



## Panduit TX6A™ and TX6A-SD™ 10Gig™ UTP COPPER CABLING SYSTEM INSTALLATION GUIDELINES

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The TX6A™ and TX6A-SD™ 10Gig™ UTP Copper Cabling System is to be installed in accordance to the cable management requirements set forth in ANSI/TIA/EIA-568-C (*Commercial Building Telecommunications Cabling Standard*) and in ANSI/TIA/EIA-569-C (*Commercial Building Standard for Telecommunications Pathways and Spaces*). To aid compliant installation, guidelines for the TX6A™ and TX6A-SD™ 10Gig™ UTP Copper Cabling System are provided below.

### **Pathways and Spacing Management**

- Pathways should be located to minimize occupant disruption and allow for easy moves, adds, and changes.
- For initial installation, the maximum fill capacity for pathways (i.e. conduit, raceways, trays, baskets) is 40 percent.

$$\text{Number cables} = \frac{\text{Pathway Internal Area} \times 40\%}{\text{Cable Area}}$$

- For the TX6A™ 10Gig™ Plenum (i.e. P/N PUP6A04\*\*) cable, the cable area is 0.0707 inches<sup>2</sup> (46 mm<sup>2</sup>).
  - For the TX6A™ 10Gig™ Riser (i.e. P/N PUR6A04\*\*) cable, the cable area is 0.0707 inches<sup>2</sup> (46mm<sup>2</sup>).
  - For the TX6A™ 10Gig™ Low Smoke Zero Halogen (i.e. P/N PUL6A04\*\*) cable, the cable area is 0.0707 inches<sup>2</sup> (46 mm<sup>2</sup>).
  - For the TX6A™ 10Gig™ CM/PVC (i.e. P/N PUC6A04\*\*) cable, the cable area is 0.0707 inches<sup>2</sup> (46 mm<sup>2</sup>).
  - For the TX6A-SD™ 10Gig™ Plenum (i.e. P/N PUP6ASD04\*\*) cable, the cable area is 0.0452 inches<sup>2</sup> (29 mm<sup>2</sup>).
  - For the TX6A-SD™ 10Gig™ Riser (i.e. P/N PUR6ASD04\*\*) cable, the cable area is 0.0452 inches<sup>2</sup> (29mm<sup>2</sup>).
  - For the TX6A-SD™ 10Gig™ Low Smoke Zero Halogen (i.e. P/N PUL6ASD04\*\*) cable, the cable area is 0.0452 inches<sup>2</sup> (29 mm<sup>2</sup>).
  - For the TX6A-SD™ 10Gig™ CM/PVC (i.e. P/N PUC6ASD04\*\*) cable, the cable area is 0.0452 inches<sup>2</sup> (29 mm<sup>2</sup>).
  - Refer to the TX6A™ and TX6A-SD™ 10Gig™ UTP Copper Cabling conduit fill capacity guideline table in Appendix A of this document to determine the maximum number of cables per conduit trade size.
- The maximum fill capacity of 60 percent is allowed to accommodate future additions after initial installation.

- Proper cable bend radius control must be maintained throughout the pathways. The bend radius needs to be four (4) times the cable diameter.
  - For the TX6A™ 10Gig™ Plenum (i.e. P/N PUP6A04\*\*) cable, the minimum bend radius is 1.20 inches (30 mm)
  - For the TX6A™ 10Gig™ Riser (i.e. P/N PUR6A04\*\*) cable, the minimum bend radius is 1.20 inches (30 mm)
  - For the TX6A™ 10Gig™ Low Smoke Zero Halogen (i.e. P/N PUL6A04\*\*) cable, the minimum bend radius is 1.20 inches (30 mm)
  - For the TX6A™ 10Gig™ CM/PVC (i.e. P/N PUC6A04\*\*) cable, the minimum bend radius is 1.20 inches (30 mm)
  - For the TX6A-SD™ 10Gig™ Plenum (i.e. P/N PUP6ASD04\*\*) cable, the minimum bend radius is 0.96 inches (24 mm)
  - For the TX6A-SD™ 10Gig™ Riser (i.e. P/N PUR6ASD04\*\*) cable, the minimum bend radius is 0.96 inches (24 mm)
  - For the TX6A-SD™ 10Gig™ Low Smoke Zero Halogen (i.e. P/N PUL6ASD04\*\*) cable, the minimum bend radius is 0.96 inches (24 mm)
  - For the TX6A-SD™ 10Gig™ CM/PVC (i.e. P/N PUC6ASD04\*\*) cable, the minimum bend radius is 0.96 inches (24 mm)

