

---

---

**Information technology — Digitally  
recorded media for information  
interchange and storage — 120 mm  
Triple Layer (100,0 Gbytes per disk)  
BD Rewritable disk**

*Technologies de l'information — Supports enregistrés  
numériquement pour échange et stockage d'information — Disques  
BD réinscriptibles de 120 mm triple couche (100,0 Go par disque)*

**ITeH STANDARD PREVIEW**  
(standards.iteh.ai/catalog/standards/sic/35be0-5ef-  
Full standard  
<https://standards.iteh.ai/catalog/standards/sic/35be0-5ef-4e60-9eea-61676366d1a2/iso-iec-30193-2020>)



**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**  
Full standard:  
<https://standards.iteh.ai/catalog/standards/sist/85b35be0-fd2f-4e60-9eea-61676366d1a2/iso-iec-30193-2020>



**COPYRIGHT PROTECTED DOCUMENT**

© ISO/IEC 2020

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office  
CP 401 • Ch. de Blandonnet 8  
CH-1214 Vernier, Geneva  
Phone: +41 22 749 01 11  
Fax: +41 22 749 09 47  
Email: [copyright@iso.org](mailto:copyright@iso.org)  
Website: [www.iso.org](http://www.iso.org)

Published in Switzerland

# Contents

	Page
Foreword .....	ix
Introduction .....	x
<b>1 Scope</b> .....	<b>1</b>
<b>2 Normative references</b> .....	<b>1</b>
<b>3 Terms and definitions</b> .....	<b>1</b>
<b>4 Symbols and abbreviated terms</b> .....	<b>6</b>
<b>5 Conformance</b> .....	<b>9</b>
5.1 Optical disk .....	9
5.2 Generating system .....	9
5.3 Receiving system .....	9
5.4 Compatibility statement .....	9
<b>6 Conventions and notations</b> .....	<b>9</b>
6.1 Levels of grouping .....	9
6.2 Representation of numbers .....	10
6.3 Integer calculus .....	11
<b>7 General description of disk</b> .....	<b>11</b>
<b>8 General requirements</b> .....	<b>12</b>
8.1 Environments .....	12
8.1.1 Test environment .....	12
8.1.2 Operating environment .....	13
8.1.3 Storage environment .....	14
8.1.4 Transportation .....	15
8.2 Safety requirements .....	15
8.3 Flammability .....	16
<b>9 Reference drive</b> .....	<b>16</b>
9.1 General .....	16
9.2 Measurement conditions .....	16
9.3 Optical system .....	16
9.4 Optical beam .....	17
9.5 HF read channel .....	18
9.6 Radial PP read channel .....	18
9.7 Disk clamping .....	18
9.8 Rotation of disk and measurement velocity .....	19
9.9 Normalized servo transfer function .....	19
9.10 Measurement velocities and reference servos for axial tracking .....	20
9.10.1 General .....	20
9.10.2 Reference servo for axial tracking for 1x measurement velocity .....	20
9.10.3 reference servo for axial tracking for 2x measurement velocity .....	21
9.11 Measurement velocities and reference servos for radial tracking .....	22
9.11.1 General .....	22
9.11.2 Reference servo for radial tracking for 1x measurement velocity .....	22
9.11.3 Reference servo for radial tracking for 2x measurement velocity .....	24
<b>10 Dimensional characteristics</b> .....	<b>25</b>
10.1 General .....	25
10.2 Disk reference planes and reference axis .....	25
10.3 Overall dimensions .....	27
10.4 First transition area .....	27
10.5 Protection ring .....	27
10.6 Clamping zone .....	27
10.7 Second transition area .....	28

