

Field Operations Manual
Chapter Four – Field Standards

MOOD:

I. Field Installation Standards

The following provides the minimums to be complied for every installation.

General Standards

- In the event of any conflict with local, state, or federal code or law and project specific scope or drawings and / or site direction provided by the Authority Having Jurisdiction (AHJ); all conflicting points within this document will be superseded by that of the AHJ.
- Completed installation must be clean, orderly, traceable and functional.
- Speakers must be plumb, straight and solid with logos oriented the same direction.
- Equipment racks must be clean and wires properly tied, bundled and numbered.
- All interconnect wiring must be correctly labeled.
- All terminations, connectors, plugs and terminal blocks must be properly terminated with any exposed wires individually protected by an insulating material such as the jacket of the wire, shield tubing or heat shrink.
- All equipment must be labeled for ease of operation.
- Entire system installation must be tested and verified for functionality against scope of work. These tests to include:
 - Impedance measurement of all speaker line circuits.
 - Volt / Ohm meter measurement for shorts, opens and continuity to ground of all circuits.
- Any customer punch list items relating to the Mood Media installation or service request must be addressed prior to customer's completion deadline.
- All audio components must be adjusted, balanced and volume levels set in accordance with Mood Media's direction.
- All precautions will be taken to ensure that during the installation none of the customer's property, furniture or fixtures is damaged.
- Client personnel will be trained on operation and preventative maintenance of system prior to customer's sign off.

Loudspeakers

- All surface speakers within a zone will be mounted at the same height. *
- All surface speakers within a zone will be mounted on the same throw axis. *
- All surface speakers in an installation will be mounted either vertically or horizontally with no combinations of the two. *
- All wires for surface speakers are to be well hidden.
- Ceiling speakers in suspended tile ceilings shall be supported from the ceiling grid by the appropriate tile bridge or rail support. Provide direct support to structure if required by local code.
- All speakers installed in ceiling tile shall have neatly cut holes that are completely hidden by the grill.
- All speakers installed in ceiling tile shall have the speaker mounted in the center of the tile unless conditions prohibit. *
- Ceiling tiles that have speakers installed in them are whole and structurally sound.
- 70v speaker transformers shall have the unused stripped leads cut back to the insulating jacket to prevent shorting on each other, the speaker casing, or the back can. Neatly bundle and secure unused transformer leads.
- Speakers shall be located as indicated on the drawings with minor changes not to exceed 12" horizontally if surface mounted, and one tile in any direction unless approved by Mood Media. *
- Loudspeakers shall be installed in a linear manner whenever possible. *
- Tension and compression mounted grills are to be fully inserted.

* Unless specified in engineering details or by direct client request.

Wiring

- All cable types to be used in accordance with Mood Media core cable charts (Appendix F). *
- Equivalent to Belden specifications may be considered.
- All wiring runs are to be concealed in ceiling and walls whenever possible.
- Any wiring that is exposed must be as well-hidden as possible: tight into corners or hidden by trim. All bends in wiring will be 90 degrees and in observation of manufacturers bend radius, and exposed wires must either run parallel or perpendicular to walls and floor.
- Wires for a Head End shall not be run exposed down any wall. They shall be in the wall or in a wire management tray or chase.
- Exposed wiring shall be attached to walls and ceiling securely enough to avoid wire sagging.
- All wiring that runs horizontally above drop tile ceiling shall be supported every 4 to 5 feet to protect the cable from the stress related to its own weight and resulting sag.
- All cable routes shall be independent of all other trades and systems.
- Cable shall not be tied to ceiling support system, sprinkler pipes, HVAC or electrical conduit.
- Wires exiting a wall or ceiling will have a wall plate.
- Any retrofit installation shall have a new wiring infrastructure (all wiring except 110V mains) pulled. *
- All wiring will be run so that it's kept at a safe distance from possible interference sources as specified in Appendix C "Cable Pulls".

* Unless specified in engineering details or by direct client request.

Wiring – (continued)

- Separate all cables by a minimum of 4" in groups as follows:

Mic Level	-60 dBV (0.001 volt) to -40dBV (0.010 volt)
Consumer & Line Level	-40 dBV (0.010 volt) to +24 dBV (16 volt)
Speaker Level	+10 dBV (3 volt) to +40 dBV (100 volt)
Video / RF / Control	RF Cable, Mood Media Satellite Cable, RGBHV, HDMI, HDBASET, Ethernet, Control, RS-232

- All equipment racks must have a minimum wiring service loop of 5' to facilitate servicing or changes to system. Service loops shall not touch the floor.
- Cable groups shall have varying service loop lengths so they do not hang together.
- Building wiring should fall from cable tray, wall plate or conduit and enter near or at the top of the rack. A bushing or cable clamp connector should be used to run wiring into an enclosed audio video equipment rack.

