SRI LANKA STANDARD 1184 : 1998

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SPECIFICATION FOR VALVE FITTINGS FOR USE WITH LIQUEFIED PETROLEUM GAS (LPG) CYLINDERS

SRI LANKA STANDARDS INSTITUTION

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SLS 1184 : 1998

Gr. 06

SRI LANKA STANDARDS INSTITUTION
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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 VALVE FITTINGS FOR USE WITH LIQUEFIED PETROLEUM GAS (LPG) CYLINDERS

FOREWORD

This standard was approved by the Sectoral Committee on LP Gas Industry and was authorized for adoption and publication as a Sri Lanka Standard by the Council of the Sri Lanka Standards Institution on 1998-12-10.

This standard deals with valve fittings for use with liquefied petroleum gas cylinders.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or an 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.

The Sri Lanka Standards Institution gratefully acknowledges the use of the following publications, in the preparation of this standard:

a) IS 8737 : 1979 — Specification for valve fittings for use with liquefied petroleum gas cylinders with more than 5 litre water capacity. Part II : Valve fittings for newly manufactured LPG cylinders.

b) MS 831 : 1986 — Specifications for valves for use with domestic liquefied petroleum gas (LPG) cylinders.

1 SCOPE

This standard specifies the requirements of materials, construction, performance and testing of valve fittings for use with liquefied petroleum gas (LPG) cylinders.

2 REFERENCES

ISO 188 Rubber vulcanized - Heat resistance and accelerated ageing tests

DIN 477 Gas cylinder valves-types, sizes, connections and threads

CS 102 Presentation of numerical values

SLS 978 Tensile testing of metallic material
Part 1: Method of testing at ambient temperature.

3 REQUIREMENTS

3.1 Material

3.1.1 All components used in valve construction shall be made of material compatible with LPG and the material of the cylinder.

3.1.2 The valve body shall be forged from wrought or extruded sections.

3.1.3 The minimum tensile strength of the valve body material shall be 392 MPa and elongation 20 per cent when determined in accordance with SLS 978 Part 1.

3.1.4 The minimum hardness of the valve body material shall be 80 HB.

3.1.5 *Test samples*

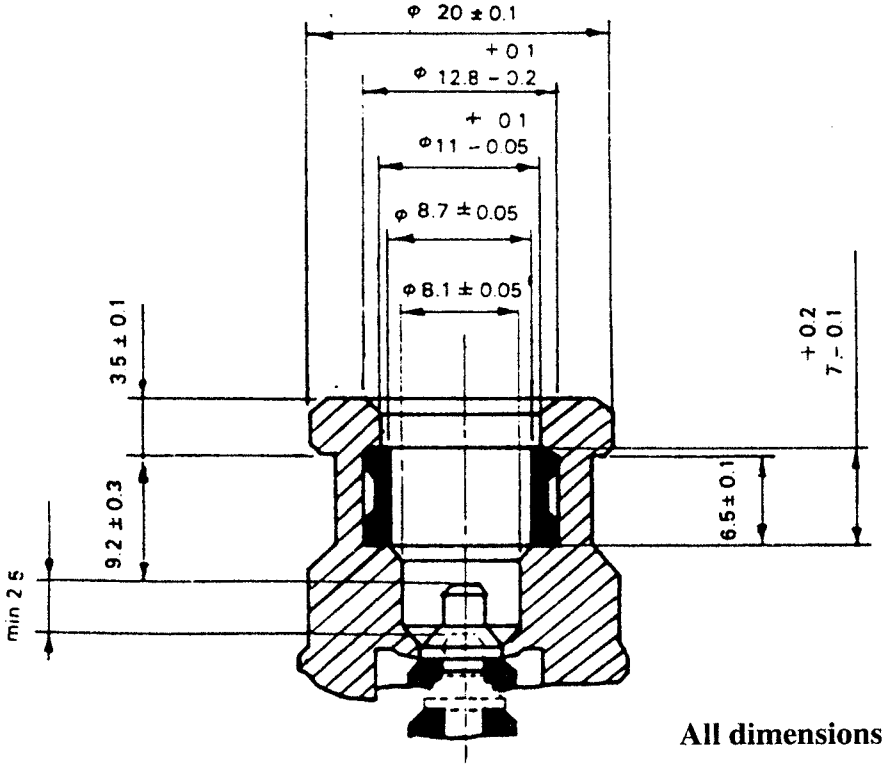
Test samples for valve body material for tensile and hardness tests shall, where practicable, be taken from a valve body blank. Where this is not practicable, the test samples shall be made from the same raw material (wrought or extruded section) giving the same outside shape as the valve body blanks it represents. The scale of sampling and criteria for conformity shall be agreed between the manufacturer and the purchaser.

