

Belden Shielded Solutions



**Superior Performance
for Complete Reliability**

Meeting your current
and future needs.

Total Solutions for Challenging Applications

As a manufacturer of high quality and innovative signal transmission solutions, Belden® sets out to meet current and future market needs. This has resulted in the expansion of Belden's extensive copper product portfolio and the introduction of Belden Shielded Systems.

Belden Shielded Solutions deliver superior performance, complete reliability, unparalleled warranty and offer you the ability to optimize your IT strategy. The new systems can be used in standard office networks and are highly suited for use in high noise environments, with guaranteed performance in challenging and worst case installations.

Following extensive internal and independent external tests, Belden Shielded Systems have been proven to provide an overall blend of high performance and quality products that deliver a reliable and easy to install solution.



Effective Shielding Solutions Are Essential

The purpose of a shielded cabling system is to provide increased immunity against high frequency noise. EMI and RF interferences have a negative impact on signal transmission performance and reliability. Depending on the electromagnetic environment the level of shielding effectiveness can have a great impact on the transmission performance of a cabling system. Poor shielding effectiveness can result in packet loss, decreased bandwidth and even connection loss.

System designers need to deal with problems of signal ingress and egress caused by electromagnetic interference (EMI) and with today's demands for high performance, maximizing shielding effectiveness is even more critical than ever before.

Effective shielding can protect cables from signal ingress or egress, as well as triboelectric or other mechanical noise. With a growing need for more sophisticated shielding solutions, system designers need to find the right shielding solution for each application.

Four Connector Channel Model

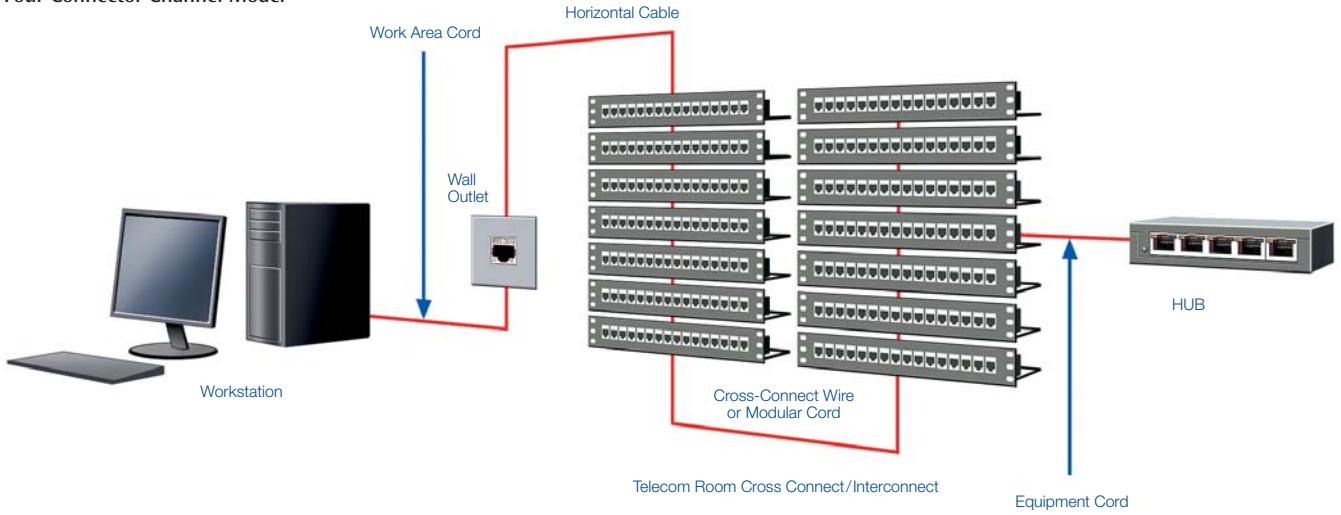
Belden Shielded Systems have undergone extensive internal testing procedures in line with relevant standards. Prior to introducing these new systems, Belden has conducted extensive tests using over 100 different cabling configurations, including short links, long links, worst cases and most demanding 4 connector channel configurations. These tests were performed at frequencies of up to 250 MHz. All transmission parameters were tested, including attenuation, NEXT, FEXT and Return Loss.

