

---

---

**Digitalno zapisovanje v videorekorderju s poševnimi sledmi na magnetni trak, širok 12,65 mm, s kompresijo po MPEG-4 – Format tipa D-16**

Helical-scan digital video cassette recording format using 12,65 mm magnetic tape and incorporating MPEG-4 compression – Type D-16 format

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

[SIST EN 62141:2006](https://standards.iteh.ai/catalog/standards/sist/75235717-7b06-4b4b-a52d-805f44b9a96/sist-en-62141-2006)

<https://standards.iteh.ai/catalog/standards/sist/75235717-7b06-4b4b-a52d-805f44b9a96/sist-en-62141-2006>

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

SIST EN 62141:2006

<https://standards.iteh.ai/catalog/standards/sist/75235717-7b06-4b4b-a52d-805f44b9a96/sist-en-62141-2006>

**Helical-scan digital video cassette recording format using  
12,65 mm magnetic tape and incorporating MPEG-4 compression -  
Type D-16 format  
(IEC 62141:2005)**

Format d'enregistrement à balayage  
hélicoïdal pour cassette vidéo numérique  
utilisant une bande magnétique  
de 12,65 mm avec système  
de compression MPEG-4 -  
Format D-16  
(CEI 62141:2005)

Videoaufnahme -  
Videokassettensystem mit digitaler  
Schrägschraufzeichnung auf Magnetband  
12,65 mm und eingeschlossener  
MPEG-4-Kompression -  
Format D-16  
(IEC 62141:2005)

**iTeh STANDARD PREVIEW  
(standards.iteh.ai)**

This European Standard was approved by CENELEC on 2006-05-01. 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 two official versions (English, 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, 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: rue de Stassart 35, B - 1050 Brussels**

## Foreword

The text of the International Standard IEC 62141:2005, prepared by IEC TC 100, Audio, video and multimedia systems and equipment, was submitted to the formal vote and was approved by CENELEC as EN 62141 on 2006-05-01 without any modification.

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) 2007-05-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2009-05-01

Annex ZA has been added by CENELEC.

---

## Endorsement notice

The text of the International Standard IEC 62141:2005 was approved by CENELEC as a European Standard without any modification.

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

SIST EN 62141:2006

<https://standards.iteh.ai/catalog/standards/sist/75235717-7b06-4b4b-a52d-805f44b9a96/sist-en-62141-2006>

**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 61213	1993	Analogue audio recording on video tape - Polarity of magnetization	EN 61213	1994
IEC 61237-1	1994	Broadcast video tape recorders - Methods of measurement Part 1: Mechanical measurements	EN 61237-1	1994
ISO/IEC 14496-2	2004	Information technology - Coding of audio-visual objects Part 2: Visual	-	-
ITU-R Recommendation BT.709	2002	Parameter values for the HDTV standards for production and international programme exchange	-	-
SMPTE 12M	1999	Television - Audio and film - Time and Control - code	-	-
SMPTE 274M	2003	Television - 1920 x 1080 Scanning and Analog and Parallel Digital Interfaces for Multiple Picture Rates	-	-
SMPTE 276M	1995	Transmission of AES-EBU Digital Audio Signals Over Coaxial Cable	-	-
SMPTE 292M	1998	Bit-Serial Digital Interface for High-Definition Television Systems	-	-
SMPTE 296M	2001	Television - 1280 x 720 Progressive Image Sample Structure - Analog and Digital Representation and Analog Interface	-	-
SMPTE 299M	1997	Television - 24-Bit Digital Audio Format for HDTV Bit-Serial Interface	-	-
SMPTE 372M	2002	Television - Dual Link 292M Interface for 1920 x 1080 Picture Raster	-	-
SMPTE RP 188	1999	Transmission of Time Code and Control Code - in the Ancillary Data Space of a Digital Television Data Stream	-	-
AES3	1997	Serial transmission format for two-channel linearly represented digital audio data	-	-

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

SIST EN 62141:2006

<https://standards.iteh.ai/catalog/standards/sist/75235717-7b06-4b4b-a52d-805f44b9a96/sist-en-62141-2006>

# INTERNATIONAL STANDARD

**IEC**  
**62141**

First edition  
2005-10

---

---

**Helical-scan digital video cassette  
recording format using 12,65 mm magnetic  
tape and incorporating MPEG-4 compression –  
Type D-16 format**

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

[SIST EN 62141:2006](#)

<https://standards.iteh.ai/catalog/standards/sist/75235717-7b06-4b4b-a52d-805f44f39a96/sist-en-62141-2006>



Reference number  
IEC 62141:2005(E)

## Publication numbering

As from 1 January 1997 all IEC publications are issued with a designation in the 60000 series. For example, IEC 34-1 is now referred to as IEC 60034-1.

