

Telecontrol equipment and systems

Part 2. Operating conditions

Section 2.1 Specification for classes of environmental conditions and power supplies

(Implementation of CENELEC HD 546.2.1 S1)

Committees responsible for this British Standard

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Association of Consulting Engineers
BAMEMA (BEAMA)
BEAMA Ltd.
EEA (the Association of Electronics, Telecommunications and Business Equipment Industries)
Electricity Supply Industry in United Kingdom
GAMBICA (BEAMA Ltd.)
North of Scotland Hydro-Electric Board
Telecommunication Engineering and Manufacturing Association
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Contents

	Page
Committees responsible	Inside front cover
Foreword	iii
Specification	
Introduction	1
1 Scope	1
2 Object	1
3 Temperature, humidity and barometric pressure classification of locations	1
3.1 General	1
3.2 Air conditioned locations (Class A)	2
3.3 Heated and/or cooled enclosed locations (Class B)	3
3.4 Sheltered locations (Class C)	5
3.5 Outdoor locations (Class D)	6
3.6 Summary of location classes	6
3.7 Barometric pressure	7
4 Mechanical influences	7
4.1 General	7
4.2 Vibration	7
4.3 Mechanical shock	9
4.4 Seismic effects (earthquakes)	11
5 Power supply	15
5.1 General	15
5.2 A.C. supply	15
5.3 D.C. supply	16
5.4 Supply interruption	18
5.5 Voltage withstand	19
Appendix	
NA Deletions from and IEC text amended by Common modifications to IEC Publication 870-2-1 (1987) (informative)	23

	Page
Tables	
I Air temperature and humidity classes for air conditioned locations	3
II Air temperature and humidity classes for enclosed locations	4
III Air temperature and humidity classes for sheltered locations	5
IV Air temperature and humidity classes for outdoor locations	6
V Summary of location classes	6
VI Location classes of barometric pressure	7
VII Low frequency vibration classes	8
VIII High frequency vibration classes	8
IX Vibrational severity classes	9
X Vibration time classes	9
XI Mechanical shock classes showing preferred combinations of a and t	10
XII Shock acceleration values	10
XIII Free fall height classes	10
XIV Shock repetition classes	11
XV Intensity classes of earthquakes	11
XVI Phenomena of earthquakes related to the scales of Richter and Mercalli	12
XVII <i>Untitled</i>	15
XVIII A.C. voltage tolerance classes	15
XIX Frequency tolerance classes	16
XX Harmonic content level classes	16
XXI <i>Untitled</i>	16
XXII D.C. voltage tolerance classes	17
XXIII Earthing condition classes	17
XXIV Ripple classes	18
XXV Interruption time classes	18
XXVI Withstand voltage classes	19
Figures	
1 Humidity versus temperature for air conditioned locations	3
2 Humidity versus temperature for enclosed locations	4
3 Humidity versus temperature for sheltered locations	5
4 Peak displacement (amplitude) and velocity with low frequency vibrations	13
5 Peak displacement (amplitude) and velocity with high frequency vibrations	14

Foreword

This Section of BS 7404 has been prepared under the direction of the Power Electrical Engineering Standards Policy Committee. It is based on IEC 870-2-1 : 1987 'Telecontrol equipment and systems Part 2 : Operating conditions Section 1 — Environmental conditions and power supplies' published by the International Electrotechnical Commission (IEC), which has been endorsed by CENELEC as HD 546.2.1 S1.

For the sake of clarity, the CENELEC common modification has been incorporated at the appropriate place in the IEC text and is marked by a vertical line at the left-hand margin. The foreword and preface of IEC 870-2-1 and the deleted part of the original IEC text have been quoted in appendix NA.

The international standard does not give the up-to-date relation between this Section of the IEC standard and the other published and envisaged Parts and Sections. Other Parts and Sections of this British Standard are as follows.

