

SRI LANKA STANDARD 814 : PART 1 : 1988

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**SPECIFICATION FOR
ELECTRIC FANS AND REGULATORS**

PART 1 - PERFORMANCE

SRI LANKA STANDARDS INSTITUTION

**SPECIFICATION FOR ELECTRIC FANS AND REGULATORS
PART 1 PERFORMANCE**

SLS 814:1988

(AMD 537 Attached)

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SPECIFICATION FOR ELECTRIC FANS AND REGULATORS

PART 1 PERFORMANCE

FOREWORD

This Sri Lanka Standard was authorised for adoption and publication by the Council of the Sri Lanka Standards Institution on 1988-01-25, after the draft finalised by the Drafting Committee on Electric Fans and Regulators had been approved by the Electrical Engineering Divisional Committee.

This Sri Lanka Standard specification covers the performance requirements for the ceiling, pedestal, table type fans, oscillating or non-oscillating type and their associated regulators, intended for use on Single phase a.c. or d.c.circuits at voltages not exceeding 250 V, suitable for normal household and similar uses. This standard is in line with the IEC 879 and BS 5060.

Part 2 of this standard covers the safety requirements for electric fans and regulators.

This Sri Lanka Standard together with SLS 814 Part 2 supersede the following Sri Lanka Standards :

SLS 163 Electric ceiling type fans and regulators

SLS 220 Electric table type fans and regulators

All standard values given in this specification are in SI units.

References have been made in this standard with regard to general and safety requirements as well as methods of test to SLS 579 which is a necessary adjunct to this specification, should however, any deviation exist between the requirements of SLS 579 and those of this specification, the provision of the latter shall apply.

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 observation shall be rounded off in accordance with SLS 102. The number of figures to be retained in the rounded off value ; shall be the same as that of the specified value in this specification.

The assistance derived from the publications of the International Electrotechnical Commission and British Standards Institution in preparation of this specification is gratefully acknowledged.

1 SCOPE

This Sri Lanka Standard specification covers the performance requirements for the ceiling, pedestal, table type fans, oscillating or non-oscillating type and their associated regulators, intended for use on single phase a.c. or d.c. circuits at voltages not exceeding 250 V, suitable for normal household and similar uses.

Part 2 of this standard covers the safety requirements for electric fans and regulators.

2 REFERENCES

- IEC 51 Direct acting indicating analogue electric measuring instrument and their accessories
- CS 102 Presentation of numerical values
- SLS 579 Specification for general and safety requirements for house-hold and similar electrical appliances
- SLS 814 Electric fans and regulators Part 2 Safety requirements

3 DEFINITIONS

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

- 3.1 ceiling type fan : A propeller-bladed fan, having two or more blades, and provided with a device for suspending the fan from the ceiling of a room so that the blades rotate in a horizontal plane.
- 3.2 table type fan : A smaller diameter propeller-bladed fan having two or more blades, and intended for use with free inlet and outlet of air. It may be a table fan or bracket mounted fan for wall or ceiling mounting.
- 3.3 pedestal type fan : A propeller-bladed type fan having two or more blades mounted on a pedestal of fixed or variable height and intended for use with free inlet and outlet of air.
- 3.4 blade sweep : The diameter of the circle traced out by the extreme tips of the fan blades.
- 3.5 size of fan : The blade sweep in millimetres.
- 3.6 plane of fan blades : The middle plane of the solid of revolution traced out by the fan blades.

