



Design Guidelines for

LANmark-6 10G *Cabling System*

Technical Paper
Nexans Cabling Solutions
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1 Introduction

The following installation requirements cover the length configurations for installing a Nexans LANmark-6 10G structured cabling system.

2 Standards Compliance

In addition to the considerations below, all installations must follow industry best practice and demonstrate compliance to the relevant sections of ISO/IEC 11801, EN50173, TIA/EIA 568 B series of documents. In the case of a LANmark-6 10G installation, compliance to TIA/EIA TSB155 or ISO/IECTR24750 must be shown as a minimum and compliance to TIA/EIA568B.2-10 and/or amendment 1.1 of ISO/IEC 11801 can be shown alternatively.

LANmark-6 10G cabling systems are targeted as ideal solution for 10GBASE-T application and all lower performing versions of Ethernet, like 1000BASE-T and 100Base-TX. Therefore, in order to achieve full performance of the cabling system and to achieve the Nexans warranty, field testing against standards, which are directly addressing the 10Gb application, is required as a absolute minimum. These are:

TIA/EIA TSB155 or ISO/IECTR24750 up to 500 MHz

In addition to 10Gb application support, customers might require compliance to higher performing standards like Cat6A or Class EA. If this is the case, field certification must use the higher standard testing requirements in order to include this into the warranty certificate. The final Warranty certificate will refer to the appropriate standard according to the test limits used.

Optional standards for 500MHz

TIA/EIA568B.2-10 draft 6.0

And

Amendment 1.1 of ISO/IEC 11801 2nd edition (Draft 25N1324)

3 Length Considerations for installation

3.1 Length specifications

The following minimum and maximum length specifications apply :

Table 31 - Minimum and Maximum length

Segment	Minimum m	Maximum m
FD-CP	15	85
CP-TO	7.5	-
FD-TO (no CP)	15	90
Work area cord ¹	2	5
Patch cord	2	-
Equip cord ²	2	5
All cords	-	10

Note 1 If there is no CP, the minimum length of the work area cord is 1m.

Note 2 If there is no cross-connect, the minimum length of the equipment cord is 1m.

3.2 Stranded Cable Length Compensation

Because the attenuation of the flexible cable is higher than the horizontal cable, the total length of the permanent link must be compensated. The maximum link length = 90 m of solid horizontal cable. For every 1 m of flexible cable used between the Consolidation Point and the Telecommunications Outlets, the horizontal cable must be reduced by 1,5 m (see table).

Following table shows the length calculation taking in consideration the length of each portion of the channel:

Table 32 - Horizontal link length equations

Model	Figure	Implementation Equations		
		Class D channels	Class E and E _A channels	Class F and F _A channels
Interconnect - TO	12a	$H=109 - FX$	$H = 107 \cdot 3^a - FX$	$H = 107 \cdot 2^a - FX$
Cross-connect - TO	12b	$H=107 - FX$	$H = 106 \cdot 3^a - FX$	$H = 106 \cdot 3^a - FX$
Interconnect - CP - TO	12c	$H=107 - FX - CY$	$H = 106 \cdot 3^a - FX - CY$	$H = 106 \cdot 3^a - FX - CY$
Cross-connect - CP - TO	12d	$H=105 - FX - CY$	$H = 105 \cdot 3^a - FX - CY$	$H = 105 \cdot 3^a - FX - CY$

H the maximum length of the fixed horizontal cable (m)

F combined length of patch cords/jumpers, equipment and work area cords (m)

C the length of the CP cable (m)

X the ration of cord cable insertion loss (dB/m) to fixed horizontal cable insertion loss (dB/m) - see Clause 9

