

TECHNICAL SPECIFICATION

LVSS-HN0062-00

FOR

4 PAIR U/UTP OUTDOOR CABLES (CATEGORY 5E)

(Ref : UL444 , ANSI/TIA-568-C.2, ISO/IEC 11801 & IEC 61156-5)

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1. SCOPE

This Specification is referred on the standards of UL444 , ANSI/TIA-568-C.2 and ISO/IEC 11801 and covers the requirements for unshielded twisted pair (U/UTP) outdoor cables of 100Ω , enhanced category 5E (Cat.5E).

- Applicable cable size & type ; 4 Pairs, PVC sheath (CM, CMR) or LSZH sheath (IEC 60332-1)

2. CABLE CONSTRUCTION

2.1 Conductor

The conductors shall be solid , annealed and bare copper with a diameter of AWG24 and nominal diameter is 0.490mm.

2.2 Insulation

Each conductor shall be insulated with solid high density polyethylene .

The insulation shall be uniform and shall not have any defects.

The diameter over the insulation shall be maximum 1.22mm.

2.3 Color code

The color code of insulation shall be shown as Table 1.

Table 1. Color code of insulation

Pair No	A - wire		B - wire	
	Base	Stripe	Base	Stripe
1	White	Blue	Blue	-
2	White	Orange	Orange	-
3	White	Green	Green	-
4	White	Brown	Brown	-

*Note) The Stripe Marking shall be applied on the white color

2.4 Core Assembly

Two insulated conductors shall be twisted into a pair.

Four twisted pairs shall be assembled into a cable core.

2.5 Sheath

The flame retardant PVC or LSZH (Low Smoke Zero Halogen) compound colored grey or other colors shall be applied over the cable core. The sheath shall be uniform and shall not have any defects.

The thickness of sheath and cable diameter shall be shown as table 2.

Table.2 thickness of sheath and cable diameter

Type	Thickness (mm)	OD (mm)
PVC	0.40 ± 0.05	4.7 ± 0.2
LSZH	0.45 ± 0.05	4.8 ± 0.2

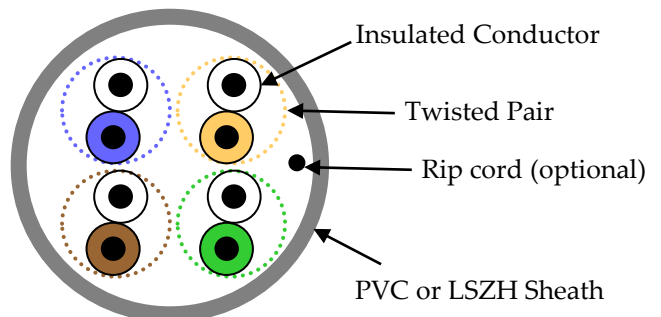


Fig 1. Cross-Sectional Diagram of Cable

- The drawing appearing on this page may be subject to change or modification without any prior notice -

3. ELECTRICAL CHARACTERISTICS

3.1 Electrical Performances

Characteristics	units	Cat.5e
Impedance (Characteristic mean)	Ω	$100 \pm 15\%$ ($1 \leq f \leq 100\text{MHz}$)
Mutual Capacitance	nF/100m	≤ 5.60
Capacitance Unbalance (Pair to Ground)	pF/100m	≤ 330
Insulation Resistance	M Ω -100m	≥ 500
Dielectric Strength	DC kV/sec	2.5 / 2
Return Loss	dB/100m	$\geq 20 + 5 * \log(\text{freq})$ $1 \leq f < 10\text{MHz}$ ≥ 25 $10 \leq f < 20\text{MHz}$ $\geq 25 - 7 * \log(\text{freq}/20)$ $20 \leq f \leq 100\text{MHz}$
Attenuation (Insertion Loss)	dB/100m	$\leq 1.967*\sqrt{(\text{freq}) + 0.023*(\text{freq}) + 0.05/\sqrt{(\text{freq})}}$ $1 \sim 100 \text{ MHz}$
NEXT Loss	dB/100m	$\geq 35.3 - 15*\log(\text{freq}/100)$, $1 < f \leq 100\text{MHz}$
Power sum NEXT Loss	dB/100m	$\geq 32.3 - 15*\log(\text{freq}/100)$, $1 < f \leq 100\text{MHz}$
ELFEXT Loss	dB/100m	$\geq 23.8 - 20*\log(\text{freq}/100)$, $1 \sim 100\text{MHz}$
Power sum ELFEXT Loss	dB/100m	$\geq 20.8 - 20*\log(\text{freq}/100)$, $1 \sim 100\text{MHz}$
Propagation Delay	ns/100m	$\leq 534 + 36 / \sqrt{(\text{Freq})}$, $1 \sim 100\text{MHz}$
Propagation Delay Skew	ns/100m	≤ 45

