

इंटरनेट

मानक

Disclosure to Promote the Right To Information

Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

“जानने का अधिकार, जीने का अधिकार”

Mazdoor Kisan Shakti Sangathan

“The Right to Information, The Right to Live”

“पुराने को छोड़ नये के तरफ”

Jawaharlal Nehru

“Step Out From the Old to the New”

IS 4007-1 (1982): Terminals for Electronic Equipment, Part I: General Requirements and Tests [LITD 3: Electromechanical Components and Mechanical Structures for Electronic Equipment]



“ज्ञान से एक नये भारत का निर्माण”

Satyanarayan Gangaram Pitroda

“Invent a New India Using Knowledge”



“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”

Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

BLANK PAGE



IS : 4007 (Part I) - 1982

Indian Standard

SPECIFICATION FOR
TERMINALS FOR ELECTRONIC EQUIPMENT

PART I GENERAL REQUIREMENTS AND TESTS

(First Revision)

UDC 621.315.684 : 621.38.038



© Copyright 1982

INDIAN STANDARDS INSTITUTION

MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

November 1982

*Indian Standard*SPECIFICATION FOR
TERMINALS FOR ELECTRONIC EQUIPMENT

PART I GENERAL REQUIREMENTS AND TESTS

*(First Revision)*Electromechanical Components for Electronic Equipment Sectional
Committee, LTDC 7*Chairman*

SHRI G. SAMSON

Representing

Indian Telephone Industries Ltd, Bangalore

*Members*SHRI S. RATNAKAR (*Alternate to*
Shri G. Samson)

LT-COL HEMJI AGRAWAL Ministry of Defence (DGI), New Delhi

SHRI V. S. MURTHY (*Alternate*)SHRI AJIT KUMAR BASAK Office of the Development Commissioner, Small
Scale Industries, New DelhiSHRI P. P. MALHOTRA (*Alternate*)SHRI K. K. BHARGAVA Electronic Component Industries Association
(ELCINA), New Delhi

SURG CAPT A. K. DEB (IN) Ministry of Defence (R & D)

SHRI P. K. SHUKLA (*Alternate*)

SHRI M. A. GANAPATHY Oil and Natural Gas Commission, Dehra Dun

SHRI J. GUPTA Peico Electronics & Electricals Ltd, Bombay

SHRI M. M. JOSHI (*Alternate*)

SHRI K. K. GUPTA U. P. Electronics Corporation Ltd, Lucknow

SHRI P. C. AGRAWAL (*Alternate*)

SHRI BAKUL HARISHANKER Allied Electronics Corporation, Bombay

SHRI V. MADHAVAN (*Alternate*)

SHRI R. K. JAYADEV Overseas Communications Service, Bombay

SHRI B. N. KARKERA Bhabha Atomic Research Centre, Bombay

SHRI K. S. KELKAR Tata Engineering & Locomotive Co Ltd,
JamshedpurSHRI V. A. KALGAONKAR (*Alternate*)

SHRI P. K. KOSHY O.E.N. India Ltd, Cochin

SHRI T. THOMAS (*Alternate*)SHRI P. C. KOTHANDARAMAN Directorate of Technical Development & Produc-
tion (AIR), Ministry of Defence, New DelhiSHRI BALDEV SINGH (*Alternate*)*(Continued on page 2)*

© Copyright 1982

INDIAN STANDARDS INSTITUTION

This publication is protected under the *Indian Copyright Act* (XIV of 1957) and reproduction in whole or in part by any means except with written permission of the publisher shall be deemed to be an infringement of copyright under the said Act.

