



BS EN877



Eco-Epoxy Coating Cast iron pipes and fittings for the evacuation of water from building

Test Certificates



HOKLAS Endorsed Test Certificates



祥興鑄鐵有限公司
CHEUNG HING FOUNDRY (HK) LIMITED

D. Type tests for pipes and fittings to BSEN877:1999

in compliance with  Building Department PNAP 282

-Cast iron pipes for drainage works

| Items to be tested | Number of samples (minimum) | Test method in accordance with | Requirements in accordance with |
|-------------------------------------|-----------------------------|--------------------------------|---------------------------------|
| Surface condition | 3 Per DN | 5.1 | 4.1.1 |
| External diameter and ovality | 3 per DN | 5.2.1/5.2.4 | 4.2.2/4.2.5 |
| Wall thickness | 3 per DN | 5.2.2 | 4.2.3 |
| Internal diameter of pipes | 3 per DN | 5.2.3 | 4.2.4 |
| Straightness of pipes | 3 per DN | 5.2.5 | 4.2.6 |
| End faces | 3 per DN | 5.2.6 | 4.2.7 |
| Length of pipes | 3 per DN | 5.2.7 | 4.2.8 |
| Length of fittings and sealing zone | 3 per DN | 5.2.7 | 4.2.9 |
| Angle of fittings | 3 per DN | 5.2.8 | 4.2.11 |
| Masses | 3 per DN | 5.3 | 4.4 |
| Tensile strength | 3 per range of DN | 5.4 | 4.5.2 |
| Brinell hardness | 3 per range of DN | 5.5 | 4.5.2 |
| Ring crush strength of pipes | 3 per range of DN | 5.6 | 4.5.2 |
| Internal coatings; | | | |
| - resistance to salt spray | 3 test panels | 5.7.2.1 | 4.6.2 |
| - resistance to waste water | 3 test panels | 5.7.2.2 | 4.6.2 |
| - chemical resistance | 3 test panels | 5.7.2.3 | 4.6.2 |
| - dry coating thickness | 3 per DN | 5.7.2.4 | 4.6.2 |
| - adhesion | 3 per range of DN | 5.7.2.5 | 4.6.2 |
| - resistance to hot water | 1 per range of DN | 5.7.2.6 | 4.6.2 |
| - resistance to temperature cycling | 1 test set up | 5.7.2.7 | 4.6.2 |
| External coatings; | | | |
| - colour | 3 test panels | 5.7.3.1 | 4.6.3 |
| - compatability with other paints | 3 test panels | 5.7.3.2 | 4.6.3 |
| - flame resistance | 3 test panels | 5.7.3.3 | 4.6.3 |
| - dry coating thickness | 3 per DN | 5.7.3.4 | 4.6.3 |
| - adhesion | 3 per range of DN | 5.7.3.5 | 4.6.3 |
| Marking | 3 per DN | 5.11 | 4.10 |



Surface condition

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CASTCO TESTING CENTRE LTD.

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Test Certificate
Surface Condition Test for Cast Iron Pipes and Fittings, their Joints and Accessories
(BS EN 877 : 1999 clause 5.1)

Date of issue : 16-04-2005
Page 1 of 1 (page(s)) Castco LRN : DP250321-0138 SUR

Details as supplied by client Sample submitted by: Asia Development (1950) Ltd.
Client: Cheung Hing Foundry Ltd. Client's Ref. No.: --
Job Title: -- Contract No.: --

Sample Description :-
Sample I.D. : DP250321-0138-1 Type : 88° Bend
Nominal size (DN) : 100 Nominal length : -- mm
Brand : CHF NT Manufacturer : Cheung Hing Foundry Ltd.

Laboratory test results
Date sample received : 21-03-2005 Date of test : 22-03-2005

The internal and external surface condition of test sample is free from defects.

Remark :
1. Test result relate only to the specimens tested.
2. Test result complies with clause 4.1.2 of BS EN 877 : 1999.

Checked by: W. K. Leung Certified by: WILLIAM CHAU
B.Sc., C.Eng., MICE, MIMechE
Registered Professional Engineer
General Manager

Form No. : FePipe-SurfCond T 04 29112004

Hong Kong Accreditation Service (HKAS) has accredited this laboratory under the Hong Kong Laboratory Accreditation Scheme (HOKLAS) for specific laboratory activities as listed in the HOKLAS Directory of Accredited Laboratories. The results shown in this report were determined by this laboratory in accordance with its terms of accreditation. This report shall not be reproduced unless with prior written approval from this laboratory.

External diameter and ovality

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Test Certificate
Determination of External Diameter and Ovality of Cast Iron Pipes and Fittings
(BS EN 877 : 1999 clause 5.2.1 and 5.2.4)

Date of issue : 18-04-2005
Page 1 of 1 (page(s)) Castco LRN : DP250321-0138 EDOV

Details as supplied by client Sample submitted by: Asia Development (1950) Ltd.
Client: Cheung Hing Foundry Ltd. Client's Ref. No.: --
Job Title: -- Contract No.: --

Sample Description :-
Sample I.D. : DP250321-0138-1 Type : 88° Bend
Nominal size (DN) : 100 Brand : CHF NT
Nominal external diameter (DE) : 110 mm Manufacturer : Cheung Hing Foundry Ltd.

Laboratory test results
Date sample received : 21-03-2005 Date of test : 07-04-2005

External Diameter of Fitting
End Face 1 = 110.7 mm, 110.9 mm
End Face 2 = 110.9 mm, 110.9 mm

Ovality of Fitting
End Face 1 = 110.7 mm, 110.9 mm
End Face 2 = 110.9 mm, 110.9 mm

Remarks :
1. Test result relates only to the specimen tested.
2. External diameter of test sample complies with clause 4.2.2 of BS EN 877 : 1999.
3. Ovality of test sample complies with clause 4.2.5 of BS EN 877 : 1999.

