

FIRE SECURE
&
FIRE SECURE PUNCH

C A B L E S

FOREWORD

Paramount FireSecure and FireSecure Punch Cables are the most technologically advanced Fire Survival -FS Cables in the world which provide critical additional protection in the event of a fire.

Paramount Cables is one of the few cable brands in the world which has a state of art facility to manufacture Fire Survival Cables holding certificates of conformity by both:

BASEC- British Approvals Service for Cables, and

LPCB- Loss Prevention Certification Board

For all the categories, including **the highest rated category** of Fire Survival Cables, namely **F120**.

Paramount FireSecure and FireSecure Punch Cables are non-toxic, resistant to chemicals, halogen free and are specially designed to maintain long term circuit integrity performance under various combinations of defined fire conditions so as to withstand:

- Resistance to fire of temperature 950°C for duration of 3 hours,
- Resistance to fire with intermittent water spray mimicking fireman's water hose,
- Resistance to fire with mechanical impact mimicking falling stones/ debris,
- Combination of resistance to fire with mechanical impact & water jet spray,
- While limiting the generation of toxic gases and fumes which hinder fire-fighting and rescue operations

Paramount FireSecure and FireSecure Punch Cables are intended for use in fixed installations in high occupancy buildings like airports, underground railways etc and strategically sensitive buildings like defense establishments, industrial areas etc where maintenance of power supply during fire for a minimum defined period of time is crucial.

Fire Resistance Characteristics of Paramount Fire Secure Cables

Paramount FireSecure Cables meet the Category F2 as per BS 7846 and are suitable for continuous operation at 90°C conductor temperature and maximum short circuit temperature of 200° C and meet the following test conditions:

- **Resistance to Fire** : Resistant to fire of temperature 950°C for duration of 3 hours by maintaining the electric circuit continuity of voltage 1000 V between phases (As per IEC-331, it is 750°C for 3 hours).
- **Resistance to Fire with water spray** : Resistant to fire at 650°C with water spray over burned area of the cable with 15 minutes of burning and 15 minutes of water spray.
- **Resistance to Fire with mechanical shock** : Resistant to fire of temperature 950°C with mechanical shock by MS rod of 25mm diameter falling on the cable mounting at regular intervals of 30 seconds for cycle of 15 minutes.

Enhanced Fire Resistance characteristics of Paramount FireSecure Punch Cables

Paramount Fire Secure Punch Cables meet Category F120 of BS 7846, the highest category of performance under fire conditions. In addition to meeting the three critical fire performance tests met by Category F2 cables, F120 category cables are required to meet the test for

- **Resistance to fire with mechanical shock and water spray in combination** : Withstands an extended test procedure which involves testing the cable under fire at temperature of 830°C for 2 hours, with direct mechanical impact by MS rod on the bending point of the cable at regular intervals of 10 Minutes and intermittent water jet spray for 5 minutes at finishing stage.