Splicing & Coupling

- Coaxial cables need to be coupled with the proper connectors (F, BNC, etc.) and it's mating coupler.
- Types of lines that may be spliced with crimp connectors are microphone, speaker, line level, and volume control. All splicing should be located where they can be easy found for service, either at a device or a central splice point. A method of strain relief shall be used on all splices.
- All splice connections (speaker, line level, volume control) shall be made with insulated crimp type connectors. All conductors within a cable shall be spliced through.
- Types of lines that may be coupled are RF, video and data cables.
- Wire nuts are not to be used for any interior low voltage wiring.

Terminations

- All wires connected to equipment will have properly sized (wire and screw size) spade lugs or wire ferrules crimped with an appropriate crimp die and handle.
- All exposed conductors shall be covered with an insulating material such as the jacket of the wire, shield tubing or heat shrink.
- All audio connections will be consistent with wiring schemes as indicated in Appendix A, “Audio Connections”.
- All RF and BNC terminations will be made as specified in Appendix B, “Coaxial Cable”.

Labeling

- All equipment shall be labeled in such a way as to indicate the “normal” level settings for each volume control used. All utilized volume controls shall have the source name and/or the zone/area controlled clearly labeled. All controls (Eq., bypass, on/off) whether used or not shall have the correct level/position labeled. Unused volume controls shall be labeled in the off position.
- All labels will be made with a Brother Labeler or similar quality thermal labeler.
- Embossed type labels are not to be used.
- All wires should be labeled as indicated on Mood Media plans (see Appendix C, Cable Pulls). If any changes are made in the field, it should be noted on the signed work order and prints. Printed heat shrink, label under clear heat shrink or a printed label listed for wire labeling.
- Accepted label brands & type:

Brother	Cable & Wire/Flexible ID TZe Labeling Tapes
Dymo Rhino	IND Vinyl Labels
	IND Flexible Nylon Labels
	IND Heat-Shrink Tube

- If a wire label scheme is not provided on Mood drawings, the following will be used:

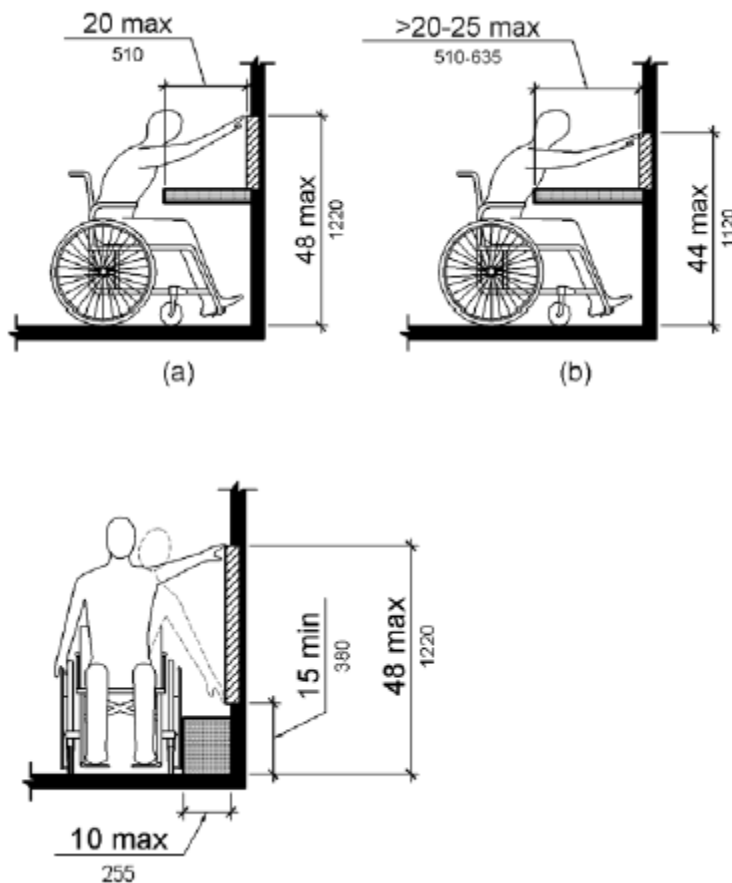
Microphone	M001 – M999
Line level	L001 – L999
Speaker	SPK001 – SPK999
Control	CTL001 – CTL999
Ethernet	NET001 – NET999

