

TB65-6th Edition

This Digital Studio Cable Guide will help you understand the important aspects of digital cables and the correct part numbers to use for a given format.



Digital Studio Cable Guide



We are in the midst of a digital revolution. Radio and television broadcasters are going digital. Digital formats have worked their way into recording studios, video post-production, film production and many associated applications, and the reason is clear – digital provides superior audio and video performance.

Bit stream coding is a vast simplification of complex audio and video signals. But because the signal is data, receiving equipment can decipher the bit stream, ignore any noise and correct for any attenuation. Audio and video signals are so sophisticated and complex however – reducing them to data code requires much higher frequencies than if they were left in analog sine waves. Digital audio and video cables need to handle ever-higher digital frequencies. Also because this is audio and video, it must be processed in real-time, in sequence, and live. We only give alphanumeric “data” the luxury of re-transmits, processing delay, and blank screen tolerance. Audio and video signals must remain on-air, without any pause to “compile.” These are the challenges broadcast quality audio and video cables have to meet.

Digital is very stable, which reduces equipment adjustments significantly. Copies or reproductions retain the quality of the original. Signal

degradation is virtually eliminated, and noise immunity is greatly improved. Whether it’s a radio, TV or post-production application, all of these advantages result in improved picture and sound quality as well as interactivity, high-speed data and Internet access, pay-per-view services, simultaneous data/Internet access and personalized electronic news.

Although digital promises to revolutionize the audio and video industry as we know it, it also poses a challenge when it comes to designing, choosing, and installing a new system. It has been estimated that there may be as many as 18 different DTV formats to choose from, with new ones being proposed all the time, all of which vary in the level of compression and transmission frequency. Various options also face the radio industry.

With all of these equipment options available, it becomes very important in the design phase to determine the correct cable to connect each of these pieces of equipment. The wrong choice in cable can be as costly as the wrong choice in equipment.

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Although digital promises to revolutionize the audio and video industry as we know it, it also poses a great challenge when it comes to designing, choosing, and installing a new system.

Digital Audio

The specification for digital audio was developed jointly by the Audio Engineering Society and European Broadcast Union (AES/EBU). The two key electrical parameters in this specification that pertain to cable are the data rate, which depends on the sampling rate (see table below) and an impedance of 110 ohms \pm 20% for twisted pair constructions and 75 ohms for coax designs.

Sampling Rate	Bandwidth
48.0 KHz	6.144 MHz
96.0 KHz	12.228 MHz
192.0 KHz	24.576 MHz

Note: Attenuation of digital signals and distance data are shown on page 11.

Twisted Pair Parameters

The AES/EBU specification, with its broad impedance tolerance, allows for cables with impedances from 88 ohms to 132 ohms to be used, with 110 ohms being ideal. While twisted-pairs with foil shields are commonly used, the option of UTP, unshielded twisted pairs, such as Category 5e or Category 6 is also common. Foil shields (such as Belden 1800B) are appropriate for permanent installations. Braid shields (such as Belden 1800F) are better for flexing applications, such as patch cables. Specialized UTP cables, such as Belden 1353A single-pair Category 5e patch cable, are also available for AES/EBU applications.

The cables are terminated with either XLR connectors or are punched down or soldered in patch panels. Most digital audio cables utilize foam polyethylene to minimize the cable's size. Standard foam polyethylenes are susceptible to crushing which can change impedance. Belden cables utilize a special foam high-density polyethylene that provides exceptional crush resistance when compared to standard foam insulations.

The advent of digital microphones requires AES/EBU cable designs with added flexibility, such as Belden 1800F, a 110 ohm design featuring our ultra-flexible "French Braid" construction.

Can analog cables be used for digital? Yes, but only for distances of roughly 50 ft. or so. The actual length is determined by the error correction and jitter tolerance of the receiving device. The impedance of most analog cables ranges from 40 ohms to 70 ohms. This large mismatch from the nominal 110 ohms results in signal reflection and jitter causing bit errors at the receiver. Also, the high capacitance of analog cables greatly decreases the rise time of digital square waves.

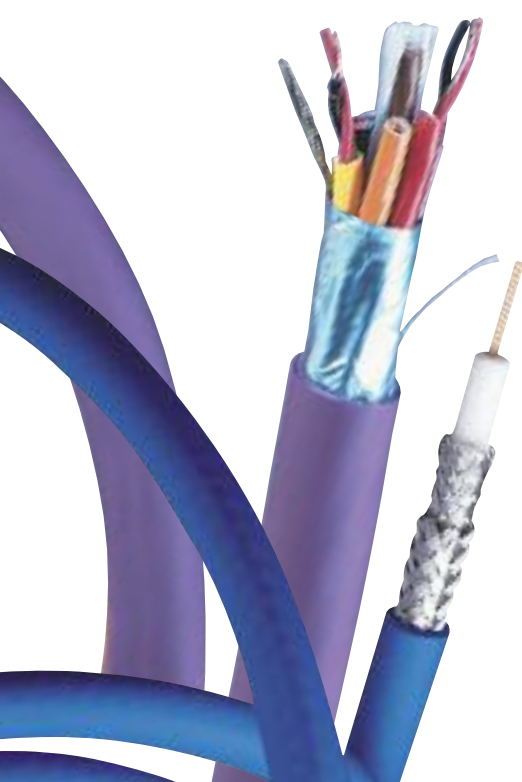
Can digital cables (paired) be used for analog? Absolutely! The capacitance of digital cables is extremely low, making them a superior analog cable.

Digital Audio Over Coax

The transmission of digital audio over 75 ohm coax requires the use of baluns unless the device contains unbalanced coax AES inputs or outputs or the audio signal is embedded on a digital video signal. The baluns convert the unbalanced 75 ohm coax signal to a 110 ohm balanced transmission.

Much greater transmission distances are obtainable over coax as compared to twisted pair. The same coax used for digital video is ideal for digital audio. The coax used should have a pure copper center conductor (no copper covered steel or aluminum) and have good braid coverage (90% or more). Using one coax for both audio and video gives the added advantage of using one type of strip and crimp tool and one type of connector.

Embedding the audio is popular in TV applications. Embedded signals are often used in "pass through" installations such as cable head-ends. However, if audio manipulation is desired, such as spot insertion or replacement, then audio must be "de-embedded" or de-multiplexed from the video stream. This is a complex and expensive procedure. For maximum versatility, separate audio and video runs are suggested.





Digital and HD Radio

When radio broadcast converts to digital – the cable selection will be equally critical and arguably more so. The basic specification parameters for digital audio cable are entirely different than for analog audio. The key attribute for the cable is no longer lower capacitance as in analog audio. The Digital Audio signal is impedance specific and it is the impedance of the cable that is now critical. Fortunately, by nature of their design, Digital Audio cables have built-in low capacitance which makes them excellent analog cables. (The converse is not true: almost no excellent - or even good - analog audio cables are suitable for digital, because they were not designed with digital audio's impedance in mind.) The point: whether you're converting to digital now or later, whether you're converting wholly or partially, whether you'll be broadcasting 100% digitally or simulcasting analog and digital – Digital Audio cabling is essential to efficient design and value engineering. Even if your immediate needs are strictly analog, installing AES/EBU digital audio cable, like 1800B, now will give you the best performing analog audio service, and will spare you cable replacement when the day arrives that you upgrade to digital. This is the key to "futureproofing."

Where AES/EBU balanced format is used, 110 ohm shielded balanced line cables are the standard. IP technology may be employed to integrate station data networking resources and requirements with programming and advertising content. Where IP technology is deployed, high quality UTP (Category 5e, Category 6 UTP, or MediaTwist®) can be used. Television stations may choose to use the AES3-id format, employ baluns, and carry digital audio over a 75 ohm coax infrastructure.

Radio Broadcasts will benefit tremendously from Digital Conversion and will be driven by the benefits it offers – even without government mandate: AM clarity equal to current FM; FM clarity rivaling current CDs; new embedded text offering news, weather, traffic, and financial market information, interactivity, customization, and audio-on-demand. Digital Conversion in radio broadcasting may happen

quickly because of low entry barriers: A low cost to convert, its use of the existing spectrum, and the preservation of existing analog service permitting consumers to upgrade on their own timetable. However this revolution unfolds, and however your station deploys, Belden has the cable for AES/EBU, IP or AES3-id digital and HD Radio upgrades.

Digital Video (SDI)

The Society of Motion Picture and Television Engineers (SMPTE) has developed two different standards for serial digital transmissions (SDI). There is also a European standards body known as ITU (formerly CCIR) that developed the European PAL specifications. Each of these specifications differs in bandwidth and transmission technology.

- **SMPTE 259M** – Covers digital video transmissions of composite NTSC 143 Mb/s (Level A) and PAL 177 Mb/s (Level B). It also covers 525/625 component transmissions of 270 Mb/s (Level C) and 360 Mb/s (Level D).
- **SMPTE 292M** – Covers the format for HD transmissions at 1.485 Gb/s.
- **ITU-R BT.601** – International standard covers component PAL transmissions of 177 Mb/s.
- **SMPTE 424M** – Covers the newest format for HD transmissions at 3 Gb/s.

Coax Parameters

Newer coax constructions that have been designed specifically for digital transmissions offer performance advantages over the old analog designs. These new constructions employ several design parameters to provide the precision electrical characteristics required for high frequency transmissions over longer distances.

- **Center Conductor** – The center conductors are solid bare copper. Solid conductors provide better impedance stability and return loss (RL). RL expresses the amount of signal lost due to the signal reflecting back to the source. This reduces the signal reaching the receiver, thus increasing attenuation and decreasing effective transmission distance.

- **Digital transmissions** contain low frequency elements that travel down the center of the conductor and high frequency elements that travel on the outside of the conductor due to skin effect. For these reasons, uncoated pure copper conductors are used for optimum performance.
- **Dielectric** – The dielectric material (insulation) consists of foam high-density polyethylene. The special formulation Belden uses is more crush-resistant than standard foam polyethylenes and is less prone to conductor migration. Both crushing and conductor migration can cause a change in the cables impedance which, in turn, will cause an increase in RL. While the nominal velocity of propagation of a solid dielectric is 66%, gas injection technology provides extremely consistent foaming and high velocities of propagation (82 to 84%). The velocity is kept very constant to minimize timing problems. Foam dielectrics reduce the size of the coax compared to older solid dielectric designs.
- **Shield** – Precision analog cables utilize double braid shields which are not optimum for digital's high frequencies. Braid shields are ideal for frequencies under 10 MHz while foil shields work best above that frequency. Since digital transmissions contain both low and high frequencies, foil-braid designs are used.
- **Testing** – Lastly, to ensure that the cables are electrically sound, every reel must be 100% sweep tested for RL to at least the third harmonic of the fundamental frequency. For HD cables at an uncompressed data rate of 1.485 Gb/s, this gives a bandwidth of 750 MHz and a third harmonic frequency of 2.25 GHz (3 x 750). Belden sweep tests many of its HD cables to 4.5 GHz, with guaranteed minimum RL steps of 23 dB from 5 MHz to 1.6 GHz and 21 dB from 1.6 GHz to 4.5 GHz. More technical information on RL and other cable parameters can be found on Belden's website at www.belden.com.

With digital audio cables, much greater transmission distances are obtainable over coax versus twisted pair. The coax used should have a pure copper center conductor and good braid coverage.

Installable Performance®

When looking at guaranteed performance on a cable's data sheet, one naturally expects that the cable will deliver that same performance after it has been installed. This assumption doesn't always hold true, however, because the installation itself can dramatically alter the cable performance.

Typically, when cables are installed they are pulled and yanked on, bent around corners, stepped on, and may kink when coming off the reel. All of these factors can change the physical properties of the cable, which in turn may degrade the cable's electrical performance.

To help ensure that the cable's electrical performance is not compromised through improper installation techniques, three key cable attributes must be held to a high level: conductor adhesion, crush resistance and Return Loss.

Conductor Adhesion

Conductor adhesion is most important to connectorization and connector reliability. Improper levels of conductor adhesion can make the connectorization process harder and can cause connector failures both during and after installation. If adhesion levels are too low, the conductor can move within the dielectric and actually migrate and appear to grow or lengthen in the cable. A cable with low conductor adhesion may appear to be fine prior to installation. However, the rigors of installation can break the conductor adhesion due to all of the pulling and bending that occurs. Once the bond between the conductor and insulation is broken, the conductor migration can, in some cases, result in the center pin of the BNC connector being pushed out of the casing. To prevent this from occurring, Belden uses a skin/foam insulation process that ensures a high degree of conductor adhesion. In addition, all Belden cables are tested for conductor adhesion to further ensure performance.

Crush Resistance

As stated earlier, most of the cables used for SDI are foam dielectrics. Foam dielectrics are, by nature, softer than their solid counter parts. If the cable is improperly handled or installed, the dielectric can be crushed and deformed thereby changing the impedance and causing RL. The special proprietary formulation Belden uses is more crush-resistant than standard foam polyethylene making it far less prone to deformation.

