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INTERNATIONAL STANDARD

AMENDMENT 1

Information technology – Generic cabling systems for data centres

ISO/IEC 24764:2010-04/AMD1:2014-04(en)

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Information technology – Generic cabling systems for data centres

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FOREWORD

Amendment 1 to International Standard ISO/IEC 24764 was prepared by subcommittee 25: Interconnection of information technology equipment, of ISO/IEC joint technical committee 1: Information technology.

This International Standard has been approved by vote of the member bodies, and the voting results may be obtained from the address given on the second title page.

Add, to the table of contents, the following new entries:

CONTENTS

Add, at the end of the existing introduction, after Figure 1, the following text:

INTRODUCTION to Amendment 1

Amendment 1 of ISO/IEC 24764:2010 provides an introduction to the intermediate cabling subsystem and an explanatory annex for the combination of several permanent links to form a single transmission channel.

2 Normative references

Add, in the list of normative references, after reference ISO/IEC 11801, the following reference:

ISO/IEC 14763-2, *Information technology – Implementation and operation of customer premises cabling – Part 2: Planning and installation*

3.1 Terms and definitions

Add, at the end of this subclause, the following new definitions:

3.1.13
equipment cord
cord connecting equipment to the equipment interfaces of generic cabling

3.1.14
equipment outlet
fixed connecting device for terminating the zone distribution cabling and providing the interface to the equipment cord

3.1.15
intermediate distribution cable
cable connecting the intermediate distributor to the zone distributor

3.1.16
intermediate distributor
distributor used to make connections between the main distribution cabling subsystem, intermediate distribution cabling subsystem, network access cabling subsystem and cabling subsystems specified in ISO/IEC 11801 and active equipment

3.2 Abbreviations

Add, after the entry EO Equipment Outlet, the following new abbreviation:

ID Intermediate Distributor
ILD Insertion Loss Deviation

5 Structure of the generic cabling system

5.2 Functional elements

Add, after item i), the following new NOTE:

NOTE This standard includes additional functional elements, the intermediate distributor and the intermediate distribution cable. The requirements for these functional elements are defined in Annex C.

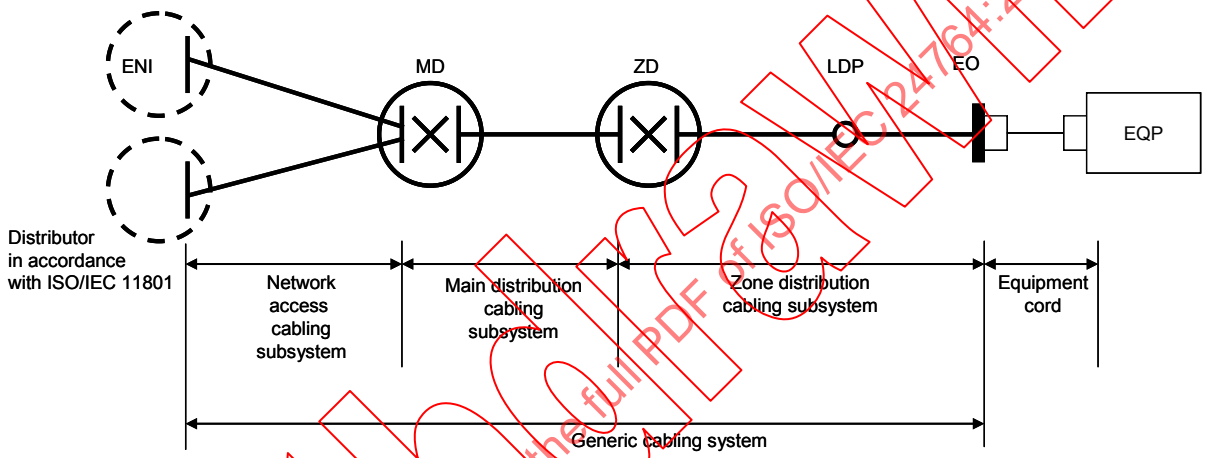
5.3 General structure and hierarchy

Replace the entire third paragraph by the following new paragraph and NOTE:

The functions of multiple distributors may be combined, see 5.7.1.