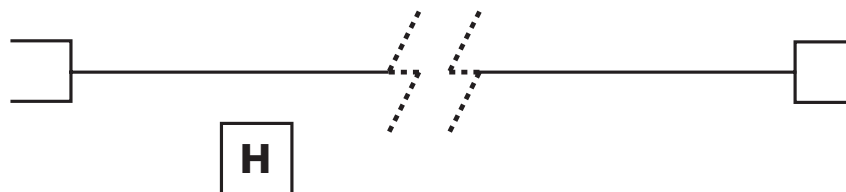
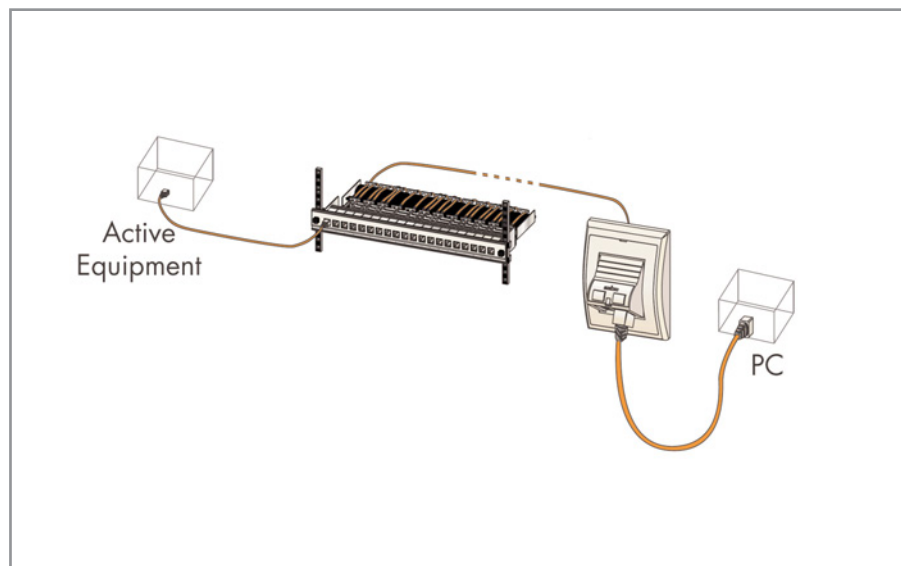
Y the ration of CP cable insertion loss (dB/m) to fixed horizontal cable insertion loss (dB/m) - see Clause 9

NOTE For operating temperatures above 20°C, H should be reduced by 0.2% per °C for screened cables; 0.4% per °C (20°C to 40°C) and 0.6% per °C (>40°C to 60°C) for unscreened cables.

^a This length reduction is to provide an allocated margin to accomodate insertion loss deviation.

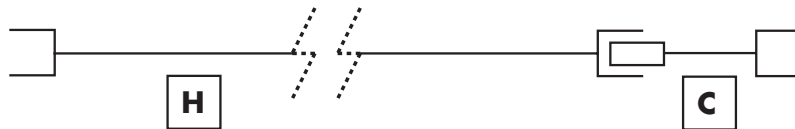
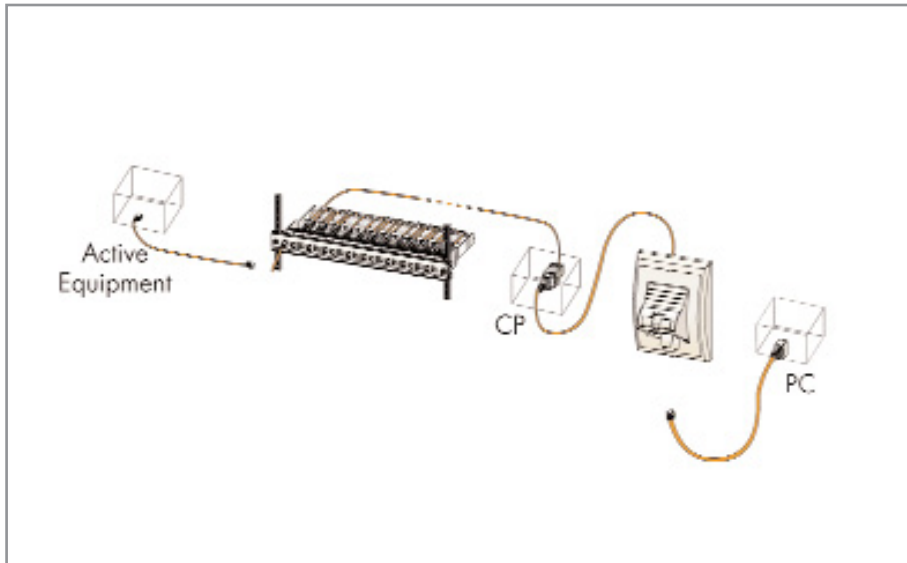
3.3 Permanent Link Length Installation Guidelines

