

ISO/IEC 14763-2:2012-02 (E)

Information technology - Implementation and operation of customer premises cabling - Part 2: Planning and installation

| Contents | Page |
|---|-------------|
| FOREWORD..... | 8 |
| INTRODUCTION..... | 10 |
| 1 Scope..... | 13 |
| 2 Normative references | 14 |
| 3 Terms, definitions and abbreviations | 15 |
| 3.1 Terms and definitions | 15 |
| 3.2 Abbreviations | 21 |
| 3.3 Conventions | 22 |
| 4 Conformance..... | 22 |
| 5 Specification of installations | 23 |
| 5.1 General | 23 |
| 5.2 Installation specification | 23 |
| 5.2.1 Requirements | 23 |
| 5.2.2 Recommendations | 25 |
| 5.3 Technical specification | 25 |
| 5.3.1 General | 25 |
| 5.3.2 Safety requirements | 26 |
| 5.3.3 Security requirements..... | 26 |
| 5.3.4 Performance and configuration – Requirements..... | 26 |
| 5.3.5 Environmental conditions..... | 27 |
| 5.4 Scope of work | 27 |
| 5.4.1 Pre-installation | 27 |
| 5.4.2 Installation..... | 28 |
| 5.4.3 Post-installation..... | 29 |
| 5.5 Quality assurance | 29 |
| 6 Quality planning | 30 |
| 6.1 Quality plan | 30 |
| 6.2 Sampling | 31 |
| 6.2.1 Balanced cabling | 31 |
| 6.2.2 Optical fibre cabling..... | 33 |
| 6.3 Treatment of marginal results | 34 |
| 6.3.1 Balanced cabling | 34 |
| 6.3.2 Optical fibre cabling..... | 34 |
| 6.4 Treatment of non-compliant results | 35 |
| 6.5 Change control..... | 35 |
| 7 Installation planning | 35 |
| 7.1 General | 35 |
| 7.2 Safety | 35 |
| 7.2.1 General | 35 |
| 7.2.2 Mains power cabling..... | 35 |
| 7.2.3 Optical fibre cabling..... | 35 |
| 7.3 Environment..... | 36 |
| 7.4 Points of electrical contact..... | 36 |
| 7.5 External service provision | 36 |
| 7.5.1 Requirements | 36 |

| | | |
|--------|---|----|
| 7.5.2 | Recommendations | 36 |
| 7.6 | Pathways and pathway systems | 36 |
| 7.6.1 | General | 36 |
| 7.6.2 | Inside buildings | 39 |
| 7.6.3 | Outside buildings..... | 42 |
| 7.7 | Spaces | 46 |
| 7.7.1 | Requirements | 46 |
| 7.7.2 | Recommendations | 48 |
| 7.8 | Functional elements | 50 |
| 7.8.1 | Requirements | 50 |
| 7.8.2 | Recommendations | 51 |
| 7.9 | Segregation of information technology cabling and mains power cabling | 52 |
| 7.9.1 | General | 52 |
| 7.9.2 | Requirements | 53 |
| 7.9.3 | Recommendations | 59 |
| 7.10 | Cabling – Requirements | 59 |
| 7.10.1 | General | 59 |
| 7.10.2 | Unscreened cabling | 59 |
| 7.10.3 | Screened cabling..... | 60 |
| 7.10.4 | Optical fibre cabling..... | 60 |
| 8 | Installation practices..... | 60 |
| 8.1 | General | 60 |
| 8.2 | Safety | 60 |
| 8.2.1 | General | 60 |
| 8.2.2 | Mains power cabling | 60 |
| 8.2.3 | Functional bonding | 60 |
| 8.2.4 | Optical fibre cabling..... | 60 |
| 8.2.5 | Guards and signs | 61 |
| 8.2.6 | Enclosed spaces | 61 |
| 8.2.7 | Maintenance holes | 61 |
| 8.2.8 | Closures | 61 |
| 8.3 | Environment..... | 61 |
| 8.3.1 | Storage | 61 |
| 8.3.2 | Installation – Requirements | 61 |
| 8.4 | Component inspection and testing – Requirements | 61 |
| 8.5 | Pathways | 62 |
| 8.5.1 | Requirements | 62 |
| 8.5.2 | Inside buildings – Requirements | 62 |
| 8.5.3 | Outside buildings..... | 62 |
| 8.6 | Spaces..... | 63 |
| 8.6.1 | Requirements | 63 |
| 8.6.2 | Entrance facilities | 63 |
| 8.6.3 | Rooms and enclosures intended to contain distributors | 63 |
| 8.6.4 | Cabinets, frames and racks | 63 |
| 8.6.5 | Closures | 63 |
| 8.6.6 | Outlets | 63 |
| 8.7 | Pathway system installation..... | 63 |
| 8.7.1 | General | 63 |
| 8.7.2 | Inside buildings | 64 |