- 3.7 **Plane of anemometer vanes** : The middle plane of the solid of revolution traced out by the vanes of the anemometer.
- 3.8 **test plane** : The horizontal (in the case of ceiling type fans) and vertical (in the case of table and pedestal type fans) plane containing the plane of the anemometer vanes.
- 3.9 **height of the fan** : The height from the base to the axis of the fan motor in the horizontal plane.
- 3.10 **service value** : The air delivery in cubic metres per minute divided by electrical power input to the fan in watts at the voltage and frequency specified for the test. In the event of the fan comprising an oscillating mechanism the electrical input in watts is measured with the fan under normal full-speed conditions, and with oscillating mechanism in action, whereas the air delivery is determined with the oscillating mechanism out of action.
- 3.11 **rating** : A statement of the operating characteristics assigned to the fan or regulator by the manufacturer.
- 3.12 **rated voltage** : The voltage assigned to the fan or regulator by the manufacturer and marked on it.
- 3.13 **rated voltage range** : The voltage limits assigned to the fan or regulator by the manufacturer and marked on it.
- 3.14 **rated frequency** : The frequency assigned to the fan or regulator by the manufacturer and marked on it.
- 3.15 **rated frequency range** : The limits of frequency assigned to the fan or regulator by the manufacturer and marked on it.
- 3.16 **rated speed** : The rotational speed specified by the manufacturer at which the fan develops the specified output at the rated frequency.
- 3.17 **full speed** : The speed at rated voltage and frequency without the regulator in circuit.
- 3.18 **cooling air temperature** : The temperature of the surrounding atmosphere in which the fan or regulator operates.
- 3.19 **types of enclosures of motors and regulators**
- 3.19.1 **totally enclosed type** : An enclosure which does not provide for circulation of air between the inside and outside of the case, but not necessarily 'air tight'.
- 3.19.2 **ventilated type** : An enclosure in which the ventilation is not materially obstructed while the live and internal rotating parts are protected mechanically against accident or careless contact.
- 3.20 **air delivery** : Quantity of air delivered in a given time under specified conditions.

3.21 rated air delivery : Air delivery of the fan assigned by the manufacturer and which serves to define the performance of the fan for ordering and testing.

3.22 methods of mounting (for table and pedestal type fans)

3.22.1 rigid mounting : The type of mounting in which direction of air flow can be changed only by changing the position of the fan.

3.22.2 semi-rigid mounting : The mounting incorporating a trunnion and or swivel arrangement so that the direction of the air flow can be altered to suit the requirements.

3.22.3 oscillating mounting : The mounting provided with a device by which the direction of the axis of the airflow is changed automatically and continuously in one plane.

3.22.4 double oscillating (or gyrostatic) mounting : The mounting provided with a device by which the direction of the axis of the air flow is changed automatically and continuously in more than one plane.

3.23 type test : Tests carried out to prove conformity with the requirements of this specification. These are intended to prove general performance and design of a given type of fan.

4 SIZES, NUMBER OF SPEEDS AND TYPES

4.1 Preferred fan sizes shall be as given in Table 1.

TABLE 1 - Fan Size

| Fan type | Fan size in mm |
|---|-------------------------------|
| Ceiling | 900, 1200, 1400, 1500 1800 |
| Table non-oscillating or oscillating | 200, 250, 300, 350, 400 |
| Pedestal type, oscillating or non-oscillating | 300, 400, 500, 600 |

4.2 Minimum number of speeds of ceiling, pedestal and table type fans shall be as given in Table 2.

TABLE 2 - Minimum number of speeds

| | Ceiling type | Pedestal type | Table type size 200mm & 250 mm | Table Type size 300mm | Table Type size 350mm & 400 mm |
|------------------|--------------|---------------|--------------------------------|-----------------------|--------------------------------|
| Number of speeds | 5 | 2 | 1 | 2 | 3 |

5 REQUIREMENTS

5.1 Frequency

The rated frequency of a.c. fans and regulators shall be 50 HZ, unless otherwise agreed between the purchaser and the manufacturer.

5.2 Design and general construction

5.2.1 Enclosures

5.2.1.1 All fans and regulators shall be suitable for use in an ambient temperature of 40 °C. Nevertheless fans or regulators made to operate in higher ambient temperatures can be regarded as complying with this standard provided the temperature rise values given in SLS 579 are reduced correspondingly to the increase in ambient temperature.

5.2.1.2 Motors and regulators of fans shall be either of the ventilated or totally enclosed type, except that motors of ceiling type fans shall be of the totally enclosed type only.

5.2.2 Blades

Fans shall be fitted with two or more well-balanced blades made from metal or other suitable material, so as to be reasonably free from vibrations.

5.2.3 Bearings

Instructions for the proper lubrication of the bearings shall be furnished by the manufacturer, if necessary.