NOTE This standard includes an additional cabling subsystem: the intermediate cabling subsystem. The requirements for this additional cabling subsystem and the modifications to the cabling subsystems of this clause are defined in Annex C.

Replace the existing Figure 2 by the following Figure:



5.6 Interfaces

5.6.2 Channels and links

Replace the existing second and third paragraphs by the following:

The channel is the transmission path between data centre equipment such as switches and servers (EQP in Figure 5). A typical channel in a data centre would consist of the zone distribution cabling subsystem together with an equipment cord at each end. For longer reach services, the channel would be formed by the connection of two or more subsystems (including patch cords and equipment cords), see Annex D. The performance of the channel excludes the connections at the application-specific equipment.

The permanent link is the transmission path of the fixed cabling subsystem, including the connecting hardware at the ends of the installed cable. In a data centre zone distribution cabling subsystem, the permanent link consists of the EO, an optional LDP cable, an optional LDP, the zone distribution cable and the termination of the zone distribution cable at the zone distributor. The permanent link includes the connections at the ends of the installed cabling.

6 Channel performance

6.1 General

Replace the third paragraph including bulleted list by:

Channels are implemented using either:

- network access cabling only;
- main distribution cabling only;
- zone distribution cabling only;
- a combination of the above, see Annex D.

Add, after Annex B, the following new Annexes C and D, and move the existing Bibliography after these new Annexes:

Annex C
(normative)

Intermediate distribution cabling subsystem

C.1 General

Depending on the size and/or complexity of the data centres, it may require an additional subsystem in order to allow for the connection of several zone distributors. In such cases, the main distributor connects several intermediate distributors, each of which acts as local main distributors.

This annex will describe the additional requirements that are required for such implementations.

C.2 General structure and hierarchy

C.2.1 General

The cabling subsystems are connected together to create a generic cabling system with a structure as shown in Figure C.1. The composition of the cabling subsystems is described in 5.4.2, 5.4.3 and 5.4.4. The functional elements of the cabling subsystems are connected to form a basic hierarchical topology as shown in Figure C.2.

Network access cabling subsystems may be connected directly to the intermediate distributor. Cabling subsystems, as specified in ISO/IEC 11801, may also be connected directly to the intermediate distributor.