Anchoring

- All equipment, surface mounted or recessed, that is supported by the building structure shall be installed with the appropriate hardware that is rated for five times the weight of the equipment hung (see Appendix D, Hardware Schedule).
- Only anchors listed in Appendix D may be used for Mood Media installations and limited in use to the type of materials listed for each anchor.
- Only rated wire rope or closed link chain may be used to suspend equipment from overhead. Open link chain may not be used in Mood Media installations.
- The mounting surface shall have a sufficient rating to hold the anchored equipment. If needed, install an anchor backing plate to spread the load over a larger surface area.
- Speakers and TV's mounted in all areas shall not be hung lower than 80" above the finished floor, unless specified by Mood Media.
- If notated by local code, a safety support tied to building structure may be required.
- Screws on all equipment shall be snug and screwed into an anchor or box.

Equipment Placement

- All equipment is to be located as specified on the plans provided by Mood Media.
- Head end equipment shall be installed in a safe and secure permanent location.
- No equipment shall be placed directly on top of a Mood Media source player for proper ventilation (at least 1" clearance). *
- All controls and inputs must be between 15" and 48" and match nearby receptacles and controls. Whenever possible, volume controls must be recessed into walls. *
- Wall plates are to be installed straight and plumb with appropriate backing.
- All volume controls are to be mounted at the same height unless specified otherwise by Mood Media.



* Unless specified in engineering details or by direct client request.

Equipment Racks/Assembly

- Install all equipment and shelves in the proper locations as specified in plans provided by Mood Media.
- Tighten all rack rail bolts to insure rail stability.
- Install rear supports for deep or heavy equipment.
- Install Panduit or other raceway for wire management, if needed
- Install lacing bars for wire support to equipment if needed
- If multiple racks, connect all racks with a common ground of at least 14 awg. to prevent a floating rack ground.
- Leave drawings with head end and return As-Built plans to Mood via Project Manager.
- Separate all cables by a minimum of 4" in groups as follows:

Mic Level	-60 dBV (0.001 volt) to -40dBV (0.010 volt)
Consumer & Line Level	-40 dBV (0.010 volt) to +24 dBV (16 volt)
Speaker Level	+10 dBV (3 volt) to +40 dBV (100 volt)
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- Building wiring should fall from cable tray, wall plate or conduit and enter near or at the top of the rack. A bushing or cable clamp connector should be used to run wiring into an enclosed audio video equipment rack.

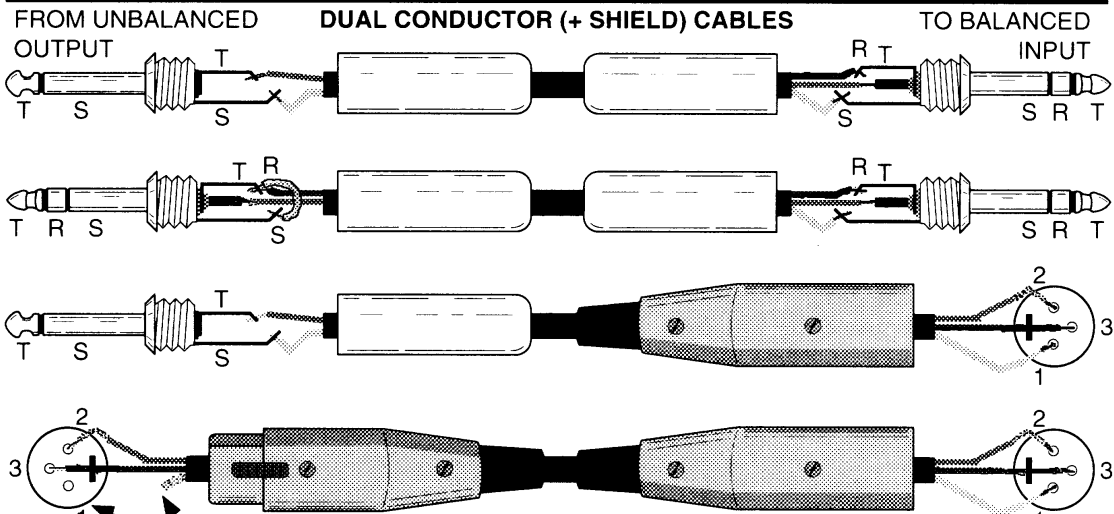
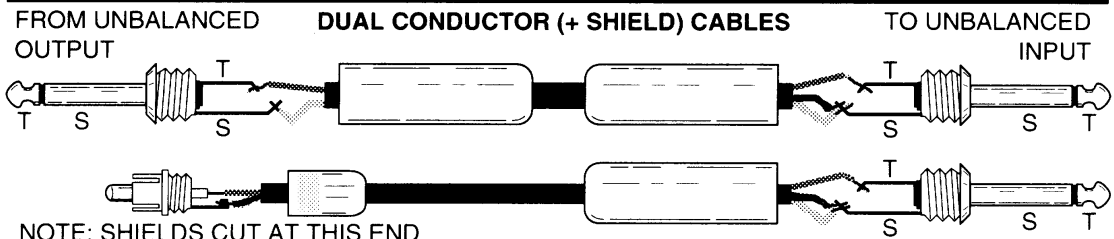
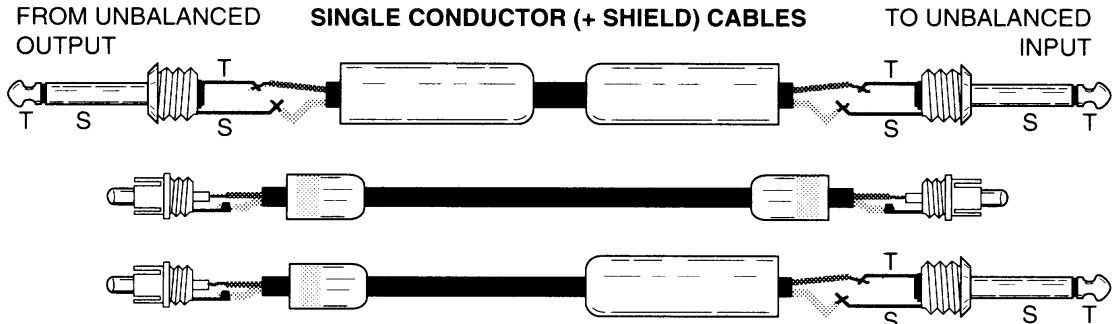
Electrical

