TESTREPORT

BS 5467

Thermosetting insulated, armoured cables of rated voltages of 600/1 000 V and 1 900/3 300 V for fixed installations

Report reference No.	2236358.52-CAT
Compiled by (+ signature)	A.A. Mackenbach
Approved by (+ signature)	R. van Daalen
Date of issue	2019-08-22
Testing laboratory	DEKRA Certification B.V.
Address	Meander 1051, 6825 MJ Arnhem, The Netherlands
Testing location	as above
Applicant	National Cables Industry Sharjah U.A.E.
Address	Plot #6, between 7th and 8th interchange,
	PO Box 27472, Al Saja'a Industrial Area, Sharjah U.A.E.
Standard	BS 5467: 2016
Test Report Form No.	BS 5467
TRF originator	DEKRA
Master TRF	dated 2016
Type of test object	Electric cables - Thermosetting insulated armoured cables of voltage of 600/1000 V for fixed installations
Trademark	NATIONAL CABLES INDUSTRY
Model/type reference	CU/XLPE/SWA/PVC 4x300 mm².
Manufacturer	National Cables Industry Sharja U.A.E.
Rating	0,6/1kV

Possible test case verdicts:

- test case does not apply to the test object ..... N(.A.)
- test object does meet the requirement..... P(ass)
- test object does not meet the requirement ..... F(ail)

Remarks:

The cable meets the requirements

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1 IDENTIFICATION OF THE TEST OBJECT

1.1 Description of the test object

Manufacturer	National Cables Industry
Type	CU/XLPE/SWA/PVC 4x300 mm²
Year of manufacture	2019
Sampling procedure	by the manufacturer
Rated voltage, U_0/U (U_m)	0,6/1 kV
No. of cores	4
Marking on the cable	ELECTRIC CABLE 600/1000 V 4X300 MM2 CU/XLPE/SWA/PVC BS 5467 NATIONAL CABLES INDUSTRY U.A.E. BASEC 2019
Conductor	
- Material	Copper (class 2)
- Cross-section	300 mm^2
- Type/shape of conductor	Sector Shaped Stranded Compacted
- Maximum conductor temperature in normal operation	90 °C
Insulation	
- Material	XLPE compound Type GP 8
- Nominal thickness	-
- Core identification	Red, Yellow, Blue and Black
Bedding	
- Material	PVC
- Type	extruded
Metallic armour	
- Material	Galvanised steel round wires
- Nominal diameter	-
- Number of wires	-
Oversheath	
- Material	PVC Type 9
- Nominal thickness	-
- Outer diameter of cable	68 mm. (approx.)
- Colour	Black
Fire retardant	Yes

2 CONDUCTOR

2.1 Conductor construction

Standard and date

Standard BS 5467 (2016) clause 5
Test date 24 July 2019

item	unit	requirement	measured/determined			
			Red	Yellow	Blue	Black
- number of wires	-	≥ 34	61	61	61	61

Result

The object passed the test.

2.2 Measurement of the resistance of the conductors

Standard and date

Standard BS 5467 (2016), clause 16.2
Test date 24 July 2019

item	unit	requirement	measured/determined			
			Red	Yellow	Blue	Black
- resistance	Ω/km	≤ 0,0601	0,0576	0,0579	0,0577	0,0576

Result

The object passed the test.

3 MEASUREMENTS OF THICKNESSES

Standard and date

Standard BS 5467 (2016), clauses 6.3, 9.2 and 11.3
Test date 24 July 2019

3.1 Measurement of thickness of insulation

thickness	unit	requirement	specified	measured/determined			
				Red	Yellow	Blue	Black
- nominal	mm	1,8	1,8	-	-	-	-
- average	mm	-	-	2,6	2,5	2,6	2,6
- minimum (t_m)	mm	≥ 1,52	-	1,92	1,79	1,97	2,12

Result

The object passed the test.

3.2 Measurement of thickness of bedding

thickness	unit	requirement	specified	measured/determined
- nominal	mm	1,6	-	-
- average	mm	-	-	1,9
- minimum (t_{min})	mm	≥ 1,08	-	1,59

Result

The object passed the test.

3.3 Measurement of thickness of over sheath and overall diameter

thickness	unit	requirement	specified	measured/determined
- nominal	mm	2,9	-	-
- average	mm	-	-	3,4
- minimum (t_{min})	mm	≥ 2,12	-	3,10
- approx. overall diameter	mm	68,8	68,0	70,1

Result

The object passed the test.

