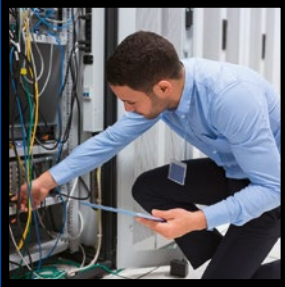


DataTuff® Industrial Ethernet Solutions



**Be certain.
Belden.**

**The Best Fit for Your Industrial
Ethernet Application – from the
Cabinet to the Machine**

Be Certain. Belden Understands Industrial Ethernet.

Optimize your costs by guiding you to the best and most suitable technology for your needs.

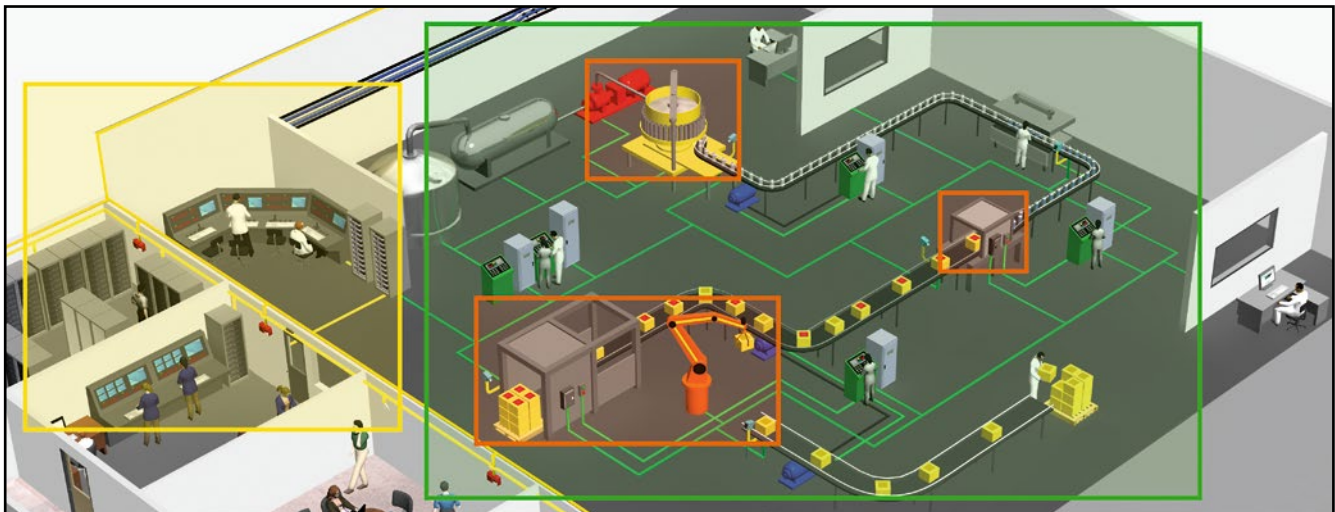
The Belden product portfolio covers all areas of the industrial environment, from the cabinet, through the telecommunications room to the factory floor, and ending on the actual machine. The comprehensive DataTuff® Industrial Ethernet cable and connectivity range ensures the highest level of reliability, quality and performance. Specifiers can choose from products suitable for indoor and outdoor applications, for use underground, and for other harsh conditions. Cordsets come with RJ45 and M12 connectors, and IP20, IP67 and IP68 protection.

The cabling meets all data rate requirements, ranging from 100 Mb/s, through 1 Gb/s, to 10 Gb/s.

How to Select the Right Industrial Ethernet Cable
DataTuff® Industrial Ethernet Cable Selector

Step1: Type of Application

First step is to identify the application of the cable, by understanding where are the cables needed, as of the picture below:



■ Cabinet/Control Room and Permanent Installation

■ Factory Floor and Moderate Flexing

■ On-Machine and Continuous Flexing

Permanent Installation range is suitable for cabinets, control rooms and telecommunication rooms: enclosed environments, where vibration is limited. In these applications, a solid conductor is the right choice, future-proofed with high bandwidth capability.

Moderate Flexing range is aimed at the factory floor and work areas where there are raised levels of vibration, and cables are likely to be exposed to oil, chemicals, rough handling, abrasion, UV radiation, temperature variations, and electronic noise (EMI and RFI).

Continuous Flexing range is for use on the machine itself, where vibration and temperatures are high to very high, and the need is for highly flexible cabling resistant to trailing and torsion, as well as a high level of connectivity protection against liquids (M12 with IP67 protection).



