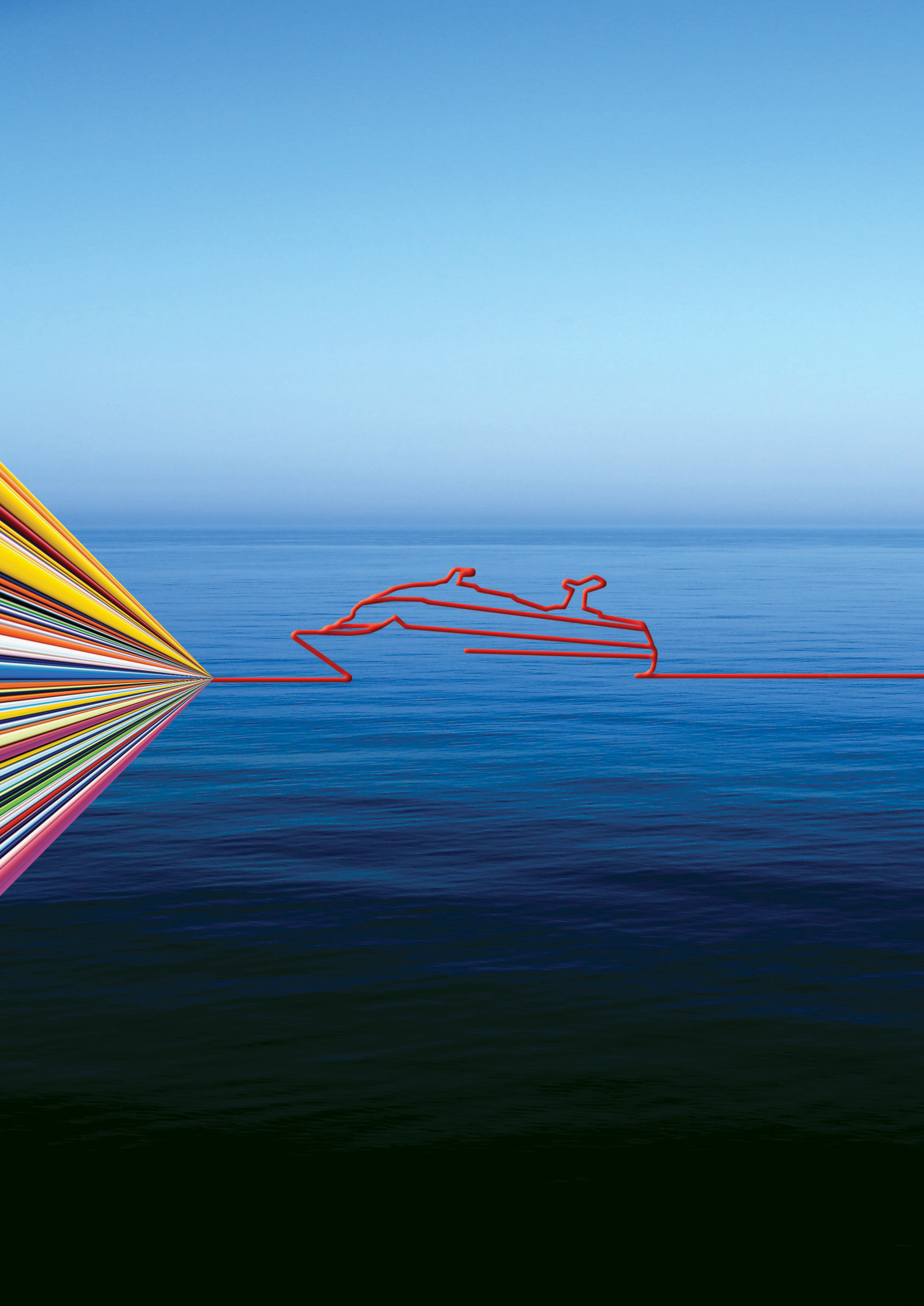


Bring safety and security onboard...

Shipbuilding is enjoying the biggest boom of its history, with 25% of the world's existing fleet now being replaced. An increase in seaborne trading (raw materials and finished goods), intense oil and gas activity, heightened ecological concerns, and growing tourism have resulted in 500 million DWT total order books in 2008.
This is equivalent to four years of average building, and includes bulk carriers, containerships, FPSOs, tankers, LNG/LPG carriers, RORO's, cruise ships and offshore supply and support vessels.

