

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 196 (1966): Atmospheric Conditions for Testing [PGD 20: Engineering Standards]



“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 : 196 - 1966**  
**( Reaffirmed 1996 )**

*Indian Standard*  
**ATMOSPHERIC CONDITIONS FOR  
TESTING**  
*( Revised )*

---

Sixth Reprint OCTOBER 1998

UDC 620.1 : 551.52/.7

© *Copyright* 1966

**BUREAU OF INDIAN STANDARDS**  
**MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG**  
**NEW DELHI 110002**

*Indian Standard*  
ATMOSPHERIC CONDITIONS FOR  
TESTING  
( Revised )

---

Engineering Standards Sectional Committee, EDC 1

*Chairman*

*Representing*

DR S. BHAGAVANTAM

Ministry of Defence ( R & D )

*Members*

COL J. P. ANTHONY ( <i>Alternate to</i> Dr S. Bhagavantam )	
SHRI P. R. AHUJA	The Institution of Engineers ( India ), Calcutta
SHRI N. BALKRISHNA	Association of Indian Automobile Manufacturers, Bombay
SHRI S. N. DE	Directorate General of Supplies & Disposals ( <i>Ministry of Industry &amp; Supply</i> )
DEPUTY DIRECTOR GENERAL OF OBSERVATORIES ( <i>INSTRUMENTS</i> )	Directorate General of Observatories ( <i>Ministry of Civil Aviation</i> ), New Delhi
DR P. S. GILL	Central Scientific Instruments Organisation ( <i>CSIR</i> ), Chandigarh
SHRI J. C. KALRA	Research, Designs & Standards Organisation ( <i>Ministry of Railways</i> )
SHRI S. N. MUKERJI	National Test House, Calcutta
SHRI S. NANDI	Indian Engineering Association, Calcutta
SHRI PREM PRAKASH	National Physical Laboratory ( <i>CSIR</i> ), New Delhi
PROF A. RAMACHANDRAN	Indian Institute of Science, Bangalore
SHRI S. RAMAMRITHAM	Directorate General of Civil Aviation ( <i>Ministry of Civil Aviation</i> ), New Delhi
PROF V. V. L. RAO	In personal capacity ( <i>Regional Engineering College, Warangal — Kazipet P.O.</i> )
MAJ-GEN J. R. SAMSON	Ministry of Defence ( <i>R &amp; D</i> )
SHRI T. R. SARKARI	Indian Institute of Technology, Bombay
SHRI J. M. SINHA	Engineering Association of India, Calcutta
SHRI M. M. SURI	Central Mechanical Engineering Research Institute ( <i>CSIR</i> ), Durgapur
SHRI M. V. PATANKAR, Deputy Director ( <i>Mech Eng</i> ) ( <i>Secretary</i> )	Director, ISI ( <i>Ex-officio Member</i> )

( *Continued on page 2* )

---

(Continued from page 1)

Atmospheric Conditions for Testing Subcommittee, EDC 1 : I

<i>Convener</i>	<i>Representing</i>
SHRI PREM PRAKASH	National Physical Laboratory ( CSIR ), New Delhi
<i>Members</i>	
SHRI A. K. BHATTACHARYYA	Research, Designs & Standards Organization ( Ministry of Railways )
SHRI K. VENKATARAMANI ( <i>Alternate</i> )	
DEPUTY DIRECTOR GENERAL OBSERVATORIES ( INSTRUMENTS )	Directorate General of Observatories ( Ministry of Civil Aviation ), New Delhi
SHRI N. C. DHAN ( <i>Alternate</i> )	
SHRI N. P. GHOSH	Office of the Chief Inspector of Mines ( Ministry of Labour & Employment ), Dhanbad
SHRI G. S. MARWAHA ( <i>Alternate</i> )	
MAJ GURBUX SINGH	Ministry of Defence ( CCR & D )
SHRI C. J. CHERIYAN ( <i>Alternate</i> )	
DR G. S. HATTIANGDI	Hindustan Lever Ltd, Bombay
DR R. L. N. IYENGAN	Indian Central Cotton Committee, Bombay
SHRI A. K. LAHIRI	National Metallurgical Laboratory ( CSIR ), Jamshedpur
WING CDR D. J. LAWYER	Directorate of Technical Development & Production ( Air ), Ministry of Defence, New Delhi
SQN LDR S. B. PURANIK ( <i>Alternate</i> )	
PROF S. R. MEHRA	Central Road Research Institute ( CSIR ), New Delhi
SHRI B. K. MUKHERJEE	National Test House, Calcutta
DR T. RADHAKRISHNAN	Ahmedabad Textile Industry's Research Association, Ahmedabad
SHRI K. SUBRAHMANYAM ( <i>Alternate</i> )	
SHRI V. N. SHAH	Italab Private Ltd, Bombay
SHRI K. N. TIWARI	Environmental Testing Procedures Sectional Committee, ETDC 26
DR J. W. WHITAKER	Indian Institute of Petroleum ( CSIR ), New Delhi

