

ISBN 978-0-626-26773-5

SANS 61000-5-2:1997
Edition 1 and nat. amdt 1
IEC TR 61000-5-2:1997
Edition 1

SOUTH AFRICAN NATIONAL STANDARD

Electromagnetic compatibility (EMC)

Part 5: Installation and mitigation guidelines

Section 2: Earthing and cabling

This national standard is the identical implementation of IEC TR 61000-5-2:1997 and is adopted with the permission of the International Electrotechnical Commission.

SANS 61000-5-2:1997
Edition 1 and nat. amdt 1
IEC TR 61000-5-2:1997
Edition 1

Table of changes

Change No.	Date	Scope
Nat. amdt 1	2007	Amended to change the designation from SABS to SANS, with no technical changes.

National foreword

This South African standard was approved by National Committee SABS TC 73, *Electromagnetic compatibility*, in accordance with procedures of the SABS Standards Division, in compliance with annex 3 of the WTO/TBT agreement.

This SANS document was published in June 2007.

This SANS document supersedes SABS IEC 61000-5-2:1997 (first edition).

**Reaffirmed and reprinted in November 2011.
This standard will be reviewed every five years and
be reaffirmed, amended, revised or withdrawn.**

**RAPPORT
TECHNIQUE – TYPE 3**

**CEI
IEC**

**TECHNICAL
REPORT – TYPE 3**

61000-5-2

Première édition
First edition
1997-11

Compatibilité électromagnétique (CEM) –

**Partie 5: Guides d'installation et d'atténuation –
Section 2: Mise à la terre et câblage**

Electromagnetic compatibility (EMC) –

**Part 5: Installation and mitigation guidelines –
Section 2: Earthing and cabling**

© IEC 1997 Droits de reproduction réservés — Copyright - all rights reserved

Aucune partie de cette publication ne peut être reproduite ni utilisée sous quelque forme que ce soit et par aucun procédé, électronique ou mécanique, y compris la photocopie et les microfilms, sans l'accord écrit de l'éditeur.

No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from the publisher.

International Electrotechnical Commission
Telefax: +41 22 919 0300

3, rue de Varembé Geneva, Switzerland
e-mail: inmail@iec.ch IEC web site <http://www.iec.ch>



Commission Electrotechnique Internationale
International Electrotechnical Commission
Международная Электротехническая Комиссия

CODE PRIX XB
PRICE CODE

For price, see current catalogue

CONTENTS

	Page
FOREWORD	9
INTRODUCTION	13
Clause	
1 Scope	17
2 Reference documents	17
3 Definitions.....	17
4 General EMC considerations on installation of earthing and cabling systems	23
4.1 General	23
4.2 EMC and safety (insulation) installation requirements.....	25
4.3 Equipment and installation ports	25
5 Earthing and bonding	25
5.1 Requirements concerning safety.....	25
5.2 Requirements concerning EMC.....	27
5.3 Design of the earthing system.....	29
6 Bonding	41
6.1 General	41
6.2 Bonding straps	43
6.3 Connections	45
6.4 Bonding of specific equipment	47
6.5 Procedures for users	49
7 Cables and wires	51
7.1 General	51
7.2 Differential and common mode circuit, transfer impedance Z_t	53
7.3 Set of EMC rules for cable and wire installation.....	57
7.4 Types of cables and their use with regard to EMC	61
7.5 Types of parallel-earthing conductor (PEC)	63
7.6 Connecting and earthing of cables and parallel earthed conductors.....	69
7.7 General routing of cables.....	71
7.8 Cable bundles	77
7.9 Cables serving power ports.....	79
7.10 Cables serving signal and control ports.....	81
8 Additional interference mitigation methods	87
8.1 Common-mode ferrite choke.....	87
8.2 Electrical separation	89
9 Measuring and testing methods	93
9.1 Earthing and bonding.....	93
9.2 Cables and installation.....	95

	Page
Figures	
1 Demonstration of the fallacy of the “equipotentiality” concept as a universal rule	27
2 Schematic plan view of a typical earth electrode	31
3 Misconception of “dedicated”, “independent”, or “isolated” earth electrodes	31
4 The concept of a single earth electrode	33
5 Recommended configuration for the earth electrodes and earthing network	33
6 Loops involving signal cables and earthing network	35
7 A three-dimensional schematic of the recommended approach for the earthing network	37
8 General principles for bonding of various apparatus or systems to the earthing network.....	39
9 Simplified representation of a bonding strap	41
10 A more realistic representation of an installed bonding strap.....	43
11 Typical bonding straps	45
12 Relative inductance of flat and round conductors.....	45
13 Relative inductance of round, flat and double bonding straps	45
14 Example of protected removable connection of a bonding strap	47
15 Example of optimal bonding of a shielded cable to the enclosure	49
16 Schematic of interconnected chassis.....	49
17 Differential mode and common mode circuits with bonding strips and signal cables ...	53
18 Effect of the configuration of a parallel-earthing conductor on the transfer impedance.....	63
19 Slits in conduits and cable trays	65
20 Recommended configuration for cable trays with branches	67
21 Recommended cable positions parallel to an H-shaped beam from the EMC point of view	67
22 Penetration of a shielded cable through an enclosure wall	69
23 Tray with partition.....	75
24 Example of stacking for conduits or trays	75
25 Topology of circuits containing switches	81
26 Undesirable connection of a coaxial cable	85
27 Typical implementations of common-mode ferrite chokes	87
28 Limitations in the effectiveness of an isolation transformer	91
29 Parasitic coupling at high frequencies.....	93