Make sure the electrician is aware of the following electrical requirements. If there is a conflict, notify Mood Media immediately.

- If isolated ground is specified, use only iso-ground outlets and strips.
- Connect all AC outlets using fan out or star method ensuring a direct circuit connection from the supplying conductor to outlet itself.
- If the AC is remotely switched, provide unswitched outlets for any control, source, test or technician gear.

Field Standards - Appendix A

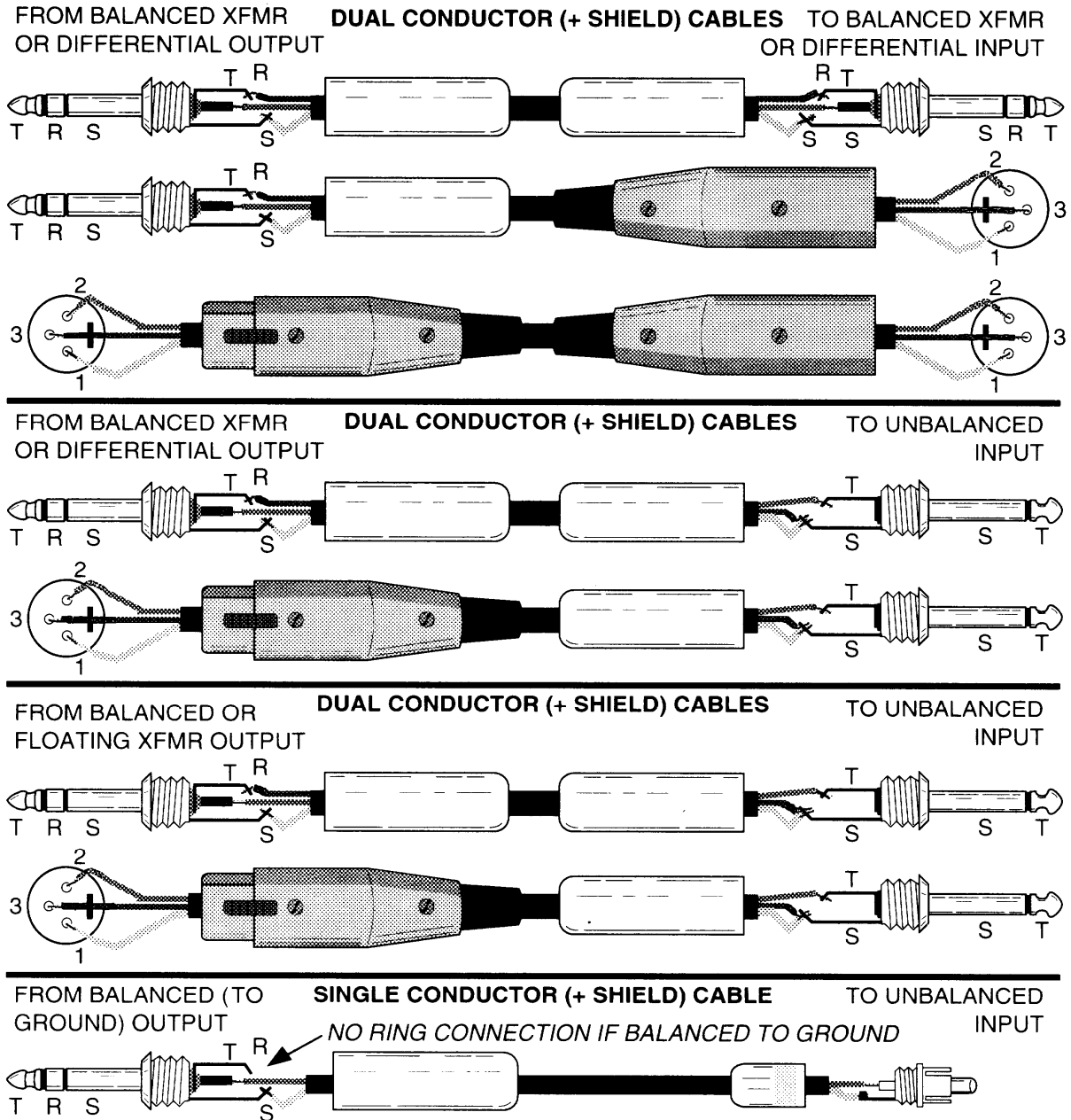
Audio Connections



CONNECT PIN 1 AT BOTH ENDS OF A MIC CABLE. CUT THE SHIELD HERE, AS SHOWN, FOR A LINE-LEVEL SIGNAL CABLE.

Field Standards - Appendix A

Audio Connections -(continued)



Note: This does not show strain relief, only connectivity. Strain relief must be used at all times.

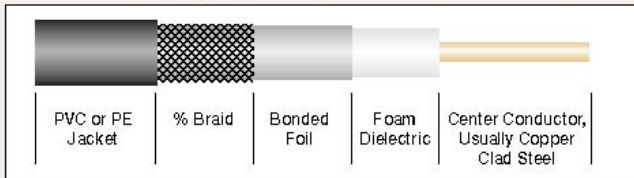
Field Standards - Appendix B Coaxial Cable

Signal distance before degradation on coax:

- RG59 baseband (video) 600' broadband (RF) 50'
- RG6 baseband (video) 800' broadband (RF) 75'
- RG11 baseband (video) 1200' broadband (RF) 150'

RF:

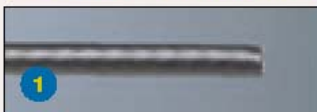
Safety Wear eye protection when installing these connectors. Follow NEC, SCTE, CSA, Local Codes and/or Satellite TV Standards for proper grounding.



Cable Preparation Tips

- Cut cable end squarely
- If braid or center conductor is scored or cut, re-prep cable
- Score and remove outer foil on Tri and Quad Shielded Cable
- No braid should touch the center conductor
- Ensure center conductor is straight and clean

Connector Installation



1

Cut cable end square



2

Position cable in cutting tool and rotate tool until cable jacket is easily removed.



2a

Properly prepared cable 1/4" - 1/4"



