SRI LANKA STANDARD 1127 : 1996

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SPECIFICATION FOR WROUGHT ALUMINIUM FOR ELECTRICAL PURPOSES - WIRE

SRI LANKA STANDARDS INSTITUTION

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Gr. 5

SRI LANKA STANDARDS INSTITUTION
53, Dharmapala Mawatha,
Colombo 03
Sri Lanka

Sri Lanka Standards are subject to periodical revision in order to accommodate the progress made by industry. Suggestions for improvement will be recorded and brought to the notice of the Committees to which the revisions are entrusted.

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

Sri Lanka Standard
SPECIFICATION FOR WROUGHT ALUMINIUM FOR ELECTRICAL PURPOSES - WIRE

FOREWORD

This standard was approved by the Sectoral Committees on Electric Cables and Conductors and was authorized for adoption and publication as a Sri Lanka Standard by the Council of the Sri Lanka Standards Institution on 1996-05-23.

This standard specifies the requirements for wrought aluminium for electrical purposes. The relevant methods of test also have been given.

The standard values which have been adopted for the purpose of this standard, are given in Appendix **A** for information. Details of the international alloy designations and the chemical composition limits for wrought aluminium alloys system also given in Appendix **B** for information.

All values given in this specification are in SI units.

For the purpose of deciding whether a particular requirements of the standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis shall be rounded off in accordance with **CS 102**. The number of significant places retained in the rounded off value shall be the same as that of the specified value in this standard.

In the preparation of this standard, the assistance obtained from the **BS 2627 : 1970** Specification for Wrought Aluminium for Electrical Purposes - Wire including amendment No. 1 published by the British Standards Institution is gratefully acknowledged.

1 SCOPE

This standard specifies requirements for aluminium round wire for electrical conductors in six conditions designated as 0, H4, H6, H8, H68 and H9 and in diameters 0.4 mm up to and including 10 mm.

2 REFERENCES

IEC 468 Method of meausurment of resistivity of matallic materials.
SLS 978 Tensile testing of metallic materials
Part 1 : Method of test at ambient temperature.

3 DEFINITIONS

For the purpose of this standard the following definition shall apply:

wire : A round solid section of not more than 10 mm diameter produced by drawing.

The difference between the maximum and minimum measurements, taken at the same cross wire section, shall not exceed 1 per cent.

4 REQUIREMENTS

4.1 General

The material shall comply with the general requirements of **4.1.1, 4.1.2** and **4.1.3.**

4.1.1 *Freedom from defects*

The wire shall be free from defects prejudicial to its use as an electrical conductor.

4.1.2 *Joints*

There shall be no joints in the wire except those made in the base rod or wire before final drawing or, by agreement between the purchaser and the supplier, those made after final drawing by a cold welding method. Joints made in this way shall comply with the other requirements of the standard.

4.1.3 *Tolerances on diameter*

The diameter of round wire determined by means of a suitable micrometer and by taking the mean of the two measurements at right angles made at the same cross section of a sample taken from any part of a coil, reel or drum shall be as ordered within a tolerance of ± 1 per cent.

The difference between the maximum and minimum measurements, taken at the same cross section, shall not exceed 1 per cent.

4.2 Properties

The material shall comply with the general requirements of **4.1.1, 4.1.2** and **4.1.3,** and shall have the chemical composition, condition and mechanical properties as specified in **4.2.1, 4.2.2** and **4.2.3.**

4.2.1 *Chemical composition limits*

The material shall be aluminium with impurities limites in per cent as given in Table **1**.

TABLE 1 - Chemical Composition

Element	Percentage
Silicon	0.10
Iron	0.40
Copper	0.05
Manganese	0.01
Chromium	0.01
Zinc	0.05
Gallium	0.03
Boron	0.05
Vanadium + Titanium	0.02
Others*	
Each	0.03
Total	0.10
Aluminium	min. 99.50**

* *Analysis is regularly made only for the elements for which specific limits are shown. If however, the presence of other elements is suspected to be, or in the course of routine analysis is indicated to be, in excess of the specified limits, further analysis is made to determine that these other elements are not in excess of the amount specified.*

** *The aluminium content for unalloyed aluminium not made by a refining process is the difference between 100.00 per cent and the sum of all other metallic elements present in amounts of 0.010 per cent or more each, expressed to the second decimal before determining the sum.*

4.2.2 The materials shall be supplied in one of the conditions shown in **4.2.3**, as specified by the purchaser, and shall comply with the mechanical and electrical properties stipulated in **4.2.3,** and **4.2.4** and **5.4.**

4.2.3 *Mechanical Properties*

The mechanical properties obtained from test pieces selected as specified in **6** and prepared and tested as specified in **5.2, 5.3** or **5.4** shall be as given in Table **2**.