3.1.6 All rubber materials of the valve shall be free from porosity, pits and foreign particles and shall have a smooth non-tacky surface with minimum talc or bloom.

3.1.7 The material of the valve springs shall not corrode or otherwise deteriorate in LPG.

3.2 Valve outlet dimensions

3.2.1 The valve outlet configuration, dimensions and machining tolerances shall be as given in Figure **1**.



All dimensions in millimetres

FIGURE 1 - Valve outlet dimensions

3.3 Screw threads on the valve stem and in cylinder neck (valve inlet threads)

3.3.1 *Types of screw threads*

The valve inlet shall be provided with any one of the two types of taper screw threads specified in **3.3.1.1** or **3.3.1.2.**

3.3.1.1 28.8 mm nominal diameter DIN 477 valve screw thread
The 28.8 mm nominal diameter valve screw thread shall be of right hand thread Whitworth form pitch equal to 1.814 mm, thread angle 55^0 and having a taper of 3:25 on diameter. The principal dimensions and limits on this screw thread shall be as given in Figures **2** and **3**.

3.3.1.2 3/4" 14 NGT valve screw thread
The valve screw thread shall be of right hand thread, angle of thread 60^0, pitch equal to 1.814 mm having a taper of 1 : 16 on diameter. The principal dimensions and limits on this screw thread shall be as given in Figures **4** and **5.**