10.8	Information area.....	28
10.8.1	General.....	28
10.8.2	Subdivision of information zone on TL disk.....	29
10.9	Rim area.....	30
<b>11</b>	<b>Mechanical characteristics.....</b>	<b>30</b>
11.1	Mass.....	30
11.2	Moment of inertia.....	30
11.3	Dynamic imbalance.....	30
11.4	Axial runout.....	30
11.4.1	General.....	30
11.4.2	Residual axial tracking error for 1x measurement velocity.....	31
11.4.3	Residual axial tracking error for 2x measurement velocity.....	31
11.5	Radial runout.....	31
11.5.1	General.....	31
11.5.2	Residual radial tracking error for 1x measurement velocity.....	32
11.5.3	Residual radial tracking error for 2x measurement velocity.....	32
11.6	Durability of cover layer.....	32
11.6.1	Impact resistance of cover layer.....	32
11.6.2	Scratch resistance of cover layer.....	33
11.6.3	Repulsion of fingerprints by cover layer.....	33
<b>12</b>	<b>Optical characteristics in information area.....</b>	<b>33</b>
12.1	General.....	33
12.2	Refractive index of transmission stacks (TS).....	33
12.3	Thickness of transmission stacks (TS).....	33
12.4	Example of target thickness of spacer layers for TL disks.....	34
12.5	Reflectivity of recording layers.....	35
12.6	Birefringence.....	36
12.7	Angular deviation.....	36
<b>13</b>	<b>Data format.....</b>	<b>37</b>
13.1	General.....	37
13.2	Data frame.....	40
13.3	Error-detection code (EDC).....	40
13.4	Scrambled data frame.....	41
13.5	Data block.....	42
13.6	LDC block.....	42
13.7	LDC code-words.....	43
13.8	LDC cluster.....	44
13.8.1	General.....	44
13.8.2	First interleaving step.....	44
13.8.3	Second interleaving step.....	44
13.9	Addressing and control data.....	46
13.9.1	General.....	46
13.9.2	Address units.....	46
13.9.3	User-control data.....	51
13.9.4	Byte/Bit assignment for user-control data.....	52
13.10	Access block.....	54
13.11	BIS block.....	54
13.12	BIS code-words.....	55
13.13	BIS cluster.....	56
13.14	ECC cluster.....	59
13.15	Recording frames.....	60
13.16	Physical cluster.....	61
13.17	17PP modulation for recordable data.....	61
13.17.1	General.....	61
13.17.2	Bit conversion rules.....	61
13.17.3	dc-control procedure.....	62
13.17.4	Frame sync.....	62

13.18	Modulation and NRZI conversion	64
<b>14</b>	<b>Physical data allocating and linking</b>	<b>64</b>
14.1	General	64
14.2	Recording-unit block (RUB)	64
14.2.1	General	64
14.2.2	Data run-in	65
14.2.3	Data run-out	66
14.2.4	Guard_3 field	67
14.3	Locating data relative to wobble addresses	67
14.3.1	General	67
14.3.2	Start-position shift (SPS)	67
<b>15</b>	<b>Track format</b>	<b>69</b>
15.1	General	69
15.2	Track shape	69
15.3	Track path	71
15.4	Track pitch	71
15.4.1	Track pitch in BCA zone	71
15.4.2	Track pitch in embossed HFM areas	71
15.4.3	Track pitch in rewritable areas	71
15.4.4	Track pitch between embossed HFM area and rewritable area	72
15.5	Track layout of HFM grooves	72
15.5.1	General	72
15.5.2	Data format	72
15.5.3	Addressing and control data	73
15.5.4	Recording frames	76
15.6	Track layout of wobbled grooves	78
15.6.1	General	78
15.6.2	Modulation of wobbles	79
15.6.3	Wobble polarity	80
15.7	ADIP information	80
15.7.1	General	80
15.7.2	ADIP-unit types	81
15.7.3	ADIP word structure	82
15.7.4	ADIP data structure	83
15.7.5	ADIP error correction	86
15.8	Disk information in ADIP aux frame	88
15.8.1	General	88
15.8.2	Error protection for disk information aux frames	89
15.8.3	Disk-Information data structure	90
<b>16</b>	<b>General description of information zone</b>	<b>139</b>
16.1	General	139
16.2	Format of information zone	140
<b>17</b>	<b>Layout of rewritable area of information zone</b>	<b>140</b>
<b>18</b>	<b>Inner zone</b>	<b>144</b>
18.1	General	144
18.2	Permanent information and control data (PIC) zone	148
18.2.1	General	148
18.2.2	Content of PIC zone	148
18.2.3	Emergency brake	149
18.3	Rewritable area of inner zone(s)	151
18.3.1	Protection-zone 2	151
18.3.2	Buffer	151
18.3.3	INFO 2/Reserved 8	151
18.3.4	INFO 2/Reserved 7	152
18.3.5	INFO 2/Reserved 6	152
18.3.6	INFO 2/Reserved 5	152

