DNV·GL

KEMA TYPE TEST CERTIFICATE OF COMPLETE TYPE TESTS

Object	Multi-core power cable		**1036-17**
Type	PVC/SWA/PVC/XLPE/mica/CU	**Serial No.**	

Rated voltage, U_0/U (U_m)	0,6/1,0 (1,2) kV	Conductor material	Cu
Conductor cross-section	4x50+1x25 mm^2	Insulation material	XLPE

Manufacturer	KEI Industries Ltd., SP-919, 920 & 922, Phase-III, RIICO Industrial Area, Bhiwadi (Rajasthan), India *)
Client	KEI Industries Ltd., Rajasthan, India
Tested by	DNV GL Netherlands B.V., Arnhem, the Netherlands
Date of tests	20 December 2016 to 20 February 2017

The object, constructed in accordance with the description, drawings and photographs incorporated in this Certificate, has been subjected to the series of proving tests in accordance with the complete type test requirements of

IEC 60502-1 (2009) subclauses 17 and 18

This Certificate has been issued by DNV GL following exclusively the STL Guides.

The results are shown in the record of proving Tests and the oscillograms attached hereto. The values obtained and the general performance are considered to comply with the above standard(s) and to justify the ratings assigned by the manufacturer as listed on page 5.

This Certificate applies only to the object tested. The responsibility for conformity of any object having the same type references as that tested rests with the Manufacturer.
*) as declared by the manufacturer

This Certificate consists of 34 pages in total.

DNV GL Netherlands B.V.

J.P. Fonteijne
Executive Vice President
KEMA Laboratories

KEMA Laboratories Arnhem, 28 February 2017

INFORMATION SHEET

1 KEMA Type Test Certificate

A KEMA Type Test Certificate contains a record of a series of (type) tests carried out in accordance with a recognized standard. The equipment tested has fulfilled the requirements of this standard and the relevant ratings assigned by the manufacturer are endorsed by DNV GL. In addition, the test object's technical drawings have been verified and the condition of the test object after the tests is assessed and recorded. The Certificate contains the essential drawings and a description of the equipment tested. A KEMA Type Test Certificate signifies that the object meets all the requirements of the named subclauses of the standard. It can be identified by gold-embossed lettering on the cover and a gold seal on its front sheet.
The Certificate is applicable to the equipment tested only. DNV GL is responsible for the validity and the contents of the Certificate. The responsibility for conformity of any object having the same type references as the one tested rests with the manufacturer.
Detailed rules on types of certification are given in DNV GL's Certification procedure applicable to KEMA Laboratories.

2 KEMA Report of Performance

A KEMA Report of Performance is issued when an object has successfully completed and passed a subset (but not all) of test programmes in accordance with a recognized standard. In addition, the test object's technical drawings have been verified and the condition of the test object after the tests is assessed and recorded. The report is applicable to the equipment tested only. A KEMA Report of Performance signifies that the object meets the requirements of the named subclauses of the standard. It can be identified by silver-embossed lettering on the cover and a silver seal on its front sheet.
The sentence on the front page of a KEMA Report of Performance will state that the tests have been carried out in accordance with ..... The object has complied with the relevant requirements.

3 KEMA Test Report

A KEMA Test Report is issued in all other cases. Reasons for issuing a KEMA Test Report could be:

- Tests were performed according to the client's instructions.
- Tests were performed only partially according to the standard.
- No technical drawings were submitted for verification and/or no assessment of the condition of the test object after the tests was performed.
- The object failed one or more of the performed tests.

The KEMA Test Report can be identified by the grey-embossed lettering on the cover and grey seal on its front sheet.
In case the number of tests, the test procedure and the test parameters are based on a recognized standard and related to the ratings assigned by the manufacturer, the following sentence will appear on the front sheet. The tests have been carried out in accordance with the client's instructions. Test procedure and test parameters were based on ..... If the object does not pass the tests such behaviour will be mentioned on the front sheet. Verification of the drawings (if submitted) and assessment of the condition after the tests is only done on client's request.
When the tests, test procedure and/or test parameters are not in accordance with a recognized standard, the front sheet will state the tests have been carried out in accordance with client's instructions.