IS : 4007 (Part I) - 1982

(Continued from page 1)

<i>Members</i>	<i>Representing</i>
SHRI D. V. S. RAJU	ELICO Pvt Ltd, Hyderabad
SHRI C. L. SHARMA	M. C. Engineering Co Pvt Ltd, New Delhi
SHRI R. TYKKU (<i>Alternate</i>)	Posts and Telegraphs Board, New Delhi
SHRI R. N. SHARMA	Bharat Electronics Ltd, Bangalore
SHRI SHIV RAM (<i>Alternate</i>)	Indian Electrical Manufacturers' Association, Bombay
SHRI S. N. KULKARNI (<i>Alternate</i>)	Electronics Trade & Technology Development Corporation Ltd, New Delhi
SHRI C. G. SUBRAMANYAN	Directorate General of Civil Aviation, New Delhi
SHRI P. V. R. NAYAR (<i>Alternate</i>)	Department of Electronics, New Delhi
SHRI P. R. SURYANANDAN	Department of Electronics, New Delhi
SHRI N. R. N. IYENGAR (<i>Alternate</i>)	All India Radio, New Delhi
SHRI A. D. TECKCHANDANI	Director General, ISI (<i>Ex-officio Member</i>)
DR A. K. JAIN (<i>Alternate</i>)	
SHRI N. K. TRIVEDI	
SHRI R. C. JAIN, Head (Electronics)	

Secretary

SHRI HARCHARAN SINGH
Deputy Director (Electronics), ISI

Indian Standard
SPECIFICATION FOR
TERMINALS FOR ELECTRONIC EQUIPMENT
PART I GENERAL REQUIREMENTS AND TESTS
(*First Revision*)

0. FOREWORD

0.1 This Indian Standard (Part I) (First Revision) was adopted by the Indian Standards Institution on 23 June 1982, after the draft finalized by the Electromechanical Components for Electronic Equipment Sectional Committee had been approved by the Electronics and Telecommunication Division Council.

0.2 This standard (Part I) was originally published in 1967. This revision has been brought out to take account of the latest technology developments and experience gained through the implementation of the standard since its first publication.

0.3 This standard (Part I) covers general requirements and tests common to various types of terminals. The specific requirements applicable to particular types of terminals are specified in the relevant specifications forming subsequent parts of this standard.

0.4 While preparing this standard, assistance has been derived from JSS 52710-1974 'Specification for terminals, captive screw cap and captive spring loaded' issued by the Directorate of Standardization, Ministry of Defence, India.

0.5 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 analysis, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

*Rules for rounding off numerical values (revised).

1. SCOPE

1.1 This standard (Part I) covers general requirements and tests for terminals (sealed and non-sealed) for use in electronics and telecommunication equipment.

1.2 This standard does not apply to system terminals, such as, transmitter terminals and receiver terminals.

2. TERMINOLOGY

2.0 For the purpose of this standard, the following definitions shall apply.

2.1 Type Tests — Tests carried out to prove conformity with the specification. These are intended to prove the general qualities and design of a given type of terminal.

2.2 Acceptance Tests — Tests carried out on items of a lot for the purpose of acceptance of the lot.

2.3 Routine Tests — Tests carried out on each terminal to check requirements which are likely to vary during production.

3. TYPE DESIGNATION

3.1 The following code shall be used to designate the terminal type:

T XX — XX — XX

Block 1 : T XX

T = terminal

XX = SC or SL

(SC = screw cap)

(SL = spring loaded)

Block 2 : XX

XX = NS = non-insulated, sealed; or

IS = insulated, sealed, or

NN = non-insulated, non-sealed, or

IN = insulated, non-sealed.

Block 3 : XX — varies from 01 to 99 for different styles.

4. CLIMATIC CATEGORIES

4.1 The terminals shall be divided into the following categories.

Climatic Test	Category			
	I		II	III
	I A	I B		
Dry heat	+100°C	+85°C	+85°C	+70°C
Cold	- 55°C	-55°C	-40°C	-10°C
Damp heat (steady state)	56 days	56 days	21 days	4 days
Damp heat (cyclic)	6 cycles	6 cycles	6 cycles	2 cycles
Low air pressure	4.4 kPa	4.4 kPa	30 kPa	60 kPa

NOTE — For special requirements, different severity combinations may be chosen out of IS : 9000*, as agreed between the manufacturer and the purchaser.