The test results prove very good and consistent matching of components and excellent end-to-end performance. Moreover, these systems have been externally verified in both channel and link configurations by Delta laboratories in Denmark.





Four Connector Channel Model



Technical Data

Frequency (MHz)	NEXT Min. Values	NEXT Typ. Values	PSNEXT Min. Values	PSNEXT Typ. Values	RL Min. Values	RL Typ. Values	Att. Min. Values	Att. Typ. Values	PSELFEXT Min. Values	PSELFEXT Typ. Values	PS ACR Min. Values	PS ACR Typ. Values
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4 Connectors Channel • Cat. 6 • Class E

1	65.0	67.5	62.0	66.0	19.0	22.0	4.0	4.0	60.3	65.3	58.0	62.0
5	61.5	64.0	59.0	63.0	19.0	22.0	4.7	4.7	46.3	51.3	54.3	58.3
10	56.6	59.1	54.0	58.0	19.0	22.0	6.6	6.4	40.3	45.3	47.4	51.6
25	50.0	52.2	47.3	51.3	17.0	19.0	10.5	10.1	32.3	37.3	36.9	41.2
50	45.0	47.5	42.2	46.2	15.0	17.0	15.0	14.4	26.3	31.3	27.2	31.8
100	39.9	42.2	37.1	41.1	12.0	14.0	21.7	21.0	20.3	25.3	15.4	20.1
150	36.9	39.4	34.0	38.0	10.2	12.2	27.1	26.3	16.7	21.7	7.0	11.7
200	34.8	37.3	31.9	35.9	9.0	11.0	31.7	30.7	14.2	19.2	0.1	5.2
250	33.1	35.6	30.2	34.2	8.0	10.0	35.9	34.8	12.3	17.3	-5.8	-0.6

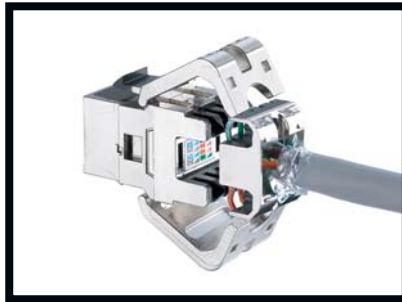
4 Connectors Channel • Cat. 5e • Class D

1	60.0	66.0	57.0	65.0	17.0	17.0	4.0	4.0	54.4	61.4	53.0	61.0
5	52.0	58.0	49.0	57.0	17.0	17.0	5.1	5.0	40.4	47.4	43.9	52.0
10	47.0	53.0	44.0	52.0	17.0	17.0	7.2	7.0	34.4	41.4	36.8	45.0
25	40.3	46.3	37.3	45.3	16.0	20.0	11.5	10.9	26.4	33.4	25.9	34.4
50	35.2	41.2	32.2	40.2	13.0	17.0	16.5	15.8	20.4	27.4	15.7	24.4
100	30.1	36.1	27.1	35.1	10.0	14.0	24.0	22.5	14.4	21.4	3.1	12.6
150	-	33.0	-	32.0	-	12.2	-	28.0	-	17.9	-6.0	4.0

Belden Shielded Solutions: Key Components



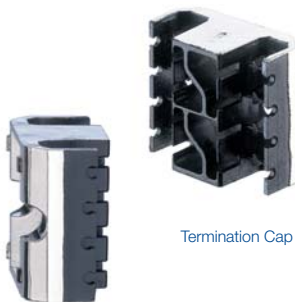
Module



Cable preparation



Terminated in 75 seconds



Termination Cap



Keyhole to secure conductor during the termination process

NEW: KeyConnect Tool less Modular Jack

At the heart of the Belden Shielded Solutions is a shielded 'Tool less' modular jack, a high quality, easy to install jack. The metalization consists of 3 conductive layers providing both effective shielding as well as low shield resistance. This helps to provide superior shielding performance without compromising the size and ease of use of the UTP connector.