5.2.4 Capacitors

Capacitors, if any, shall be easily replaceable and placed at sufficient distance from the windings, so that the maximum safe working temperature as marked on the capacitor is not exceeded. Capacitors shall be clearly marked with the maximum safe working temperature, and the corresponding voltage and capacitance.

5.2.5 Method of mounting (for table and pedestal type fans)

The mounting may be rigid semi-rigid oscillating or double oscillating (gyrostatic). In the case of semi-rigid mounting the minimum angle through which is possible to rotate the fan horizontally as well as vertically without changing the position of the fan shall be 45° and 7° respectively.

5.2.6 Oscillating mechanism (for table and pedestal type fans)

5.2.6.1 The number of oscillations (i.e. complete to and fro cycles) per minute at full speed shall be not less than four.

5.2.6.2 Whether or not the angular movement of the mechanism is adjustable, an angular movement of not less than 60° shall be available (see Fig.1, Page 10).

5.2.6.3 A device shall be provided to render the oscillating mechanism inoperative when desired. The method of operating the device should preferably be indicated. Means shall be provided to ensure that, when installed according to the manufacturer's instructions, the fan is not stalled or overturned if the oscillating mechanism is impeded.

5.2.7 Guards

Guards shall be fitted to all fans of the pedestal or table type in accordance with Clause 5.12.1 of SLS 814:Part 2:1988.

5.3 Noise level

The noise level of fans and regulators at all speeds shall be within reasonable limits.

5.4 Finish

All surfaces of the assembly and mechanism of both fan and regulator, if any, shall be of corrosion resisting material or shall be suitably and durably protected against corrosion.

5.5 Speed regulators

5.5.1 Regulators shall be capable of reducing the speed of the fan at least 50 percent of the full speed at the voltage and frequency specified for the test, except in the case of fans of the shaded pole type where the speed reduction shall be not less than 20 percent. Fans shall be capable of running continuously on any of the contacts of the regulator at the rated voltage or voltages or within the whole rated voltage range, whichever is applicable.

5.5.2 The speed regulators shall have an OFF position preferably next to the lowest speed contact. The speed difference at any running position shall not deviate more than ± 50 per cent from the ideal speed difference calculated on the basis of maximum and minimum speeds divided by the number of steps provided in the speed regulator.

5.6 Interchangeability

Components of a particular model and size of fan, its associated regulator and set of blades shall be interchangeable.

6 MARKING

6.1 Each fan shall be indelibly marked with the size of fan in addition to the information specified in Part 2 of SLS 814 (safety requirements for electric fans and regulators) as applicable. Separately mounted regulators shall be marked with the model/size of fans for which they are suited.

6.2 The following information shall be supplied on request :

- a) power factor ;
- b) rated speed in revolutions per minute ;
- c) number of blades ;
- d) type of regulator and number of running positions ;
- e) class of insulation ;
- f) type of bearings ;
- g) rated air delivery ; and
- h) service value.

7 TESTS

7.1 Type test

The tests specified in this standard are type tests.

7.2 Limits of error of electrical measuring instruments

Ammeters, voltmeters and wattmeters used for type tests shall have a class index 0.5 or better as defined in IEC 51.

7.3 Test voltage and frequency

The voltage and frequency at which the tests are conducted shall be as follows :

7.3.1 Test voltage

When a rated voltage is indicated on the nameplate, the test shall be conducted at the rated voltage. If the fan is specified for two or more distinct rated voltages, the tests shall be carried out at the most unfavourable voltage.

When a voltage range is indicated on the nameplate, the test voltage shall be :

- a) the highest and the lowest values of the range when voltage range is in excess of 10 per cent of the mean of the range ; and
- b) the mean of the upper and lower limits when the voltage range is 10 per cent or less of the mean of the range.

7.3.2 Test frequency

For a fan with a range of frequencies, the tests shall be made at the frequency which gives the most unfavourable results.

7.3.3 Limits of voltage variation

The variation in the voltage shall not exceed ± 1 per cent the test voltage during air performance tests. While taking the current and voltage readings during these tests, however, the voltage shall be the test voltage.

7.4 Air delivery test

The method for determining the air delivery shall be as follows :

The test shall be carried out at an ambient temperature of $25 \pm 10^\circ\text{C}$.

