

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.

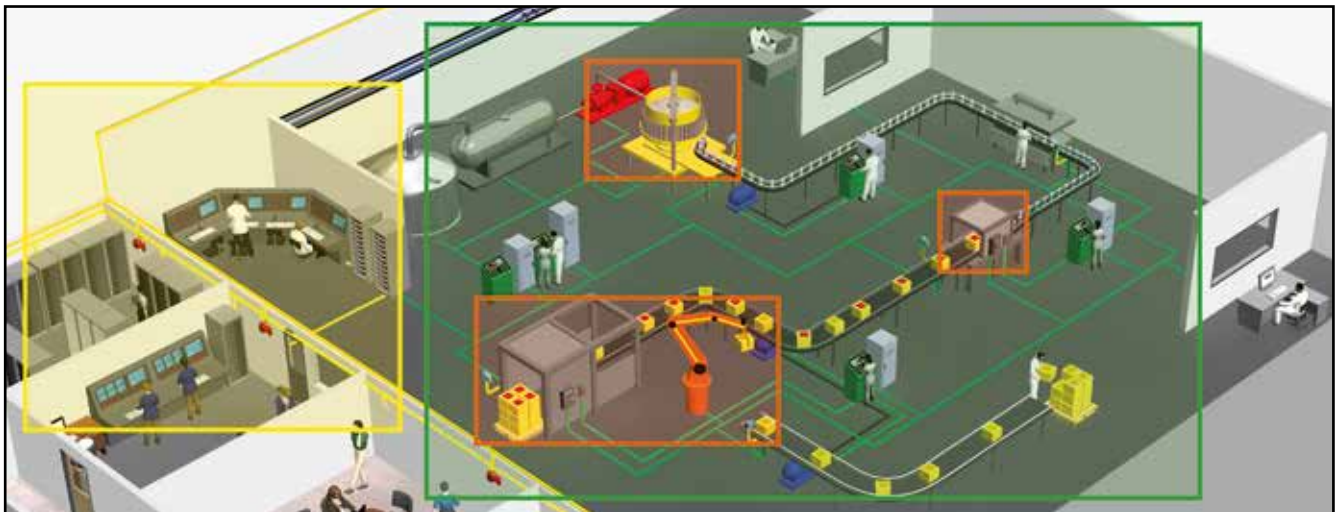
The Belden product portfolio covers all areas of the industrial environment, from the cabinet, through the telecommunications room to the factory floor, and ending on the actual machine. The comprehensive DataTuff® Industrial Ethernet cable and connectivity range ensures the highest level of reliability, 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 IP20 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.



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)

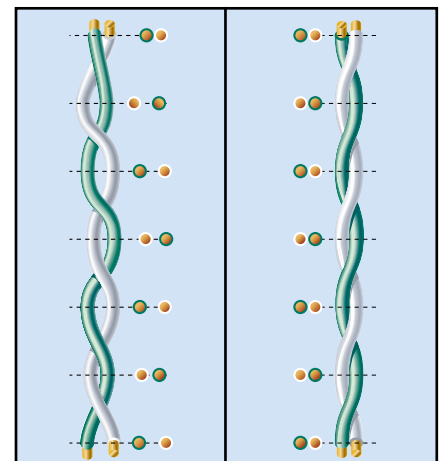
Belden's Patented Bonded-Pair Technology:

- 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%	-	✓	-	-
	1 Gb/s	Cat 5e	AWG 24 (1)	-	4	✓	-	-	-	-	✓	-	✓	7923A <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%	-	✓	-	-
PROFINET														
	100 Mb/s	Cat 5e	AWG 22 (1)	-	Quad	✓	-	-	-	Foil Braid >85%	-	✓	-	70006E
						-	✓	-	-	Foil Braid >85%	-	✓	-	-



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

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).