The KeyConnect Modular Jack helps to reduce installation time and offers the following:

Key Features and Benefits

- Usable Bandwidth up to 300 Mhz
- Patented Encapsulated Lead Frame Technology
- Overall Shielded – increased shield coverage (Termination Cap/Wings) providing a more complete shield geometry delivering high shielding performance
- AWG 22-26 wire gauges – up to an insulated diameter of 1.6 mm (UTP or Shielded)
- Easy termination of foil and foil/screen style cables
- A series of easy steps to a successful termination
- Consistent termination practise – Shielded or UTP

- UTP simplicity in the shielded world
- No special tools required
- Able to terminate the following cable styles:
 - U/UTP
 - F/UTP
 - SF/UTP
 - S/FTP
 - also available in unshielded version
- Fully Interoperable and backward compatible with Cat. 5e/Cat. 5 standards (EC Verified)
- Compact Shielded Modular Jack
 - Applicable for high density applications
 - Internal termination of the shield, enables the compact overall size

Termination Cap

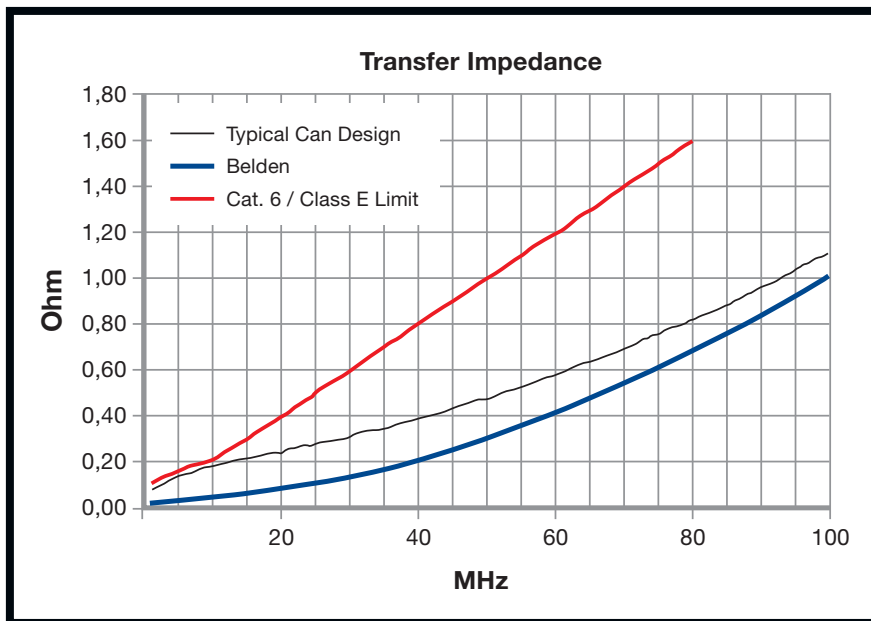
The termination cap prevents the untwisting of the pairs, ensuring that the integrity of the transmission performance is maintained. It also facilitates consistent installation, module to module, providing reliable connections time and again. By minimizing the length of the unjacketed cable, the termination cap helps to keep the integrity of cable at the terminated end. Used in combination with the cap, the wings support tool-less easy termination.



Why Metalized Plastic?

Belden have utilized the innovative process of metalizing plastic to provide superior shielding performance without compromising the size and ease of use of a UTP connector. The shielding performance outperforms that provided by the traditional metal can design, and is illustrated in the comparative graph below. The metalization consists of 3 conductive layers providing both effective shielding as well as low shield resistance.

The process of metalizing plastic delivers the benefit of an improved shield geometry (with an all-around metallization) which optimizes/increases the shielding effectiveness of the connector housing. In combination with the Belden patented Encapsulated Lead Frame Technology this ensures long-term reliability with extremely stable market leading transmission performance.



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A Broad Choice of Compatible Cables

Belden Category 6 and 5e Cables

Effective high-performance communication systems require the speed, reliability and performance advantages that only Belden Category 5e and 6 cables can offer.