Checked by: W. K. Leung Certified by: W. K. LEE
B.Sc., C.Eng., MICE, MIMechE
Registered Professional Engineer
General Manager

Form No. : FePipe-ExtDiam/Ovality T 04 29112004

Hong Kong Accreditation Service (HKAS) has accredited this laboratory under the Hong Kong Laboratory Accreditation Scheme (HOKLAS) for specific laboratory activities as listed in the HOKLAS Directory of Accredited Laboratories. The results shown in this report were determined by this laboratory in accordance with its terms of accreditation. This report shall not be reproduced unless with prior written approval from this laboratory.

Wall thickness

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Test Certificate
Determination of Wall Thickness of Cast Iron Pipes and Fittings
(BS EN 877 : 1999 Clause 5.2.2)

Date of issue : 18-04-2005
Page 1 of 1 (page(s)) Castco LRN : DP250321-0138 WT

Details as supplied by client Sample submitted by: Asia Development (1950) Ltd.
Client: Cheung Hing Foundry Ltd. Client's Ref. No.: --
Job Title: -- Contract No.: --

Sample Description :-
Sample I.D. : DP250321-0138-1 Type : 88° Bend
Nominal size (DN) : 100 Nominal length : -- mm
Brand : CHF NT Manufacturer : Cheung Hing Foundry Ltd.

Laboratory test results
Date sample received : 21-03-2005 Date of test : 04-04-2005

| End Face | Mean Thickness (mm) |
|----------|---------------------|
| 1 | 5.5 |
| 2 | 5.1 |
| 3 | -- |

Remarks :
1. Test results relate only to the specimen tested.
2. Test result comply with Cl. 4.2.3 of BS EN 877 : 1999.

Checked by: W. K. Leung Certified by: W. K. LEE
B.Sc., C.Eng., MICE, MIMechE
Registered Professional Engineer
General Manager

Form No. : FePipe-Thick T 04 29112004

Hong Kong Accreditation Service (HKAS) has accredited this laboratory under the Hong Kong Laboratory Accreditation Scheme (HOKLAS) for specific laboratory activities as listed in the HOKLAS Directory of Accredited Laboratories. The results shown in this report were determined by this laboratory in accordance with its terms of accreditation. This report shall not be reproduced unless with prior written approval from this laboratory.

Internal diameter of pipes

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Test Certificate
Determination of Internal diameter of Cast Iron Pipes
(BS EN 877 : 1999 Clause 5.2.3)

Date of issue : 12-01-2006
Page 1 of 1 (page(s)) Castco LRN : DP250321-0126 ID

Details as supplied by client Sample Submitted by: Asia Development (HK) Ltd.
Client: Cheung Hing Foundry Limited Client's Ref. No.: --
Job Title: -- Contract No.: --

Sample Description :-
Sample I.D. : DP250321-0126-1 Type : Pipe
Nominal size (DN) : 100 Brand : CHF NT
Nominal length : 3000 mm Manufacturer : Cheung Hing Foundry Limited

Laboratory test results
Date sample received : 21-03-2005 Date of test : 10-01-2006

Internal Diameter of Pipe
End Face 1 = 101.9 mm
End Face 2 = 102.9 mm

Remarks :
1. Test results relate only to the specimen tested.
2. Test result comply with Cl. 4.2.4 of BS EN 877 : 1999.

Checked by: W. K. Leung Certified by: K. YEO
B.Sc., C.Eng., MICE, MIMechE
Registered Professional Engineer
General Manager

Form No. : FePipe-ID T 04 29112004

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Straightness of pipes

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Test Certificate
Determination of Straightness of Cast Iron Pipes
(BS EN 877 : 1999 clause 5.2.5)

Date of issue: 18-04-2005 Page 1 of 1 page(s) Castco LRN : DP250321-0126 STS

Details as supplied by client Sample submitted by: Asia Development (1950) Ltd.

Client: Cheung Hing Foundry Ltd. Client's Ref. No.: --
Job Title: -- Contract No.: --

Sample Description :-
Sample I.D. : DP250321-0126-1
Nominal size (DN) : 100 Nominal length : 3000 mm
Brand : CHF NT Manufacturer : Cheung Hing Foundry Ltd

Laboratory test results
Date sample received : 21-03-2005 Date of test : 08-04-2005

| | |
|---|---------|
| Measured straightness of cast iron pipe | 0.23 mm |
|---|---------|

Remark :
1. Test result relate only to the specimens tested.
2. Test result complies with clause 4.2.6 of BS EN 877 : 1999.

Checked by: W. K. LEUNG Certified by: W. K. LEE
B.Sc., C. Eng., MICE, MIMechE
Registered Professional Engineer
General Manager

Form No. : FdPipe-Straight T 44 06/05/2004

Hong Kong Accreditation Service (HKAS) has accredited this laboratory under the Hong Kong Laboratory Accreditation Scheme (HOKLAS) for specific laboratory activities as listed in the HOKLAS Directory of Accredited Laboratories. The results shown in this report were determined by this laboratory in accordance with its terms of accreditation. This report shall not be reproduced unless with prior written approval from this laboratory.

End faces

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Test Certificate
Determination of Perpendicularity of End Faces of Cast Iron Pipes and Fittings
(BS EN 877 : 1999 clause 5.2.6)

Date of issue: 18-04-2005 Page 1 of 1 page(s) Castco LRN : DP250321-0138 EF

Details as supplied by client Sample submitted by: Asia Development (1950) Ltd.

Client: Cheung Hing Foundry Ltd. Client's Ref. No.: --
Job Title: -- Contract No.: --

Sample Description :-
Sample I.D. : DP250321-0138-1
Nominal size (DN) : 100 Type : 88° Bend
Brand : CHF NT Manufacturer : Cheung Hing Foundry Ltd

Laboratory test results
Date sample received : 21-03-2005 Date of test : 06-04-2005

End Face 1
Maximum deviation is 1°

End Face 2
Maximum deviation is 1°

Remark :
1. Test result relate only to the specimens tested.
2. Test result complies with clause 4.2.7 of BS EN 877 : 1999.

