Fermilab CD/DCI Tech Note

Cable, UTP-TN-004.8

The following are construction requirements for Fermilab Computing Division Data Communication's Category-5 (and/or higher) unshielded-twisted-pair (UTP) trunk ("backbone") cables. Users should always purchase cords from recommended vendors only to ensure compliance with tech notes. Call Fermi CD/ Data Comm. for a list of qualified vendors or visit our web page at http://computing.fnal.gov/dci/Document-pdf-Files/Cable-Assy-Houses.pdf. Use the Fermi part number(s) on Purchase Requests when ordering cables, unless directed otherwise. *Red sidebar indicates most recent change to this Tech Note. Orange sidebar indicates previous change.*

1. CABLE

   a.) Standard solid-wire Cat5 non-plenum (PVC) trunk cables must be made from blue Belden 1864A cable.

   b.) Standard solid-wire Cat5 plenum (PLN) trunk cables must be made from blue Belden 1871A-H8M.

   c.) Halogen-free must be made from Belden 1864A-LSOH*.

   d.) Standard solid-wire Cat5e non-plenum (PVC) trunk cables must be made from blue Hitachi 30093-50.

   e.) Standard solid-wire Cat5e plenum (PLN) trunk cables must be made from blue Hitachi 39419-50.

   f.) When requested, solid-wire Cat5e non-plenum (PVC) trunk cables shall be made from natural Belden ss1100 877 (prototype #539732).

   g.) When requested, solid-wire Cat5e plenum (PLN) trunk cables shall be made from (color) Belden ss11__<xx>.

2. CONNECTORS

   a). "Right 110 degree Male" (R110M), "Left 110 degree Male" (L110M) RJ21 connectors for solid-wire must be Avaya 525AP-0039 (Comcode 108361916).

   b.) "Right 110 degree Female" (R110F) and "Left 110 degree Female" (L110F) RJ21 connectors for solid wire are not yet defined.

   c.). "Right 90 degree Male" (R90M), "Left 90 degree Male" (L90M) RJ21 connectors for solid wire must be Avaya 525PA-003 (Comcode 107487506).

   d.) "Right 90 degree Female" (R90F) and "Left 90 degree Female" (L90F) RJ21 connectors for solid wire must be Avaya 525JA-003, Comcode 107487480.

   e.) "Center Male" (CM) RJ21 180-degree in-line connectors for solid-wire must be Avaya 525CP-003 (Comcode 108361908).

f.) "Center Female" (CF) RJ21 180-degree in-line connectors for solid-wire is not defined yet.

g.) When requested, "right 120 degree male" (R120M), "left 120 degree male" (L120M) RJ21 connectors for solid-wire shall be AMP 1-558693-1 (hood 569336-3).

h.) When requested, "right 90 degree male" (R90M), "left 90 degree male" (L90M) RJ21 connectors for solid wire shall be AMP 1-558693-1 (hood 552960-1).

i.) When requested "center male" (CM) RJ21 180-degree in-line connectors for solid-wire shall be AMP 1-558693-1 (hood 4-552008-1).

j.) Six-Port Surface Pack Module without mounting magnets shall be Siemon SP5-C5.

k.) Six-Port Surface Pack Module with mounting magnets shall be Siemon SP5-C5-M.

3. DESIGN

a.) A "Right" oriented cable is defined as a cable routing to the right of the back of a patch panel when RJ21 pin#1 is up,on the top row of the horizontal connector. (See drawing below.)

b.) A "Left" oriented cable is defined as a cable routing to the left of the back of a patch panel when RJ21 pin#1 is up.

c.) In-line (180 degree) connectors shall be defined as Center Male (CM) and Center Female (CF).

d.) RJ21 plugs shall be referred to as "male" and jacks shall be referred to as "female".

e.) Surface Pack Modules shall be referred to as “SP”.

4. PERFORMANCE

a.) RJ21 connectors and cable assemblies must meet EIA/TIA 568 Cat5e requirements when tested by Fermilab with a Superior Modular Products DCC2488/25V-03. Cables not meeting 3dB NEXT headroom on a Fluke DSP4300 Permanent Link Cat5e test shall be returned for re-termination.

b.) Wiring shall meet FCC Part68 RJ21 pin out requirements.

5. MECHANICAL

a.) Connectors must have proper strain relief such that tugging forces are not exerted directly on the individual conductors.

b.) Heat shrink must be applied 1.5" long at the neck with 0.75" exposed outside of the hood.