Return Loss Headroom

In order to ensure the SMPTE minimum level of 15 dB RL is met, the cables used must be several dB better to ensure the minimum level is met after the rigors of installation. Other components in the transmission chain can also degrade RL such as a bad termination or improper patch bay connections. Belden's guaranteed minimum level of 21 dB RL gives the user 6 dB of RL headroom to account for such potential inconsistencies.

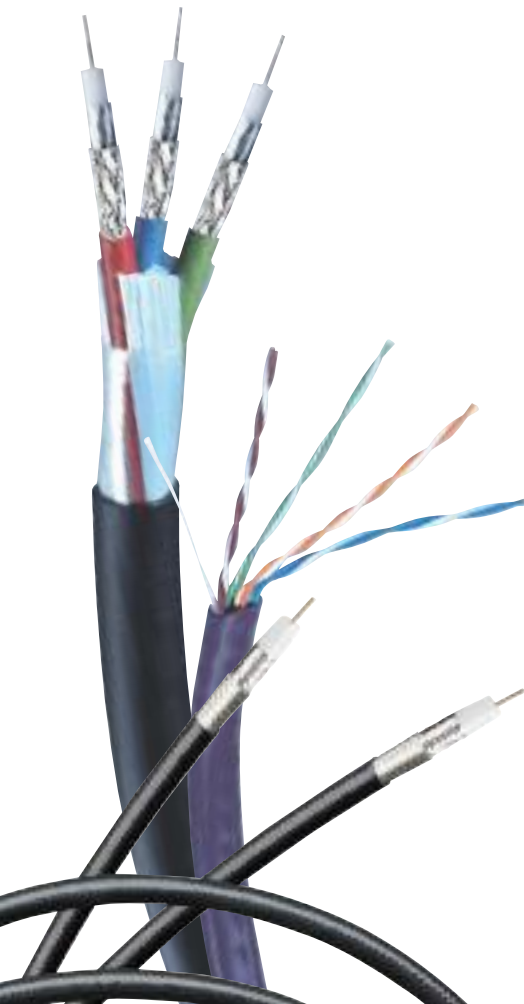
Careful attention to all of the above attributes ensures that the cable the customer receives from Belden will meet performance specifications after installation. After all, that is what Installable Performance is all about.

Can analog coax cables be used for digital?

Standard video cables may have stranded center conductors or copper covered steel. They also may not have adequate shielding as mentioned above. Standard video cables are usually not tested for RL. Beware of plain old coax!

Can digital coax cables be used for analog?

Yes, but only if your plant has analog cable equalization (EQ) designed to work within the loss characteristics of the particular coax. If the transmission distance is short, equalization may not be a problem. Many equipment manufacturers are now making equalization cards designed specifically for the new digital cables when running analog.





Can I mix foam and solid polyethylene designs together in the same run?

If you run analog in short un-equalized runs, you can mix cables together. However, you will have two connectors, with different dimensions, two different stripping tools, and two different crimping tools. For longer EQ'd runs combining two cables would make it difficult or impossible to equalize. Belden suggests you standardize on one cable for as long as you can. Foam core cables have a delay of 1.24 ns/ft compared to 1.54 ns/ft. for solid polyethylene. The loss characteristics of the cables will also be different. Both parameters must be taken into consideration if mixing cable types. As a rule of thumb, it's best to stay with one design throughout.

Video Connectors

Most connectors used for analog video are 50 ohm BNCs. In analog video, where the quarter wavelength of the signal is approximately 60 feet, the impedance mismatch of a 1/2 inch BNC connector, or even a dozen in a row, is minimal. However, the quarter wavelength of a digital signal can be as short as one inch at HD frequencies, and even shorter at 1080p/60. Most video signals go through many connectors in a typical studio. For this reason, it is recommended to use not only 75 ohm connectors, but also connectors demonstrated to maintain their impedance up to at least the third harmonic of the HD clock (750 MHz). For 1080p/60, every component should be tested to 4.5 GHz. That's why it's a good idea to ask your cable and connector supplier if all the components selected – cables, connectors, etc. – are tested to 4.5 GHz.

Cable Installation

Care must be taken when installing digital, and especially high definition, coax. Improper handling, cable pulling and installation techniques can deform the cables which can in turn cause a RL problem. The following practices should be utilized when installing any digital cable.

Installation Basics

- Do not step on the cables.
- Do not lay equipment on the cables.
- Do not kink the cables.
- Cable pulls should be done in a slow steady fashion – no jerking. Do not exceed the cables maximum pulling tension (call the manufacturer for this information).
- Do not exceed the minimum bend radius of the cable: 10 times the diameter of the cable.
- Do not cinch cable ties too tightly. If you cannot move any cable inside a tied bundle, the cable tie is too tight.
- Do not put cable ties or J hooks at identical distances apart. This can lead to deformation at a given wavelength, which can cause RL. Place cable ties at random distances.
- Cables should be supported by cable trays, J-hooks, etc. to take the gravitational forces off of the cable. Cable sag should be less than 8 inches.
- Conduit runs in excess of 90' and/or with more than two 90° equivalent turns should include a pull box. Each 90° turn is equivalent to the friction of a 30' straight conduit run.
- If cable is pulled into conduit, an anti-friction lubricant should be used that is compatible with the cable jacketing material.
- Maintain the original physical shape of the cable.

Testing Digital Video

Belden suggests measuring and documenting the RL on every link to ensure that the SMPTE minimum suggested level of 15 dB is met. RL is the measurement of reflected signal caused by impedance discontinuities in the channel. These discontinuities are caused by connectors, cable, transition devices, patch panels and improper cable installation or handling. Any reflected energy reduces the power of the transmitted signal. Measuring RL will give a good expectation of just how well each link will do with SDI or HD video.

Digital Camera Cables

In 1998 the Society of Motion Picture and Television Engineers (SMPTE) developed the industry standard SMPTE 311 for High-Definition Television Camera cables to assure clear, reliable transmission of audio, video and camera control cables.

Belden's new composite cable incorporates two tight-buffer, single-mode 10µm optical fibers for video, four 20 AWG or two 16 AWG auxiliary conductors (depending on the design) and two 24 AWG signal conductors. The fibers, color-coded blue and yellow, permit long-haul transmission of critical audio and video signals with extraordinary reliability and clarity. The new standard provides a cable smaller in diameter and lighter in weight than traditional camera cables resulting in easier handling during installation or in field applications.

Belden's SMPTE 311 cables are 7804R and 7804C. 7804R is made with tight buffer fiber designs and (4) 20 AWG auxiliary (power) conductors per traditional design parameters. 7804C has been designed with breakout fibers to enhance ruggedness and with (2) 16 AWG auxiliary (power) conductors to simplify termination and reduce installation time. In addition, a central stainless steel strength member is used for additional durability during installation. The overall jacket is black Belflex® providing exceptional flexibility.

The Future

Unshielded Twisted Pairs (UTP)

The digitization of audio and video signals has given rise to a convergence with data wiring technology, which utilizes unshielded twisted pairs.

It is a misconception to equate digital signals to digital data signals though, simply because "they are both digital." Ethernet protocols allow for the use of packets which may be scrambled, transmitted, certain packets re-transmitted, unscrambled and recompiled before the information is presented. All that

The digitization of audio and video signals has given rise to a convergence with data wiring technology, which utilizes unshielded twisted pairs. Depending on bandwidth or distance, fiber optic cables may be used.

processing and reprocessing introduces delay which we tolerate for this media. Audio and video bit streams are required to arrive at "real time" with minimal time delay or "latency." And we require its playback to occur live and in real time. Just as a picture is worth a thousand words and can be taken in the blink of an eye — audio and video signals are much more than "data" — even when they are digital.

While almost any UTP cable can handle low-bandwidth or low data-rate applications (such as a telephone), few cables can handle signals like 270 Mb/s digital video for appreciable distances. Like coax, it's a question of what bandwidth (frequency) or data rate and how far. Distance is the key.

The consistency of a UTP cable determines the transmission distance. Physical characteristics of concentricity, conductor-to-conductor and pair-to-pair spacing relationships, and how well they are maintained along the length of the cable determine how far a signal at a given frequency can be carried without excessive attenuation. The quality of the cable determines the quality of the signal at a distance.

NanoSkew®

NanoSkew (7987R) is a 4-pair, 100 ohm 24 AWG UTP cable with no EIA/TIA data category rating. It is designed for the lowest possible skew delay difference between pairs, which is the critical factor for component video applications. NanoSkew is designed specifically for video, and is strictly for video applications. It should not be used where Ethernet data will be transmitted. See Belden new product bulletin NP212 for complete details about NanoSkew Cables.

Brilliance VideoTwist®

Brilliance VideoTwist cables are Category 5e and Category 6 cables incorporating low-skew characteristics for video performance. Most Ethernet cables are not designed with video in mind, so do not pay as close attention to minimizing skew and to delivering consistent skew performance. In Belden VideoTwist cables, the insulated conductors

of each pair are bonded together so they maintain their spacing and orientation throughout the run, around bends, and during the rigors of installation. This gives them the consistent physical characteristics so important for stable impedance. Their blend of Video performance (low skew between pairs) and Data rating make Brilliance VideoTwist the ideal choice for shared sheath applications, for video over IP, for KVM applications, and where one cable is preferred for both data circuits and for video circuits. Belden Bulletin NP212 provides full details on Brilliance VideoTwist cables.

Fiber Optic Cables

At some point, either in bandwidth or distance, copper cables may not be able to perform the task at hand. In these cases, fiber optic cables are an option. Fiber comes as either single-mode or multimode core constructions. Multimode has a 50 micron or 62.5 micron fiber core. 62.5 micron fiber has a modal bandwidth of 160 MHz at 850 nm and 500 MHz at 1300 nm. Single-mode has an 8.3 micron core with a theoretical exit bandwidth into the gigahertz, essentially unlimited. Technologies are now extending even these bandwidths. Multimode and single-mode connectors are easy to install and can be field installed in minutes. Belden offers a comprehensive line of fiber optic cables and rapid field connectors.

Environmental Compliance

The use of materials that are environmentally friendly is of growing concern to Belden, its broadcast customers and to the global community. As a result, 100% of all Belden Digital Audio and Video Cables, and virtually all of the remaining Belden broadcast cables, now meet the requirements of both the Restriction on Hazardous Substances (RoHS) Directive and California Proposition 65. Consult the Belden Master Catalog for more information.







AES/EBU Digital Audio Cable Single- and Double-Pair Cables

Description	Part No.	UL NEC/ C(UL) CEC Type	No. of Pairs	Color Code	Standard Lengths		Standard Unit Weight		Nom. DCR		Nominal OD		Nom. Imp. (Ω)	Nom. Vel. of Prop.	Nom. Capacitance			
					Ft.	m	Lbs.	kg	Cond.	Shield	Inch	mm			* pF/ Ft.	* pF/ m	** pF/ Ft.	** pF/ m

26 AWG Stranded (7x34) .018" Tinned Copper • Twisted Pair • Beldfoil® Shield • 26 AWG Stranded TC Drain Wire


Datalene® Insulation • Chrome or Violet PVC Jacket																		
2-Conductor Digital Video Time Code Cable 80°C	9180	NEC: CMR CEC: CMG FT4	1	Black, White	1000	304.8	11.0	5.0	37.3Ω/M' 122.3Ω/km	23.1Ω/M' 75.8Ω/km	.144	3.66	110	76%	13	43	26	85
 <p>Shorting Fold</p>																		
For cross-connect use with 7891A (et al.) Digital Audio Snake Cables, see page 8.																		

24 AWG Stranded (7x32) Tinned Copper • Twisted Pairs • Overall 100% Beldfoil Shield • 24 AWG Drain Wire


Datalene Insulation • Slate Gray or Violet PVC Jacket																		
60°C	1800B	NEC: CMG CEC: CMG FT4	1	Black, Red	500* U-1000 1000 5000*	152.4 U-304.8 304.8 1524.0	12.0 18.0 18.0 88.8	5.5 8.2 8.2 40.4	23.7Ω/M' 77.7Ω/km	18.9Ω/M' 62.0Ω/km	.177	4.57	110	76%	13	43	26	85
																		
For cross-connect use with 1803F (et al.) Digital Audio Snake Cables, see page 8.																		
For Plenum version of 1800B, see 1801B.																		

*500 ft. put-up available in Gray only. 5000 ft. put-up available in Violet only.
The jacket and shield are bonded so both can be removed with automatic stripping equipment.


24 AWG Stranded (42x40) HC Bare Copper • Conductors Cabled with Fillers • TC "French Braid" Shield (95% Coverage) • BC Drain Wire

Datalene Insulation • Matte PVC Jacket (Red, Yellow, Green, Blue, Gray or Black)																		
Digital Mic Cable High-Flex 60°C	1800F	NEC: CL2R	1	Black, Red	500^ U-1000 1000^	152.4 U-304.8 304.8	13.5 26.0 26.0	6.1 11.8 11.8	23.7Ω/M' 77.7Ω/km	5.0Ω/M' 16.4Ω/km	.211	5.36	110	76%	13	43	26	85
 <p>French Braid</p>																		
^500 ft. and 1000 ft. put-ups available in Black only.																		