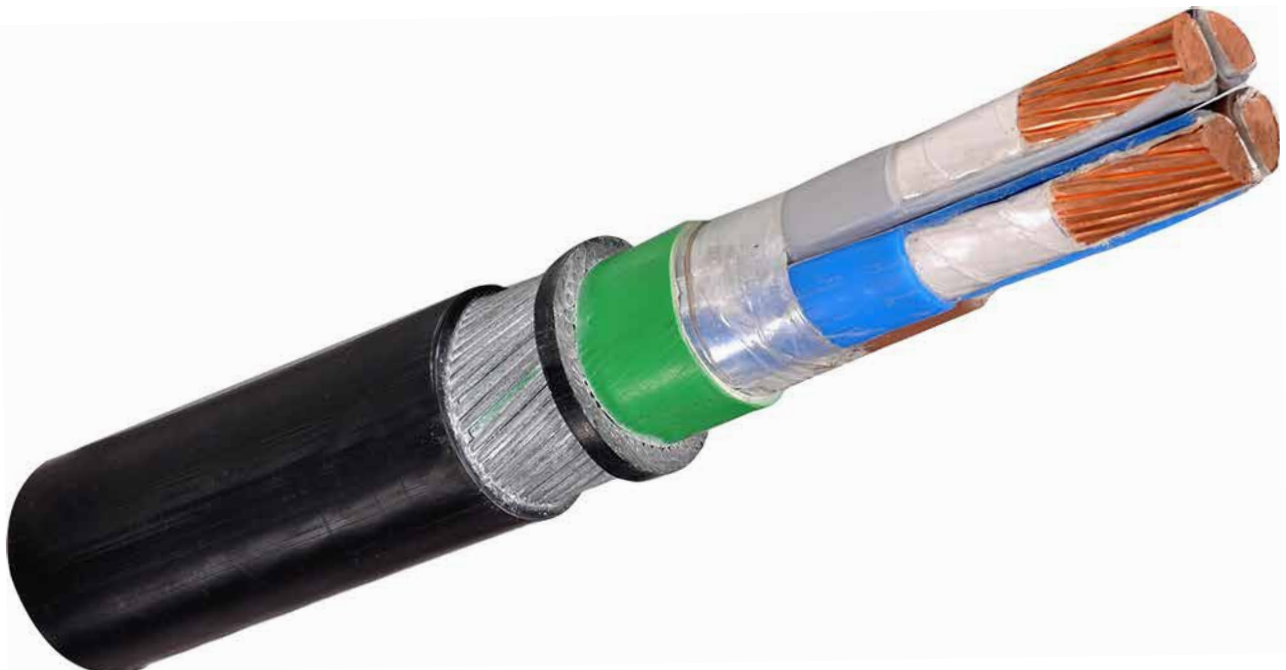
Paramount FireSecure and FireSecure Punch Cables also meet the following international fire performance and other test parameters:

- Minimum 70% light transmission requirement for Smoke emission on burning of cables in a chamber for a duration of 40 minutes as per IEC-61034-2.
- Flame propagation of bunched cables under fire as per IEC-60332-2/IEEE-383.
- Maximum 20% smoke density rating of sheath material tested as per ASTM-2843.
- Critical oxygen index more than 30 at room temperature for sheath material as per ASTM-2863.
- Ultraviolet and thermal stability tests as per DIN-53387.
- Maximum 0.5% Acid gas generation for Sheath material as per IEC-754(P-2).

Construction Details of Paramount FireSecure and FireSecure Punch Cables

Copper conductor, thermosetting polymer insulated, Fire-resistant inner and outer sheath having low emission of smoke and corrosive gases when effected by fire, galvanized steel wire armoured, of voltage 1000 volts in accordance with BS:7846:2009.

Conductor	:	Stranded annealed copper wires as per BSEN: 60228.
Fire Retardant Insulating Barrier	:	Glass Mica tape/tapes applied helically.
Insulation	:	Low Halogen Thermosetting XLPE.
Core Identification by	:	Coloring of cores.
Laying Up of Cores less-than 0.5% by weight.	:	Laid up and lapped with binder having HCL level
Inner Sheath material.	:	Extruded layer of Halogen Free Low Smoke polymeric
Armouring zinc coating	:	Galvanized steel round wire armoured with heavy duty
Outer Sheath material.	:	Extruded layer of Halogen Free Low Smoke polymeric



Fire Performance Testing- An Overview

Fire Performance Tests for Category F2 Fire Survival Cable are:

BS 7846:2009 requires the cables to be tested as per BS 6387:2013 for each of the following three protocols:

- i) Resistance to Fire Alone, Protocol C
- ii) Resistance to Fire & Water, Protocol W
- iii) Resistance to Fire with Mechanical Shock, Protocol Z

Category F2 Cables passing all the three Protocols can therefore also be designated as Category “CWZ”. These tests are described as follows:

(i) Resistance to Fire alone, Protocol C Clause 6 of BS 6387:2013

- Flame Temperature: $950^{\circ}\text{C} \pm 40^{\circ}\text{C}$ for 3 Hours.
- Test Voltage in each Core: 1000 volts
- Test Requirement: No failure of circuit continuity during the test.



Fig 1: Fixture for Resistance to Fire alone, Protocol C

(ii) Resistance to Fire with Water Protocol W, Clause 7 of BS 6387:2013

- Flame Temperature: $650^{\circ}\text{C} \pm 40^{\circ}\text{C}$ for 15 Minutes.
- Test Voltage in each Core: 1000 volts
- Flame and Water Spray on flames: duration 15 Minutes
- Total Duration of Test: 30 Minutes
- Test Requirement: No failure of circuit continuity during the test.