Growth of this magnitude has changed the dynamics for shipyards, prime contractors, designers and suppliers who are striving to increase production capacity and assembly speed, while at the same time assuring the highest levels of quality, onboard safety, security and reliability.

Increasingly, many shipyard actors see themselves as "integrators." Prefabricated modules are now put together in a coordinated series of supply, assembly, and installation activities. Maritime cables are essential elements in this process.

Although cables account for only 1-2% of a ship's overall cost, they provide the energy and data to enable onboard operating efficiency and safety. That is why you, as a shipbuilder, have high expectations of a cable manufacturer in terms of quality and performance, support services, and cost reduction through e-purchasing, progressive procurement and on-time delivery.

What you expect from a cable producer:

- Multi-standard capability to deliver the right, certified cable worldwide
- Reliable cables that optimize operations and passenger safety onboard
- Pre-cut and pre-assembled solutions to facilitate modular construction
- Ability to quickly meet unexpected design changes and modifications
- Optimize solutions that shorten installation time and increase installer effiency
- Energy and propulsion efficiency through lighter high-performance cables
- Increase data capacity both for ship administration and passenger/crew comport
- Flexible, strippable, paint-resistant, environmentally-friendly cables

...through Nexans maritime cables and solutions

Nexans is the worldwide cable leader on the shipbuilding market.
Rather than depend on external suppliers, Nexans draws on its own production facilities in Europe, Asia and the Americas to produce every type of cable used on a modern vessel, from bulk carriers, anchor handling tug supply(AHTS) ships, ocean station vessels(OSVs) and FPSOs to cruise liners and oceanic research ships.

A truly global manufacturer and supplier, Nexans provides a wide family of marine cables for ships being built around the world. In fact, Nexans currently supplies approximately 25% of the global shipboard cable market.

With a vast product range, extensive global production and research facilities, Nexans is continuing to innovate and develop new products and services for shipbuilding: making cables easier to install and more flexible, ensuring that they are operationally and environmentally safe, improving fire performance and survivability, and developing new customer services in design, custom cutting, labeling, pre-assembly, and just-in-time delivery worldwide.

Maritime cables offering quality and performance

- Complete family of shipbuilding and offshore cables from the world's leading cable manufacturer
- Reliable performance in terms of heat, cold, humidity, oil, vibration, salt corrosion, etc
- Advance fiber and copper LANs for next generation maritime telecommunications
- LV/MV power cables for all yard and shipboard energy needs
- Reduced weight and volume through advanced material and cable designs
- Global presence and fast delivery wherever you are located in the world

Maritime cables offering quality and performance

- International IEC 60092 series
- Japanese JIS specification
- IEEE1580 Type P for offshore and UL 1309 & 1072
- Norwegian NEK606 and BS6883
- German VG95218 for submarines
- Mil-Dtl-24643 and Mil-Dtl-24640 for naval vessels
- IEC advanced fire performance
- ABS, BV, CCS, DNV, GL, KR, LR, NK, RINA, RFMR, UL, ETL, VDE, US Coast Guard approved
- ISO 9001 quality standards
- Qualified products List(QPL)

Kukdong
a Nexans company ... feet on the ground, but imagine the ocean

Kukdong, which possesses manufacturing facilities capable of producing 2.5 million meters of cable for shipping and offshore on the basis of a 30 years know-how, has the highest level of quality and price competitiveness. And as an all-round cable maker, occupies the number 1 position in the world in the area of shipboard and offshore cables which require stringent quality features. With the inflow of orders for over 60 ocean projects including naval vessels, FPSO, drill ships and bout 1800 ships from more than 40 major shop construction companies, we at Kukdong will be your best partner.

The Largest Production Capacity in the World - 30,000km per year

The Largest Supplier in the World - 32% Market Share in the World

Contents

What is a HIS cable?

HIS cable development under cooperation with Electric working group of Hyundai Heavy industries, Global leader.