Belden Category 6 and 5e cables exceed all ISO/IEC 11801 standard specifications. They provide the performance, throughput and reliability that keeps your response-time critical applications operating at peak efficiencies. Belden Category 5e and 6 cables offer extremely stable transmission characteristics and a Signal-to-Noise ratio that is ideal for networks where noise and interference is high.

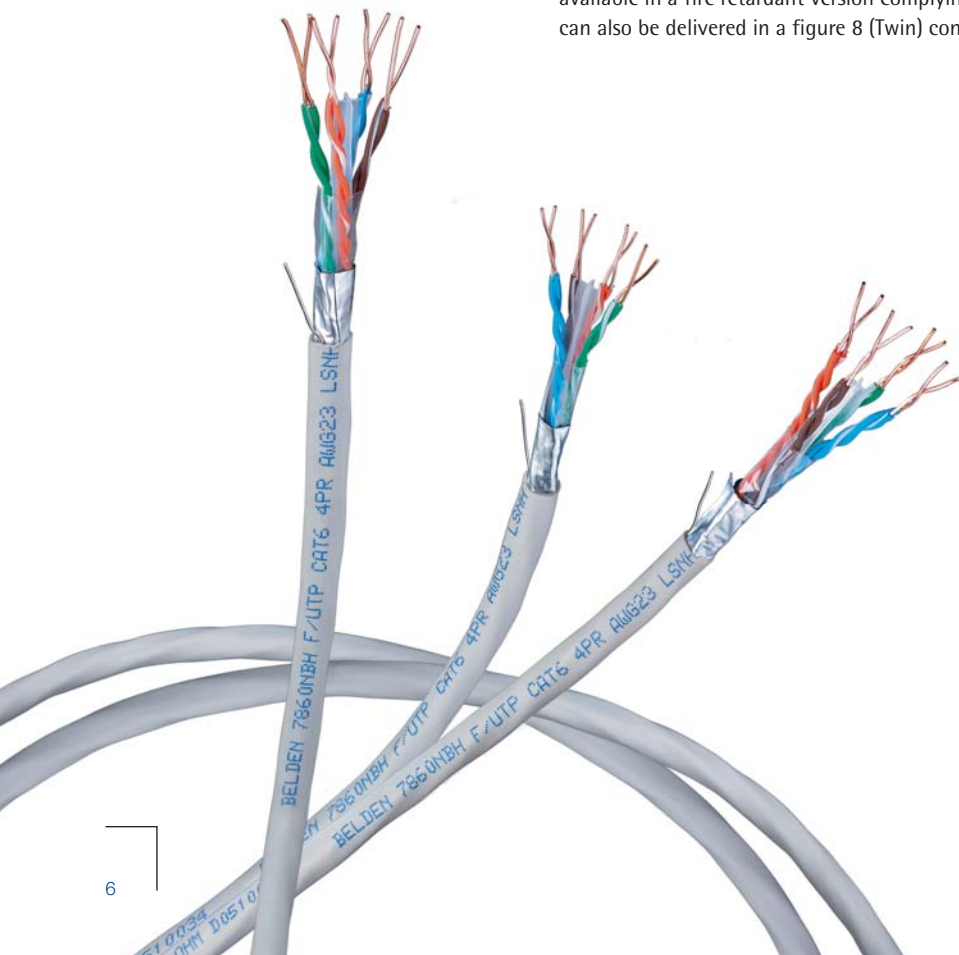
Belden Category 6 cables consist of 4 pairs of 23 AWG insulated copper conductors with a round flexible core construction. The design features a central spline to provide pair separation, and matched conductors on all four pairs, which provide superior electrical performance.

Belden Category 5e cables consist of 4 pairs of 24 AWG insulated copper conductors with a round flexible core construction.

Belden Category 6 cables can be specified in either our Nonbonded-Pair design or in Belden's exclusive Bonded-Pair construction.