Fig :2 Fixture for Resistance to Fire with Water, Protocol W

(iii) **Resistance to fire with Mechanical Shock-Protocol Z Clause 8 of BS 6387:2013**

- Flame Temperature: $950^{\circ}\text{C} \pm 40^{\circ}\text{C}$ for 15 Minutes.
- Test Voltage in each Core: 1000 volts
- Total Mechanical Shocks: 30 (2 shocks in 1 minute)
- Test Requirement: No failure of circuit continuity during the test.



Fig : 3 Fixture for Resistance to Fire with Mechanical Shock, Protocol Z

Additional Fire Performance Tests for Category F120 Fire Survival Cables as per BS 8491:2008 are:

- Flame Temperature: $830^{\circ}\text{C} +40^{\circ}\text{C} -0^{\circ}\text{C}$ for 120 Minutes.
- Propane Flow Rate: 10 ± 0.4 LPM
- Air Flow Rate: 160 ± 8 LPM Water
- Jet Nozzle Flow Rate: 12.5 Liter / Minute:
- Test Voltage in each Core: 1.0 kv
- Number of Impacts after 10 Minutes: 12
- Initial Water Drenching start time at 115.55 minutes for 5 cycles of 5 seconds each after 1 minute intervals.
- Test Requirement: No failure of circuit continuity during the test.



Fig 4 : Fixture for Assessment of Fire Integrity to BS 8491:2008 Category F120

Note:

If a cable conforms to the requirements for category F120 it shall be deemed to conform to the requirements for categories F30 (30 Minutes, 3 Impacts) & F60 (60 Minutes, 6 Impacts) as the tests are identical except for the test duration and the number of Impacts.

The tests in BS 8491 are applicable to cables having overall diameter greater than 20mm

Constructional & Electrical data for 2 core FS Cable 600/1000 Volts

Nominal Area	Nom. Insulation Thickness	Approx thickness of Innersheath	Nominal Diameter of Armour wire	Nom. Outer sheath Thickness	Approx. Overall diameter	Approx. Net Weight	Max. DC Resistance of conductor at 20°C	Max.AC Resistance of conductor at 90°C	Approx. Reactance (At 50 Hz)	Impedance at 90°C	Current carrying capacity In Ground at 15°C	Current carrying capacity In Air at 30°C	Short circuit of conductor for 1 sec.	Voltage drop DC	Voltage drop 1 Ø AC
mm ²	mm	mm	mm	mm	mm	Kg/KM	Ω/Km	Ω/Km	Ω/Km	Ω/Km	Amps.	Amps.	KA	mV/A/m	mV/A/m
*16	0.7	0.8	1.25	1.5	21.5	1000	1.15	1.47	0.081	1.472	141	118	2.29	2.9	2.9
*25	0.9	0.8	1.25	1.6	25	1300	0.727	0.927	0.079	0.93	183	154	3.58	1.85	1.9
*35	0.9	1	1.6	1.7	28.5	1750	0.524	0.668	0.077	0.672	219	190	5.01	1.35	1.35
50	1	1	1.6	1.8	26.5	1900	0.387	0.494	0.076	0.5	259	229	7.15	0.98	1
70	1.1	1	1.6	1.9	30	2400	0.268	0.342	0.075	0.35	317	288	10.01	0.67	0.69
95	1.1	1.2	2	2	34	3250	0.193	0.247	0.073	0.257	381	355	13.59	0.49	0.52
120	1.2	1.2	2	2.1	37	3810	0.153	0.197	0.073	0.21	433	411	17.16	0.39	0.42
150	1.4	1.2	2	2.2	40	4500	0.124	0.16	0.073	0.176	485	469	21.45	0.31	0.35
185	1.6	1.4	2.5	2.4	46	5750	0.0991	0.128	0.073	0.147	547	541	26.46	0.25	0.29
240	1.7	1.4	2.5	2.5	50	6950	0.0754	0.0989	0.072	0.122	632	639	34.32	0.195	0.24
300	1.8	1.6	2.5	2.6	55	8250	0.0601	0.0802	0.072	0.108	708	728	42.9	0.155	0.21
400	2	1.6	2.5	2.8	60	10200	0.047	0.064	0.071	0.096	799	838	57.2	0.12	0.19

