REPORT OF PERFORMANCE

TIC 1615-11

OBJECT	single-core power cable
TYPE	0,6/1 kV, 1x800 mm² CU/XLPE/TCUW/PVC
MANUFACTURER	National Cables Industry-Sharjah, U.A.E., Sharjah, U.A.E.
CLIENT	National Cables Industry-Sharjah, U.A.E., Sharjah, U.A.E.
TESTED BY	KEMA HIGH-VOLTAGE LABORATORY Arnhem, The Netherlands
DATES OF TESTS	29 September 2011 until 21 October 2011
TEST PROGRAMME	Type tests in accordance with IEC 60502-1 (2004) including Amendment 1 (2009).
SUMMARY AND CONCLUSION	The object passed the tests.

This Report of Performance applies only to the object tested. The responsibility for conformity of any object having the same designations with that tested rests with the Manufacturer.

This report consists of 28 pages in total.

KEMA Nederland B.V.

S.A.M. Verhoeven
Director Testing, Inspections & Certification The Netherlands

Arnhem, 20 December 2011

TABLE OF CONTENTS

1 IDENTIFICATION OF THE TEST OBJECT

1.1 Description of the test object

Manufacturer	NATIONAL CABLES INDUSTRY-SHARJAH, U.A.E.
Type	0,6/1 kV, 1x800 mm² CU/XLPE/TCUW/PVC
Year of manufacture	2011
Test according to standard(s)	IEC 60502-1
Rated voltage, U_0/U (U_m)	0,6/1 (1,2) kV
No. of cores	1
Marking on the cable	KAHRAMAA QATAR, 600/1000 VOLTS 1X800 MM2 CU/XLPE/TCUW/PVC, IEC 60502, NATIONAL CABLES INDUSTRY, UAE, 2011

Conductor

- material	Copper
- cross-section	800 mm^2
- approx. diameter/dimensions	33,7 mm
- type/shape of conductor	round compacted
- maximum conductor temperature in normal operation	90 °C

Insulation

- material	XLPE
- nominal thickness	2,6 mm
- material designation	known in KEMA's file
- material supplier	known in KEMA's file
- core identification	Black

Inner covering

- type	extruded
- material	PVC
- nominal thickness	1,4 mm
- material supplier	known in KEMA's file

Metallic armour

- material	Tinned Copper Wires
- nominal diameter / dimensions	48 x 2,5 mm
- cross-sectional area	235,6 mm²
- material supplier	known in KEMA's file

Oversheath

- material	PVC, type ST_2
- nominal thickness	2,5 mm
- outer diameter of cable	approx. 53 mm
- material supplier	known in KEMA's file
- colour	back

Fire retardant — Yes, as per (IEC 60332-1)

Manufacturing details (of cable sent to KEMA for testing)

- location of manufacturing	Sharjah, U.A.E.
- factory identification of extrusion line	NEXTROM
- manufacturer of the extrusion line	NEXTROM
- identification of the production batch	# 319084; identification no. 50738527
- manufacturing length (where cable sample for testing has been taken from)	1000 m

1.2 List of documents

The manufacturer has guaranteed that the object submitted for tests has been manufactured in accordance with the following document.
KEMA has verified that this document adequately represents the object tested.

The following document is included in this report:

drawing no./ document no.	revision	date	title
0102Q26123R1	0	01.08.2011	cable drawing 1x800 mm^2 CU/XLPE/TCUW/PVC

2 GENERAL INFORMATION

2.1 The tests were witnessed by

The tests were not witnessed.

2.2 The tests were carried out by

Name	Company
Mr B. Vos	DEKRA Certification B.V., Arnhem, the Netherlands

2.3 Subcontracting

All tests were subcontracted to DEKRA Certification B.V.

2.4 Purpose of the 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 appendix A. Unless otherwise indicated in the report, the measurement uncertainties of the results presented are as indicated in this table.