3

Fold back braid



4

Position connector



4a

(Detach sleeve only if required for cable insertion)



5

Bottom connector, post flush at dielectric



6

Compress sleeve

For more information call 800-920-0328

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Field Standards - Appendix B Coaxial Cable - (continued)

BNC:

Thomas & Betts



LRC® SNAP-N-SEAL®

BNC Compression Connectors

Introducing super premium Snap-N-Seal® precision BNC compression connectors from Thomas & Betts. Four connector options are available. SNS59HECBNC designed for applications using CommScope® series F59HEC-2 Headend Cable, S59HEC Headend Cable, or Times Fiber Communications, Inc. series 02241V Headend Cables. SNS59HECBNCB designed for applications using Belden® series 1505A Serial Digital Video Cable, 9167 Broadband Headend Cable or Belden® 9275 or 8241 cables. SNS6BNC designed for applications using RG6 cable. SNS6QSBNC designed for applications using RG6 quad shield cable.

DESIGN FEATURES

- High performance, 75 ohm Snap-N-Seal® BNC Male connectors feature precision coaxial contacts for demanding bandwidth applications.
- True 360 degree compression onto cable ensures optimum RF shielding performance, -65dB effective shielding.
- BNC Male Plug interface is designed to nominal Mil Spec C-39012 with 75 ohm characteristic impedance.
- Integral silver-plated contact and Snap-N-Seal® design ensures ease of installation and reliable, high frequency return loss performance of -30dB to 1 GHz.
- Installation requires one-step 1/4" - 1/4" cable preparation and standard compression tools (CST596, CST596711 and SNSUTL) used for all 59 & 6 series Snap-N-Seal® product families, saving installation time.