- Part 1 General considerations
 - Section 1.1 General principles
 - Section 1.2 Guide for specifications
 - Section 1.3 Glossary
 - Section 1.4¹⁾ Basic aspects of telecontrol data transmission
- Part 2 Operating conditions
 - Section 2.1 Specification for classes of environmental conditions and power supplies
 - Section 2.2²⁾ Specification for electromagnetic compatibility and erosive and corrosive influences
- Part 3 Specification for interfaces (electrical characteristics)
- Part 4 Specification for performance
- Part 5 Transmission protocols
 - Section 5.1 Specification for transmission frame formats
 - Section 5.2³⁾ Specification for transmission procedures
 - Section 5.3⁴⁾ Specification for structure of application data
 - Section 5.4⁵⁾ Specification for coding specifications of application data
- Part 6²⁾ Specification for telecontrol protocols compatible with ISO and CCITT standards

Cross-references

International standard	Corresponding British Standard
IEC 60-2 : 1973	BS 923 Guide on high-voltage testing techniques Part 2 : 1980 Test procedures (Identical)
IEC 870-2-2 ⁶⁾	BS 7404 Telecontrol equipment and systems Section 2.2 ⁷⁾ Specification for electromagnetic compatibility and erosive and corrosive influences (Identical)

The Technical Committee has reviewed the provisions of IEC 38, to which reference is made in the text, and has decided that they are acceptable for use in conjunction with this British Standard.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

¹⁾ Will be published after IEC 870-1-4 has been published.
²⁾ Not yet published, envisaged as future work by IEC.
³⁾ Will be published after IEC 870-5-2 has been published.
⁴⁾ Will be published after IEC 870-5-3 has been published.
⁵⁾ Will be published after IEC 870-5-4 has been published.
⁶⁾ Not yet published by IEC.
⁷⁾ Will be published after IEC 870-2-2 has been published.

TELECONTROL EQUIPMENT AND SYSTEMS

Part 2: Operating conditions

Section One – Environmental conditions and power supplies

INTRODUCTION

Telecontrol systems are used for monitoring and control of geographically widespread processes and have to work under a wide range of environmental conditions.

To ensure the optimal performance under all possible conditions, it is absolutely necessary to establish classes for the different environmental influences. Thus manufacturer and user are given the possibility to agree on the quality of the equipment and to avoid delivery and installation of equipment not adequate to the special application.

As telecontrol equipment is part of the wide field of electronic equipment, it was decided to base these standards on the equivalent IEC standard for electronic process control equipment. The classes used in this standard thus correspond to the classes adopted for electronic process control equipment. However, only those classes were considered which apply to the usage of telecontrol equipment.

Corrosive and erosive influences, EMC as well as relevant test procedures are under consideration and will be dealt with in IEC Publication 870-2-2 (under consideration).

1. Scope

This series of standards applies to telecontrol equipment and systems with coded bit serial data transmission for monitoring and control of geographically widespread processes.

2. Object

This section specifies classes for environmental conditions under which telecontrol equipment has to operate. The specified classes and given parameters correspond with the classes specified by the IEC for electronic process control equipment, but according to the practical needs of telecontrol equipment, the number of classes has been reduced in some cases.

3. Temperature, humidity and barometric pressure classification of locations

3.1 General

This standard lists the temperature, humidity and barometric conditions which telecontrol equipment may be exposed to during operation.

The influencing quantities considered in this part are limited to those which may directly affect the performance of telecontrol systems. The effects upon personnel are not within the scope of this standard.

The conditions of temperature and humidity are classified according to severity dictated by the location and, where appropriate, more than one set of limit values for a particular location may be given.

The severity of the various operating conditions is shown by limit values rather than by means of average values. It is recognized that extreme or special operating conditions exist where values may be greater or less than those stated. These may be covered by the use of “special” categories listed as Ax, Bx, etc., which must be negotiated between purchaser and supplier.

Furthermore it is essential to note that wider climatic ranges can occur during transportation and/or storage. The relevant classes are not specified in this clause. They are to be negotiated separately.

The conditions classified in this document apply to permanent conditions during which the equipment shall perform normally in accordance with the defined specifications taking into account the effects of temperature and humidity. It is recognized that permanent operation at maximum ratings may reduce the life span of equipment.

