Structured Cabling Course

Features & Benefits

- Gives delegates confidence to install and test CCS systems
- Course details industry standards, LAN topologies and installation techniques
- Delegates experience 'hands-on' link testing, verification and troubleshooting
- Each successful delegate is awarded with a course certificate forming the basis of becoming a Connectix Approved Installer
- No previous industry knowledge required


Certificate Number: I/002442

This is to certify that

Name

Of

Business Name

Has attended the Connectix Structured Cabling Installation Course held on

Date

Demonstrating a good knowledge and understanding of the following sections:

- Industry Overview
- Overview of Local Area Networks
- Telecommunications Standards & Support References
- Testing & Troubleshooting Category 5E/6/6A Links
- Category 6A, Category 6, Enhanced Category 5, Structured Cabling LAN Installation Practices

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Connectix Cabling Systems

08 February 2016

DATE

Correct installation procedures are a fundamental part of today's structured cabling industry. Connectix are committed to ensuring that our cabling systems are installed quickly, professionally and in compliance with the rapidly changing standards proposed by ISO/IEC and EIA/TIA.

The one day Structured Cabling Installation Course is split into the following key areas:

- Introduction to Connectix
- Course overview
- Structured cabling theory
- Installation of structured cabling
- Structured cabling systems testing
- Assessment

The course offers a balanced mix of theory and practice relating to the structured cabling system standards EIA/TIA-568C, ISO/IEC 11801 2nd edition and EN50174. The comprehensive theory is followed by a practical session in a fully equipped installation room and allows delegates to gain an understanding of structured cabling systems and installation techniques.

This course requires no previous knowledge of structured cabling and it's intended that delegates leave with adequate knowledge of the standards, cable installation/termination practice, and the confidence and experience for the future supervision and assessment of system installations.

The course is run by a fully qualified Connectix Cabling Systems structured cabling trainer who is constantly updated in line with the rapidly changing standards and cabling system technologies.

Upon completion of the course an examination is offered for assessment purposes by each delegate and successful candidates are awarded a certificate acknowledging their competence, which can then be used to obtain Connectix Approved Installer status.

Fibre Optic Termination Course

Features & Benefits

- Gives delegates confidence to successfully install and terminate fibre optic cables and connectors
- Course details industry overview, theory of light and health and safety procedures
- Delegates experience 'hands-on' fibre optic testing, terminating and link installation
- Each successful delegate is awarded with a course certificate
- No previous industry knowledge required

Certificate Number: I/002442

This is to certify that

Name

Of

Business Name

Has attended the Connectix Optical Fibre Termination Course held on

Date

Demonstrating a good knowledge and understanding of the following sections:

- Industry Overview
- Optical Fibre Introduction and Theory of Light
- Optical Fibre Cables - Construction, Bandwidths & Specifications
- Termination of Optical Fibre Connections
- Installation Practices
- Optical Fibre Test Equipment - Power Meter, Light Sources & OTDR's

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08 February 2016

Fibre optic links are becoming an increasingly common part of cabling infrastructures. Installers have to be competent when specifying, terminating, testing and installing fibre optics. The Connectix Fibre Optic Termination Course provides delegates with the hands-on practical experience and theoretical knowledge needed to successfully terminate fibres on-site.

The one day Fibre Termination Course is split into the following key areas:

- Introduction to Connectix
- Course overview
- Fibre optic cabling theory
- Practical detail
- Fibre link testing
- Assessment

The course offers a balanced mix of theory and practice relating to the use of fibre optic cabling within the structured cabling system standards EIA/TIA-568C, ISO/IEC 11801 2nd edition and EN50174. The course begins with an in-depth theory session followed by a 'hands-on' practical session, including termination of connectors on various fibre optic cable constructions. The practical element also gives delegates the experience of testing and troubleshooting fibre optics links.

The practical exercises and demonstrations cover; fibre cable preparation, fibre cleaving, connector glue loading, fibre connector threading, glue curing, hand polishing, connector visual inspection, connector crimp and optical loss testing.

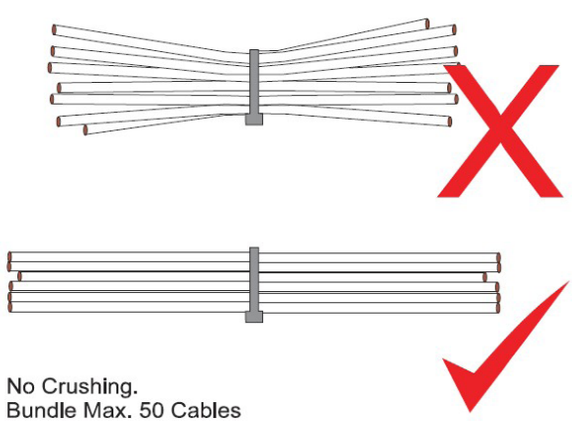
This course requires no previous knowledge of fibre optics and it's intended that delegates leave with suitable ability, confidence and practical experience for the successful installation of fibre optic links.