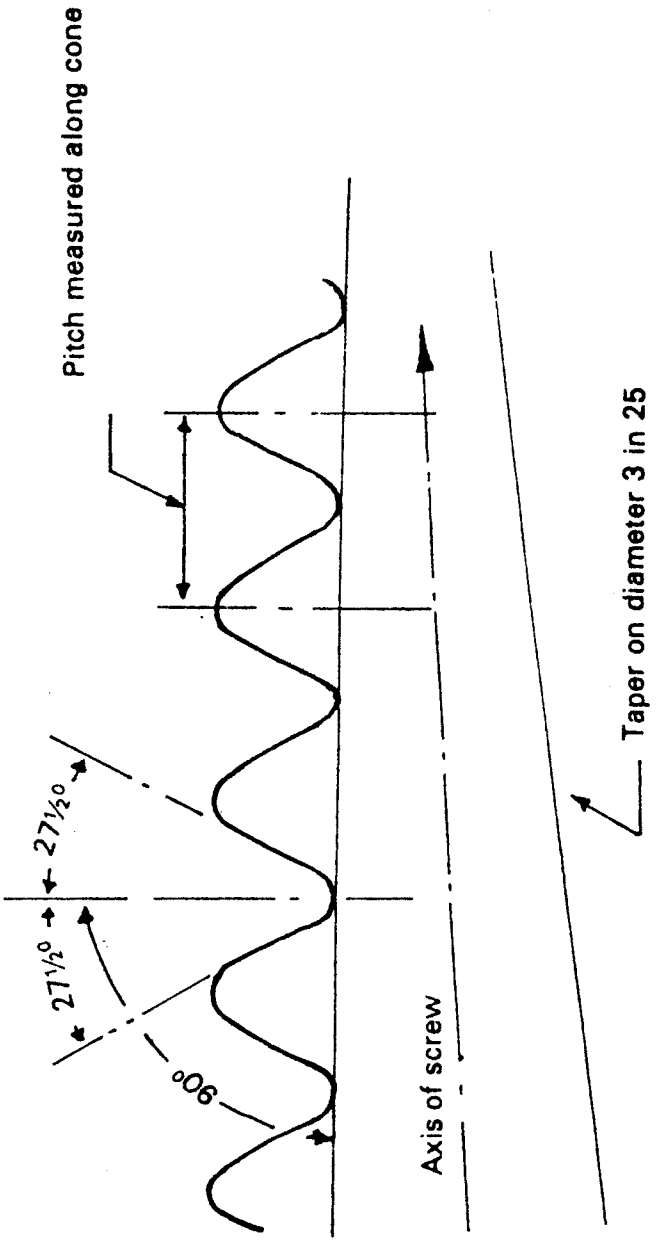
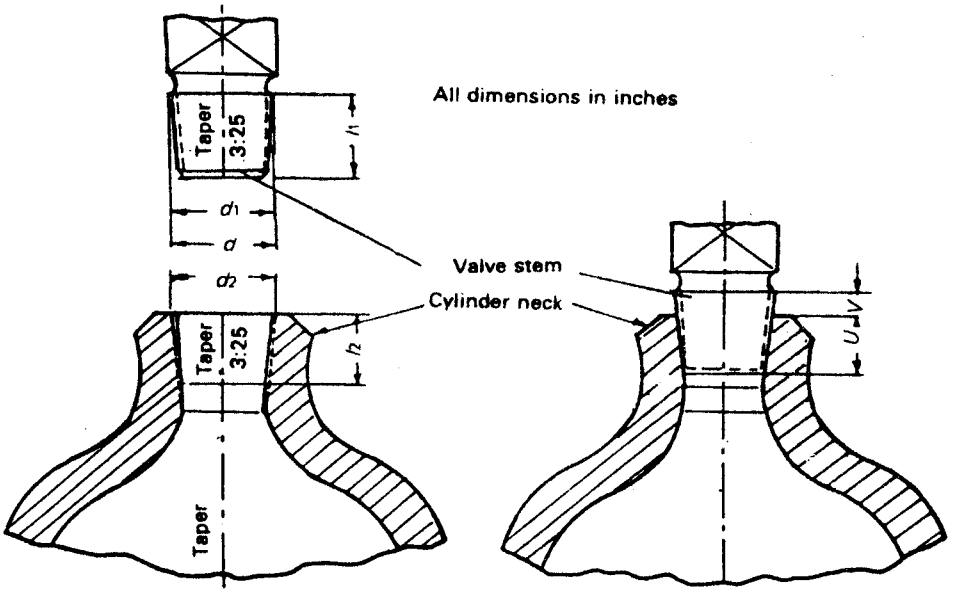