5. MATERIALS AND WORKMANSHIP

5.1 Materials

5.1.1 *General* — The terminals shall be constructed from suitable materials which shall be free from flaws and other defects and shall, as far as practicable, conform to the relevant Indian Standards, wherever available. Only non-corrosive fluxes shall be used for soldering the tags of the terminals.

5.2 *Workmanship* — All parts of the terminals shall be manufactured in a thoroughly workmanlike manner in accordance with good engineering practices.

5.2.1 Screws and threads used, if any, should conform to IS : 4218 (Part II)-1976†.

6. ELECTRICAL RATING

6.1 The rated voltage and rated current for each type of terminal shall be specified.

*Basic environmental testing procedures for electronic and electrical items.

†ISO metric screw threads: Part II Diameter pitch combinations (*first revision*).

7. MARKING

7.1 The following information shall be indelibly marked on the package of terminals and on the terminals to the extent possible in the order given below:

- a) Manufacturer's name or trade-mark;
- b) Manufacturer's type number;
- c) Rated voltage;
- d) Rated current;
- e) Category;
- f) Type designation;
- g) Any other marking, if required by the purchaser; and
- h) Country of manufacture.

7.1.1 The terminal or its package may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act, and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

8. TESTS

8.0 General Test Conditions

8.0.1 Atmospheric Conditions for Testing — Unless otherwise specified, all tests shall be performed under standard atmospheric conditions as defined in IS : 9000 (Part I)-1977*.

8.0.2 Preconditioning — Wherever necessary, a preconditioning procedure shall be specified to be followed before forming the actual tests.

8.0.3 Accuracy of Test Equipment — The accuracy of the test equipment shall be specified in the relevant test clause.

8.1 Type Test — The procedure for type tests shall be in accordance with IS : 2612-1965†. The schedule of type tests is given in Table 1.

*Basic environmental testing procedures for electronic and electrical items: Part I General.

†Recommendations for type approval and sampling procedures for electronic components.

TABLE 1 SCHEDULE OF TYPE TESTS
(Clause 8.1)

GROUP	NUMBER OF SPECIMENS	TEST	CLAUSE REF
(1)	(2)	(3)	(4)
0	20	Visual examination	8.4.1
		Dimensions (outline)	8.4.2
		Dimensions (detail) and materials	8.4.3
		Sealing	8.5
		Voltage proof	8.6
		Insulation resistance	8.7
		Contact resistance	8.8
		Torque	8.9
1	6	Solderability	8.10
		Vibration	8.11
		Impact (shock)	8.12
		Change of temperature	8.13
		Climatic sequence	8.14
2	6	Damp heat (steady state)	8.15
3	4	Conductor retention	8.16
		Life (mechanical)	8.17
		Cap spring pressure	8.18
		Cap retention	8.19
4	2	Corrosive atmosphere (salt mist)	8.20
Spares	2		

8.1.1 Samples for Type Tests — The type tests shall be applied to 20 samples of a given type.

8.2 Acceptance Tests — The acceptance tests shall be carried out on samples which have already passed the routine tests. The schedule of acceptance tests on two groups of samples, Group A and Group B is given in Table 2.

8.3 Routine Tests — Every terminal shall be subjected to the following test:

Visual examination (8.4.1).

TABLE 2 SCHEDULE OF ACCEPTANCE TESTS
(Clause 8.2)

Group A

TEST	AQL (PERCENT DEFECTIVE)	INSPECTION LEVEL*
(1)	(2)	(3)
Dimensions (outline) } Sealing } Voltage proof } Insulation resistance } Contact resistance }	1	II

Group B

TEST	AQL (PERCENT DEFECTIVE)	INSPECTION LEVEL*	D/N†
(1)	(2)	(3)	(4)
<i>Subgroup 1</i>			
Solderability } Climatic sequence }	4	S3	N
<i>Subgroup 2</i>			
Life (mechanical) } Cap spring pressure } Cap retention }	4	S3	N

*See Indian Standard 'Sampling plans and procedures' for inspection by attributes for electronic items (*under print*).