4 Official and uncontrolled test documents

The official test documents of DNV GL are issued in bound form. Uncontrolled copies may be provided as loose sheets or as a digital file for convenience of reproduction by the client. The copyright has to be respected at all times.

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1 IDENTIFICATION OF THE TEST OBJECT

1.1 Ratings/characteristics of the object tested

Rated voltage, U_0/U (U_m)	0,6/1,0 (1,2) kV
Rated maximum conductor temperature in normal operation	90 °C
Rated conductor cross-section	50+25 mm²

1.2 Description of the test object

Standard	IEC 60502-1:2004 +A1:2009
Manufacturer	KEI Industries Ltd., Rajasthan, India
Type	XLPE Cable
Manufacturing year	2016
Sampling procedure	by the manufacturer
Rated voltage, U_0/U	0,6/1,0 (1,2) V
No. of cores	5
Marking on the cable	KEI CABLE ELECRIC 0,6/1,0 (1,2) KV 4Cx50+Ex25 SQMM IEC 60502-1 XLPE/FR PVC 2016

Conductor

• material	copper conductor, untinned
• cross-section	main cores 50 mm² earth cores 25 mm²
• nominal diameter	main cores 8,7 mm earth cores 6,6 mm
• type	class 2, round compacted
• number and nominal diameter of wires	main cores 7 x Ø 3,02 mm earth cores 7 x Ø 2,20 mm
• maximum conductor temperature in normal operation	90 °C

Insulation

• material	XLPE
• nominal thickness	main cores 1,00 mm earth cores 0,90 mm
• material designation	known in KEMA Laboratories' files
• material supplier	known in KEMA Laboratories' files
• core identification	red / yellow / blue / black / yellow-green

Filler

• material	polypropylene

Binder

• material	polyester tape

Inner covering

• type	PVC, ST_2
• material	PVC-ST-2
• approximate thickness	0,4 mm

Metallic armour

• material	galvanized steel wire
• number of wires	49 (approx)
• nominal diameter / dimensions	2,0 mm
• material supplier	known in KEMA Laboratories' files

Oversheath

• material	PVC, type ST_2
• nominal thickness	2,1 mm
• outer diameter of cable	41,0 mm
• material designation	PVC-ST-2
• material supplier	known in KEMA Laboratories' files
• colour	black

Fire retardant yes

Manufacturing details insulation system

• location of manufacturing	KEI Industries Ltd., SP-919, 920 & 922, Phase-III, RIICO Industrial Area, Bhiwadi (Rajasthan), India
• factory identification of extrusion line	VCV/HCV/MDCV/CCV
• type of extrusion	triple common extrusion / triple extrusion long die
• manufacturer of the extrusion line	known in KEMA Laboratories' files
• identification of the production batch	known in KEMA Laboratories' files
• manufacturing length (where cable sample for testing has been taken from)	known in KEMA Laboratories' files
• length markings on cable sample sent to KEMA Laboratories	begin: 0000 m, end: 0063 m

1.3 List of documents

The manufacturer has guaranteed that the object submitted for tests has been manufactured in accordance with the following drawings and/or documents. KEMA Laboratories has verified that these drawings and/or documents adequately represent the object tested. The manufacturer is responsible for the correctness of these drawings and/or documents and the technical data presented.

The following drawings and/or documents have been included in this Certificate

Drawing no./document no.	Revision
KEVDW/4C + E Sqmm	B
2029203EL0018-000-EL-D09-00D1	C

2 GENERAL INFORMATION

2.1 The tests were witnessed by

The tests were carried out without a representative of the client present.

2.2 The tests were carried out by

Name	Company
B. Vos	DNV GL Netherlands B.V.,
E.F. Rijpstra	Arnhem, the Netherlands

2.3 Subcontracting

All tests were subcontracted to DNV GL – New Energy Technology, Arnhem, the Netherlands.

2.4 Purpose of test

Purpose of the test was to verify whether the material complies with the specified requirements.

2.5 Measurement uncertainty

A table with measurement uncertainties is enclosed in this Certificate Unless otherwise stated, the measurement uncertainties of the results presented in this Certificate are as indicated in that table.