In environments where a high EMI protection is needed Belden offers the possibility to use an S/FTP construction. The Belden S/FTP cables match excellently with this module. These S/FTP cables consist of 4 individually foil shielded pairs with an overall braiding.

The cables are available in PVC or LSNH jacketed version. Selected LSNH cables variants are available in a fire retardant version complying with IEC 6033-2-24 (category C). Selected cables can also be delivered in a figure 8 (Twin) construction.





Modular Cords: Patch Cords and Pigtails

Belden Category 6 and Category 5e shielded modular cords exceed all the stringent ISO/IEC 11801 and EN-50288-5-2 standard mechanical stress reliability specifications and provide optimum electrical performance at component level.

The modular cords are LSNH sheathed premium stranded cables for improved flexibility and reliability. They are assembled with improved strain relief and a flexible boot for optimum protection in high-density installations.

Belden shielded modular cords are available in various Belden specified colors.

Patchcords available in:

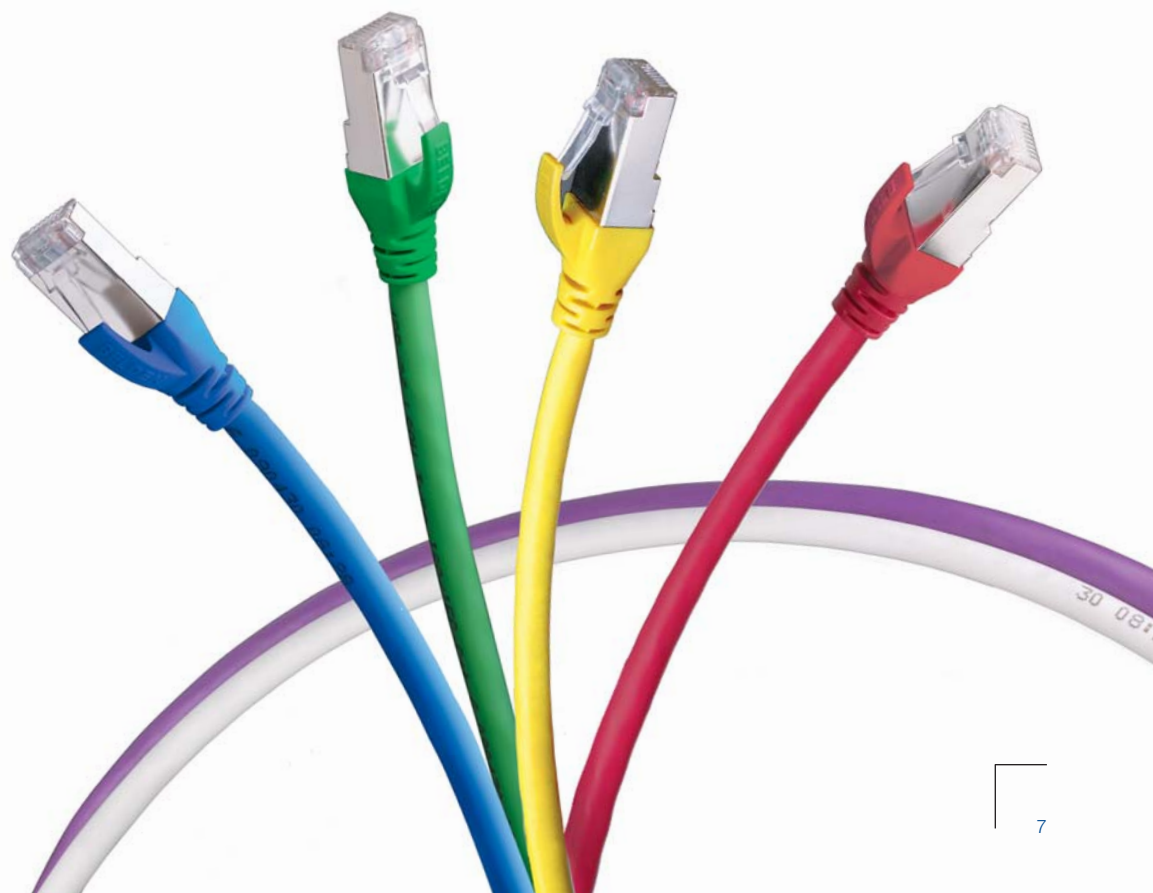
- Category 6 = S/FTP 26 AWG Stranded
- Category 5e = F/UTP 26 AWG Stranded

Pigtails

Also available are high performance solid pigtails for cabling in consolidation points and for equipment cords in cross-connect configuration.