†Destructive/Non-destructive.

8.4 General Examination

8.4.1 Visual Examination — The specimen shall be visually examined. For acceptance tests reference shall be made to type approval certificate for compliance.

The condition, workmanship and finish shall be satisfactory (*see 5.2* also).

The marking shall be legible.

8.4.2 Dimensions (Outline) — The dimensions shall be checked for compliance with the outline drawings given in the relevant specification.

8.4.3 Dimensions (Detail) and Materials — One specimen shall be dismantled and all parts shall be checked for complete compliance with dimensions (detail). This specimen shall not be used for further tests.

8.4.3.1 *For type tests* — The dimensions and materials used shall be in accordance with the relevant specifications, unless otherwise specified and shall be recorded on type approval certificate.

8.4.3.2 *For acceptance tests* — The dimensions shall conform to the details recorded in the type approval certificate.

8.5 Sealing (for Sealed Terminals Only) — The test shall be done in accordance with Sec 1 of IS : 9000 (Part XV)-1982*.

The rate of leakage of air shall not exceed 1 cc/h for either direction of applied pressure.

8.6 Voltage Proof (for Insulated Terminals Only) — The specimen shall be mounted on a suitable metal plate in the normal manner.

An ac test voltage of a frequency 50 Hz shall be applied between the terminal and mounting plate for 1 min for type approval test and for 5 s for acceptance test. The relationship between the rated voltage, U_R (rms) and the test voltage, E (rms) is given below:

For terminals with rated voltage above 34 V (peak):

$$E = 2 U_R + 1\ 500\ \text{V with a minimum of 2 kV}$$

For terminals with rated voltage below 34 V (peak):

$$E = 500\ \text{V}$$

The voltage shall be steadily increased from zero to the proof value at a rate of approximately 500 V per second. Upon completion of the test, the proof voltage shall be gradually reduced to avoid voltage surges.

There shall be no breakdown or flashover.

NOTE — When required, a suitable current limiting device shall be used to limit current surges.

8.7 Insulation Resistance (for Insulated Terminals Only) — The specimen shall be mounted on a suitable metal plate in the normal manner. The insulation resistance shall be measured at $100 \pm 15\ \text{V}$ or $500 \pm 50\ \text{V}$ as specified in the relevant specification.

The voltage shall be applied for 1 minute \pm 5 seconds (or less if a stable reading has been obtained) between the terminal and the mounting plate. The insulation resistance shall be read at the end of that period.

*Basic environmental testing procedures for electronic and electrical items: Part XV Sealing test.

The insulation resistance shall be not less than 1 000 megohms.

NOTE — When insulation resistance measurements are made before and after a test, both measurements shall be made under the same conditions, including use of same polarity as the initial measurement. The measurement error at the insulation resistance value required shall not exceed 10 percent.

8.8 Contact Resistance — The specimen shall be mounted on a suitable metal plate in the normal manner. A solid copper conductor of 1.5 mm diameter shall be tightly connected to the terminal. The contact resistance shall then be measured between the terminal and the closest exposed portion of the conductor with a dc voltage source, the open circuit voltage of which does not exceed 2.5 V and a current of 1 A. A 40/0.2 mm conductor insulated with PVC 0.6 mm thick shall be used for spike type of terminal.

The contact resistance value shall not exceed 5 milliohms.

8.9 Torque — The specimens shall be mounted on a suitable metal plate in the normal manner. A torque of 1.35 Nm shall be applied in the following manner.

8.9.1 Screw-Cap Terminal

- a) (*Applicable to moulded insulated heads with threaded metal inserts only*) — With the cap screwed down, the torque shall be applied to the cap in a clockwise direction; and
- b) With the cap at the upper limit of travel, the torque shall be applied to the cap in a counter clockwise direction.

