

ISBN 978-0-626-33216-7

**SANS 959-2-4:2017**

Edition 1.1

# **SOUTH AFRICAN NATIONAL STANDARD**

## **Photovoltaic systems for use in individual homes, schools and clinics**

### **Part 2-4: Test procedures for main components — Inverters**

**WARNING**

**This document references other documents normatively.**

## SANS 959-2-4:2017

Edition 1.1

Amdt 1

### Table of changes

Change No.	Date	Scope
Amdt 1	2017	Amended to change the designation "SANS 959-2-4/NRS 052-2-4" to read "SANS 959-2-4", to delete the note to the normative references clause, and to update referenced standards.

## Foreword

This South African standard was approved by National Committee SABS/TC 069, *Power electronics and alternative energy conversion*, in accordance with procedures of the SABS Standards Division, in compliance with annex 3 of the WTO/TBT agreement.

This document was approved for publication in February 2017.

This document supersedes SANS 959-2-4:2012 (edition 1).

A vertical line in the margin shows where the text has been technically modified by amendment No. 1.

SANS 959 consists of the following parts and sections, under the general title *Photovoltaic systems for use in individual homes, schools and clinics*:

*Part 1: Standardized requirements applicable to off-grid individual homes, schools and clinics.*

*Part 2-1: Test procedures for main components – Photovoltaic modules.*

*Part 2-2: Test procedures for main components – Batteries.*

*Part 2-3: Test procedures for main components – Regulators, charge controllers and maximum power point trackers (MPPTs).*

*Part 2-4: Test procedures for main components – Inverters.*

*Part 2-5: Test procedures for main components – Luminaires.*

*Part 3: Standardized requirements applicable to the installation and maintenance of off-grid systems in individual homes, schools and clinics.*

**Compliance with this document cannot confer immunity from legal obligations.**

## Introduction

This section of SANS 959-2 has been developed to standardize the testing of inverters as applicable to home photovoltaic systems as envisaged in SANS 959-1 for a national programme to provide solar power supplies to individual homes, schools and clinics remote from the electricity grid. **Amdt 1**

This section of SANS 959-2 covers inverters suitable for a d.c. input of 12 V and an a.c. output of 230 V. This specification may also be utilized to standardize the testing of inverters as applicable to schools and clinic systems specified in SANS 959-1. **Amdt 1**

In order to facilitate the placing of separate contracts for supply and installation, the requirements for installation, including the electrical installation, are contained in SANS 959-3. **Amdt 1**

## Contents

	Page
Introduction	
<b>1</b> Scope .....	3
<b>2</b> Normative references .....	3
<b>3</b> Terms, definitions and abbreviations .....	4
<b>4</b> Inspection and tests .....	4
<b>4.1</b> General .....	4
<b>4.2</b> Documentation .....	4
<b>4.3</b> Test circuit and measurement equipment .....	4
<b>4.4</b> Measurement conditions .....	4
<b>4.5</b> Efficiency calculations .....	5
<b>4.6</b> Voltage regulation .....	5
<b>4.7</b> Harmonic content of the output voltage wave form .....	5
<b>4.8</b> Output frequency variation .....	5
<b>4.9</b> Short-circuit survival test .....	5
<b>4.10</b> Loss measurements .....	5
<b>4.11</b> Acoustic noise emission test .....	6
<b>4.12</b> Electromagnetic interference test .....	6
<b>4.13</b> Radiated susceptibility test .....	6
<b>4.14</b> Electrostatic discharge test .....	6
<b>4.15</b> Indicators and alarms .....	6
<b>4.16</b> Built-in protection .....	6
<b>4.17</b> Figures of merit: weighted efficiency .....	6
<b>4.18</b> Load tests .....	7
<b>4.19</b> Mechanical tests .....	8
<b>Bibliography</b> .....	9

**SANS 959-2-4:2017**  
Edition 1.1

**Amdt 1**

**This page is intentionally left blank**

## **Photovoltaic systems for use in individual homes, schools and clinics**

### **Part 2-4:**

#### **Test procedures for main components — Inverters**

## **1 Scope**

**1.1** This section of SANS 959-2 specifies test procedures for inverters for use in photovoltaic systems of nominal d.c. voltages 12 V, 24 V, 36 V and 48 V and maximum currents of up to 15 A.

**Amdt 1**

**1.2** The inverters are rated at a d.c. input as above and an a.c. r.m.s. output voltage of  $230\text{ V} \pm 11\text{ V}$  at a frequency of  $50\text{ Hz} \pm 1,25\text{ Hz}$  and are capable of a single-phase power output.

## **2 Normative references**

The following documents contain provisions which, through reference in this text, constitute provisions of this section of SANS 959-2. All documents are subject to revision and, since any reference to a document is deemed to be a reference to the latest edition of that document, parties to agreements based on this specification are encouraged to take steps to ensure the use of the most recent editions of the documents listed below. Information on currently valid national and international standards can be obtained from the SABS Standards Division.

**Amdt 1**

NOTE Deleted by amendment No. 1.

IEC 61683, *Photovoltaic systems – Power conditioners – Procedure for measuring efficiency.*

IEC 62093:2005, *Balance-of-system components for photovoltaic systems – Design qualification natural environments.*

SANS 959-1, *Photovoltaic systems for use in individual homes, schools and clinics – Part 1: Standardized requirements applicable to off-grid individual homes, schools and clinics.*

**Amdt 1**

SANS 222/CISPR 22, *Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement.*

SANS 3744/ISO 3744, *Acoustics – Determination of sound power levels and sound energy levels of noise sources using sound pressure – Engineering methods for an essentially free field over a reflecting plane.*

SANS 61000-4-2/IEC 61000-4-2, *Electromagnetic compatibility (EMC) – Part 4-2: Testing and measurement techniques – Electrostatic discharge immunity test.*

SANS 61000-4-3/IEC 61000-4-3, *Electromagnetic compatibility (EMC) – Part 4-3: Testing and measurement techniques – Radiated, radio-frequency, electromagnetic field immunity test.*