## Consolidated editions

The IEC is now publishing consolidated versions of its publications. For example, edition numbers 1.0, 1.1 and 1.2 refer, respectively, to the base publication, the base publication incorporating amendment 1 and the base publication incorporating amendments 1 and 2.

## Further information on IEC publications

The technical content of IEC publications is kept under constant review by the IEC, thus ensuring that the content reflects current technology. Information relating to this publication, including its validity, is available in the IEC Catalogue of publications (see below) in addition to new editions, amendments and corrigenda. Information on the subjects under consideration and work in progress undertaken by the technical committee which has prepared this publication, as well as the list of publications issued, is also available from the following:

- **IEC Web Site** ([www.iec.ch](http://www.iec.ch))
- **Catalogue of IEC publications**  
The on-line catalogue on the IEC web site ([www.iec.ch/searchpub](http://www.iec.ch/searchpub)) enables you to search by a variety of criteria including text searches, technical committees and date of publication. On-line information is also available on recently issued publications, withdrawn and replaced publications, as well as corrigenda.
- **IEC Just Published** ([standards.iteh.ai](http://standards.iteh.ai))  
This summary of recently issued publications ([www.iec.ch/online\\_news/justpub](http://www.iec.ch/online_news/justpub)) is also available by email. Please contact the Customer Service Centre (see below) for further information.  
<https://standards.iteh.ai/catalog/standards/sist/75235717-7b06-4b4b-a52d-805f44b9a96/sist-en-62141-2006>
- **Customer Service Centre**  
If you have any questions regarding this publication or need further assistance, please contact the Customer Service Centre:

Email: [custserv@iec.ch](mailto:custserv@iec.ch)  
Tel: +41 22 919 02 11  
Fax: +41 22 919 03 00



# INTERNATIONAL STANDARD

# IEC 62141

First edition  
2005-10

---

---

**Helical-scan digital video cassette  
recording format using 12,65 mm magnetic  
tape and incorporating MPEG-4 compression –  
Type D-16 format**

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

[SIST EN 62141:2006](https://standards.iteh.ai/catalog/standards/sist/75235717-7b06-4b4b-a52d-805f44f39a96/sist-en-62141-2006)

<https://standards.iteh.ai/catalog/standards/sist/75235717-7b06-4b4b-a52d-805f44f39a96/sist-en-62141-2006>

© IEC 2005 — Copyright - all rights reserved

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, 3, rue de Varembé, PO Box 131, CH-1211 Geneva 20, Switzerland  
Telephone: +41 22 919 02 11 Telefax: +41 22 919 03 00 E-mail: [inmail@iec.ch](mailto:inmail@iec.ch) Web: [www.iec.ch](http://www.iec.ch)



Commission Electrotechnique Internationale  
International Electrotechnical Commission  
Международная Электротехническая Комиссия

PRICE CODE

**XD**

*For price, see current catalogue*

## CONTENTS

FOREWORD.....	6
1 Scope.....	8
2 Normative references .....	8
3 Terms, definitions and acronyms .....	9
3.1 Terms and definitions .....	9
3.2 Acronyms .....	10
4 Environment and test conditions.....	10
4.1 Calibration tape.....	11
4.2 Record locations and dimensions .....	11
5 Tape and cassette physical specifications .....	11
5.1 Magnetic tape specifications .....	11
5.2 Cassette specifications.....	11
6 Tape record physical parameters.....	34
6.1 Input reference signal.....	34
6.2 Tape speed .....	34
6.3 Helical record physical parameters.....	34
6.4 Longitudinal record physical parameters.....	35
7 Longitudinal track signal and magnetic parameters.....	39
7.1 Longitudinal track record parameters.....	39
7.2 Control track record parameters.....	39
7.3 Time and control code track record parameters.....	40
8 Source picture and audio processing.....	41
8.1 Introduction .....	41
8.2 Input formats.....	44
8.3 Input data segmentation and shuffling .....	46
8.4 Picture data encoding.....	60
8.5 Data packing .....	63
8.6 Audio input format and data packing.....	77
9 Helical track signal parameters and magnetization .....	80
9.1 Introduction .....	80
9.2 Video data outer correction and shuffling.....	80
9.3 Audio data outer correction and shuffling.....	82
9.4 Helical track data parameters.....	86
9.5 Channel coding .....	97
9.6 Magnetization.....	97
Annex A (normative) Digital interfaces .....	98
Annex B (informative) Tape transport and scanner.....	100
Annex C (informative) Compatibility with the other digital formats using Type-L derivative cassettes .....	103

