

This document is a preview generated by EVS

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

Käesolev Eesti standard EVS-EN 61280-2-3:2009 sisaldb Euroopa standardi EN 61280-2-3:2009 ingliskeelset teksti.	This Estonian standard EVS-EN 61280-2-3:2009 consists of the English text of the European standard EN 61280-2-3:2009.
Standard on kinnitatud Eesti Standardikeskuse 30.11.2009 käskkirjaga ja jõustub sellekohase teate avaldamisel EVS Teatajas.	This standard is ratified with the order of Estonian Centre for Standardisation dated 30.11.2009 and is endorsed with the notification published in the official bulletin of the Estonian national standardisation organisation.
Euroopa standardimisorganisatsioonide poolt rahvuslikele liikmetele Euroopa standardi teksti kätesaadavaks tegemise kuupäev on 23.09.2009.	Date of Availability of the European standard text 23.09.2009.
Standard on kätesaadav Eesti standardiorganisatsionist.	The standard is available from Estonian standardisation organisation.

ICS 33.180.01

Standardite reproduutseerimis- ja levitamisõigus kuulub Eesti Standardikeskusele

Andmete paljundamine, taastekitamine, kopeerimine, salvestamine elektroonilisse süsteemi või edastamine ükskõik millises vormis või millisel teel on keelatud ilma Eesti Standardikeskuse poolt antud kirjaliku loata.

Kui Teil on küsimusi standardite autorikaitse kohta, palun võtke ühendust Eesti Standardikeskusega:
Aru 10 Tallinn 10317 Estonia; www.evs.ee; Telefon: 605 5050; E-post: info@evs.ee

Right to reproduce and distribute Estonian Standards belongs to the Estonian Centre for Standardisation

No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying, without permission in writing from Estonian Centre for Standardisation.

If you have any questions about standards copyright, please contact Estonian Centre for Standardisation:
Aru str 10 Tallinn 10317 Estonia; www.evs.ee; Phone: +372 605 5050; E-mail: info@evs.ee

English version

**Fibre optic communication subsystem test procedures -
Part 2-3: Digital systems -
Jitter and wander measurements
(IEC 61280-2-3:2009)**

Procédures d'essai des sous-systèmes
de télécommunications à fibres optiques -
Partie 2-3: Systèmes numériques -
Mesures des gigues et des dérapages
(CEI 61280-2-3:2009)

Prüfverfahren für Lichtwellenleiter-
Kommunikationsuntersysteme -
Teil: 2-3: Digitale Systeme -
Messung von Jitter und Wander
(IEC 61280-2-3:2009)

This European Standard was approved by CENELEC on 2009-08-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: Avenue Marnix 17, B - 1000 Brussels

Foreword

The text of document 86C/885/FDIS, future edition 1 of IEC 61280-2-3, prepared by SC 86C, Fibre optic systems and active devices, of IEC TC 86, Fibre optics, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 61280-2-3 on 2009-08-01.

The following dates were fixed:

- latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2010-05-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2012-08-01

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 61280-2-3:2009 was approved by CENELEC as a European Standard without any modification.

Annex ZA
(normative)

**Normative references to international publications
with their corresponding European publications**

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.

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60825-1	¹⁾	Safety of laser products - Part 1: Equipment classification and requirements	EN 60825-1	2007 ²⁾
ITU-T Recommendation G.813	¹⁾	Timing characteristics of SDH equipment slave clocks (SEC)	-	-

¹⁾ Undated reference.

²⁾ Valid edition at date of issue.

CONTENTS

FOREWORD	5
1 Scope	7
1.1 Types of jitter measurements	7
1.2 Types of wander measurements	7
2 Normative references	7
3 Terms and definitions	7
4 General considerations	11
4.1 Jitter generation	11
4.1.1 Timing jitter	11
4.1.2 Alignment jitter	11
4.1.3 Other effects	12
4.2 Effects of jitter on signal quality	12
4.3 Jitter tolerance	12
4.4 Waiting time jitter	13
4.5 Wander	14
5 Jitter test procedures	14
5.1 General considerations	14
5.1.1 Analogue method	14
5.1.2 Digital method	14
5.2 Common test equipment	15
5.3 Safety	16
5.4 Fibre optic connections	17
5.5 Test sample	17
6 Jitter tolerance measurement procedure	17
6.1 Purpose	17
6.2 Apparatus	17
6.3 BER penalty technique	17
6.3.1 Equipment connection	17
6.3.2 Equipment settings	18
6.3.3 Measurement procedure	18
6.4 Onset of errors technique	18
6.4.1 Equipment connection	18
6.4.2 Equipment settings	19
6.4.3 Measurement procedure	19
6.5 Jitter tolerance stressed eye receiver test	20
6.5.1 Purpose	20
6.5.2 Apparatus	20
6.5.3 Sinusoidal jitter template technique	20
7 Measurement of jitter transfer function	21
7.1 General	21
7.2 Apparatus	21
7.3 Basic technique	22
7.3.1 Equipment connection	22
7.3.2 Equipment settings	22
7.3.3 Measurement procedure	22
7.4 Analogue phase detector technique	23