6. LABELING

a.) Cables must be labeled flag-style, six inches from the RJ21 connector, on both ends. For an unconnectorized end, the label should be six inches from the end of the jacket.

b.) All cable labels must contain the following information: the vendor name, the vendor part number and a unique serial number. Serial numbers must be in one of the following formats:

1.) Purchase Orders

The serial number shall be derived from the Purchase Order number and be in the following format: XXX-YYYYYY, where XXX is a number that begins from 001 and increments by 1 up to the total number of cables being made by that vendor for that Purchase Order (regardless of whether the Purchase Order includes other assembled cables which are not Cat5 trunk) and YYYYYY is the Purchase Order number.

2.) Computing Division ProCard Orders

The serial number shall be derived from the ProCard number and be in the following format: XXX-ZZZZZ, where XXX is a number that begins from 001 and increments by 1 up to the total number of cables being made by that vendor for that ProCard Order (regardless of whether the ProCard Order includes other assembled cables, which are not Cat5 trunk); ZZZZZ is the PRN number.

3.) Non-Computing Division ProCard Orders

The serial number shall be derived from the ProCard number and be in the following format: XXX-ZZZZ-MMDDYY, where XXX is a number that begins from 001 and increments by 1 up to the total number of cables being made by that vendor for that ProCard Order (regardless of whether the ProCard Order includes other assembled cables which are not Cat5 trunk); ZZZZ are the last four digits of the ProCard number and MMDDYY is the month, day and year of the ProCard order.

c.) Vendors shall keep track of order numbers so that they do not get reused in future serial numbers, thereby preventing any two cables from having the same serial number.

d.) The labels shall also include the cables' end-end type (i.e. R110M-CM) its jacket type (PVC or PLN), the appropriate Fermi part number and the length in feet (F) or meters (M) for that cable.

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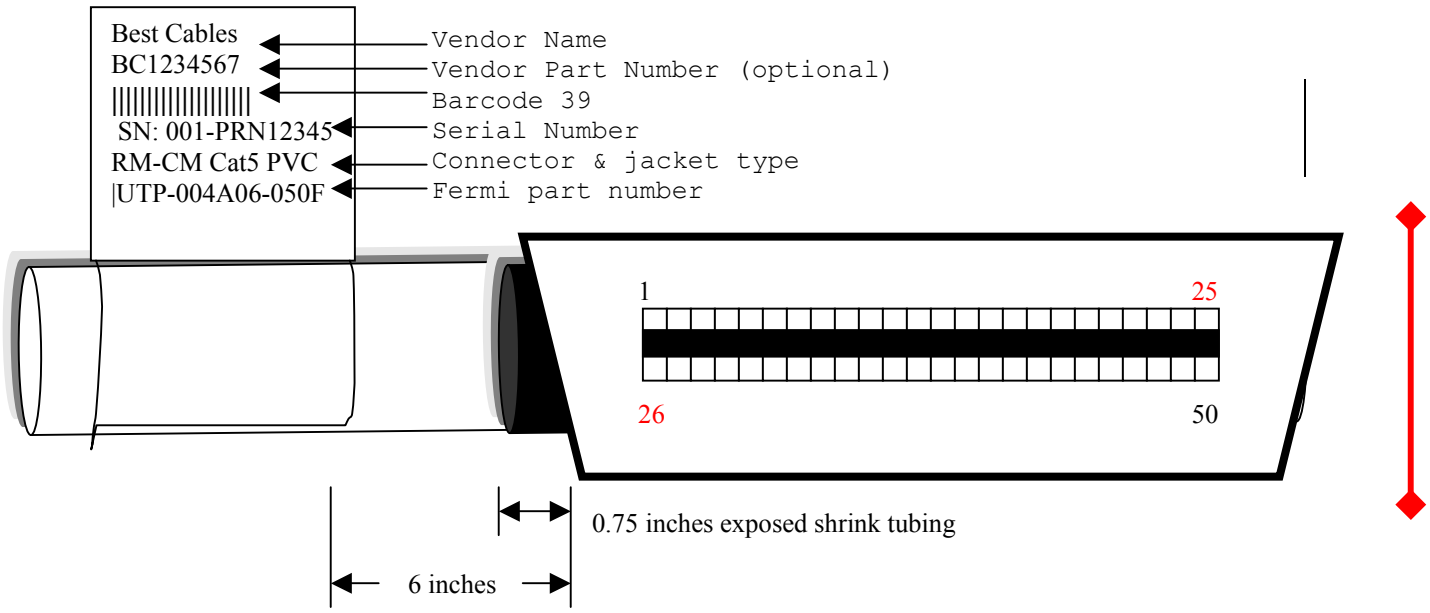
Right-Angle Cable with Label:



e.) The labels must be Kroy 2556701, Panduit LS5-10 or equivalent.

f.) The labels must be laminated such that the information on the labels does not smear, fade or become unreadable under normal handling and installation conditions.

g.) The font size **must** be 8-point or greater. Tiny, blotchy, smeared or otherwise unreadable characters will not be accepted.