24 AWG Stranded (7x32) Tinned Copper • Twisted Pairs • Overall 100% Beldfoil Shield • 24 AWG Drain Wire

Plenum • Foam FEP Teflon® Insulation • Natural White or Violet Flamarrest® Jacket																		
75°C, Non-conduit	1801B	NEC: CMP CEC: CMP FT6	1	Black, Red	500† U-1000† 1000†	152.4 U-304.8 304.8	9.0 14.0 14.0	4.1 6.4 6.4	23.7Ω/M' 77.7Ω/km	18.9Ω/M' 62.0Ω/km	.165	4.19	110	78%	13	43	26	85
																		

24 AWG Stranded (7x32) Tinned Copper • Dual Twisted Pairs • Overall 100% Beldfoil Shield • 24 AWG Drain Wire

Datalene Insulation • Violet PVC Jacket in Zip-Cord Construction																		
60°C	1802B	NEC: CMG CEC: CMG FT4	2	Black, Red	500 U-1000 1000	152.4 U-304.8 304.8	18.5 36.0 37.0	8.4 16.4 16.8	23.7Ω/M' 77.7Ω/km	18.9Ω/M' 62.0Ω/km	.180 x .360	4.57 x 9.14	110	76%	13	43	26	85
																		
The jacket and shield are bonded so both can be removed with automatic stripping equipment.																		

22 AWG Stranded (7x30) Tinned Copper • Twisted Pair with Fillers • Overall 100% Beldfoil Shield + 90% TC Braid Shield • 24 AWG Drain Wire

Datalene Insulation • Black High-Flex Matte PVC Jacket																		
High-Flex 60°C	1696A		1	Blue, White	250 500 U-1000 1000	76.2 152.4 U-304.8 304.8	8.0 16.0 32.0 32.0	3.6 7.3 14.5 14.5	14.8Ω/M' 48.5Ω/km	4.6Ω/M' 15.2Ω/km	.234	5.94	110	76%	13	43	26	85
 <p>Z-Fold®</p>																		

BC = Bare Copper • DCR = DC Resistance • HC = High-conductivity • TC = Tinned Copper

*Capacitance between conductors. **Capacitance between one conductor and other conductors connected to shield.
†Spools and/or UnReel® cartons are one piece, but length may vary ±10% for spools and ±5% for UnReel from length shown.

Teflon is a DuPont trademark.

AES/EBU Digital Audio Cable

Multi-Pair Snake Cables

Individually Shielded and Jacketed Pairs

Individually Shielded and Jacketed Pairs

NEC: CMG (CEC: CMG FT4)

Product Description

26 AWG or 24 AWG stranded tinned copper conductor. Datalene® insulation. Pairs individually shielded with bonded Beldfoil® and have numbered and color-coded PVC jackets (see Chart 7 in the Technical Information Section of the Master Catalog for colors). Pair jackets and shields are bonded so both strip simultaneously with automatic stripping equipment. Overall Beldfoil shield plus overall Purple PVC jacket and nylon rip cord.

Datalene insulation features include low dielectric constant and a dissipation factor for high-speed, low-distortion data handling. Physical properties include good crush resistance and light weight.

Color Code: Black, Red.

Specifications

Nominal OD — Conductor

26 AWG	.019" (.48mm)
24 AWG	.024" (.60mm)

Nominal OD — Insulation

26 AWG	.054" (1.37mm)
24 AWG	.070" (1.78mm)

Inner Pair Jacket OD

26 AWG	.136" (3.45mm)
24 AWG	.167" (4.24mm)

Approvals

NEC	CEC
CMG	CMG FT4

Nominal DC Resistance (26 AWG)

Conductor	37.3Ω/M' (122.3Ω/km)
Shield	23.1Ω/M' (75.8Ω/km)

Nominal DC Resistance (24 AWG)

Conductor	23.7Ω/M' (77.7Ω/km)
Shield	18.9Ω/M' (62.0Ω/km)

Nominal Impedance

110Ω ±10Ω

Nominal Velocity of Propagation

76%

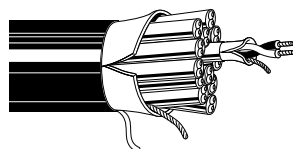
Nominal Capacitance

Between Conductors	13 pF/Ft. (43 pF/m)
Between Conductor/Shield*	26 pF/Ft. (85 pF/m)

DCR = DC Resistance

*Capacitance between one conductor and other conductors connected to shield.

For audio and video cable assemblies, visit www.belden.com for a list of Belden Certified Assemblers.



Part No.	No. of Pairs	Standard Lengths		Standard Unit Weight		Nominal OD	
		Ft.	m	Lbs.	kg	Inch	mm

Individually Shielded & Jacketed

26 AWG (7x34) • NEC: CMG (CEC: CMG)							
7891A	2	500	152.4	28.0	12.7	.343	8.71
		1000	304.8	56.0	25.5		
7890A	4	100	30.5	8.2	3.7	.399	10.13
		250	76.2	18.0	8.2		
		500	152.4	31.0	14.1		
		1000	304.8	61.0	27.7		
7880A†	8	250	76.2	29.8	13.5	.541	13.74
		500	152.4	57.0	25.9		
		1000	304.8	141.0	64.1		
7892A	12	500	152.4	85.0	38.6	.679	17.25
		1000	304.8	174.0	79.1		
7893A	16	500	152.4	109.5	49.8	.770	19.56
		1000	304.8	240.0	109.1		
24 AWG (7x32) • Flexible • NEC: CMG (CEC: CMG FT4)							
1803F	4	250	76.2	30.0	13.6	.488	12.40
		500	152.4	57.5	26.1		
		1000	304.8	107.0	48.6		
1805F	8	250	76.2	52.3	23.8	.661	16.79
		500	152.4	103.5	47.0		
		1000	304.8	205.0	93.2		
1806F	12	250	76.2	78.8	35.8	.829	21.06
		500	152.4	156.0	70.9		
		1000	304.8	322.0	146.4		
1850F	16	250	76.2	99.5	45.2	.944	23.98
		500	152.4	209.5	95.2		
		1000	304.8	410.0	186.4		
1852F	24	250	76.2	156.0	70.9	1.205	30.61
		500	152.4	322.0	146.4		
		1000	304.8	646.0	293.6		
1854F	32	250	76.2	224.0	101.8	1.346	34.19
		500	152.4	434.0	197.3		
		1000	304.8	846.0	384.5		

Length may vary -10% to +0% from length shown.

†7880A is designed to fit large-bore all metal shells for 25-pin D-Sub connectors.



Tactical Field-Deployable Cat 5e Audio/Video Cables

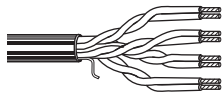
Indoor/Outdoor Applications

Description	Part No.	UL NEC/ C(UL) CEC Type	No. of Pairs	Standard Lengths		Standard Unit Wt.		Nominal OD		Freq. (MHz)	Max. Atten. (dB/ 100m)	Min. PSUM NEXT (dB)	Min. PSUM ACR (dB/ 100m)	Min. PSUM ELFEXT (dB/ 100m)	Input Imped. (Ω)	Min. RL (dB)
				Ft.	m	Lbs.	kg	Inch	mm							

Cat 5e • 24 AWG Bonded-Pairs Stranded (7x32) BC Conductors • Rip Cord • See Color Code Chart (below)

Heavy-Duty Jacketed • Polyolefin Insulation • .030" Flexible Matte Black PVC Jacket • Category 5e

1304A	—	4	Standard Lengths		Standard Unit Wt.		Nominal OD		Freq. (MHz)	Max. Atten. (dB/100m)	Min. PSUM NEXT (dB)	Min. PSUM ACR (dB/100m)	Min. PSUM ELFEXT (dB/100m)	Input Imped. (Ω)	Min. RL (dB)
			Ft.	m	Lbs.	kg	Inch	mm							
			1000	304.8	27.8	12.6	.245	6.22	1	2.4	62.3	63.3	60.8	100 \pm 15	20.0
			500	152.4	14.4	6.5			4	4.9	53.3	52.3	48.7	100 \pm 15	23.0
									8	6.9	48.8	46.1	42.7	100 \pm 15	24.5
									10	7.8	47.3	43.9	40.8	100 \pm 15	25.0
									16	9.9	44.3	39.1	36.7	100 \pm 15	25.0
									25	12.5	41.3	34.1	32.8	100 \pm 15	24.3
									31.25	14.1	39.9	31.3	30.9	100 \pm 15	23.6
									62.5	20.4	35.4	21.6	24.8	100 \pm 15	21.5
									100	26.4	32.3	17.1	20.8	100 \pm 15	20.1

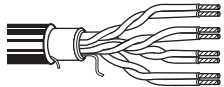


Neutrik EtherCon® compatible
 RJ-45 Compatible • -40°C Cold Bend
 U.S. Patents 5,606,151; 5,734,126 and 5,763,823
 Jacket sequentially marked at 2 ft. intervals • Third party verified to TIA/EIA-568-B.2, Category 5e

Cat 5e • 24 AWG Bonded-Pairs Stranded (7x32) BC Conductors • Rip Cord • See Color Code Chart (below)

Upjacketed • Polyolefin Insulation • PVC Inner Jacket • .035" Matte Black Flexible PVC Outer Jacket • Category 5e

1305A	—	4	Standard Lengths		Standard Unit Wt.		Nominal OD		Freq. (MHz)	Max. Atten. (dB/100m)	Min. PSUM NEXT (dB)	Min. PSUM ACR (dB/100m)	Min. PSUM ELFEXT (dB/100m)	Input Imped. (Ω)	Min. RL (dB)
			Ft.	m	Lbs.	kg	Inch	mm							
			1000	304.8	39.5	18.1	.295	7.49	1	2.4	62.3	63.3	60.8	100 \pm 15	20.0
			500	152.4	19.8	9.0			4	4.9	53.3	52.3	48.7	100 \pm 15	23.0
									8	6.9	48.8	46.1	42.7	100 \pm 15	24.5
									10	7.8	47.3	43.9	40.8	100 \pm 15	25.0
									16	9.9	44.3	39.1	36.7	100 \pm 15	25.0
									25	12.5	41.3	34.1	32.8	100 \pm 15	24.3
									31.25	14.1	39.9	31.3	30.9	100 \pm 15	23.6
									62.5	20.4	35.4	21.6	24.8	100 \pm 15	21.5
									100	26.4	32.3	17.1	20.8	100 \pm 15	20.1



Neutrik EtherCon® compatible
 RJ-45 Compatible • -40°C Cold Bend
 U.S. Patents 5,606,151 and 5,734,126
 Jacket sequentially marked at 2 ft. intervals • Third party verified to TIA/EIA-568-B.2, Category 5e

ACR = Attenuation Crosstalk Ratio • BC = Bare Copper • ELFEXT = Equal Level Far-end Crosstalk • NEXT = Near-end Crosstalk • PSUM = Power Sum • RL = Return Loss

Color Codes

Pair No.	Color Combination	Pair No.	Color Combination
1	White/Blue Stripe & Blue	3	White/Green Stripe & Green
2	White/Orange Stripe & Orange	4	White/Brown Stripe & Brown

AES/EBU Digital Audio Cable

TIA/EIA-568-B.2 Category 5e Patch Cable

Description	Part No.	UL NEC/ C(UL) CEC Type	No. of Pairs	Standard Lengths		Standard Unit Weight		Nominal OD		Nom. Imp. (Ω)	Nom. Vel. of Prop.	Nom. Capacitance		Max. DCR (Ω) 100m	Max. DCR Unbal. (%)	Freq. (MHz)	Max. Atten. (dB/100m)	Fitted Imped. (Ω)	Min. RL (dB)	Min. SRL (dB)
				Ft.	m	Lbs.	kg	Inch	mm			pF/Ft.	pF/m							

24 AWG Stranded (7 x 32) BC Conductors • Bonded-Pairs

Non Plenum • Polyolefin Insulation • PVC Jacket (see colors below)

300V RMS	1353A	NEC:	1	500	152.4	5.5	2.5	0.126	3.20	100	70%	15	49	9.0	3.0	1	2.4	105 \pm 15	20.0	23.0
		CMR:		U-1000	U-304.8	9.0	4.1									4	4.9	100 \pm 15	23.0	23.0
		CEC:		U-1000	U-304.8	9.0	4.1									8	6.9	100 \pm 15	24.5	23.0
		CMG FT4		1000	304.8	9.0	4.1									10	7.8	100 \pm 15	25.0	23.0
																16	9.9	100 \pm 15	25.0	23.0
																20	11.1	100 \pm 15	25.0	23.0
																25	12.5	100 \pm 15	24.3	22.0
																31.25	14.1	100 \pm 15	23.6	21.0
																62.5	20.4	100 \pm 15	21.5	18.0
																100	26.4	100 \pm 15	20.1	16.0

DCR = DC Resistance

Jacket Colors Available

Black	Orange	Blue	Gray
Brown	Yellow	Violet	White
Red	Green		

AES/EBU Digital Audio Cable

Plenum-Rated, Multi-Pair Snake Cables
Individually Shielded Pairs

Individually Shielded Pairs
NEC: CMP (CEC: CMP FT6)

Product Description

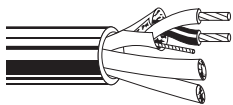
24 AWG stranded (7x32) tinned copper conductor. Foam FEP insulation. Twisted pairs individually shielded with 100% Beldfoil®. Overall Gray fluorocopolymer jacket (except 82729 which has Natural Flam arrest® jacket). 24 AWG stranded tinned copper drain wire.