18.3.7	INFO 2/PAC 2	152
18.3.8	INFO 2/Reserved	152
18.3.9	INFO 2/DMA 2	152
18.3.10	INFO 2/Control data 2	152
18.3.11	INFO 2/Buffer 2	152
18.3.12	OPC/Test zone	153
18.3.13	Reserved	153
18.3.14	INFO 1/Buffer 1	153
18.3.15	INFO 1/Drive area (optional)	153
18.3.16	INFO 1/Reserved 3	154
18.3.17	INFO 1/Reserved 2	154
18.3.18	INFO 1/Reserved 1	154
18.3.19	INFO 1/DMA 1	154
18.3.20	INFO 1/Control Data 1	154
18.3.21	INFO 1/PAC 1	154
18.3.22	INFO 1/Reserved	154
<b>19</b>	<b>Data zone</b>	<b>155</b>
<b>20</b>	<b>Outer zone(s)</b>	<b>155</b>
20.1	General	155
20.2	INFO 3/Buffer 3	155
20.3	INFO 3/DMA 3	156
20.4	INFO 3/Control data 3	156
20.5	Angular buffer	156
20.6	INFO 4/DMA 4	156
20.7	INFO 4/Control data 4	156
20.8	INFO 4/Buffer 4	156
20.9	DCZ 0/Test zone, DCZ 1/Test zone and DCZ 2/Test zone	156
20.10	Protection-zone 3	156
<b>21</b>	<b>Physical-access control clusters</b>	<b>156</b>
21.1	General	156
21.2	Layout of PAC zones	157
21.3	General structure of PAC clusters	157
21.4	Primary PAC cluster (mandatory)	162
21.5	Disk write-protect PAC cluster (optional)	165
21.6	IS1 and IS2 PAC clusters	169
<b>22</b>	<b>Disk management</b>	<b>170</b>
22.1	General	170
22.2	Disk-management structure (DMS)	171
22.2.1	General	171
22.2.2	Disk-definition structure (DDS)	172
22.2.3	Defect list (DFL)	176
<b>23</b>	<b>Assignment of logical-sector numbers (LSNs)</b>	<b>181</b>
<b>24</b>	<b>Characteristics of grooved areas</b>	<b>182</b>
<b>25</b>	<b>Method of testing for grooved area</b>	<b>182</b>
25.1	General	182
25.2	Environment	182
25.3	Reference drive	182
25.3.1	General	182
25.3.2	Read power	182
25.3.3	Read channels	182
25.3.4	Tracking requirements	183
25.3.5	Scanning velocities	183
25.4	Definition of signals	183
<b>26</b>	<b>Signals from HFM grooves</b>	<b>184</b>

26.1	Push-pull polarity.....	184
26.2	Push-pull signal.....	184
26.3	Wobble signal.....	185
26.4	Jitter of HFM signal.....	185
<b>27</b>	<b>Signals from wobbled grooves.....</b>	<b>185</b>
27.1	Phase depth.....	185
27.2	Push-pull signal.....	185
27.3	Wobble signal.....	186
27.3.1	General.....	186
27.3.2	Measurement of NWS.....	186
27.3.3	Measurement of the wobble CNR.....	186
27.3.4	Measurement of harmonic distortion of wobble.....	186
<b>28</b>	<b>Characteristics of recording layer.....</b>	<b>187</b>
<b>29</b>	<b>Method of testing for recording layer.....</b>	<b>187</b>
29.1	General.....	187
29.2	Environment.....	187
29.3	Reference drive.....	187
29.3.1	General.....	187
29.3.2	Read power.....	187
29.3.3	Read channels.....	187
29.3.4	Tracking requirements.....	187
29.3.5	Scanning velocities.....	188
29.4	Write conditions.....	188
29.4.1	Write-pulse waveform.....	188
29.4.2	Write powers.....	188
29.4.3	Average power.....	189
29.4.4	Write conditions for i-MLSE measurement.....	189
29.4.5	Write conditions for cross-erase measurements.....	189
29.5	Definition of signals.....	189
<b>30</b>	<b>Signals from recorded areas.....</b>	<b>189</b>
30.1	HF signals.....	189
30.2	Modulated amplitude.....	189
30.3	Reflectivity-modulation product.....	191
30.4	Asymmetry.....	191
30.5	i-MLSE@DOW( $n$ ).....	191
30.6	Cross-erase @ DOW( $n$ ) <sub>XE</sub> .....	191
30.7	Read stability.....	192
<b>31</b>	<b>Local defects.....</b>	<b>193</b>
<b>32</b>	<b>Characteristics of user data.....</b>	<b>193</b>
<b>33</b>	<b>Method of testing for user data.....</b>	<b>193</b>
33.1	General.....	193
33.2	Environment.....	193
33.3	Reference drive.....	193
33.3.1	General.....	193
33.3.2	Read power.....	193
33.3.3	Read channels.....	193
33.3.4	Error correction.....	194
33.3.5	Tracking requirements.....	194
33.3.6	Scanning velocities.....	194
33.4	Definition of signals.....	194
<b>34</b>	<b>Minimum quality of recorded information.....</b>	<b>195</b>
34.1	General.....	195
34.2	Random symbol error rate.....	195
34.3	Maximum burst errors.....	195