### **Pathways and Spacing Management**

- For data center applications, it is recommended to use Panduit® FiberRunner™ or GridRunner™ Underfloor Cable Routing Systems for cable raceway management. The fittings provide minimum 1.5-inch bend radius to protect against signal loss due to excessive cable bends.
- Pathways should be designed to allow for future expansion (minimum two cables per work area, with pathways supporting three cables per work area). Therefore when designing a pathway, the pathway needs to accommodate 150% of the initial cable installation. For example, if the initial design requires 2 cables each for ten work areas, the pathway shall be designed to accommodate 30 cables.
- Conduit should be run in the most direct route possible with no more than two 90 degree bends between pull boxes and serve no more than three outlet boxes. Conduit bends should be at least six times the conduit diameter.
- Cable trays are to be installed per manufacturing guidelines and loading capacities must be considered during cabling installation.
- Cable trays used in the ceiling should allow for at least 12 inches (305 mm) of clearance above the tray. Cable trays used in the floor should allow for at least 2 inches (51 mm) of clearance between the top part of the tray and the bottom of the floor tile.
- J-Mod® or J-Pro® Cable Support System should be located at 5 foot intervals maximum and have at least 3 inches (76 mm) of clearance above suspended ceilings.
- Please reference Panduit website for J-Mod® or J-Pro® Cabling Support System fill capacity information for various sizes available.

**Cable Separation Management**

- TX6A™ and TX6A-SD™ 10Gig™ UTP Copper Cables do not have any specific limitations with sharing pathways with other category copper cables throughout the whole cable run.
- Separation and physical barriers between TX6A™ or TX6A-SD™ 10Gig™ UTP Copper Cable and power cables must be maintained within raceways. If TX6A™ or TX6A-SD™ 10Gig™ UTP Copper Cable and power cables need to cross install perpendicular to each other. Please reference the National Electric Code for local installation guidelines.
- The maximum channel distance for the TX6A™ 10Gig™ UTP Copper Cabling System in the backbone and/or horizontal is 328 feet (100 meters). The total length of equipment cords, patch cords and work area cords shall not exceed 33 feet (10 meters)
- The maximum permanent link distance for the TX6A™ 10Gig™ UTP Copper Cabling System in the backbone and/or horizontal is 295 feet (90 meters)
- The maximum channel distance for the TX6A-SD™ 10Gig™ UTP Copper Cabling System in the backbone and/or horizontal is 230 feet (70 meters). The total length of equipment cords, patch cords and work area cords shall not exceed 33 feet (10 meters)
- The maximum permanent link distance for the TX6A-SD™ 10Gig™ UTP Copper Cabling System in the backbone and/or horizontal is 197 feet (60 meters)

**Cable Pulling & Installation Management**

- The maximum pulling tension is not to exceed 25 lbf. Cable installation should not in any way deform the cable jacket.
- The cable should not come in contact with any water or chemicals (ex. paint, lubricants), or be exposed to any high humidity during or after installation.
- Avoid any cable kinks and maintain proper bend radius control during cabling pulling. If any kinks should occur, kinked cable should be removed and replaced.
- Tak-Ty® Hook & Loop Cable Ties, Contour-Ty® Cable Ties, Belt-Ty™ In-Line Cable Ties or Pan-Ty® Cable Ties should be applied loosely and at random intervals to cable bundles to avoid any pinching or crushing of the cable jackets.
- For aesthetics and ease of bundling, the Cable Bundling and Organizing Tool (i.e. P/N CBOT24K) is recommended.

### **Cable Management in the Telecommunication Room**

- Organize and manage cables for quick and easy moves, adds and changes
- Use the rack vertical manager fill cable capacity table in Appendix B of this document to determine the maximum number of cables per telecommunication rack.
- Termination procedures at the patch panel include:
  - Feed cables from both sides of the panel
  - Maintain acceptable bend radius levels
  - Do not kink cables
  - Do not cinch cable ties so tightly as to deform the cable in any way
  - To enhance wire management in the back of the panel, it is recommended that a strain relief bar (i.e. P/N SRBM19BLY) be mounted to the rack. The strain relief bar includes Tak-Ty<sup>®</sup> Hook & Loop Cable Ties for additional cable management.
- Termination procedures for the DP6A™ 10Gig™ Punchdown Patch Panel include:
  - Follow installation instruction sheet [PN379](#).
  - Outer cable jacket should be as close as possible to point of termination
  - Last twist should be no further than 0.5 inches from the point of termination.

