



IEC 62153-4-6

Edition 2.0 2017-08  
REDLINE VERSION

# INTERNATIONAL STANDARD



---

**Metallic communication cables and other passive components test methods –  
Part 4-6: Electromagnetic compatibility (EMC) – Surface transfer impedance –  
Line injection method**

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

ICS 33.120.10

ISBN 978-2-8322-4788-4

**Warning! Make sure that you obtained this publication from an authorized distributor.**

## CONTENTS

FOREWORD .....	4
1 Scope .....	6
2 Normative references .....	6
3 Terms and definitions .....	6
4 <del>General coupling considerations</del> Physical background .....	7
5 Test set-up .....	7
5.1 General .....	8
5.2 Equipment .....	9
5.3 <del>Launcher</del> Injection feature .....	9
5.4 Impedance <del>matching</del> of inner circuit .....	12
6 Preparation of the test sample .....	13
6.1 General .....	14
6.2 Sample length .....	16
6.3 Screened symmetrical cables .....	17
6.4 Screened multi-conductor cables .....	17
7 Measurement .....	17
7.1 General .....	17
7.2 Measurement precautions .....	17
7.2.1 Reduced primary current .....	17
7.2.2 Uncontrolled currents .....	18
7.2.3 Inhomogeneities of cable screens around the circumference .....	18
7.3 Calibration .....	18
7.4 Measuring procedure .....	18
7.5 Evaluation of the test results .....	22
8 Expression of test results .....	22
8.1 Expression .....	23
8.2 Normalised screening attenuation .....	23
8.3 Temperature correction .....	24
8.4 Test report .....	24
9 Requirement .....	24
Bibliography .....	25
Figure 1 – Complete installation .....	7
Figure 2 – Assembled <del>launcher</del> injection feature for the transmission type line, Injection method – Parts list .....	9
Figure 3 – Upper part of <del>launcher</del> injection feature – Position 1 .....	10
Figure 4 – Lower part of <del>launcher</del> injection feature – Position 2 .....	10
Figure 5 – Impedance matching part of <del>launcher</del> injection feature – Position 3 .....	11
Figure 6 – Insert for adapting the different sizes of the cables under test – Position 4 .....	11
<del>Figure 7 – Impedance matching for <math>Z_1 &lt; 50 \Omega</math> .....</del>	<del>13</del>
Figure 7 – Preparation of the cable under test (CUT) .....	13
<del>Figure 8 – Impedance matching for <math>Z_1 &gt; 50 \Omega</math> .....</del>	<del>13</del>
Figure 8 – Additional screening of connectors on the cable under test (CUT) .....	13
Figure 9 – Preparation of symmetrical samples .....	14

Figure 10 – Calibration set-up.....	16
Figure 11 – Far end measuring set-up .....	17

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**METALLIC-~~COMMUNICATION~~ CABLES AND OTHER  
PASSIVE COMPONENTS TEST METHODS –****Part 4-6: Electromagnetic compatibility (EMC) –  
Surface transfer impedance – Line injection method**

## FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

**This redline version of the official IEC Standard allows the user to identify the changes made to the previous edition. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.**

International Standard IEC 62153-4-6 has been prepared by subcommittee 46A: Coaxial cables, of IEC technical committee 46: Cables, wires, waveguides, RF connectors, RF and microwave passive components and accessories cables, wires, waveguides, r.f. connectors and accessories for communication and signalling.

This second edition cancels and replaces the first edition, published in 2006.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
46/650/FDIS	46/654/RVD

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

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

A list of all parts in the IEC 62153 series, published under the general title *Metallic communication cable test methods*, can be found on the IEC website.

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

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

**IMPORTANT – The “colour inside” logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this publication using a colour printer.**

## **METALLIC ~~COMMUNICATION~~ CABLES AND OTHER PASSIVE COMPONENTS TEST METHODS –**

### **Part 4-6: Electromagnetic compatibility (EMC) – Surface transfer impedance – Line injection method**

#### **1 Scope**

This part of IEC 62153 determines the screening effectiveness of a shielded metallic communication cable by applying a well-defined current and voltage to the screen of the cable and measuring the induced voltage in order to determine the surface transfer impedance.