3 CONDUCTOR

Standard and date

Standard IEC 60502-1 clause 5
Test dates 20 and 21 December 2016

3.1 Measurement of the resistance of the conductor

Item	Unit	Requirement	Measured/determined			
			Red	Black	Blue	Green/yellow
Resistance main	Ω/km	≤ 0,387	0,387	0,387	0,387	-
Resistance earth	Ω/km	≤ 0,727	-	-	-	0,717

Result
The object passed the test.

3.2 Measurement of the number of wires of the conductor

Item	Unit	Requirement	Measured/determined			
			Red	Black	Blue	Green/yellow
Number of wires	-	≥ 6	7	7	7	7

Result
The object passed the test.

3.3 Measurement of the diameter of the conductor

Item	Unit	Requirement	Measured/determined			
			Red	Black	Blue	Green/yellow
Diameter	mm	-	8,4	8,4	8,4	6,4

Result
The result is for information only.

4 ELECTRICAL TYPE TESTS

4.1 Measurement of insulation resistance at ambient temperature

Standard and date

Standard IEC 60502-1, clause 17.1

Test dates 20 and 21 December 2016

Item	Unit	Requirement	Measured/determined			
			Red	Black	Blue	Green/yellow
Volume resistivity, ρ at 20 °C	Ω.cm	-	$7{,}16^{E}+15$	$3.62^{E}+15$	$8.9^{E}+15$	$1{,}8^{E}+16$
Insulation resistance constant, K_i at 20 °C	MΩ.km	-	$7{,}16\text{x}10^{15}$ 26305	$3{,}62\text{x}10^{15}$ 13306	$8{,}9\text{x}10^{15}$ 32958	$1{,}8\text{x}10^{15}$ 67773

Result

The test results are for information only.

4.2 Measurement of insulation resistance at max. conductor temperature

Standard and date

Standard IEC 60502-1, clause 17.2

Test dates 20 and 21 December 2016

Item	Unit	Requirement	Measured/determined			
			Red	Black	Blue	Green/yellow
Volume resistivity, ρ at 90 °C	Ω.cm	≥ 10^{12}	1,2^{E}+16	2,5^{E}+16	7,1^{E}+15	6,0^{E}+15
Insulation resistance constant, K_i at 90 °C	MΩ.km	≥ 3,67	1,2x10^{16} 44627	2,5x10^{16} 94371	7,1x10^{15} 26101	6,0x10^{15} 22186

Result

The object passed the test.

4.3 Voltage test for 4 h

Standard and date

Standard IEC 60502-1, clause 17.3
Test date 3 January 2017

Environmental conditions

Temperature 20 ± 15 °C
Temperature of test object 20 °C

Applied voltage kV	Frequency Hz	Duration h	Measured/determined
2,4	50	4	No breakdown

Requirement

No breakdown of the insulation shall occur.

Result

The object passed the test.

5 NON-ELECTRICAL TYPE TESTS

5.1 Measurement of thickness of insulation

Standard and date

Standard IEC 60502-1, clause 18.1

Test date 21 December 2016

Thickness	Unit	Requirement	Specified	Measured/determined			
				Red	Black	Blue	Green/yellow
Nominal main	mm	-	1,0	-	-	-	-
Average main	mm	≥ 1,0	-	1,7	1,2	1,6	-
Minimum (t_m) main	mm	≥ 0,80	-	1,53	1,04	1,42	-
Nominal earth	mm	-	0,9	-	-	-	-
Average earth	mm	≥ 0,9	-	-	-	-	2,2
Minimum (t_m) earth	mm	≥ 0,71	-	-	-	-	2,00

Result

The object passed the test.

5.2 Measurement of thickness of non-metallic sheaths

Standard and date

Standard IEC 60502-1, clause 18.2
Test date 21 December 2016

Oversheath

Thickness	Unit	Requirement	Specified	Measured/determined
Nominal	mm	≥ 1,8	2,1	-
Average	mm	-	-	2,6
Minimum (t_m)	mm	≥ 1,48	-	2,30

Result

The object passed the test.