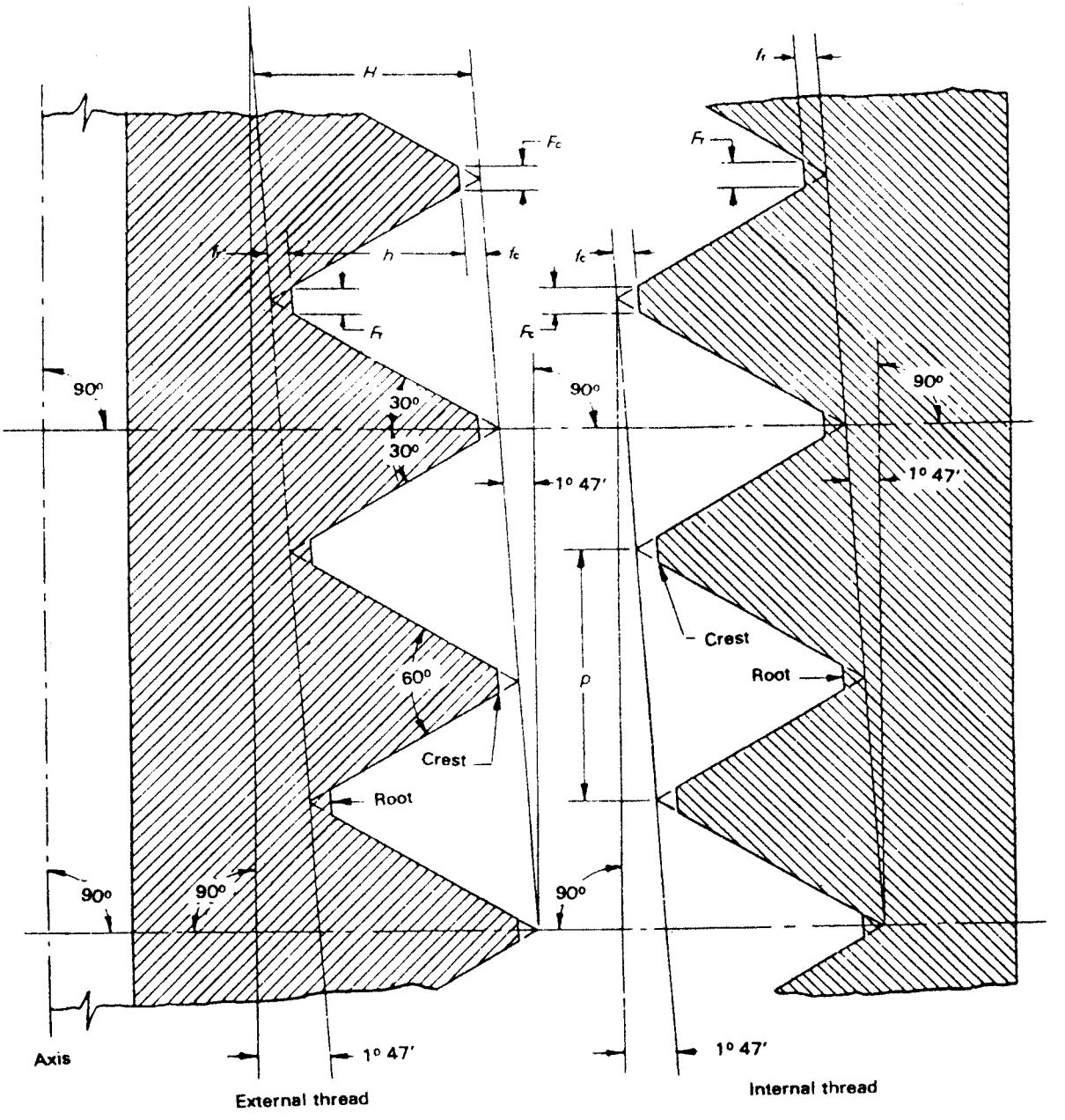