Checked by: W. K. LEUNG Certified by: W. K. LEE
B.Sc., C. Eng., MICE, MIMechE
Registered Professional Engineer
General Manager

Form No. : FdPipe-Perpend T 44 06/05/2004

Hong Kong Accreditation Service (HKAS) has accredited this laboratory under the Hong Kong Laboratory Accreditation Scheme (HOKLAS) for specific laboratory activities as listed in the HOKLAS Directory of Accredited Laboratories. The results shown in this report were determined by this laboratory in accordance with its terms of accreditation. This report shall not be reproduced unless with prior written approval from this laboratory.

Length of pipes

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Test Certificate
Measurement of Length of Cast Iron Pipes, Fittings and Accessories
(BS EN 877 : 1999 clause 5.2.7)

Date of issue: 16-04-2005 Page 1 of 1 page(s) Castco LRN : DP250321-0126L

Details as supplied by client Sample submitted by: Asia Development (1950) Ltd.

Client: Cheung Hing Foundry Ltd. Client's Ref. No.: --
Job Title: -- Contract No.: --

Sample Description :-
Sample I.D. : DP250321-0126-1
Nominal size (DN) : 100 Type : Pipe
Brand : CHF NT Nominal length : 3000 mm
Manufacturer : Cheung Hing Foundry Ltd

Laboratory test results
Date sample received : 21-03-2005 Date of test : 08-04-2005

Length of Pipe is 3002 mm

Remarks :
1. Test result relates only to the specimen tested.
2. Length of pipe complies with clause 4.2.8 of BS EN 877 : 1999.

Checked by: W. K. LEUNG Certified by: W. K. LEE
B.Sc., C. Eng., MICE, MIMechE
Registered Professional Engineer
General Manager

Form No. : FdPipe-Length T 44 29/11/2004

Hong Kong Accreditation Service (HKAS) has accredited this laboratory under the Hong Kong Laboratory Accreditation Scheme (HOKLAS) for specific laboratory activities as listed in the HOKLAS Directory of Accredited Laboratories. The results shown in this report were determined by this laboratory in accordance with its terms of accreditation. This report shall not be reproduced unless with prior written approval from this laboratory.

Length of fittings and sealing zone

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Test Certificate
Measurement of Length of Cast Iron Pipes, Fittings and Accessories
(BS EN 877 : 1999 clause 5.2.7)

Date of issue: 07-06-2007 Page 1 of 1 page(s) Castco LRN : DP270526-0415L

Details as supplied by client Sample Submitted by: Asia Development (HK.) Ltd.

Client: Cheung Hing Foundry Ltd. Client's Ref. No.: --
Job Title: -- Contract No.: --

Sample Description :-
Sample I.D. : DP270526-0415
Nominal size (DN) : 100 Type : Anti-siphon P trap (G)
Brand : CHF NT Nominal length : -- mm
Manufacturer : Cheung Hing Foundry Ltd

Laboratory test results
Date sample received : 26-05-2007 Date of test : 05-06-2007

Length of Fitting

| | Length from manufacturer's catalogue (mm) | Measured length (mm) |
|-----|---|----------------------|
| (A) | 333 | 333 |
| (B) | 280 | 282 |
| (C) | 241 | 243 |
| (S) | 80 | 81 |

Remarks :
1. Test result relates only to the specimen tested.
2. Length of fitting or sealing zone complies with clause 4.2.9 of BS EN 877 : 1999.
3. There is a statutory requirement on chapter 123 I Building (Standards of sanitary fittings, plumbing, drainage works and latrines) Regulations that disconnecting trap shall have a water seal of not less than 75mm.

Checked by: K. N. SIT Certified by: TSE WAJ LAI
Quality Manager

Form No. : FdPipe-Length T 44 01/02/2005

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Angle of fittings

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Test Certificate
Determination of Angles of Cast Iron Fittings
(BS EN 877 : 1999 clause 5.2.8)

Date of issue : 07-01-2006 Page 1 of 1 pages Castco LRN : DP251230-0622 AOF

Details as supplied by client Sample Submitted by : Asia Development (HK) Ltd.
Client : Cheung Hing Foundry Limited Client's Ref. No. : --
Job Title : -- Contract No. : --
Sample Description :-
Sample I.D. : DP251230-0622-1
Nominal size (DN) : 100 Type : Bend
Class : -- Nominal angle : 88°
Brand : CHF NT Manufacturer : Cheung Hing Foundry Limited

Laboratory test results
Date sample received : 30-12-2005 Date of test : 31-12-2005

Angle of Fitting = 88° 0'

Remarks :
1. Test result relates only to the specimen tested.
2. Test sample complies with clause 4.2.11 of BS EN 877 : 1999.

Checked by : W. K. LEUNG Certified by : W. L. TSE
Quality Manager

Form No. : FdPpe-Angle T dd 06/05/2004

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Masses

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Test Certificate
Mass Determination of Cast Iron Pipes and Fittings, their Joints and Accessories
(BS EN 877 : 1999 clause 5.3)

Date of issue : 07-01-2006 Page 1 of 1 pages Castco LRN : DP251230-0622 MAS

Details as supplied by client Sample Submitted by : Asia Development (HK) Ltd.
Client : Cheung Hing Foundry Limited Client's Ref. No. : --
Job Title : -- Contract No. : --
Sample Description :-
Sample I.D. : DP251230-0622-1
Nominal size (DN) : 100 Type : 88° Bend
Class : -- Nominal mass : 2.4 kg
Brand : CHF NT Manufacturer : Cheung Hing Foundry Limited

Laboratory test results
Date sample received : 30-12-2005 Date of test : 31-12-2005

| | | |
|----------------|------|----|
| Mass of Sample | 2.40 | kg |
|----------------|------|----|

Remarks :
1. Test result relates only to the specimen tested.
2. Test result complies with clause 4.4 of BS EN 877 : 1999.