Type of Connector

DataTuff® RJ45

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
Solid Protection	Protection against contact with the fingers and solid foreign bodies with $\varnothing > 12\text{mm}$
Liquid Protection	No protection against 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 CA00666 patch cord, 25 m, the part number is: **CA00666.00C25**



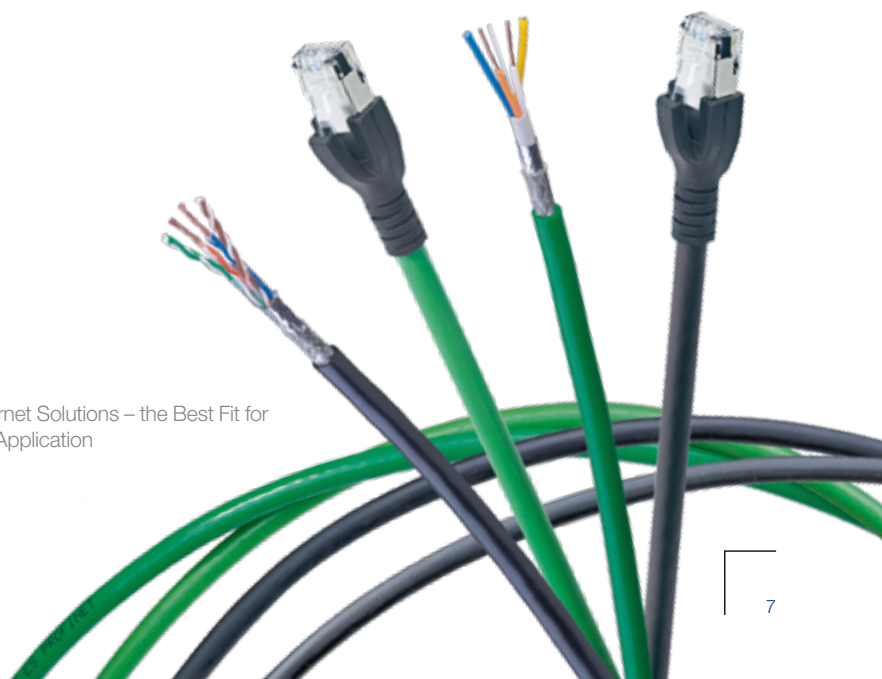
Data Rates	Patch Cord Category	AWG (Stranding)	No. of Pairs	Assembly Cable Reference	Jacket	Shielding	Connectivity	Cable Ratings	Patch Cord Part. No.
10 Gb/s	Cat 6A	26 (7)	4	74005NH	LSZH	Foil Braid >65%	IP 20 RJ45-RJ45	HS, SR, OR, Halogen Free	CA00666
10 Gb/s	Cat 6A	26 (7)	4	74005PU	PUR	Foil Braid >65%	IP 20 RJ45-RJ45	HS, SR, OR	CA00652
1 Gb/s	Cat 5e	24 (1)	4	74001E	PVC	Foil Braid >80%	IP 20 RJ45-RJ45	HS, SR, OR	CA00600
1 Gb/s	Cat 5e	24 (1)	4	74001NH	LSZH	Foil Braid >80%	IP 20 RJ45-RJ45	HS, SR, OR, Halogen Free	CA00643
1 Gb/s	Cat 5e	24 (7)	4	74002E	PVC	Foil Braid >80%	IP 20 RJ45-RJ45	HS, SR, OR	CA00613
100 Mb/s	Cat 5	26 (7)	2	72002PU	PUR	Foil Braid >80%	IP 20 RJ45-RJ45	HS, SR, OR	CA00662
100 Mb/s	Cat 5	22 (7)	2	70007E	PVC	Foil Braid >80%	IP 20 RJ45-RJ45	HS, OR, Profinet Type B	CA00730
100 Mb/s	Cat 5	22 (1)	2	70006E	PVC	Foil Braid >80%	IP 20 RJ45-RJ45	HS, OR, Profinet Type A	CA00656

Notes: **HS** High Shield
SR Sunlight Resistant (black only)
OR Oil Resistant



DataTuff® Industrial Ethernet Ruggedized RJ45 Plug Kit – suitable for use in IP20 unsealed installations

DataTuff® Industrial Ethernet Solutions – the Best Fit for your Industrial Ethernet Application



GLOBAL LOCATIONS

More information can be found at
www.beldensolutions.com



**Be certain
you stay
in touch.**

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