3.3.1 2 Connector Link Installation Guidelines



Description	Minimum	Maximum
H Horizontal Permanent Link	15m	90m

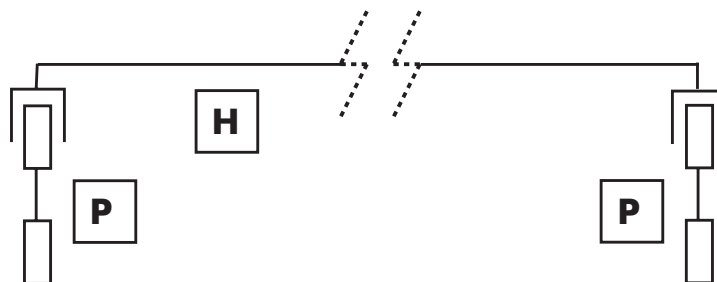
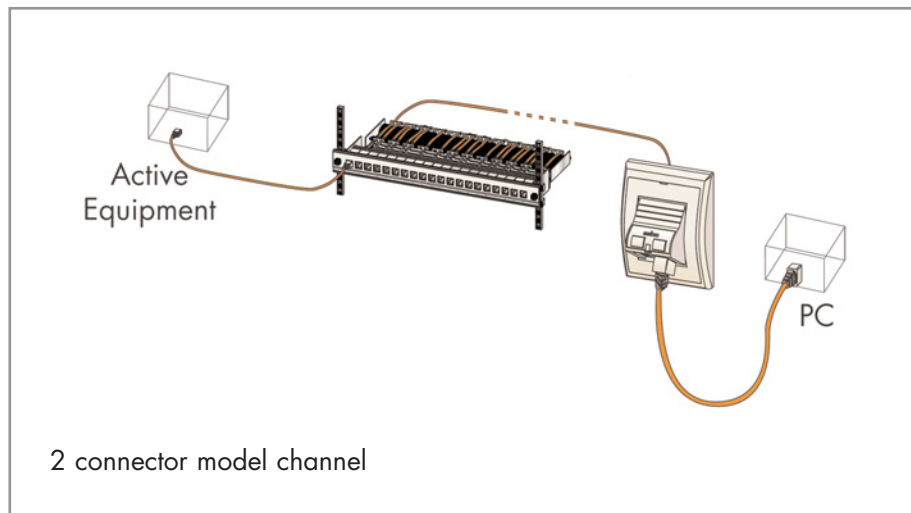
3.3.2 3 Connector Link Installation Guidelines



	Description	Minimum	Maximum
H	Horizontal Permanent Link	15m	90m - (C*1.5)
C	Consolidation Point	7.5m	20m
H + C	Total Link Length	15 + 7.5 = 22.5m	90 - (7.5*1.5) + 7.5 = 86.25m