The course is run by a fully qualified Connectix Cabling Systems trainer who is constantly updated in line with the rapidly changing standards and fibre optic cabling technologies, and upon completion of the course each successful delegate is issued a certificate acknowledging
their competence.

To meet the stringent requirements of the performance standards, installation should be carried out in accordance with the requirements of BS EN 50174 and BS 6701 and tested in accordance with BS EN 50346. Bonding and Earthing should be carried out in accordance with BS EN 50310.

The following guidelines highlight some of the key points to be followed:

- Cables should not be joined to increase length. If cables are found to be short they must not be re-routed by a less suitable path, but must be re-run.
- Cables must be secured so as to relieve any mechanical stress on the terminations.



No Crushing.
Bundle Max. 50 Cables

- Cable ties must be finger tight only. Over tight ties deform the geometry of the cable and affect its link performance. They should not be so tight as to distort the outer sheath of the cable.
- Cable bundles should be limited to 50 cables to avoid crushing the lower cables of the bundle.
- Care must be taken to avoid kinks in the cable during cable pulling.
- Any cabling over suspended ceilings must be laid in standard cable trays and supported every 1.2 to 1.5 metres to avoid possible movement.
- The minimum bend radius during installation should be 12x cable diameter and 4x cable diameter once installed.
- Do not use undue strain when cable pulling. (Maximum 25lb/110N)
- Avoid high temperature environments, power cable, lift shafts, switch gear and other sources of interference.
- All cable runs should be concealed, and Cable Routes e.g. mini-trunking, should be parallel or perpendicular to walls.
- When cable routes pass through walls the holes must be sleeved and the cables exit and enter at 90° to the wall.
- All cables must be free of tension along the entire route, and cable supports should be used to distribute any strain.
- All metallic conduit and trunking must be earth bonded in accordance with the IET wiring regulations.
- All cable exits must be bushed or sleeved so as not to cause damage to the cable's outer sheath.
- Space should be left to allow for additional cables to be run in the existing cable routes. It is recommended that conduit and trays should not be filled to more than 80% fill capacity therefore leaving a minimum of 25% spare cable route capacity available for future system expansion.

Multi Mode Fibre		62.5 / 125 µm OM1	50 / 125 µm OM2	50 / 125 µm OM2	50 / 125 µm OM2	50 / 125 µm OM3	50 / 125 µm OM4
Bandwidth (overfilled launch)							
@ 805 nm	Mhz.km	≥ 220	≥ 500	≥ 600	≥ 600	≥ 1500	≥ 3500
@ 1300 nm	Mhz.km	≥ 600	≥ 500	≥ 1200	≥ 1200	≥ 500	≥ 500
Bandwidth (laser EMB[1])							
@ 850 nm	Mhz.km	-	-	-	-	≥ 2000	≥ 4700
@ 1300 nm	Mhz.km	-	-	-	-	≥ 5000	≥ 500
1 Gbps Ethernet Operation Link Length							
@ 850 nm	m	≤ 300	550[2]	≤ 600[1]	≤ 750[1]	-	-
@ 1300 nm	m	≤ 550	550[3]	≤ 600[2]	≤ 2000[2]	-	-
10 Gigabit Ethernet Operation Link Length							
@ 850 nm	m	-	-	-	-	≤ 300	550
Attenuation - Loose Tube Cables							
@ 850 nm (typical / maximum)	dB/km	2.6 / 3.0	2.4 / 3.5	2.3 / 3.0	2.3 / 3.0	2.0 / 3.0	2.0 / 3.0
@ 1300 nm (typical / maximum)	dB/km	0.5 / 1.0	0.7 / 1.5	0.6 / 1.0	0.6 / 1.0	0.5 / 1.0	0.5 / 1.0
Attenuation - Tight Buffer Cables							
@ 850 nm (typical / maximum)	dB/km	2.6 / 3.2	2.0 / 3.5	2.0 / 3.5	2.0 / 3.5	2.1 / 3.5	2.1 / 3.5
@ 1300 nm (typical / maximum)	dB/km	0.5 / 1.0	0.5 / 1.5	0.5 / 1.5	0.5 / 1.5	0.7 / 1.5	0.7 / 1.5
Numerical Aperture	µm	0.275 ± 0.015	0.20 ± 0.015	0.20 ± 0.015	0.20 ± 0.015	0.20 ± 0.015	0.20 ± 0.015
Core Diameter	µm	62.5 ± 2.5	50.0 ± 2.5	50.0 ± 2.5	50.0 ± 2.5	50.0 ± 2.5	50.0 ± 2.5
Core Non-Circularity	%	≤ 5	≤ 5	≤ 5	≤ 5	≤ 5	
Cladding Diameter	µm	125 ± 10	125 ± 10	125 ± 10	125 ± 10	125 ± 10	125 ± 10
Cladding Non-Circularity	%	≤ 1	≤ 1	≤ 1	≤ 1	≤ 1	≤ 1
Coating Diameter	µm	245 ± 10	245 ± 10	245 ± 10	245 ± 10	245 ± 10	245 ± 10
Coating Non-Circularity	%	≤ 5	≤ 5	≤ 5	≤ 5	≤ 5	
Core/Cladding Concentricity Error	µm	≤ 1.0	≤ 1.5	≤ 1.5	≤ 1.5	≤ 1.5	≤ 1.5
Coating/Cladding Concentricity Error	µm	≤ 8	≤ 8	≤ 8	≤ 8	≤ 8	≤ 8
Zero Dispersion Wavelength (λ0)	nm	1320 to 1365	1295 to 1340	1295 to 1340	1295 to 1340	1295 to 1340	1295 to 1340
Group Refractive Index							
@ 850 nm		1.496	1.483	1.483	1.483	1.483	1.483
@ 1300 nm		1.491	1.479	1.479	1.479	1.479	1.479