TABLE 2 - Mechanical properties

Designation	Specified diameter mm		Tensile strength MPa		Elongation on 250 mm %	Wrapping test
	Over	Up to and including	Min	Max		
(1)	(2)	(3)	(4)	(5)	(6)	(7)
0	0.4	10	-	90	15	not applicable
H4	0.4	5	95	125	not applicable	see 5.3
H6	0.4	5	125	165	not applicable	see 5.3
H6	5	10	125	165	3	not applicable
H8	0.4	5	160	205	not applicable	see 5.3
H68	0.4	5	125	205	not applicable	see 5.3
H9	1.25	1.50	193	-	not applicable	see 5.3
H9	1.50	1.75	188	-	not applicable	see 5.3
H9	1.75	2.00	184	-	not applicable	see 5.3
H9	2.00	2.25	180	-	not applicable	see 5.3
H9	2.25	2.50	176	-	not applicable	see 5.3
H9	2.50	2.75	172	-	not applicable	see 5.3
H9	2.75	3.00	169	-	not applicable	see 5.3
H9	3.00	3.25	165	-	not applicable	see 5.3
H9	3.25	3.50	164	-	not applicable	see 5.3
H9	3.50	3.75	162	-	not applicable	see 5.3
H9	3.75	4.25	160	-	not applicable	see 5.3
H9	4.25	5.00	159	-	not applicable	see 5.3

4.2.4 *Electrical resistivity*

The electrical resistivity of the wire determined in accordance with 5.5 shall not exceed the values given in Table 3.

TABLE 3 - Resistivity

Designation	Resistivity at 20 °C Ω m
0	2.803×10^{-8}
H4	2.8264×10^{-8}
H6	2.8264×10^{-8}
H8	2.8264×10^{-8}
H9	2.8264×10^{-8}

5 METHODS OF TEST

5.1 Sampling

The samples for the tensile test, the wrapping test and electrical resistivity tests specified in **5.2, 5.3, 5.4** and **5.5** shall be selected as follows:

Wire of the same diameter produced in the same way and of the same condition, shall be grouped in to batches not exceeding the masses given in Table **4** and test samples shall be cut from a coil selected from each batch. Before the test samples are cut off they shall be marked to identify tham. The test samples shall be taken from the wire as supplied and shall not be annealed or mechanically worked other than straightening before testing.

5.2 Tensile test

The test shall be made in accordance with **SLS 978 : Part 1 : 1992**.

The load shall be applied gradually and the rate of separation of the jaws of the testing machine shall be not less than 25 mm per minute and not greater than 100 mm per minute.

5.3 Elongation test

The test shall be made in accordance with **SLS 978 : Part 1 : 1992.** The load shall be applied gradually and uniformly on straightened lengths of wire, having an orginal gauge length of 250 mm.

The elongation shall be measured on the gauge length after the fractured ends have been fitted together. The determination shall be valid, whatever the position of the fracture, if the specified value is reached. If the specified value is not reached the determination shall be valid only if the fracture occurs between the gauge marks and not closer than 25 mm to either mark.

5.4 Wrapping test

The wire shall be wrapped round a wire of its own diameter to form a close helix of eight turns. Six turns shall then be unwrapped and again closely re-wrapped in the same direction as the first wrapping.

The wire shall not crack when tested.

5.5 Electrical resistivity test

The resistivity shall be determined by direct measurement on the wire in accordance with the routine method given in **IEC 468 : 1974.**

TABLE 4 : Samples

Wire diameter mm	Mass of batch kg
0.4 up to and including 1.25	250
Over 1.25	1000

APPENDIX A
STANDARDS VALUES
(for information only)

For the purposes of this standard the following standard values have been adopted:

a) Density at 20 ^{0}C is 2.703 x 10^3 kg/m^3.

b) Constant mass temperature coefficient of resistance at 20 ^{0}C, measured between two potential points rigidly fixed to the conductors is 0.004 03/ ^{0}C.

c) Coefficient of linear expansion between 0 and 30 ^{0}C is 23 x 10^{-6}/ ^{0}C.

APPENDIX B

DETAILS OR THE INTERNATIONAL ALLOY DESIGNATIONS AND CHEMICAL COMPOSITION LIMITS FOR WROUGHT ALUMINIUM ALLOYS SYSTEM

B.1 Alloy groups

The first of the four digits in the designation indicates the alloy group as follows.

B.1.1 Aluminium, minimum 99.00 per cent and greater 1 xxx

B.1.2 Aluminium alloys groups by major alloying elements

Copper	2 xxx
Manganese	3 xxx
Silicon	4 xxx
Magnesium	5 xxx
Magnesium and silicon	6 xxx
Zinc	7 xxx
Other element	8 xxx
Unused series	9 xxx

B.2 1 xxx group

In the 1 xxx group for minimum purities of **99.00** per cent and greater, the last two of the four digits in the designation indicate the minimum aluminium percentage.

These digits are the same as the two digits to the right of the decimal point in the minimum aluminium percentage when it is expressed to the nearest **0.01** per cent.

The second digit in the designation indicates modifications in impurity limits or alloying elements. If the second digit in the designation is zero, it indicates unalloyed aluminium having natural impurity limits: integers **1** to **9**, which are assigned consecutively as needs, indicate special control of one or more individual impurities or alloying elements.

B.3 2 xxx to 8 xxx group.

In the **2 xxx** to **8 xxx** groups the last two of the four digits in the designation have no special significance but serve only to identify the different aluminium alloys in the group. The second digit in the alloy designation indicates alloy modifications. If the second digit in the designation is zero, it indicates the orginal alloy, integers **1** to **9**, which are assigned consecutively, indicate alloy modifications.

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SRI LANKA STANDARDS INSTITUTION

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