2.6 Applicable standards

When reference is made to a standard and the date of issue is not stated, this applies to the latest issue, including amendments, which have been officially published prior to the date of the tests.

3 CONDUCTOR

Standard and date

Standard IEC 60502-1 (2004) +A1 (2009), clause 5
Test date 29 September 2011

3.1 Measurement of the resistance of the conductor

item	unit	requirement	measured/determined
- resistance	Ω/km	≤ 0,0221	0,0221

Result

The object passed the test.

3.2 Measurement of the number of wires of the conductor

item	unit	requirement	measured/determined
- number of wires	-	≥ 53	61

Result

The object passed the test.

4 ELECTRICAL TYPE TESTS

4.1 Measurement of insulation resistance at ambient temperature

Standard and date

Standard IEC 60502-1 (2004) +A1 (2009), clause 17.1
Test date 4 October 2011

item	unit	requirement	measured/determined
volume resistivity, ρ			
at 20 °C	Ω.cm	–	9 x10^{16}
insulation resistance constant, K_i			
at 20 °C	MΩ.km	–	318503

Result

The test results are for information only.

4.2 Measurement of insulation resistance at max. conductor temperature in normal operation

Standard and date

Standard IEC 60502-1 (2004) +A1 (2009), clause 17.2

Test date 6 October 2011

item	unit	requirement	measured/determined
volume resistivity, ρ at 90 °C	Ω.cm	≥ 10^{12}	1,2 x 10^{16}
insulation resistance constant, K_i at 90 °C	MΩ.km	≥ 3,67	45439

Result

The object passed the test.

4.3 Voltage test for 4 h

Standard and date

Standard IEC 60502-1 (2004) +A1 (2009), clause 17.3
Test date 29 September 2011

Environmental conditions

Temperature 20 ± 2 °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 (2004) +A1 (2009), clause 18.1
Test date 5 October 2011

insulation thickness	unit	requirement	specified	measured/determined
- nominal	mm	≥ 2,6	2,6	-
- average	mm	-	-	3,3
- minimum (t_m)	mm	≥ 2,24	-	3,11

Result

The object passed the test.

5.2 Measurement of thickness of non-metallic sheaths

Standard and date

Standard IEC 60502-1 (2004) +A1 (2009), clause 18.2
Test date 5 October 2011

Oversheath

thickness	unit	requirement	specified	measured/determined
- nominal	mm	≥ 1,4	2,5	-
- average	mm	-	-	3,2
- minimum (t_{min})	mm	≥ 1,8	1,8	2,96

Inner sheath

thickness	unit	requirement	specified	measured/determined
- nominal	mm	-	1,4	-
- average	mm	-	-	1,7
- minimum (t_{min})	mm	-	0,92	1,55

Result

The object passed the test.

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

Standard and date

Standard IEC 60502-1 (2004) +A1 (2009), clause 18.3
Test period 5 October 2011 until 13 October 2011

Characteristic test data

Temperature during ageing 135 ±3 °C
Duration 7 days

item	unit	requirement	measured/determined
without ageing			
- tensile strength	N/mm²	≥ 12,5	26,4
- elongation	%	≥ 200	624
after ageing			
- tensile strength	N/mm²	-	27,4
- variation with samples without ageing	%	± 25 max.	4
- elongation	%	-	598
- variation with samples without ageing	%	± 25 max.	-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 (2004) +A1 (2009), clause 18.4
Test period	5 October 2011 until 13 October 2011

Characteristic test data (oversheath)

Temperature during ageing	100 ± 2	°C
Duration	7	days

Oversheath

item	unit	requirement	measured/determined
without ageing			
- tensile strength	N/mm²	≥ 12,5	19,2
- elongation	%	≥ 150	222
after ageing			
- tensile strength	N/mm²	≥ 12,5	18,3
- variation with samples without ageing	%	± 25 max.	-5
- elongation	%	≥ 150	213
- variation with samples without ageing	%	± 25 max.	-4

Result

The object passed the test.