*Indian Standard*  
**ATMOSPHERIC CONDITIONS FOR  
TESTING**  
*( Revised )*

**0. FOREWORD**

**0.1** This Indian Standard ( Revised ) was adopted by the Indian Standards Institution on 3 March 1966, after the draft finalized by the Engineering Standards Sectional Committee had been approved by the Mechanical Engineering Division Council.

**0.2** This standard was first issued in 1950 specifying atmospheric conditions for testing. This revision has been undertaken to bring this standard in line with the latest work done by the Co-ordinating Committee on Atmospheric Conditions for Testing ( ATCO ) of ISO in collaboration with IEC.

**0.3** The properties of materials and behaviour of equipment under test are influenced by atmospheric conditions, such as the temperature, the relative humidity and the pressure of the ambient air at the time of the test. For comparison of test results obtained by different test laboratories/testing centres, it becomes necessary to specify standard atmospheric conditions and conditioning procedures, under which the test should be carried out or at which specimen should be conditioned before the test.

**0.4** The principal considerations that would justify the adoption of a set of conditions may be enumerated in short as follows:

- a) Temperature and humidity conditions specified should be suited to a majority of tests requiring standard atmospheric conditions;
- b) Equipment required to maintain the standard conditions should be economical to install and easy to maintain; and
- c) The standard conditions should be within the comfort zone for workers.

**0.5** Although the necessity for having an internationally agreed set of standard atmospheric conditions for test is realized, the wide divergence of the atmospheric conditions in the temperate and tropical or sub-tropical regions indicates that the same test conditions may not be suitable for all the zones. This aspect was examined in great detail by the several technical committees of ISO and IEC, and the Co-ordinating

Committee on Atmospheric Conditions for Testing ( ATCO ) of ISO, in collaboration with IEC, has recommended the following three sets of standard atmospheric conditions from which the individual countries could choose whichever is most suitable to them :

- a) 20°C with 65 percent relative humidity
- b) 23°C with 50 percent relative humidity
- c) 27°C with 65 percent relative humidity

The atmosphere (c) above is intended for tropical and sub-tropical zones and this was accepted at the international level as a result of continued efforts by India. This atmosphere has now been adopted for India. The values of temperature and relative humidity in (c) are based on an analysis of the weather conditions of several important centres of India spread over a long period.

**0.6** In many cases, measurements are necessarily made at ambient conditions in an uncontrolled atmosphere, for example, electric motors, generators, transformers, switchgear, etc, are tested in the atmospheric conditions existing at the time and at the place where measurements are made and no question of controlled atmosphere arises in such cases.

**0.7** In most industrial testing, it is seldom necessary to control the atmospheric pressure as is done in the case of temperature and humidity. Tests are normally carried out at the prevailing atmospheric pressure. Tolerance limits for pressure, therefore, have different significance in different cases depending on the pressure sensitivity of the characteristic to be measured. It may, therefore, be necessary to specify the pressure tolerance in accordance with the needs of the situation in individual cases. In such cases correction factors shall also be specified.

**0.8** It is realized that for many purposes the adoption of the primary international temperature, namely, 20°C would have great advantages on the grounds of international comparability, for example, measurements of basic standard of weights and measures, physical constants and precision measurements in terms of the basic standards as well as in such tests as the calibration of gauges, tools, etc. It is desirable that in such cases as well as in other cases where international comparability is of prime importance, the primary international temperature shall be adopted both for actually carrying out the test and for calculating the parameters when the test is carried out at the prevailing atmospheric conditions.