34.4	User-written data.....	195
<b>35</b>	<b>Burst-cutting area (BCA).....</b>	<b>195</b>
<b>Annex A</b>	<b>(normative) Thickness of transmission stacks in case of multiple layers.....</b>	<b>197</b>
<b>Annex B</b>	<b>(normative) Measurement of reflectivity.....</b>	<b>200</b>
<b>Annex C</b>	<b>(normative) Measurement of scratch resistance of cover layer.....</b>	<b>206</b>
<b>Annex D</b>	<b>(normative) Measurement of repulsion of grime by cover layer.....</b>	<b>208</b>
<b>Annex E</b>	<b>(normative) Measurement of wobble amplitude.....</b>	<b>211</b>
<b>Annex F</b>	<b>(normative) Write-pulse waveform for testing.....</b>	<b>216</b>
<b>Annex G</b>	<b>(normative) Optimum power control (OPC) procedure for disk.....</b>	<b>223</b>
<b>Annex H</b>	<b>(normative) HF signal pre-processing for integrated-maximum likelihood sequence error estimation (i-MLSE) measurements.....</b>	<b>226</b>
<b>Annex I</b>	<b>(normative) Measurement procedures.....</b>	<b>238</b>
<b>Annex J</b>	<b>(informative) Measurement of birefringence.....</b>	<b>250</b>
<b>Annex K</b>	<b>(informative) Measurement of thickness of cover layer and spacer layer.....</b>	<b>253</b>
<b>Annex L</b>	<b>(informative) Measurement of impact resistance of cover layer.....</b>	<b>256</b>
<b>Annex M</b>	<b>(informative) Groove deviation and wobble amplitude.....</b>	<b>258</b>
<b>Annex N</b>	<b>(informative) Guidelines for write pulse adjustment using L-SEAT edge-shift.....</b>	<b>260</b>
<b>Bibliography</b>	<b>.....</b>	<b>269</b>

iTeh STANDARD PREVIEW  
 (standards.iteh.ai)  
 Full standard:  
<https://standards.iteh.ai/catalog/standards/sist/83225be0-fd2f-4e60-9eea-61676366d1a2/iso-iec-30193-2020>

## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](http://www.iso.org/directives)).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document is in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

This document was prepared by Joint Technical Committee ISO/IEC JTC 1, information *Technology*, Subcommittee SC 23, *Digitally recorded media for information interchange and storage*.

This third edition cancels and replaces the second edition (ISO/IEC 30193:2016), which has been technically revised. It also incorporates the Amendment ISO 30193:2016/DAM1.

The main changes compared to the previous edition are as follows:

- additional requirements for 4x reading velocity have been added;
- additional requirements for physical access control and reserved area of BD application have been added.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at [www.iso.org/members.html](http://www.iso.org/members.html).

## Introduction

In March 2002, nine companies known as the Blu-ray Disc Founders, or BDF, came together to create optical-disk formats with large capacity and high-speed transfer rates that would be needed for recording and reproducing high-definition video content. This joint effort turned out to be fruitful and the first version of its Blu-ray Disc™ Rewritable Format Part 1 version 1.0 in June 2002.