4 ELECTRICAL TYPE TESTS

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

Standard and date

Standard IEC 60502-1 (2004) + Amd. 1 (2009), clause 17.1

Test date 24 July 2019

item	unit	requirement	measured/determined			
			Red	Yellow	Blue	Black
insulation resistance constant, K_i at 90 °C	MΩ.km	≥ 3,67	$6{,}4 \cdot 10^4$	$5{,}0 \cdot 10^4$	$5{,}5 \cdot 10^4$	$5{,}4 \cdot 10^4$

Result

The object passed the test.

5 MECHANICAL PROPERTIES

5.1 Tests for determining the mechanical properties of the insulation before and after ageing and after ageing on complete cable

Standard BS 5467 (2016), clauses 6.1, 18.2
Test period 25 July 2019 until 5 August 2019

Characteristic test data (ageing of insulation)

Temperature during ageing 135 ±2 °C
Duration 7 days

item	unit	requirement	measured/determined			
			Red	Yellow	Blue	Black
before ageing						
- tensile strength	N/mm²	≥ 12,5	25,1	25,8	27,1	27,5
- elongation	%	≥ 200	587	589	583	576
after ageing						
- tensile strength	N/mm²	-	27,0	27,5	27,3	26,7
- variation with samples without ageing	%	± 25 max.	8	7	1	-3
- elongation	%	-	544	555	560	566
- variation with samples without ageing	%	± 25 max.	-7	-6	-4	-2

Characteristic test data (ageing on complete cable)

Temperature during ageing 100 ±2 °C
Duration 7 days

item	unit	requirement	measured/determined			
			Red	Yellow	Blue	Black
after ageing on complete cable						
- tensile strength	N/mm²	≥ 12,5	24,1	24,2	22,6	25,7
- variation with samples without ageing	%	± 25 max.	-4	-6	-17	-7
- elongation	%	≥ 200	535	521	522	534
- variation with samples without ageing	%	± 25 max.	-9	-12	-10	-7

Result

The object passed the test.

5.2 Tests for determining the mechanical properties of the bedding

Standard BS 5467 (2016), clause 9.1
Test date 25 July 2019

item	unit	requirement	measured/determined
before ageing			
- tensile strength	N/mm²	≥ 4	17,6
- elongation	%	≥ 50	257

Result
The object passed the test.

5.3 Tests for determining the mechanical properties of the over sheath before and after ageing and after ageing on complete cable

Standard BS 5467 (2016), clauses 11.1, 18.2
Test period 25 July 2019 until 5 August 2019

Characteristic test data (ageing of oversheath)

Temperature during ageing 100 ±2 °C
Duration 7 days

item	unit	requirement	measured/determined
before ageing			
- tensile strength	N/mm²	≥ 12,5	20,4
- elongation	%	≥ 150	229
after ageing in air			
- tensile strength	N/mm²	≥ 12,5	20,6
- variation with samples without ageing	%	± 25 max.	1
- elongation	%	≥ 150	221
- variation with samples without ageing	%	± 25 max.	-3

Characteristic test data (ageing on complete cable)

Temperature during ageing 100 ± 2 °C
Duration 7 days

item	unit	requirement	measured/determined
after ageing on complete cable			
- tensile strength	N/mm²	≥ 12,5	21,0
- variation with samples without ageing	%	± 25 max.	3
- elongation	%	≥ 150	225
- variation with samples without ageing	%	± 25 max.	-2

Result

The object passed the test.

6 TESTS ON INSULATION

6.1 Water absorption test on XLPE insulation

Standard BS 5467 (2016), clause 6.1
Test period 17 July 2019 until 7 August 2019

Characteristic test data

Temperature 85 ± 2 °C
Duration 14 days

item	unit	requirement	measured/determined			
			Red	Yellow	Blue	Black
- variation of mass	mg/cm^2	≤ 1	0,2	0,3	0,2	0,2

Result

The object passed the test.

6.2 Hot set test for XLPE insulation

Standard BS 5467 (2016), clause 6.1
Test date 31 July 2019

Characteristic test data

Air temperature	200 ±3	°C
Time under load	15	min
Mechanical stress	0,2	N/mm²

item	unit	requirement	measured/determined			
			Red	Yellow	Blue	Black
- elongation under load	%	≤ 175	50	55	50	50
- elongation after unloading	%	≤ 15	0	0	0	0

Result
The object passed the test.