Figure 1 – Top- and side-view dimensions (S-cassette) .....	14
Figure 2 – Bottom-view dimensions (S-cassette).....	15
Figure 3 – Datum areas, supporting areas, tape guides and associated dimensions (S-cassette).....	17
Figure 4 – Reel location in the unlocked position (S-cassette) .....	17
Figure 5 – Protecting lid dimensions (S-cassette) .....	18
Figure 6 – Reel dimensions (S-cassette).....	19
Figure 7 – Reel height in the unlocked position (S-cassette).....	19
Figure 8 – Unlocking lever insertion area (S-cassette) .....	20
Figure 9 – Lid unlocking force (S-cassette) .....	22
Figure 10 – Lid opening force (S-cassette).....	22
Figure 11 – Reel spring force (S-cassette).....	22
Figure 12 – Safety plug strength (S-cassette) .....	23
Figure 13 – Extraction force (F1, F2) and friction torque (S-cassette) .....	23
Figure 14 – Top and side views (L-cassette).....	24
Figure 15 – Bottom view (L-cassette).....	25
Figure 16 – Datum areas, supporting areas and tape guides (L-cassette) .....	27
Figure 17 – Reel location in unlocked position (L-cassette).....	27
Figure 18 – Protecting lid (L-cassette) .....	28
Figure 19 – Reel dimensions (L-cassette).....	29
Figure 20 – Reel height in unlocked operation (L-cassette).....	29
Figure 21 – Unlocking lever insertion area (L-cassette).....	30
Figure 22 – Lid unlocking force (L-cassette) .....	32
Figure 23 – Lid opening force (L-cassette).....	32
Figure 24 – Reel spring force (L-cassette) .....	32
Figure 25 – Safety plug strength (L-cassette).....	33
Figure 26 – Extraction force (F1, F2) and friction torque (L-cassette).....	33
Figure 27 – Locations and dimensions of recorded tracks .....	37
Figure 28 – Locations and dimensions of tolerance zones of helical track records .....	38
Figure 29 – Recorded control code waveform .....	40
Figure 30 – Overall recording block diagram.....	41
Figure 31 – Overall playback block diagram.....	42
Figure 32 – Type D-16 encoding, one coding channel.....	43
Figure 33 – Type D-16 encoding, two coding channels .....	43
Figure 34 – 1920 × 1080/PsF 4:2:2 YC <sub>B</sub> C <sub>R</sub> shuffle blocks .....	46
Figure 35 – 1920 × 1080/PsF 4:4:4 RGB shuffle blocks .....	47
Figure 36 – 1920 × 540/I 4:2:2 YC <sub>B</sub> C <sub>R</sub> shuffle blocks.....	48
Figure 37 – 1920 × 540/I 4:4:4 RGB shuffle blocks .....	49
Figure 38 – 1280 × 720/P 4:2:2 YC <sub>B</sub> C <sub>R</sub> frame shuffle blocks.....	49
Figure 39 – 1920 × 1080/PsF 4:2:2 YC <sub>B</sub> C <sub>R</sub> shuffle sets .....	50
Figure 40 – 1920 × 1080/PsF 4:4:4 RGB shuffle sets .....	51