Then, in October 2004, more than 100 companies joined and BDF became an open forum called the Blu-ray Disc Association (BDA). The BDA issued version 2.1 of the Blu-ray Disc™ Rewritable Format Part 1 in October 2005 and version 3.0 in June 2010. By the end of 2010, over a hundred million Blu-ray Disc™ had been shipped and Blu-ray™ devices such as players, recorders, game consoles and PC drives were in use all over the world.

The BDA also conducts verification activities for both disks and devices and has established more than 10 testing centers in Asia, Europe and the USA.

The BDA gave consumer applications the highest priority in the first few years. But it was known, of course, that international standardization would be required before many government entities and their contractors would be allowed to use Blu-ray Disc™. In January and February 2011, the chairs of ISO/IEC JTC 1/SC 23 and JIIMA (Japan Image and information Management Association) formally requested the BDA to consider international standardization. The reason for this was to enable the inclusion of writable BDs along with DVDs and CDs in an International Standard specifying the test methods for the estimation of lifetime of optical storage media for long-term data storage. In October 2011, the President of the BDA responded that his organization had decided to pursue international standardization for the basic physical formats for the recordable and rewritable Blu-ray™ Formats.

In December 2011, the BDA sent project proposals for international standardization of four formats to ISO/IEC JTC 1/SC 23 via the Japanese national body. They are 120 mm single layer (25,0 Gbytes per disk) and dual layer (50,0 Gbytes per disk) BD recordable disks, 120 mm single layer (25,0 Gbytes per disk) and dual layer (50,0 Gbytes per disk) BD rewritable disks, 120 mm triple layer (100,0 Gbytes per disk) and quadruple layer (128,0 Gbytes per disk) BD recordable disks and 120 mm triple layer (100,0 Gbytes per disk) BD rewritable disk.

This document specifies the mechanical, physical and optical characteristics of a 120 mm rewritable optical disk with a capacity of 100,0 Gbytes.

A few additional specifications are required in order to write and read video-recording applications, such as BDAV format which had been specified by the BDA for use on BD rewritable disks. These specifications, which are related to the BD application, the file system or the content-protection system, are required for the disk, the generating system and the receiving system. For more information about the BD application, the content-protection system and the additional requirements for the Blu-ray™ Format specifications, see <http://www.blu-raydisc.info>.

The International Organization for Standardization (ISO) and International Electrotechnical Commission (IEC) draw attention to the fact that it is claimed that compliance with this document may involve the use of a patent.

ISO and IEC take no position concerning the evidence, validity and scope of this patent right.

The holder of this patent right has assured ISO and IEC that he/she is willing to negotiate licences under reasonable and non-discriminatory terms and conditions with applicants throughout the world. In this respect, the statement of the holder of this patent right is registered with ISO and IEC. information may be obtained from the patent database available at [www.iso.org/patents](http://www.iso.org/patents).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights other than those in the patent database. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

NOTE Blu-ray™, Blu-ray Disc™ and the logos are trademarks of the Blu-ray Disc Association.

# Information technology — Digitally recorded media for information interchange and storage — 120 mm Triple Layer (100,0 Gbytes per disk) BD Rewritable disk

## 1 Scope

This document specifies the mechanical, physical and optical characteristics of a 120 mm rewritable optical disk with a capacity of 100,0 Gbytes. It specifies the quality of the recorded and unrecorded signals, the format of the data and the recording method, thereby allowing for information interchange by means of such disks. User data can be written, read and overwritten many times using a reversible method. This disk is identified as a BD rewritable disk.

This document specifies the following:

- the one disk type;
- the conditions for conformance;
- the environments in which the disk is to be operated and stored;
- the mechanical and physical characteristics of the disk, so as to provide mechanical interchange between data processing systems;
- the format of the information on the disk, including the physical disposition of the tracks and sectors;
- the error-correcting codes and the coding method used;
- the characteristics of the signals recorded on the disk, enabling data processing systems to read data from the disk.

This document provides for interchange of disks between disk drives. Together with a standard for volume and file structure, it provides for full data interchange between data processing systems.