8.9.2 Spring Loaded Terminal — The torque shall be applied to the cap in a clockwise direction.

8.9.3 Requirements

8.9.3.1 For insulated portions — There shall be no cracking, crazing, chipping or deforming.

8.9.3.2 For metal portion — There shall be no bending, twisting, warping or cross-threading.

8.10 Solderability — This test shall be done in accordance with Method 2 of Sec 1 of IS : 9000 (Part XVIII)-1981*.

Tinny shall occur within 2 seconds and the solder shall adhere firmly to the termination.

*Basic environmental testing procedures for electronic and electrical items: Part XVIII Solderability test.

8.11 Vibration — This test shall be done in accordance with IS : 9000 (Part VIII)-1981* (endurance by sweeping method) at the severity specified in the relevant specification.

8.11.1 Preliminary — The specimen shall be mounted on a suitable metal plate in the normal manner. A 60 cm length of conductor of 1.5 mm dia shall then be connected to the terminal.

8.11.2 Final Measurements — On completion of the test the specimen shall be visually examined.

The terminal shall retain the conductor and there shall be no damage to the terminal.

8.11.3 The contact resistance test shall be repeated after the vibration test and it shall not exceed 5 milliohms (see **8.8**).

8.12 Impact (Shock) — The test shall be carried out in accordance with Sec 1 of IS : 9000 (Part VII)-1979† at the severity specified in the relevant specification.

8.12.1 Preliminary — As in **8.11.1**.

8.12.2 Final Measurements — On completion of the test the following measurements shall be made:

- a) *Visual examination* — The specimen shall be visually examined. The terminal shall retain the conductor and there shall be no damage to the terminal.
- b) *Contact resistance* — As in **8.8**.

8.13 Change of Temperature — This test shall be done in accordance with IS : 9000 (Part XIV)-1978‡ at the maximum and minimum temperature severity specified in the relevant specification.

8.13.1 Preliminary — The specimen shall be mounted on a suitable metal plate in the normal manner.

8.13.2 Final Measurement — On completion of the test, the specimen shall be visually examined.

There shall be no cracking, chipping, crazing, warping or stretching of insulated portions.

*Basic environmental testing procedures for electronic and electrical items: Part VIII Vibration test.

†Basic environmental testing procedures for electronic and electrical items: Part VII Impact test.

‡Basic environmental testing procedures for electronic and electrical items: Part XIV Change of temperature.

8.14 Climatic Sequence

8.14.1 Preliminary — The specimen shall be mounted on a suitable metal plate in the normal manner.

8.14.2 Dry Heat — This test shall be done in accordance with Sec 3 of IS : 9000 (Part III)-1977* at the maximum temperature of temperature severity in the relevant specification.

8.14.3 Damp Heat (Cyclic), First Cycle — This test shall be done in accordance with Sec 2 of IS : 9000 (Part V)-1981†.

8.14.4 Cold — This test shall be done in accordance with Sec 3 of IS : 9000 (Part II)-1977‡ at the minimum temperature of the temperature severity specified in the relevant specification.

8.14.5 Low Air Pressure — This test shall be done in accordance with IS : 9000 (Part XIII)-1981§ for five minutes, at the severity specified in the relevant specification.

8.14.5.1 Working voltage (for insulated terminals only) — During the last minute the rated voltage shall be applied between the terminal and the mounting plate.

There shall be no flashover or breakdown.

8.14.6 Damp Heat (Cyclic), Remaining Cycles — According to Sec 2 of IS : 9000 (Part V)-1981†.

- a) *Working voltage (for insulated terminals only)* — Within 15 minutes after removal from the chamber the peak working voltage shall be applied for one minute between the terminal and the mounting plate.

There shall be no breakdown or flashover.