Figure 41 – 1920 × 1080/I 4:2:2 YC <sub>B</sub> C <sub>R</sub> shuffle sets .....	52
Figure 42 – 1920 × 1080/I 4:4:4 RGB shuffle sets .....	53
Figure 43 – 1280 × 720/P 4:2:2 YC <sub>B</sub> C <sub>R</sub> shuffle sets .....	54
Figure 44 – 1920 × 1080 4:2:2 YC <sub>B</sub> C <sub>R</sub> macro block unit number allocation .....	56
Figure 45 – 1920 × 1080 4:4:4 RGB macro block unit number allocation .....	57
Figure 46 – 1280 × 720 4:2:2 YC <sub>B</sub> C <sub>R</sub> macro block unit number allocation .....	57
Figure 47 – 1920 × 1080 ancillary data bursts .....	58
Figure 48 – 1280 × 720 ancillary data bursts .....	58
Figure 49 – Ancillary data headers .....	59
Figure 50 – Macro block encoding .....	61
Figure 51 – Basic block format .....	63
Figure 52 – Macro block identifier byte descriptions .....	64
Figure 53 – Auxiliary data time code .....	67
Figure 54 – 4:2:2 YC <sub>B</sub> C <sub>R</sub> differential DC block order .....	70
Figure 55 – 4:4:4 RGB differential DC block order .....	70
Figure 56 – 4:2:2 DCT code interleave .....	71
Figure 57 – 4:2:2 YC <sub>B</sub> C <sub>R</sub> DCT macro block interleaving example .....	72
Figure 58 – 4:4:4 DCT code interleave .....	72
Figure 59 – 4:4:4 RGB DCT macro block interleaving example .....	73
Figure 60 – 4:2:2 YC <sub>B</sub> C <sub>R</sub> DPCM code word interleave order .....	73
Figure 61 – 4:2:2 YC <sub>B</sub> C <sub>R</sub> DPCM macro block interleaving example .....	74
Figure 62 – 4:4:4 RGB DPCM code word interleave order .....	74
Figure 63 – 4:4:4 RGB DPCM macro block interleaving example .....	75
Figure 64 – 1920 × 1080 packing example .....	76
Figure 65 – 1280 × 720 packing example .....	76
Figure 66 – Start and end sample number of data recording mode .....	78
Figure 67 – Audio auxiliary data words .....	79
Figure 68 – Video data blocking .....	81
Figure 69 – Audio data blocking for each audio channel .....	83
Figure 70 – Audio sync block alignments on helical tracks .....	85
Figure 71 – General sector arrangement on helical track .....	86
Figure 72 – Sector and segment arrangement on helical track .....	88
Figure 73 – Record unit, segment, channel and track pair counts .....	89
Figure 74 – Video sync block format .....	90
Figure 75 – Audio sync block format .....	90
Figure 76 – Sync block identification bytes .....	91
Figure 77 – Sync sequence number .....	93
Figure A1 – System overview .....	98
Figure B.1 – Possible scanner configuration (29,97 Hz, 25 Hz, 24 Hz and 23,98 Hz record unit rates) .....	101
Figure B.2 – Possible longitudinal head location and tape wrap (29,97 Hz, 25 Hz, 24 Hz and 23,98 Hz record unit rates) .....	102

Table 1 – Tape speeds for each record unit rate .....	34
Table 2 – Record location and dimensions .....	36
Table 3 – Control track pulse widths .....	39
Table 4 – Data rates associated with source picture rates .....	42
Table 5 – 1920 × 1080 ancillary data line number ranges .....	44
Table 6 – 1920 × 1080 source picture rates .....	45
Table 7 – 1280 × 720 ancillary data line number ranges .....	45
Table 8 – 1280 × 720 source picture rates .....	45
Table 9 – Shuffle-set allocation .....	55
Table 10 – Pseudo-random SIZE and RANGE value .....	56
Table 11 – Ancillary line ID values .....	60
Table 12 – General coding constraints .....	61
Table 13 – Range for quantizer_scale_code .....	62
Table 14 – Coded sequence segment numbers .....	65
Table 15 – Auxiliary basic block data .....	66
Table 16 – Frame-rate flags .....	67
Table 17 – Ancillary data line numbers for 1920 × 1080 sources .....	68
Table 18 – Macro block header syntax .....	69
Table 19 – Packing size for each record unit rate .....	77
Table 20 – Sync sequence number and UL .....	94
Table A1 – Audio sampling clock ratios .....	99
Table B.1 – Parameters for a possible scanner design .....	100
Table B.2 – Data rate and recorded wavelength .....	101

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**HELICAL-SCAN DIGITAL VIDEO CASSETTE  
RECORDING FORMAT USING 12,65 mm MAGNETIC TAPE  
AND INCORPORATING MPEG-4 COMPRESSION –  
TYPE D-16 FORMAT (TA6)**

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 provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with an IEC Publication.
- 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 62141 has been prepared by IEC technical committee 100: Audio, video and multimedia systems and equipment.

The text of this standard is based on the following documents:

CDV	Report on voting
100/925/CDV	100/1004/RVC

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

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

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

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

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

## **iTeh STANDARD PREVIEW (standards.iteh.ai)**

SIST EN 62141:2006

<https://standards.iteh.ai/catalog/standards/sist/75235717-7b06-4b4b-a52d-805f44f39a96/sist-en-62141-2006>