

INTERNATIONAL STANDARD



Protection against lightning – Thunderstorm warning systems



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Protection against lightning – Thunderstorm warning systems

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CONTENTS

FOREWORD.....	5
INTRODUCTION.....	7
1 Scope.....	8
2 Normative references.....	9
3 Terms, definitions and abbreviations	9
3.1 Terms and definitions	9
3.2 Abbreviations	12
4 Thunderstorm phases and detectable phenomena for alarming.....	13
4.1 Introductory remark	13
4.2 Phase 1 – Initial phase (cumulus stage).....	13
4.3 Phase 2 – Growth phase	13
4.4 Phase 3 – Mature phase.....	13
4.5 Phase 4 – Dissipation phase	13
5 Classification of thunderstorm detection devices and their properties.....	14
6 Alarm method	15
6.1 General.....	15
6.2 Areas.....	16
6.2.1 Target area (TA)	16
6.2.2 Surrounding area (SA)	16
6.2.3 Monitoring area (MA)	17
6.2.4 Coverage area (CA)	17
6.3 Alarm triggering	17
6.4 Alarm information delivery	19
7 Installation and maintenance.....	19
8 Alarm evaluation.....	19
8.1 General.....	19
8.2 Evaluation of TWS by using lightning location data	21
8.3 Fine tuning of TWS by processing archived data	21
9 Thunderstorms warning systems application guide	21
9.1 General.....	21
9.2 Procedure	22
9.2.1 General	22
9.2.2 Step 1 – Identification of hazardous situations	22
9.2.3 Step 2 – Determination of type of loss	22
9.2.4 Step 3 – Risk control.....	23
Annex A (informative) Overview of the lightning phenomena	25
A.1 Origin of thunderclouds and electrification.....	25
A.2 Lightning phenomena.....	25
A.3 Electric thunderstorm and lightning characteristics useful for prevention	26
A.3.1 Electrostatic field.....	26
A.3.2 Electromagnetic fields	27
A.3.3 Other parameters useful in lightning detection.....	27
Annex B (informative) Thunderstorm detection techniques	28
B.1 Introductory remarks	28
B.2 Detection techniques and parameters to qualify a sensor.....	28

B.2.1	General	28
B.2.2	Class A.....	28
B.2.3	Class B.....	29
B.2.4	Class C.....	29
B.2.5	Class D.....	29
B.3	Location techniques	29
B.3.1	General	29
B.3.2	Multi-sensor location techniques	29
B.3.3	Single sensor techniques	30
B.4	Thunderstorm detectors evaluation	31
B.5	Choosing a thunderstorm detection system	31
Annex C (informative)	Examples of application of thunderstorm warning systems	32
C.1	Example n° 1 – Telecommunication tower	32
C.1.1	Step 1: Identification of hazardous situations	32
C.1.2	Step 2: Determination of type of loss	32
C.1.3	Step 3: Risk control.....	33
C.2	Example n° 2 – Golf course	33
C.2.1	Step 1: Identification of hazardous situations	33
C.2.2	Step 2: Determination of type of loss	34
C.2.3	Step 3: Risk control.....	35
Annex D (informative)	Catalogue of possible recommended preventive actions to be taken.....	36
Annex E (informative)	Example of TWS evaluation on a wind turbine site	38
Annex F (informative)	How to test thunderstorm detectors	40
F.1	General.....	40
F.2	Laboratory tests	40
F.2.1	General	40
F.2.2	Resistance to UV radiation tests (for non-metallic sensor housing).....	40
F.2.3	Resistance tests to corrosion (for metallic parts of sensor).....	41
F.2.4	Mechanical tests	41
F.2.5	Index of protection confirmation (IP Code).....	42
F.2.6	Electric tests.....	42
F.2.7	Marking test.....	43
F.2.8	Electromagnetic compatibility (EMC)	43
F.3	Optional tests on an open air platform under natural lightning conditions	43
Bibliography	47
Figure 1	– Examples of different target area shapes	16
Figure 2	– Example of the distribution of the coverage area (CA), the monitoring area (MA), the target area (TA), and surrounding area (SA).....	17
Figure 3	– Example of an alarm.....	18
Figure A.1	– Standard lightning classifications.....	26
Figure D.1	– Procedure flow chart.....	37
Figure E.1	– Lightning activity around the site for a period of eight years	38
Figure F.1	– Difference in electric field measurement during one thunderstorm event	45
Table 1	– Lightning detector properties	15

Table 2 – Contingency table.....	20
Table 3 – Identification of hazardous situations	22
Table 4 – Loss concerning people	23
Table 5 – Loss concerning goods	23
Table 6 – Loss concerning services.....	23
Table 7 – Loss concerning environment.....	23
Table 8 – Risk control	24
Table C.1 – Identification of hazardous situations	32
Table C.2 – Loss concerning goods.....	32
Table C.3 – Loss concerning services	33
Table C.4 – Loss concerning environment	33
Table C.5 – Risk control.....	33
Table C.6 – Identification of hazardous situations	34
Table C.7 – Loss concerning people.....	34
Table C.8 – Loss concerning goods.....	34
Table C.9 – Loss concerning services	34
Table C.10 – Loss concerning environment	35
Table C.11 – Risk control.....	35
Table E.1 – Results of TWS evaluation based on archived lightning data for an 8-year period (2000 to 2007), when some of the key parameters (size of MA, trigger parameters and dwell time) were varied	39

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**PROTECTION AGAINST LIGHTNING –
THUNDERSTORM WARNING SYSTEMS**

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The text of this standard is based on the following documents:

FDIS	Report on voting
81/508/FDIS	81/519/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

A bilingual version of this publication may be issued at a later date.