1. Effective Modal Bandwidth per TIA/EIA-492AAAC and draft IEC 60793-2-10 for type A1a.2, ensured by DMD performance specifications for sources meeting launch conditions specified in 10 Gbit Ethernet (IEEE 802.3ae), OIF OC-192/STM-64 VSR-4-04, and 10 Gbit Fibre Channel (10FGC)
2. Serial laser 1000BASE-SX
3. Serial laser 1000BASE-LX

Single Mode Fibre		9/125 µm OS2 G.652D-ZWP	9 / 125 µm OS2 G.657.A1	9 / 125 µm OS2 G.657.A2	9 / 125 µm OS2 G.657.B3	9 / 125 µm G.655C&D	9 / 125 µm G.655C&E, G.656
Chromatic Dispersion							
@ 1285 - 1330 nm	ps/(nm.km)	≤ 3.5	-	-	-	-	-
@ 1550 nm	ps/(nm.km)	≤ 18	-	-	-	-	-
@ 1530 - 1565 nm	ps/(nm.km)	-	-	-	-	2.6 - 6.0	5.5 - 8.9
@ 1565 - 1625 nm	ps/(nm.km)	-	-	-	-	4.0 - 8.9	6.9 - 11.4
@ 1460 - 1625 nm	ps/(nm.km)	-	-	-	-	-1.0 - 8.9	2.0 - 11.4
Attenuation - Loose Tube Cables							
@ 1310 nm (typical / maximum)	dB/km	0.31 / 0.35	0.31 / 0.35	0.31 / 0.35	0.31 / 0.35	-	-
@ 1550 nm (typical / maximum)	dB/km	0.20 / 0.24	0.20 / 024	0.20 / 0.24	0.20 / 0.24	0.25 / 0.30	0.25 / 0.30
@ 1625 nm (typical / maximum)	dB/km	0.21 / 0.26	0.21 / 0.26	0.21 / 0.26	0.21 / 0.26	0.27 / 0.34	0.27 / 0.34
Attenuation - Tight Buffer Cables							
@ 1310 nm (typical / maximum)	dB/km	0.35 / 0.40	0.35 / 0.40	0.35 / 0.40	0.35 / 0.40	-	-
@ 1550 nm (typical / maximum)	dB/km	0.25 / 0.30	0.25 / 0.30	0.25 / 0.30	0.25 / 0.30	0.25 / 0.35	0.25 / 0.35
@ 1625 nm (typical / maximum)	dB/km	0.21 / 0.26	0.21 / 0.26	0.21 / 0.26	0.21 / 0.26	0.27 / 0.34	0.27 / 0.34
Cable Cut-Off Wavelength (λcc)	µm	≤ 1260	≤ 1260	≤ 1260	≤ 1260	-	-
Mode Field Diameter							
@ 1310 nm	µm	9.2 ± 0.4	8.95 ± 0.35	8.8 ± 0.4	7.9 ± 1.6	-	-
@ 1550 nm	µm	10.4 ± 0.5	10.0 ± 0.5	-	9.8 ± 0.6	8.4 ± 0.6	8.6 ± 0.4
Cladding Diameter	µm	125.0 ± 0.7	125.0 ± 0.7	125.0 ± 0.7	125.0 ± 0.7	125.0 ± 0.7	125.0 ± 0.7
Cladding Non-Circularity	%	≤ 1	≤ 1	≤ 1	≤ 1.25	≤ 0.7	≤ 0.7
Coating Diameter	µm	240 ± 5	240 ± 5	240 ± 5	245 ± 10	245 ± 5	245 ± 5
Core/Cladding Concentricity Error	µm	≤ 0.5	≤ 0.5	≤ 0.5	-	≤ 0.5	≤ 0.5
Coating/Cladding Concentricity Error		≤ 12 µm	≤ 12 µm	≤ 5%	≤ 5%	≤ 10 µm	≤ 10 µm
Zero Dispersion Wavelength (λ0)	nm	1302 - 1322	1302 - 1322	1302 - 1322	1302 - 1324	-	≤ 1405
Group Refractive Index							
@ 1310 nm		1.467	1.467	-	-	1.471	1.471
@ 1550 nm		1.468	1.468	-	1.468	1.470	1.470
Fibre PMD Individual Fibre	ps/√km	.01	0.1	0.1	0.2	0.1	0.1