Checked by : W. K. LEUNG Certified by : W. L. TSE
Quality Manager

Form No. : FdPpe-Mass T dd 06/05/2004

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Tensile strength

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Test Certificate
Determination of Tensile Strength of Cast Iron Pipes and Fittings
(BS EN 877 : 1999 clause 5.4.1 and 5.4.2 (Method A) with modification)

Date of issue : 21-04-2005 Page 1 of 1 pages Castco LRN : DP250321-0138 TS

Details as supplied by client Sample Submitted by : Asia Development (1950) Ltd.
Client : Cheung Hing Foundry Ltd Client's Ref. No. : --
Job Title : -- Contract No. : --
Sample Description :-
Sample I.D. : DP250321-0138-1
Type : 88° Bend Class : -- Brand : CHF NT
Nominal size (DN) : 100 Manufacturer : Cheung Hing Foundry Ltd

Laboratory test results
Date sample received : 21-03-2005 Date of test : 19-04-2005

Sample cut parallel with the pipe axis

| Cross-sectional Area (mm ²) | Tensile | |
|---|-----------|----------------|
| | Load (kN) | Strength (MPa) |
| 40.41 | 6.8 | 168.3 |

Remark :
1. Test result relates only to the specimens tested.
2. Test result complies with Cl. 4.5.2 of BS EN 877 : 1999.

Checked by : W. K. LEUNG Certified by : W. K. LEE
Registered Professional Engineer
General Manager

Form No. : FdPpe-SP180718ER T dd 06/05/2004

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Brinell hardness

CASTCO 佳力高試驗中心有限公司
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Test Certificate
Brinell Hardness Test of Cast Iron Pipes, Fittings, and Accessories
(BS EN 877 : 1999 Clause 5.5)

Date of issue : 25-04-2005 Page 1 of 1 pages Castco LRN : DP250321-0138 BH

Details as supplied by client Sample Submitted by : Asia Development (1950) Ltd.
Client : Cheung Hing Foundry Ltd Client's Ref. No. : --
Job Title : -- Contract No. : --
Sample description :-
Sample I.D. : DP250321-0138-1
Nominal size (DN) : 100 Type : 88° Bend
Class : -- Manufacturer : Cheung Hing Foundry Ltd
Brand : CHF NT
Brinell hardness testing machine Machine type : HB-3000B Series No. : 0125 (BH01)
Cert. No. : CL140525-13 I.D. No. : NDT-4H-01
Calipers ST-100 I.D. No. : ST-100

Laboratory test results
Date received : 21-03-2005 Date of test : 23-04-2005
Test specimen thickness : 4.3mm Test temperature : 24°C

Sketch of test locations

| Indentation no. | Indentation diameter (2 directions) (mm) | Indentation means (mm) | Corresponding hardness value (HB) | Results |
|-----------------------|--|------------------------|-----------------------------------|---------|
| 1 | 2.60 | 2.59 | 185 | Comply |
| "End of this Section" | | | | |

Remark :
1. Test results relate only to the specimen tested.
2. Test result complies with BS EN 877 Cl. 5.5 and Table 3.

Checked by : W. K. LEUNG Certified by : K. YEO
Technical Manager

Form No. : FdPpe-SP180718ER T dd 06/05/2004

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Ring crush strength of pipes

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Test Certificate
Ring Crush Test of Grey Cast Iron Pipes
(BS EN 877 : 1999 clause 5.6)

Date of issue: 13-04-2005 Page 1 of 1 page(s) Castco LRN: DP25021-0126 RCT

Details as supplied by client
Client: Cheung Hing Foundry Ltd. Sample submitted by: Asia Development (1950) Ltd.
Job Title: -- Client's Ref. No.: --
Contract No.: --
Sample Description: --
Sample I.D.: DP25021-0126-1 Type: Pipe
Nominal size (DN): 100 Manufacturer: Cheung Hing Foundry Ltd.
Brand: CHF NT

Laboratory test results
Date sample received: 21-03-2005 Date of test: 09-04-2005

| Ring | Ring Crush Strength (MPa) | Mean (MPa) |
|------|---------------------------|------------|
| 1 | 481.6 | 449.3 |
| 2 | 403.6 | |
| 3 | 462.6 | |

Remark: 1. Test result relate only to the specimens tested.
2. Test result complies with clause 4.5.2 of BS EN 877 : 1999.

Checked by: W. K. Leung Certified by: W. K. LEE
B.Sc., C. Eng., MICE, MICE Registered Professional Engineer General Manager

Form No. FdPipe-Ring T44 (04/05/2004)

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Internal coatings - resistance to salt spray

CASTCO 佳力高試驗中心有限公司
CASTCO TESTING CENTRE LTD.

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Tel: 2677 2032, 2677 2138 Fax: 2677 0301 E-mail: castco@hoklas.com Website: www.castco.com.hk

Test Certificate
Resistance to Salt Spray of Internal Coating for Cast Iron Pipes and Fittings
(BS EN 877:1999 Clause 5.7.2.1)

Date of issue: 12-09-2005 Page 1 of 1 page(s) Castco LRN: DP250826-0317 IC-RSS

Details as supplied by client
Client: Cheung Hing Foundry Ltd. Sample submitted by: Asia Development (1950) Ltd.
Job Title: -- Client's Ref. No.: --
Contract No.: --
Sample Description: --
Sample I.D.: DP250826-0317 Type: Test Panel
Nominal size (DN): 150 x 100 x 1mm Nominal length: -- m
Brand: -- Manufacturer: Cheung Hing Foundry Ltd.
Coating information: --
Brand: -- Age: --
Manufacturer: -- Sample submitted by: Asia Development (1950) Ltd.