7.4.1	Equipment connections.....	23
7.4.2	Equipment settings	23
7.4.3	Measurement procedure	24
7.4.4	Measurement calculations	24
8	Measurement of output jitter	24
8.1	General	24
8.2	Equipment connection	24
8.2.1	Equipment settings	24
8.2.2	Measurement procedure	24
8.2.3	Controlled data.....	25
9	Measurement of systematic jitter	25
9.1	Apparatus.....	25
9.2	Basic technique	25
9.2.1	Equipment connection	25
9.2.2	Equipment settings	26
9.2.3	Measurement procedure	26
10	BERT scan technique	27
10.1	Apparatus.....	29
10.2	Basic technique	29
10.2.1	Equipment connection	29
10.2.2	Equipment settings	29
10.2.3	Measurement process	29
11	Jitter separation technique	30
11.1	Apparatus.....	31
11.2	Equipment connections	31
11.3	Equipment settings.....	31
11.4	Measurement procedure.....	32
11.4.1	Sampling oscilloscope:	32
11.4.2	Real-time oscilloscope.....	32
12	Measurement of wander	33
12.1	Apparatus.....	33
12.2	Basic technique	33
12.2.1	Equipment connection	33
12.2.2	Equipment settings	34
12.2.3	Measurement procedure	35
13	Measurement of wander TDEV tolerance	35
13.1	Intent.....	35
13.2	Apparatus.....	35
13.3	Basic technique	35
13.4	Equipment connection	35
13.4.1	Wander TDEV tolerance measurement for the test signal of EUT	35
13.4.2	Wander TDEV tolerance measurement for timing reference signal of EUT	36
13.5	Equipment settings	36
13.6	Measurement procedure.....	37
14	Measurement of wander TDEV transfer	37
14.1	Apparatus.....	37
14.2	Equipment connection	37

14.2.1	Wander TDEV transfer measurement for the test signal of EUT	37
14.2.2	Wander TDEV transfer measurement for timing reference signal of EUT	37
14.3	Equipment settings	38
14.4	Measurement procedure	38
15	Test results	38
15.1	Mandatory information	38
15.2	Available information	39
	Bibliography	40
	 Figure 1 – Jitter generation	11
	Figure 2 – Example of jitter tolerance	13
	Figure 3 – Jitter and wander generator	15
	Figure 4 – Jitter and wander measurement	16
	Figure 5 – Jitter stress generator	16
	Figure 6 – Jitter tolerance measurement configuration: bit error ratio (BER) penalty technique	18
	Figure 7 – Jitter tolerance measurement configuration: Onset of errors technique	19
	Figure 8 – Equipment configuration for stressed eye tolerance test	20
	Figure 9 – Measurement of jitter transfer function: basic technique	22
	Figure 10 – Measurement of Jitter transfer: analogue phase detector technique	23
	Figure 11 – Output jitter measurement	25
	Figure 12 – Systematic jitter measurement configuration: basic technique	26
	Figure 13 – Measurement of the pattern-dependent phase sequence xi	27
	Figure 14 – BERT scan bathtub curves (solid line for low jitter, dashed line for high jitter)	28
	Figure 15 – Equipment setup for the BERT scan	29
	Figure 16 – Dual Dirac jitter model	31
	Figure 17 – Equipment setup for jitter separation measurement	31
	Figure 18 – Measurement of time interval error	32
	Figure 19 – Synchronized wander measurement configuration	34
	Figure 20 – Non-synchronized wander measurement configuration	34
	Figure 21 – Wander TDEV tolerance measurement configuration for the test signal of EUT	36
	Figure 22 – Wander TDEV tolerance measurement configuration for the timing signal of EUT	36
	Figure 23 – Wander TDEV transfer measurement configuration for the test signal of EUT	37
	Figure 24 – Wander TDEV transfer measurement configuration for the timing signal of EUT	38

FIBRE OPTIC COMMUNICATION SUBSYSTEM TEST PROCEDURES –

Part 2-3: Digital systems – Jitter and wander measurements

1 Scope

This part of IEC 61280 specifies methods for the measurement of the jitter and wander parameters associated with the transmission and handling of digital signals.

1.1 Types of jitter measurements

This standard covers the measurement of the following types of jitter parameters:

- a) jitter tolerance
 - 1) sinusoidal method
 - 2) stressed eye method
- b) jitter transfer function
- c) output jitter
- d) systematic jitter
- e) jitter separation

1.2 Types of wander measurements

This standard covers the measurement of the following types of wander parameters:

- a) non-synchronized wander
- b) TDEV tolerance
- c) TDEV transfer
- d) synchronized wander

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 60825-1, Safety of laser products – Part 1: Equipment classification and requirements

ITU-T Recommendation G.813, *Timing characteristics of SDH equipment slave clocks (SEC)*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

NOTE See also IEC 61931.