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

ISO 9352, *Plastics — Determination of resistance to wear by abrasive wheels*

ISO/IEC 646, *Information technology — ISO 7-bit coded character set for information interchange*

IEC 60068-2-2, *Environmental testing — Part 2-2: Tests — Test B: Dry heat*

IEC 60068-2-30, *Environmental testing — Part 2-30: Tests — Test Db: Damp heat, cyclic (12 h + 12 h cycle)*

IEC 60950-1, *Information technology equipment — Safety — Part 1: General requirements*

## 3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

### 3.1

#### **BD**

disk having a *cover layer* (3.4) around 0,1 mm thick and a *substrate* (3.43) around 1,1 mm thick on which data is read or recorded by an optical pick-up unit (OPU) using 405 nm laser diode and numerical aperture, NA = 0,85 lens

Note 1 to entry: User data recorded on a disk is formatted using 17PP modulation and an LDC+BIS Code.

### 3.2

#### **BD application**

##### **BDAP**

contents standard specified for a *BD* (3.1), for instance a video application, which requires area for a content-protection system and for its own defect-management system on the disk

### 3.3

#### **channel bit**

element by which the binary value ZERO or ONE is represented by *pits* (3.27)/*marks* (3.19) and *spaces* (3.42) on a disk

### 3.4

#### **cover layer**

transparent layer with precisely controlled optical properties that covers the *recording layer* (3.33) closest to the entrance surface of a disk

### 3.5

#### **data zone *n***

area between the inner zone and the outer zone on layer *Ln* (3.17)

### 3.6

#### **defective cluster**

cluster in a *user-data area* (3.47) that has been registered in a defect list as unreliable or uncorrectable one

### 3.7

#### **digital-sum value**

##### **DSV**

arithmetic sum obtained from a bit stream by assigning the decimal value +1 to *channel bits* (3.3) set to ONE and the decimal value -1 to channel bits set to ZERO

### 3.8

#### **disk reference plane**

plane defined by the perfect flat annular surface of an ideal spindle, onto which the clamping zone of a disk is clamped, that is normal to the axis of rotation

### 3.9

#### **embossed HFM area**

area on a disk where information has been stored by means of an *HFM groove* (3.13) during manufacturing of the disk

### 3.10

#### **entrance surface**

surface of a disk onto which the optical beam first impinges

**3.11****erased groove**

blank *groove* (3.12) on a disk that has been erased by irradiating the *track* (3.44) using only erase power level,  $P_{EO}$ , as determined by the OPC algorithm

**3.12****groove**

trench-like feature of a disk connected to a *recording layer* (3.33)

Note 1 to entry: In case of triple-layer disk, one groove can be carried by the *substrate* (3.43) and other grooves can be carried by the *spacer layer* (3.41) or the *cover layer* (3.4) (see [Figure 1](#)) grooves are used to define the *track* (3.44) locations.

In the BD rewritable system, there are 3 types of grooves:

- *wobbled groove* (3.49) in rewritable area containing address information;
- *HFM groove* (3.13) in embossed HFM area containing permanent information and control data;
- straight groove without any modulation in the BCA zone.

**3.13****high-frequency modulated groove****HFM groove**

*groove* (3.12) modulated in the radial direction with a rather high bandwidth signal

Note 1 to entry: HFM groove creates a data channel with sufficient capacity and data rate for replicated information.

**3.14****information area**

area on a disk in which information can be recorded

**3.15****information zone**

recorded part of the *information area* (3.14)

**3.16****land**

surface of a *recording layer* (3.33) between successive windings of a *groove* (3.12)

**3.17****layer  $L_n$** 

one *recording layer* (3.33) of a disk identified by  $n$

Note 1 to entry: layer  $L_{(n+1)}$  is closer to the *entrance surface* (3.10) of a disk than layer  $L_n$ .

**3.18****layer type**

identification of a disk using number of layer(s)

Note 1 to entry: In case of triple-layer disk, the layer type is TL (see [Clause 7](#)).

**3.19****mark**

feature of a *recording layer* (3.33), which can take the form of an amorphous domain in the crystalline recording stack due to recording, that can be sensed by an optical read-out system

Note 1 to entry: The pattern of marks and *spaces* (3.42) represents the data on a disk.

**3.20****mark polarity**

polarity of reflectivity change when *marks* (3.19) are recorded