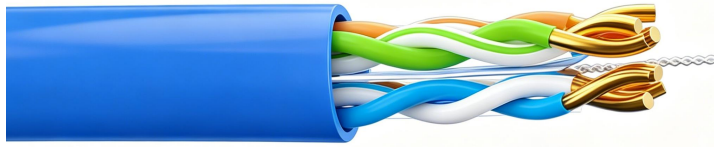


## Network / Data Cables



### UTP Cat 6 — Category 6 Unshielded Twisted-Pair LAN Cable

4-pair U/UTP | 23 AWG solid copper | 250 MHz bandwidth | Up to 10GBASE-T at 55 m / 1000BASE-T at 100 m

Standards: IEC 61156-5 (horizontal cable spec), ISO/IEC 11801 Class E (generic cabling), EN 50173-1, EN 50288-6-1, ANSI/TIA-568.2-D Category 6; flame: IEC/EN 60332-1-2 (or IEC/EN 60332-3-24 Cat. C for ZB1); smoke: IEC/EN 61034-2; halogen: IEC/EN 60754-2 (LSZH variant)

#### Technical Data

**Category:** Cat 6 / Class E per ISO/IEC 11801

**Construction type:** U/UTP — unshielded twisted pair (4 pairs)

**Bandwidth:** up to 250 MHz

**Supported data rates:** 1000BASE-T (Gigabit Ethernet) at 100 m; 10GBASE-T at up to 55 m

**PoE compatibility:** IEEE 802.3bt PoE Type 1/2/3/4 (15.4 / 30 / 60 / 90 W); Cisco UPoE / UPoE+; HDBaseT PoH (95 W)

**Characteristic impedance:**  $100 \pm 15 \Omega$  (1 – 250 MHz)

**Max. DC conductor resistance:**  $\leq 95 \Omega/\text{km}$  at 20 °C

**Max. resistance unbalance:**  $\leq 2\%$  per pair

**Mutual capacitance:**  $\leq 5.6 \text{ nF} / 100 \text{ m}$  at 1 kHz

**Insulation resistance:**  $\geq 5\,000 \text{ M}\Omega \cdot \text{km}$

**Dielectric withstand:** 1.5 kV DC / 1 min, no breakdown

**Velocity of propagation:**  $\geq 66\%$

**Operating temperature:** -20 °C to +60 °C

**Min. bending radius:**  $\geq 8 \times \text{OD}$  installation;  $\geq 4 \times \text{OD}$  after installation

**Max. pulling tension:**  $\leq 110 \text{ N}$

**Max. channel length:** 100 m (90 m permanent link + 10 m patch cords)

#### Application

Cat 6 U/UTP is the standard horizontal cabling medium for structured-cabling systems in commercial buildings, offices, data centres, campuses, and industrial automation networks. It supports Gigabit Ethernet (1000BASE-T) over the full 100 m channel and 10 Gigabit Ethernet (10GBASE-T) over reduced distances up to 55 m, voice over IP (VoIP), broadband video, building management systems, and Power over Ethernet (PoE) up to IEEE 802.3bt Type 4 / 90 W. The unshielded construction is suitable for normal office and indoor environments free from heavy electromagnetic interference; for industrial or high-EMI environments and runs near power cables, the F/UTP or S/FTP shielded variants are recommended.

#### Construction

| Element           | Material / Specification                                                              | Diameter (mm)   | Notes                                                                                        |
|-------------------|---------------------------------------------------------------------------------------|-----------------|----------------------------------------------------------------------------------------------|
| 1. Conductor      | Bare solid annealed copper (23 AWG; option 24 AWG)                                    | $0.57 \pm 0.01$ | High-purity oxygen-free copper preferred                                                     |
| 2. Insulation     | High-density polyethylene (HDPE)                                                      | $1.00 \pm 0.05$ | Low dielectric constant — controls characteristic impedance                                  |
| 3. Pair lay       | 4 twisted pairs, each with a unique lay length                                        | —               | Different twist pitch per pair minimises pair-to-pair crosstalk (NEXT/PSNEXT)                |
| 4. Pair separator | Polyethylene (PE) cross-filler / spline (X-shape)                                     | —               | Maintains pair geometry and pair-to-pair separation — required for Cat 6 250 MHz performance |
| 5. Ripcord        | Polyester yarn                                                                        | —               | For easy sheath removal                                                                      |
| 6. Outer jacket   | PVC (riser-rated CMR) — options: LSZH (Cca/Dca), PE (outdoor), PE+PVC (double jacket) | 5.8 – 6.3       | Colour: gray (default); blue, white, red, etc. available                                     |

