SRI LANKA STANDARD 821 : PART 5 : 1990

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SPECIFICATION FOR

LOW FREQUENCY CABLES AND WIRES WITH PVC INSULATION AND PVC SHEATH FOR TELECOMMUNICATION

PART 5 - CABLES WITH SOLID OR STRANDED CONDUCTORS, SCREENED AND SHEATHED, ONE PAIR

SRI LANKA STANDARDS INSTITUTION

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SLS 821 : Part 5 : 1990

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SRI LANKA STANDARDS INSTITUTION
53, Dharmapala Mawatha,
Colombo 3,
Sri Lanka.

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This standard does not purport to include all the necessary provisions of a contract.

SRI LANKA STANDARD

SPECIFICATION FOR LOW FREQUENCY CABLES AND WIRES WITH PVC INSULATION AND PVC SHEATH FOR TELECOMMUNICATION

PART 5 : CABLES WITH SOLID OR STRANDED CONDUCTORS, SCREENED AND SHEATHED, ONE PAIR

FOREWORD

This standard was authorized for adoption and publication as a Sri Lanka Standard by the Council of the Sri Lanka Standards Institution on 90.11.20, after the draft, finalized by the Drafting Committee on Low frequency cables , had been approved by the Electrical Engineering Divisional Committee.

This standard is in five parts. Part 1 of the standard deals with general requirements and tests. Part 4 of the standard deals with specific requirements for cables with solid or stranded conductors, screened and sheathed, one pair and this should be read in conjunction with Part 1 of this standard . Other parts of this standard deals with specific requirements for different types of Low Frequency cables as follows.

Part 2 Equipment wires with solid or stranded conductors, unscreened, single.

Part 3 Cables and equipment wires, with solid or stranded conductors, screened, single.

Part 4 Equipment wires with solid or stranded conductors unscreened, in pairs, triples, quads and quintuples.

All values given in this specification are in SI units.

For the purpose of deciding whether a particular requirement of this specification is complied with, the final value, observed or calculated, expressing the result of a test or an observation shall be rounded off in accordance with SLS 102. The number of significant figures to be retained in the rounded off value should be the same as that of the specified value in SLS 102.

The Sri Lanka Standards Institution gratefully acknowledges the use of relevant publications of the International Eletrotechnical Commission and British Standards Institution in the preparation of this specification.

1 SCOPE

This part of the standard gives details of construction, materials, dimensions and requirements for screened and sheathed single pair cables, used Inside telephone and telegraph exchanges and for the internal wiring of electronic and other equipment.

2 REFERENCES

IEC 344 Guide to calculation of resistance of plain and coated copper conductors of low-frequency cables and wires.

BS 6746 PVC insulation and sheath of electric cables.

SLS 102 Presentation of numerical values.

SLS 821 Low frequency cables and wires with PVC insulation and PVC sheath for telecommunication.
Part 1 General requirements and tests

3 DEFINITIONS

For the purpose of this standard, definitions given in **SLS 821 : Part 1 : 1988** shall apply.

4 REQUIREMENTS

4.1 Cables, conforming with this specification, shall meet the general requirements of **SLS 821 : Part 1 : 1988** and when tested in accordance with methods specified therein shall meet the detailed requirements of **4.2** to **4.13** of this specification.

4.2 Conductor dimensions

The dimensions of the conductors shall be as given in Table 1. The solid conductor shall be designated by its nominal diameter. The stranded conductor shall be designated by its nominal cross-sectional area, the number of strands and the maximum diameter of the strands.

4.3 Insulation

4.3.1 *Material*

The insulation shall consist of PVC compound complying with the requirements of Type 2 of **BS 6746**.

4.3.2 *Thickness*
The insulation shall be perfectly continuous having a thickness as uniform as possible and not less than the values specified in Table 1.

The maximum diameters of cables shall be calculated in accordance with the methods given in Appendix A. The minimum thickness of the insulation shall be measured in accordance with the method of specified in Clause 7.3 of **SLS 821 : Part 1 : 1988.**

4.3.3 *Colour*
The insulated conductors shall be identified by one colour or two different colours.

4.4 Maximum length of lay
The insulated conductors shall be uniformly twisted together. Maximum length of lay for cables shall be 100 mm.

4.5 Wrapping
The twisted insulated conductors may be wrapped with a protective layer, preferably of non-hygroscopic material; for example, a helical or longitudinal lapping of one or more tapes with overlap or a thin continuous sheath).