Applied standard for HIS cable

International Standard

HIS based on IEC

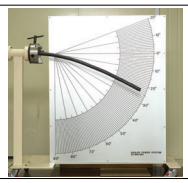
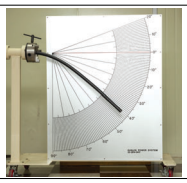
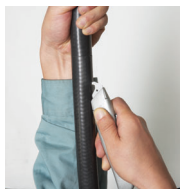
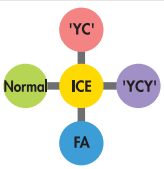
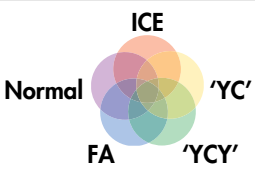
Regional Standard

National Standard

Collective Standard

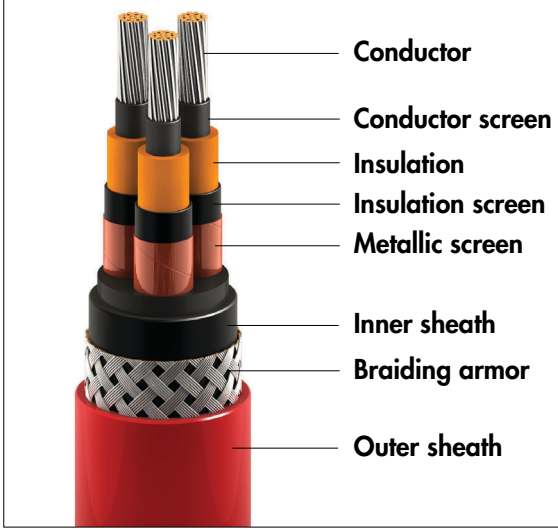
- **IEC 60092-350** General requirement
- **IEC 60092-352** Cable installation
- **IEC 60092-353/354/376** Cable construction
- **IEC 60228** Cable conductor
- **IEC 60092-351** Insulation maternal
- **IEC 60092-359** Sheath maternal
- **IEC 60331-1/2/3/21** Fire resistant
- **IEC 60332-1/3** Flame retardant
- **IEC 60811** Common testing method

Advanced property of HIS cable

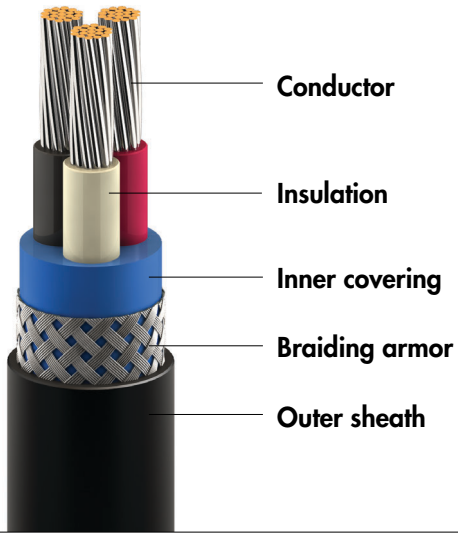
Performance Comparison	ORDINARY Cable	HIS Cable
Compact Reduced volume & weight		
Flame retardant IEC 60332-3 Cat.A	 **Burning length 1.78m**	 **Burning length 0.98m**
Cold resistant (at -30℃)		
Flexibility (maker std.)		
Eco-friendly Without dry paint dust & decrease of waste from cable		
Easy installation Economy of man hours Removed sheath by Rip cord		
Simplify		

Cable construction detail

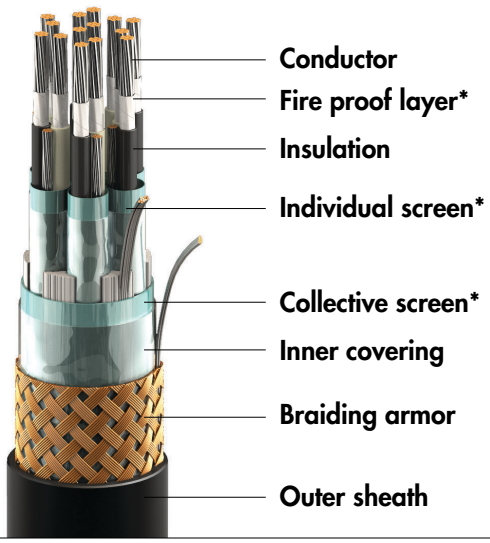
High Voltage Cable



Low Voltage Cable



Instrument Cable



Switch board & bonding wire

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Code designation for HIS cables

250V P O Y (C)