## General Electrical & Mechanical Properties

| Parameter                            | Value                                                                                           |
|--------------------------------------|-------------------------------------------------------------------------------------------------|
| Cable category                       | Category 6 / Class E                                                                            |
| Bandwidth                            | Up to 250 MHz (rated)                                                                           |
| Conductor size                       | 23 AWG solid (0.57 mm) — standard; 24 AWG optional                                              |
| Characteristic impedance             | 100 ± 15 Ω (1 – 250 MHz)                                                                        |
| Max. DC conductor resistance         | ≤ 95 Ω/km at 20 °C (≤ 9.5 Ω/100 m)                                                              |
| Max. resistance unbalance            | ≤ 2% per pair                                                                                   |
| Mutual capacitance (pair @ 1 kHz)    | ≤ 5.6 nF/100 m                                                                                  |
| Capacitance unbalance (pair vs gnd)  | ≤ 330 pF/100 m                                                                                  |
| Insulation resistance                | ≥ 5 000 MΩ·km                                                                                   |
| Dielectric withstand voltage         | 1.5 kV DC / 1 min, conductor-to-conductor; 1 kV DC / 1 min, conductor-to-screen (if applicable) |
| Velocity of propagation (NVP)        | ≥ 66% of c                                                                                      |
| Max. delay skew                      | ≤ 45 ns / 100 m                                                                                 |
| Max. propagation delay               | ≤ 538 ns / 100 m at 250 MHz                                                                     |
| Operating temperature                | -20 °C to +60 °C                                                                                |
| Installation temperature             | 0 °C to +50 °C                                                                                  |
| Min. bending radius (installation)   | ≥ 8 × OD                                                                                        |
| Min. bending radius (after install.) | ≥ 4 × OD                                                                                        |
| Max. pulling tension                 | ≤ 110 N (≈ 25 lbf)                                                                              |
| Max. channel length                  | 100 m (90 m permanent link + 10 m patch cords)                                                  |
| Net weight                           | ≈ 38 kg/km (PVC); ≈ 36 kg/km (LSZH)                                                             |
| Standard delivery length             | 305 m / 500 m / 1 000 m in a pull-box or on a reel                                              |

## Transmission Performance vs. Frequency (worst-case @ 20 °C, per IEC 61156-5)

| Frequency (MHz) | Max. Insertion Loss (dB / 100 m) | Min. NEXT (dB) | Min. PS NEXT (dB) | Min. Return Loss (dB) | Min. ACR-F (ELFEXT) (dB / 100 m) |
|-----------------|----------------------------------|----------------|-------------------|-----------------------|----------------------------------|
| 1               | 2.0                              | 74.3           | 72.3              | 20.0                  | 67.8                             |
| 4               | 3.8                              | 65.3           | 63.3              | 23.0                  | 55.8                             |
| 8               | 5.3                              | 60.8           | 58.8              | 24.5                  | 49.7                             |
| 10              | 6.0                              | 59.3           | 57.3              | 25.0                  | 47.8                             |
| 16              | 7.6                              | 56.2           | 54.2              | 25.0                  | 43.7                             |
| 20              | 8.5                              | 54.8           | 52.8              | 25.0                  | 41.8                             |
| 25              | 9.5                              | 53.3           | 51.3              | 24.3                  | 39.8                             |
| 31.25           | 10.7                             | 52.0           | 50.0              | 23.6                  | 37.9                             |
| 62.5            | 15.4                             | 47.4           | 45.4              | 21.5                  | 31.9                             |
| 100             | 19.8                             | 44.3           | 42.3              | 20.1                  | 27.8                             |
| 200             | 29.0                             | 39.8           | 37.8              | 18.0                  | 21.8                             |
| 250             | 32.8                             | 38.3           | 36.3              | 17.3                  | 19.8                             |

Note: Values are the worst-case limits from IEC 61156-5 Ed. 2 / ISO/IEC 11801 Class E; typical production cable exceeds these limits with margin. NEXT = Near-End Crosstalk; PS NEXT = Power-Sum NEXT; ACR-F = Attenuation-to-Crosstalk Ratio Far-end (formerly ELFEXT). Insertion-loss values are at 20 °C reference; apply +0.4%/°C correction for operating temperature. Return loss applies above 1 MHz. For 10GBASE-T operation (full 100 m), the Cat 6A (Class EA, ISO/IEC 11801) cable is recommended; standard Cat 6 supports 10GBASE-T up to 55 m only. Jacket options: PVC riser (CMR) — default; LSZH (EuroClass Cca s2 d1 a1 or Dca s2 d2 a1) for indoor occupancies requiring low-smoke, halogen-free performance; PE for outdoor (option PE+PVC double-jacket for direct burial). Specific parameters subject to product drawings.