Color Code: See Chart 5 (in Belden Master Catalog)

Specifications

Nominal OD – Conductor	.024" (.60mm)
Nominal OD – Insulation	.062" (1.57mm)
Approvals	
NEC	CMP
CEC	CMP FT6
UL Ratings	Non-conduit Plenum
Voltage Rating	300V RMS
Nominal DC Resistance	
Conductor	23.7Ω/M' (77.7Ω/km)
Shield	18.9Ω/M' (62.0Ω/km)
Nominal Impedance	100Ω
Nominal Velocity of Propagation	76%
Nominal Capacitance	
Between Conductors	13.5 pF/Ft. (44 pF/m)
Between Conductor/Shield*	22.5 pF/Ft. (73.8 pF/m)

*Capacitance between one conductor and other conductors connected to shield.



Part No.	No. of Pairs	Standard Lengths		Standard Unit Weight		Nominal OD	
		Ft.	m	Lbs.	kg	Inch	mm

Plenum Individually Shielded NEC: CMP (CEC: CMP FT6)

24 AWG							
82729	2	U-1000 1000	U-304.8 304.8	27.0 28.0	12.3 12.7	.255	6.48
89729	2	500 1000	152.4 304.8	18.5 31.0	8.4 14.1	.261	6.63
89730	3	500 1000	152.4 304.8	23.0 40.0	10.5 18.2	.278	7.06
89728	4	500 1000	152.4 304.8	26.5 50.0	12.0 22.7	.307	7.80
89705	5	500 1000	152.4 304.8	30.5 62.0	13.9 28.2	.327	8.31
89731	6	500 1000	152.4 304.8	35.0 71.0	15.9 32.3	.361	9.17
89757	7	500 1000	152.4 304.8	39.5 80.0	18.0 36.4	.361	9.17
89732	9	1000	304.8	106.0	48.2	.433	11.00
89734	12	500 1000	152.4 304.8	71.0 140.0	32.3 63.6	.498	12.65
89758	18	500 1000	152.4 304.8	100.5 204.0	45.7 92.7	.616	15.65

Spools are one piece, but length may vary ±10% from length shown.



AES/EBU Digital Audio Cable (cont.)

Maximum Recommended Transmission Distance at Digital Audio Data Rates* (AES3-2003)**

Part Number	6 MHz		12 MHz		25 MHz	
	Ft.	m	Ft.	m	Ft.	m
1353A	1112	339	772	235	525	160
9180, 7880A Series	813	248	633	193	474	144
1800F	664	203	424	129	279	85
1800B, 1801B, 1802B, 1803F Series	1105	337	877	267	649	198
1696A	1538	469	1250	381	1015	309
179DT (AES3)†♦	1005	306	722	220	522	159
(AES-3id)††	402	123	289	88	209	64
1855A (AES3)†♦	1992	607	1538	469	1111	339
(AES-3id)††	796	242	615	188	444	135
1505A (AES3)†♦	2911	887	2222	677	1538	469
(AES-3id)††	1164	355	888	270	615	188
1505F (AES3)†♦	2985	910	2041	622	1389	423
(AES-3id)††	1194	364	816	249	556	169
1694A (AES3)†♦	3407	1039	2500	762	2000	610
(AES-3id)††	1363	416	1000	305	800	244
1694F (AES3)†♦	3660	1116	2411	735	1701	518
(AES-3id)††	1811	552	1193	364	841	256

- * Sampling rates include: 38 KHz, 44.1 KHz, 48 KHz, 96 KHz and 192 KHz.
 ** Longer transmission distances are achievable but are contingent upon specific input/output voltages.
 † Transmission distance calculations assume minimum allowable output signal amplitude (2V per AES3-2003) and minimum allowable input signal amplitude (200mV per AES3-2003).
 †† Per AES-3id-2001, when using analog video distribution equipment to implement AES-3id, maximum transmission distances are 40% of AES3 values assuming a minimum allowable output signal amplitude of 1V and a minimum allowable input signal amplitude of 320mV.
 ♦ Implementation of AES3 with coaxial cable and 110-75Ω baluns can be achieved with transmission distances of 91% of the AES3 coaxial distances listed above.

Digital Audio Attenuation

Part Number	6 MHz		12 MHz		25 MHz	
	dB/100 Ft.	dB/100m	dB/100 Ft.	dB/100m	dB/100 Ft.	dB/100m
1353A	2.59	8.50	3.81	12.50	3.80	12.50
9180, 7880A Series	2.46	8.07	3.16	10.37	4.22	13.85
1800F	3.01	9.88	4.72	15.49	7.17	23.52
1800B, 1801B, 1802B, 1803F Series	1.81	5.94	2.28	7.48	3.08	10.10
1696A	1.30	4.27	1.60	5.25	1.97	6.46
179DT (coax)	1.99	6.53	2.77	9.09	3.83	12.57
1855A (coax)	1.00	3.29	1.30	4.27	1.80	5.91
1505A (coax)	.69	2.25	.90	2.95	1.30	4.27
1505F (coax)	.67	2.20	.98	3.22	1.44	4.72
1694F (coax)	.55	1.80	.83	2.70	1.18	5.90
1694A (coax)	.59	1.93	.80	2.62	1.00	3.28

Values reflect typical results.

Precision Video Cable for Analog and Digital DigiTruck® Miniature Coax for Broadcast Production Trucks

Description	Part No.	UL NEC/ C(UL) CEC Type	Standard Lengths		Standard Unit Weight		Conductor (stranding) Diameter Nom. DCR	Nominal Core OD		Shielding Materials Nom. DCR	Nominal OD		Nom. Imp. Ω	Nom. Vel. of Prop.	Nominal Capacitance		Nominal Attenuation	
			Ft.	m	Lbs.	kg		Inch	mm		Inch	mm			pF/Ft.	pF/m	MHz	dB/100 Ft.

28.5 AWG Solid .012" Bare Copper • Duofoil (100%)+ 95% Tinned Copper Braid Shield

Gas-injected Foam HDPE Insulation • PVC Jacket (Red, Green, Blue, White, Yellow, Brown, Orange, Gray, Violet, Black)

DigiTruck SDI/HDTV Digital Video 75°C	179DT	NEC: CM	500	152.4	4.2	1.9	28.5 AWG (solid) .012" BC 108Ω/M' 350Ω/km	.056 1.42	Duofoil (100%) + 95% TC Braid 8.9Ω/M' 29.2Ω/km	.100 .254	75 77%	17.4 57.4	1	1.2	3.9
			1000	304.8	8.0	3.6							3.6	1.5	5.1
													6	2.0	6.5
													10	2.3	7.4
													12	2.8	9.1
													25	3.8	12.6
													71.5	5.7	18.6
													135	7.5	24.6
													270	10.5	34.5
													360	12.2	40.0
													540	15.1	49.5
													720	17.5	57.4
													750	17.8	58.4
													1000	20.7	67.9
													1500	25.4	83.3
				2250	31.5	103.4									
				3000	36.7	120.4									
				4500	47.5	155.8									

100% Sweep tested. 5 MHz to 4.5 GHz.

BC = Bare Copper • HDPE = High-density Polyethylene • TC = Tinned Copper

Precision Video Cable for Analog and Digital (cont.) Sub-Miniature RG-59/U Type

Description	Part No.	UL NEC/ C(UL) CEC Type	Standard Lengths		Standard Unit Weight		Conductor (stranding) Diameter Nom. DCR	Nominal Core OD		Shielding Materials Nom. DCR	Nominal OD		Nom. Imp. (Ω)	Nom. Vel. of Prop.	Nominal Capacitance		Nominal Attenuation		
			Ft.	m	Lbs.	kg		Inch	mm		Inch	mm			pF/Ft.	pF/m	MHz	dB/100 Ft.	dB/100m

25 AWG Stranded (19x37) .021" Bare Copper • Duofoil + 95% Tinned Copper Braid Shield

Gas-injected Foam HDPE Insulation • PVC Jacket (Available in 10 colors)*																			
SDI/HDTV Digital Video 75°C	1865A	NEC: CMR CEC: CMG FT4	1000	304.8	16.0	7.3	25 AWG (19x37) .021" BC	.094	2.39	Duofoil + 95% TC Braid 6.0Ω/M' 19.8Ω/km	.150	3.81	75	82%	16.5	54.1	1	.5	1.5
																	3.6	1.0	3.1
																	10	1.6	5.2
																	71.5	3.7	12.1
																	135	5.0	16.4
																	270	7.1	23.3
																	360	8.2	26.9
																	540	10.1	33.1
																	720	11.8	38.7
																	750	12.0	39.4
																	1000	13.9	45.6
																	1500	17.0	55.8
																	2250	20.8	68.2
																	3000	24.0	78.7

*Available in Brown, Blue, White, Red, Violet, Black, Orange, Gray, Green and Yellow

23 AWG Solid .023" Bare Copper • Duofoil + 95% Tinned Copper Braid Shield

Gas-injected Foam HDPE Insulation • PVC Jacket (Available in 10 colors)*																			
SDI/HDTV Digital Video 75°C	1855A	NEC: CMR CEC: CMG FT4	500 [▲] 1000	152.4 304.8	9.0 18.0	4.1 8.2	23 AWG (solid) .023" BC	.102	2.59	Duofoil + 95% TC Braid 4.1Ω/M' 13.5Ω/km	.159	4.03	75	83%	16.3	53.5	1	.4	1.3
																	3.6	.8	2.6
																	6	1.0	3.3
																	10	1.2	3.9
																	12	1.3	4.3
																	25	1.8	5.9
																	71.5	3.1	10.2
																	135	3.8	12.5
																	270	5.4	17.7
																	360	6.2	20.3
																	540	7.7	25.3
																	720	9.5	31.2
																	750	9.6	31.5
																	1000	10.5	34.5
																	1500	13.0	42.7
																	2250	16.0	52.5
																	3000	18.5	60.7
																	4500	24.6	80.7

▲ 500 ft. put-up available in Black only.

♦ U-1000 ft. put-up available in Gray only.

* Available in Brown, Red, Orange, Yellow, Green, Blue, Violet, Gray, White or Black.

23 AWG Solid .023" Bare Copper • Duofoil + 95% Tinned Copper Braid Shield

Plenum • Foam FEP Insulation • Flamarrest® Jacket (Available in 10 colors)*																			
SDI/HDTV Digital Video 75°C	1855P	NEC: CMP CEC: CMP FT6	1000	304.8	22.0	9.9	23 AWG (solid) .023" BC	.102	2.59	Duofoil + 95% TC Braid 4.1Ω/M' 13.5Ω/km	.159	4.03	75	83%	16.3	53.5	1	.4	1.3
																	3.6	.8	2.6
																	10	1.3	4.1
																	71.5	3.0	10.0
																	135	4.1	13.4
																	270	5.8	19.0
																	360	6.8	22.3
																	540	8.6	28.1
																	720	10.1	33.2
																	750	10.4	34.0
																	1000	12.2	40.1
																	1500	15.5	50.7
																	2250	19.5	64.1
																	3000	23.2	76.1
																	4500	29.6	97.1

* Available in Brown, Red, Orange, Yellow, Green, Blue, Violet, Gray, White or Black.

BC = Bare Copper • HDPE = High density Polyethylene • TC = Tinned Copper



Precision Video Cable for Analog and Digital RG-59/U Type

Description	Part No.	UL NEC/ C(UL) CEC Type	Standard Lengths		Standard Unit Weight		Conductor (stranding) Diameter Nom. DCR	Nominal Core OD		Shielding Materials Nom. DCR	Nominal OD		Nom. Imp. (Ω)	Nom. Vel. of Prop.	Nominal Capacitance		Nominal Attenuation		
			Ft.	m	Lbs.	kg		Inch	mm		Inch	mm			pF/Ft.	pF/m	MHz	dB/100 Ft.	dB/100m

20 AWG Solid .032" Bare Copper • Duofoil + 95% Tinned Copper Braid Shield

Gas-injected Foam HDPE Insulation • PVC Jacket (Available in 10 colors)*																			
SDI/HDTV	1505A	NEC:	500 [▲]	152.4	17.5	8.0	20 AWG	.145	3.68	Duofoil	.234	5.94	75	83%	16.3	53.5	1	.3	1.0
Digital Video		CMR	1000 [♦]	304.8	36.0	16.4	(solid)			+ 95%							3.6	.6	2.0
75°C		CEC:	5000 [♦]	1524.0	165.4	75.2	.032"			TC Braid							6	.7	2.2
		CMG FT4					BC			3.8Ω/M'							10	.9	3.0
						10.0Ω/M'			12.5Ω/km							12	.9	3.1	
						32.8Ω/km										25	1.3	4.3	
																71.5	2.1	6.9	
																135	2.7	8.9	
																270	3.8	12.5	
																360	4.4	14.4	
																540	5.5	18.0	
																720	6.4	21.0	
																750	6.5	21.3	
																1000	7.6	24.9	
																1500	9.3	30.5	
																2250	11.6	38.1	
																3000	13.4	44.0	
																4500	18.0	59.0	

▲500 ft. put-up available in Black, Red or Blue only.