Shield
(C) : Al/PS tape common screen with drain wire
(I) : AL/PS tape individual screen with drain wire
(I/C) : AL/PS tape individual & common screen with drain wire
-S : Tinned annealed copper wire braid individual screen

Sheath
Y : Premium PVC as per IEC 60092-359, ST2
I : Enhanced SHF1 as per IEC 60092-359, SHF1

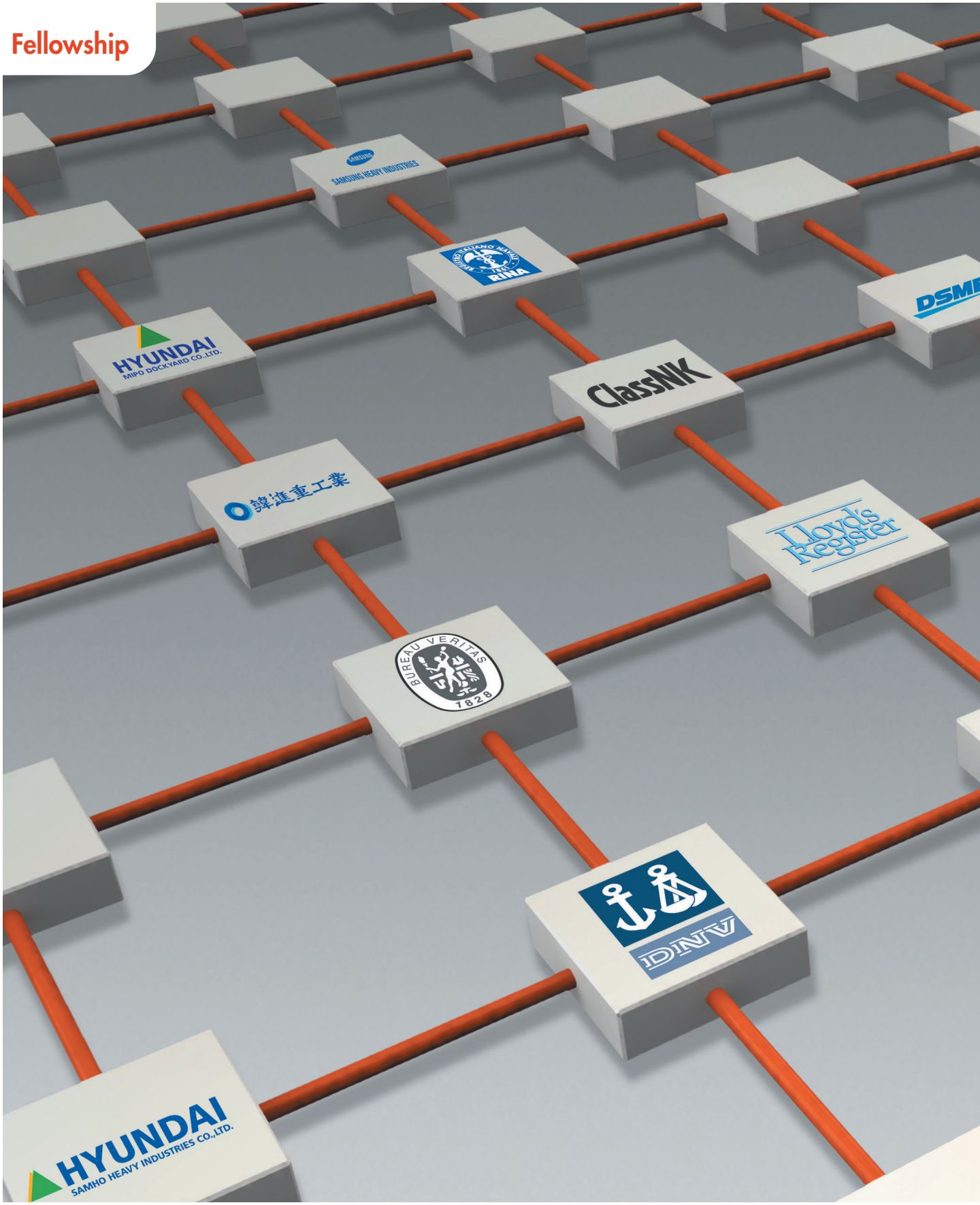
Armor
X : Non-armoured
C : Galvanized steel wire braid as per IEC 60092-350
O : Copper wire braid as per IEC 60092-350
B : Bronze(Copper alloy) wire braid as per IEC 60092-350