Laboratory test results
Date sample received: 26-08-2005 Date of test: 26-08-2005

| Examination of the test surface | 1 st half | 2 nd half | Compliance: |
|---------------------------------|-----------------------------|-----------------------------|---|
| Sign of deterioration | N.A. | N.A. | -- |
| Blistering | Degree of blistering: 2(S2) | Degree of blistering: 2(S2) | Not exceed rating 3(S3) in accordance with ISO 4628-2 |
| Rusting | Ri Class: 1 | Ri Class: 1 | Not exceed rating Ri 2 in accordance with ISO 4628-3 |

Remarks: 1. The specimen complies with the requirement of BS EN 877:1999 Clause 5.7.2.1 & 5.7.2.7 in blistering.
2. Test results relate to the specimen tested only.

Checked by: W. K. Leung Certified by: W. K. LEE
B.Sc., C. Eng., MICE, MICE Registered Professional Engineer General Manager

Form: FdPipe-IC-RSS T44 (20/04/2004)

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Internal coatings; - resistance to waste water

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Test Certificate
Resistance to Waste Water of Internal Coating for Cast Iron Pipes and Fittings
(BS EN 877 : 1999 Clause 5.7.2.2)

Date of issue: 13-03-2006 Page 1A of 1 page Castco LRN: DP260104-0003 IC-RWW

Details as supplied by client
Client: Cheung Hing Foundry Ltd. Sample submitted by: Asia Development (HK) Ltd.
Job Title: -- Client's Ref. No.: --
Contract No.: --
Sample description: --
Sample I.D.: DP260104-0003-3 Type: 100 and 150 access door
Nominal size (DN): -- Manufacturer: Cheung Hing Foundry Ltd.
Class: -- Brand: CHF NT

Laboratory test results
Date sample received: 04-01-2006 Date of test: 06-01-2006

| Degree of blistering to ISO 4628-2 | Examination immediately after cutting | | Re-examination after 24 hrs at ambient temperature of 21 °C | |
|------------------------------------|---------------------------------------|-----------|---|-----------|
| | Class | Dimension | Class | Dimension |
| Signs of damage | 2 | S2 | 2 | S2 |
| Signs of loss of adhesion | No | | No | |
| Signs of rusting | No | | No | |

Remark: 1. Test result relates to specimen tested.
2. Test result complies with BS EN 877 Cl. 5.7.2.2.
3. This report supersedes previous test certificate of Castco LRN: DP260104-0003 IC-RWW.

Checked by: Y. F. LIE Certified by: K. YEO
Technical Manager

Form No. FdPipe-IC-RWW T44 (20/04/2004)

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Internal coatings; - chemical resistance

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Test Certificate
Chemical Resistance to Internal Coating for Cast Iron Pipes and Fittings
(BS EN 877:1999 Clause 5.7.2.3)

Date of issue: 13-03-2006 Page 1A of 1 page(s) Castco LRN: DP260104-0003 IC-RCR

Details as supplied by client
Client: Cheung Hing Foundry Ltd. Sample submitted by: Asia Development (HK) Ltd.
Job Title: -- Client's Ref. No.: --
Contract No.: --
Sample Description: --
Sample I.D.: DP260104-0003-1,2 Type: 100 and 150 access door
Nominal size (DN): -- Nominal length: -- m
Brand: CHF NT Manufacturer: Cheung Hing Foundry Ltd.
Coating information: --
Brand: -- Age: --
Manufacturer: --

Laboratory test results
Date sample received: 04-01-2006 Date of test: 06-01-2006
Size of specimen ¹: 150 x 100 mm, Size of specimen ²: 150 x 100 mm

| Examination of the test surface | Specimens ¹ At pH 2 | | Compliance |
|---------------------------------|---|-----------------------------|--|
| | Degree of blistering: 2(S2) | Degree of blistering: 2(S2) | |
| Blistering | Degree of blistering: 2(S2) | Degree of blistering: 2(S2) | Degree of blistering shall not exceed rating 3(S3) in accordance with ISO 4628-2 |
| Evaluation | Site of separation (multi-coat system only) | -- | Not exceeding level 1 of table 1 of EN ISO 2409:1992 (E) |
| | Class | 1 | 1 |

Remarks: 1. The specimen complies with the requirement of BS EN 877:1999 Clause 5.7.2.3 in chemical resistance of internal coating.
2. Test results related to the specimen tested only.
3. This report supersedes previous test certificate of Castco LRN: DP260104-0003 IC-RCR.

Checked by: Y. F. LIE Certified by: K. YEO
Technical Manager

Form: FdPipe-IC-RCR T44 (20/04/2004)

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Internal coatings; - dry coating thickness

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HOKLAS

Test Certificate

Internal Coating Thickness of Cast Iron Pipes and Fittings
[BS EN 877:1999 Clause 5.7.2.4]

Date of issue: 19-06-2006
Page 1 of 1 page
Castco LRN: DP260525-0266-IC-CT

Details as supplied by client- Sample submitted by: Asia Development (HK) Ltd
Client: Cheung Hing Foundry Ltd. Client's ref. no.: --
Job title: -- Contract No.: --

Sample Description:-
Sample I.D.: DP260525-0266 Type: 88° Bend
Nominal size (DN): 100 Nominal length: -- m
Brand: CHF NT Manufacturer: Cheung Hing Foundry Ltd.
Coating information:-
Brand: -- Manufacturer: --
Manufacturer specified coating thickness: 40 µm Age: --

Laboratory test results:-
Date sample received: 25-05-2006 Date of test: 08-06-2006

| Pipe / Fitting | Mean Internal Coating Thickness (µm) | Compliance |
|----------------|--------------------------------------|---|
| Specimen | 141.6 | Not less than the minimum factory applied thickness specified by the manufacturer and not exceed 400µm. |

Remarks:
1. Test results relate only to the specimen tested.
2. The specimen complies with the requirement of BS EN 877:1999 Clause 4.6.2 in internal coating thickness.