Step 2: Data Rates Requirements

Data Rates	Up to 100 Mb/s	Up to 1 Gb/s	Up to 10 Gb/s
Channel Class ISO/IEC 11801	Class D	Class D	Class E
Belden Recommended Cable Category	Cat 5e (2 pr)	Cat 5e (4 pr)	Cat 7
Belden Recommended Patch Cord Category	Cat 5e (2 pr)	Cat 5e (4 pr)	Cat 6A

Step 3: Type of Jacketing

Function	PVC	FRNC ¹	TPE	PUR ¹
Oil Resistance	**	**	***	***
Abrasion Resistance	**	*	***	****
Continuous Flex	**	*	****	****
Specific Attributes	General purpose, good mechanical strength	Flame retardant, low smoke when burned	Excellent for flexing applications and very good resistance to oils and coolants	Outstanding resistance to abrasion, high flex and high tolerance to solvents
Cost of Installation	\$	\$\$	\$\$\$	\$\$\$
Type of Application	Permanent Installation Moderate Flexing	Permanent Installation Moderate Flexing	Continuous Flexing	Moderate Flexing Continuous Flexing

Legend: * = Fair, ** = Good, *** = Excellent, **** = Outstanding

¹ The FRNC and PUR jackets are also LSNH

Step 4: Unshielded vs Shielded

Function	Unshielded Cables	Shielded Cables
Protection in noisy environment (with high EMI)	Lower	Higher
Ease of Installation	Higher	Lower
Cost of Installation	Lower	Higher

Step 5: Bonded vs Twisted Pair (Nonbonded-Pair)

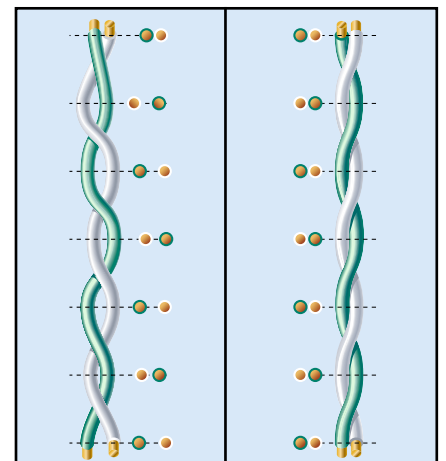
Belden's Patented Bonded-Pair Technology:

- No gaps between the conductor pairs means that the conductor-to-conductor spacing, or centricity, is always uniform
- With a uniform centricity, the cable offers excellent and consistently reliable electrical performance
- Installable Performance[®] is achieved – the affixing of the insulation of the cable pairs and the uniform centricity translate to superior electrical performance, even after the cable has been subjected to the bending, pulling and twists inherent in the installation process








Function	Bonded-Pair	Twisted Pair (Nonbonded-Pair)
Performance after bending, pulling and twists inherent in the installation process	Higher	Lower
Electrical Stability	Higher	Lower

Twisted Pair (Nonbonded-Pair)






Bonded-Pair



Permanent Installation




Product Image	Data Rates	Cat-egory	Conductor (Stranding)		No. of Pairs	Jacket				Shielding		Design		Part. No.
			Solid	Stranded		PVC	FRNC	TPE	PUR	Shielded	Unshielded	Twisted Pair	Bonded Pair	
INDUSTRIAL ETHERNET														
	100 Mb/s	Cat 5e	AWG 24 (1)	-	2	✓	-	-	-	Foil Braid >80%	-	✓	-	72001E
						-	✓	-	-	Foil Braid >80%	-	✓	-	72001NH
	100 Mb/s	Cat 5e	AWG 24 (1)	-	2	✓	-	-	-	-	✓	-	✓	7932A <i>EtherNet/IP</i>
	1 Gb/s	Cat 5e	AWG 24 (1)	-	4	✓	-	-	-	Foil Braid >80%	-	✓	-	74001E
						-	✓	-	-	Foil Braid >80%	-	✓	-	74001NH
	1 Gb/s	Cat 5e	AWG 24 (1)	-	4	✓	-	-	-	-	✓	-	✓	7923A <i>EtherNet/IP</i>
						-	✓	-	-	-	✓	-	✓	7935A <i>EtherNet/IP</i>
	1 Gb/s	Cat 5e	AWG 24 (1)	-	4	✓	-	-	-	✓	-	-	✓	7929A
	10 Gb/s	Cat 7	AWG 23 (1)	-	4	✓	-	-	-	Foil Braid >65%	-	✓	-	74004E
						-	✓	-	-	Foil Braid >65%	-	✓	-	74004NH
PROFINET														
	100 Mb/s	Cat 5e	AWG 22 (1)	-	Quad	✓	-	-	-	Foil Braid >85%	-	✓	-	70006E
						-	✓	-	-	Foil Braid >85%	-	✓	-	70006NH