4.6 Screening

4.6.1 The pair of conductors shall be provided with a screen either lapped or braided.
The lapped screen shall consist of one of the following:

a) A close and continuos lapping of tinned copper conductors of diameter of the range of 0.1 mm to 0.2 mm.

b) One copper or aluminium tape of 0.04 mm minimum thickness.

c) One thin tape of the same material , of 0.008 mm minimum thickness laminated to a non-hygroscopic tape, followed by a close and continuous lapping of tinned copper conductors of diameter of the range 0.1 mm to 0.2 mm.

d) One thin tape of copper or aluminium of 0.008 mm minimum thickness, laminated to a non-hygroscopic tape and provided with one tinned copper conductor in permanent contact with the metal tape. The conductor shall have a minimum diameter of 0.4 mm or a flat cross-section of equal area.

Table 1 - Dimensions and test requirements of one-pair screened equipment cable

Conductor					Insulation	Sheath		Test requirements	
Nominal diameter of single conductor mm (1)	Nominal cross section of stranded conductor (2)	Number of strands (3)	Maximum diameter of strands mm (4)	Maximum resistance km (5)	Minimum thickness mm (6)	Minimum thickness mm (7)	Maximum diameter mm (8)	Dielectric strength test vltage V (9)	Minimum Insulation resistance for 1 km in M (10)
0.5	-	-	-	97.8	0.25	0.35	4.9	1000 (r.m.s) a.c.	50
-	0.22	7	0.21	92.5	0.25	0.35	5.5	or	50
0.6	-	-	-	67.9	0.25	0.35	5.5	1500 d.c.	50
-	0.5	28	0.16	40.3	0.3	0.35	6.5	1500 (r.m.s) a.c.	50
		16	0.21	39.7	0.3	0.35	6.5	or	50
0.8	-	-	-	37.5	0.3	0.35	6.0	2250 d.c.	50

** With diameter increase of 0.95 mm for braided screen and wrapping. These values are meant only for calculation purposes.*

4.6.2 The braided screen shall consist of tinned copper conductors of diameter of the range 0.1 mm to 0.2 mm. The braid angle shall be not more than 45°.
The filling factor shall be not less than 0.5.
The braided screen shall be applied tightly over the insulation or over the covering of the insulated conductor.

The screen may be provided with an outer protective layer, preferably of non-hygroscopic material; for example, a longitudinal or helical lapping of one or more tapes with overlap.

4.7 Rip cord
The cable may be provided with a non-metallic rip cord.

4.8 Sheath
The cable shall be provided with a sheath.

4.8.1 *Material*
The sheath shall consist of polyvinyl chloride

4.8.2 *Thickness*
The sheath shall be perfectly continuous having a thickness as uniform as possible and not less than the value specified in Table 1.
The minimum thickness of the sheath shall be determined in accordance with the method specified in Clause 7.3 of **SLS 821 : Part 1 : 1988.**

4.9 Finished cable
The diameter over sheath of the finished cable shall not exceed the values given in Table 1 and calculated in accordance with the method given in Appendix A.

4.10 Mechanical requirements

4.10.1 *Conductors*

4.10.1.1 Elongation at break of the bare conductor shall be not less than :
a) 10 per cent for solid conductor of 0.4 mm diameter ; and
b) 15 per cent for solid conductor over 0.4 mm diameter.

Compliance shall be checked by measuring the elongation at break in accordance with Clause 7.4.3 of SLS 821 : Part 1 : 1988.

4.10.1.2 If the conductor is tinned, the amount of tin per unit area shall be adequate for soldering the conductor to the terminals without difficulty.
Compliance shall be checked by the method specified in Clause 7.5.7 of SLS 821 : Part 1 : 1988.

4.10.2 *Insulation*

The insulation shall have adequate mechanical strength and elasticity. These properties shall remain sufficiently constant during normal use. Compliance shall be checked before and after accelerated ageing by measuring the tensile strength and the elongation at break on samples of the insulation in accordance with clause 7.4.3 of SLS 821 : Part 1 : 1988 .

The accelerated ageing is specified in clause 7.5.1 of SLS 821 : Part 1 : 1988.

The median of the measured values of tensile strength shall be not less than 12.5 N/mm^2.

The median of the measured values of elongation at break shall be not less than 125 per cent for single colour insulation and 100 per cent for extruded bicolour insulation.