Available in:

- Category 6 = SF/UTP 24 AWG Solid
- Category 5e = SF/UTP 24 AWG Solid



KeyConnect Shielded Patch Panels

Belden KeyConnect patch panels are created on a modular approach based upon the Belden Keyconnect footprint. The series provide a flexible, versatile solution for all installation and application requirements.

Applications include horizontal distribution or equipment terminations, in data centers and telecommunications rooms.

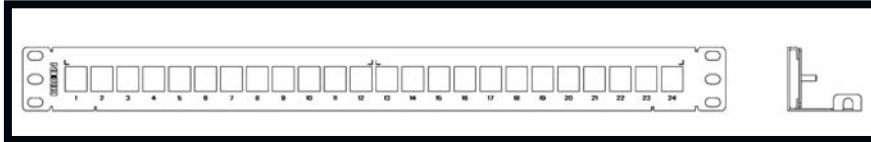
Optimum Flexibility
and Modularity.

The Belden Shielded Panels are available in the following formats:

- Suitable for 19" rack mounting
- 1U – 24 Port
- 2U – 48 Port
- Universally compliant with the KeyConnect Tool less Modular Jack Cat. 5e/Class D and Cat. 6/Class E (Shielded and UTP)
- Cable Management bars and mounting kits are included with these panels
- Easy port identification is provided through pre-printed numbering on both the front and rear of these panels



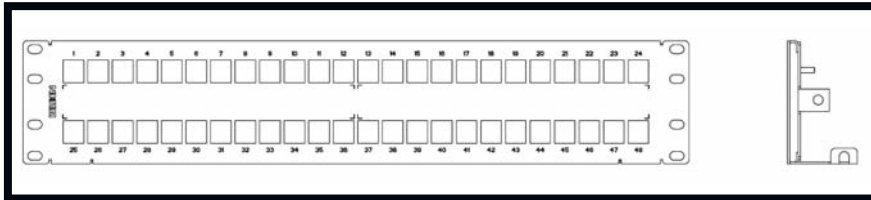
24 port 1U



Dimensions

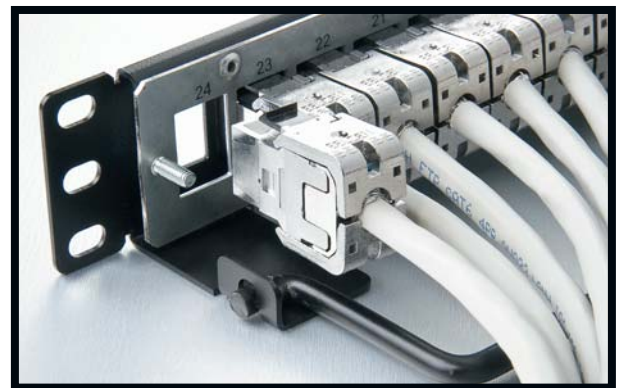
24 port 1U

- (HxWxD) 45x483x33 mm
- Steel, 16 gauge, black (RAL 9005)



48 port 2U

- (HxWxD) 90x483x33 mm
- Steel, 16 gauge, black (RAL 9005)



48 port 2U

System Design



Belden sets out to ensure that each system design is based on a worst case scenario, so you can be assured that our systems will meet your standards based requirement for Gigabit Ethernet applications. Extensive testing enables Belden to prove full system performance. This gives you the absolute certainty not offered by lower-value/alternative systems that claim to be compliant.

Belden offers an unparalleled 25 year warranty on all systems installed and certified by a Belden CSV (Certified System Vendor). This provides assurance and peace of mind whilst protecting your investment, throughout the lifecycle of the system.