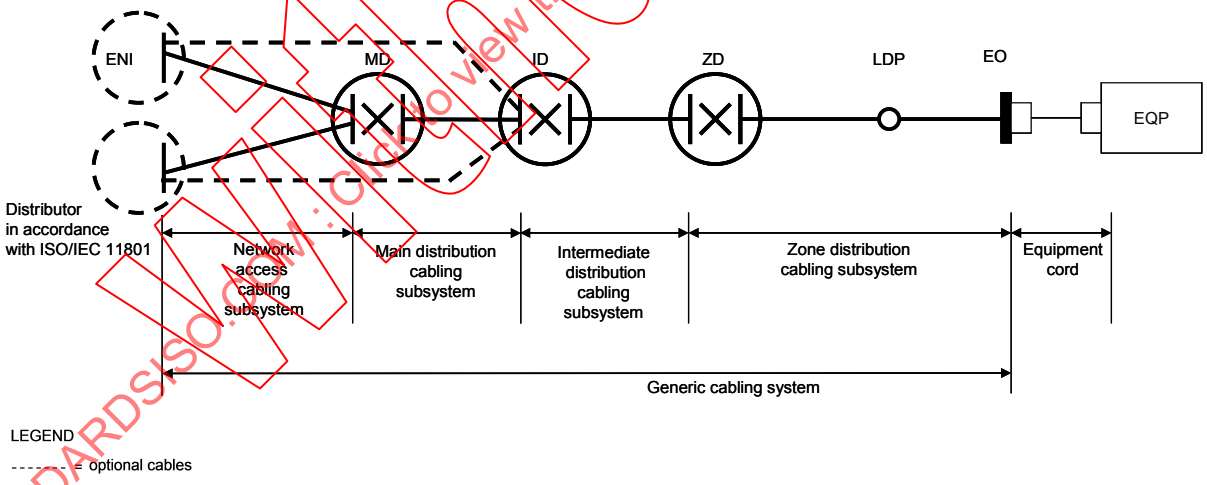


Figure C.1 – Structure of generic cabling within a data centre

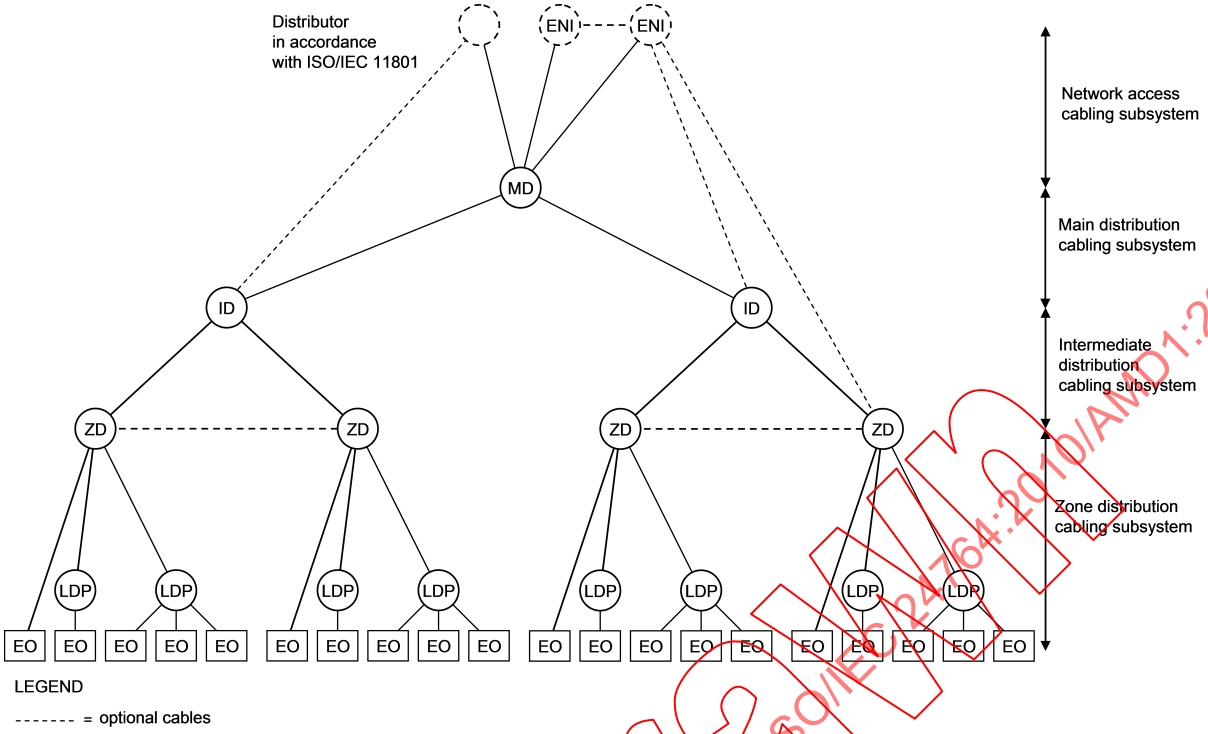


Figure C.2 – Hierarchical structure of generic cabling within a data centre

C.3 Cabling subsystems

C.3.1 Main distribution cabling subsystem

The main distribution cabling subsystem extends from an MD to the ID(s) connected to it. The subsystem includes:

a) the main distribution cables;

b) the mechanical termination of the main distribution cables at the MD together with associated patch cords and/or jumpers at the MD;

c) the mechanical termination of the main distribution cables at the ID(s).