5.3 Tests for determining the mechanical properties of insulation before and after ageing

Standard and date

Standard IEC 60502-1, clause 18.3
Test dates 12 to 25 January 2017

Characteristic test data

Temperature during ageing 135 ± 3 °C
Ageing duration 7 days

Item	Unit	Requirement	Measured/determined			
			Red	Black	Blue	Green/yellow
Without ageing						
Tensile strength	N/mm²	≥ 12,5	23,1	18,2	24,1	22,3
Elongation at break	%	≥ 200	608	455	551	553
After ageing						
Tensile strength	N/mm²	-	24,8	17,4	25,8	25,1
Variation with samples without ageing	%	± 25 max.	7	-4	7	13
Elongation	%	-	565	420	533	573
Variation with samples without ageing	%	± 25 max.	-7	-8	-3	4

Result

The object passed the test.

5.4 Tests for determining the mechanical properties of non-metallic sheaths before and after ageing

Standard and date

Standard IEC 60502-1, clause 18.4
Test dates 12 to 23 January 2017

Characteristic test data (oversheath)

Temperature during ageing 100 ± 2 °C
Ageing duration 7 days

Oversheath

Item	Unit	Requirement	Measured/determined
Without ageing			
Tensile strength	N/mm²	≥ 12,5	18,7
Elongation	%	≥ 150	214
After ageing			
Tensile strength	N/mm²	≥ 12,5	19,8
Variation with samples without ageing	%	± 25 max.	6
Elongation	%	≥ 150	216
Variation with samples without ageing	%	± 25 max.	1

Result

The object passed the test.

5.5 Additional ageing test on pieces of completed cables

Standard and date

Standard IEC 60502-1, clause 18.5

Test dates 12 to 25 January 2017

Characteristic test data

Temperature during ageing 100 ± 2 °C

Ageing duration 7 days

Insulation

Item	Unit	Requirement	Measured/determined			
			Red	Black	Blue	Green/yellow
Tensile strength	N/mm²	-	18,2	16,1	22,5	23,3
Variation with samples without ageing	%	± 25 max.	-21	-12	-7	4
Elongation	%	-	610	451	514	607
Variation with samples without ageing	%	± 25 max.	0	-1	-7	10

Oversheath

Item	Unit	Requirement	Measured/determined
Tensile strength	N/mm²	≥ 12,5	19,0
Variation with samples without ageing	%	± 25 max.	2
Elongation	%	≥ 150	227
Variation with samples without ageing	%	± 25 max.	6

Result

The object passed the test.

5.6 Loss of mass test on PVC sheaths of type ST_2

Standard and date

Standard IEC 60502-1, clause 18.6
Test dates 4 January 2017

Characteristic test data

Temperature during ageing 100 ± 2 °C
Duration 7 days

Oversheath

Item	Unit	Requirement	Measured/determined
Loss of mass	mg/cm^2	≤ 1,5	1,1

Result

The object passed the test.

5.7 Pressure test at high temperature on non-metallic sheaths

Standard and date

Standard	IEC 60502-1, clause 18.7
Test date	9 January 2017

Characteristic test data (oversheath)	
Temperature during ageing	90 ± 2 °C
Duration	6 h
Load	8 N

Oversheath

Item	Unit	Requirement	Measured/determined
Depth of indentation	%	≤ 50	26

Result

The object passed the test.

5.8 Test on PVC insulation and sheaths and halogen free sheaths at low temperatures

Standard and date

Standard	IEC 60502-1, clause 18.8
Test dates	9 and 10 January 2017

Characteristic test data (oversheath)

Temperature	-15 ± 2	°C
Period of application	>16	h
Mass of hammer	1000	g

Oversheath

Item	Unit	Requirement	Measured/determined
Cold elongation	%	≥ 20	76
Cold impact test	-	No cracks	No cracks

Result

The object passed the test.

5.9 Test for resistance of PVC insulation and sheaths to cracking (heat shock test)

Standard and date

Standard	IEC 60502-1, clause 18.9
Test date	11 January 2017

Characteristic test data (oversheath)

Temperature	150 ± 3 °C
Period of application	1 h
Diameter of mandrel	6 mm
Number of turns	6

Oversheath

Item	Unit	Requirement	Measured/determined
Soundness	-	No cracks	No cracks

Result

The object passed the test.