Moderate Flexing

Product Image	Data Rates	Cat-egory	Conductor (Stranding)		No. of Pairs	Jacket				Shielding		Design		Part. No.
			Solid	Stranded		PVC	FRNC	TPE	PUR	Shielded	Unshielded	Twisted Pair	Bonded Pair	
INDUSTRIAL ETHERNET														
	100 Mb/s	Cat 5e	-	AWG 26 (7)	2	✓	-	-	-	Foil Braid >80%	-	✓	-	72002E
						-	✓	-	-	Foil Braid >80%	-	✓	-	72002NH
						-	-	-	✓	Foil Braid >80%	-	✓	-	72002PU
	1 Gb/s	Cat 5e	-	AWG 26 (7)	4	✓	-	-	-	Foil Braid >80%	-	✓	-	74002E
						-	✓	-	-	Foil Braid >80%	-	✓	-	74002NH
						-	-	-	✓	Foil Braid >80%	-	✓	-	74002PU
	1 Gb/s	Cat 5e	-	AWG 24 (7)	4	✓	-	-	-	-	✓	-	✓	7924A
	10 Gb/s	Cat 7	-	AWG 26 (7)	4	-	-	-	✓	Foil Braid >65%	-	✓	-	74005PU
PROFINET														
	100 Mb/s	Cat 5e	-	AWG 22 (7)	Quad	✓	-	-	-	Foil Braid >85%	-	✓	-	70007E
						-	✓	-	-	Foil Braid >85%	-	✓	-	70007NH
						-	-	-	✓	Foil Braid >85%	-	✓	-	70007PU



Continuous Flexing

Product Image	Data Rates	Cat-egory	Conductor (Stranding)		No. of Pairs	Jacket				Shielding		Design		Part. No.
			Solid	Stranded		PVC	FRNC	TPE	PUR	Shielded	Unshielded	Twisted Pair	Bonded Pair	
INDUSTRIAL ETHERNET														
	1 Gb/s	Cat 5e	–	AWG 24 (7) Trailing ¹	4	–	–	✓	–	Foil Braid >85%	–	–	✓	7938A
	1 Gb/s	Cat 5e	–	AWG 26 (19) Trailing ²	4	–	–	–	✓	Foil Braid >80%	–	✓	–	74003PU
				AWG 26 (19) Torsion ²	4	–	–	–	✓	Foil Braid >80%	–	✓	–	74009PU
PROFINET														
	100 Mb/s	Cat 5e	–	AWG 22 (19) Trailing ²	Quad	–	–	–	✓	Foil Braid >85%	–	✓	–	70008PU
				AWG 22 (19) Torsion ²	Quad	–	–	–	✓	Foil Braid >85%	–	✓	–	70009PU

1 = 10 million cycles
2 = > than 2 million cycles

DataTuff® Specials

Data Rates	Category	Special Environmental Issues									Description*	Part. No.
		Weld-Splatter Resistance	CMX/Outdoor	Underground (burial)	Gasoline Resistance	Oil Resistance I & II	MSHA	Hi/Lo Temp	600V UL AWM Rated	Armored		
INDUSTRIAL ETHERNET												
1 Gb/s	Cat 5e	✓	–	–	–	–	–	–	–	–	Weld-splatter resistant, Continuous Flex – 10 million cycles, TPE jacket	7938A
1 Gb/s	Cat 5e	–	✓	–	–	–	✓	–	–	–	Double PVC jacket	11700A <i>EtherNet/IP</i>
1 Gb/s	Cat 5e	–	–	–	–	✓	–	–	–	–	Double PVC jacket	11700A2
1 Gb/s	Cat 5e	–	–	–	–	–	–	–	–	✓	AL Interlocked Armor, PVC jacket	121700A
1 Gb/s	Cat 5e	–	✓	–	–	–	✓	–	–	–	PVC jacket	7923A <i>EtherNet/IP</i>
1 Gb/s	Cat 5e	–	–	–	✓	–	–	✓	–	–	Plenum Rated – High & Low Temp, FEP jacket	7928A <i>EtherNet/IP</i>
1 Gb/s	Cat 5e	–	–	✓	–	–	–	–	–	–	Halogen Free – Waterblocked Burial, Polyethylene jacket	7934A <i>EtherNet/IP</i>
1 Gb/s	Cat 5e	–	✓	–	–	–	✓	–	✓	–	600 V UL AWM, MSHA Approved, PVC jacket, Shielded	7958A <i>EtherNet/IP</i>
10 Gb/s	Cat 6	–	✓	–	–	–	–	–	✓	–	Double PVC jacket, Shielded	7953A <i>EtherNet/IP</i>
10 Gb/s	Cat 6	–	–	–	✓	–	–	✓	–	–	Plenum Rated–High & Low Temp, FEP jacket	7931A
10 Gb/s	Cat 6	–	–	–	–	–	–	–	–	✓	AL Interlocked Armor, PVC jacket	121872A