*** Compacted Circular Conductor**

Constructional & Electrical data for 3 core FS Cable 600/1000 Volts

Nominal Area	Nom. Insulation Thickness	Approx thickness of Innersheath	Nominal Diameter of Armour wire	Nom. Outer sheath Thickness	Approx. Overall diameter	Approx. Net Weight	Max.DC Resistance of conductor at 20°C	Max.AC Resistance of conductor at 90°C	Approx. Reactance (At 50 Hz)	Impedance at 90°C	Current carrying capacity In Ground at 15°C	Current carrying capacity In Air at 30°C	Short circuit of conductor for 1 sec.	Voltage drop 3 Ø AC
mm ²	mm	mm	mm	mm	mm	Kg/KM	Ω/Km	Ω/Km	Ω/Km	Ω/Km	Amps.	Amps.	K A	mV/A/m
*16	0.7	0.8	1.25	1.6	22.5	1180	1.15	1.47	0.081	1.472	119	101	2.29	2.5
*25	0.9	1	1.6	1.7	27.5	1750	0.727	0.927	0.079	0.93	152	132	3.58	1.65
*35	0.9	1	1.6	1.8	31	2100	0.524	0.668	0.077	0.672	182	162	5.01	1.15
50	1	1	1.6	1.8	30	2450	0.387	0.494	0.076	0.5	217	196	7.15	0.87
70	1.1	1	1.6	1.9	33	3150	0.268	0.342	0.075	0.35	266	247	10.01	0.64
95	1.1	1.2	2	2.1	38	4250	0.193	0.247	0.073	0.257	319	305	13.59	0.45
120	1.2	1.2	2	2.2	42	5050	0.153	0.197	0.073	0.21	363	353	17.16	0.37
150	1.4	1.4	2.5	2.3	47	6400	0.124	0.16	0.073	0.176	406	404	21.45	0.3
185	1.6	1.4	2.5	2.4	51	7500	0.0991	0.128	0.073	0.147	458	465	26.46	0.26
240	1.7	1.4	2.5	2.6	56	9350	0.0754	0.0989	0.072	0.122	529	549	34.32	0.21
300	1.8	1.6	2.5	2.7	61	11250	0.0601	0.0802	0.072	0.108	592	626	42.9	0.185
400	2	1.6	2.5	2.9	68	13850	0.047	0.064	0.071	0.096	667	720	57.2	0.165

*** Compacted Circular Conductor**

Constructional & Electrical data for 4 core FS Cable 600/1000 Volts

Nominal Area	Nom. Insulation Thickness	Approx thickness of Innersheath	Nominal Diameter of Armour wire	Nom. Outer sheath Thickness	Approx. Overall diameter	Approx. Net Weight	Max.DC Resistance of conductor at 20°C	Max.AC Resistance of conductor at 90°C	Approx. Reactance (At 50 Hz)	Impedance at 90°C	Current carrying capacity In Ground at 15°C	Current carrying capacity In Air at 30°C	Short circuit of conductor for 1 sec.	Voltage drop 3 Ø AC
mm ²	mm	mm	mm	mm	mm	Kg/KM	Ω/Km	Ω/Km	Ω/Km	Ω/Km	Amps.	Amps.	KA	mV/A/m
*16	0.7	0.8	1.25	1.6	22.5	1180	1.15	1.47	0.081	1.472	119	101	2.29	2.5
*25	0.9	1	1.6	1.7	27.5	1750	0.727	0.927	0.079	0.93	152	132	3.58	1.65
*35	0.9	1	1.6	1.8	31	2100	0.524	0.668	0.077	0.672	182	162	5.01	1.15
50	1	1	1.6	1.8	30	2450	0.387	0.494	0.076	0.5	217	196	7.15	0.87
70	1.1	1	1.6	1.9	33	3150	0.268	0.342	0.075	0.35	266	247	10.01	0.64
95	1.1	1.2	2	2.1	38	4250	0.193	0.247	0.073	0.257	319	305	13.59	0.45
120	1.2	1.2	2	2.2	42	5050	0.153	0.197	0.073	0.21	363	353	17.16	0.37
150	1.4	1.4	2.5	2.3	47	6400	0.124	0.16	0.073	0.176	406	404	21.45	0.3
185	1.6	1.4	2.5	2.4	51	7500	0.0991	0.128	0.073	0.147	458	465	26.46	0.26
240	1.7	1.4	2.5	2.6	56	9350	0.0754	0.0989	0.072	0.122	529	549	34.32	0.21
300	1.8	1.6	2.5	2.7	61	11250	0.0601	0.0802	0.072	0.108	592	626	42.9	0.185
400	2	1.6	2.5	2.9	68	13850	0.047	0.064	0.071	0.096	667	720	57.2	0.165

