# ISO/IEC 25434:2008-12 (E)

## Information technology - Data interchange on 12 0 mm and 80 mm optical disk using +R DL format - Capacity: 8,55 Gbytes and 2,66 Gbytes per side (recording speed up to 16X)

## Contents

Page


Foreword ..... viii

Introduction ..... ix

1 Scope ..... 1

2 Conformance ..... 1
2.1 Optical Disk ..... 1
2.2 Generating system ..... 1
2.3 Receiving system ..... 2
2.4 Compatibility statement ..... 2

3 Normative references ..... 2

4 Terms and definitions ..... 2

5 Conventions and notations ..... 5
5.1 Representation of numbers ..... 5
5.2 Names ..... 5

6 Abbreviated terms ..... 6

7 General description of the optical disk ..... 6

8 General Requirements ..... 7
8.1 Environments ..... 7
8.1.1 Test environment ..... 7
8.1.2 Operating environment ..... 8
8.1.3 Storage environment ..... 8
8.1.4 Transportation ..... 8
8.2 Safety requirements ..... 8
8.3 Flammability ..... 8
8.4 Light fastness ..... 8

9 Reference Drive ..... 9
9.1 Optical system ..... 9
9.2 Optical beam ..... 9
9.3 Read channel 1 ..... 10
9.4 Disk clamping ..... 10
9.5 Rotation of the disk ..... 11
9.6 Wobble channel (Read channel 2) ..... 11
9.7 Tracking channel (Read channel 2) ..... 11
9.8 Reference servo systems ..... 11
9.8.1 Normalized servo transfer function ..... 11
9.8.2 Reference Servo for Axial Tracking ..... 12
9.8.3 Reference Servo for Radial Tracking ..... 13

10 Dimensional characteristics ..... 14
10.1 Reference Planes ..... 15

10.2 Overall dimensions ..... 16
10.3 First transition area ..... 16
10.4 Second transition area ..... 17
10.5 Clamping Zone ..... 17
10.6 Third transition area ..... 17
10.7 Information Zone ..... 17
10.7.1 Sub-division of the Information Zone ..... 18
10.7.2 Track mode ..... 19
10.8 Rim area ..... 19
10.9 Remark on tolerances ..... 19
11 Mechanical characteristics ..... 19
11.1 Mass ..... 19
11.2 Moment of inertia ..... 19
11.3 Dynamic imbalance ..... 19
11.4 Axial runout ..... 19
11.4.1 Tracking requirements at the Reference velocity (CLV) ..... 20
11.4.2 Tracking requirements at 3 000 RPM (CAV) ..... 20
11.5 Radial runout ..... 20
11.5.1 Tracking requirements at the Reference velocity (CLV) ..... 20
11.5.2 Tracking requirements at 3 000 RPM (CAV) ..... 21
12 Optical characteristics in the Information Zone ..... 21
12.1 Index of refraction ..... 21
12.2 Thickness of the substrate ..... 22
12.3 Reflectivity ..... 22
12.4 Birefringence ..... 22
12.5 Angular deviation ..... 22
13 Data format ..... 24
13.1 Data Frames ..... 24
13.1.1 Identification Data (ID) ..... 24
13.1.2 ID Error Detection Code (IED) ..... 25
13.1.3 RSV ..... 26
13.1.4 Error Detection Code (EDC) ..... 26
13.2 Scrambled Frames ..... 26
13.3 ECC Blocks ..... 27
13.4 Recording Frames ..... 28
13.5 Modulation and NRZI conversion ..... 29
13.6 Physical Sectors ..... 30
13.7 Layout of a Recording UNit (RUN) ..... 31
13.7.1 Recording Unit position ..... 32
13.8 d.c. component suppression control ..... 32
14 Track format ..... 33
14.1 Track shape ..... 33
14.2 Track path ..... 34
14.3 Track pitch ..... 34
14.4 Track layout ..... 34
14.4.1 ADIP information ..... 34
14.4.2 Physical format information in ADIP ..... 37
15 General description of the Information Zone ..... 66
16 Layout of the Information Zone of a Single-session disk ..... 67
16.1 Usage of the Data Zone ..... 68
16.1.1 Additional Testing Zone on Layer 1 (optional) ..... 69
16.2 Physical Sector Numbers (PSNs) ..... 70
17 Inner Drive Areas ..... 71
17.1 Initial Zone / Final Zone ..... 71
17.2 Inner Disk Test Zones ..... 72
17.3 Count Zone Run-in / Dummy Zone ..... 72
17.4 Inner Disk Count Zones ..... 72
17.5 Inner Disk Administration Zone ..... 72
17.6 Table of Contents (TOC) Zone ..... 73
17.6.1 Table of Contents Blocks ..... 73
17.6.2 Recorded Area Indicators (optional) ..... 77
18 Lead-in Zone ..... 78

18.1 Guard Zone 1 ..... 79
18.2 Reserved Zone 1 ..... 79
18.3 Reserved Zone 2 ..... 79
18.4 Inner Disk Identification Zone ..... 79
18.5 Reserved Zone 3 ..... 79
18.6 Reference Code Zone ..... 80
18.7 Buffer Zone 1 ..... 80
18.8 Control Data Zone ..... 80
18.8.1 Physical format information ..... 80
18.8.2 Disk manufacturing information ..... 83
18.8.3 Content provider information ..... 83
18.9 Buffer Zone 2 ..... 83
19 Data Zone ..... 83