Insulation
P : High modulus Ehtylenepropylene rubber as per IEC 60092-351, HEPR
E : Fire proof layer & High modulus Ehtylenepropylene rubber as per IEC 60092-351, HF-HEPR
SCP : FR-XLPE insulation
SYP : PVC insulation
HF-SCP : Halogen free, FR-XLPE insulation

Voltage rating
3.6/6kV, 6/10kV, 8.7/15kV, 12/20kV, 0.6/1kV, 250V

Division	Sheath	Change marking (e.g. 0.6/1kV PCY 3CX50mm²)
Basic cable IEC 60332-3 Cat. A	Flame retardant PVC as per IEC 60092-359, ST2	0.6/1kV PCY 3Cx50SQMM KUKDONG-30DEG. IEC 60332-3 A year, length marking
Normal cable IEC 60332-1	General PVC as per IEC 60092-359, ST2	0.6/1kV PCY 3Cx50SQMM KUKDONG-30DEG. IEC 60332-1 year, length marking
Paint resistant cable IEC 60332-1	Paint resistance PVC as per IEC 60092-359, ST2	0.6/1kV PCY 3Cx50SQMM KUKDONG-30DEG. IEC 60332-1 PAINT RESISTANCE year, length marking
Premium cable IEC 60332-3 Cat. A & Paint resistance	Premium PVC (Flame & Paint resistance) as per IEC 60092-359, ST2	0.6/1kV PCY 3Cx50SQMM KUKDONG-30DEG. IE C 60332-3 A PAINT RESISTANCE year, length marking

Fellowship


SAMSUNG HEAVY INDUSTRIES
HYUNDAI
MIPO DOCKYARD CO.,LTD.
PRS
DSM
ClassNK
Lloyd's Register
BUREAU VERITAS
1828
DNV
HYUNDAI
SAMHO HEAVY INDUSTRIES CO.,LTD.


SAMSUNG HEAVY INDUSTRIES
SPF
KR
KOREAN REGISTER
Nexans
ABS
Kukdong
a Nexans company
HYUNDAI
HEAVY INDUSTRIES CO.,LTD.
HIS
cable

Attached table1

Unarmoured Power distribution cables MV PXY / PXI
Armoured Power distribution cables MV PCY (PBY:1C) / PCI (PBI:1C)

Construction Details

1 **Conductor** : Stranded tinned annealed copper as per IEC 60228, Class 2

2 **Conductor screen** : Semi-conducting tape and/or Semi-conducting compound

3 **Insulation** : Ethylene-propylene rubber as per IEC 60092-351, EPR

4 **Insulation screen** : Semi-conducting compound and/or Semi-conducting tape

5 **Metallic screen** : Copper tape overlap with thickness about 0.1mm

6 **Cabling (with filler)**

7 **Inner sheath** : see note
Code PXY, PCY : Polyvbinyl chloride compound (PVC) as per IEC 60092-359, ST2
Code PXI, PCI : Enhanced Halogen free thermoplastic compound as per IEC 60092-359, SHF1

8 **Armour (Applied to armoured cable)** : Metal wire braid (see note)
1 Core : Bronze(Copper alloy) wire braid as per IEC 60092-354
3 Core : Galvanized steel wire braid as per IEC 60092-354
A suitable separator tape or tapes may be applied under and/or over the armour.

9 **Outer sheath (Applied to armoured cable)** : see table
Code PCY : Polyvinyl chloride compound (PVC) as per IEC 60092-359, ST2
Code PCI : Enhanced Halogen free thermoplastic compound as per IEC 60092-359, SHF1

Type	Sheath material	Type	Sheath material
Basic cable	Flame retardant PVC as per IEC 60092-359, ST2	Paint resistant cable	Paint resistant PVC as per IEC 60092-359, ST2
Normal cable	General PVC as per IEC 60092-359, ST2	Premium	Flame & Paint resistant PVC as per IEC 60092-359, ST2

Note) In case of copper or bronze wire braided armour, the armour designation code is applied "O" or "B" instead of "C"

Approvals

ABS, Lloyd's Register, DNV, Bureau Veritas, Germanischer Lloyd, KR Korean Register, ClassNK

