

# INTERNATIONAL STANDARD

# IEC 62330-2

First edition  
2003-05

---

---

## Helical-scan digital video cassette recording system using 12,65 mm (0,5 in) magnetic tape – Format HD-D5 –

### Part 2: Compression format

© IEC 2003 — 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

X

*For price, see current catalogue*

## CONTENTS

FOREWORD .....	4
1 Scope .....	6
2 Normative references .....	6
3 Acronyms .....	6
4 Video processing .....	8
4.1 Overview .....	8
4.2 Video signal .....	9
4.3 Block formation .....	11
4.4 SMBG distribution .....	16
4.5 DCT .....	19
4.6 Categorization and weighting .....	20
4.7 CG shuffling .....	24
4.8 RMB shuffling .....	27
4.9 Quantization .....	29
4.10 Rate control .....	29
4.11 VLC .....	29
4.12 Packing .....	33
Annex A (normative) Overlapped block DCT coding for robustness .....	44
Figure 1 – Block diagram of outline about video processing .....	9
Figure 2 – Transmitting samples of 1 080i system .....	10
Figure 3 – Transmitting samples of 720p system .....	11
Figure 4 – Overlapped blocking of luminance (Y) pixels .....	12
Figure 5 – Overlapped blocking of colour difference $C_B/C_R$ pixels .....	13
Figure 6 – Macro block structure in 1 080i system and 720p systems .....	13
Figure 7 – Super macro block structure in 1 080i system and 720p systems .....	14
Figure 8 – Pixel arrangement for blocking of 1 080i system .....	15
Figure 9 – The arrangement of SMBs in one field for 1 080i system .....	16
Figure 10 – The arrangement of SMBs in one frame for 720p system .....	16
Figure 11 – SMBG distribution in 1 080i system .....	17
Figure 12 – SMBG distribution in 720p system .....	18
Figure 13 – The structure of DCT coefficient block .....	20
Figure 14 – CG shuffling for Y .....	25
Figure 15 – CG shuffling for C .....	26
Figure 16 – RMB shuffling .....	28
Figure 17 – The order of VLC coding .....	30
Figure 18 – Structure of C3RMB .....	34
Figure 19 – Rearrangement of VLC data codewords .....	36
Figure 20 – Data structure of one 1 080i field/720p frame .....	37
Figure 21 – Main data DIF block packing .....	42
Figure 22 – Packing the compressed data in 5 760 DIF Blocks .....	43
Figure A.1 – The process of missing coefficient reproduction .....	44

Table 1 – The construction of video signal sampling ..... 9

Table 2 – Categorization of Y signal.....21

Table 3 – Categorization of  $C_B$  signal .....21

Table 4 – Categorization of  $C_R$  signal .....21

Table 5 – Table  $CY_0(t, u)$  .....21

Table 6 – Table  $CY_1(t, u)$  .....22

Table 7 – Table  $CY_2(t, u)$  .....22

Table 8 – Table  $CY_3(t, u)$  .....22

Table 9 – Table  $CC_0(t, u)$  .....23

Table 10 – Table  $CC_1(t, u)$  .....23

Table 11 – Table  $CC_2(t, u)$  .....23

Table 12 – Codewords for variable length coding (1).....30

Table 13 – Codewords for variable length coding (2).....31

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

---

**HELICAL-SCAN DIGITAL VIDEO CASSETTE RECORDING SYSTEM  
USING 12,65 mm (0,5 in) MAGNETIC TAPE – FORMAT HD-D5 –**
**Part 2: Compression format**

## FOREWORD

- 1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the 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, the IEC publishes International Standards. 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. The 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 the 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 National Committees.
- 3) The documents produced have the form of recommendations for international use and are published in the form of standards, technical specifications, technical reports or guides and they are accepted by the National Committees in that sense.
- 4) In order to promote international unification, IEC National Committees undertake to apply IEC International Standards transparently to the maximum extent possible in their national and regional standards. Any divergence between the IEC Standard and the corresponding national or regional standard shall be clearly indicated in the latter.
- 5) The IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with one of its standards.
- 6) Attentions drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. The IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 62330-2 has been prepared by Technical Area 6: Higher data rate storage media and equipment of IEC technical committee 100: Audio, video and multimedia systems and equipment.

It was submitted to the national committees for voting under the Fast Track Procedure as the following documents:

CDV	Report on voting
100/505/CDV	100/604/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 2008. At this date, the publication will be

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

IEC 62330 consists of the following parts, under the general title *Helical-scan digital video cassette recording system using 12,65 mm (0,5 in) magnetic tape – Format HD-D5*.

Part 1: VTR specifications

Part 2: Compression format

Part 3: Data stream format

Part 1 describes the VTR specifications which are tape, magnetization, helical recording, modulation method and basic system data for high definition video compressed data on 29,97 or 59,94 frame rate.

This part 2 describes the specifications for encoding process and data format for 1080i and 720p systems.

Part 3 describes the specifications for transmission of HD-D5 compressed video and audio data stream over 360 Mb/s serial digital interface.

# HELICAL-SCAN DIGITAL VIDEO CASSETTE RECORDING SYSTEM USING 12,65 mm (0,5 in) MAGNETIC TAPE – FORMAT HD-D5 –

## Part 2 – Compression format

### 1 Scope

This part of IEC 62330 defines the encoding process of the HD-D5 video compression and its data format for the 1 080/59,94i system (hereinafter referred to as the 1 080i system) and the 720/59,94p system (hereinafter referred to as the 720p system).

### 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.

ITU-R BT.1543, *1 280 × 720, 16 × 9 progressively-captured image format for production and international programme exchange in the 60 Hz*

ITU-R BT.709, *Parameter values for the HDTV standards for production and international programme exchange*