6.3 Shrinkage test for XLPE insulation

Standard BS 5467 (2016), clause 18.3
Test date 9 August 2019

Characteristic test data

Temperature 130 ±2 °C
Duration 1 h

item	unit	requirement	measured/determined			
			Red	Yellow	Blue	Black
- shrinkage	%	≤ 4	2	2	2	2

Result

The object passed the test.

7 TESTS ON ARMOUR

Standard and date

Standard BS 5467 (2016), clauses 10.1, 10,2 and 10.4
Test date 24 July 2019

7.1 Length of lay of the galvanised steel armour wires

item	unit	requirement	measured/determined
- direction of the lay	-	Left hand lay	Left hand lay
- maximum length of lay	mm	≤ 1280	750

Result

The object passed the test.

7.2 Measurement of the diameter of galvanised steel armour wires

item	unit	requirement	measured/determined
- diameter nom.	mm	2,37 ≥ d ≤ 2,63	2,50

Result

The object passed the test.

7.3 Mass of zinc of the galvanised steel armour wires

item	unit	requirement	measured/determined
- minimum mass of zinc	g/m²	≥ 195	266

Result

The object passed the test.

7.4 Wrap test of the galvanised steel armour wires

item	unit	requirement	measured/determined
- diameter of mandrel	mm	10	no cracks

Result

The object passed the test.

7.5 Measurement of the resistance of galvanised steel armour wires

item	unit	requirement	measured/determined
- resistance	Ω/km	≤ 0,49	0,44

Result

The object passed the test.

8 TESTS ON OVERSHEATH

8.1 Test on PVC oversheath at low temperature

Standard BS 5467 (2016), clause 11.1
Test period 22 July 2019 until 23 July 2019

Characteristic test data

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

item	unit	requirement	measured/determined
- elongation	%	≥ 20	115
- cold impact test	-	no cracks	no cracks

Result

The object passed the test.

8.2 Pressure test at high temperature on PVC oversheath

Standard BS 5467 (2016), clause 11.1
Test date 26 July 2019

Characteristic test data

Temperature during ageing	90 ±2	°C
Duration	6	h
Load	13,0	N

item	unit	requirement	measured/determined
- depth of indentation	%	≤ 50	18

Result
The object passed the test.

8.3 Test for resistance of PVC oversheath to cracking (heat shock test)

Standard BS 5467 (2016), clause 11.1
Test date 14 August 2019

Characteristic test data

Temperature	150 ± 2	°C
Duration	1	h
Diameter of mandrel	8	mm
Number of turns	4	

item	unit	requirement	measured/determined
- soundness	-	no cracks	no cracks

Result
The object passed the test.

8.4 Loss of mass test on PVC oversheath

Standard BS 5467 (2016), clause 11.1
Test period 25 July 2019 until 5 August 2019

Characteristic test data

Temperature during ageing	100 ± 2	°C
Duration	7	days

item	unit	requirement	measured/determined
- loss of mass	mg/cm^2	≤ 1,5	0,1

Result
The object passed the test.

8.5 Measurement of insulation resistance constant on PVC oversheath

Standard and date

Standard BS 5467 (2016), clause 11.1
Test date 24 July 2019

Characteristic test data

Resistivity measured at 20 ± 2 °C

item	unit	requirement	measured/determined
K-value	MΩ.km	≥ 0,0035	1022

Result

The object passed the test.

9 TESTS ON COMPLETE CABLE

9.1 Voltage test on completed cable

Standard and date

Standard BS 5467 (2016), clause 16.3
Test date 22 July 2019

Environmental conditions

Temperature 20 °C
Temperature of test object 20 °C

applied voltage (kV)	frequency (Hz)	duration (min)	determined
test between individual conductors			
3,5	50	5	No breakdown
test between the conductors and armour			
3,5	50	5	No breakdown

Requirement

No breakdown of the insulation shall occur.

Result

The object passed the test.

9.2 Flame propagation test on single cable

Standard BS 5467 (2016), clause 17.2
Test date 22 July 2019

Characteristic test data

Time of flame application 240 s

item	unit	requirement	measured/determined
- length free of charring	mm	> 50	350
- downward limit charred surface	mm	< 540	490

Result

The object passed the test.

9.3 Abrasion resistance test

Standard BS 5467 (2016), clause 18.4
Test date 23 July 2019

Characteristic test data

Speed	150 ~ 300	mm/s
Number of movements	50	
Vertical load	270	N

item	unit	requirement	measured/determined
- examination of the sheath	-	no cracks/splits	Pass

Result
The object passed the test.