7.4.1 Ceiling type fans

a) Test chamber

The fan shall be tested in a test chamber having the following dimensions :

Length : 450 m, width : 4.50 m, height : 3m (see Fig.2 and 3 Page 10 and 11).

The top of the test chamber shall be covered except for a centrally situated circular opening (top-opening), the diameter of which shall be between 1.1 and 1.2 times the blade sweep. The central diaphragm in which the top opening is located shall be not more than 6 mm thick.

The observer shall take readings from a position between the chamber and outer screen, and a small shelf for electrical instruments may be provided in this space. Except for these, the space between the chamber and the outer screen and the space inside the test chamber shall be clear of all obstructions, and there shall be no heating or cooling apparatus anywhere in the system. The room in which the test chamber and the outer screen are erected shall be suitably protected from extraneous draughts.

b) Height of fan

The fan shall be placed at such a height that the plane of the fan blades is 3 m (tolerance ± 10 mm) from the ground level and lies in the plane of the top edge of the diaphragm containing the top opening in the roof of the test chamber.

Any ceiling external to the test chamber or any projecting beam which might interfere with the air flow shall be not less than 1 m above the top opening that is not less than 4 m from the ground level at this point.

c) Testing instrument

The air movement shall be measured by means of a rotating vane anemometer having an internal diameter not exceeding 100 mm.

d) Arrangement of apparatus

The arrangement of the apparatus shall be such as to permit the anemometer being moved in either direction along both diagonals of the test chamber in a test plane 1.50 m (tolerance ± 10 mm) below the plane of the fan blades. The anemometer shall be supported in such a manner as to offer as little obstruction as possible to the air flow.

e) Procedure for test

Before taking any steps towards testing a fan according to this standard, it is essential that it should have been 'run-in' to steady conditions at the test voltage. A period of 2 hours is considered adequate for this purpose.

The measurements shall be carried out with the fan running at full speed at the test voltage.

Air velocity readings shall be taken along each of the four semi-diagonals of the test chamber commencing at a point 40 mm from the vertical axis of the fan motor by increments of 80 mm so that each reading represents an air velocity at the mean radius of an annulus 80 mm wide. The readings shall be continued until the velocity falls below 9.0 m per min.

Each readings shall consist of the time taken by an air movement of 300 m measured by the anemometer, except when such air movement takes more than 2 min. the reading shall then consist of the time taken by a movement of some convenient and readable quantity of air requiring approximately 2 min.

The average air velocity over any annulus shall be the mean of the readings on the four semi-diagonals at each mean radius of annulus.

The average velocity so obtained, multiplied by the area of the corresponding annulus shall be taken as the total air delivery through that annulus.

The sum of the air deliveries through all such annuli up to the limit of readings shall be taken as the measured air delivery of the fan for the purposes of this standard.

No correction is made for relative humidity and pressure.

7.4.2 Table and pedestal type fans

a) Test chamber

The fan shall be tested in a test chamber having the following dimensions, length: 4.50 m for table type fans, 6 m for pedestal type fans, width : 4.50 m, height : 3m. This chamber shall be suitably protected from extraneous draughts.

The test chamber shall be free from obstructions other than the stand on which the fan is kept. Any table or shelf for electrical instruments shall be on the intake side of the fan, beyond a distance of 0.90 m from the plane of the fan blades. No heating or cooling apparatus shall be used in the test room while the test is in progress.

The table type fan shall be mounted with the blade centre 1.20 m from the floor and with the front of the blades at least 1.20 m from the back wall and at least 1.80 m from the side walls and the wall in front.

The pedestal type fan shall be so situated that the blade centre is 1.50 m from the floor and the front of the blades is at least 1.20 m from the back wall. 1.80 m from the side walls and 4 m from the wall in front.

The test chamber of dimensions mentioned above may not be suitable for fans having impeller diameter exceeding 600 mm.

b) Testing instrument

The air movement shall be measured by means of rotating vane anemometer having an internal diameter not exceeding 100 mm suitable for the range of velocities to be measured.

c) Arrangement of apparatus

The arrangement of the apparatus (see Figures 4 and 5 Pages 11 & 12) shall be such as to permit the anemometer being moved in a horizontal plane containing the axis of the fan, the movement being at right angles to the axis and extendable in both directions. The anemometer shall be supported in such a manner as to offer as little obstruction as possible to the air flow. The axis of the anemometer vane shall always be parallel to the axis of the fan blades.