- b) *Insulated resistance* — As in **8.7**, the specimen shall be tested between $1\frac{1}{2}$ and 2 hours after removal from chamber.

The value shall be not less than 10 megohms.

*Basic environmental testing procedures for electronic and electrical items: Part III Dry heat test.

†Basic environmental testing procedures for electronic and electrical items: Part V Damp heat (cyclic) test.

‡Basic environmental testing procedures for electronic and electrical items: Part II Cold test.

§Basic environmental testing procedures for electronic and electrical items: Part XIII Low air pressure test.

8.14.6.1 Final measurements — The following measurements shall be made at the conclusion of the appropriate **8.14.6** sequence:

- a) *Visual examination* — The specimen shall be visually examined.
There shall be no corrosion or other mechanical deterioration.
- b) *Contact resistance* — As in **8.8**.
- c) *Sealing* — As in **8.5**.
- d) *Torque* — As in **8.9**.

8.15 Damp Heat (Steady State) — The test shall be done in accordance with IS : 9000 (Part IV)-1979* at the severity specified in the relevant specification.

8.15.1 Preliminary — The specimen shall be mounted on a suitable metal plate in the normal manner.

8.15.2 Final Measurements — The following measurements shall be made after the completion of the appropriate recovery period.

- a) *Visual examination* — The specimen shall be visually examined.
There shall be no corrosion or other mechanical deterioration.
- b) *Insulation resistance* — As in **8.7**.
The value shall be not less than 100 megohms.
- c) *Contact resistance* — As in **8.8**.
- d) *Sealing* — As in **8.5**.
- e) *Voltage proof* — As in **8.6**.
- f) *Torque* — As in **8.9**.

8.16 Conductor Retention (for Spring Loaded Terminals Only) — The specimen shall be mounted on a suitable mounting plate in the normal manner.

A solid conductor of 1.5 mm diameter shall be inserted in the contact cavity. A 22 N pull shall then be applied to the conductor in a direction along the conductor and perpendicular to the gripping action. The terminal shall retain the conductor.

8.17 Life (Mechanical) — The specimen shall be mounted on a suitable mounting plate in the normal manner.

*Basic environmental testing procedures for electronic and electrical items: Part IV Damp heat (steady state) test.

8.17.1 Screw-Cap Terminal — The specimen shall be subjected 1 000 times to a torque of 340 mN m in the following manner:

- a) With the cap at the upper limit of travel, the torque shall be applied to the cap in a counter-clockwise direction; and
- b) With the cap screwed down, the torque shall be applied to the cap in a clockwise direction.

8.17.2 Spring Loaded Terminal — The cap shall be depressed fully and released 1 000 times.

8.17.3 Final Measurements — On completion, the following measurement shall be made:

- a) *Visual examination* — The specimen shall be visually examined. There shall be no loosening of inserts, stripping and disturbing of threads or chipping and cracking of insulated portions; and
- b) *Contact resistance* — As in **8.8**.

8.18 Cap Spring Pressure (for Spring Loaded Terminals Only) — The specimen shall be mounted on a suitable metal plate in the normal manner.

The cap shall be depressed to its maximum position by applying an axial compressive force in the centre of the cap top. The pressure shall then be gradually released at the rate of 18 N per minute. When the cap has returned approximately 0.4 mm from its fully depressed condition, the remaining spring pressure shall be recorded. The cap spring pressure shall be not more than 22 N and not less than 14 N.

8.19 Cap Retention (for Spring Loaded Terminals Only) — The specimen shall be held in a fixed position by gripping the upper half of the cap. A suitable gripping device shall be used.

An axial pull of 45 N shall then be applied to the terminal end using a suitable device.

8.19.1 Final Measurements — On completion, the following test shall be made:

- a) *Visual examination* — The specimen shall be visually examined. There shall be no loosening of parts or other mechanical deterioration;
- b) *Conductor retention* — As in **8.16**, and
- c) *Cap spring pressure* — As in **.18**.

