

Aerials for the reception of sound and television broadcasting in the frequency range 30 MHz to 1 GHz —

**Part 2: Methods of measurement of
electrical performance parameters**

UDC 621.396.67

Cooperating organizations

The Electronic Equipment Standards Committee, under whose direction this British Standard was prepared, consists of representatives from the following Government department and scientific and industrial organizations:

- British Broadcasting Corporation*
- British Electrical and Allied Manufacturers' Association (BEAMA)
- British Radio Equipment Manufacturers' Association
- Cable and Wireless Limited
- Cable Television Association of Great Britain
- Electrical, Electronic, Telecommunications Plumbing Union
- Electricity Supply Industry in England and Wales
- Electronic Components Industry Federation*
- Electronic Engineering Association*
- Institution of Electronic and Radio Engineers*
- Ministry of Defence
- Post Office*
- Scientific Instrument Manufacturers' Association

The organizations marked with an asterisk in the above list, together with the following, were directly represented on the committee entrusted with the preparation of this British Standard

- Aerial Manufacturers' Association
- British Aerial Standards Council
- Confederation of Aerial Industries
- Home Office
- Independent Broadcasting Authority

This British Standard, having been prepared under the direction of the Electronic Equipment Standards Committee, was published under the authority of the Executive Board on 30 November 1978

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National foreword

This British Standard has been prepared under the direction of the Electronic Equipment Standards Committee. It is identical with Publication 597-2 “*Aerials for the reception of sound and television broadcasting in the frequency range 30 MHz to 1 GHz*” Part 2 “*Methods of measurement of electrical performance parameters*”, published by the International Electrotechnical Commission (IEC).

Terminology and conventions. The text of the International Standard has been approved as suitable for publication, without deviation, as a British Standard. Some terminology and certain conventions are not identical with those used in British Standards; attention is especially drawn to the following.

Wherever the word “standard” appears, referring to this standard, it should be interpreted as “British Standard”.

Cross-reference. For the following International Standard referred to in the text, there is a corresponding British Standard; this is as given below:

International Standard	Corresponding British Standard
IEC 597-1:1977	BS 5640 <i>Aerials for the reception of sound and television broadcasting in the frequency range 30 MHz to 1 GHz</i> Part 1:1978 <i>Electrical and mechanical characteristics</i> (Identical)

NOTE The reference to IEC 107:1960, for which there is no corresponding British Standard, constitutes informative matter only and since no mandatory requirements are involved, the validity of this British Standard is not affected.

However, the method of measurement referred to in 3.1 of this British Standard is described under section forty (clauses 115 and 116) of the second edition of IEC Publication 107-1:1977. It is intended to revise BS 3549:1963 “*Methods for measuring and expressing the performance of television receivers*” to align with this new edition of IEC 107-1.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

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

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 8, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

1 Scope

This standard applies to linearly polarized aerials for domestic use in the frequency range 30 MHz to 1 GHz.

2 Object

This standard specifies the conditions and methods of measurement of electrical performance parameters of aerials for the reception of sound and television broadcasting.

3 Methods of measurement

3.1 Reflection coefficient

For most purposes, either the magnitude of the reflection coefficient or the standing wave ratio as a function of frequency for the range for which the aerial has been designed, will give sufficient information.

The one may be derived from the other or they may be independently determined from the aerial impedance either by calculation or by reading a Smith impedance chart. The same precautions as indicated in Sub-clause 4.2 shall be taken into account.

The reflection coefficient can be calculated from measurements made by means of, for example, a slotted line, a frequency sweep method (see IEC Publication 107, Recommended Methods of Measurement on Receivers for Television Broadcast Transmissions, Sub-clause 3.5) or a reflectometer method.

3.1.1 Graphical presentation

The magnitude of the reflection coefficient or the standing wave ratio (SWR) or return loss ratio (RLR) shall be given as a function of frequency, the measured points being clearly indicated. The specified resistive load for which the aerial has been designed shall be stated.

3.2 Gain

Gain shall be expressed as defined in Sub-clause 3.2 of IEC Publication 597-1, Aerials for the Reception of Sound and Television Broadcasting in the Frequency Range 30 MHz to 1 GHz, Part 1: Electrical and Mechanical Characteristics, and calculated from measurements made on site as detailed in Sub-clause 4.1.

By the law of reciprocity, an aerial (other than an active receiving aerial) will exhibit equivalent characteristics whether it be tested as a receiving or as a transmitting aerial. Either method may be used when measuring gain and directivity.

Gain shall be measured by either the substitution method, Sub-clause 3.2.1 a) and b), or by the reciprocity (identical aerials) method, Sub-clause 3.2.2.

3.2.1 Gain measurements by the substitution method

a) The aerial together with its mounting system, shall be placed on a site as indicated in Clause 4 and exposed to an incident plane electromagnetic wave, having a polarization corresponding to the design of the aerial. The aerial output power delivered to the specified resistive load shall be compared with the power from a substituted reference dipole or transfer standard aerial.

b) The aerial, together with its mounting system, shall be placed on a site as indicated in Clause 4 and connected to a radio frequency source with an impedance equal to the specified resistive load. The power delivered to the terminals of this aerial, to produce a certain field strength at a distant receiving aerial, shall be compared with the power which must be supplied to a reference dipole or transfer standard aerial to produce the same field strength at the same distant receiving aerial.

In using the above methods a) or b) a resonant half-wave dipole will normally be used as a reference aerial in measuring gain, but it is frequently necessary to use a more directional aerial and this has been defined in Sub-clause 3.13 of IEC Publication 597-1. A transfer standard aerial must have accurately known and consistently reproducible gain, directivity and cross-polarization characteristics. It must be completely specified in dimensional working drawings, with full mechanical specification to permit it to be reproducibly constructed whenever required.

Where an unbalanced transmission system is used, a suitable balance to unbalance transformation shall be made between the dipole and the transmission system; the transformation loss shall be taken into account.

The magnitude of the reflection coefficient of the reference aerial to the transmission system shall not exceed 0.1 at the measuring frequencies.

3.2.2 Gain measurement by the reciprocity method

Two identical aerials of the type to be tested are necessary. One is used as the transmitting aerial and the other as the receiving aerial. Each aerial is mounted with its designed mounting system on a mast as described in Sub-clause 5.1. During each measurement both aerials are at the same height above the ground, facing each other.