C.3.2 Intermediate distribution cabling subsystem

The intermediate distribution cabling subsystem extends from an ID to the ZD(s) connected to it.

The subsystem includes:

a) the intermediate distribution cables;

b) the mechanical termination of the intermediate distribution cables at the ID together with associated patch cords and/or jumpers at the ID;

c) the mechanical termination of the intermediate distribution cables at the ZD(s).

C.3.3 Redundancy

Consideration should be given to the resilience of the data centre with respect to the cabling infrastructure. This may be enhanced by the provision of redundant distributors, cabling, and pathways.

In certain circumstances, for example for security or reliability reasons, redundancy may be built into a cabling design. Figure C.3 shows one of many possible examples of the connection of functional elements within the structured framework to provide such protection against failure in one or more parts of the cabling infrastructure. This could form the basis for the design of generic cabling for a data centre, providing some protection against such hazards as fire damage or the failure of an external network.

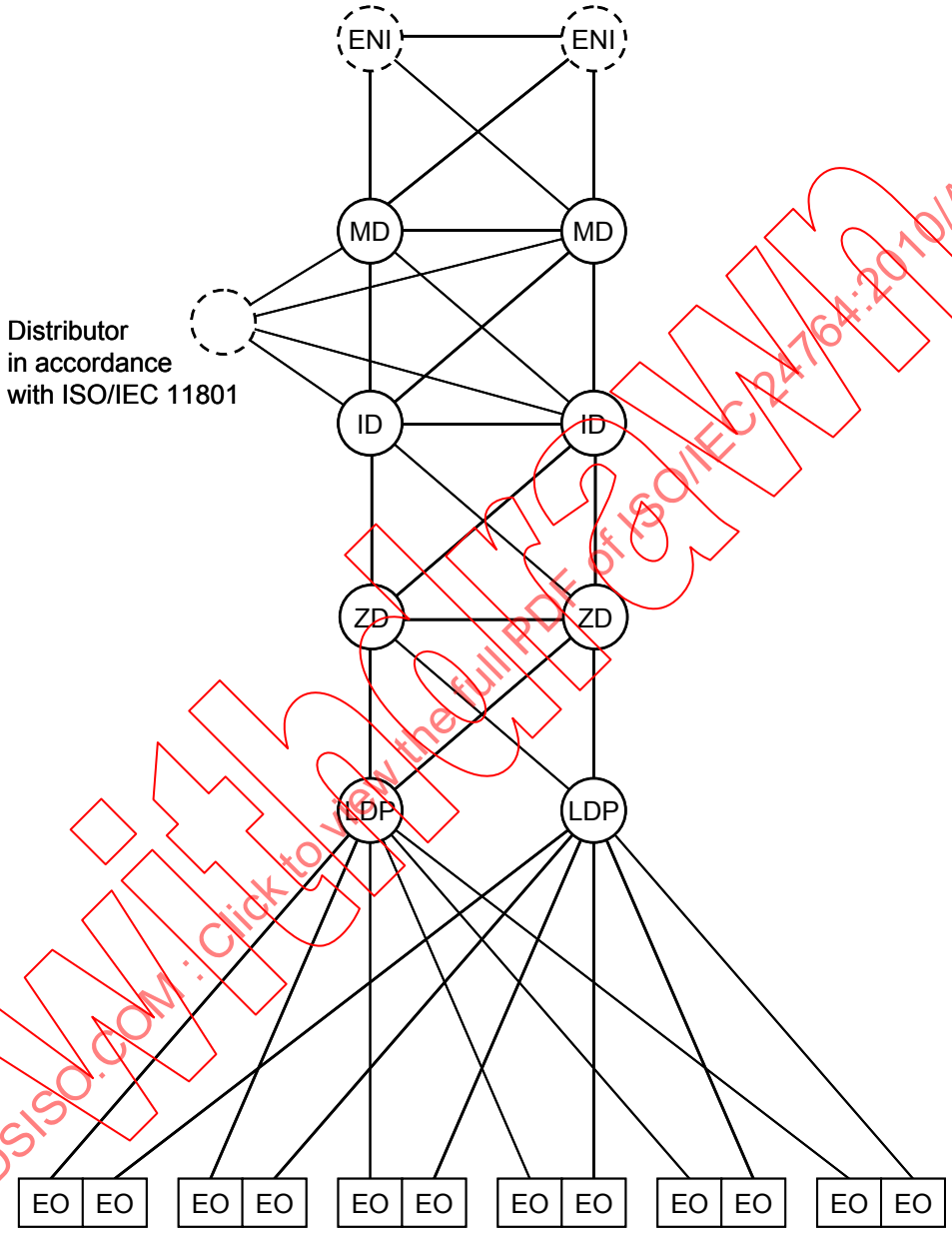


Figure C.3 – Connection of functional elements providing redundancy

C.4 Transmission performance

C.4.1 Balanced cabling

The intermediate distribution cabling shall be designed to provide a minimum of Class E_A channel performance as specified in ISO/IEC 11801.

C.4.2 Optical fibre cabling