5.10 Hot set test for XLPE insulation

Standard and date

Standard IEC 60502-1, clause 18.11
Test date 12 January 2017

Characteristic test data

Temperature	200 ± 3	°C
Time under load	15	min
Mechanical stress	20	N/cm^2

Item	Unit	Requirement	Measured/determined			
			Red	Black	Blue	Green/yellow
Elongation under load	%	≤ 175	73	70	76	78
Permanent elongation	%	≤ 15	4	5	5	6

Result

The object passed the test.

5.11 Water absorption test on insulation

Standard and date

Standard IEC 60502-1, clause 18.13
Test dates 15 December 2016 to 5 January 2017

Characteristic test data

Temperature 85 ± 2 °C
Duration 14 days

Item	Unit	Requirement	Measured/determined			
			Red	Black	Blue	Green/yellow
Variation of mass	mg/cm^2	≤ 1	0,08	0,06	0,05	0,07

Result

The object passed the test.

5.12 Fire tests

5.12.1 Flame spread test on single cables

Standard and date

Standard IEC 60502-1, clause 18.14.1
Test date 30 January 2017

Characteristic test data

Duration 120 s

Item	Unit	Requirement	Measured/determined
Length free of charring	mm	> 50	470
Downward limit charred surface	mm	< 540	481

Result

The object passed the test.

5.13 Shrinkage test for XLPE insulation

Standard and date

Standard IEC 60502-1, clause 18.16
Test date 12 January 2017

Characteristic test data

Temperature 130 ± 3 °C
Duration 1 h

Item	Unit	Requirement	Measured/determined			
			Red	Black	Blue	Green/yellow
Shrinkage	%	≤ 4	1,5	3	1,5	1,5

Result

The object passed the test.

6 VERIFICATION OF CABLE CONSTRUCTION

Verification of cable construction was carried out in accordance with clauses 5-13 of IEC 60502-1. The results are presented below.

	Observed/determined
Marking on the cable	KEI CABLE ELECTRIC 0,6/1 kV (1,2 Kv) 4Cx50+Ex25 SQMM IEC 60502-1 XLPE/FR PVC 2016
Construction	Copper conductor compacted class 2 • main core 1-6 Ø 3,02 • earth core 1-6 Ø 2,20
	Mica tape double layer
	XLPE insulation
	Polypropylene filler
	Synthetic binder tape and cord
	Inner covering, type ST2
	Steel wire armour 49 st Ø 2,0 approx.
	Outer sheath, type ST2
Outer diameter of the cable, average	43,5 mm approx.
Outer diameter of the cores, average	Red: 12,0 mm approx. Black: 12,0 mm approx. Blue: 12,0 mm approx. Green/yellow: 12,0 mm approx.

Result

No significant deviations from the specified requirements are found.

7 ADDITIONAL TESTS

7.1 Tests on armour

Standard and date

Standard EN 10257-1
Test dates 4 January to 20 February 2017

7.1.1 Tensile strength and elongation

Characteristic test data

Speed tensile test	250	mm/s
Diameter of wires	2,0	mm
Amount of tested wires	5	

Item	Unit	Requirement	Measured/determined
Tensile strength	N/mm²	340 ≤ F ≤ 500	442
Elongation	%	≥ 10	15 (mean)
Variation within one batch	N/mm²	≤ 150	93

Result

The object passed the test.

7.1.2 Torsion

Characteristic test data

Gauge length	150	mm
Diameter of wires	2,0	mm
Amount tested wires	5	

Item	Unit	Requirement	Measured/determined
Minimum number of turns	-	≥ 30	44

Result

The object passed the test.

7.1.3 Measurement of the diameter of steel armour wire

Item	Unit	Requirement	Measured/determined
Diameter	mm	1,9950 ≤ d ≤ 2,0050	2,0000 (mean)

Result
The object passed the test.

7.1.4 Measurement of the mass of zinc coating of galvanized steel wire

Item	Unit	Requirement	Measured/determined
Mass of zinc	g/m^2	≥ 155	162

Result
The object passed the test.

7.1.5 Measurement of the resistance of steel armour wire

Item	Unit	Requirement	Measured/determined
Resistance	Ω/km	≤ 43,93	0,78

Result
The object passed the test.