**0.9** The standard atmospheric conditions for testing together with the tolerances specified in this standard are intended for use in most industrial types of tests, where a controlled atmosphere is necessary. These conditions and tolerances shall not be considered as applicable in all cases. Typical examples where exceptions shall have to be made include:

- a) Conditions for drying a material free from moisture and other solvents where a temperature of the order of the boiling point



of the solvent and tolerances depending on the effect of temperature on the material shall have to be specified.

- b) Certain chemical and physical constants, such as specific gravity, refractive index and vapour pressure, may need be specified at temperatures other than the temperature of 27°C, for reasons such as non-availability of data and the desirability ( from the technical point of view ) of using a temperature other than the standard. In cases of non-availability of data, efforts should be made as far as possible to specify the constants on the basis of these standard conditions as the data become available, exceptional conditions being adopted in the interim period.
- c) Certain determinations, such as those of viscosity of liquids, plasticity of solids and density of materials, require much finer limits of tolerance than those required by this standard. In all such cases, suitable limits of tolerance shall be specified, but as far as possible the basic temperature should be retained at the standard value.
- d) Certain tests of specialized character which are intended to establish suitability of goods, materials, equipment, etc, for service under severe conditions, such as climatic tests on electrical and electronic components and equipments.

**0.10** 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.

---

## 1. SCOPE

**1.1** This standard specifies the atmospheric conditions for testing of materials, products, equipment, etc, and applies to such tests where atmospheric conditions need to be controlled to obtain comparable and reproducible results or to conduct measurements where test results obtained under different conditions have to be reduced to standard conditions.

**1.2** This standard does not apply to the basic standards of weights and measures, to the precision measurement made in terms of these basic standards and to such tests as calibration of test gauges, precision tools, etc, and to the cases covered in **0.9**.

**1.3** This standard is not applicable to cases where testing is done under the atmospheric conditions existing at the time and place where measurements are made ( for example electric motors, generators, transformers, etc ) and where no question of controlled atmosphere arises.

---

\*Rules for rounding off numerical values ( revised ).

## 2. TERMINOLOGY

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

**2.1 Pre-conditioning** — The treatment of a sample of material, product or equipment with the object of removing or partly counteracting the effect of its previous history in respect, principally, of the temperature and humidity to which it has been exposed. This treatment usually precedes conditioning of the sample.

**2.2 Conditioning** — The subjection of the sample to an atmosphere of a specified relative humidity, or complete immersion in water or other liquid, at a specified temperature for a specified period of time.

**NOTE 1** — When the temperature and humidity for conditioning are the same as those prescribed for pre-conditioning, the pre-conditioning and conditioning may be merged and the pre-conditioning may be said to take the place of conditioning.

**NOTE 2** — According to circumstances, the space used for measurement and conditioning may be a whole laboratory room in which the specified conditions are maintained within the prescribed tolerances, or a special test chamber.

**2.3 Standard Test Atmosphere** — The atmosphere in which tests are conducted or to which the parameters are calculated.

**2.4 Ambient Atmosphere** — The atmosphere surrounding the sample of material or equipment to be tested.

## 3. STANDARD CONDITIONS

### 3.1 Standard Test Atmosphere

**3.1.1** The standard test atmosphere shall be :

Temperature	27°C
Relative humidity	65 percent
Air pressure	1 013 mbar ( 760 mmHg )

**NOTE** — Wherever international comparability becomes necessary, the international accepted atmospheric conditions, for example, 20°C and 65 percent relative humidity in the case of basic standards of weights and measures, electrical and electronic industry; and 15°C in the case of alcohol and petroleum products, may be adopted ( see also 0.8 and 0.9 ).

**3.1.2** This atmosphere shall be used either for actually carrying out the test or for calculating the parameters when the tests are carried out at any other atmospheric conditions, the law of dependence of the parameter on temperature and/or humidity and/or pressure being known.