TECHNICAL SPECIFICATION

PHYSICAL PROPERTIES

BODY COMPONENTS: BRASS CDA 360
BODY FINISH: NICKEL
NUT: ZINC ALLOY WITH NICKEL PLATE
TERMINAL/CONTACT: BERYLLIUM
COPPER WITH SILVER PLATE
INSULATORS: TPX
O-RINGS: ETHYLENE PROPYLENE

ELECTRICAL PROPERTIES

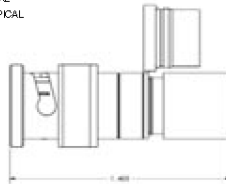
RETURN LOSS: -30 dB UP TO 1 GHz TYPICAL
INSERTION LOSS: -0.2 dB UP TO 1 GHz TYPICAL
RFI SHIELDING: -65 dB TYPICAL

MECHANICAL PROPERTIES

CABLE RETENTION: 40 LBS MIN.
COMPLIES TO SCTE IPS-SP-404
CABLE INSERTION FORCE: <20 LBS

ENVIRONMENTAL PROPERTIES

TEMPERATURE RATING: -40°F (-40°C)
TO 140°F (60°C)



ORDERING INFORMATION

Catalog Number	Cable Types	Center Cond Dia Range	Post ID	Sleeve ID	Sleeve Color	Tool†	Inner Pack	Outer Pack
SNS59HECBNC	COMMSCOPE F59 HEC-2 TIMES FIBER 02240V TIMES FIBER 02241V COMMSCOPE S59 HEC	.022 TO .036	0.154	0.290	WHITE	1+2	40	480
SNS59HECBNCB	BELDEN 9167 BROADBAND HEADEND BELDEN 1505A SERIAL DIGITAL VIDEO BELDEN 8241	.022 TO .036	0.154	0.253	ORANGE	1+2	40	480
SNS6BNC	RG6	.032 TO .040	0.191	0.290	BLUE	1+2	40	480
SNS6QSBNC	RG6QS	.032 TO .040	0.191	0.315	VIOLET	1+2	40	480

† 1 = CST596 OR CST596711 2 = SNSUTL

COMMSCOPE IS A TRADEMARK OF COMMSCOPE PROPERTIES, INC.
BELDEN IS A TRADEMARK OF BELDEN WIRE AND CABLE COMPANY

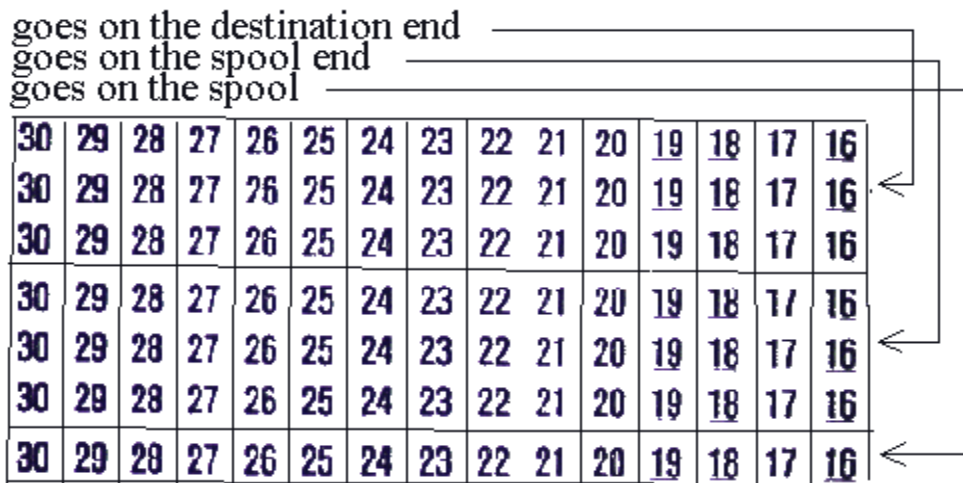
Order

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Field Standards - Appendix C Cable Pulls

Leave extra wire at the starting and termination points. With long term profitability in mind, losing a few feet of wire is better than having to “extend” or “stretch” a wire run. When the run is completed and there is extra at each end, tie the wire to the structure or high on the ceiling support members every few feet. Always pull in an extra string to facilitate easy addition of wires to the same conduit.