7.2 Minimum thermal stability at 200 °C

Standard and date

Standard IEC 60811-405
Test date 6 February 2017

Characteristic test data

Temperature 200 ± 0,5 °C
Number of samples 3
Weight of sample 50 ± 5 mg
Change in pH-value 5 to 3

Item	Unit	Requirement	Measured/determined
Thermal stability	min	≥ 100	168

Result

The object passed the test.

7.3 Measuring the minimum oxygen concentration to support candle-like combustion of plastics

Standard and date

Standard	ASTM D 2863
Test date	9 February 2017

Characteristic test data

Temperature during test	22 °C
Dimensions	1,85 mm x 10 mm x 100 mm (type III)
Gas measurement accuracy	0,1%
Ignition procedure	Top surface ignition (method A)

Oversheath

Item	Unit	Requirement	Measured/determined
As received			
Oxygen Index*	%	≥ 28	Approx.30,5 (charring behaviour)

* Measuring the minimum oxygen concentration to support candle-like combustion of plastics (Oxygen index)

Note

The test results relate only to the behaviour of the test specimens under the conditions of this test method and these results may not be used to infer the fire hazards of the material in other forms or under other fire conditions.

Result

The object passed the test.

7.4 Measuring the minimum temperature index

Standard and date

Standard	Client's instructions
Test date	14 February 2017

Characteristic test data

Temperature during test	22 °C
Dimensions	1,85 mm x 10 mm x 100 mm (type III)
Gas measurement accuracy	0,1%
Ignition procedure	Top surface ignition (method A)

Oversheath

Item	Unit	Requirement	Calculated
As received			
Oxygen Index*	%	≥ 21	Approx.25% at 250 °C

* Measuring the minimum oxygen concentration to support candle-like combustion of plastics (Oxygen index)

Note

The result was calculated by instruction of the client. Multiple measurements at 25, 50, 75, 100, 125 °C where carried out and the oxygen index at 250 °C was extrapolated.
The test results relate only to the behaviour of the test specimens under the conditions of this test method and these results may not be used to infer the fire hazards of the material in other forms or under other fire conditions.

Result

The object passed the test as per client's requirements.

8 DRAWING

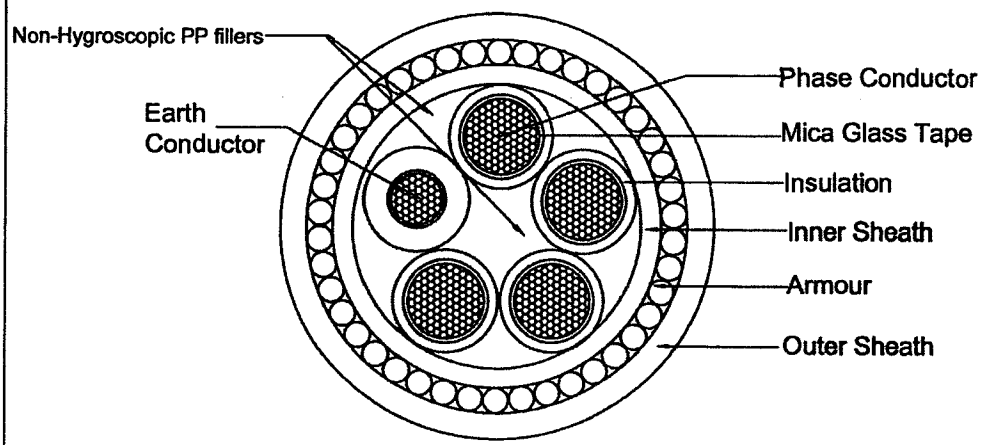
KEI Wires and Cables
The power behind the power

Doc.no.:- 2029203EL0018-000-EL-B02-0001

Rev.No.:- B

600/1000V, 4Cx25 + 1Ex16 Sqmm
4Cx35 + 1Ex16 Sqmm
4Cx50 + 1Ex25 Sqmm
4Cx70 + 1Ex35 Sqmm
4Cx95 + 1Ex50 Sqmm
4Cx120 + 1Ex70 Sqmm

as per IEC 60502-1



CABLE DETAILS

1.Conductor - Stranded (Class 2) Annealed Plain Copper

2.Mica Glass Tape

3.Insulation - Cross Linked polyethylene (XLPE)

