thickness of 400 µm. If the thickness is greater allow additional curing time. In all cases higher temperatures will shorten and lower temperatures will lengthen the curing times.

dry to handle (°C)	7	15	21	30
(hours)	36	24	16	8

For most exterior atmospheric exposures, the coating may be placed in service as soon as it has dried sufficiently to withstand handling.

For immersion in water, where early abrasion resistance is not required such as ships, ballast tanks or bilges, the required curing times are as follows:

7°C	15°C	21°C	30°C
9 days	3 days	26 hours	18 hours

Where the maximum chemical or abrasion resistance is required or for critical applications such as circulating waterlines, the coating must be fully cured according the following schedule:

10-13°C	18-24°C	32-38°C
20 days	10 days	6 days

Application Procedure

Amercoat 78HBB is packaged in the proper mixing proportions of resin and cure.

resin:	16 l in 20 l can
cure:	4 l in 5 l can
thinner/cleaner:	Amercoat 65

1. Flush equipment with Amercoat 65 before use.
2. Stir resin to an even consistency with a power mixer.
3. Add cure to resin, and continue stirring for 5 minutes. NOTE: Since the potlife is limited and shortened by high temperatures, do not mix more material than will be used in 4 hours at 21°C or 2 hours at 30°C.
4. For conventional spray, thin only as needed for workability with no more than 10% of thinner Amercoat 65. Thinning is normally not needed for airless spray.
5. Stir during application to maintain uniformity of material. Apply a heavy wet coat in even, parallel passes with 50% overlap. Immediately follow with additional cross-spray passes to obtain a continuous film without bare spots, pinholes or holidays.
6. Double coat all welds, corners, sharp edges, rivets and bolts, rough spots, etc.
7. Application at 524 µm wet film thickness will normally provide 400 µm dry film.
8. Check thickness of dry and cured coating with a non-destructive dry film thickness gauge, such as Mikrotest or Elcometer. If less than specified thickness, apply additional material as needed. Allowable thickness range is 125 to 500 µm depending upon service conditions.
9. When a pinhole-free coating is required, check continuity of dry but uncured coating with a high voltage holiday detector. Voltage setting on the equipment should not exceed a level of 3 Volts per µm of coating thickness, e.g. 1200 Volts for 400 µm dft of the coating.
10. Apply additional material needed for correction of film thickness and repair of pinholes or damaged areas within the times shown in **Recoat and Repair Schedule**. The surface must be clean when repair coat is applied.
11. In confined areas ventilate with clean air during application and drying until all solvents are removed. Temperature and humidity of ventilating air must be such that moisture condensation will not form on surface.
12. Clean all equipment with Amercoat 65 immediately after use or at least at the end of each working day or shift. When left in spray equipment, Amercoat 78HBB will cure and cause clogging.

Safety

Since improper use and handling can be hazardous to health and cause fire or explosion, safety precautions included with application instructions must be observed during all storage, handling, use and drying periods.
To avoid any confusion that may arise through translation into other languages, the English version of the Product Data/Application instructions will be the governing literature and must be referred to in case of deviations with product literature in other languages.

Warranty

Ameron warrants its products to be free from defects in material and workmanship. Ameron's sole obligations and Buyer's exclusive remedy in connection with the products shall be limited, at Ameron's option, to either replacement of products not conforming to this warranty or credit to Buyer's account in the invoiced amount of the nonconforming products. Any claim under this warranty must be made by Buyer to Ameron in writing within five (5) days of Buyer's discovery of the claimed defect, but in no event later than the expiration of the applicable shelf life, or one year from the delivery date, whichever is earlier. Buyer's failure to notify Ameron of such nonconformance as required herein shall bar Buyer from recovery under this warranty.

Ameron makes no other warranties concerning the product. No other warranties, whether express, implied, or statutory, such as warranties of merchantability or fitness for a particular purpose, shall apply. In no event shall Ameron be liable for consequential or incidental damages.

Any recommendation or suggestion relating to the use of the products made by Ameron, whether in its technical literature, or response to specific enquiry, or otherwise, is based on data believed to be reliable; however, the products and information are intended for use by Buyer's having requisite skill and know-how in the industry, and therefore it is Buyer to satisfy itself of the suitability of the products for its own particular use and it shall be deemed that Buyer has done so, as its sole discretion and risk.
Variation in environment, changes in procedures of use, or extrapolation of data may cause unsatisfactory results.

Limitation of Liability

Ameron's liability on any claim of any kind, including claims based upon Ameron's negligence or strict liability, for any loss or damage arising out of, connected with, or resulting from the use of the products, shall in no case exceed the purchase price allocable to the products or part thereof which give rise to the claim.
In no event shall Ameron be liable for consequential or incidental damages.

Conditions of Sale

All our transactions are subject to our Terms and Conditions of Sale

Caution

This product is flammable. Keep away from heat and open flame. Keep container closed. Use with adequate ventilation. Avoid prolonged and repeated contact with skin. If used in confined areas, observe the following precautions to prevent hazards of fire or explosion or damage to health:

1. circulate adequate fresh air continuously during application and drying;
2. use fresh air masks and explosion proof equipment;
3. prohibit all flames, sparks, welding and smoking.

Do not empty into drains. Take precautionary measures against static discharges. For specific information on hazardous ingredients, required ventilation, possible consequences of contact, exposure and safety measures see Safety Data Sheet.