Telco Wiring Specifications

Wiring Specifications

24 Way RJ45 - 2 Way Telco (10 Base-T)

RJ45 No.	1				2				3				4				5				6			
RJ45 Pin	1	2	3	6	1	2	3	6	1	2	3	6	1	2	3	6	1	2	3	6	50	2	3	6
Telco(1) Pin	26	1	27	2	28	3	29	4	30	5	31	6	32	7	33	8	34	9	35	10	36	11	37	12
RJ45 No.	7				8				9				10				11				12			
RJ45 Pin	1	2	3	6	1	2	3	6	1	2	3	6	1	2	3	6	1	2	3	6	1	2	3	6
Telco(1) Pin	38	13	39	14	40	15	41	16	42	17	43	18	44	19	45	20	46	21	47	22	48	23	49	24
RJ45 No	13				14				15				16				17				18			
RJ45 Pin	1	2	3	6	1	2	3	6	1	2	3	6	1	2	3	6	1	2	3	6	1	2	3	6
Telco(1) Pin	26	1	27	2	28	4	29	3	30	5	31	6	32	7	33	8	34	9	35	10	36	11	37	12
RJ45 No	19				20				21				22				23				24			
RJ45 Pin	1	2	3	6	1	2	3	6	1	2	3	6	1	2	3	6	1	2	3	6	1	2	3	6
Telco(1) Pin	38	13	39	14	40	15	41	16	42	17	43	18	44	19	45	20	46	21	47	22	48	23	49	24

24 Way RJ45 - 1 Way Telco

RJ45 No	1		2		3		4		5		6		7		8		9		10		11		12	
RJ45 Pin	4	5	4	5	4	5	4	5	4	5	4	5	4	5	4	5	4	5	4	5	4	5	4	5
Telco(1) Pin	1	26	2	27	3	28	4	29	5	30	6	31	7	32	8	33	9	34	10	35	11	36	12	37
RJ45 No	13		14		15		16		17		18		19		20		21		22		23		24	
RJ45 Pin	4	5	4	5	4	5	4	5	4	5	4	5	4	5	4	5	4	5	4	5	4	5	4	5
Telco(1) Pin	13	38	14	39	15	40	16	41	17	42	18	43	19	44	20	45	21	46	22	47	23	48	24	49

16 Way RJ45 - 1 Way Telco

RJ45 No	1		2		3		4		5		6		7		8	
RJ45 Pin	4	5	4	5	4	5	4	5	4	5	4	5	4	5	4	5
Telco(1) Pin	1	26	2	27	4	29	5	30	7	32	8	33	10	35	11	36
RJ45 No	9		10		11		12		13		14		15		16	
RJ45 Pin	4	5	4	5	4	5	4	5	4	5	4	5	4	5	4	5
Telco(1) Pin	13	38	14	39	16	41	17	42	19	44	20	45	22	47	23	48