20 Middle Zones ..... 83
20.1 Buffer Zones 3 ..... 85
20.2 Reserved Zones ..... 85
20.3 Guard Zones 2 ..... 85
21 Outer Drive Areas ..... 85
21.1 Outer Disk Administration Zones ..... 85
21.2 Outer Disk Count Zones ..... 86
21.3 Dummy Zone / Count Zone Run-in ..... 87
21.4 Outer Disk Test Zone ..... 87
21.5 Guard Zones 3 ..... 87
22 Lead-out Zone ..... 87
22.1 Lead-out Zone at finalization ..... 87
22.2 Lead-out Zone at closing of first Session ..... 88
23 Multi-session Layout ..... 89
23.1 Intro ..... 90
23.1.1 Buffer Zone A ..... 90
23.1.2 Inner Session Identification Zone ..... 90
23.1.3 Session Control Data Zone ..... 90
23.1.4 Buffer Zone B ..... 90
23.2 Data Zone ..... 90
23.3 Closure ..... 90
23.3.1 Buffer Zone C ..... 90
23.3.2 Outer Session Identification Zone ..... 90
24 Sequential recording in Fragments ..... 91
24.1 Opening a Session ..... 91
24.1.1 Incomplete Fragment ..... 91
24.1.2 Reserved Fragments ..... 91
24.1.3 Recording User Data in Fragments ..... 92
24.1.4 Closing a Fragment ..... 92
24.2 Closing a Session ..... 93
24.2.1 Lead-in/Intro Zone ..... 93
24.2.2 Closure Zone ..... 94
24.3 Finalizing the disk ..... 94
25 Assignment of Logical Sector Numbers (LSNs) ..... 94
26 Disk Control Blocks ..... 94
26.1 General format of Disk Control Blocks ..... 94
26.2 Format of the Session DCB (SDCB) ..... 96
26.2.1 Session Items ..... 98
27 General ..... 100
28 Method of testing ..... 100
28.1 Environment ..... 100
28.2 Reference Drive ..... 100
28.2.1 Optics and mechanics ..... 100
28.2.2 Read power ..... 101
28.2.3 Read channels ..... 101
28.2.4 Tracking ..... 101
28.3 Definition of signals ..... 101
29 Characteristics of the groove signals ..... 102

29.1 Phase depth ..... 102
29.2 Push-pull signal ..... 102
29.3 Track Cross signal ..... 102
29.4 Normalized wobble signal ..... 102
29.5 Characteristics of the wobble ..... 103

30 Method of testing ..... 103
30.1 Environment ..... 103
30.2 Reference Drive ..... 103
30.2.1 Optics and mechanics ..... 103
30.2.2 Read power ..... 103
30.2.3 Read channels ..... 104
30.2.4 Tracking ..... 104
30.2.5 Scanning velocity ..... 104
30.3 Write conditions ..... 104
30.3.1 Write pulse waveform ..... 104
30.3.2 Write power ..... 105
30.3.3 Write power dependency on wavelength ..... 105
30.3.4 Write power window ..... 106
30.3.5 Write power shift for layer L1 due to recording on layer L0 ..... 107
30.4 Measurement conditions ..... 107
31 Characteristics of the recorded signals ..... 107
31.1 Channel bit length ..... 107
31.2 Definition of signals ..... 107
31.2.1 High frequency signals (HF) ..... 107
31.2.2 Modulated amplitude ..... 108
31.2.3 Signal asymmetry ..... 108
31.2.4 Normalized Slicing Level jump ..... 108
31.2.5 Jitter ..... 109
31.2.6 Track Cross signal ..... 109
31.3 Read stability ..... 109
32 Additional testing conditions ..... 109
32.1 Test environment ..... 109
32.1.1 Optics ..... 109
32.2 Definition of signals ..... 110
32.2.1 Modulated amplitude ..... 110
32.2.2 Signal asymmetry ..... 110
32.2.3 Jitter ..... 110
32.2.4 Track Cross signal ..... 110
32.2.5 Differential phase tracking error signal ..... 111
32.2.6 Tangential push-pull signal ..... 112
33 Quality of the recording layer ..... 112
33.1 Defects ..... 112
33.2 Data errors ..... 112
34 Method of testing ..... 113
34.1 Environment ..... 113
34.2 Reference Drive ..... 113
34.2.1 Optics and mechanics ..... 113
34.2.2 Read power ..... 113
34.2.3 Read channels ..... 113
34.2.4 Error correction ..... 114
34.2.5 Tracking ..... 114
35 Minimum quality of a Recording Unit ..... 114
35.1 Tracking ..... 114
35.2 User-written data ..... 114

Annex A (normative) 80 mm +R DL disk ..... 115

Annex B (normative) Structure for Extended format information in the Data Zone ..... 119

Annex C (normative) Measurement of light reflectivity ..... 122

**Annex D (normative) Measurement of birefringence ..... 124**

**Annex E (normative) Measuring conditions for operation signals ..... 127**

**Annex F (normative) Measurement of the differential phase tracking error ..... 130**

**Annex G (normative) The write pulse wave form for testing ..... 134**

**Annex H (normative) 8-to-16 Modulation ..... 140**

**Annex I (normative) Optimum Power Control and Recording Conditions ..... 148**

**Annex J (informative) Running OPC ..... 151**

**Annex K (informative) Wavelength dependency ..... 152**

**Annex L (informative) Explanation about the usage of the reference servos ..... 157**

**Annex M (informative) Measurement of the groove wobble amplitude ..... 167**

**Annex N (informative) Light fastness of the disk ..... 169**

**Annex O (informative) Transportation ..... 170**

**Annex P (informative) Video Content Protection System ..... 171**

**Annex Q (informative) How to use the Physical format information in ADIP ..... 172**

**Annex R (informative) Values to be Implemented in Existing and Future Specifications ..... 174**

**Bibliography ..... 177**