**3.2 Range of Ambient Atmospheric Conditions for Testing** — Wherever the parameters to be measured are not materially affected within a range of temperature and relative humidity it may not be necessary to

carry out the measurements at the standard test atmosphere mentioned in 3.1. In such cases the measurements may be carried out within the following range:

Temperature	15° to 35°C
Relative humidity	45 to 75 percent
Air pressure	860 to 1 060 mbar

3.2.1 The above temperature range may, however, be 10° to 40°C in special cases.

#### 4. TOLERANCES ON STANDARD TEST ATMOSPHERE

**4.1 Temperature and Humidity** — There shall be two classes of tolerances, normal and close. The normal tolerance shall be  $\pm 2$  deg C on temperature and  $\pm 5$  percent on relative humidity and the close tolerance shall be  $\pm 1$  deg C on temperature and  $\pm 2$  percent on relative humidity at any point in the test room or chamber.

NOTE — Depending upon the sensitiveness of the particular test to atmospheric variations either of the two tolerances may be chosen. When the relevant specification requires a period of conditioning or pre-conditioning, it is important to distinguish between the overall limits of the temperatures within which it may be carried out and the limits within which the temperature should be maintained in order to maintain the specified relative humidity limits, for example, the close temperature tolerance of  $\pm 1$  deg C will not in itself ensure the close relative humidity requirement of  $\pm 2$  percent.

**BUREAU OF INDIAN STANDARDS****Headquarters:**

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

Telephones: 323 0131, 323 3375, 323 9402

Fax : 91 11 3234062, 91 11 3239399, 91 11 3239382

Telegrams : Manaksanstha

(Common to all Offices)

Telephone

**Central Laboratory :**

Plot No. 20/9, Site IV, Sahibabad Industrial Area, Sahibabad 201010

8-77 00 32

**Regional Offices:**

Central : Manak Bhavan, 9 Bahadur Shah Zafar Marg, NEW DELHI 110002 323 76 17

\*Eastern : 1/14 CIT Scheme VII M, V.I.P. Road, Maniktola, CALCUTTA 700054 337 86 62

Northern : SCO 335-336, Sector 34-A, CHANDIGARH 160022 60 38 43

Southern : C.I.T. Campus, IV Cross Road, CHENNAI 600113 235 23 15

†Western : Manakalaya, E9, Behind Marol Telephone Exchange, Andheri (East),  
MUMBAI 400093 832 92 95**Branch Offices:**

\*Pushpak', Nurmohamed Shaikh Marg, Khanpur, AHMEDABAD 380001 550 13 48

‡Peenya Industrial Area, 1st Stage, Bangalore-Tumkur Road,  
BANGALORE 560058 839 49 55

Gangotri Complex, 5th Floor, Bhadbhada Road, T.T. Nagar, BHOPAL 462003 55 40 21

Plot No. 62-63, Unit VI, Ganga Nagar, BHUBANESHWAR 751001 40 36 27

Kalaikathir Buildings, 670 Avinashi Road, COIMBATORE 641037 21 01 41

Plot No. 43, Sector 16 A, Mathura Road, FARIDABAD 121001 8-28 88 01

Savitri Complex, 116 G.T. Road, GHAZIABAD 201001 8-71 19 96

53/5 Ward No.29, R.G. Barua Road, 5th By-lane, GUWAHATI 781003 54 11 37

5-8-56C, L.N. Gupta Marg, Nampally Station Road, HYDERABAD 500001 20 10 83

E-52, Chitaranjan Marg, C-Scheme, JAIPUR 302001 37 29 25

117/418 B, Sarvodaya Nagar, KANPUR 208005 21 68 76

Seth Bhawan, 2nd Floor, Behind Leela Cinema, Naval Kishore Road,  
LUCKNOW 226001 23 89 23

NIT Building, Second Floor, Gokulpat Market, NAGPUR 440010 52 51 71

Patliputra Industrial Estate, PATNA 800013 26 23 05

Institution of Engineers (India) Building 1332 Shivaji Nagar, PUNE 411005 32 36 35

T.C. No. 14/1421, University P. O. Palayam, THIRUVANANTHAPURAM 695034 6 21 17

\*Sales Office is at 5 Chowringhee Approach, P.O. Princep Street,  
CALCUTTA 700072 27 10 85

†Sales Office is at Novelty Chambers, Grant Road, MUMBAI 400007 309 65 28

‡Sales Office is at 'F' Block, Unity Building, Narashimaraja Square,  
BANGALORE 560002 222 39 21