Standard Applied

- **Design guideline** : IEC 60092-354
- **Material properties** : IEC 60092-351, Insulation, EPR
  IEC 60092-359, Sheath, ST2 or SHF1
- **Flame retardant** : IEC 60332-3, Cat. 'A'
- **HCl emission** : IEC 60754-1, 0.5% ↓ for Halogen tree cable
- **Smoke emission** : IEC 61034, transmittance 60% ↑ for Halogen free cable
- **Cold properties(option)** : IEC 60811-1-4, Upgrade test at -30℃
- **Oil resistant(option)** : IEEE Std. 1580-2001 Type T, at 70℃ for 4hours, for PVC sheathed cable
- **Paint resistant(option)** : Maker standard (Epoxy, Alkyd paint, at 100℃ for 168hours)

Identification of color

- **Insulation**
  - 1 core : Black (colored tape under the copper braid screen)
  - 3 core : Black, White, Red (colored tapes under the copper braid screens)
- **Outer sheath :** Red

-30 to 90℃ | Flame retardant IEC 60332-3, A | Weather Resistance to severe weather conditions | Flexibility | Halogen free IEC 60754-1 (option) | Smoke density IEC 61034 (option) | Gass toxicity No (option)

Application

- Power circuit above 1kV.
- Fixed installation in both explosion risk and safe areas.
- Medium voltage power cables for general purpose.
- Maximum operating conductor temperature 90℃.

Standard Applied

• Design guideline :	IEC 60092-354
• Material properties :	IEC 60092-351, Insulation, EPR IEC 60092-359, Sheath, ST2 or SHF1
• Flame retardant :	IEC 60332-3, Cat. 'A'
• HCl emission :	IEC 60754-1, 0.5% ↓ for Halogen tree cable
• Smoke emission :	IEC 61034, transmittance 60% ↑ for Halogen free cable
• Cold properties(option) :	IEC 60811-1-4, Upgrade test at -30℃
• Oil resistant(option) :	IEEE Std. 1580-2001 Type T, at 70℃ for 4hours, for PVC sheathed cable
• Paint resistant(option) :	Maker standard (Epoxy, Alkyd paint, at 100℃ for 168hours)

3.6/6kV Power Cable

Unarmoured Power distribution cables 3.6/6kV PXY / PXI
Armoured Power distribution cables 3.6/6kV PBY / PBI

No. of core	Conductor			Thickness of insulation	Unarmoured, PXY Unarmoured, PXI			Armoured, PBY Armoured, PBI			
	Nominal sectional area	Min. No. of wires	Max. overall dia.		Thickness of sheath	Nominal dia. over sheath	Cable weight (approx.)	Dia. of metal wire for braid	Thickness of sheath	Nominal dia. over sheath	Cable weight (approx.)
EA	mm²	EA	mm	mm	mm	mm	kg/km	mm	mm	mm	kg/km
1	10	7	4.2	3.0	1.4	17.2 ±0.7	435	0.30	1.1	21.0 ±0.8	695
	16	7	5.3	3.0	1.4	18.2 ±0.7	580	0.30	1.1	22.0 ±0.9	795
	25	7	6.6	3.0	1.5	19.7 ±0.8	670	0.30	1.1	23.5 ±0.9	950
	35	7	7.9	3.0	1.5	20.9 ±0.8	765	0.30	1.2	24.9 ±1.0	1,105
	50	19	9.1	3.0	1.6	22.4 ±0.9	885	0.30	1.2	26.4 ±1.1	1,290
	70	19	11.0	3.0	1.6	24.2 ±1.0	1,045	0.30	1.2	28.2 ±1.1	1,560
	95	19	12.9	3.0	1.7	26.3 ±1.1	1,325	0.30	1.3	30.5 ±1.2	1,915
	120	37	14.5	3.0	1.8	28.1 ±1.1	1,550	0.30	1.3	32.3 ±1.3	2,235
	150	37	16.2	3.0	1.8	29.7 ±1.2	1,825	0.30	1.4	34.1 ±1.4	2,570
	185	37	18.0	3.0	1.9	31.7 ±1.3	2,435	0.40	1.4	36.5 ±1.5	3,100
	240	61	20.6	3.0	2.0	34.6 ±1.4	2,890	0.40	1.5	39.6 ±1.6	3,800
	300	61	23.1	3.0	2.1	37.2 ±1.5	3,410	0.40	1.6	42.4 ±1.7	4,525