Checked by: W.K. LEUNG Certified by: KEITH CHOI
From: FHP-IC-CT 01 25/11/2004 C.Eng., M.Eng., MICE Laboratory Engineer

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Internal coatings; - adhesion

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HOKLAS

Test Certificate

Adhesion Test of Internal Coating for Cast Iron Pipes and Fittings
[BS EN 877 : 1999 Clause 5.7.2.5]

Date of issue: 19-06-2006
Page 1 of 1 page
Castco LRN: DP260525-0266-IC-A

Details as supplied by client Sample submitted by: Asia Development (HK) Ltd
Client: Cheung Hing Foundry Ltd. Client's ref. no.: --
Job title: -- Contract no.: --

Sample description :-
Sample I.D.: DP260525-0266 Type: 88° Bend
Nominal size (DN): 100 Manufacturer: Cheung Hing Foundry Ltd.
Brand: CHF NT

Laboratory test results
Date sample received: 25-05-2006 Date of test: 09-06-2006

| Test position | 1 | 2 | 3 |
|----------------|---|---|---|
| Classification | 1 | 1 | 1 |

Remark : 1. Test result relates to specimen tested.
2. Test result comply with BS EN 877 Cl. 4.6.2.

Checked by: W.K. LEUNG Certified by: KEITH CHOI
From: FHP-IC-A 01 25/11/2004 C.Eng., M.Eng., MICE Laboratory Engineer

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Internal coatings; - resistance to temperature cycling

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HOKLAS

Test Certificate

Resistance to Temperature Cycling of Internal Coating for Cast Iron Pipes and Fittings
[BS EN 877 : 1999 Clause 5.7.2.7]

Date of issue: 19-06-2006
Page 1B of 1 pages
Castco LRN: DP260602-0289-IC-RTC

Details as supplied by client Sample submitted by: Asia Development (HK) Ltd
Client: Cheung Hing Foundry Ltd. Client's ref. no.: --
Job title: -- Contract no.: --

Sample description :-
1 No. DN50, DN75, DN100 Cast Iron Pipe; 2 Nos. DN75 x 88 Degree Bend,
1 No. DN100 x 88 Degree Bend; 1 No. DN75 x DN50 Flexible Sewer Coupling,
1 No. DN100 x DN75 Flexible Sewer Coupling; 1 No. DN50 Stainless Steel Coupling,
2 Nos. DN75, DN100 Stainless Steel Coupling

Brand: CHF NT Manufacturer: Cheung Hing Foundry Ltd

Laboratory test results
Date sample received: 02-06-2006 Date of test started: 02-06-2006

Examination of Internal coating

| Sample I.D. | DP260602-0289-1 | DP260602-0289-2 | DP260602-0289-3 | DP260602-0289-4 |
|------------------------------------|-----------------|-----------------|-----------------|-----------------------|
| Sample description | DN 50 Pipe | DN 75 Pipe | DN 100 Pipe | DN75 x 88 Degree Bend |
| Degree of blistering to ISO 4628-2 | 2 S2 | 2 S2 | 2 S2 | 2 S2 |
| Degree of rusting to ISO 4628-3 | R 11 | R 11 | R 11 | R 11 |

Sample I.D.: DP260602-0289-1 DP260602-0289-2 DP260602-0289-3 DP260602-0289-4
Sample description: DN75 x 88 Degree Bend DN100 x 88 Degree Bend
Degree of blistering to ISO 4628-2: 2 S2 2 S2 2 S2
Degree of rusting to ISO 4628-3: R 11 R 11

Sample I.D.: -- Sample I.D.: -- Sample I.D.: -- Sample I.D.: --
Sample description: --
Degree of blistering to ISO 4628-2: --
Degree of rusting to ISO 4628-3: --

Remark : 1. Test result relates to specimen tested.
2. Test result comply with BS EN 877 Cl. 5.7.2.7.
3. This page of report supersedes page 1A of previous test certificate of Castco LRN: DP260602-0289-IC-RTC.

Checked by: Y.F. LIE Certified by: KEITH CHOI
From: FHP-IC-RTC 01 25/11/2004 C.Eng., M.Eng., MICE Laboratory Engineer

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Internal coatings; - resistance to hot water

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HOKLAS

Test Certificate

Resistance to Hot Water of Internal Coating for Cast Iron Pipes and Fittings
[BS EN 877 : 1999 Clause 5.7.2.6]

Date of issue: 19-06-2006
Page 1 of 1 page
Castco LRN: DP260613-0307-IC-RHW

Details as supplied by client Sample submitted by: Asia Development (HK) Ltd
Client: Cheung Hing Foundry Ltd. Client's ref. no.: --
Job title: -- Contract no.: --

Sample description :-
Sample I.D.: DP260613-0307 Type: 88° Bend
Nominal size (DN): 100 mm Manufacturer: Cheung Hing Foundry Ltd.
Class: -- Brand: CHF NT

Laboratory test results
Date sample received: 13-06-2006 Date of started time: 13-06-2006

| Degree of blistering to ISO 4628-2 | |
|------------------------------------|------------------|
| Class | Dimension / size |
| 3 | S2 |

Remark : 1. Test result relates only to specimen tested.
2. Test result complies with BS EN 877 Cl. 5.7.2.6.

Checked by: W.K. LEUNG Certified by: K. YEO
From: FHP-IC-RHW 01 25/11/2004 Technical Manager

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祥興鑄鐵有限公司
CHEUNG HING FOUNDRY (HK) LIMITED

External coatings; - colour

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Test Certificate

Colour of External Coatings for Cast Iron Pipes and Fittings
[BS EN 877 : 1999 Clause 5.7.3.1]

Date of issue: 20-04-2006 Page 1 of 1 pages Castco LRN: DP260403-0171 EC-X-COLOUR

Details as supplied by client

Client: Cheung Hing Foundry Limited Client's ref. no.:
Job title: -- Contract no.:

Sample description

Panel size: 150 x 100 x 1.5 (mm) Brand: Coating on panel to be applied on **CHF** **NT**
Manufacturer: Coating on panel supplied by Cheung Hing Foundry Limited Colour: Reddish Brown

Laboratory test results

Date sample received: 03-04-2006 Date of test: 04-04-2006

| Test specimen no. | Reference trichromatic coordinates (CIE LAB) | Measured readings from colorimeter |
|-------------------|--|---|
| 1 | L* = 37 a* = 24 b* = 16 ΔE = 4.0 | L* = 31.68 a* = 22.85 b* = 16.71 ΔE = 5.32 |
| | 2 | L* = 31.86 a* = 22.86 b* = 16.48 ΔE = 5.27 |
| | | L* = 32.28 a* = 21.77 b* = 15.97 ΔE = 5.28 |

Remark: 1. Test result relates to the specimen tested only.