Measurements in the frequency range from a few kHz up to and above 1 GHz can be made with the use of normal high frequency instrumentation.

#### **2 Normative references**

~~The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.~~

~~IEC 61196-1:2005, Coaxial communication cables – Part 1: Generic specification – General, definitions and requirements~~

~~IEC 62153-4-3, Metallic communication cable test methods – Electromagnetic Compatibility (EMC) – Surface transfer impedance – Triaxial method~~

There are no normative references in this document.

# INTERNATIONAL STANDARD

---

**Metallic cables and other passive components test methods –  
Part 4-6: Electromagnetic compatibility (EMC) – Surface transfer impedance –  
Line injection method**

## CONTENTS

FOREWORD .....	3
1 Scope .....	5
2 Normative references .....	5
3 Terms and definitions .....	5
4 Physical background.....	5
5 Test set-up .....	6
5.1 General.....	6
5.2 Equipment .....	7
5.3 Injection feature .....	7
5.4 Impedance of inner circuit.....	10
6 Preparation of the test sample .....	11
6.1 General.....	11
6.2 Sample length.....	12
6.3 Screened symmetrical cables.....	13
6.4 Screened multi-conductor cables .....	13
7 Measurement.....	13
7.1 General.....	13
7.2 Measurement precautions .....	14
7.2.1 Reduced primary current .....	14
7.2.2 Uncontrolled currents .....	14
7.2.3 Inhomogeneities of cable screens around the circumference .....	14
7.3 Calibration .....	14
7.4 Measuring procedure .....	15
7.5 Evaluation of the test results .....	17
8 Expression of test results .....	18
8.1 Expression.....	18
8.2 Normalised screening attenuation .....	18
8.3 Temperature correction.....	19
8.4 Test report.....	19
9 Requirement.....	19
Bibliography.....	20
Figure 1 – Complete installation.....	7
Figure 2 – Assembled injection feature for the transmission type line, Injection method – Parts list .....	8
Figure 3 – Upper part of injection feature – Position 1.....	9
Figure 4 – Lower part of injection feature – Position 2.....	9
Figure 5 – Impedance matching part of injection feature – Position 3.....	10
Figure 6 – Insert for adapting the different sizes of the cables under test – Position 4.....	10
Figure 7 – Preparation of the cable under test (CUT) .....	12
Figure 8 – Additional screening of connectors on the cable under test (CUT).....	12
Figure 9 – Preparation of symmetrical samples.....	13
Figure 10 – Calibration set-up.....	15
Figure 11 – Far end measuring set-up .....	16



## INTERNATIONAL ELECTROTECHNICAL COMMISSION

---

**METALLIC CABLES AND OTHER  
PASSIVE COMPONENTS TEST METHODS –****Part 4-6: Electromagnetic compatibility (EMC) –  
Surface transfer impedance – Line injection method****FOREWORD**

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 62153-4-6 has been prepared by subcommittee 46A: Coaxial cables, of IEC technical committee 46: Cables, wires, waveguides, RF connectors, RF and microwave passive components and accessories cables, wires, waveguides, r.f. connectors and accessories for communication and signalling.

This second edition cancels and replaces the first edition, published in 2006.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
46/650/FDIS	46/654/RVD

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

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

A list of all parts in the IEC 62153 series, published under the general title *Metallic communication cable test methods*, can be found on the IEC website.

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

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

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

## **METALLIC CABLES AND OTHER PASSIVE COMPONENTS TEST METHODS –**

### **Part 4-6: Electromagnetic compatibility (EMC) – Surface transfer impedance – Line injection method**

#### **1 Scope**

This part of IEC 62153 determines the screening effectiveness of a shielded metallic communication cable by applying a well-defined current and voltage to the screen of the cable and measuring the induced voltage in order to determine the surface transfer impedance.

Measurements in the frequency range from a few kHz up to and above 1 GHz can be made with the use of normal high frequency instrumentation.

#### **2 Normative references**

There are no normative references in this document.