However, the difference between the median values for tensile strength and elongation obtained before and after accelerated ageing shall not exceed 20 per cent of the median values before accelerated ageing.

NOTES

1. The values specified for tensile strength and for elongation at break are independent and non-concomitant minima. An insulation with one characteristic of near-minimum value should present a value well above the minimum for the other characteristic.

The insulation should be such that the product of tensile strength in N/mm^2 (MPa) and the elongation percentage at break should be not less than 1750, or 1400 in the case of extruded bicolour insulation.

2. The median value is the middle value if an odd number of values is obtained or the average of the two middle values if an even number of values is obtained. The test results should have been arranged in sequence of increasing values.

4.10.3 *Sheath*
The sheath shall have adequate mechanical strength and elasticity. These properties shall stay sufficiently constant during normal use.
Compliance shall be checked before and after accelerated ageing by measuring the tensile strength and the elongation at break on samples of the sheath in accordance with the method specified in Clause **7.4.3 of SLS 821 : Part 1 : 1988.**

The median of the measured values of tensile strength shall be not less than 12.5 N/mm^2.

The median of the measured values of elongation at break shall be not less than 125 per cent.

Moreover, the difference between the median values for tensile strength and elongation obtained before and after accelerated ageing shall not exceed 20 per cent of the median values before ageing.

4.11 Thermal stability and climatic requirements

4.11.1 *Insulation*

4.11.1.1 Measurement of insulation shrirkage after overheating of conductor.
The insulation shall not shrirk unduly when soldering the conductor.
Compliance shall be checked in accordance with the test specified in clause **7.5.6 of SLS 821 : Part 1 : 1988.**

4.11.1.2 Cold bend test
The insulation shall remain adequately pliable at the low temperature to which it may be exposed.
Compliance shall be checked in accordance with the test specified in Clause **7.5.4.1 of SLS 821 : Part 1 : 1988.**

4.11.1.3 Heat shock test
The insulation shall withstand variations in temperature without suffering damage.
Compliance shall be checked in accordance with the test specified in Clause **7.5.5.1 of SLS 821 : Part 1 : 1988.**

4.11.2 *Sheath*

4.11.2.1 Pressure test
The sheath shall be sufficiently resistant to external pressure when exposed to moderately high temperatures.

Compliance shall be checked in accordance with the test specified in Clause **7.5.2 of SLS 821 : Part 1 : 1988.**
The thickness at the point of impression shall be not less than 40 per cent of the mean value of the thickness at the other two points.

4.11.2.2 Cold bend test
The sheath shall remain adequately pliable at the low temperatures to which it may be exposed.

Compliance shall be checked in accordance with the test specified in Clause 7.5.4.2 of **SLS 821 : Part 1 : 1988.**
The sheath shall show no cracks.

4.12 Resistance to flame propagation
Resistance to flame propagation shall be tested in accordance with Clause 7.5.3 of **SLS 821 : Part 1 : 1988.**

4.13 Electrical requirements

4.13.1 *Electrical resistance of conductors*
Electrical resistance of plain or tinned conductors when measured in accordance with Clause **7.6.1 of SLS 821 : Part 1 : 1988** shall not exceed the value specified in Table 1.

4.13.2 *Dielectric strength*
The insulation shall withstand the voltage specified in Table 1 for 1 min without breakdown.

The method for checking the dielectric strength is specified in Clause **7.6.2 of SLS 821 : Part 1 : 1988.**

4.13.3 *Insulation resistance*
Insulation resistance when measured in accordance with Clause **7.6.3 of SLS 821 : Part 1 : 1988** shall be not less than the value specified in Table 1.

APPENDIX A

CALCULATION OF THE MAXIMUM DIAMETER OF CABLES

The value of (Dg + 10%) calculated in accordance with IEC Publlication 649 using an average sheath thickness of 0.65 mm and for minimum specified thickness of 0.35 mm is rounded to the nearest two decimal places.

that is to say XX.XX

The value is then rounded upwards to the first decimal place if the value is 5 mm or less, for example 4.61 rounded to 4.7.

If the value is greater than 5 mm, it is rounded to the first decimal place and further rounded upwards to the next multiple of 0.5 mm. for example : 25.05 rounded to 25.1 then to 25.5
25.04 rounded to 25.0 then to 25.0.

SRI LANKA STANDARDS INSTITUTION

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