भारतीय मानक

Indian Standard

IS 196 : 2024

परीक्षण की वायुमंडलीय स्थितियां

(दूसरा पुनरीक्षण)

Atmospheric Conditions for Testing

(Second Revision)

ICS 19.020

भारतीय मानक ब्यूरो
BUREAU OF INDIAN STANDARDS
मानक भवन, 9 बहादुर शाह ज़फर मार्ग, नई दिल्ली - 110002
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI - 110002
www.bis.gov.in www.standardsbis.in

May 2024 **Price Group 4**

Basic Standards Sectional Committee, PGD 01

FOREWORD

This Indian Standard (Second Revision) was adopted by the Bureau of Indian Standards after the draft finalized by the Basic Standards Sectional Committee, had been approved by the Production and General Engineering Division Council (PGDC).

This standard was first issued in 1950 and subsequently revised in 1966. This revision following changes has been made:

a) Amendment no. 1 has been incorporated; and

b) Values of pressure are also mentioned in milli bar.

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.

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 atmospheric conditions should be within the comfort zone for workers.

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; and
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.

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.

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.

(*Continued on third cover*)

Indian Standard

ATMOSPHERIC CONDITIONS FOR TESTING

(Second Revision)

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 the foreword.

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.

2 TERMINOLOGY

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.

NOTES

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

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	86 kPa to 106 kPa (645 mmHg to 795 mmHg) (860 mbar to 1 060 mbar)

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* Foreword).

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 with 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 °C to 35 °C
Relative humidity	45 percent to 75 percent
Air pressure	86 kPa to 106 kPa (645 mmHg to 795 mmHg) (860 mbar to 1 060 mbar)

The above temperature range may, however, be 10 °C 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 ± 2 °C on temperature ± 5 percent on relative humidity and the close tolerance shall be ± 1 °C on temperature and ± 2 percent on relative humidity at any point in the test room or chamber.

NOTE — Depending upon the sensitiveness of the particular test to the atmospheric conditions either of the 2 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 ± 1 °C will not in itself ensure the close relative humidity requirement of ± 2 percent.

ANNEX A

(*Foreword*)

COMMITTEE COMPOSITION

Basic Standard Sectional Committee, PGD 01

Organization	*Representative(s)*
Bhabha Atomic Research Centre , Mumbai	SHRI V. H. PATANKAR **(*Chairperson*)** SHRI SAURABH KUMAR NEEMA (*Alternate*)
Central Manufacturing Technology Institute, Bangaluru	SHRI MOHAN RAJ SHRI KRISHNA RATHOD (*Alternate*)
Central Mechanical Engineering Research Institute, Durgapur	DR AVIK CHATTERJEE DR P. RAJAN (*Alternate*)
Central PublicWorks Department, New Delhi	SHRI DIVAKAR AGGRAWAL SHRI VINAYAK RAI (*Alternate*)
Defense Metallurgical Research Laboratory Hyderabad	SHRI SHAHNAWAZ AHMAD SHRI A. SAMBASIVA RAO (*Alternate*)
Delhi Metro Rail Corporation, New Delhi	SHRI N. K KOTHARI SHRI A. S. BISHT (*Alternate*)
DRDO (HQ) , Delhi	SHRI RANJIT SINGH SHRI MANMEET SINGH (*Alternate*)
Hilti India Pvt. Ltd.	SHRI PRASHANT DASHARATH SATHE SHRI SHOUNAK MITRA (*Alternate*)
HMT Limited Bangaluru	SHRI B. V. S. S. PRASAD RAO SHRI CHANDRA SHEKHAR (*Alternate*)
Indian Society for Technical Education, New Delhi	SHRI MAHESH KAKADE SHRI R. HARIHARAN (*Alternate*)
Indian Statistical Institute, Bangalore	SHRI U. H. ACHARYA SHRI P. R. LAKSHMIKANTHA (*Alternate*)
Ministry of Science andTechnology,Dept. Of Science and Technology, New Delhi	SHRI S. MUBASHIR
National AccreditationBoard For Testing & Calibration Laboratories, New Delhi	SHRI AVIJIT DAS SHRI N. VENKATESWARAN (*Alternate*)
National Physical Laboratory, New Delhi	DR J. C. BISWAS SHRI R. P. ALOYSIUS (*Alternate*)
National Test House Kolkata	SHRI RAMESH ARORA SHRI VIJAY SHANKAR (*Alternate*)
SAIL (IPSS), New Delhi	SHRI GULSHAN KUMAR SHRI A. M. DANNY (*Alternate*)
Tata Motors Ltd. Pune	SHRI R. R. KULKARNI SHRI RAJAT BINEKAR (*Alternate*)

Organization(s)	*Representative(s)*
BIS Directorate General	SHRI RAJEEV RANJAN SINGH, SCIENTIST 'F'/ SENIOR DIRECTOR AND HEAD (PRODUCTION AND GENERAL ENGINEERING) [REPRESENTING DIRECTOR GENERAL (*Ex-officio*)]

Member Secretary
SHRI VIMAL KUMAR
SCIENTIST 'B'/ASSISTANT DIRECTOR
(PRODUCTION AND GENERAL ENGINEERING), BIS

(*Continued from second cover*)

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.

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; and

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 equipment.

The composition of the Committee, responsible for the formulation of this standard is given in Annex A.

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 : 2022 ‘Rules for rounding off numerical values (*second revision*)’.

Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act*, 2016 to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

Copyright

Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the website-www.bis.gov.in or www.standardsbis.in.

This Indian Standard has been developed from Doc No.: PGD 01 (19182).

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

BUREAU OF INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002
Telephones: 2323 0131, 2323 3375, 2323 9402 *Website*: www.bis.gov.in

Regional Offices:		*Telephones*
Central	: 601/A, Konnectus Tower -1, 6th Floor, DMRC Building, Bhavbhuti Marg, New Delhi 110002	2323 7617
Eastern	: 8th Floor, Plot No 7/7 & 7/8, CP Block, Sector V, Salt Lake, Kolkata, West Bengal 700091	2367 0012 2320 9474
Northern	: Plot No. 4-A, Sector 27-B, Madhya Marg, Chandigarh 160019	265 9930
Southern	: C.I.T. Campus, IV Cross Road, Taramani, Chennai 600113	2254 1442 2254 1216
Western	: Manakalya, 4th Floor, NTH Complex (W Sector), F-10, MIDC, Andheri (East), Mumbai 400093	283 25838

Branches : AHMEDABAD, BENGALURU, BHOPAL, BHUBANESHWAR, CHANDIGARH, CHENNAI, COIMBATORE, DEHRADUN, DELHI, FARIDABAD, GHAZIABAD, GUWAHATI, HARYNA, HUBLI, HYDERABAD, JAIPUR, JAMMU & KASHMIR, JAMSHEDPUR, KOCHI, KOLKATA, LUCKNOW, MADURAI, MUMBAI, NAGPUR, NOIDA, PARWANOO, PATNA, PUNE, RAIPUR, RAJKOT, SURAT, VIJAYAWADA.

Published by BIS, New Delhi