FIGURE 2 — Whitworth form thread, right hand normal to surface of cone, pitch = 1.814 mm, thread angle 55°, taper 3 in 25 on diameter



Nominal diameter of valve	Valve stem			Cylinder neck		Thread engagement	
	d +0.12	d_1 +0.12	l_1	d_2 -0.12	l_2 min.	u	v
						at theoretical thread dimensions	
28.8	28.8	25.8	26	27.8	22	17.67	8.33

FIGURE 3 – Principal dimension of 28.8 mm nominal diameter valve thread 14 thread per inch conforming to DIN 477.



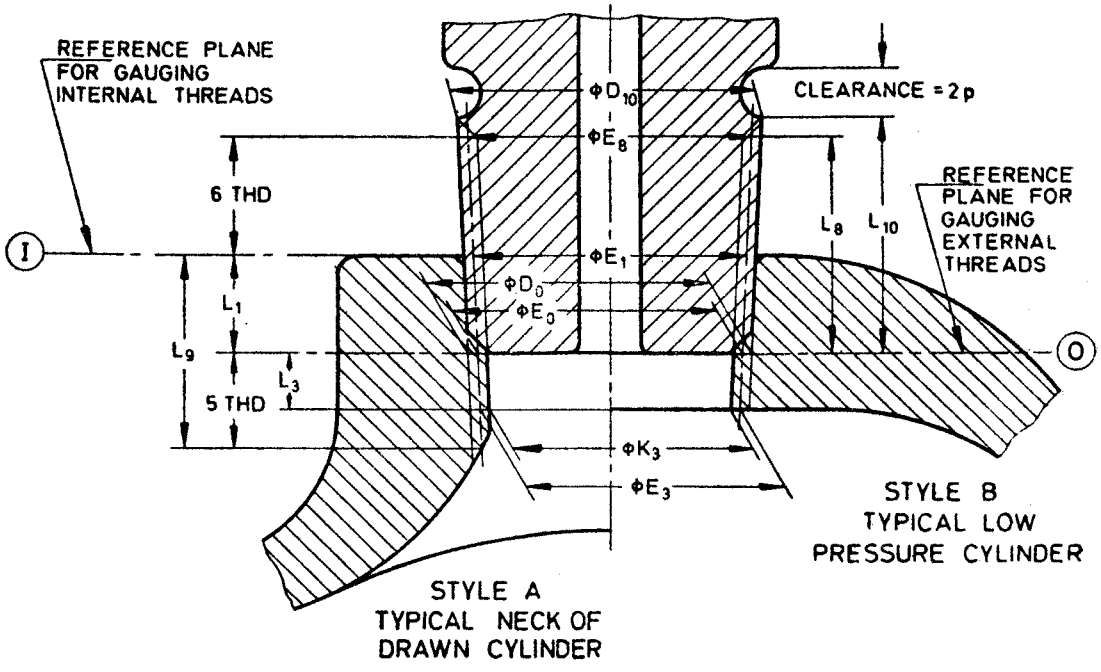
Pitch measured parallel to axis, p = 1.814 mm

Thread angle 60° normal to the axis.

Taper 1 in 16 measured on the diameter along the axis.

H = 0.866025 p = height of 60° sharp V thread
h = 0.800000 p = height of thread on product
f_c = depth of truncation of crest, f_r = depth of truncation at root
F_c = width of flat at crest, F_r = width of flat at root

FIGURE 4 – Thread form of ¾", 14 National Gas Taper (NGT) threads



D = Major diameter
D_0 = 26·03
D_{10} = 27·42

E = Pitch diameter
E_0 = 24·58
E_1 = 25·118
E_3 = 24·24
E_8 = 25·798

K = Minor diameter
K_2 = 22·79

L_1 = Standard handtight engagement
= 8·611

L_3 = 3 threads (for wrenching)

$L_1 + L_3$ = 14·05

L_8 = Length of full external threads
= 19·497

L_9 = Length of full roots (minimum) on internal threads
= 17·681

L_{10} = Overall length of external threads (approx)
= 23

Diameter at small end of the valve after chamfer = 23

All dimensions in millimetres

FIGURE 5 - Dimensions for 3/4" 14 National Gas Taper(NGT) threads on valve stems and in cylinder necks.

3.3.2 *Tolerance of screw threads*

3.3.2.1 Limits on size
Final inspection limits on size (pitch diameter) of both the external and internal threads are $\pm$ 1 turn from basic; although the preferred working limits are $\pm$ 1/2 turn from basic.

3.3.2.2 Limits on taper

a) The taper on pitch elements of *external* threads shall be 1: 16 on diameter, with a minus tolerance of 1 turn, but no plus tolerance in gauging.

b) The taper on pitch elements of *internal* threads shall be 1:16 on diameter, with a plus tolerance of 1 turn, but with no minus tolerance on gauging.