7. PART NUMBERS

Fermi #	Description
UTP-004A00	Cable,UTP,RJ21.R110M-RJ21.R110M,Cat5,Solid,PVC (Cable: 1.a Connectors: 2.a & 2.a Design: 3.a)
UTP-004A01	Cable,UTP,RJ21.R110M-RJ21.R110M,Cat5,Solid,PLN (Cable: 1.b Connectors: 2.a & 2.a Design: 3.a)
UTP-004A02	Cable,UTP,RJ21.CM-RJ21.CM,Cat5,Solid,PVC (Cable: 1.a Connectors: 2.e & 2.e Design: 3.c)
UTP-004A03	Cable,UTP,RJ21.CM-RJ21.CM,Cat5,Solid,PLN (Cable: 1.b Connectors: 2.e & 2.e Design: 3.c)
UTP-004A04	Cable,UTP,RJ21.L110M-RJ21.L110M,Cat5,Solid,PVC (Cable: 1.a Connectors: 2.a & 2.a Design: 3.b)

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UTP-004A05	Cable,UTP,RJ21.L110M-RJ21.L110M,Cat5,Solid,PLN (Cable: 1.b Connectors: 2.a & 2.a Design: 3.b)
UTP-004A06	Cable,UTP,RJ21.R110M-RJ21.CM,Cat5,Solid,PVC (Cable: 1.a Connectors: 2.a & 2.e Design: 3.a&c)
UTP-004A07	Cable,UTP,RJ21.R110M-RJ21.CM,Cat5,Solid,PLN (Cable: 1.b Connectors: 2.a & 2.e Design: 3.a&c)
UTP-004A08	Cable,UTP,RJ21.L110M-RJ21.CM,Cat5,Solid,PVC (Cable: 1.a Connectors: 2.a & 2.e Design: 3.b&c)
UTP-004A09	Cable,UTP,RJ21.L110M-RJ21.CM,Cat5,Solid,PLN (Cable: 1.b Connectors: 2.a & 2.e Design: 3.b&c)
UTP-004A10	Cable,UTP,RJ21.R110F-RJ21.R110F,Cat5,Solid,PVC
UTP-004A11	Cable,UTP,RJ21.R110F-RJ21.R110F,Cat5,Solid,PLN
UTP-004A12	Cable,UTP,RJ21.CF-RJ21.CF,Cat5,Solid,PVC
UTP-004A13	Cable,UTP,RJ21.CF-RJ21.CF,Cat5,Solid,PLN
UTP-004A14	Cable,UTP,RJ21.L110F-RJ21.L110F,Cat5,Solid,PVC
UTP-004A15	Cable,UTP,RJ21.L110F-RJ21.L110F,Cat5,Solid,PLN
UTP-004A16	Cable,UTP,RJ21.R110F-RJ21.CF,Cat5,Solid,PVC
UTP-004A17	Cable,UTP,RJ21.R120F-RJ21.CF,Cat5,Solid,PLN
UTP-004A18	Cable,UTP,RJ21.L110F-RJ21.CF,Cat5,Solid,PVC
UTP-004A19	Cable,UTP,RJ21.L110F-RJ21.CF,Cat5,Solid,PLN
UTP-004A20	Cable,UTP,RJ21.R90M-RJ21.R90M,Cat5,Solid,PVC
UTP-004A21	Cable,UTP,RJ21.R90M-RJ21.R90M,Cat5,Solid,PLN
UTP-004A22	(----------)
UTP-004A23	(----------)
UTP-004A24	Cable,UTP,RJ21.L90M-RJ21.L90M,Cat5,Solid,PVC
UTP-004A25	Cable,UTP,RJ21.L90M-RJ21.L90M,Cat5,Solid,PLN
UTP-004A26	Cable,UTP,RJ21.R90M-RJ21.CM,Cat5,Solid,PVC
UTP-004A27	Cable,UTP,RJ21.R90M-RJ21.CM,Cat5,Solid,PLN
UTP-004A28	Cable,UTP,RJ21.L90M-RJ21.CM,Cat5,Solid,PVC
UTP-004A29	Cable,UTP,RJ21.L90M-RJ21.CM,Cat5,Solid,PLN
UTP-004A30	Cable,UTP,RJ21.R90F-RJ21.R90F,Cat5,Solid,PVC
UTP-004A31	Cable,UTP,RJ21.R90F-RJ21.R90F,Cat5,Solid,PLN
UTP-004A32	(----------)
UTP-004A33	(----------)