3.20 Corrosive Atmosphere (Salt Mist) — The test shall be done in accordance with IS : 9000 (Part XI)*.

3.20.1 Final Measurements — After recovery the following tests shall be made:

- a) *Visual examination* — The specimen shall be visually examined. There shall be no corrosion or other mechanical deterioration; and
- b) *Contact resistance* — As in **3.8**.

The contact resistance shall be not more than 10 millions.

*Basic environmental testing procedures for electronic and electrical items: Part XI Salt mist test (*under preparation*).

INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

QUANTITY	UNIT	SYMBOL
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

QUANTITY	UNIT	SYMBOL
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

QUANTITY	UNIT	SYMBOL	DEFINITION
Force	newton	N	1 N = 1 kg.m/s ²
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m ²
Frequency	hertz	Hz	1 Hz = 1 c/s (s ⁻¹)
Electric conductance	siemens	S	1 S = 1 A/V
Electromotive force	volt	V	1 V = 1 W/A
Pressure, stress	pascal	Pa	1 Pa = 1 N/m ²

PUBLICATIONS OF INDIAN STANDARDS INSTITUTION

INDIAN STANDARDS

Over 10 000 Indian Standards covering various subjects have been issued so far. Of these, the standards belonging to the Electronics and Telecommunication group fall under the following categories:

Acoustics and acoustics measurement	Microwave components and accessories
Capacitors and resistors	Piezolectric devices
Electromagnetic interference and suppression	Prieted circuits
Electromechanical components	Recording
Electron tubes	Reliability
Electronic measuring equipment	Radio communication
Environmental testing procedures	Semiconductor devices and integrated circuits
Magnetic components and ferrits materials	Transformers and Inductors
	Wire and Cables

OTHER PUBLICATIONS

ISI Bulletin (Published Every Month)						
Single Copy	...	...	...	...	...	Rs 4 ⁰⁰
Annual Subscription	...	...	...	...	...	Rs 36 ⁰⁰
Standards : Monthly Additions						
Single Copy	...	...	...	...	...	Re 0 ³⁰
Annual Subscription	...	...	...	...	...	Rs 3 ⁰⁰
Annual Reports (from 1948-49 Onwards )	...	...	...	...	...	Rs 2 ⁰⁰ to 7 ⁰⁰
ISI Handbook 1980	..	...	...	...	...	Rs 100 ⁰⁰

INDIAN STANDARDS INSTITUTION

Manak Bhavan, 9 Bahadur Shah Zafar Marg, NEW DELHI 110002

Telephones : 26 60 21, 27 01 31

Telegrams : Manakcanstha

Regional Offices :

		Telephone
Western : Novelty Chambers, Grant Road	BOMBAY 400007	37 97 29
Eastern : 5 Chowringhee Approach	CALCUTTA 700072	27 50 90
Southern : C.I.T. Campus, Adyar	MADRAS 600020	41 24 42
Northern : B69, Phase VII	S.A.S. NAGAR (MOHALI) 160051	—

Branch Offices :

'Pushpak' Nurmohamed Shaikh Marg, Khanpur	AHMADABAD 380001	2 03 91
'F' Block, Unity Bldg, Narasimharaja Square	BANGALORE 560002	2 76 49
Gangotri Complex, Bhadbhada Road, T.T. Nagar	BHOPAL 462003	6 27 16
22F Kalpana Area	BHUBANESHWAR 751014	5 36 27
5-B-56C L.N. Gupta Marg	HYDERABAD 500001	22 10 83
R 14 Yudhister Marg, C Scheme	JAIPUR 302005	6 98 32
117/418 B Sarvodaya Nagar	KANPUR 208005	4 72 92
Patliputra Industrial Estate	PATNA 300013	6 28 08
Hantex Bldg (2nd Floor), Rly Station Road	TRIVANDRUM 695001	32 27

Printed at Printograph, New Delhi, India