Optical fibre cabling shall be designed using the optical fibre cables specified in Clause 8. Where multimode optical fibre is used, the intermediate distribution cabling shall provide channel performance as specified in ISO/IEC 11801 using a minimum of Category OM3 cabled optical fibre and optical connecting hardware, as specified in 9.3.

C.5 Reference implementations

C.5.1 Main distribution cabling

C.5.1.1 Component choice

The selection of balanced cabling components will be determined by the Class of applications to be supported by the cabling. Refer to Annex F of ISO/IEC 11801:2002/Amendment 2:2010 for guidance.

Using the models of C.5.1.2:

- Category 6_A components provide Class E_A balanced cabling performance;
- Category 7 components provide Class F balanced cabling performance;
- Category 7_A components provide Class F_A balanced cabling performance.

C.5.1.2 Dimensions

The connection of application-specific equipment to the main distribution cabling at the MD and IDs adopts either an interconnect or cross-connect approach (see ISO/IEC 11801). The channel includes patch cords and equipment cords. For the purposes of this subclause, jumpers used in place of patch cords are treated as cords.

Figure C.4 shows the model used to correlate main distribution cabling dimensions specified in this clause with the channel specifications in Clause 5. Figure C.4 shows the full configuration for the main distribution channel.

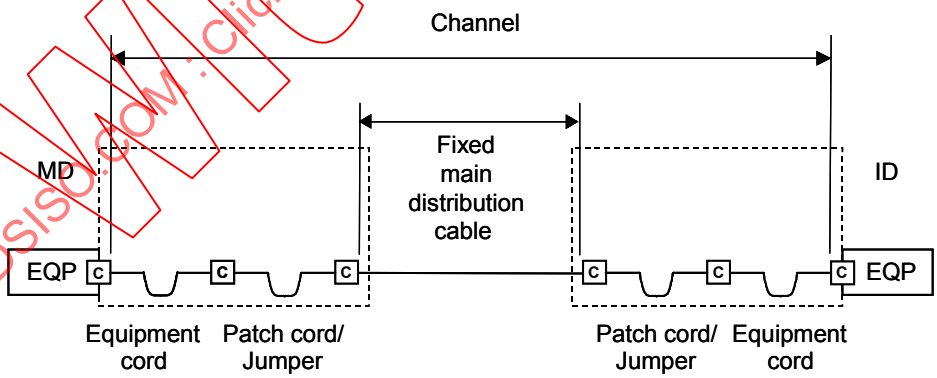


Figure C.4 – Main distribution cabling models

Table C.1 contains the length assumptions of the mathematical model used to validate channel performance using components specified in Clauses 8, 9 and 10. They do not represent absolute restrictions on the implementation of channels and permanent links, but may be used for guidance in reference implementations.