♦1000 ft. and 5000 ft. put-ups available in all ten colors: Black, Brown, Red, Orange, Yellow, Green, Blue, Violet, Gray or White

22 AWG Stranded (7x29) .031" Bare Compacted Copper* • Double Tinned Copper Braid Shield

Gas-injected Foam HDPE Insulation • PVC Jacket (Matte Black, Red, Green, Blue, Yellow, White or Violet)																			
High-Flex	1505F	NEC:	1000	304.8	44.0	20.0	22 AWG	.145	3.68	TC Double	.242	6.15	75	80%	17.0	55.7	1	.2	.7
SDI/HDTV		CM					(7x29)			Braid							3.6	.5	1.6
Video Patch		CEC:					.031"			95% Shield							6	.7	2.2
75°C		CM					BCC			Coverage							10	.9	2.9
						12.2Ω/M'			2.4Ω/M'							12	1.0	3.2	
						40.0Ω/km			7.8Ω/km							25	1.4	4.7	
																71.5	2.5	8.2	
																135	3.5	11.5	
																270	5.1	16.7	
																360	6.0	19.7	
																540	7.4	24.3	
																720	8.7	28.5	
																750	8.9	29.2	
																1000	10.5	34.4	
																1500	13.3	43.6	
																2250	16.9	55.4	
																3000	20.3	66.6	
																4500	28.2	92.5	

*Compacted conductor combines impedance uniformity of solid conductors and "nick-resistance" of stranded conductor.

20 AWG Solid .032" Bare Copper • Duofoil + 95% Tinned Copper Braid Shield

Plenum • Foam FEP Insulation • Flamarrest® Jacket (Available in 10 colors)†																			
SDI/HDTV	1506A	NEC:	500 [‡]	152.4	16.5	7.5	20 AWG	.133	3.38	Duofoil	.199	5.05	75	84%	16.1	52.8	1	.3	1.0
Digital Video		CMP	1000 [‡]	304.8	33.0	15.0	(solid)			+ 95%							3.6	.6	2.0
75°C		CEC:					.032"			TC Braid							10	1.1	3.4
		CMP FT6					BC			3.8Ω/M'							71.5	2.3	7.4
						10.0Ω/M'			12.5Ω/km							135	3.2	10.5	
						32.8Ω/km										270	4.6	14.9	
																360	5.3	17.2	
																540	6.4	21.0	
																720	7.3	23.9	
																750	7.5	24.6	
																1000	9.4	30.8	
																1500	12.8	42.0	
																2250	17.5	57.4	
																3000	21.9	71.8	
																4500	23.6	77.4	

Suitable for Outdoor and Direct Burial applications.

‡500 ft. put-up available in Black or Natural only.

†1000 ft. put-up available in all ten colors: Black, Brown, Red, Orange, Yellow, Green, Blue, Violet, Gray or Natural.

BC = Bare Copper • BCC = Bare Compacted Copper • DCR = DC Resistance • HDPE = High-density Polyethylene • TC = Tinned Copper

For Connector Cross Reference, visit www.belden.com or call Customer Service 1-800-BELDEN-1. For audio and video cable assemblies, visit the Belden Web site for a list of Belden Certified Assemblers.

*Compacted conductor combines impedance uniformity of solid conductors and "nick-resistance" of stranded conductor.

†Spools are one piece, but length may vary ±10% from length shown.


Precision Video Cable for Analog and Digital (cont.)

Double Braided RG-59/U Type

Description	Part No.	UL NEC/ C(UL) CEC Type	Standard Lengths		Standard Unit Weight		Conductor (stranding) Diameter Nom. DCR	Nominal Core OD		Shielding Materials Nom. DCR	Nominal OD		Nom. Imp. (Ω)	Nom. Vel. of Prop.	Nominal Capacitance		Nominal Attenuation		
			Ft.	m	Lbs.	kg		Inch	mm		Inch	mm			pF/Ft.	pF/m	MHz	dB/100 Ft.	dB/100m


20 AWG Solid .031" Bare Copper • 98% Tinned Copper Double Braid Shield

Polyethylene Insulation • Polyethylene Jacket (Available in Red, Yellow, Green, Light Blue, White, Orange or Black)

80°C	8281		500 [▲]	152.4	37.0	16.8	20 AWG (solid) .031"	.198	5.03	TC Double Braid	.305	7.75	75	66%	21.0	68.9	1	.3	.8
			1000	304.8	74.0	33.6											3.6	.5	1.8
																	10.0	.8	2.6
																	71.5	2.1	6.9
																	135	3.0	9.8
																	270	4.3	14.1
																	360	5.1	16.6
																	540	6.3	20.7
																	720	7.4	24.3
																	750	7.6	24.9
																	1000	9.2	30.2
																	1500	11.8	38.7
														2250	15.1	49.5			
														3000	18.1	59.4			
														4500	23.2	76.1			

▲ 500 ft. put-up not available in White.


Flame-retardant Semi-Foam Polyethylene Insulation • PVC Jacket (Available in 10 colors)*

UL AWM Style 1354 (30V 80°C)	8281B	NEC: CMR CEC: CMG FT4	1000	304.8	85.0	38.6	20 AWG (solid) .031"	.198	5.03	TC Double Braid	.305	7.75	75	66%	21.0	68.9	1	.3	.8
																	3.6	.5	1.8
																	10.0	.8	2.6
																	71.5	2.1	6.9
																	135	3.0	9.8
																	270	4.4	14.4
																	360	5.1	16.6
																	540	6.6	21.5
																	720	7.8	25.4
																	750	8.0	26.2
																	1000	10.2	33.5
																	1500	13.7	44.9
														2250	18.3	60.0			
														3000	22.5	73.8			
														4500	30.1	98.8			

*8281B available in Brown, Red, Orange, Yellow, Green, Blue, Violet, Gray, White or Black.

22 AWG Stranded (7x29) .031" Bare Compacted Copper* • Double Tinned Copper Braid Shield

Polyethylene Insulation • PVC Jacket (Matte Red, Blue, Green, Gray or Black)

High-Flex 60°C	8281F		500 [♯]	152.4	32.0	14.5	22 AWG (7x29) .031"	.193	4.90	TC Double Braid	.305	7.75	75	66%	21.0	68.9	1	.3	.9
			1000	304.8	65.0	29.5											3.6	.5	1.7
																	10.0	.9	2.9
																	71.5	2.5	8.0
																	135	3.6	11.6
																	270	5.1	16.7
																	360	6.0	19.7
																	540	7.4	24.3
																	720	8.7	28.5
																	750	8.9	29.2
																	1000	10.5	34.4
																	1500	13.2	43.3
														2250	16.6	54.5			
														3000	19.6	64.3			
														4500	24.7	81.0			

♯ 500 ft. put-up available in Black only.

* Compacted conductor combines impedance uniformity of solid conductors and "nick-resistance" of stranded conductor.

BC = Bare Copper • BCC = Bare Compacted Copper • DCR = DC Resistance • TC = Tinned Copper



Precision Video Cable for Analog and Digital (cont.) Double Braided RG-59/U Type

Description	Part No.	UL NEC/ C(UL) CEC Type	Standard Lengths		Standard Unit Weight		Conductor (stranding) Diameter Nom. DCR	Nominal Core OD		Shielding Materials Nom. DCR	Nominal OD		Nom. Imp. (Ω)	Nom. Vel. of Prop.	Nominal Capacitance		Nominal Attenuation		
			Ft.	m	Lbs.	kg		Inch	mm		Inch	mm			pF/Ft.	pF/m	MHz	dB/100 Ft.	dB/100m
20 AWG Solid .031" Bare Copper • 98% Tinned Copper Double Braid Shield																			
Plenum • FEP Insulation • Black Fluorocopolymer Jacket																			
150°C	88281	NEC: CMP CEC: CMP FT6	500† 1000†	152.4 304.8	46.0 86.0	20.9 39.1	20 AWG (solid) .032" BC 9.9Ω/M' 32.5Ω/km	.185	4.70	TC Double Braid 98% Shield Coverage 1.1Ω/M' 3.6Ω/km	.271	6.88	75	71%	19.0	62.4	1	.2	.7
																	3.6	.5	1.6
																	10.0	.8	2.6
																	71.5	2.3	7.5
																	135	3.3	10.8
																	270	5.1	16.7
																	360	6.1	20.0
																	540	8.0	26.2
																	720	9.7	31.8
																	750	10.0	32.8
																	1000	12.3	40.3
																	1500	16.3	53.5
																	2250	21.7	71.2
																	3000	26.5	86.9
																	4500	35.1	115.2

† Spools are one piece, but length may vary ±10% from length shown.
Suitable for Outdoor and Direct Burial applications.

BC = Bare Copper • DCR = DC Resistance • TC = Tinned Copper

For Connector Cross Reference, visit www.belden.com or call Customer Service 1-800-BELDEN-1. For audio and video cable assemblies, visit the Belden Web site for a list of Belden Certified Assemblers.

Precision Video Cable for Analog and Digital Low Loss Serial Digital Coax RG-6/U Type and RG-11/U Type

Description	Part No.	UL NEC/ C(UL) CEC Type	Standard Lengths		Standard Unit Weight		Conductor (stranding) Diameter Nom. DCR	Nominal Core OD		Shielding Materials Nom. DCR	Nominal OD		Nom. Imp. (Ω)	Nom. Vel. of Prop.	Nominal Capacitance		Nominal Attenuation		
			Ft.	m	Lbs.	kg		Inch	mm		Inch	mm			pF/Ft.	pF/m	MHz	dB/100 Ft.	dB/100m
RG-6/U Type • 18 AWG Solid .040" Bare Copper • Duofoil + 95% Tinned Copper Braid Shield																			
Gas-injected Foam HDPE Insulation • PVC Jacket (Available in 10 colors)*																			
SDI/HDTV Digital Video 75°C	1694A	NEC: CMR CEC: CMP FT4	500▲ 1000 4500	152.4 304.8 1371.6	23.0 45.0 207.0	10.5 20.5 94.3	18 AWG (solid) .040" BC 6.4Ω/M' 21.0Ω/km	.180	4.57	Duofoil + 95% TC Braid 2.8Ω/M' 9.2Ω/km	.275	6.99	75	82%	16.2	53.1	1	.2	.7
																	3.6	.5	1.6
																	6	.6	1.9
																	10	.7	2.3
																	12	.8	2.6
																	25.0	1.0	3.3
																	71.5	1.6	5.2
																	135	2.1	6.9
																	270	3.0	9.8
																	360	3.4	11.2
																	540	4.3	14.1
																	720	4.9	16.1
																	750	5.0	16.4
																	1000	5.9	19.4
																	1500	7.3	24.0
																	2250	9.1	29.9
																	3000	10.7	35.1
																	4500	14.7	48.2

▲ 500 ft. put-up available in Black only.

* Available in Black, Brown, Red, Orange, Yellow, Green, Blue, Purple, Gray or White.

Plenum • Foam FEP Insulation • Flammarrest Jacket (Available in 10 colors)**																			
Description	Part No.	UL NEC/ C(UL) CEC Type	Standard Lengths		Standard Unit Weight		Conductor (stranding) Diameter Nom. DCR	Nominal Core OD		Shielding Materials Nom. DCR	Nominal OD		Nom. Imp. (Ω)	Nom. Vel. of Prop.	Nominal Capacitance		Nominal Attenuation		
			Ft.	m	Lbs.	kg		Inch	mm		Inch	mm			pF/Ft.	pF/m	MHz	dB/100 Ft.	dB/100m
SDI/HDTV Digital Video 75°C	1695A	NEC: CMP CEC: CMP FT6	500†* 1000†	152.4 304.8	22.5 45.0	10.2 20.5	18 AWG (solid) .040" BC 6.4Ω/M' 21.0Ω/km	.170	4.32	Duofoil + 95% TC Braid 2.8Ω/M' 9.2Ω/km	.234	5.94	75	82%	16.2	53.1	1	.2	.8
																	3.6	.5	1.5
																	10	.8	2.5
																	71.5	1.8	5.8
																	135	2.4	7.9
																	270	3.4	11.2
																	360	4.0	13.1
																	540	5.2	17.1
																	720	6.1	20.0
																	750	7.3	23.9
																	1000	7.5	24.6
																	1500	9.2	30.2
																	2250	11.6	38.0
																	3000	13.7	44.9
																	4500	20.0	65.6

▲ 500 ft. put-up available in Black, Red, Yellow, Violet or Natural only.

** Available in Black, Brown, Red, Orange, Yellow, Green, Blue, Purple, Gray or Natural.

Precision Video Cable for Analog and Digital (cont.)