When starting a wire pull with multiple runs, use Panduit Pan-Code wire marker books. Part number PCMB-3 or a comparable product to label the wires. These markers adhere well and usually don't come off unless scraped against a sharp object like ceiling grid or metal studs.



One number strip will break in half. One half (three numerals) goes 18” from the end of the wire. The single numeral goes on the side of the wire reel. The other half (three numerals) goes 18” from the end of the wire after the run is complete and you are ready to cut the run from the reel. Do not use more than three numerals on a wire as this makes a higher label that will catch on sharp objects as you make the pull. Putting the wire number 18” from the end allows plenty of room to connect pulling devices (i.e., tape, jet string, wire grips and fish tapes). Run the wire in the most direct route to the destination.

Field Standards - Appendix C

Cable Pulls - (continued)

The best place to run the cable is through the roof support structure. *Do not leave the wire laying on the grid as this is not acceptable according to the NEC.* When penetrating fire walls be sure to fill the hole with approved fire stop compound or inform the G.C. that it needs to be done. Stay away from higher voltage wires and all other trades low voltage wires. Keep in mind that other trades are carrying data on their lines which can cause EMI in ours.

Stay away from other trades:

- 6" from <2KV lines
- 1' from HiV lighting
- 3' from 5KV lines
- 3.5' from transformers / motors.

RISER CLOSETS:

Riser closets are an integral part of system wiring. Connections, test points and some equipment will be housed in these small closets. The same care that is taken into making a rack look good should be used here. When pulling wire through riser closets keep signal types separated and neatly dressed. It is very important to prevent wires from tangling or interweaving within conduit between floors. All wires need to be supported on every floor as soon as that particular pull is complete. This relieves the strain on the cable and prevents cable stretching and disfiguring. If multiple pulls through the same conduit are necessary, group them separately and strain relief all pulls separately until all the wire is pulled and routed to its final destination. When all wire has been pulled, the separate bundles of like signals can be dressed together in one large neatly combed group. Ideally, all the wires on the outside of the bundle can be followed from the top closet to the bottom without weaving in and out of the bundle.

PULLING TOOLS:

When pulling wire through conduit, you can use many methods. One is to use a fish tape with a pulling grip (Hubble 6C095, 6C107, 6D212). Twisted nylon twine (Jet Line) is rated at 165lbs. tensile strength and is sucked or blown through conduit with a shop vac and a conduit piston (Greenlee 608 1/2" to 613 2"). Pulling lubricant Greenlee Gel-q 5C647) makes pulls much easier. Wires have pulling tensions per cable that cannot be exceeded. These tensions also apply to wire installed vertically in riser closets.

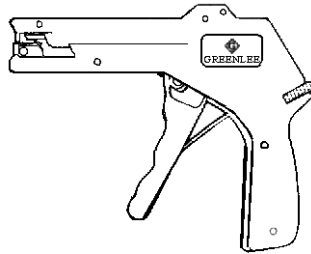
24awg	:4lbs.	20awg	:12lbs.	16awg	:30lbs.
22awg	:7lbs.	18awg	:19lbs.	14awg	:48lbs.
				12awg	:77lbs.

Field Standards - Appendix C

Cable Pulls - (continued)

CABLE DRESSING:

- Do not tie AC cables from equipment together. Tie each cable separately with just enough length to reach its outlet.
- Tie cable bundles with wire ties in 6" intervals.
- *Do not tie cables extremely tight.*
- If the wire tie deforms or squeezes the bundle, it will affect the shielding characteristics and can cause bleed through (EMI). *This is very important on all bundles and critical on video and RF signals.*
- A *wire tie gun* is the only appropriate way to get the correct amount of tension on a wire tie.
- When dressing coaxial cable, a bend radius of 8" should be observed.
- When dressing audio and control cable, a 90 degree. bend should have a radius no less than 1/2".
- The cable should be tied within 6" of its final termination point.

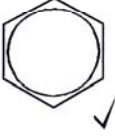



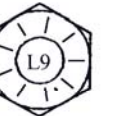




The tension settings are:

Video, RF	:4
Audio, Mic and Line	:2
Speaker, 70V and 8ohm	:3
Control and Timecode	:2
Fiber Optic	:1 or less



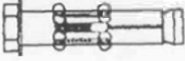
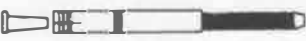

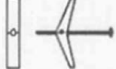







Mounting Hardware

Use This Bolt reference chart when choosing hardware.