5.5 Additional ageing test on pieces of completed cables

Standard and date

Standard	IEC 60502-1 (2004) +A1 (2009), clause 18.5
Test period	5 October 2011 until 13 October 2011

Characteristic test data

Temperature during ageing	100 ± 2	°C
Duration	7	days

Insulation

item	unit	requirement	measured/determined
- tensile strength	N/mm²	-	25,2
- variation with samples without ageing	%	± 25 max.	-5
- elongation	%	-	606
- variation with samples without ageing	%	± 25 max.	-3

Oversheath

item	unit	requirement	measured/determined
- tensile strength	N/mm²	-	18,6
- variation with samples without ageing	%	± 25 max.	-3
- elongation	%	-	216
- variation with samples without ageing	%	± 25 max.	-3

Result

The object passed the test.

5.6 Loss of mass test on PVC sheath of type ST_2

Standard and date

Standard	IEC 60502-1 (2004) +A1 (2009), clause 18.6
Test period	4 October 2011 until 13 October 2011

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	0,3

Result

The object passed the test.

5.7 Pressure test at high temperature on PVC non-metallic sheath

Standard and date

Standard	IEC 60502-1 (2004) +A1 (2009), clause 18.7
Test date	7 October 2011

Characteristic test data

Temperature during ageing	90 ± 2	°C
Duration	6	h
Load	18,8	N

Oversheath

item	unit	requirement	measured/determined
- depth of indentation	%	≤ 50	27

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 (2004) +A1 (2009), clause 18.8
Test date	27 September 2011

Characteristic test data

Temperature	-15 ± 2	°C
Mass of hammer	1250	g

Oversheath

item	unit	requirement	measured/determined
- cold elongation	%	≥ 20	130
- cold impact test	-	no cracks	no cracks

Result

The object passed the test.

5.9 Test for resistance of PVC sheath to cracking (heat shock test)

Standard and date

Standard	IEC 60502-1 (2004) +A1 (2009), clause 18.9
Test date	7 October 2011

Characteristic test data (oversheath)

Temperature	150 ± 3	°C
Duration	1	h
Diameter of mandrel	8	mm
Number of turns	4	

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 (2004) +A1 (2009), clause 18.11
Test date	7 October 2011

Characteristic test data

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

item	unit	requirement	measured/determined
- elongation under load	%	≤ 175	95
- permanent elongation	%	≤ 15	10

Result

The object passed the test.

5.11 Water absorption test on XLPE insulation

Standard and date

Standard	IEC 60502-1 (2004) +A1 (2009), clause 18.13
Test period	22 September 2011 until 11 October 2011

Characteristic test data

Temperature	85 ± 2	°C
Duration	14	days

item	unit	requirement	measured/determined
- variation of mass	mg/cm^2	≤ 1	0,1

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 (2004) +A1 (2009), clause 18.14.1 and IEC 60332-1
Test date	21 October 2011

Characteristic test data

Duration 240 s

item	unit	requirement	measured/determined
- length free of charring	mm	> 50	360
- downward limit charred surface	mm	< 540	500

Result

The object passed the test.

5.13 Shrinkage test for XLPE insulation

Standard and date

Standard	IEC 60502-1 (2004) +A1 (2009), clause 18.16
Test date	26 September 2011

Characteristic test data

Temperature	130 ±3	°C
Duration	1	h

item	unit	requirement	measured/determined
- shrinkage	%	≤ 4	2

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
construction	- round compacted copper conductor - construction : 1-6-12-18-24 wires ø 4,1 mm - XLPE insulation - inner sheath (extruded PVC) - water blocking tape - armour of tinned copper wires; 50 wires ø 2,5 mm - water blocking tape - oversheath (extruded PVC)
outer diameter of the cable, average	58 mm (approx.)
outer diameter of the cores, average	34 mm (approx.)

Result

No deviations from the specified requirements are found.