Checked by: W.K. LEUNG Approved Signatory: K. YEO Technical Manager

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External coatings; - compatibility with other paints

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Test Certificate

Compatibility with other paints of External Coatings for Cast Iron Pipes and Fittings
[BS EN 877 : 1999 Clause 5.7.3.2]

Date of issue: 20-04-2006 Page 1 of 1 pages Castco LRN: DP260403-0171 EC-X-COMPATIBILITY

Details as supplied by client

Client: Cheung Hing Foundry Limited Client's ref. no.:
Job title: -- Contract no.:

Sample description

Panel size: 150 x 100 x 1.5 (mm) Colour: Reddish Brown
Coating applying method: Spraying Brand: Coating on panel to be applied on **CHF** **NT**
Manufacturer: Coating on panel supplied by Cheung Hing Foundry Limited

Laboratory test results

Date sample received: 03-04-2006 Date of test: 04-04-2006
Date of applying finishing paint on test specimen: 28-03-2006

| Test specimen no. | Dry coating thickness of test specimen (μm) | Type of finishing paint | BS requirement on dry coating thickness of finishing paint (μm) |
|-------------------|---|-------------------------------|---|
| 1 | 45 | Alkyd-resin | 50 ± 10 |
| 2 | 48 | Alkyd-resin | 50 ± 10 |
| 3 | 49 | Alkyd-resin | 50 ± 10 |
| 4 | 55 | Acrylic and copolymeric resin | 50 ± 10 |
| 5 | 58 | Acrylic and copolymeric resin | 50 ± 10 |
| 6 | 57 | Acrylic and copolymeric resin | 50 ± 10 |

Crack-and-Test

Test temperature: 22 (22 ± 2°C), Relative humidity 53 % (50-55%)
Cutting edge of blade: Single / Multi-blade

| Test specimen no. | Test position '1' | Test position '2' | Test position '3' |
|-------------------|--|--|--|
| 1 | No. of cut: 0 Spacing of cut: 2 mm Classification: 0 | No. of cut: 0 Spacing of cut: 2 mm Classification: 0 | No. of cut: 0 Spacing of cut: 2 mm Classification: 0 |
| | No. of cut: 0 Spacing of cut: 2 mm Classification: 0 | No. of cut: 0 Spacing of cut: 2 mm Classification: 0 | No. of cut: 0 Spacing of cut: 2 mm Classification: 0 |
| 2 | No. of cut: 0 Spacing of cut: 2 mm Classification: 0 | No. of cut: 0 Spacing of cut: 2 mm Classification: 0 | No. of cut: 0 Spacing of cut: 2 mm Classification: 0 |
| | No. of cut: 0 Spacing of cut: 2 mm Classification: 0 | No. of cut: 0 Spacing of cut: 2 mm Classification: 0 | No. of cut: 0 Spacing of cut: 2 mm Classification: 0 |
| 3 | No. of cut: 0 Spacing of cut: 2 mm Classification: 0 | No. of cut: 0 Spacing of cut: 2 mm Classification: 0 | No. of cut: 0 Spacing of cut: 2 mm Classification: 0 |
| | No. of cut: 0 Spacing of cut: 2 mm Classification: 0 | No. of cut: 0 Spacing of cut: 2 mm Classification: 0 | No. of cut: 0 Spacing of cut: 2 mm Classification: 0 |
| 4 | No. of cut: 0 Spacing of cut: 2 mm Classification: 0 | No. of cut: 0 Spacing of cut: 2 mm Classification: 0 | No. of cut: 0 Spacing of cut: 2 mm Classification: 0 |
| | No. of cut: 0 Spacing of cut: 2 mm Classification: 0 | No. of cut: 0 Spacing of cut: 2 mm Classification: 0 | No. of cut: 0 Spacing of cut: 2 mm Classification: 0 |
| 5 | No. of cut: 0 Spacing of cut: 2 mm Classification: 0 | No. of cut: 0 Spacing of cut: 2 mm Classification: 0 | No. of cut: 0 Spacing of cut: 2 mm Classification: 0 |
| | No. of cut: 0 Spacing of cut: 2 mm Classification: 0 | No. of cut: 0 Spacing of cut: 2 mm Classification: 0 | No. of cut: 0 Spacing of cut: 2 mm Classification: 0 |
| 6 | No. of cut: 0 Spacing of cut: 2 mm Classification: 0 | No. of cut: 0 Spacing of cut: 2 mm Classification: 0 | No. of cut: 0 Spacing of cut: 2 mm Classification: 0 |
| | No. of cut: 0 Spacing of cut: 2 mm Classification: 0 | No. of cut: 0 Spacing of cut: 2 mm Classification: 0 | No. of cut: 0 Spacing of cut: 2 mm Classification: 0 |

Remark: 1. Test result relates to the specimen tested only.
2. Test result complies with BS EN 877 Cl. 4.6.3 - compatibility with other paints.