Identification Grade Mark	Specification	Material	Nominal Size Range (in.)	Proof Load (psi.)	Yeild Strength Min. (psi.)	Tensile Strength Min. (psi.)
	SAE J429 Grade 1	Low or Medium Carbon Steel	1/4" thru 1 1/2"	33,000	36,000	60,000
	ASTM A 307 Grades A&B	Low Carbon Steel	1/4" thru 4"	—	—	—
	SAE J429 Grade 2	Low or Medium Carbon Steel	1/4" thru 3/4" Over 3/4" thru 1 1/2"	55,000 33,000	57,000 36,000	74,000 60,000
	SAE J429 Grade 5	Medium Carbon Steel, Quenched & Tempered	1/4" thru 1"	85,000	92,000	120,000
	ASTM A 449		Over 1" thru 1 1/2" Over 1 1/2" thru 3"	74,000 55,000	81,000 58,000	105,000 90,000
	ASTM A 325 Type 1	Quenched & Tempered	1/2" thru 1" 1 1/8" thru 1 1/2"	85,000 74,000	92,000 81,000	120,000 105,000
	SAE J429 Grade 8	Medium Carbon Alloy Steel, Quenched & Tempered	1/4" thru 1 1/2"	120,000	130,000	150,000
	ASTM A354 Grade BD	Alloy Steel, Quenched & Tempered				
	L9	Alloy Steel, Quenched & Tempered	1/4" thru 1 1/2"	145,000	155,000	180,000
	ISO R898 CLASS 8.8	Medium Carbon Steel Quenched & Tempered	4mm thru 24mm	85,000	92,000	120,000
	ISO R898 CLASS 10.9	Alloy Steel, Quenched & Tempered		120,000	130,000	150,000

Field Standards - Appendix E Anchor Chart

Use this chart when choosing anchors.

Anchor	Type	Size Range	Use In
	Wej - It Anchors	1/4" x 1 3/4" to 1" x 12"	Concrete, Stone & Block
	Wedge Anchors	1/4" x 1 3/4" to 1 1/4" x 12"	Concrete or Stone
	Sleeve Anchors	1/4" x 1 1/8" to 3/4" x 6 1/4"	Concrete, Stone & Brick
	Stud Anchors	1/4" x 1 3/4" to 3/4" x 8 1/2"	Concrete, Stone & Brick
	Machine Screw Anchors	6/32" to 1/2" - 13"	Concrete, Stone & Brick
	Toggle Bolts	1/8 x 2" to 1/2 x 6"	Hollow block, Wallboard & Plaster
	Plastic Anchor Kits	Plastic Jars or Boxes	Concrete, Brick, Block & Wallboard
	Plastic Screw Anchors	4- 6- 8 x 1" to 14- 16 x 1 1/2"	Concrete, Brick, Block & Wallboard
	Plastic Anchors	1 - 2 - 3 x 1 to 13 - 14 - 15 x 2	Concrete, Brick, Block & Stone
	One Step Wallboard Anchors	6 - 8 - 10 Zinc & Nylon	Wallboard
	E - Z Toggle Anchor	# 8 Dia. x 2"	Wallboard
	Polly Toggle Anchor	3/8" to 5/8"	Wallboard or Solid Masonry
	Hollow Wall Anchor	1/8" to 1/4"	Wallboard, Hollow Plaster & Tile Block

~~X~~
DO NOT USE

Field Standards - Appendix E Anchor Chart - (continued)

Use this chart to determine the size of the hole to drill for the anchor you choose.

DESCRIPTION	DIAMETER OF ANCHOR	DRILL HOLE SIZE	DIAMETER OF ANCHOR	DRILL HOLE SIZE
Drop in Anchors	1/4	3/8	5/8	7/8
	3/8	1/2	3/4	1
	1/2	5/6		
Lag Shields	1/4	1/2	1/2	3/4
	5/16	1/2	5/8	7/8
	3/8	5/8	3/4	1
Lead Wood Screw Anchors	#8	1/4	#16	3/8
	#10	5/16		
Lead Machine Screw	6/32	5/16	3/8	3/4
Anchors, Single	8/32	5/16	1/2	7/8
Expansion Shields &	10/24	3/8	5/8	1-1/8
Double Expansion Shields	1/4	1/2	3/4	1-1/4
	5/16	5/8		
Plastic Conical Anchors	6-8	3/16	10-12	1/4
	8-10	3/16	10-12	5/16
Toggle Bolts	1/8	3/8	5/16	7/8
	3/16	1/2	3/8	1
	1/4	5/8	1/2	1-1/4
Hollow Wall Anchors	1/8 - All Sizes	5/16	1/4 - S	7/16
	3/16 - S	3/8	1/4 - L	7/16
	3/16 - L	3/8	1/4 - XL	1/2
	3/16 - XL	7/16		
Plastic Toggles	1/8 - All Sizes	5/16		