*** Compacted Circular Conductor**

CERTIFICATIONS

BASEC Certificate for BS 7846: Paramount FireSecure and FireSecure Punch Cables

BASEC
BRITISH APPROVAL SERVICE FOR CABLES

Product Certification Schedule

Schedule No: 156001017
 Licensee: PARAMOUNT COMMUNICATIONS LIMITED, PARAMOUNT HOUSE, C-125, NARAINA INDUSTRIAL AREA, PHASE I, NEW DELHI - 110028, INDIA
 Factory: PARAMOUNT COMMUNICATIONS LIMITED, PLOT NO. SP-30A, SP-30B & E-31, RICO INDUSTRIAL AREA, KHUSHKHERA (NEAR BHWADI), VILLAGE & P.O. BUDI BAWAL (KAROLI), DISTRICT: ALWAR, RAJASTHAN, PIN: 301 707 INDIA
 Specification: BS 7846:2009 - Electric cables - Thermosetting insulated, armoured, fire resistant cables of rated voltage 600/1000 V, having low emission of smoke and corrosive gases when affected by fire - Specification
 Type of Cable: Tables 4, 5 & 6 - Two-core, three-core and four-core 600/1000V cables with stranded copper conductors
 HAR Document: Not applicable
 HAR Specification: Not applicable
 Range of Approval: 50sqmm to 400sqmm nominal cross-sectional area of conductors inclusive. Two-core to four-core inclusive. Resistance to fire - Category F120. Sheath L.T.S1. Insulation - GPE.
 Origin Thread: Not applicable
 Origin Mark: PARAMOUNT P-1

PERMISSIBLE MARKS

 **BASEC** 
 YELLOW ACETATE THREAD
 Please refer to the BASEC Product Certification Requirements

Expiry Date: 14/05/2017

Signed for and on behalf of the British Approval Service for Cables:  Date: 08/10/2015
 We confirm that the product conforms to the product of BS 7846:2009 as indicated on the schedule.

LPCB Certificate for category F120: Paramount FireSecure Punch Cables

LPCB
www.lpcb.co.uk

Certificate of Product Approval
 Certificate Number: 1261b Issue: 02

PARAMOUNT COMMUNICATIONS LIMITED
 Plot No. SP-30A, SP-30B & E-31
 RICO Industrial Area
 Khushkhera (near Bhwadi)
 Budi Bawal (Karoli)
 Alwar, Rajasthan
 India
 301707

is authorised to use the LPCB mark in accordance with the provisions listed in this certificate and against its liability in connection with the requirements of the standards listed below.

Product(s)
 Cable Types as listed below:
 FireSecure Punch Cable
 See Certificate Appendix for details

Standard(s) (see Appendix for details)
 BS 6387:2013 (Category CW2)
 EN 50267-2:1999
 EN 61034-2:2005 + A1:2013
 EN 60332-3-24:2009
 BS 8491:2008

This Certificate is maintained and held in force through regular surveillance activities and subject to the corresponding ISO 9001 Certificate being maintained.

Signed for LPCB:  David House, Certification Scheme Manager, 26 November 2014, Date of Issue
 10 November 2014, Date of Test Issue