### **Cable Management in the Work Area**

- For surface raceway applications, the Pan-Way<sup>®</sup> TG Surface Raceway System is the optimal solution in the work area for routing TX6A™ or TX6A-SD™ 10Gig™ Copper Cables. The TG Raceway system provides adequate space to maintain proper cable bend radius control.
- Allow for at least one outlet per work area with a minimum of two cable terminations.
- Pathways should be designed to allow for future expansion. For example, work areas with two cables must be served by pathways that can accommodate a minimum of three cables.
- Allow for at least 12 inches (305 mm) of slack at the work area. Pull slack up into the ceiling or back into the raceway and store it there, where it can later be pulled into the box if re-termination is necessary.
- Terminate Mini-Com<sup>®</sup> TX6A™ 10Gig™ UTP Jack Modules per installation instruction sheet [PN511](#).
- To improve bend radius control of TX6A™ or TX6A-SD™ 10Gig™ Copper Cable in junction boxes, it is recommended that Panduit sloped faceplates (i.e. P/N UICFPSE2\*\*) be used in the work area.
- With Panduit sloped faceplates, the following junction boxes can be used with TX6A™ or TX6A-SD™ 10Gig™ UTP Copper Cable (i.e. P/N JBX3510\*\*-A, JB1\*\*-A, JBP1\*\*-A, JBP1I\*\*-A, JB1FS\*\*-A, JBP2\*\*-A, JB1D\*\*-A, JBP1D\*\*-A, JBP2D\*\*-A).

- With Panduit® flush faceplates, the following junction boxes can be used with TX6A™ or TX6A-SD™ 10Gig™ UTP Copper Cable (i.e. P/N JB1D\*\*-A, JBP1D\*\*-A, JBP2D\*\*-A).

**Reference Documents**

ANSI/TIA/EIA-568-C (*Commercial Building Telecommunications Cabling Standard*)

ANSI/TIA/EIA-569-C (*Commercial Building Standard for Telecommunications Pathways and Spaces*)

DP6™ 10Gig™ Patch Panel installation instruction sheet [PN379](#).

Mini-Com® TX6A™ 10Gig™ UTP Jack Modules installation instruction sheet [PN511](#).

**Appendix A**  
**Panduit® TX6A™ and TX6A-SD™ 10Gig™ UTP Copper Cabling System**  
**Conduit Fill Capacity Table**

<b>TX6A™ 10Gig™ UTP Copper Cable</b>										
Conduit Trade Size Inches (mm)	Internal Conduit Area						Cable Area		Max. No. Cables Using 40% Fill Rate	
	Internal Diameter		Area-.79D <sup>2</sup>	Total 100%	Area 40% Fill		inches <sup>2</sup>	mm <sup>2</sup>		
	inches	mm	inches <sup>2</sup>	mm <sup>2</sup>	inches <sup>2</sup>	mm <sup>2</sup>				
3/4 (21)	0.82	20.9	0.53	345	0.21	138	0.0707	46	3	
1 (27)	1.05	26.6	0.87	559	0.35	224	0.0707	46	5	
1 (35)	1.38	35.1	1.50	973	0.60	389	0.0707	46	8	
1 (41)	1.61	40.9	2.05	1322	0.82	529	0.0707	46	12	
2 (53)	2.07	52.5	3.39	2177	1.35	871	0.0707	46	19	
2-1/2 (63)	2.47	62.7	4.82	3106	1.93	1242	0.0707	46	27	
3 (78)	3.07	77.9	7.45	4794	2.98	1918	0.0707	46	42	
3-1/2 (91)	3.55	90.1	9.96	6413	3.98	2565	0.0707	46	56	
4 (103)	4.03	102.3	12.83	8268	5.13	3307	0.0707	46	73	
5 (129)	5.05	128.2	20.15	12984	8.06	5194	0.0707	46	114	
6 (155)	6.07	154.1	29.11	18760	11.64	7504	0.0707	46	165	

<b>TX6A-SD™ 10Gig™ UTP Copper Cable</b>										
Conduit Trade Size Inches (mm)	Internal Conduit Area						Cable Area		Max. No. Cables Using 40% Fill Rate	
	Internal Diameter		Area-.79D <sup>2</sup>	Total 100%	Area 40% Fill		inches <sup>2</sup>	mm <sup>2</sup>		
	inches	mm	inches <sup>2</sup>	mm <sup>2</sup>	inches <sup>2</sup>	mm <sup>2</sup>				
3/4 (21)	0.82	20.9	0.53	345	0.21	138	0.0452	44	5	
1 (27)	1.05	26.6	0.87	559	0.35	224	0.0452	44	8	
1 (35)	1.38	35.1	1.50	973	0.60	389	0.0452	44	13	
1 (41)	1.61	40.9	2.05	1322	0.82	529	0.0452	44	18	
2 (53)	2.07	52.5	3.39	2177	1.35	871	0.0452	44	30	
2-1/2 (63)	2.47	62.7	4.82	3106	1.93	1242	0.0452	44	43	
3 (78)	3.07	77.9	7.45	4794	2.98	1918	0.0452	44	66	
3-1/2 (91)	3.55	90.1	9.96	6413	3.98	2565	0.0452	44	88	
4 (103)	4.03	102.3	12.83	8268	5.13	3307	0.0452	44	114	
5 (129)	5.05	128.2	20.15	12984	8.06	5194	0.0452	44	178	
6 (155)	6.07	154.1	29.11	18760	11.64	7504	0.0452	44	258	