Low Loss Serial Digital Coax RG-6/U Type and RG-11/U Type

Description	Part No.	UL NEC/ C(UL) CEC Type	Standard Lengths		Standard Unit Weight		Conductor (stranding) Diameter Nom. DCR	Nominal Core OD		Shielding Materials Nom. DCR	Nominal OD		Nom. Imp. (Ω)	Nom. Vel. of Prop.	Nominal Capacitance		Nominal Attenuation			
			Ft.	m	Lbs.	kg		Inch	mm		Inch	mm			pF/Ft.	pF/m	MHz	dB/ 100 Ft.	dB/ 100m	
19 AWG Stranded (7x27) .040" Bare Compacted Copper* • Double Tinned Copper Braid Shield																				
Gas-injected Foam HDPE Insulation • PVC Jacket Low Gloss (Black, Red, Green, Blue, Yellow, White or Violet)																				
High Flex SDI/HDTV Video Patch 75°C	1694F	NEC: CMR CEC: CMG FT4	1000	304.8	54.0	24.7	19 AWG .040" BCC 8.5Ω/M' 27.9Ω/km	0.18	4.57	Double 93% TC Braid 99% Total Coverage 1.7Ω/M' 5.6Ω/km	.274	7.00	75	81%	16.2	53.2	1 .2 .8	3.6 6 10 12 25.0 	.3 .5 .7 .8 1.2 2.0 2.8 4.0 4.7 5.9 6.9 7.0 8.2 10.4 13.2 15.6 19.8	1.0 1.5 1.8 2.3 2.7 5.9 6.6 9.2 13.1 15.4 19.4 22.6 23.0 26.9 34.1 43.3 51.2 64.9

*Compacted conductor combines impedance uniformity of solid conductors and "nick-resistance" of stranded conductor.
For use with 1694A connectors.

RG-11/U Type • 14 AWG Solid .064" Bare Copper • Duofoil + 95% Tinned Copper Braid Shield																			
Gas-injected Foam HDPE Insulation • PVC Jacket (Available in 10 colors)*																			
SDI/HDTV Digital Video 75°C	7731A	NEC: CMR CEC: CMG FT4	500* 1000 4000	152.4 304.8 1219.2	48.0 94.0 467.0	21.8 42.8 212.3	14 AWG (solid) .064" BC 2.5Ω/M' 8.2Ω/km	.280	7.11	Duofoil + 95% TC Braid 1.5Ω/M' 4.9Ω/km 5.6Ω/km	.405	10.3	75	85%	16.0	52.4	1 3.6 10 71.5 135 270 360 540 720 750 1000 1500 2250 3000 4500	.2 .3 .5 1.1 1.5 2.1 2.5 3.1 3.6 3.7 4.3 5.5 6.9 8.2 9.8	.5 1.0 1.5 3.6 4.8 6.9 8.0 10.0 11.7 12.0 14.1 18.0 22.6 26.9 32.1

* Available in Black, Brown, Red, Orange, Yellow, Green, Blue, Violet, Gray or White.
* 500 ft. put-up available in Red or Black only.

Plenum • Foam FEP Insulation • Fluorocopolymer Jacket (Available in 10 colors)**																			
SDI/HDTV Digital Video 150°C	7732A	NEC: CMP CEC: CMP FT6	500* 1000 2000*	152.4 304.8 609.6	45.0 88.0 176.0	20.5 40.0 80.0	14 AWG (solid) .064" BC 2.5Ω/M' 8.2Ω/k	.274	6.96	Duofoil + 95% TC Braid 2.5Ω/M' 8.2Ω/km	.348	8.84	75	83%	16.3	53.5	1 3.6 10 71.5 135 270 360 540 720 750 1000 1500 2250 3000 4500	.1 .3 .4 1.2 1.8 2.6 3.1 3.9 4.6 4.7 5.5 6.9 9.2 10.2 15.4	.5 .9 1.3 4.1 5.8 8.5 10.2 12.8 15.0 18.0 22.7 30.2 33.5 50.5

* 500 ft. put-up available in Black or Natural only.
* 2000 ft. put-up available in Natural only.
** Available in Black, Brown, Red, Orange, Yellow, Green, Blue, Violet, Gray or Natural.
Suitable for Outdoor and Direct Burial applications

Plenum • PTFE Insulation • Fluorocopolymer Jacket (Available in 10 colors)**																			
SDI/HDTV Digital Video 150° C	7732LL	NEC: CMP CEC: CMP FT6	500 1000	152.4 304.8	45.0 90.0	20.5 40.8	14 AWG (solid) .064" BC 2.5Ω/M' 8.2Ω/km	.276	7.01	Duofoil + 95% TC Braid 1.6Ω/M' 5.3Ω/km	.345	8.76	75	83	16.3	53.5	1 3.6 10 71.5 135 270 360 540 720 750 1000 1500 2250 3000 4500	.1 .3 .5 1.3 1.7 2.3 2.7 3.8 3.9 4.5 5.7 7.0 8.2 10.2	.3 1.0 1.6 4.1 5.4 7.4 8.7 12.5 12.7 14.9 18.5 22.9 26.8 33.5

** Available in Black, Brown, Red, Orange, Yellow, Green, Blue, Violet, Gray or Natural

BC = Bare Copper • BCC = Bare Compacted Copper • DCR = DC Resistance • HDPE = High-density Polyethylene • TC = Tinned Copper
For Connector Cross Reference, visit www.belden.com or call Customer Service 1-800-BELDEN-1.



VideofLEX® Snake Cable for Precision for Analog and Digital Bundled Miniature and RG-59/U Type

Description	Part No.	UL NEC/ C(UL) CEC Type	No. of Cond.	Standard Lengths		Standard Unit Weight		Conductor (stranding) Diameter Nom. DCR	Nominal Core OD		Shielding Materials Nom. DCR	Nominal OD		Nom. Imp. (Ω)	Nom. Vel. of Prop.	Nominal Capacitance		Nominal Attenuation		
				Ft.	m	Lbs.	kg		Inch	mm		Inch	mm			pF/Ft.	pF/m	MHz	dB/ 100 Ft.	dB/ 100m

Miniature • 23 AWG Solid .023" Bare Copper • Duofoil + 95% Tinned Copper Braid (100% Shield Coverage)

Solid Copper, Gas-injected Foam HDPE Insulation • Overall Matte Black PVC Jacket (Color Code: See chart below)																					
SDI/HDTV	7787A	NEC:	3	500	152.4	47.5	21.6	23 AWG	.102	2.55	Duofoil	.432	10.97	75	83%	16.5	54.1	1	.4	1.3	
Digital Video		CMR:	1000	304.8	94.0	42.7	(solid)			Coax OD:	+ 95%								3.6	.8	2.6
75°C		CEC:					.023"	.159	4.03	TC Braid									10	1.2	3.9
(1855A Bundled)		CMG FT4					BC			4.1Ω/M'									71.5	3.2	10.5
									20.1Ω/M'										135	3.9	12.8
									65.9Ω/km										270	5.5	18.0
																			360	6.3	20.7
																			540	7.9	25.9
																			720	9.7	31.8
																			750	9.8	32.2
																			1000	10.7	35.1
																			1500	13.3	43.6
																			2500	16.3	53.5
																			3000	18.9	62.0
																			4500	24.6	80.7
	7788A	NEC:	4	1000	304.8	111.0	50.5	same	.102	2.55	same	.481	12.22								
		CMR:						as													
		CEC:						above	.159	4.03	above										
		CMG FT4																			
	7789A	NEC:	5	500	152.4	72.5	33.0	same	.102	2.55	same	.539	13.69								
		CMR:	1000	304.8	141.0	64.1		as													
		CEC:						above	.159	4.03	above										
		CMG FT4																			
	7790A	NEC:	6	500	152.4	88.5	40.2	same	.102	2.55	same	.597	15.16								
		CMR:	1000	304.8	175.0	79.5		as													
		CEC:						above	.159	4.03	above										
		CMG FT4																			
	7791A	NEC:	10	500	152.4	155.5	70.7	same	.102	2.55	same	.796	20.22								
		CMR:	1000	304.8	303.0	137.7		as													
		CEC:						above	.159	4.03	above										
		CMG FT4																			
	7792A	NEC:	12	500	152.4	171.5	78.0	same	.102	2.55	same	.825	20.96								
		CMR:	1000	304.8	353.0	160.5		as													
		CEC:						above	.159	4.03	above										
		CMG FT4																			

Sweep tested 5 MHz to 3 GHz.

RG-59/U Type • 20 AWG Solid .032" Bare Copper • Duofoil + 95% Tinned Copper Braid (100% Shield Coverage)

Gas-injected Foam HDPE Insulation • Overall Matte Black PVC Jacket (Color Code: See chart below)																						
SDI/HDTV	7794A	NEC:	3	500	152.4	94.5	43.0	20 AWG	.145	3.68	Duofoil	.631	16.03	75	83%	16.3	53.1	1	.3	1.0		
Digital Video		CMR:	1000	304.8	188.0	85.5	(solid)			Coax OD:	+ 95%									3.6	.6	2.0
75°C		CEC:					.032"	.235	5.97	TC Braid										10	.9	3.0
(1505A Bundled)		CMG FT4					BC			3.8Ω/M'										71.5	2.1	6.9
									10.0Ω/M'											135	2.8	9.2
									32.8Ω/km											270	3.9	12.8
																				360	4.5	14.8
																				540	5.6	18.4
																				720	6.5	21.3
																				750	6.6	21.7
																				1000	7.8	25.6
																				1500	9.5	31.2
																				2500	11.8	38.7
																				3000	13.7	44.9
																				4500	18.0	59.0
	7795A	NEC:	4	500	152.4	116.5	53.0	same	.145	3.68	same	.706	17.93									
		CMR:	1000	304.8	237.0	107.7		as														
		CEC:						above	.235	5.97	above											
		CMG FT4																				
	7796A	NEC:	5	500	152.4	150.0	68.2	same	.145	3.68	same	.790	20.07									
		CMR:	1000	304.8	293.0	133.2		as														
		CEC:						above	.235	5.97	above											
		CMG FT4																				
	7798A	NEC:	10	500	152.4	319.5	145.2	same	.145	3.68	same	1.166	29.62									
		CMR:	1000	304.8	625.0	284.1		as														
		CEC:						above	.235	5.97	above											
		CMG FT4																				

Sweep tested 5 MHz to 3 GHz.

BC = Bare Copper • DCR = DC Resistance • HDPE = High-density Polyethylene • TC = Tinned Copper

For Connector Cross Reference, visit www.belden.com or call Customer Service 1-800-BELEDEN-1. For audio and video cable assemblies, visit the Belden Web site for a list of Belden Certified Assemblers.

Color Code Chart

Cond.	Color	Cond.	Color	Cond.	Color	Cond.	Color	Cond.	Color	Cond.	Color
1	Red	3	Blue	5	Yellow	7	Orange	9	Violet	11	Pink
2	Green	4	White	6	Brown	8	Gray	10	Black	12	Tan

VideofLEX® Snake Cable for Precision Analog and Digital (cont.) RG-6U and RG-59/U Type

Description	Part No.	UL NEC/ C(UL) CEC Type	Standard Lengths		Standard Unit Weight		Conductor (stranding) Diameter Nom. DCR	Nominal Core OD		Shielding Materials Nom. DCR	Nominal OD		Nom. Imp. (Ω)	Nom. Vel. of Prop.	Nominal Capacitance		Nominal Attenuation	
			Ft.	m	Lbs.	kg		Inch	mm		Inch	mm			pF/Ft.	pF/m	MHz	dB/ 100 Ft.

RG-6/U Type • 18 AWG Solid .040" Bare Copper • Duofoil + 95% Tinned Copper Braid Shield

Gas-injected Foam HDPE Insulation • Overall Matte Black PVC Jacket (Color Code: See chart below)

SDI/HDTV Digital Video 75°C (1694A Bundled)	7710A	NEC: CMR CEC: CMG FT4	3 1000	500 1000	152.4 304.8	131.5 273.0	59.8 124.1	18 AWG (solid) .040" BC 6.4Ω/M' 21.0Ω/km	.180 Coax OD: .257	4.57 + 95% 6.99	Duofoil TC Braid 2.8Ω/M' 9.2Ω/km	.770 19.56	75	82%	16.2	53.1	1 3.6 10 71.5 135 270 360 540 720 750 1000 1500 2500 3000 4500	.2 .5 .7 1.6 2.1 3.1 3.5 4.4 5.0 5.1 6.0 7.4 9.3 10.9 14.7	.7 1.6 2.3 5.2 6.9 10.2 11.5 14.4 16.4 16.7 19.7 24.3 30.5 35.8 48.2
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100% Sweep tested. 5 MHz to 3 GHz.



