SRI LANKA STANDARD 821 : PART 4 : 1990

UDC 621. 315. 21 : 678. 743

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

PART 4 - EQUIPMENT WIRES WITH SOLID OR STRANDED CONDUCTORS UNSCREENED IN PAIRS, TRIPLES, QUADS, QUINTUPLES

SRI LANKA STANDARDS INSTITUTION

- Blank Page -

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

PART 4: EQUIPMENT WIRES WITH SOLID OR STRANDED CONDUCTORS UNSCREENED IN PAIRS, TRIPLES, QUADS, QUINTUPLES

SLS 821 : Part 4 : 1990

Gr. 5

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

DRAFTING COMMITTEE ON LOW-FREQUENCY CABLES AND WIRES WITH PVC INSULATION AND PVC SHEATH FOR TELECOMMUNICATION

CONSTITUTION

CHAIRMAN	*REPRESENTING*
Mr. W.S.A. Perera	Telecommunication Department
MEMBERS	
Mr. J.M.S. Jayasinghe	Kelani Cables Limited
Mr. K.D.L.C. Kumarasinghe	Associated Cables Limited
Mr. Nihal Kularatne	Arthur C. Clarke Centre for Modern Technologies
Mr. T.M. Premaratne	K.M.L. Cables
Mr. L.L. Rajasekera	NERD Centre
Mr. T. Satyamurthy	Alucop Cables
Mr. R.A.M.N. Samarasinghe	Ruhunu Cables Limited
Mr. A. de Silva	Hayleys Limited

TECHNICAL SECRETARIAT
SRI LANKA STANDARDS INSTITUTION

SRI LANKA STANDARD

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

PART 4: EQUIPMENT WIRES WITH SOLID OR STRANDED CONDUCTORS UNSCREENED IN PAIRS, TRIPLES, QUADS, QUINTUPLES

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 equipment wires with solid or stranded conductors, in pairs, triples, quads and quintuples, and this should be read in conjuction with Part 1 of this standard. The other parts deal 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 5 Cables with solic or stranded conductors, screened and sheathed, one pair.

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 CS 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 CS 102.

The Sri Lanka standards Institution gratefully acknowledges the useof relevant publicatios of the International Electrotechnical 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 unscreened equipment wires with solid or stranded conductors, and insulated with PVC, in pairs, triples, quads or quintuples, used inside telephone and telegraph exchanges, and for the internal wiring of other electronic equipment.

2 REFERENCES

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

IEC 649 Calculation of minimum external diameter of cables for indoor installatiions.

BS 6746 PVC insulation and sheath of electric cables.

CS 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 Equipment wires 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 4.8 of this specification.

4.2 Conductor dimensions
The conductor shall be designated by its nominal diameter. Dimensions shall be in accordance with Table 1.

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 values specified in Table 1.
The maximum diameter of the wire shall be calculated in accordance with Appendix A.
The minimum thickness of the insulation shall be measured in accordance with Clause 7.3 of SLS 821 : Part 1 : 1988.

4.3.3 *Colour*
The insulated conductors shall be identified by one colour only.

4.4 Maximum length of lay
For wires with conductors of 0.6 mm nominal diameter, the maximum length of lay shall be :

a) 60 mm for pairs ;
b) 70 mm for triples;
c) 85 mm for quads ; and
d) 100 mm for quintuples

For conductors of nominal diameter other than 0.6 mm, these values shall be multiplied by d/0.6, where d is the nominal diameter of the conductor in millimetres.

For cables with stranded conductors, the value for d is the nominal value quoted in Table 1.

4.5 Mechanical requirements

4.5.1 *Conductors*

4.5.1.1 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 the method specified in Clause 7.4.3 of SLS 821 : Part 1 : 1988.

4.5.1.2 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.

4.5.2 *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 conditioning 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.

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.

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.

4.6 Thermal stability and climatic requirements

4.6.1 *Insulation*

4.6.1.1 Measurement of insulation shrinkage after overheating of conductor.

The insulation shall not shrink 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.