Freq. (MHz)	Attenuation (dB/100m) Max.	NEXT (dB/100m) Min.	PSNEXT (dB/100m) Min.	ELFEXT (dB/100m) Min.	PSELFEXT (dB/100m) Min.	RL (dB/100m) Min.	P.Delay (ns/100m) Max.
1	2.0	65.3	62.3	63.8	60.8	20.0	570
4	4.1	56.3	53.3	51.8	48.8	23.0	552
8	5.8	51.8	48.8	45.7	42.7	24.5	547
10	6.5	50.3	47.3	43.8	40.8	25.0	545
16	8.2	47.2	44.2	39.7	36.7	25.0	543
20	9.3	45.8	42.8	37.8	34.8	25.0	542
25	10.4	44.3	41.3	35.8	32.8	24.3	541
31.25	11.7	42.9	39.9	33.9	30.9	23.6	540
62.5	17.0	38.4	35.4	27.9	24.9	21.5	539
100	22.0	35.3	32.3	23.8	20.8	20.1	538

3.2 Measurements Precaution

All electrical characteristics specified in clause 3.1 shall be tested on one sample length of 100 meter or greater removed from the package.

4. PHYSICAL PROPERTIES

4.1 Insulation

The un-aged tensile strength and elongation of HDPE insulation, measured in accordance with clause 7.3 of UL 444 shall be minimum 16.5MPa and 300%, respectively.

The heat-aged tensile strength and elongation, measured in accordance with clause 7.3 of UL 444 shall be minimum 75% and 75% of un-aged, respectively.

The shrinkage of insulation , measured in accordance with clause 7.4 of UL 444 , shall not exceed 9.5mm.

The bending test of insulation at low temperature, measured in accordance with clause 7.5 of UL 444 , shall show no visible cracks.

4.2 Sheath

The un-aged tensile strength and elongation of PVC sheath, measured in accordance with clause 7.8 of UL 444 shall be minimum 17.24MPa and 100%, respectively.

The heat-aged tensile strength and elongation of PVC sheath, measured in accordance with clause 7.8 of UL 444 shall be minimum 85% and 50% of un-aged, respectively.

The un-aged tensile strength and elongation of LSZH sheath, measured in accordance with clause 6.4.6 & 6.4.7 of IEC 61156-5 shall be minimum 9.0MPa and 100%, respectively.

The heat-aged tensile strength and elongation of LSZH sheath, measured in accordance with clause 6.5.4 & 6.5.5 of IEC 61156-5 shall be minimum 70% and 50% of un-aged, respectively.

The LSZH compound shall be complied with IEC 60754-2 and IEC 61034.

4.3 Cable Cold Bend

All cables shall meet the requirements of clause 7.10 of UL 444.

4.4 Flame Requirements

A cable marked CM shall comply with the vertical flame test specified in UL 1685 or IEC 60332-3.

A cable marked CMR shall comply with the riser test specified in UL 1666.

A cable marked LSZH shall comply with the vertical flame test specified in IEC 60332-1

4.5 Sunlight Resistance

The sunlight resistance, measured in accordance with clause 1200 of UL 1581 shall be minimum 85% at 300h and 80% at 720h in the tensile strength and elongation.

5. PACKING AND IDENTIFICATION

5.1 Cable Marking

The cable shall be marked on the sheath to designate the transmission performance and/or others (if ordered by purchaser).

The marking shall be repeated through the outer sheath clearly.

5.2 Cable Packing

5.2.1 The standard delivery length of cable is 305m.

5.2.2 Each length of completed cable shall be wound on box.

5.3 Marking on tag or box

The following details shall be marked on a tag affixed to each shipping length of cable in a box, or directly printed on the outer surface of the box.

- AWG size and number of pairs
- Flame test classification
- Manufacturer name and logo
- length
- Others

- End of Specification -

※ **APPENDIX – PRODUCT PART NUMBER**

Description	Part Number
Category 5e U/UTP 4Pair CM	UTP-E-C5G-E1VN-M 0.5X004P/xx
Category 5e U/UTP 4Pair CMR	UTP-E-C5G-E1VN-R 0.5X004P/xx
Category 5e U/UTP 4Pair LSZH 332-1	UTP-E-C5G-E1ZN-X 0.5X004P/xx

* xx denotes color: WH=White, BL=Blue, GY=Gray, VI=Violet, OR=Orange, RD=Red, GN=Green, YL=Yellow, BK=Black

* Other colors are available

REV.	Date	Prepared By	Approved By	Remark
00	2022.02.15	L.V.Trong	S.G.Ok	1. Issued