**Appendix B**  
**Panduit® Rack Vertical Manager Horizontal Cable Fill Capacity Table**

Cable	Diameter (inches)	PatchRunner™ 6"				PatchRunner™ 8"				PatchRunner™ 12"								
		Front		Back		Front		Back		Front		Back						
		Channel Area (in <sup>2</sup> )	Practical Fill	Channel Area (in <sup>2</sup> )	Practical Fill	Channel Area (in <sup>2</sup> )	Practical Fill	Channel Area (in <sup>2</sup> )	Practical Fill	Channel Area (in <sup>2</sup> )	Practical Fill	Channel Area (in <sup>2</sup> )	Practical Fill					
PUP6004**	0.233	34.00	319	22.20	208	50.50	473	32.90	308	83.50	783	54.40	510					
PUR6004**	0.240		300											196	446	291	738	481
PUC6004**	0.225		342											223	508	331	840	547
PUL6004**	0.225		342											223	508	331	840	547
PUP6504**	0.265		246											161	366	238	605	394
PUR6504**	0.266		244											159	363	236	601	391
PUP6A04**	0.300		192											126	286	186	473	308
PUR6A04**	0.300		192											126	286	186	473	308
PUC6A04**	0.300		192											126	286	186	473	308
PUL6A04**	0.300		192											126	286	186	473	308
PUP6ASD04**	0.240		300											196	446	291	738	481
PUR6ASD04**	0.240		300											196	446	291	738	481
PUC6ASD04**	0.240		300											196	446	291	738	481
PUL6ASD04**	0.240		300											196	446	291	738	481
PUP6X04**	0.331		158											103	234	153	388	253
PUR6X04**	0.342		148											96	220	143	363	236
PUC6X04**	0.338		151											99	225	146	372	242
PUL6X04**	0.342		148											96	220	143	363	236

Cable	Diameter (inches)	Net-Access™ - End				Net-Access™ - Center			
		Front		Back		Front		Back	
		Channel Area (in <sup>2</sup> )	Practical Fill	Channel Area (in <sup>2</sup> )	Practical Fill	Channel Area (in <sup>2</sup> )	Practical Fill	Channel Area (in <sup>2</sup> )	Practical Fill
PUP6004**	0.233	42.20	396	42.20	396	84.40	792	84.40	792
PUR6004**	0.240		373		373		746		746
PUC6004**	0.225		424		424		849		849
PUL6004**	0.225		424		424		849		849
PUP6504**	0.265		306		306		612		612
PUR6504**	0.266		303		303		607		607
PUP6A04**	0.295		239		239		478		478
PUR6A04**	0.295		239		239		478		478
PUC6A04**	0.295		239		239		478		478
PUL6A04**	0.295		239		239		478		478
PUP6ASD04**	0.240		373		373		746		746
PUR6ASD04**	0.240		373		373		746		746
PUC6ASD04**	0.240		373		373		746		746
PUL6ASD04**	0.240		373		373		746		746
PUP6X04**	0.331		196		196		392		392
PUR6X04**	0.342		183		183		367		367
PUC6X04**	0.338		188		188		376		376
PUL6X04**	0.342		183		183		367		367

Cable	Diameter (inches)	Net-Access™ - End with Slack Spool				Net-Access™ - Center with Slack Spool			
		Front		Back		Front		Back	
		Channel Area (in <sup>2</sup> )	Practical Fill	Channel Area (in <sup>2</sup> )	Practical Fill	Channel Area (in <sup>2</sup> )	Practical Fill	Channel Area (in <sup>2</sup> )	Practical Fill
PUP6004**	0.233	32.40	304	32.40	304	74.60	700	74.60	700
PUR6004**	0.240		286		286		659		659
PUC6004**	0.225		326		326		750		750
PUL6004**	0.225		326		326		750		750
PUP6504**	0.265		235		235		541		541
PUR6504**	0.266		233		233		537		537
PUP6A04**	0.300		183		183		422		422
PUR6A04**	0.300		183		183		422		422
PUC6A04**	0.300		183		183		422		422
PUL6A04**	0.300		183		183		422		422
PUP6ASD04**	0.240		286		286		659		659
PUR6ASD04**	0.240		286		286		659		659
PUC6ASD04**	0.240		286		286		659		659
PUL6ASD04**	0.240		286		286		659		659
PUP6X04**	0.331		150		150		346		346
PUR6X04**	0.342		141		141		324		324
PUC6X04**	0.338		144		144		332		332
PUL6X04**	0.342		141		141		324		324

Practical Fill: Estimate assumes a 40% fill factor (i.e. Sum of the cable cross sectional areas equals 40% of the vertical channel.) The 40% factor is intended to account for cable routing.

Note: All content subject to change without notice.