7711A	NEC: CMR CEC: CMG FT4	4 1000	500 1000	152.4 304.8	174.0 339.0	79.1 154.1	same as above	.180 Coax OD: .257	4.57 as 6.99	same as above	.900 22.86						1000 1500 2500 3000 4500	6.0 7.4 9.3 10.9 14.7	19.7 24.3 30.5 35.8 48.2
7712A	NEC: CMR CEC: CMG FT4	5 1000	500 1000	152.4 304.8	209.5 440.0	95.2 200.0	same as above	.180 Coax OD: .257	4.57 as 6.99	same as above	.942 23.93						3000 4500	10.9 14.7	35.8 48.2
7713A	NEC: CMR CEC: CMG FT4	10 1000	500 1000	152.4 304.8	450.0 878.0	204.5 399.1	same as above	.180 Coax OD: .257	4.57 as 6.99	same as above	1.386 35.20								

Color Code Chart

Cond. 1	Red	Cond. 3	Blue	Cond. 5	Yellow	Cond. 7	Orange	Cond. 9	Violet
Cond. 2	Green	Cond. 4	White	Cond. 6	Brown	Cond. 8	Gray	Cond. 10	Black

VideofLEX® Triax Cable RG-59/U Type

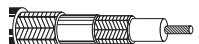
Description	Part No.	UL NEC/ C(UL) CEC Type	Standard Lengths		Standard Unit Weight		Conductor (stranding) Diameter Nom. DCR	Nominal Core OD		Shielding Materials Nom. DCR	Nominal OD		Nom. Imp. (Ω)	Nom. Vel. of Prop.	Nominal Capacitance		Nominal Attenuation	
			Ft.	m	Lbs.	kg		Inch	mm		Inch	mm			pF/Ft.	pF/m	MHz	dB/ 100 Ft.

22 AWG Stranded (19x34) .031" Bare Copper Conductor • Double Bare Copper Braid Shields (95% Coverage)

Foam Polyethylene Insulation • Belflex® Jacket (Red, Yellow, Green, Blue, Purple or Black) Polyethylene Insulation between Braids

High-Flex 75°C	1857A	—	500 1000	152.4 304.8	42.5 86.0	19.3 39.1	22 AWG (19x34) .031" BC 14.0Ω/M' 45.9Ω/km	.143 3.63	3.63	(2) BC Braids 95% Coverage Inner: BC 2.5Ω/M' 8.2Ω/km Outer: 1.6Ω/M' 5.3Ω/km	.360 9.14	75	79%	17.0	55.8	1 3.6 10 71.5 135 270 360 540 720 750 1000 1500 2250 3000	.3 .5 .8 2.2 3.1 4.5 5.4 6.8 8.1 8.4 10.1 13.3 17.6 21.4	1.0 1.6 2.6 7.2 10.2 14.8 17.7 22.3 26.6 27.6 33.1 43.6 57.7 70.2
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100% Sweep tested. 5 MHz to 3 GHz.



Suitable for Outdoor applications: Black for permanent installations, all colors for field deployable use.

BC = Bare Copper • DCR = DC Resistance • HDPE = High-density Polyethylene • PE = Polyethylene • TC = Tinned Copper

For Connector Cross Reference, visit www.belden.com or call Customer Service 1-800-BELDEN-1. For audio and video cable assemblies, visit the Belden Web site for a list of Belden Certified Assemblers.



Video Triax Cable (cont.) RG-59/U Type

Description	Part No.	UL NEC/ C(UL) CEC Type	Standard Lengths		Standard Unit Weight		Conductor (stranding) Diameter Nom. DCR	Nominal Core OD		Shielding Materials Nom. DCR	Nominal OD		Nom. Imp. (Ω)	Nom. Vel. of Prop.	Nominal Capacitance		Nominal Attenuation		
			Ft.	m	Lbs.	kg		Inch	mm		Inch	mm			pF/Ft.	pF/m	MHz	dB/100 Ft.	dB/100m

20 AWG Solid .032" Bare Copper Conductor • Double Bare Copper Braid Shields (80% Coverage)

Gas-injected Foam HDPE Insulation • Black Polyethylene Jacket (Polyethylene Insulation between Braids)																			
80°C	8232	—	500	152.4	31.0	14.1	20 AWG (solid)	.145	3.68	(2) BC Braids 95% Coverage	.315	8.00	75	83%	16.2	53.1	1	.3	1.0
			1000	304.8	60.0	27.3	.032" BC			Inner: 2.5Ω/M'							3.6	.6	2.0
			2000	609.6	118.0	53.6	10.0Ω/M'			Outer: 2.8Ω/M'							10	.9	3.0
							32.8Ω/km			8.2Ω/km							71.5	2.1	6.9
																	135	3.0	9.8
																	270	4.2	13.8
																	360	4.8	15.7
																	540	5.9	19.4
																	720	7.0	23.0
																	750	7.1	23.3
																	1000	8.3	27.2
																	1500	10.5	34.4
																	2250	13.4	44.0
																	3000	15.9	52.2

Suitable for Outdoor and Direct Burial applications.

Suitable for Aerial applications when supported by a messenger wire.

20 AWG Solid .032" Bare Copper Conductor • Double Bare Copper Braid Shields (80% Coverage)

Gas-injected Foam HDPE Insulation • Black PVC Jacket (PVC Insulation between Braids)																			
75°C	8232A	NEC: —	1000	304.8	68.0	30.8	20 AWG (solid)	.145	3.68	(2) BC Braids 95% Coverage	.315	8.00	75	83%	16.2	53.1	1	.3	1.0
60°C (UL)		CMR					.032" BC			Inner: 2.5Ω/M'							3.6	.6	2.0
		CEC: CMG FT4					10.0Ω/M'			Outer: 2.8Ω/M'							10	.9	3.0
							32.8Ω/km			8.2Ω/km							71.5	2.1	6.9
																	135	3.0	9.8
																	270	4.2	13.8
																	360	4.8	15.7
																	540	5.9	19.4
																	720	7.0	23.0
																	750	7.1	23.3
																	1000	8.3	27.2
																	1500	10.5	34.4
																	2250	13.4	44.0
																	3000	15.9	52.2

20 AWG Solid .032" Bare Copper Conductor • Double Bare Copper Braid Shields (95% Coverage)

Gas-injected Foam HDPE Insulation • Belflex Jacket (Red, Yellow, Green, Blue or Black) Polyethylene Insulation between Braids																			
75°C	1856A	—	1000	304.8	83.0	37.7	20 AWG (solid)	.145	3.68	(2) BC Braids 95% Coverage	.360	9.14	75	83%	16.2	53.1	1	.3	1.0
							.032" BC			Inner: 2.5Ω/M'							3.6	.6	1.8
							10.1Ω/M'			Outer: 2.8Ω/M'							10	.8	2.7
							33.1Ω/km			8.2Ω/km							71.5	2.2	7.2
																	135	3.0	9.8
																	270	4.2	13.8
																	360	4.8	15.7
																	540	5.9	19.4
																	720	6.9	22.6
																	750	7.1	23.3
																	1000	8.8	28.9
																	1500	12.0	39.4
																	2250	16.4	53.8
																	3000	20.4	66.9

Suitable for Outdoor applications: Black for permanent installations, all colors for field deployable use.

22 AWG Stranded (19x34) .031" Bare Copper Conductor • Double Bare Copper Braid Shields (95% Coverage)

Foam Polyethylene Insulation • Belflex Jacket (Red, Yellow, Green, Blue, Purple or Black) Polyethylene Insulation between Braids																			
High-Flex	1857A	—	500	152.4	42.5	19.3	22 AWG (19x34)	.143	3.63	(2) BC Braids 95% Coverage	.360	9.14	75	79%	17.0	55.8	1	.3	1.0
75°C			1000	304.8	86.0	39.1	.031" BC			Inner: 2.5Ω/M'							3.6	.5	1.6
							14.0Ω/M'			Outer: 2.5Ω/M'							10	.8	2.6
							45.9Ω/km			8.2Ω/km							71.5	2.2	7.2
																	135	3.1	10.2
																	270	4.5	14.8
																	360	5.4	17.7
																	540	6.8	22.3
																	720	8.1	26.6
																	750	8.4	27.6
																	1000	10.1	33.1
																	1500	13.3	43.6
																	2250	17.6	57.7
																	3000	21.4	70.2

Suitable for Outdoor applications: Black for permanent installations, all colors for field deployable use.

BC = Bare Copper • DCR = DC Resistance • FEP = Fluorinated Ethylene Propylene • HDPE = High-density Polyethylene

Contact the Belden Customer Service Department for a Comprehensive Connector Cross Reference. 1-800-BELDEN-1. Request quotations of cables not listed.

Video Triax Cable RG-11/U Type

Description	Part No.	UL NEC/ C(UL) CEC Type	Standard Lengths		Standard Unit Weight		Conductor (stranding) Diameter Nom. DCR	Nominal Core OD		Shielding Materials Nom. DCR	Nominal OD		Nom. Imp. (Ω)	Nom. Vel. of Prop.	Nominal Capacitance		Nominal Attenuation	
			Ft.	m	Lbs.	kg		Inch	mm		Inch	mm			pF/Ft.	pF/m	MHz	dB/100 Ft.

15 AWG Stranded (19x27) .064" Bare Copper Conductor • Double Bare Copper Braid Shield (95% Coverage)

Gas-injected Foam HDPE Insulation • Belflex Jacket (Red, Yellow, Green, Blue, Purple or Black) Polyethylene Insulation between Braids

High-Flex 75°C	1858A	—	500	152.4	80.5	36.5	15 AWG (19x27) .064" BC 3.1Ω/M' 8.9Ω/km	.312	7.92	(2) BC Braids 95% Coverage Inner: BC 1.8Ω/M' 5.2Ω/km Outer: 1.4Ω/M' 4.6Ω/km	.520	13.20	75	78%	17.3	56.8	1	.1	.5
			1000	304.8	157.0	71.2											3.6	.3	1.0
100% Sweep tested. 5 MHz to 3 GHz.																			
750																			
1000																			
1500																			
2250																			
3000																			

Suitable for Outdoor applications: Black for permanent installations, all colors for field deployable use.

Plenum • Foam FEP Teflon® Insulation • Black Fluorocopolymer Jacket (Fluorocopolymer Insulation between Braids)

125°C	1859A	NEC: CMP CEC: CMP FT6	500	152.4	66.5	30.2	15 AWG (19x27) .064" BC 3.1Ω/M' 8.9Ω/km	.285	7.24	(2) BC Braids 95% Coverage Inner: BC 1.4Ω/M' 4.6Ω/km Outer: 1.4Ω/M' 4.6Ω/km	.406	10.30	75	80%	16.5	54.1	1	.1	.5
			1000	304.8	134.0	60.9											3.6	.2	.7
100% Sweep tested. 5 MHz to 3 GHz.																			
270																			
360																			
540																			
720																			
750																			
1000																			
1500																			
2250																			
3000																			

Suitable for Outdoor and Direct Burial applications.

Suitable for Aerial applications when supported by a messenger wire.

14 AWG Solid .064" Bare Copper Conductor • Double Bare Copper Shield (95% Coverage)

Gas-injected Foam HDPE Insulation • Black Polyethylene Jacket (Polyethylene Insulation between Braids)

80°C	8233	—	500	152.4	63.0	28.6	14 AWG (solid) .064" BC 2.5Ω/M' 8.2Ω/km	.285	7.24	(2) BC Braids 95% Coverage Inner: BC 1.6Ω/M' 5.2Ω/km Outer: 1.4Ω/M' 4.6Ω/km	.475	12.07	75	84%	16.1	52.8	1	.2	.7
			1000	304.8	122.0	55.5											3.6	.3	1.0
			2000	609.6	240.0	109.1											10	.4	1.3
100% Sweep tested. 5 MHz to 3 GHz.																			
71.5																			
135																			
270																			
360																			
540																			
720																			
750																			
1000																			
1500																			
2250																			
3000																			

Suitable for Outdoor and Direct Burial applications.

BC = Bare Copper • DCR = DC Resistance • FEP = Fluorinated Ethylene Propylene • HDPE = High-density Polyethylene

Teflon is a DuPont Trademark.



Video Triax Cable (cont.) RG-11/U Type

Description	Part No.	UL NEC/ C(UL) CEC Type	Standard Lengths		Standard Unit Weight		Conductor (stranding) Diameter Nom. DCR	Nominal Core OD		Shielding Materials Nom. DCR	Nominal OD		Nom. Imp. (Ω)	Nom. Vel. of Prop.	Nominal Capacitance		Nominal Attenuation	
			Ft.	m	Lbs.	kg		Inch	mm		Inch	mm			pF/Ft.	pF/m	MHz	dB/100 Ft.

14 AWG Solid .064" Bare Copper Conductor • Two Bare Copper Braids (95% Shield Coverage)

Gas-injected Foam HDPE Insulation • Black PVC Jacket (PVC Insulation between Braids)																			
80°C	8233A	NEC:	1000	304.8	142.0	64.5	14 AWG	.285	7.24	(2) BC Braids	.475	12.07	75	84%	16.1	52.8	1	.2	.7
		CMR:	2000	609.6	240.0	109.1	(solid)			95%							3.6	.3	1.0
		CEC:	4000	1219.2	574.0	260.9	.064"			Coverage							10	.4	1.3
		CMG FT4					BC			Inner:							71.5	1.1	3.6
							2.5Ω/M'			1.6Ω/M'							135	1.5	4.9
							8.2Ω/km			5.2Ω/km							270	2.3	7.5
										Outer:							360	2.7	8.9
										1.4Ω/M'							540	3.5	11.5
										4.6Ω/km							720	4.2	13.8
																	750	4.3	14.1
																	1000	5.2	17.1
																	1500	7.1	23.3
																	2250	9.6	31.5
																	3000	12.0	39.4

BC = Bare Copper • DCR = DC Resistance • HDPE = High-density Polyethylene • PE = Polyethylene

For Connector Cross Reference, visit www.belden.com or call Customer Service 1-800-BELDEN-1. For audio and video cable assemblies, visit the Belden Web site for a list of Belden Certified Assemblers.