3.4 Channel Installation Guidelines

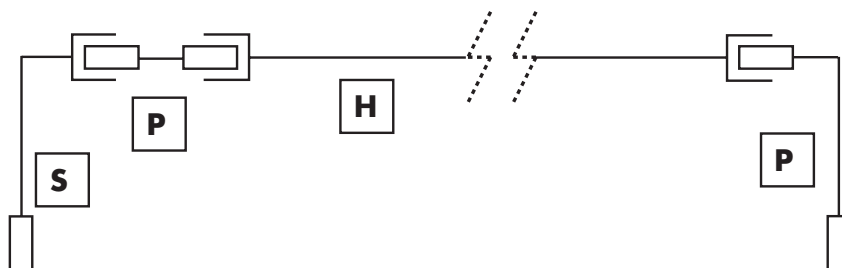
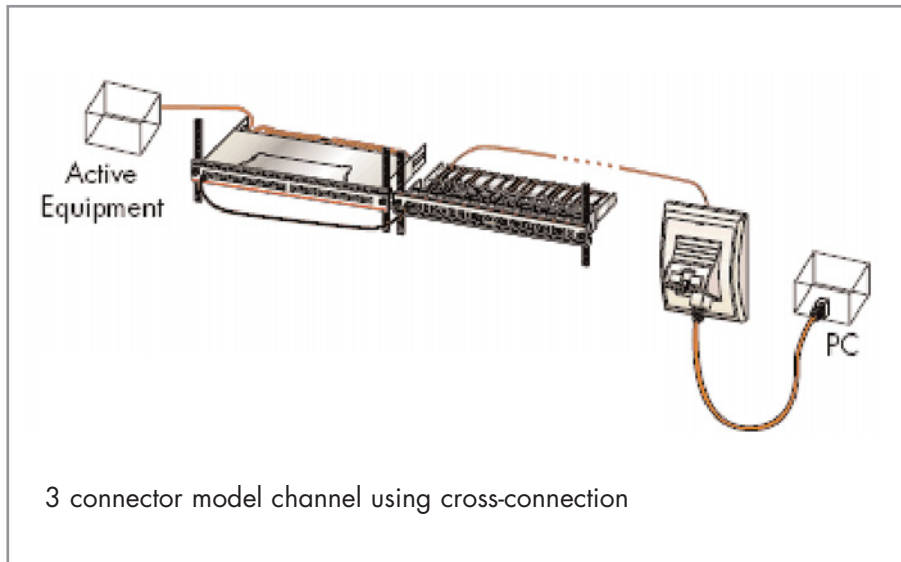
3.4.1 2 Connector Channel Installation Guidelines



Description		Minimum	Maximum
H	Horizontal Permanent Link	15m	90m
P	Patch cord	2m	5m
H + 2P	Total Channel Length	$15 + 2 \times 2 = 19\text{m}$	$90 + 2 \times 5 = 100\text{m}$

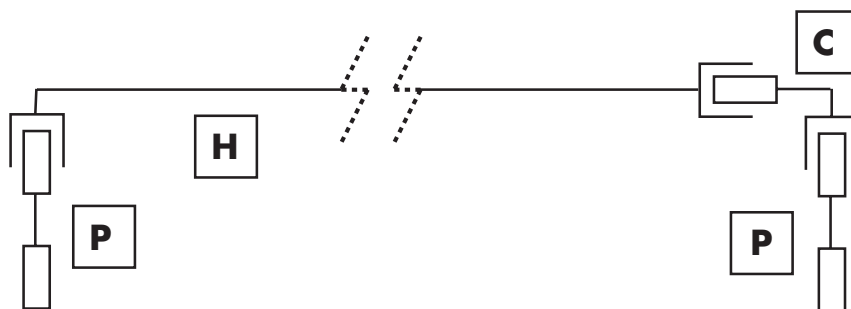
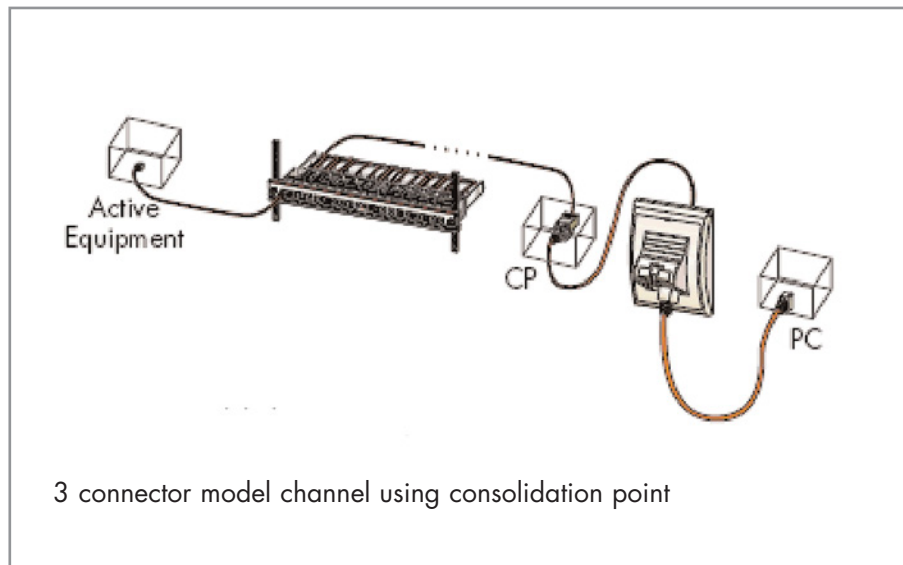
3.4.2 3 Connector Channel Installation Guidelines