3.3.2.3 Tolerance on angle
The tolerance on 60^0 angle of threads shall be $\pm 2^0$

3.4 Safety design features

3.4.1 All valves shall incorporate a safety relief feature of the spring loaded type and be designed for gas tightness. The start-to-discharge pressure of the safety relief valve shall be 2.6 MPa, with permissible tolerance of $\pm$10 per cent.

3.4..2 The discharge rate of the relief valve shall be in accordance with the formula:

$$Q = 27.8 \times 10^{-6} \times P \times W$$

Where,
Q is the discharge rate in m^3/min of free air;
P is the start-to-discharge pressure in kPa (absolute); and
W is the water capacity of the cylinder in kg.

3.4.3 The spring used in the safety relief valve must be able to function normally at all temperatures in the range of -20^0 C to 65^0 C.

3.4.4 All valve openings shall be tamper proof, designed with provision of seals or otherwise.

3.5 Performance and strength
The valves and their components shall satisfy the relevant testing requirements as specified in **5**.

4 MARKING

4.1 All valves shall be indelibly marked with the following information:

a) manufacturer's name and/or trade mark; and
b) month and year of manufacture.

NOTE

Attention is drawn to certification facilities offered by SLSI. See the inside back cover of this standard.

5 METHODS OF TEST

5.1 Samples for tests

Unless otherwise specified, the sampling procedure shall be agreed upon by the manufacturer and the purchaser.

5.2 Hydrostatic test

Representative samples of machined valve bodies, before assembly, shall be subjected to a hydrostatic test at a pressure twice the design pressure* for a period of one min. There shall be no rupture or deformation of the valve.

5.3 Pneumatic test

Each assembled valve shall be subjected to pneumatic test at a pressure not less than the design pressure* in the closed position. There shall be no leakage through the valve.

5.4 Performance test of safety relief valve

Each assembled valve shall be subjected to pneumatic pressure of upto 2.6 MPa ± 10 per cent. The safety relief valve shall operate within this pressure range.

5.5 Endurance test

Samples of the valve shall be cycled 5000 times for opening and closing operations at a cycle time of 5 s and spindle displacement of 2.5 mm. After the cycling operation the valve shall be subjected to the pneumatic test and test for leakage. There shall be no leakage through the valve.

5.6 Tests on rubber materials

All rubber materials in contact with LPG shall comply with the requirements of **5.6.1, 5.6.2** and **5.6.3**

* The design pressure of domestic and industrial gas cylinders currently in use for LPG is 1.65 MPa.

5.6.1 *Hydrocarbon resistance test*
Samples of rubber materials shall first be weighed in air and reweighed while completely immersed in distilled water. Then the samples shall be immersed in liquid propene for 72 h at a temperature of 23 $\pm$ 2 ^{0}C. The samples shall then be removed from the propene and wiped over with a filter paper and then weighed after 5 min interval, in air and in distilled water. The sample shall then be left in air for 24 h and weighed again in air and in distilled water. The variations in weight and volume be recorded as percentages of the original weight and volume.

The sample shall change neither in weight nor in volume by more than 20 per cent at the 5 min weighing, and nor more than 10 per cent at the 24 h weighing.

5.6.2 *Flexibility test*
The hardness of the rubber material shall be such as to remain flexible enough over the temperature range of - 20 ^{0}C to 50 ^{0}C unless otherwise specified by the purchaser. This test shall be carried out in the following manner.

A strip of the material shall be immersed in a methanol solution cooled to the required test temperature by small additions of dry ice. After maintaining the test piece at the test temperature for approximately 10 minutes, the flexibility is checked and compared with the flexibility of a similar test piece at room temperature. There should be little or no increased resistance to flexing.

5.6.3 *Ageing test.*
The rubber materials shall show no marked deterioration when subjected to accelerated ageing test as described in ISO 188, method A, for a period of 168 hours.

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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.*

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SRI LANKA STANDARDS INSTITUTION

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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.

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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.

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