| | | |
|--------|---|----|
| 8.7.3 | Outside buildings..... | 64 |
| 8.8 | Closure installation..... | 64 |
| 8.9 | Cable installation..... | 65 |
| 8.9.1 | Cable installation within pathway systems | 65 |
| 8.9.2 | General | 65 |
| 8.9.3 | Inside buildings | 66 |
| 8.9.4 | Cable installation in maintenance holes | 66 |
| 8.9.5 | Cable installation within closures – Requirements | 67 |
| 8.10 | Jointing and terminating of cables | 67 |
| 8.10.1 | Requirements | 67 |
| 8.10.2 | Balanced cabling | 68 |
| 8.10.3 | Screened balanced cabling..... | 68 |
| 8.10.4 | Optical fibre cabling..... | 68 |
| 8.11 | Cords and jumpers | 68 |
| 8.12 | Surge protective devices | 68 |
| 8.13 | Acceptance | 68 |
| 8.13.1 | Inspection..... | 68 |
| 8.13.2 | Testing | 69 |
| 9 | Documentation and administration..... | 69 |
| 9.1 | Symbols and preparation of documents | 69 |
| 9.2 | Administration | 69 |
| 9.2.1 | General | 69 |
| 9.2.2 | Administration system | 70 |
| 9.2.3 | Identifiers – Requirements..... | 72 |
| 9.2.4 | Component labelling | 72 |
| 9.2.5 | Records..... | 75 |
| 9.2.6 | Cable administration system..... | 79 |
| 9.2.7 | Reports | 82 |
| 10 | Testing | 82 |
| 10.1 | General | 82 |
| 10.1.1 | Links and permanent links | 82 |
| 10.1.2 | Channels | 83 |
| 10.1.3 | Cabling interface adaptors..... | 84 |
| 10.1.4 | Calibration..... | 84 |
| 10.1.5 | Equipment protection..... | 84 |
| 10.1.6 | Measurement conditions..... | 84 |
| 10.2 | Test procedures for balanced cabling | 85 |
| 10.2.1 | General | 85 |
| 10.2.2 | Measurement of length-related parameters..... | 85 |
| 10.2.3 | Treatment of marginal test results | 85 |
| 10.2.4 | Treatment of unacceptable test results | 85 |
| 10.2.5 | Test result format | 85 |
| 10.2.6 | Test result documentation | 86 |
| 10.3 | Test procedures for optical fibre cabling | 86 |
| 10.3.1 | General | 86 |
| 10.3.2 | Treatment of unacceptable test results | 86 |
| 10.3.3 | Test result documentation | 87 |
| 11 | Inspection..... | 87 |
| 11.1 | General | 87 |

| | | |
|--------|---|-----|
| 11.2 | Inspection Level 1 | 87 |
| 11.3 | Inspection Level 2 | 88 |
| 11.4 | Inspection Level 3 | 88 |
| 11.5 | Inspection documentation – Requirements | 88 |
| 12 | Operation | 89 |
| 12.1 | Standard operating procedure | 89 |
| 12.1.1 | Requirements | 89 |
| 12.1.2 | Recommendations | 89 |
| 12.2 | Cords and jumpers | 89 |
| 12.3 | Optical fibre adaptors | 89 |
| 13 | Maintenance..... | 89 |
| 13.1 | Approaches to maintenance | 89 |
| 13.1.1 | General | 89 |
| 13.1.2 | Requirements | 90 |
| 13.2 | Maintenance procedures | 90 |
| 13.2.1 | Requirements | 90 |
| 13.2.2 | Recommendations | 90 |
| 14 | Repair | 91 |
| | Annex A (normative) Optical fibre polarity maintenance: connecting hardware for multiple optical fibres | 92 |
| | Annex B (normative) Common infrastructures within multi-tenant premises..... | 101 |
| | Annex C (normative) Cabling in accordance with ISO/IEC 11801 | 109 |
| | Annex D (normative) Cabling in accordance with ISO/IEC 15018 | 116 |
| | Annex E (normative) Cabling in accordance with ISO/IEC 24764 | 122 |
| | Annex F (normative) Cabling in accordance with ISO/IEC 24702 | 135 |
| | Annex G (normative) Cabling in accordance with ISO/IEC TR 24704 | 138 |
| | Bibliography..... | 139 |
| | Figure 1 – Schematic relationship between ISO/IEC 14763-2 and other relevant standards..... | 12 |
| | Figure 2 – Quality assurance schematic..... | 23 |
| | Figure 3 – Example of conformant and non-conformant bend radius management | 40 |
| | Figure 4 – Example of use of curved corners in pathway systems | 42 |
| | Figure 5 – Example of cabling installations outside buildings | 43 |
| | Figure 6 – Dimensions of rooms intended to contain distributors..... | 50 |
| | Figure 7 – Process of determining cable separation | 54 |
| | Figure 8 – Flowchart for cable separation calculation..... | 57 |
| | Figure 9 – Separation of mains power and information technology cables without dividers..... | 58 |
| | Figure 10 – Separation of mains power and information technology cables with dividers..... | 58 |
| | Figure 11 – Examples of cord and jumper labelling | 74 |
| | Figure 12 – Cable administration database and possible linkages..... | 80 |
| | Figure 13 – Basic cabling administration | 80 |
| | Figure 14 – Examples of cabling permanent links | 83 |
| | Figure 15 – Reference planes for link and channels (point-to-point)..... | 83 |
| | Figure 16 – Example of a cabling channel..... | 84 |