The distance between the test plane and the plane of the fan blades shall be equal to three times the size of the fan.

d) Procedure for test

Before taking any steps towards testing a fan according to this standard, it is essential that it should have been 'run-in' to steady conditions at the test voltage. A period of 2 hours is considered adequate for this purpose.

The measurements shall be carried out with the fan running at full speed at the test voltage, with the guard in position, if normally provided and with the oscillating mechanism, if any, disconnected.

Air velocity readings shall be commenced at a point 20 mm from the axis of the fan blades, and shall progress along the horizontal line in each direction, by increments of 40 mm wide. Readings shall be continued in each direction until the true air velocity falls below 25 m/min.

Each rading shall consist of the time taken by an air movement of 100 cc measured by the anemometer, except when such air movement takes more than a min ; the readings shall then consist of the time taken by a movement of some convenient and readable quantity of air requiring approximately 2 min. In no case should the duration of the reading be less than 1 min.

The average air velocity over any annulus shall be the mean of the readings on either side of the axis of the fan blades at each mean radius of annulus.

The average velocity so obtained, multiplied by the area of the corresponding annulus shall be taken as the total air delivery through that annulus.

The sum of the air deliveries through all such annuli up to the limit of readings shall be taken as the measured air delivery of the fan for the purposes of this standard.

No correction is made for relative humidity and pressure.

7.5 Measurement of speed of the fan

The speed of rotation of the fan shall be determined by running the fan at the test voltage and at its rated frequency (if a.c.). The method of measurement shall be such that the speed of the fan is not affected. The regulator, if any, shall be at the highest speed position and the oscillating mechanism, if any, shall be disconnected.

7.6 Measurement of power factor (for a.c. fans only) and power input

The fan shall be connected to the supply at the voltage and frequency, Capacitors, if any, associated with the fan shall be retained in the circuit. The regulator, if provided, shall be set at the highest speed position and the oscillating mechanism, if any, shall be disconnected. Power input (W) shall be noted and power factor of the fan shall be either measured directly with the help of a power factor meter or calculated from the readings of ammeter, voltmeter and wattmeter.

8 TOLERANCE ON RATINGS

The tolerance to be applied to the rated quantities when assigned by the manufacturer, shall be as given below :

- a) Air delivery :- -10 per cent
- b) Power factor :- $1/6 (1 - \cos \phi)$, minimum 0.02, maximum 0.07
- c) Fan speed : ± 10 per cent

Where a tolerance in one direction is omitted, there is no restriction on the value in that direction.