Sub-clauses 3.2 to 3.5 establish types of air conditioned, heated and/or cooled enclosed, sheltered and outdoor locations based on appropriate combinations of temperature and humidity limit specifications. Sub-clause 3.6 presents a summary of location classes for telecontrol purposes.

It should be noted, however, that the location classes as specified below are defined by the ranges of temperature and humidity that may be experienced and do not necessarily correspond to the type of enclosure (air conditioned, heated or cooled, etc.) listed above since, for example, a temperate climate class B3 (+5 °C to +40 °C, 5 % to 95 % relative humidity) could exist in a sheltered location without recourse to heating or cooling.

For the purposes of this standard, temperature and humidity shall be considered as ambient condition measured at a single representative point within a local environment and with equipment running in its normal manner.

This measurement point shall be adjacent to the equipment to which the operating conditions apply. The measurement point shall be exposed to free air circulation and shall not be significantly affected by heat from the equipment nor by direct solar radiation and similar effects.

The actual air temperature (and corresponding relative humidity) surrounding the equipment (as within cabinets, racks, and behind panels) may differ significantly from this measured value depending on heat generated, radiation, air circulation, etc., all of which should be taken into account.

Because a simple description of a realistic combination of high temperature and high humidity is difficult, this inter-relationship is specified in charts for each class.

Note. – These charts are extracted from the so-called *Uta* charts: relative humidity (*U*), air temperature (*t*), absolute humidity (*a*). Only the parameters appropriate to the particular class are shown in order to improve the clarity.

3.2 Air conditioned locations (Class A)

This class applies to locations where provision is made to control air temperature and humidity within specified limits.

These locations are usually provided where process control computers and other electronic equipment requiring a controlled air environment are installed. Major central control rooms and any associated equipment rooms are normally in this category.

TABLE I

Air temperature and humidity classes for air conditioned locations

Class	Air temperature		Humidity	
	Range (°C)	Max. rate of change (°C/h)	Relative humidity (%)	Absolute humidity
A1	Not less than +18 nor more than +27 and controlled at ± 2 within this span	5*	35 to 75	See Figure 1 below
Ax	Special			

* May have to be reduced to 1.2 if magnetic tapes are to be used.