4.Inner Sheath - Extruded PVC Type ST-2 Compound

5.Armour - Galvanized Steel Round Wire

6.Outer Sheath - Extruded Flame Retardant PVC Type ST-2 Compound

KEI Industries Ltd, India

Drawing No. - KEI/DWG/4C+E Sqmm	Not to Scale

KEI

Petrofac

DOC.TITLE

DATA SHEET FOR LV CABLES - COMMON

PAGE

LOWER FARS HEAVY OIL DEVELOPMENT PROGRAM PHASE-1 (60 MBOPD)

Company Proj. No.: EF/1852

Contract NO.15050901 | DOC.NO. : | 2029203EL0018-000-EL-D09-0001

REV.: C

DATA SHEET FOR 0.6/1kV POWER CABLES (NON-LEAD SHEATHED)-FIRE RESISTANT

CABLE CHARACTERISTICS ITEM	UNIT	CABLE SIZES 4Cx50+Ex25
1) CONDUCTOR		
Diameter of conductor wire (approx)	mm	8.1 / 6.0
No. of conductor wires (minimum)		6
2) INSULATION		
Insulation thickness (nominal)	mm	1.0 / 0.9
Insulation thickness (minimum)	mm	0.8 / 0.71
Diameter over laid assembly (approx)	mm	29.2
3) LEAD SHEATH		
Lead Sheath thickness (nominal)	mm	NA
Lead Sheath thickness (minimum)	mm	NA
Diameter over lead sheath	mm	NA
4) BEDDING (INNER SHEATH)		
Inner sheath thickness (nominal)	mm	NA
Inner sheath thickness (minimum)	mm	0.4
5) ARMOUR		
Armour wire dia.	mm	2.0
No. of armour wires (approx.)	No.	43
Diameter under armour (approx.)	mm	30.6
Diameter over armour (approx.)	mm	34.6
6) OUTER SHEATH		
Outer sheath thickness (nominal)	mm	2.1
Outer sheath thickness (minimum)	mm	1.48
Overall Diameter	mm	39.2
Tolerance on O.D. of cable	±mm	± 2
7) PACKING		
Maximum cable Drum length	meters	500
Positive Tolerance on drum cable length		2%
Cable Weight (Approx.)	Kg/km	3577
Drum Weight (Empty woden drm) Aprox. (Cable shall be delivered in Non-returnable type drums as per clause 6.1.7(C) of KOC-E-023.	kG	250 (Steel)
Size of Wooden Drum (H x W) Approx.	mm	1600 x 850
Minimum Pulling tension	kG	50 N/MM²
Min. Bending Radius (No. x Diameter)	mm	12 x OD
8) ELECTRICAL PARAMETERS		
Max. DC resistance at 20°C	ohm/km	0.387 / 0.727
Max. DC resistance at 90°C	ohm/km	0.495 / 0.930
Approx. AC resistance at 90°C	ohm/km	0.495 / 0.930
Approx. Reactance at 50Hz	ohm/km	0.078
Approx. capacitance	µF/km	0.24
Cable charging current at nom. V&Hz	A/km	0.045
DC resistance of armour at 20°C	ohm/km	1.13
AC resistance of armour at 80°C	ohm/km	1.47
Voltage drop/amp/meter		0.87
9) CURRENT RATING		
Buried 750 mm at ground temperature of 40°C, g=2°Km/W, single cable	Amps	146
In Duct at 750mm, ground temperature of 40°C, g=2°Km/W, single cable	Amps	127
Cable laid in Air, at ambient temperature of 50°C, Single cable	Amps	162
Short circuit rating of cond. for 1 sec.	Amps	7.1 / 3.6
Fault current rating of armour-1 sec.	Amps	6216

9 MEASUREMENT UNCERTAINTIES

The measurement uncertainties in the results presented are as specified below unless otherwise indicated.

Measurement	**Measurement uncertainty**
Tensile strength test	1%
Measurement of dimensions	5 μm
Measurement loss of mass	0,11 mg : 8,0 gr
Measurement of conductor resistance	0,03% of measured value
Measurement at low temperature	0,1 °c
Measurement in heating cabinets	0,1 °c
Voltage test	2.10^{-3}.u + 20v 2.10^{-3}.i + 0,2%