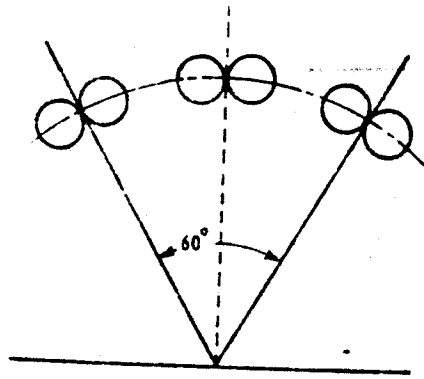
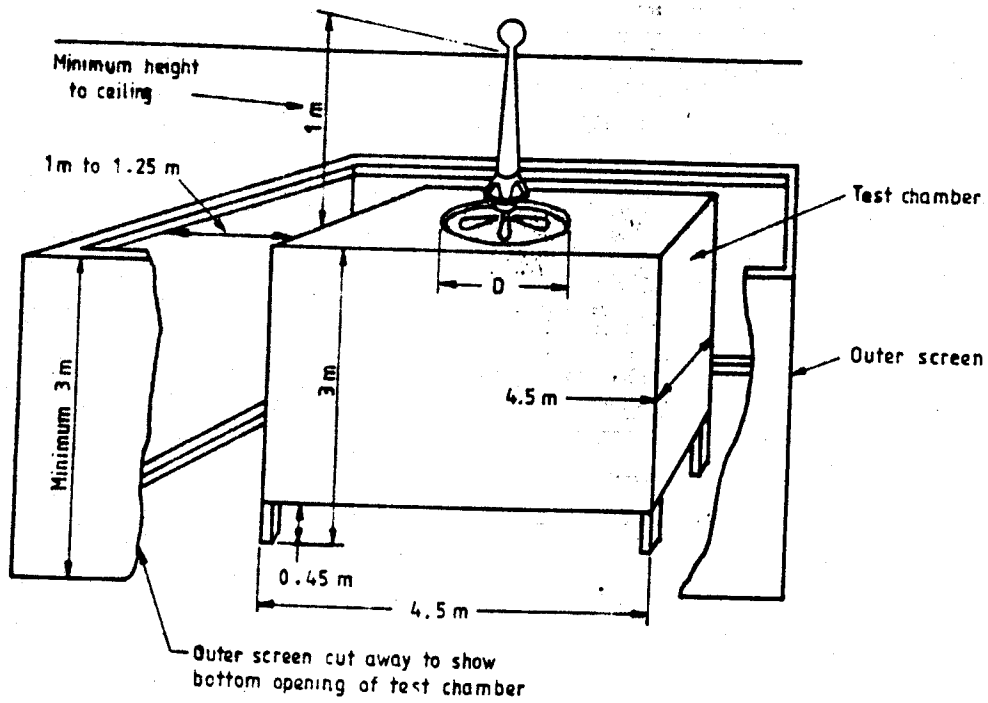
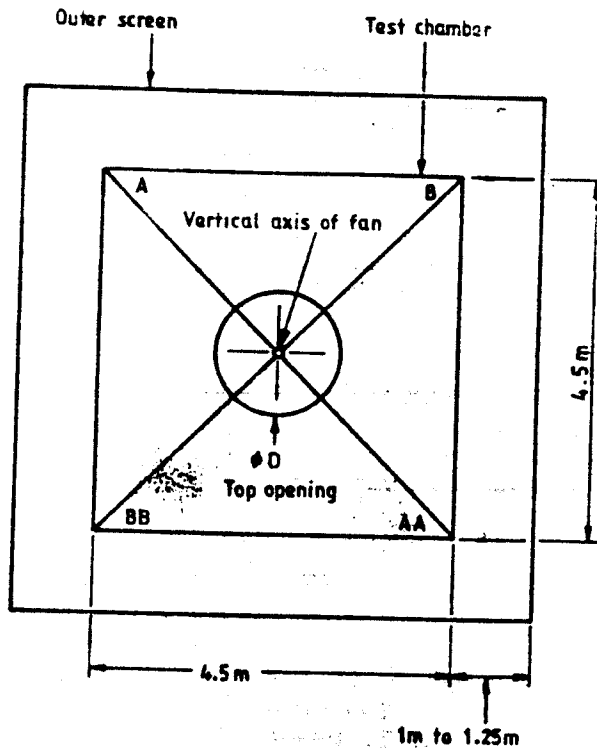