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INTRODUCTION

Natural atmospheric electric activity and, in particular, cloud-to-ground lightning poses a serious threat to living beings and property. Every year severe injuries and even deaths of humans are caused as a result of direct or indirect lightning strikes.

Lightning:

- may affect sport, cultural and political events attracting large concentrations of people; events may have to be suspended and people evacuated in the case of a risk of thunderstorm;
- may affect industrial activities by creating power outages and unplanned interruptions of production processes;
- may interrupt all kinds of traffic (people, energy, information, etc.);
- has led to a steady increase in the number of accidents per year due to the wider use of electric components that are sensitive to the effects of lightning (in industry, transportation and communication);
- may be a hazard for activities with an environmental risk, for example handling of sensitive, inflammable, explosive or chemical products;
- may be a cause of fire.

During the last decades, technical systems including systems devoted to real-time monitoring of natural atmospheric electric activity and lightning, have experienced an extraordinary development. These systems can provide high quality and valuable information in real-time of the thunderstorm occurrence, making it possible to achieve information which can be extremely valuable if coordinated with a detailed plan of action.

Although this information allows the user to adopt anticipated temporary preventive measures, it should be noted that all the measures to be taken based on monitoring information are the responsibility of the system user according to the relevant regulations. The effectiveness will depend largely on the risk involved and the planned decisions to be taken. This International Standard gives an informative list of possible actions.

Lightning and thunderstorms, as with many natural phenomena, are subject to statistical uncertainty. It is not possible therefore to achieve precise information on when and where lightning will strike.

Other lightning protection standards do not cover the use of thunderstorm warning systems.

PROTECTION AGAINST LIGHTNING – THUNDERSTORM WARNING SYSTEMS

1 Scope

This International Standard describes the characteristics of thunderstorm warning systems and evaluation of the usefulness of lightning real time data and/or storm electrification data in order to implement lightning hazard preventive measures.

This standard provides the basic requirements for sensors and networks collecting accurate data of the relevant parameters, giving real-time information of lightning tracks and range. It describes the application of the data collected by these sensors and networks in the form of warnings and historical data.

This standard applies to the use of information from thunderstorm warning systems (systems or equipment providing real-time information) on atmospheric electric activity in order to monitor preventive measures.

This standard includes:

- a general description of available lightning and storm electrification hazard warning systems;
- a classification of thunderstorm detection devices and properties;
- guidelines for alarming methods;
- a procedure to determine the usefulness of thunderstorm information;
- some informative examples of possible preventive actions.

The following aspects are outside the scope of this standard:

- a) lightning protection systems; such systems are covered by the IEC 62305 series;
- b) other thunderstorm related phenomena such as rain, hail, wind;
- c) satellite and radar thunderstorm detection techniques.

A non-exhaustive list of situations to which this standard could be applicable is given below:

- people in open areas involved in activities such as maintenance, labour, sports, competitions, agriculture and fisheries or situations where large crowds gather;
- wind farms, large solar power systems, power lines;
- occupational health and safety prevention;
- sensitive equipment such as computer systems, emergency systems, alarms and safety equipment;
- operational and industrial processes;
- storage, processing and transportation of hazardous substances (e.g. flammable, radioactive, toxic and explosive substances);
- determined environments or activities with special danger of electrostatic discharges (e.g. space and flight vehicle operations);
- operations in which the continuity of the basic services is very important (e.g. telecommunications, the generation, transport and distribution of energy, sanitary services and emergency services);
- infrastructures: ports, airports, railroads, motorways and cableways;

- civil defense of the environment: forest fires, land slide and floods;
- wide networks (e.g. power lines, telecommunication lines) may also benefit from having early detection of thunderstorms.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 62305 (all parts), *Protection against lightning*

3 Terms, definitions and abbreviations

3.1 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1.1

alarm

information indicating that the target or the surrounding area is likely to be affected by thunderstorms and the accompanying lightning related events

3.1.2

cloud-to-ground lightning

CG

electric discharge of atmospheric origin that is comprised of one or more cloud-to-ground lightning strokes that propagate from cloud to ground or vice versa and lead to a net transfer of charge between cloud and ground

3.1.3

coverage area

CA

area where a given warning equipment has a sufficient detection efficiency and/or accuracy to give a warning

3.1.4

detection efficiency

DE

percentage of cloud-to-ground discharges (flashes or strokes) that are detected and located by a sensor or a network

Note 1 to entry: As cloud-to-ground flashes are often composed of several strokes, there is a difference between flash detection efficiency and stroke detection efficiency. A flash is reported (detected) if at least one stroke (first or subsequent) is detected and therefore flash detection efficiency is always equal or higher than stroke detection efficiency.

3.1.5

dwelt time

DT

time that an alarm is sustained after all warning criteria are no longer met

3.1.6

effective alarm

EA

alarm where a lightning related event occurs in the surrounding area during the total alarm duration