| | |
|---|-----|
| Figure A.1 – Duplex connecting hardware plug | 93 |
| Figure A.2 – Duplex connecting adapter | 93 |
| Figure A.3 – Duplex patch cord..... | 93 |
| Figure A.4 – Views of crossover patch cords..... | 94 |
| Figure A.5 – Optical fibre sequences and adapter orientation in patch panel for the symmetrical position method..... | 95 |
| Figure A.6 – Optical fibre sequences and adapter orientation in patch panel for the reverse-pair position method..... | 95 |
| Figure A.7 – Array connector cable or patch cord (key-up to key-up) | 97 |
| Figure A.8 – Array adapter with aligned keyways | 97 |
| Figure A.9 – Transition assembly..... | 98 |
| Figure A.10 – Connectivity method for duplex signals | 99 |
| Figure A.11 – Connectivity method for parallel optics channels..... | 100 |
| Figure B.1 – Example of common pathways and spaces in a multi-tenant building | 102 |
| Figure B.2 – Example of a campus entrance facility | 104 |
| Figure B.3 – Example 1: Common equipment room..... | 106 |
| Figure B.4 – Example 1: Common telecommunications room | 107 |
| Figure B.5 – Example 2: Common telecommunications room | 107 |
| Figure C.1 – Connection of functional elements providing redundancy | 110 |
| Figure E.1 – Connection of functional elements providing redundancy | 123 |
| Figure E.2 – Example of layered cable trays with smaller width upper trays | 126 |
| Figure E.3 – Example of uncovered (accessible) row of floor tiles to provide access to lower tray..... | 127 |
| Figure E.4 – Dimensions of rooms intended to contain distributors | 129 |
| Figure E.5 – Example of "hot" aisles, "cold" aisles and cable pathway locations | 131 |
| | |
| Table 1 – Installed balanced cabling test parameters | 31 |
| Table 2 – Minimum sample sizes for alien (exogenous) crosstalk testing | 33 |
| Table 3 – Installed optical fibre cabling test parameters | 33 |
| Table 4 – Examples of pathway systems..... | 37 |
| Table 5 – Stacking height for non-continuous and interval support pathway systems | 41 |
| Table 6 – Design and planning of pathways outside buildings | 43 |
| Table 7 – Separation recommendations between metallic information technology cabling and specific EMI sources | 53 |
| Table 8 – Classification of information technology cables | 55 |
| Table 9 – Minimum separation S..... | 55 |
| Table 10 – Power cabling factor P | 56 |
| Table 11 – Level of installation complexity | 70 |
| Table 12 – Level of operational complexity | 70 |
| Table 13 – Minimum requirements of administration systems..... | 71 |
| Table 14 – Minimum requirements of operational administration systems | 72 |
| Table 15 – Labelling requirements | 73 |
| Table 16 – Labelling recommendations (additional)..... | 74 |
| Table 17 – Infrastructure records for spaces, cabinets, racks, frames and closures | 76 |

| | |
|--|-----|
| Table 18 – Infrastructure records for cables and termination points | 77 |
| Table 19 – Infrastructure records | 78 |
| Table 20 – Infrastructure records for pathways and premises..... | 79 |
| Table 21 – Recommendations of installation administration systems..... | 81 |
| Table 22 – Recommendations of operational administration systems | 81 |
| Table A.1 – Optical fibre colour code scheme of IEC 60794-2..... | 92 |
| Table B.1 – Summary of common spaces used to service a multi-tenant building..... | 102 |
| Table D.1 – Minimum requirements for dimensions of primary distribution spaces | 118 |
| Table D.2 – Requirements for dimensions of secondary distribution spaces..... | 119 |
| Table D.3 – Minimum dimensions of spaces allocated to junction boxes | 120 |
| Table D.4 – Recommendations for dimensions of primary distribution spaces | 120 |
| Table D.5 – Recommendations for dimensions of secondary distribution spaces..... | 121 |
| Table E.1 – Environmental requirements for data centres | 124 |
| Table F.1 – Risk elements for consideration in determining an appropriate maintenance approach..... | 137 |