Figure 1 - Angular movement of oscillation



Note - For dimension D, see sub clause 7.4.1.a

Figure 2 - Arrangement of test chamber and screen



Note - For dimension D, see sub clause 7.4.1.a

Figure 3 - Plan of test chamber and screen

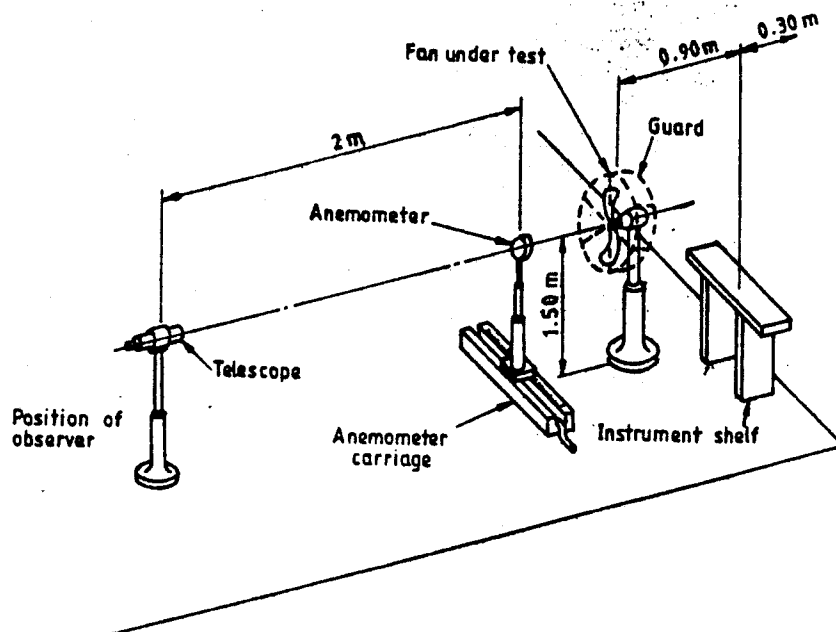


Figure 4 - Arrangement for air delivery test for pedestal type fans

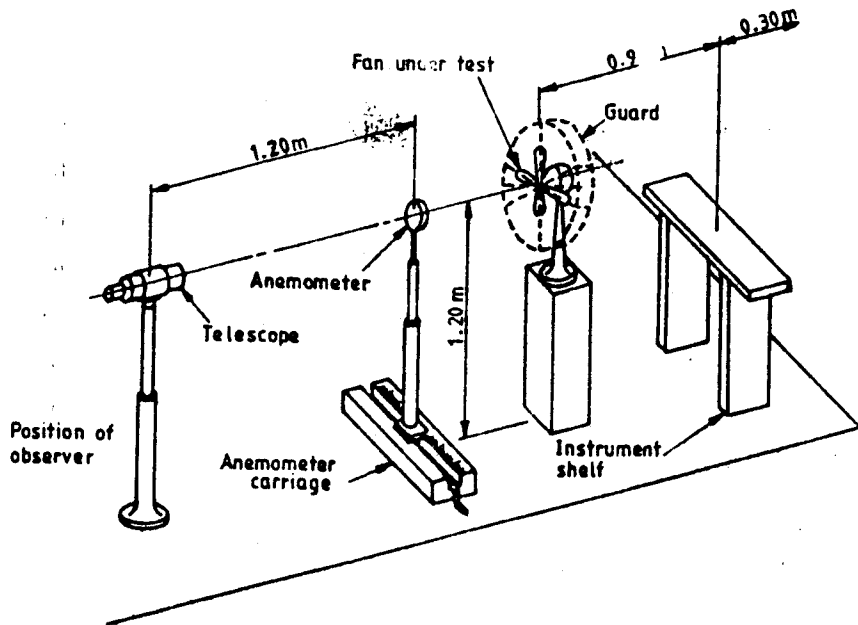


Figure 5 - Arrangement for air delivery test for table and cabin type fans

**CORRIGENDUM NO 01
TO
SLS 814 -1: 1988**

**SRI LANKA STANDARD SPECIFICATION FOR
ELECTRIC FANS AND REGULATORS
PART 1 : PERFORMANCE**

1. Clause 7.4.1a) Test chamber

Delete second line of first paragraph and substitute with the following.

Length : 4.50 m, width 4.50 m, height : 3 m
(see Figure 2 and Figure 3)

2. Clause 7.4.2 d) Procedure for test

- i) Delete “25 m / min” given in 3rd paragraph and substitute with “0.4 m / s”
- ii) Delete the word “a min” given in 4th paragraph and substitute with “120 s”

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Amendment No. 1 Approved on 2020-07-22 to SLS 814 Part 1: 1988

Sri Lanka Standard for Electric Ceiling Fans Part 1: Performance requirements

1) Replace the existing Clause 4.1 including Table 1 Fan Sizes, with the following:

4 SIZES, NUMBER OF SPEEDS AND TYPES

4.1 Fan sizes shall be as given in Table 1

TABLE 1 Fan Size

| Fan type | Fan Size in mm | Tolerance |
|---|-----------------------------|--------------------|
| Ceiling | 900, 1200, 1400, 1500, 1800 | $\pm 5 \text{ mm}$ |
| Table non-oscillating or oscillating | 200, 250, 300, 350, 400 | |
| Pedestal type, oscillating or non-oscillating | 300, 400, 500, 600 | |

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.

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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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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.