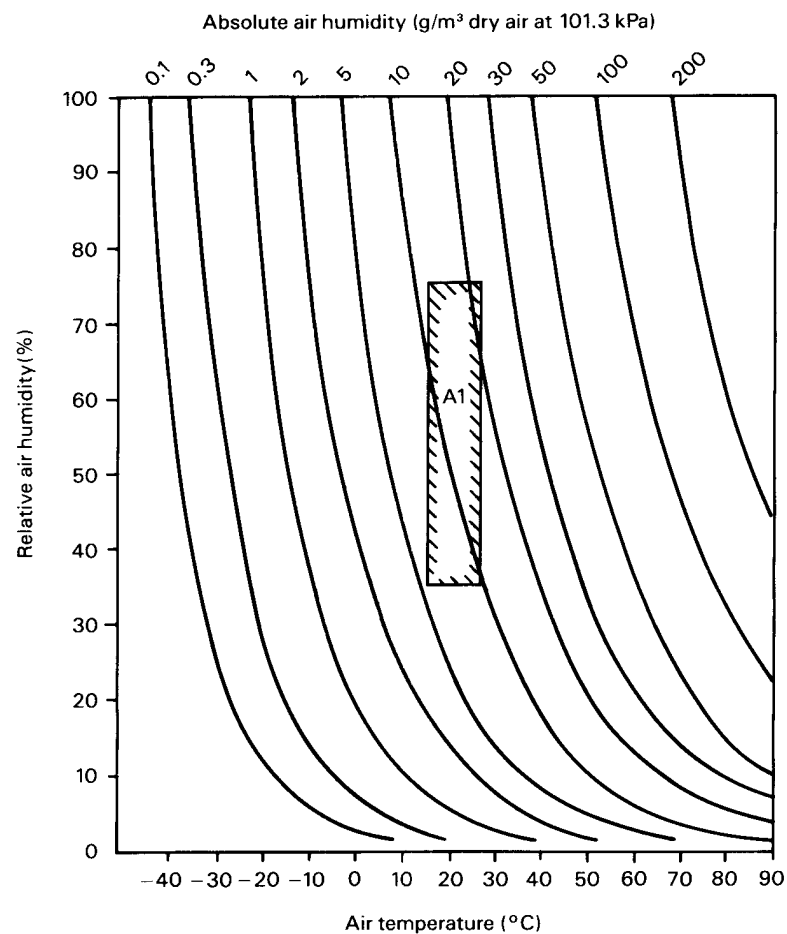


FIG. 1. – Humidity versus temperature for air conditioned locations.

3.3 Heated and/or cooled enclosed locations (Class B)

Where equipment is enclosed in a location provided with heating and/or cooling facilities and where conditions are maintained within specific limits which may or may not be controlled automatically.

Temperature and humidity control within the limits of Class B1 (see below) is recommended for work space where operating or maintenance personnel may have to work for sustained periods. Classes B3 and B4 are suitable for most ranges of telecontrol equipment but considerable human discomfort can exist under continued exposure to the extremes of temperature of Class B3 or B4.

TABLE II
Air temperature and humidity classes for enclosed locations

Class	Air temperature		Humidity	
	Range (°C)	Maximum rate of change (°C/h)	Relative humidity (%)	Maximum absolute humidity (g/m ³)
B1	+15 to +30	10	10 to 75	20
B3	+5 to +40	10	5 to 95	28
B4	0 to +55	20	5 to 95	28
Bx	Special			

Note. – Temporary condensation may occur during maintenance when spare parts are introduced which have been stored at a lower temperature than that prevailing in the telecontrol equipment environment.

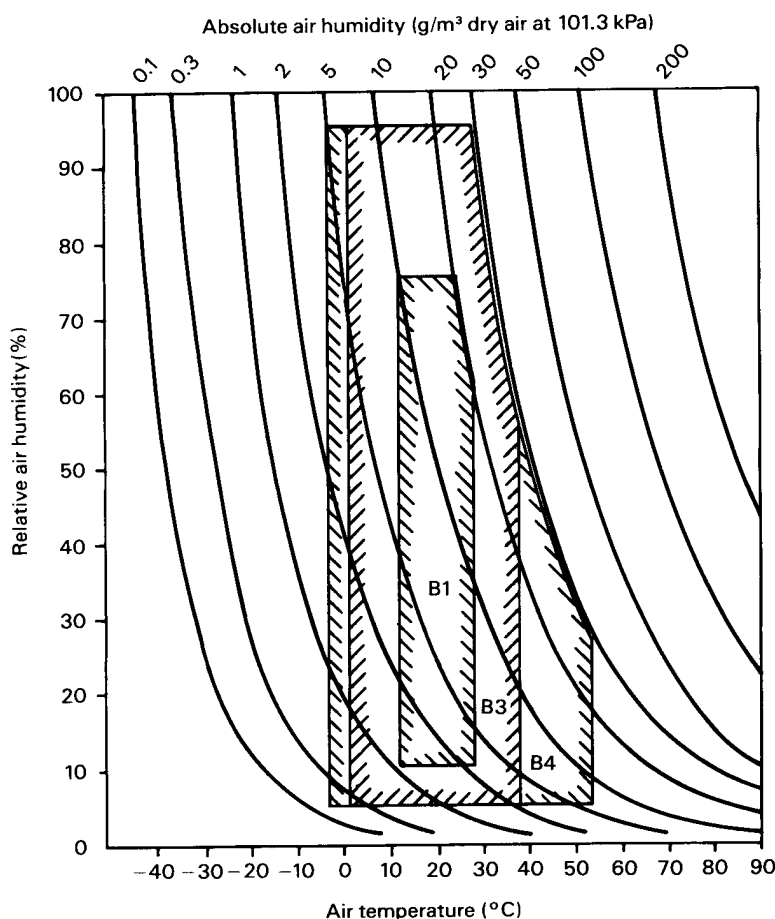


FIG. 2. – Humidity versus temperature for enclosed locations.