*All cables are Bonded Pair design, solid conductor, unshielded – unless specified differently

How to Select the Right Industrial Ethernet Connectivity DataTuff® Industrial Ethernet Connectivity Selector

After specification of the related Ethernet Protocol, the selection of a suitable patch cord is the same as for the Bulk cable (Step 1-5). In addition the type of connector and the type of protection needs to be selected.

Type of Connector

DataTuff® RJ45 and M12 D-coded, M12 X-coded

Type of Protection

For safety, electrical equipment must be protected from any external interference. This is ensured by enclosures which protect the electrical equipment from contact with dangerous parts and prevent ingress of solid foreign objects, dust, humidity and water.



Ingress Protection Class	IP20	IP67	IP68
Solid Protection	Protection against contact with the fingers and solid foreign bodies with $\varnothing > 12\text{mm}$	Total protection against contact, protection against penetration of dust	Total protection against contact, protection against penetration of dust
Liquid Protection	No protection against water	Protection against temporary submersion in water	Protection against permanent submersion in water

Length Selection Table for CAxxx* Patch Cords

1 m	3 m	5 m	10 m	25 m
.00C01	.00C03	.00C05	.00C10	.00C25

Example: for Belden DataTuff® Industrial Ethernet CA00600 patch cord, 25 m, the part number is: **CA00600.00C25**

Permanent Installation

Permanent Installation

Data Rates	Patch Cord Category	Conductor (Stranding)		No. of Pairs	Jacket				Shielding		Design		Connectivity				Part. No.
		Solid	Stranded		PVC	FRNC	TPE	PUR	Shielded	Unshielded	Twisted Pair	Bonded Pair	Plug End 1	Protection End 1	Plug End 2	Protection End 2	
INDUSTRIAL ETHERNET																	
100 Mb/s	Cat 5e	AWG 24 (1)	-	2	✓	-	-	-	Foil Braid >80%	-	✓	-	RJ45	IP20	RJ45	IP20	CA00641
					-	✓	-	-	Foil Braid >80%	-	✓	-	RJ45	IP20	RJ45	IP20	CA00642
1 Gb/s	Cat 5e	AWG 24 (1)	-	4	✓	-	-	-	Foil Braid >80%	-	✓	-	RJ45	IP20	RJ45	IP20	CA00600
					✓	-	-	-	-	✓	-	✓	RJ45	IP20	RJ45	IP20	E501001*
					✓	-	-	-	✓	-	-	✓	RJ45	IP20	RJ45	IP20	E505001*
					-	✓	-	-	Foil Braid >80%	-	✓	-	RJ45	IP20	RJ45	IP20	CA00643
10 Gb/s	Cat 6A	-	AWG 26 (7)	4	✓	-	-	-	Foil Braid >65%	-	✓	-	RJ45	IP20	RJ45	IP20	CA00664
					-	✓	-	-	Foil Braid >65%	-	✓	-	RJ45	IP20	RJ45	IP20	CA00665
PROFINET																	
100 Mb/s	Cat 5e	AWG 22 (1)	-	Quad	✓	-	-	-	Foil Braid >85%	-	✓	-	RJ45	IP20	RJ45	IP20	CA00656
					-	✓	-	-	Foil Braid >85%	-	✓	-	RJ45	IP20	RJ45	IP20	CA00658

*Version in 1 m length. For different length options please contact Customer Service.