4.6.1.2 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.

4.6.1.3 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.

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

4.8 Electrical requirements

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

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

Compliance shall be checked in accordance with the method specified in Clause 7.6.2 of SLS 821 : Part 1 : 1988.

4.8.3 *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.

Table 1 - Dimensions and test requirements of insulated conductors

Conductor		Insulation		Test requirements	
Nominal diameter d	Maximum resistance	Minimum thickness	Maximum diameter	Dielectric strength test	Minimum insulation resistance for 1 km in
mm (1)	k /m (2)	mm (3)	mm (4)	V (5)	M (6)
0.5	95.0	0.25	1.30	1500 r.m.s.	50
0.6	65.9	0.25	1.40	a.c.	50
0.8	36.7	0.25	1.60	or	50
1.0	23.3	0.25	1.85	2250 d.c.	50

NOTE

Calculation of these values is based on Table 1 of IEC 344, using the k_1 value for twisting lay factor greater than 16. If the twisting lay factor is 16 or less, Table 1 of IEC 344 shall be applied with the corresponding value of k_3.

APPENDIX A

CALCULATION OF THE MAXIMUM DIAMETER OF INSULATED CONDUCTORS

The nominal diameter d_1 is calculated in accordance with IEC 649.

The value (d_1 + 10%) is calculated and rounded to the nearest two decimal places

that is X.XX

The second decimal place (0.0X) is then rounded up in steps of 0.05.

for example : 1.81 rounded to 1.85
1.86 rounded to 1.90

SRI LANKA STANDARDS INSTITUTION

The Sri Lanka Standards Institution (SLSI) is the National Standards Organization of Sri Lanka established under the Sri Lanka Standards Institution Act No. 6 of 1984 which repealed and replaced the Bureau of Ceylon Standards Act No. 38 of 1964. The Institution functions under the Ministry of Science & Technology.

The principal objects of the Institution as set out in the Act are to prepare standards and promote their adoption, to provide facilities for examination and testing of products, to operate a Certification Marks Scheme, to certify the quality of products meant for local consumption or exports and to promote standardization and quality control by educational, consultancy and research activity.

The Institution is financed by Government grants, and by the income from the sale of its publications and other services offered for Industry and Business Sector. Financial and administrative control is vested in a Council appointed in accordance with the provisions of the Act.

The development and formulation of National Standards is carried out by Technical Experts and representatives of other interest groups, assisted by the permanent officers of the Institution. These Technical Committees are appointed under the purview of the Sectoral Committees which in turn are appointed by the Council. The Sectoral Committees give the final Technical approval for the Draft National Standards prior to the approval by the Council of the SLSI.

All members of the Technical and Sectoral Committees render their services in an honorary capacity. In this process the Institution endeavours to ensure adequate representation of all view points.

In the International field the Institution represents Sri Lanka in the International Organization for Standardization (ISO), and participates in such fields of standardization as are of special interest to Sri Lanka.

Printed at the Sri Lanka Standards Institution, 17, Victoria Place, Elvitigala Mawatha, Colombo 08.

SLS CERTIFICATION MARK

The Sri Lanka Standards Institution is the owner of the registered certification mark shown below. Beneath the mark, the number of the Sri Lanka Standard relevant to the product is indicated. This mark may be used only by those who have obtained permits under the SLS certification marks scheme. The presence of this mark on or in relation to a product conveys the assurance that they have been produced to comply with the requirements of the relevant Sri Lanka Standard under a well designed system of quality control inspection and testing operated by the manufacturer and supervised by the SLSI *which includes surveillance inspection of the factory, testing of both factory and market samples.*

Further particulars of the terms and conditions of the permit may be obtained from the Sri *Lanka Standards Institution, 17, Victoria Place, Elvitigala Mawatha, Colombo 08.*

Printed at SLSI (Printing Unit)