APPENDIX A MEASUREMENT UNCERTAINTIES

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

measurement	measurement uncertainty
tensile strenght 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
measurment in heatingcabinets	0,1 °C
voltage test	2.10^{-3}.U + 20V 2.10^{-3}.I + 0,2%

APPENDIX B MANUFACTURER'S DRAWING(S)/DATA SHEET

2 pages (including this page)

drawing no./ document no.	revision	date	title
0102Q26123R1	0	01.08.2011	cable drawing 1x800 mm^2 CU/XLPE/TCUW/PVC

Drawing No.: 0102Q26123R1 Rev. 0
Dated: 01.08.2011

TECHNICAL & QC DEPARTMENT

الوطنية لصناعة الكابلات
NATIONAL CABLES INDUSTRY

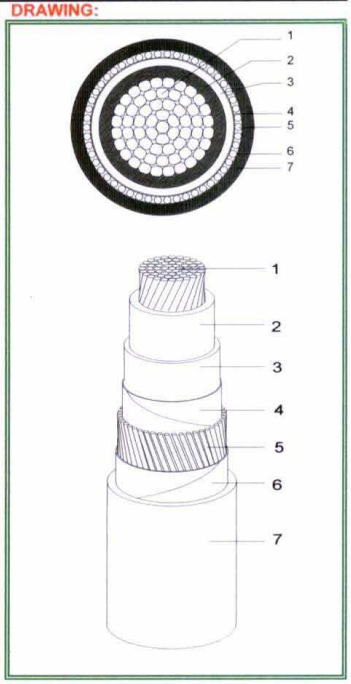
CABLE DRAWING

Cable size	: 1x800 MM²	Rated Voltage	: 0.6/1 (1.2) kV	Cable code:	0102Q26123R1
Cable Type	: CU/XLPE/TCUW/PVC	Ref. Standards	: IEC 60502-1 & KAHRAMAA Spec no: ED-03-040 : Version#5 Rev-0/2010		

DIMENSION DATA:

S.NO	DESCRIPTION	UNIT	OFFER DETAILS
1	**CONDUCTOR:**		
	Material		Copper
	Form of stranding		Round compacted
	Approximate diameter	mm	34.2
	D.C. Resistance at 20°C	Ω/km	0.0221
2	**INSULATION:**		
	Material		Extruded XLPE
	Nominal thickness	mm	2.6
	Approximate diameter	mm	39.4
	Colors		Red or Black
3	**INNER SHEATH:**		
	Material		Extruded PVC
	Nominal thickness	mm	1.4
	Approximate diameter	mm	42.2
4	**WATER BARRIER TAPES**		Non conductive water swellable tape
	Material		
	Nominal thickness	mm	0.15
	Approximate diameter	mm	42.6
5	**ARMOUR:**		
	Material		Tinned copper wires
	Wire diameter	mm	2.5
	Approximate diameter	mm	47.6
6	**WATER BARRIER TAPES**		Non conductive water swellable tape
	Material		
	Nominal thickness	mm	0.15
	Approximate diameter	mm	48
7	**OUTER SHEATH:**		
	Material		Extruded PVC
	Nominal thickness	mm	2.5
	Approximate overall diameter	mm	53.0
	Color		Black

DRAWING:



Note: Water barrier tapes shall be applied under and over armour to prevent movement of water in transverse and longitudinal direction

CABLE MARKING:

Embossing on the outer sheath in max 50 cm spacing in one line:

KAHRAMAA QATAR, 600/1000 VOLTS, 1x800MM², CU/XLPE/TCUW/PVC, IEC 60502
NATIONAL CABLES INDUSTRY, U.A.E., 2011

PACKAGING:

Approximate weight of complete cable	: 10650 kg/km
Nominal cutting length	: 300 M ± 5%
Drum type	: Steel or Wooden
Drum dimensions (Approx.):	
• Outer diameter	: 1850 mm
• Outer width	: 1100 mm

All diameters and weights are approximate.

TECHNICAL & QC DEPT NCI

Prepared by: *Checked by:* *Approved by:*

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