Moderate Flexing

Data Rates	Patch Cord Category	Conductor (Stranding)		No. of Pairs	Jacket				Shielding		Design		Connectivity				Part. No.
		Solid	Stranded		PVC	FRNC	TPE	PUR	Shielded	Unshielded	Twisted Pair	Bonded Pair	Plug End 1	Protection End 1	Plug End 2	Protection End 2	
INDUSTRIAL ETHERNET																	
100 Mb/s	Cat 5e	-	AWG 26 (7)	2	✓	-	-	-	Foil Braid >80%	-	✓	-	RJ45	IP20	RJ45	IP20	CA00660
100 Mb/s	Cat 5e	-	AWG 24 (7)	2	✓	-	-	-	-	✓	-	✓	M12MD	IP68	RJ45	IP20	900 001 991*
100 Mb/s	Cat 5e	-	AWG 26 (7)	2	✓	-	-	-	Foil Braid >80%	-	✓	-	M12MD	IP67	M12MD	IP67	CA00713
100 Mb/s	Cat 5e	-	AWG 26 (7)	2	-	✓	-	-	Foil Braid >80%	-	✓	-	RJ45	IP20	RJ45	IP20	CA00661
													M12MD	IP67	M12MD	IP67	CA00717
100 Mb/s	Cat 5e	-	AWG 24 (7)	2	-	-	✓	-	Foil Braid >65%	-	-	✓	RJ45	IP20	RJ45	IP20	900 002 884*
100 Mb/s	Cat 5e	-	AWG26 (7)	2	-	-	-	✓	Foil Braid >80%	-	✓	-	M12MD	IP67	M12MD	IP67	CA00737
1 Gb/s	Cat 5e	-	AWG 26 (7)	4	✓	-	-	-	Foil Braid >80%	-	✓	-	RJ45	IP20	RJ45	IP20	CA00613
1 Gb/s	Cat 5e	-	AWG 24 (7)	4	✓	-	-	-	-	✓	-	✓	RJ45	IP20	RJ45	IP20	900 001 898*
1 Gb/s	Cat 5e	-	AWG 24 (7)	4	✓	-	-	-	✓	-	-	✓	RJ45	IP20	RJ45	IP20	E507001*
													RJ45	IP20	RJ45	IP20	CA00630
1 Gb/s	Cat 5e	-	AWG 26 (7)	4	-	✓	-	-	Foil Braid >80%	-	✓	-	RJ45	IP20	RJ45	IP20	CA00652
													M12MX	IP67	RJ45	IP20	CA00653
													M12MX	IP67	M12MX	IP67	CA00654
10 Gb/s	Cat 6A	-	AWG 26 (7)	4	-	-	-	✓	Foil Braid >65%	-	✓	-	M12MX	IP67	RJ45	IP20	CA00653
													M12MX	IP67	M12MX	IP67	CA00654
PROFINET																	
100 Mb/s	Cat 5e	-	AWG 22 (7)	Quad	✓	-	-	-	Foil Braid >85%	-	✓	-	RJ45	IP20	RJ45	IP20	CA00730
100 Mb/s	Cat 5e	-	AWG22 (7)	Quad	✓	-	-	-	Foil Braid >85%	-	✓	-	M12MD	IP67	M12MD	IP67	CA00738
100 Mb/s	Cat 5e	-	AWG 22 (7)	Quad	-	✓	-	-	Foil Braid >85%	-	✓	-	RJ45	IP20	RJ45	IP20	CA00735
100 Mb/s	Cat 5e	-	AWG22 (7)	Quad	-	✓	-	-	Foil Braid >85%	-	✓	-	M12MD	IP67	M12MD	IP67	CA00739
100 Mb/s	Cat 5e	-	AWG22 (7)	Quad	-	-	-	✓	Foil Braid >85%	-	✓	-	M12MD	IP67	M12MD	IP67	CA00740

Moderate Flexing

Continuous Flexing

Data Rates	Patch Cord Category	Conductor (Stranding)		No. of Pairs	Jacket				Shielding		Design		Connectivity				Part. No.
		Solid	Stranded		PVC	FRNC	TPE	PUR	Shielded	Unshielded	Twisted Pair	Bonded Pair	Plug End 1	Protection End 1	Plug End 2	Protection End 2	
INDUSTRIAL ETHERNET																	
100 Mb/s	Cat 5e	-	AWG 26 (7)	2	-	-	-	✓	Foil Braid >85%	-	✓	-	M12MD	IP68	M12MD	IP68	0985 S4549 100*
PROFINET																	
100 Mb/s	Cat 5e	-	AWG22 (19) Trailing ²	Quad	-	-	-	✓	Foil Braid >85%	-	✓	-	M12MD	IP67	M12MD	IP67	CA00666
100 Mb/s	Cat 5e	-	AWG22 (19) Torsion ²	Quad	-	-	-	✓	Foil Braid >85%	-	✓	-	M12MD	IP67	M12MD	IP67	CA00741

2 = > than 2 million cycles

*Version in 1 m length. For different length options please contact Customer Service.

Continuous Flexing

GLOBAL LOCATIONS

More information can be found at
www.beldensolutions.com



**Be certain
you stay
in touch.**

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