9.1 Measurement of insulation resistance constant on PVC oversheath

Standard and date

Standard BS 5467 (2016), clause 18.5
Test date 18 July 2019

Characteristic test data

Resistivity measured at 20 ± 2 °C

item	unit	requirement	measured/determined
K-value	MΩ.km	≥ 0,0035	0,015

Result

The object passed the test.

9.2 Shrinkage test of PVC oversheath

Standard BS 5467 (2016), clause 17.4
Test date 7 August 2019

Characteristic test data

Temperature 80 ±2 °C
Duration 4 h

item	unit	requirement	measured/determined
- shrinkage	mm	≤ 4	1

Result

The object passed the test.

10 VERIFICATION OF CABLE CONSTRUCTION

Verification of cable construction was carried out in accordance with clauses 5-12 of BS 5467.
The results are presented below.

	observed/determined
Markings	ELECTRIC CABLE 600/1000 V 4X300 MM2 CU/XLPE/SWA/PVC BS 5467 NATIONAL CABLES INDUSTRY U.A.E. BASEC 2019
Construction	- Conductors of copper wires, sector shaped stranded - XLPE insulations (red, yellow, blue and black) - Polypropelene tape - Polypropelene yarns - Bedding of extruded PVC - Armour of galvanized steel wires (67 wires of ø 2,5 mm) - Outer sheath of extruded PVC (Type 9)
Outer diameter of the cable, average	70,9 mm (approx.)

Result
No deviations from the specified requirements are found.

11 DRAWING

TECHNICAL & QC DEPARTMENT

الوطنية لصناعة الكابلات
NATIONAL CABLES INDUSTRY NCI

TECHNICAL DATA SHEET

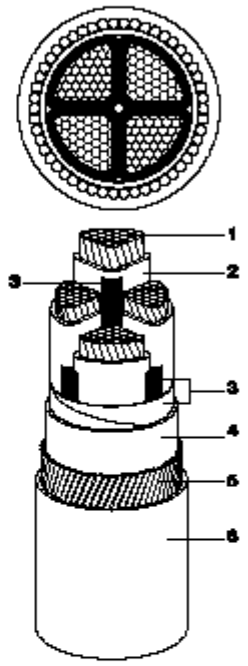
Cable Size : 4x300 mm²	Rated Voltage : 0.6/1 (1.2) kV	Cable Code: 0102342419
Cable Type : CU/XLPE/SWA/PVC	Ref. Standards : BS 5467	

DIMENSION DATA:

S.NO	DESCRIPTION	UNIT	OFFER DETAILS
1	**CONDUCTOR:**		
	Material		Copper
	Form of stranding		Sectoral Shaped
	Type of conductor		Class 2 to BS EN 60228
	D.C. Resistance at 20°C	Ω/km	0.0601
2	**INSULATION:**		
	Material		Extruded XLPE
	Thickness of insulation	mm	1.8 (Avg.) / 1.52 (Min.)
	Colors		Red, Yellow, Blue, Black
3	**ASSEMBLY:**		
	Approximate diameter	mm	54.2
	Fillers		Polypropylene yarns
	Binding tape		Polypropylene tape
4	**INNER SHEATH:**		
	Material		Extruded PVC
	Thickness of inner sheath	mm	1.6 (Nom.) / 1.08 (Min.)
	Approximate diameter	mm	57.4
5	**ARMOUR:**		
	Material		Galvanized Round Steel Wire
	Wire diameter	mm	2.5
	Approximate diameter	mm	62.4
6	**OUTER SHEATH:**		
	Material		Extruded PVC (Type 9)
	Thickness of outer sheath	mm	2.9 (Nom.) / 2.12 (Min.)
	Approximate overall diameter	mm	68.0
	Color		Black

Note: Colour Code as per new BS 5467 can also be provided based on Special request.

DRAWING:



CABLE MARKING:

Embossing on the Outer Sheath in Max 50 cm Spacing along TWO lines :

ELECTRIC CABLE 600/1000 V - 4x300 mm², CU/XLPE/SWA/PVC - BS 5467
NATIONAL CABLES INDUSTRY, U.A.E., BASEC, "YEAR"

PACKAGING:

Approximate weight of complete cable	: 15400 kg/km
Nominal cutting length	: 500 m (± 5%)
Drum type	: Steel Drum
Drum dimensions (Approx.):	
• Outer diameter	: 2450 mm
• Outer width	: 1200 mm

All diameters and weights are approximate.

***Prepared by:** Naimuddin* ***Checked by:** Rajasree* ***Approved by:** Altaf Ahmed*

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FORM # TE01/F06 Rev. 02