Checked by: W.K. LEUNG Approved Signatory: K. YEO Technical Manager

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External coatings; - dry coating thickness

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Test Certificate

External Coating Thickness of Cast Iron Pipes and Fittings
[BS EN 877:1999 Clause 5.7.3.4]

Date of issue: 19-06-2006 Page 1 of 1 page(s) Castco LRN: DP260525-0266 EC-CT

Details as supplied by client

Client: Cheung Hing Foundry Ltd. Client's Ref. No.: --
Job Title: -- Contract No.:

Sample Description

Sample ID: DP260525-0266 Type: 88° Bend
Nominal size (DN): 100 Nominal length: -- m
Brand: CHF NT Manufacturer: Cheung Hing Foundry Ltd.
Coating information: --
Brand: -- Manufacturer: --
Manufacturer specified coating thickness: 40 μm Age: --

Laboratory test results

Date sample received: 25-05-2006 Date of test: 08-06-2006

| | Mean External Coating Thickness (μm) | Compliance |
|------------------------|--------------------------------------|---|
| [] Pipe / [√] Fitting | 185.8 | Not less than the minimum factory applied thickness specified by the manufacturer |

Remarks:
1. The specimen complies with the requirement of BS EN 877:1999 Clause 4.6.3 in external coating thickness.
2. Test results related to the specimen tested only.

Checked by: W.K. LEUNG Certified by: KEITH CHOW Laboratory Engineer

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External coatings; - flame resistance

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Test Certificate

Flame Resistance of External Coatings for Cast Iron Pipes and Fittings
[BS EN 877 : 1999 Clause 5.7.3.3]

Date of issue: 20-04-2006 Page 1 of 1 pages Castco LRN: DP260403-0171 EC-X-FLAME

Details as supplied by client

Client: Cheung Hing Foundry Limited Client's ref. no.:
Job title: -- Contract no.:

Sample description

Panel size: 150 x 100 x 1.5 (mm) Colour: Reddish Brown
Coating applying method: Spraying Brand: Coating on panel to be applied on **CHF** **NT**
Manufacturer: Coating on panel supplied by Cheung Hing Foundry Limited

Laboratory test results

Date sample received: 03-04-2006 Date of test: 04-04-2006
Ambient temperature (23±3°C)

| Test specimen no. | Time duration (mins) | Distance of test specimen from radiant heat source (mm) | Reading from radiant thermal meter (W) | Compliance | BS requirement |
|-------------------|----------------------|---|--|------------|--|
| 1 | 2 | 24 | 1.04 | Yes | At least 1.04W (equivalent to 125 J/m² for 2 mins) |
| 2 | 2 | 24 | 1.04 | Yes | |
| 3 | 2 | 24 | 1.04 | Yes | |

Remark: 1. Test result relates to the specimen tested only.
2. Test result complies with BS EN 877 Cl. 4.6.3 - flame resistance.

Checked by: W.K. LEUNG Approved Signatory: K. YEO Technical Manager

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External coatings; - adhesion

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HOKLAS

Test Certificate
Adhesion Test of External Coating for Cast Iron Pipes and Fittings
(BS EN 877 : 1999 Clause 5.7.3.5)

Date of issue : 19-06-2006
Page 1 of 1 page
Castco LRN : DP260525-0266-EC-A

Details as supplied by client
Sample submitted by: Asia Development (HK) Ltd
Client : Cheung Hing Foundry Ltd. Client's ref. no. : --
Job title : -- Contract no. : --

Sample description :-
Sample I.D. : DP260525-0266 Type : 88° Bend
Nominal size (DN) : 100 Manufacturer : Cheung Hing Foundry Ltd.
Brand : CHF NT

Laboratory test results
Date sample received : 25-05-2006 Date of test : 09-06-2006

| Test position | 1 | 2 | 3 |
|----------------|---|---|---|
| Classification | 1 | 1 | 1 |

Remark : 1. Test result relates to specimen tested.
2. Test result comply with BS EN 877 Cl. 4.6.3.

Checked by : W.K. LEUNG
Certified by : KEITH CHOI
C.Eng., M.I.M.E., M.I.C.E.
Laboratory Engineer

Hong Kong Accreditation Service (HKAS) has accredited this laboratory under the Hong Kong Laboratory Accreditation Scheme (HOKLAS) for specific laboratory activities as listed in the HOKLAS Directory of Accredited Laboratories. The results shown in this report were determined by this laboratory in accordance with its terms of accreditation. This report shall not be reproduced unless with prior written approval from this laboratory.

Marking

佳力高試驗中心有限公司
CASTCO TESTING CENTRE LTD.

香港新界粉嶺安樂街29A號 29A, On Chau Street, On Lok Tsuen, Fanling, N.T., Hong Kong
Tel: 2677 0332, 2677 2138 Fax: 2677 0353 E-mail: castco@hoklas.com Website: www.castco.com.hk

HOKLAS

Test Certificate
Visual Inspection of Marking of Cast Iron Pipes and Fittings, their Joints and Accessories
(BS EN 877 : 1999 clause 5.11)

Date of issue : 18-04-2005
Page 1 of 1 page(s)
Castco LRN : DP250321-0138 MARK

Details as supplied by client
Sample submitted by: Asia Development (1950) Ltd.
Client : Cheung Hing Foundry Ltd. Client's Ref. No. : --
Job Title : -- Contract No. : --

Sample Description :-
Sample I.D. : DP250321-0138-1 Type : 88° Bend
Nominal size (DN) : 100 Nominal length : -- mm
Brand : CHF NT Manufacturer : Cheung Hing Foundry Ltd.

Laboratory test results
Date sample received : 21-03-2005 Date of test : 07-04-2005

A. Legible and indelible marking are found for :
(a) Manufacturer's name or mark
(b) Identification of production site
(c) Period of manufacture, coded
(d) Reference to BS EN 877 : 1999
(e) DN or several DN where applicable

B. Additional information for cast-on fittings / buried system / rainwater system installed outside building.
N.A.

Remark :
1. Test result relate only to the specimens tested.
2. Test result complies with clause 4.10 of BS EN 877 : 1999.

Checked by : W.K. LEUNG
Certified by : W.K. LEE
B.Sc., C.Eng., M.I.M.E., M.I.C.E.
Registered Professional Engineer
General Manager

Form No. : FullPipe-Mark, 1.46 96/03/2004

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