Table C.1 – Length assumptions used in the mathematical modelling of balanced main distribution cabling

Segment	Minimum m	Maximum m
MD-ID	15	90
Equipment cord at the MD	2[a]	5
Equipment cord at the ID	2[b]	5
Patch cord	2	–
All cords	–	10

[a] If there is no cross-connect at the MD, the minimum length of the equipment cord at the MD is 1 m.

[b] If there is no cross-connect at the ID, the minimum length of the equipment cord at the ID is 1 m.

The maximum length of the fixed main distribution cable will depend on the total length of cords to be supported within a channel. During the operation of the installed cabling, an administration system in accordance with ISO/IEC 14763-2 shall be implemented to ensure that the length of cords used to create the channel conform to the design rules of this standard.

In order to accommodate the higher insertion loss of flexible cables used for cords, the length of the cables used within a channel of a given Class (see Clause 6) shall be determined by the equations shown in Table C.2.

In Table C.2 it is assumed that

a) the flexible cable within these cords has a higher insertion loss specification than that used in the fixed main distribution cable (see Clause 10),

b) the cables within these cords in the channel have a common insertion loss specification.

The following general restrictions apply:

c) the physical length of the channel shall not exceed 100 m;

d) the physical length of the fixed main distribution cable shall not exceed 90 m and may be less depending on the length of cords used and the number of connections.

Table C.2 – Main distribution channel length equations

Model	Implementation equations	
	Class E_A	**Class F and Class F_A**
Interconnect – interconnect	$M = 104^{a} - F \times X$	$M = 105^{a} - F \times X$
Interconnect – cross-connect	$M = 103^{a} - F \times X$	$M = 103^{a} - F \times X$
Cross-connect – cross-connect	$M = 102^{a} - F \times X$	$M = 102^{a} - F \times X$
For operating temperatures above 20 °C, M should be reduced by 0,2 % per °C for screened cables and 0,4 % per °C (20 °C to 40 °C) and 0,6 % per °C (40 °C to 60 °C) for unscreened cables.		
Key M maximum length of the fixed main distribution cable (m) F combined length of patch cords, jumpers and equipment cords (m) X ratio of flexible cable insertion loss (dB/m) to fixed main distribution cable insertion loss (dB/m)		
[a] This includes a length reduction allocation to accommodate ILD.		

C.5.2 Intermediate distribution cabling

C.5.2.1 Balanced cabling

C.5.2.1.1 Component choice

The selection of balanced cabling components will be determined by the Class of applications to be supported by the cabling. Refer to Annex F of ISO/IEC 11801:2002/Amendment 2:2010 for guidance.

Using the models of 7.2.3.2:

- Category 6_A components provide Class E_A balanced cabling performance;
- Category 7 components provide Class F balanced cabling performance;
- Category 7_A components provide Class F_A balanced cabling performance.

C.5.2.1.2 Dimensions

The connection of application-specific equipment to the intermediate distribution cabling at the ID and ZDs adopts either an interconnect or cross-connect approach (see ISO/IEC 11801). The channel includes patch cords and equipment cords. For the purposes of this subclause, jumpers used in place of patch cords are treated as cords.

Figure C.5 shows the model used to correlate intermediate distribution cabling dimensions specified in this clause with the channel specifications in Clause 5. This figure represents the full configuration for the intermediate distribution channel.

