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Meteorological Aids (Met Aids);
Radiosondes to be used in the 400,15 MHz to 406 MHz frequency range with power levels ranging up to 200 mW;
Part 1: Technical characteristics and test methods

Reference
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Contents

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Foreword

This European Standard (EN) has been produced by ETSI Technical Committee Electromagnetic compatibility and Radio spectrum Matters (ERM).

For non EU countries the present document may be used for regulatory (Type Approval) purposes.

The present document is part 1 of a multi-part deliverable covering digitally modulated Radiosonde transmitters in the Meteorological Aids frequency band from 400,15 MHz to 406 MHz, as identified below:

Part 1: "Technical characteristics and test methods";

Part 2: "Harmonised Standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU".

National transposition dates	
Date of adoption of this EN:	22 October 2015
Date of latest announcement of this EN (doa):	31 January 2016
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	31 July 2016
Date of withdrawal of any conflicting National Standard (dow):	31 July 2017

Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the ETSI Drafting Rules (Verbal forms for the expression of provisions).

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Introduction

Meteorological aids, Radiosondes, are light weight, disposable precision measurement instruments mainly used for *in situ* upper air measurements of meteorological variables (pressure, temperature, relative humidity, wind speed and direction) in the atmosphere up to an altitude of 36 km. The measurements are vital to international weather forecasting capability (and hence severe weather warning services for the public involving protection of life and property). The Radiosonde systems provide simultaneous measurements of the vertical profile of temperature, relative humidity as well as wind speed and direction. The variation of these meteorological variables in the vertical contains the majority of the critical information for weather forecasting. These systems are the only meteorological observing systems able to regularly provide the vertical resolution that meteorologists need for all five variables.

Typically the Radiosonde observations are produced by Radiosondes measuring atmosphere for approximately 2 hours and carried by ascending balloons launched from land stations or ships. Radiosonde observations are carried out routinely by almost all countries, two to four times a day. The observation data is then circulated immediately to all other countries within a few hours via the WMO (World Meteorological Organization) Global Telecommunications System (GTS). The observing systems and data dissemination are all organized under the framework of the World Weather Watch Programme of WMO.

The observation stations are required, worldwide, at a horizontal spacing of less than or equal to 250 km, during the first decade of the twenty-first century, with a frequency of observation of from one to four times per day.

Remotely sensed measurements from satellites do not have the vertical resolution available from Radiosondes. Successful derivation of vertical temperature structure from these satellite measurements usually requires a computation initialized either directly from Radiosonde statistics or from the numerical weather forecast itself. In the latter case, the Radiosonde measurements ensure that the vertical structure in these forecasts remains accurate and stable with time. In addition, the Radiosonde measurements are used to calibrate satellite observations by a variety of techniques.

Radiosonde observations are thus seen to remain absolutely necessary for meteorological operations for the foreseeable future.

Other applications, independent of the main civilian meteorological organizations include environmental pollution, hydrology, radioactivity in the free atmosphere, significant weather phenomena (e.g. winter storms, thunderstorms, etc.) and investigation of a range of physical and chemical properties of the atmosphere.

About 150 000 Radiosondes are annually used in Europe, about 90 % of them are in 403 MHz band. This use is not decreasing with time, since with modern automation it is now much easier to successfully operate systems without highly skilled operators and a large amount of supporting equipment.

The Radiosondes use unidirectional transmission on two frequency bands: 403 MHz band covers primary and co-primary allocations from 400,15 MHz to 406 MHz and 1 680 MHz band from 1 668,4 MHz to 1 690 MHz. The 403 MHz Radiosonde technology applies GNSS (Global Navigation Satellite Systems) for wind measurement, whereas the 1 680 MHz systems may base the wind measurement on balloon tracking with a Radio Direction Finding antenna. Because the 403 MHz wind measurement depends on the availability of the GNSS signals, many operators do not consider this technology secure enough for critical applications (e.g. defence and national security), and consequently prefer 1 680 MHz systems.

National regulatory conditions may apply regarding the, channel/frequency separations, and the inclusion of an automatic transmitter shut-off feature as a condition of an individual or general license, or, as a condition of use under license exemption. The automatic transmitter shut-off facility of the Radiosonde may be based on elapsed time from the beginning of the sounding, or atmospheric pressure or height measured by the Radiosonde.

1 Scope

The present document defines the technical requirements for transmitters used in Radiosondes operating in the range from 400,15 MHz to 406 MHz and with power levels ranging up to 200 mW.

2 References

2.1 Normative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the reference document (including any amendments) applies.

Referenced documents which are not found to be publicly available in the expected location might be found at http://docbox.etsi.org/Reference.

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The following referenced documents are necessary for the application of the present document.

[1] CISPR 16-1-1: "Specification for radio disturbance and immunity measuring apparatus and methods - Part 1-1: Radio disturbance and immunity measuring apparatus - Measuring apparatus".

[2] ETSI TS 103 052 (V1.1.1) (2011-03): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Radiated measurement methods and general arrangements for test sites up to 100 GHz".

[3] ETSI EN 300 220-1 (V2.4.1) (2012-05): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Short Range Devices (SRD); Radio equipment to be used in the 25 MHz to 1 000 MHz frequency range with power levels ranging up to 500 mW; Part 1: Technical characteristics and test methods".

2.2 Informative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the reference document (including any amendments) applies.

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The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

Not applicable.

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

conducted measurements: measurements which are made using a direct 50 Ω connection to the equipment under test

dedicated antenna: removable antenna supplied and type tested with the radio equipment, designed as an indispensable part of the equipment

integral antenna: permanent fixed antenna, which may be built-in, designed as an indispensable part of the equipment

radiated measurements: measurements which involve the absolute measurement of a radiated field