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LPCB

Appendix to Certificate No: 1261b
PARAMOUNT COMMUNICATIONS LIMITED Issue: 02


Product name FireSecure Punch Cable




Normal size of core and type	Cable Construction	BS 6387	EN 50267-2	EN 61034-2	EN 60332-3-24	EN 50267
10	2, 1.8.4 ¹	EW2	<0.1% HC	<40%	Complete	120min
15	2, 1.8.4 ¹	EW2	<0.1% HC	<40%	Complete	120min
25	2, 1.8.4 ¹	EW2	<0.1% HC	<40%	Complete	120min
35	2, 1.8.4 ¹	EW2	<0.1% HC	<40%	Complete	120min
50	2, 1.8.4 ¹	EW2	<0.1% HC	<40%	Complete	120min
70	2, 1.8.4 ¹	EW2	<0.1% HC	<40%	Complete	120min
95	2, 1.8.4 ¹	EW2	<0.1% HC	<40%	Complete	120min
120	2, 1.8.4 ¹	EW2	<0.1% HC	<40%	Complete	120min
150	2, 1.8.4 ¹	EW2	<0.1% HC	<40%	Complete	120min
185	2, 1.8.4 ¹	EW2	<0.1% HC	<40%	Complete	120min
240	2, 1.8.4 ¹	EW2	<0.1% HC	<40%	Complete	120min
300	2, 1.8.4 ¹	EW2	<0.1% HC	<40%	Complete	120min
400	2, 1.8.4 ¹	EW2	<0.1% HC	<40%	Complete	120min

Uo/U 600/1000 V

Notes:
 1. Stranded conductor only.
 2. The FireSecure Punch Cable, listed also met the requirements of EN 60332-1-2:2004

This Certificate is maintained and held in force through regular surveillance activities and subject to the corresponding ISO 9001 Certificate being maintained.

Signed for LPCB:  David House, Certification Scheme Manager, 26 November 2014, Date of Issue
 10 November 2014, Date of Test Issue

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BASEC Certificate for BS 7846: Paramount FireSecure and FireSecure Punch Cables

LPCB®

www.lpcb.co.uk

Certificate of Product Approval

Certificate Number: 1261a

Issue: 02

PARAMOUNT COMMUNICATIONS LIMITED

Plot No. SP-30A, SP-30B & E-31
RBCO Industrial Area
Khushkhara (near Bhiwadi)
Budi Bawal (Karnali)
Alwar, Rajasthan
India
301707

is authorised to use the LPCB mark in accordance with the products listed in this certificate and appendix having complied with the requirements of the standards detailed below.

Product(s)

Cable Types as listed below:
FireSecure Cable
See Certificate Appendix for details

Standard(s) (see Appendix for details)
BS 6387:2013 (Category CW2)
EN 50267-2-1:1999
EN 61034-2:2005 + A1:2013
EN 60332-3-24:2009

This Certificate is maintained and held in force through regular surveillance activities and subject to the corresponding ISO 9001 Certificate being maintained.

David Hoare

26 November 2014

10 November 2014

Signature of LPCB

Certification Scheme Manager

Date of Issue

Date of First Issue

LPCB

UKAS

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BS 1345 Rev. 9.2

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Appendix to Certificate No: 1261a

PARAMOUNT COMMUNICATIONS LIMITED

Issue: 02

Product Name

FireSecure Cable

LPCB Ref
Tb1

1261a01

Mineral Insulation (mm²)	Cable Construction	BS 6387	EN 50267-2-1	EN 61034-2	EN 60332-3-24
10	2, 3 x 0.4"	CW2	+0.5% HC1	+0.5%	Complies
70	2, 3 x 0.4"	CW2	+0.5% HC1	+0.5%	Complies
95	2, 3 x 0.4"	CW2	+0.5% HC1	+0.5%	Complies
120	2, 3 x 0.4"	CW2	+0.5% HC1	+0.5%	Complies
150	2, 3 x 0.4"	CW2	+0.5% HC1	+0.5%	Complies
185	2, 3 x 0.4"	CW2	+0.5% HC1	+0.5%	Complies
240	2, 3 x 0.4"	CW2	+0.5% HC1	+0.5%	Complies
300	2, 3 x 0.4"	CW2	+0.5% HC1	+0.5%	Complies
400	2, 3 x 0.4"	CW2	+0.5% HC1	+0.5%	Complies

Uo/U 600/1000 V

Notes:
1. Stranded conductor only.
2. The FireSecure Cables listed also meet the requirements of EN 60332-1-2: 2004

This Certificate is maintained and held in force through regular surveillance activities and subject to the corresponding ISO 9001 Certificate being maintained.

David Hoare

26 November 2014

10 November 2014

Signature of LPCB

Certification Scheme Manager

Date of Issue

Date of First Issue

LPCB

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ISO 9001 & 14001 Certified



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