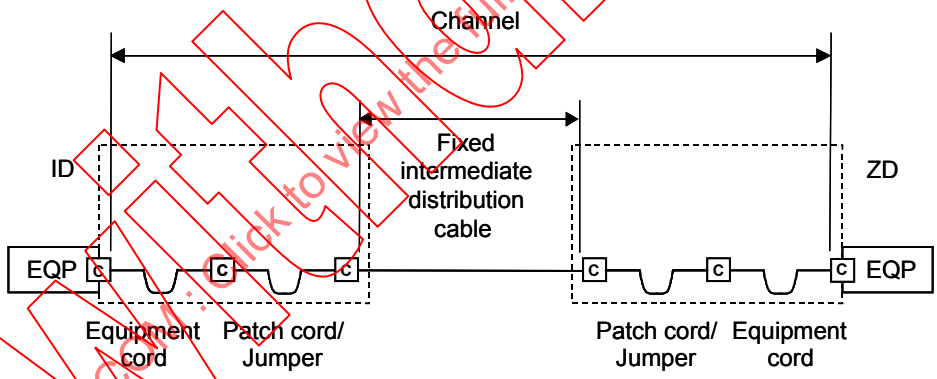


Figure C.5 – Intermediate distribution cabling models

Table C.3 contains the length assumptions of the mathematical model used to validate channel performance using components specified in Clauses 8, 9 and 10. They do not represent absolute restrictions on the implementation of channels and permanent links, but may be used for guidance in reference implementations.

Table C.3 – Length assumptions used in the mathematical modelling of balanced intermediate distribution cabling

Segment	Minimum m	Maximum m
ID-ZD	15	90
Equipment cord at the ID	2[a]	5
Equipment cord at the ZD	2[b]	5
Patch cord	2	–
All cords	–	10

[a] If there is no cross-connect at the ID, the minimum length of the equipment cord at the ID is 1 m.

[b] If there is no cross-connect at the ZD, the minimum length of the equipment cord at the ZD is 1 m.

The maximum length of the fixed intermediate distribution cable will depend on the total length of cords to be supported within a channel. During the operation of the installed cabling, an administration system in accordance with ISO/IEC 14763-2 shall be implemented to ensure that the length of cords used to create the channel conform to the design rules of this standard.

In order to accommodate the higher insertion loss of flexible cables used for cords, the length of the cables used within a channel of a given Class (see Clause 6) shall be determined by the equations shown in Table C.4.

In Table C.4 it is assumed that

a) the flexible cable within these cords has a higher insertion loss specification than that used in the fixed main distribution cable (see Clause 10),

b) the cables within these cords in the channel have a common insertion loss specification.

The following general restrictions apply:

c) the physical length of the channel shall not exceed 100 m;

d) the physical length of the fixed intermediate distribution cable shall not exceed 90 m and may be less depending on the length of cords used and the number of connections.

Table C.4 – Intermediate distribution channel length equations

Model	Implementation equations	
	Class E_A	Class F and Class F_A
Interconnect – interconnect	$M = 104^a - F \times X$	$M = 105^a - F \times X$
Interconnect – cross-connect	$M = 103^a - F \times X$	$M = 103^a - F \times X$
Cross-connect – cross-connect	$M = 102^a - F \times X$	$M = 102^a - F \times X$
For operating temperatures above 20 °C, M should be reduced by 0,2 % per °C for screened cables and 0,4 % per °C (20 °C to 40 °C) and 0,6 % per °C (40 °C to 60 °C) for unscreened cables.		
Key M maximum length of the fixed intermediate distribution cable (m) F combined length of patch cords, jumpers and equipment cords (m) X ratio of flexible cable insertion loss (dB/m) to fixed main distribution cable insertion loss (dB/m)		
[a] This includes a length reduction allocation to accommodate ILD.		

C.5.2.2 Optical fibre cabling

The channel length restriction of Figure C.5 does not apply, but channel lengths instead are limited by the specific applications supported and the cabled optical fibre category used (see ISO/IEC 11801). It should be noted that the connection systems used to terminate fixed optical fibre cabling may contain mated connections and splices (permanent or re-usable) and that cross-connects may comprise re-usable splices.