3.4.2.1 3 Connector Model Using Cross-Connection



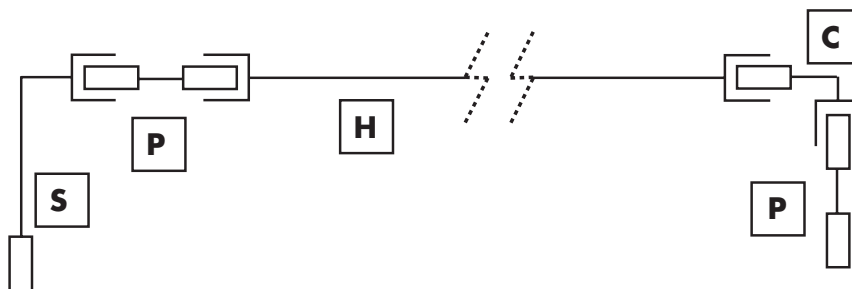
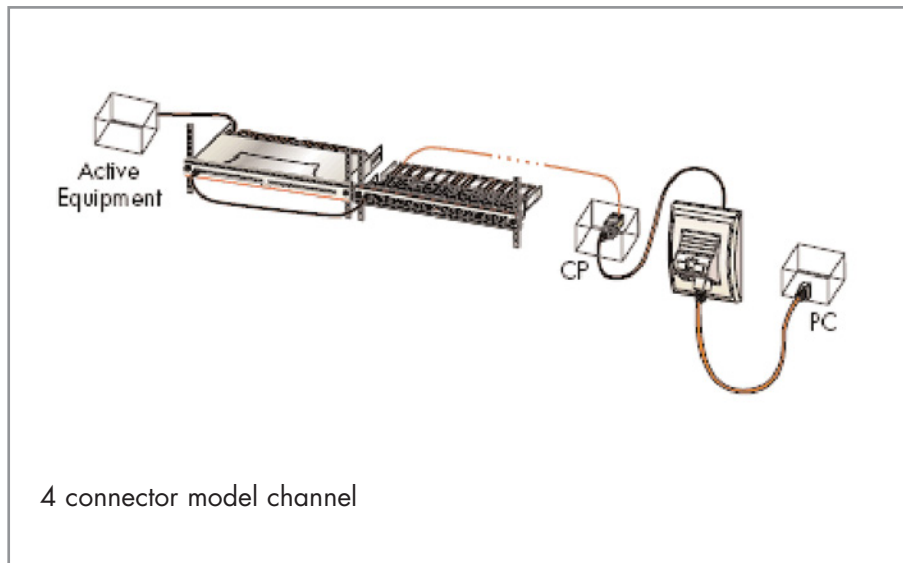
	Description	Minimum	Maximum
H	Horizontal Permanent Link	15m	90m - (S*1.5)
S	Service Presentation / Cross Connect	7.5m	20m
P	Patch Cord	2m	5m
H+S+2P	Total Channel Length	15+7.5+2*2=27.5m	90-(7.5*1.5)+7.5+2*5=96.25m

3.4.2.2 3 Connector Model Using Consolidation Point



Description		Minimum	Maximum
H	Horizontal Permanent Link	15m	90m - (C*1.5)
C	Consolidation Point	7.5m	20m
H + C	Total Link Length	15+7.5= 22.5m	90-(7.5*1.5)+7.5= 86.25m
P	Patch Cord	2m	5m
H+C+2P	Total Channel Length	15+7.5+2*2= 26.5m	86.25+2*5= 96.25m

3.4.3 4 Connector Channel Installation Guidelines



Description		Minimum	Maximum
H	Horizontal Permanent Link	15m	$90m - ((C+S) * 1.5)$
C	Consolidation Point	7.5m	20m
H + C	Total Link Length	$15+7.5=$ 22.5m	$90-((7.5+1.5)*1.5)+7.5=$ 75m
S	Service Presentation / Cross Connect	7.5m	20m
P	Patch Cord	2m	5m
H+C+S+2P	Total Channel Length	$15+7.5+7.5+2*2=$ 34m	$75+7.5+2*5=$ 92.5m



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