Whichever high noise environment solution you select, shielded or unshielded, Belden can deliver the right system to support all your applications. Whether you need a solution in a high noise office, hospital environment or on the factory floor, the new Belden tool-less range delivers Belden quality, performance and reliability with the added benefit of tool-free termination.



Features

- External system verification Cat. 6 (Class E) and Cat. 5e (Class D) – Delta Labs, Denmark
- Quick and Easy termination, enabled through the Tool-less modular jack
- Superior Performance and proven reliability

Applications

- High Noise environments
- Office Networks
- BMS (Building Management Systems)
- Healthcare





Ordering Information

Description	Color	Part Number
KeyConnect Tool less Modular Jack		
Shielded		
Cat. 6	Metallic	NN01361
Cat. 5e	Metallic	NN01360
KeyConnect Shielded Patch Panels		
Unloaded		
24 Port 1U	Black	NN01400
48 Port 2U	Black	NN01401



Ordering Information

How to Create Your Full Part Number?

Before you can order your parts, you need to create a full Part Number. For an example see below:

Step 1: Select Performance, Cable Type and Part Number

(in this example Cat. 6, S/FTP, 26 AWG Stranded = **NN01297**)

Step 2: Select color (in this example green = **05**)

Step 3: Select **C** to indicate coil

Step 4: Select length (in this example 0.5 meters = **D5**)

The full Part Number is: **NN01297.05CD5**

= Cat. 6 Patchcord, S/FTP 26 AWG Stranded, LSNH, Green, 0.5 m

Performance	Cable Type	Part Number	Standard Color		Length	
			Color	Code (AA)	Length (m)	Code (LL)

Belden Shielded Patch Cords

Patch Cords • LSNH							
Cat. 6	S/FTP 26 AWG Stranded	NN01297	.	Brown = 01	C	0.5 = D5	
Cat. 5e	F/UTP 26 AWG Stranded	NN01296	.	Red = 02	C	1 = 1	
				Orange = 03	C	2 = 2	
				Yellow = 04	C	3 = 3	
				Green = 05	C	5 = 5	
				Blue = 06	C	10 = 10	
				Purple = 07	C	15 = 15	
				Grey = 08	C		
				White = 09	C		
				Black = 10	C		



Ordering Guide

Description	Blue	Grey	Green	Yellow	Red	White
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Belden Shielded Patch Cords

Cat. 6 • LSNH • S/FTP • 26 AWG • Stranded						
0.5 m	NN01297.06CD5	NN01297.08CD5	NN01297.05CD5	NN01297.04CD5	NN01297.02CD5	NN01297.09CD5
1.0 m	NN01297.06C1	NN01297.08C1	NN01297.05C1	NN01297.04C1	NN01297.02C1	NN01297.09C1
2.0 m	NN01297.06C2	NN01297.08C2	NN01297.05C2	NN01297.04C2	NN01297.02C2	NN01297.09C2
3.0 m	NN01297.06C3	NN01297.08C3	NN01297.05C3	NN01297.04C3	NN01297.02C3	NN01297.09C3
5.0 m	NN01297.06C5	NN01297.08C5	NN01297.05C5	NN01297.04C5	NN01297.02C5	NN01297.09C5
10.0 m	NN01297.06C10	NN01297.08C10	NN01297.05C10	NN01297.04C10	NN01297.02C10	NN01297.09C10
Cat. 5e • LSNH • F/UTP • 26 AWG • Stranded						
0.5 m	NN01296.06CD5	NN01296.08CD5	NN01296.05CD5	NN01296.04CD5	NN01296.02CD5	NN01296.09CD5
1.0 m	NN01296.06C1	NN01296.08C1	NN01296.05C1	NN01296.04C1	NN01296.02C1	NN01296.09C1
2.0 m	NN01296.06C2	NN01296.08C2	NN01296.05C2	NN01296.04C2	NN01296.02C2	NN01296.09C2
3.0 m	NN01296.06C3	NN01296.08C3	NN01296.05C3	NN01296.04C3	NN01296.02C3	NN01296.09C3
5.0 m	NN01296.06C5	NN01296.08C5	NN01296.05C5	NN01296.04C5	NN01296.02C5	NN01296.09C5
10.0 m	NN01296.06C10	NN01296.08C10	NN01296.05C10	NN01296.04C10	NN01296.02C10	NN01296.09C10



Ordering Information

How to Create Your Full Part Number?