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UTP-004A34	Cable,UTP,RJ21.L90F-RJ21.L90F,Cat5,Solid,PVC
UTP-004A35	Cable,UTP,RJ21.L90F-RJ21.L90F,Cat5,Solid,PLN
UTP-004A36	Cable,UTP,RJ21.R90F-RJ21.CF,Cat5,Solid,PVC
UTP-004A37	Cable,UTP,RJ21.R90F-RJ21.CF,Cat5,Solid,PLN
UTP-004A38	Cable,UTP,RJ21.L90F-RJ21.CF,Cat5,Solid,PVC
UTP-004A39	Cable,UTP,RJ21.L90F-RJ21.CF,Cat5,Solid,PLN
UTP-004A40	Cable,UTP,RJ21.R110M-RJ21.R110M,Cat5,Solid,LSOH
UTP-004A41	Cable,UTP,RJ21.CM-RJ21.CM,Cat5,Solid,LSOH
UTP-004A42	Cable,UTP,RJ21.L110M-RJ21.L110M,Cat5,Solid,LSOH
UTP-004A43	Cable,UTP,RJ21.R110M-RJ21.CM,Cat5,Solid,LSOH
UTP-004A44	Cable,UTP,RJ21.L110M-RJ21.CM,Cat5,Solid,LSOH
UTP-004A45	Cable,UTP,RJ21.R110F-RJ21.R110F,Cat5,Solid,LSOH
UTP-004A46	Cable,UTP,RJ21.CF-RJ21.CF,Cat5,Solid,LSOH
UTP-004A47	Cable,UTP,RJ21.L110F-RJ21.L110F,Cat5,Solid,LSOH
UTP-004A48	Cable,UTP,RJ21.R110F-RJ21.CF,Cat5,Solid,LSOH
UTP-004A49	Cable,UTP,RJ21.L110F-RJ21.CF,Cat5,Solid,LSOH
UTP-004A50	Cable,UTP,RJ21.R90M-RJ21.R90M,Cat5,Solid,LSOH
UTP-004A51	Cable,UTP,RJ21.CM-RJ21.CM,Cat5,Solid,LSOH
UTP-004A52	Cable,UTP,RJ21.L90M-RJ21.L90M,Cat5,Solid,LSOH
UTP-004A53	Cable,UTP,RJ21.R110M-RJ21.R110M,Cat5e,Solid,PVC (Cable: 1.d Connectors: 2.a & 2.a Design: 3.a)
UTP-004A54	Cable,UTP,RJ21.R110M-RJ21.R110M,Cat5e,Solid,PLN (Cable: 1.e Connectors: 2.a & 2.a Design: 3.a)
UTP-004A55	Cable,UTP,RJ21.CM-RJ21.CM,Cat5e,Solid,PVC (Cable: 1.d Connectors: 2.e & 2.e Design: 3.c)
UTP-004A56	Cable,UTP,RJ21.CM-RJ21.CM,Cat5e,Solid,PLN (Cable: 1.e Connectors: 2.e & 2.e Design: 3.c)
UTP-004A57	Cable,UTP,RJ21.L110M-RJ21.L110M,Cat5e,Solid,PVC (Cable: 1.d Connectors: 2.a & 2.a Design: 3.b)
UTP-004A58	Cable,UTP,RJ21.L110M-RJ21.L110M,Cat5e,Solid,PLN (Cable: 1.e Connectors: 2.a & 2.a Design: 3.b)
UTP-004A59	Cable,UTP,RJ21.R110M-RJ21.CM,Cat5e,Solid,PVC (Cable: 1.d Connectors: 2.a & 2.e Design: 3.a&c)
UTP-004A60	Cable,UTP,RJ21.R110M-RJ21.CM,Cat5e,Solid,PLN (Cable: 1.e Connectors: 2.a & 2.e Design: 3.a&c)