For additional sweep-tested digital video Triax Cables, see the Belden Master Catalog and/or www.belden.com.

Digital Audio and Video Composite Camera Cables for ENG/EFP Applications RG-59U Type Coax

Description	Part No.	UL NEC/ C(UL) CEC Type	Standard Lengths		Standard Unit Weight		Conductor (stranding) Diameter Nom. DCR	Nominal Core OD		Shielding Materials Nom. DCR	Overall Nominal OD		Nom. Imp. (Ω)	Nom. Vel. of Prop.	Nominal Capacitance		Nominal Attenuation	
			Ft.	m	Lbs.	kg		Inch	mm		Inch	mm			pF/Ft.	pF/m	MHz	dB/100 Ft.

(2) RG-59 Type SDI Coax (1505A) + (4) 22 AWG Audio Cables (9451 Type) • (2) 20 AWG Solid Coax with Duofoil + TC Braid Shield (95% Coverage) • (4) Jacketed 22 AWG STP Audio Cables

Insulation: Gas-Injected Foam Polyethylene (Coax) and Polypropylene (Pairs) • Matte Black Overall PVC Jacket																			
UL	1347A	NEC:	500	152.4	108.5	49.3	(2) Coax:	.145	3.68	Duofoil	.630	16.0	75	83%	16.3	53.5	1	.3	1.0
300V 60°C		CMR:	1000	304.8	232.0	105.5	20 AWG			+ TC Braid							3.6	.6	2.0
		CEC:					(solid)	.233	5.92	95% Shield							5	.6	2.1
		CMG FT4					.034" BC			Coverage							7	.7	2.4
							10.0Ω/M'			3.8Ω/M'							10	.9	3.0
							32.8Ω/km			12.5Ω/km							67.5	2.1	6.7
							Jackets: Black, white										71.5	2.1	6.9
							(4) Pairs:	.076	1.93	Each Pair:			45	66%	35.0	114.8	88.5	2.2	7.2
							22 AWG			Beldfoil							100	2.3	7.5
							(7x30)	.135	3.43	Shielded							135	2.7	8.9
							.030" BC			100% Shield							143	2.8	9.2
							14.1Ω/M'			Coverage							180	3.1	10.2
							46.2Ω/km			w/22 AWG							270	3.8	12.5
							Jackets: Brown,			TC Drain Wire							360	4.4	14.4
							Red, Orange, Yellow			14.3Ω/M'							540	5.5	18.0
										46.9Ω/km							720	6.4	21.0
																	750	6.5	21.3
																	1000	7.6	24.9
																	1500	9.3	30.5
																	2000	10.9	35.8
																	2250	11.6	38.1
																	3000	13.4	44.0
																	4500	16.4	53.8

BC = Bare Copper • DCR = DC Resistance • STP = Shielded Twisted Pairs • TC = Tinned Copper

For Connector Cross Reference, visit www.belden.com or call Customer Service 1-800-BELDEN-1. For audio and video cable assemblies, visit the Belden Web site for a list of Belden Certified Assemblers.

For additional sweep-tested digital video Triax Cables, see the Belden Master Catalog and/or www.belden.com.

Audio and Video Composite Camera Cable

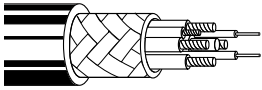
SMPTE 311M HDTV Cables

Single-mode Fiber with Copper Conductors

Description	Part No.	UL NEC/ C(UL) CEC Type	Standard Lengths		Standard Unit Weight		Conductor (stranding) Nom. DCR	Nominal Core OD		Shielding Materials Nom. DCR	Nominal OD		Nominal Optical Attenuation (@1310nm)	
			Ft.	m	Lbs.	kg		Inch	mm		Inch	mm	dB/1000 Ft.	dB/km

4 Power Conductors • SM Fiber w/ 24 and 20 AWG Stranded (7x32 and 19x32) Tinned Copper • Overall 95% TC Braid Shield

PVC Insulation • Black Belflex Jacket														
75°C	7804R	NEC:	328	100.0	33.5	15.2	(2) Fibers:	.079	2.00	36 AWG	.362	9.20	.14	.45
		CMR:	500	152.4	50.0	22.7	SM/125μ/900μ			TC Braid				
		CEC:	1000	304.8	98.0	44.5	(core/clad/buffer)			95% Shield				
		CMG FT4	1640	500.0	155.8	70.8	(2) Cond.:	.050	1.27	Coverage				
			3280	1000.0	321.4	146.1	24 AWG			2.9Ω/M'				
						(7x32)			9.5Ω/km					Other conductor counts/diameters available by special order.
						.024"								
						Tinned Copper								
						23.3Ω/M'								
						76.4Ω/km								
						(4) Cond.:	.063	1.60						
						20 AWG								
						(19x32)								
						.037"								
						Tinned Copper								
						8.8Ω/M'								
						28.9Ω/km								



2 Power Conductors • SM Fiber w/ 24 and 16 AWG Stranded (7x32 and 65x34) Tinned Copper • Overall 95% TC Braid Shield

PVC Insulation • Black Belflex Jacket														
75°C	7804C	NEC:	328	100.0	32.0	14.5	(2) Breakout	.079	2.00	38 AWG	.362	9.20	.14	.45
		CMR:	500	152.4	46.0	20.9	Fibers:			TC Braid				
		CEC:	1000	304.8	87.0	39.5	SM/125μ/900μ			95% Shield				
		CMG FT4	1640	500.0	140.0	63.6	(core/clad/buffer)			Coverage				
			3280	1000.0	288.0	130.9	(2) Cond.:	.050	1.27	2.8Ω/M'				
						24 AWG			9.2Ω/km					Other conductor counts/diameters available by special order.
						(7x32)								
						.024"								
						Tinned Copper								
						23.3Ω/M'								
						76.4Ω/km								
						(2) Cond.:	.093	2.36						
						16 AWG								
						(65x34)								
						.059"								
						Tinned Copper								
						4.3Ω/M'								
						14.1Ω/km								

TC = Tinned Copper



Field Deployable Tactical Fiber Optic Cable

Single-mode Fiber

Applications

- ENG vehicles
- Outdoor news, sporting or other events
- Digital camera transmission
- Military communications
- Re-deployable communications
- Mining and industrial applications

Product Description

Small and lightweight with a rugged jacket, Tactical Cable provides a durable design for repeated deployment and retrieval cycles and a superior level of crush resistance. Designed to military standards.

Jacket Material	UV-resistant PU
Buffer	Polyester
Strength Member	Aramid Yarn
Color Code	
Jacket	Black
Fiber/Buffer	Per EIA/TIA 598-C
Fiber/Buffer 1	Blue
Fiber/Buffer 2	Orange
Fiber/Buffer 3	Green
Fiber/Buffer 4	Brown
Fiber/Buffer 5	Slate
Fiber/Buffer 6	White
Fiber/Buffer 7	Red
Fiber/Buffer 8	Black
Fiber/Buffer 9	Yellow
Fiber/Buffer 10	Violet
Fiber/Buffer 11	Rose
Fiber/Buffer 12	Aqua

Specifications

Temperature Range	
Storage	-70 to +85°C
Operating	-55 to +85°C
Crush Resistance (EIA-455-41)	440 N/cm
Impact Resistance (EIA-455-25)	200 Impacts @ 2.2 N-m
Cyclic Flexing (EIA-455-104)	2000 cycles, min.
Min. Bend Radius	
Installation	15 x OD
Long Term	8 x OD

Optical Specifications

Single-mode Enhanced *

Operating Wavelength (nm)	1310/1550
Max. Attenuation Tight Buffered (dB/km)	0.80/0.50

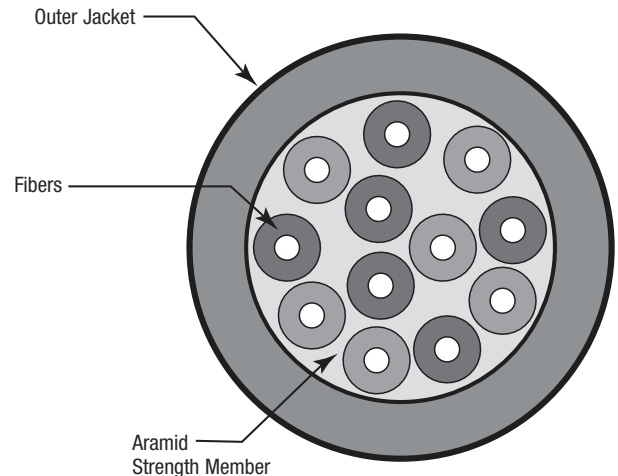
*Low water peak Single-mode suitable for CWDM use complies with ITU G.652.c/d

Belden Part Number	No. of Fibers	Outside Diameter		Weight		Max. Install Load	
		Inch	mm	Lbs./1000'	kg/km	Lbs.	N
M96566	2	0.210	5.5	19	28	330	1468
M96639	4	0.225	5.7	21	31	330	1468
M96567	6	0.240	6.0	23	34	330	1468
M96568	8	0.250	6.3	26	39	330	1468
M96570	12	0.255	7.1	31	46	330	1468

Please contact the Technical Support Group for proper connectivity integration and installation guidance. All optical fiber products can be supplied in compliance with RoHS regulations. Please contact Inside Sales for more details.

Other Tactical Fiber constructions utilizing multimode fibers are available by special order.

Fiber Bundle Detail



Maximum Transmission Distance at Serial Digital Data Rates

Data Rate:	143 Mb/s		177 Mb/s		270 Mb/s		360 Mb/s		1.5 Gb/s		3.0 Gb/s	
Spec:	SMPTE 259M		ITU-R BT. 601		SMPTE 259M		SMPTE 259M		SMPTE 292M		SMPTE 424M	
Cable Part Number	Composite SD-SDI (NTSC)		Composite SD-SDI (PAL)		Component SD-SDI		Widescreen SD-SDI		HD-SDI		1080p/50 1080p/60	
	Ft.	m	Ft.	m	Ft.	m	Ft.	m	Ft.	m	Ft.	m
179DT	502	153	454	138	382	116	336	102	109	33	76	23
1865A	811	247	732	223	600	183	517	158	167	51	118	36
1855A*	980	299	949	289	787	240	685	209	209	64	154	47
1855P	968	295	878	268	732	223	634	193	190	58	127	39
1505A**	1429	436	1364	416	1111	339	968	295	308	94	215	66
1505F	1200	366	1071	326	857	261	732	223	225	69	150	46
1506A***	1333	406	1209	369	938	286	822	251	267	81	91	28
8281	1429	436	1279	390	1000	305	870	265	N/A	N/A	N/A	N/A
8281B	1429	436	1269	387	1000	305	870	265	N/A	N/A	N/A	N/A
8281F	1200	366	1056	322	833	254	707	215	N/A	N/A	N/A	N/A
88281	1304	397	1153	351	909	277	769	234	N/A	N/A	N/A	N/A
1694A****	1786	544	1622	494	1339	408	1167	356	364	111	250	76
1694F	1500	457	1364	416	1071	326	909	277	286	87	192	59
1695A	1685	514	1546	471	1250	381	1071	326	323	98	217	66
7731A	2752	839	2479	756	2041	622	1775	541	546	166	364	111
7732A	2419	737	2143	653	1685	514	1435	437	427	130	289	88
7732LL	2400	732	2202	671	1818	554	1580	482	515	157	354	108

The serial digital interconnect standards are designed to operate where the signal loss at 1/2 the clock frequency does not exceed the approximate loss values listed below. The maximum length values shown are based on typical attenuation values for the cables listed and the following criteria: **Maximum length = 30 dB loss at 1/2 the clock frequency: SMPTE 259M, PAL, Widescreen. Maximum length = 20 dB loss at 1/2 the clock frequency: SMPTE 292M and SMPTE 424M.**

The bit error rate (BER) can vary dramatically as the calculated distances are approached. BER is dependent on receiver design and the losses of the actual coax used. Distribution and routing equipment manufacturers should be contacted to verify their maximum recommended transmission.

- * Includes cables that use 1855A as a constituent, such as 7787A, 7788A, 7789A, 7790A, 7791A, 7792A, 1855S3, 1855S5, 1855S6
- ** Includes cables that use 1505A as a constituent, such as 7794A, 7795A, 7796A, 7798A, 1505S3, 1505S5, 1505S6
- *** Includes cables that use 1506A as a constituent, such as 1283S3, 1283S5, 1283S6
- **** Includes cables that use 1694A as a constituent, such as 7710A, 7711A, 7712A, 7713A, 1694S3, 1694S5, 1694S6

Return Loss Headroom (1694A)