Before you can order your parts, you need to create a full Part Number. For an example see below:

Step 1: Select Performance, Cable Type and Part Number
(in this example Cat. 6, SF/UTP, 24 AWG Solid = **NN01313**)

Step 2: Select color (in this example green = **05**)

Step 3: Select **C** to indicate coil

Step 4: Select length (in this example 5 meters = **5**)

The full Part Number is: **NN01313.05C5**
= Cat. 6 Pigtailed, SF/UTP 24 AWG Solid, LSNH, Green, 5 m

Performance	Cable Type	Part Number	Standard Color		Length	
			Color	Code (AA)	Length (m)	Code (LL)
Pigtails • LSNH						
Cat. 6	SF/UTP 24 AWG Solid	NN01313	Brown = 01	C	5 = 5	
Cat. 5e	SF/UTP 24 AWG Solid	NN01307	Red = 02	C	10 = 10	
			Orange = 03	C		
			Yellow = 04	C		
			Green = 05	C		
			Blue = 06	C		
			Purple = 07	C		
			Grey = 08	C		
			White = 09	C		
			Black = 10	C		



Ordering Guide

Description	Blue	Grey	Green	Yellow	Red	White
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Belden Shielded Pigtails

Cat. 6 • LSNH • SF/UTP • 24 AWG • Solid						
5.0 m	NN01313.06C5	NN01313.08C5	NN01313.05C5	NN01313.04C5	NN01313.02C5	NN01313.09C5
10.0 m	NN01313.06C10	NN01313.08C10	NN01313.05C10	NN01313.04C10	NN01313.02C10	NN01313.09C10
Cat. 5e • LSNH • SF/UTP • 24 AWG • Solid						
5.0 m	NN01307.06C5	NN01307.08C5	NN01307.05C5	NN01307.04C5	NN01307.02C5	NN01307.09C5
10.0 m	NN01307.06C10	NN01307.08C10	NN01307.05C10	NN01307.04C10	NN01307.02C10	NN01307.09C10

Ordering Information

Description	Color*	Part Number
Cables		
Category 6 • Non-bonded • PVC		
F/UTP	Grey, Blue, Purple	7860NBE
Category 6 • Non-bonded • LSNH		
F/UTP	Grey, Blue, Purple	7860NBH, 7860NBC**
F/UTP twin	Grey, Blue, Purple	7868NBH
S/FTP	Grey, Blue, Purple	1885ENH, 1885ENC**
S/FTP twin	Grey, Blue, Purple	1887ENH, 1887ENC**
Category 6 • Bonded • PVC		
F/UTP	Grey, Blue, Purple	7860E
SF/UTP	Grey, Blue, Purple	7860ES
Category 6 • Bonded • LSNH		
F/UTP	Grey, Blue, Purple	7860ENH, 7860ENC**
F/UTP twin	Grey, Blue, Purple	7868ENH
SF/UTP	Grey, Blue, Purple	7860ENS
Category 5e • Non-bonded • PVC		
F/UTP	Grey, Blue, Purple	1633E
F/UTP twin	Grey, Blue, Purple	1668E
SF/UTP	Grey, Blue, Purple	1633ES
Category 5e • Non-bonded • LSNH		
F/UTP	Grey, Blue, Purple	1633ENH
F/UTP twin	Grey, Blue, Purple	1668ENH
SF/UTP	Grey, Blue, Purple	1633ENS

* Other colors available upon request

** Meets IEC 60332-3-24 flame retardancy
Lengths available in 305, 500 and 1000 m.





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See www.beldensolutions.com for a complete listing of Belden Locations.



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