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UTP-004A61	Cable,UTP,RJ21.L110M-RJ21.CM,Cat5e,Solid,PVC (Cable: 1.d Connectors: 2.a & 2.e Design: 3.b&c)
UTP-004A62	Cable,UTP,RJ21.L110M-RJ21.CM,Cat5e,Solid,PLN (Cable: 1.e Connectors: 2.a & 2.e Design: 3.b&c)
UTP-004A63	Cable,UTP,RJ21.R110M-RJ21.R110M,Cat5e,Solid,PVC (Cable: 1.d Connectors: 2.g & 2.g Design: 3.a)
UTP-004A64	Cable,UTP,RJ21.R110M-RJ21.R110M,Cat5e,Solid,PLN (Cable: 1.e Connectors: 2.g & 2.g Design: 3.a)
UTP-004A65	Cable,UTP,RJ21.CM-RJ21.CM,Cat5e,Solid,PVC (Cable: 1.d Connectors: 2.i & 2.i Design: 3.c)
UTP-004A66	Cable,UTP,RJ21.CM-RJ21.CM,Cat5e,Solid,PLN (Cable: 1.e Connectors: 2.i & 2.i Design: 3.c)
UTP-004A67	Cable,UTP,RJ21.L110M-RJ21.L110M,Cat5e,Solid,PVC (Cable: 1.d Connectors: 2.g & 2.g Design: 3.b)
UTP-004A68	Cable,UTP,RJ21.L110M-RJ21.L110M,Cat5e,Solid,PLN (Cable: 1.e Connectors: 2.g & 2.g Design: 3.b)
UTP-004A69	Cable,UTP,RJ21.R110M-RJ21.CM,Cat5e,Solid,PVC (Cable: 1.d Connectors: 2.g & 2.i Design: 3.a&c)
UTP-004A70	Cable,UTP,RJ21.R110M-RJ21.CM,Cat5e,Solid,PLN (Cable: 1.e Connectors: 2.g & 2.i Design: 3.a&c)
UTP-004A71	Cable,UTP,RJ21.L110M-RJ21.CM,Cat5e,Solid,PVC (Cable: 1.d Connectors: 2.g & 2.i Design: 3.b&c)
UTP-004A72	Cable,UTP,RJ21.L110M-RJ21.CM,Cat5e,Solid,PLN (Cable: 1.e Connectors: 2.g & 2.i Design: 3.b&c)
UTP-004A73	Cable,UTP,SP-RJ21.CM,Cat5e,Solid,PVC (Cable: 1.d Connectors: 2.j & 2.e Design: 3.e&c)
UTP-004A74	Cable,UTP,SP-RJ21.CM,Cat5e,Solid,PLN (Cable: 1.e Connectors: 2.j & 2.e Design: 3.e&c)
UTP-004A75	Cable,UTP,RJ21.R110M-RJ21.R110M,Cat5e,Solid,PVC (Cable: 1.f Connectors: 2.a & 2.a Design: 3.a)
UTP-004A76	Cable,UTP,RJ21.R110M-RJ21.R110M,Cat5e,Solid,PLN (Cable: 1.g Connectors: 2.a & 2.a Design: 3.a)
UTP-004A77	Cable,UTP,RJ21.CM-RJ21.CM,Cat5e,Solid,PVC (Cable: 1.f Connectors: 2.e & 2.e Design: 3.c)
UTP-004A78	Cable,UTP,RJ21.CM-RJ21.CM,Cat5e,Solid,PLN (Cable: 1.g Connectors: 2.e & 2.e Design: 3.c)
UTP-004A79	Cable,UTP,RJ21.L110M-RJ21.L110M,Cat5e,Solid,PVC (Cable: 1.f Connectors: 2.a & 2.a Design: 3.b)
UTP-004A80	Cable,UTP,RJ21.L110M-RJ21.L110M,Cat5e,Solid,PLN (Cable: 1.g Connectors: 2.a & 2.a Design: 3.b)
UTP-004A81	Cable,UTP,RJ21.R110M-RJ21.CM,Cat5e,Solid,PVC (Cable: 1.f Connectors: 2.a & 2.e Design: 3.a&c)

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UTP-004A82 Cable,UTP,RJ21.R110M-RJ21.CM,Cat5e,Solid,PLN
(Cable: 1.g Connectors: 2.a & 2.e Design: 3.a&c)

UTP-004A83 Cable,UTP,RJ21.L110M-RJ21.CM,Cat5e,Solid,PVC
(Cable: 1.f Connectors: 2.a & 2.e Design: 3.b&c)

UTP-004A84 Cable,UTP,RJ21.L110M-RJ21.CM,Cat5e,Solid,PLN
(Cable: 1.g Connectors: 2.a & 2.e Design: 3.b&c)

UTP-004A85 Cable,UTP,SP-RJ21.CM,Cat5e,Solid,PVC
(Cable: 1.f Connectors: 2.j & 2.e Design: 3.e&c)

UTP-004A86 Cable,UTP,SP-RJ21.CM,Cat5e,Solid,PLN
(Cable: 1.g Connectors: 2.j & 2.e Design: 3.e&c)