Conductor	Tinned copper, class2	Tinned copper, Class2
Conductor screen	Semi-conductive layer	Semi-conductive layer
Insulation	HF-EPR	HF-EPR
Insulation screen	Semi-conductive layer	Semi-conductive layer
Metallic screen	Copper tape	Copper tape
Inner sheath	Not applicable	PVC or SHF1
Armoring	Not applicable	Metal wire braid
Outer sheath	PVC or SHF1	PVC or SHF1

Identification of color

- Insulation
  - 1 core : Black (colored tape under the copper braid screen)
  - 3 core : Black, White, Red (colored tapes under the copper braid screens)
- Outer sheath : Red

Application

- Power circuit above 1kV.
- Fixed installation in both explosion risk and safe areas.
- Medium voltage power cables for general purpose.
- Maximum operating conductor temperature 90℃.

Standard Applied

• Design guideline :	IEC 60092-354
• Material properties :	IEC 60092-351, Insulation, EPR IEC 60092-359, Sheath, ST2 or SHF1
• Flame retardant :	IEC 60332-3, Cat. 'A'
• HCl emission :	IEC 60754-1, 0.5% ↓ for Halogen tree cable
• Smoke emission :	IEC 61034, transmittance 60% ↑ for Halogen free cable
• Cold properties(option) :	IEC 60811-1-4, Upgrade test at -30℃
• Oil resistant(option) :	IEEE Std. 1580-2001 Type T, at 70℃ for 4hours, for PVC sheathed cable
• Paint resistant(option) :	Maker standard (Epoxy, Alkyd paint, at 100℃ for 168hours)

3.6/6kV Power Cable

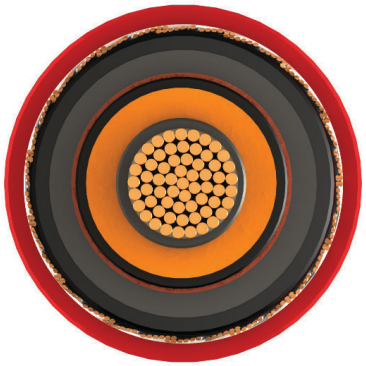
Unarmoured Power distribution cables 3.6/6kV PXY / PXI
Armoured Power distribution cables 3.6/6kV PCY / PCI

No. of core	Conductor			Thickness of insulation	Unarmoured, PXY Unarmoured, PXI			Armoured, PCY Armoured, PCI			
	Nominal sectional area	Min. No. of wires	Max. overall dia.		Thickness of sheath	Nominal dia. over sheath	Cable weight (approx.)	Dia. of metal wire for braid	Thickness of sheath	Nominal dia. over sheath	Cable weight (approx.)
EA	mm²	EA	mm	mm	mm	mm	kg/km	mm	mm	mm	kg/km
3	10	7	4.2	3.0	2.0	34.6 ±1.4	1,280	0.40	1.5	39.6 ±1.6	1,995
	16	7	5.3	3.0	2.1	36.9 ±1.5	2,065	0.40	1.6	42.1 ±1.7	2,295
	25	7	6.6	3.0	2.2	39.9 ±1.6	2,375	0.40	1.6	45.1 ±1.8	2,760
	35	7	7.9	3.0	2.3	42.7 ±1.7	2,705	0.40	1.7	48.1 ±1.9	3,250
	50	19	9.1	3.0	2.4	45.7 ±1.8	3,085	0.40	1.8	51.3 ±2.1	3,835
	70	19	11.0	3.0	2.6	50.0 ±2.0	3,660	0.40	1.9	55.8 ±2.2	4,775
	95	19	12.9	3.0	2.7	54.3 ±2.2	4,375	0.40	2.0	60.3 ±2.4	5,870
	120	37	14.5	3.0	2.9	58.1 ±2.3	5,010	0.40	2.1	64.3 ±2.6	6,915
	150	37	16.2	3.0	3.0	61.8 ±2.5	5,730	0.40	2.2	68.2 ±2.7	8,010
	185	37	18.0	3.0	3.2	66.1 ±2.6	6,795	0.40	2.3	72.7 ±2.9	9,465
	240	61	20.6	3.0	3.4	72.3 ±2.9	8,070	0.40	2.5	79.3 ±3.2	11,715
	300	61	23.1	3.0	3.6	77.9 ±3.1	9,395	0.40	2.6	85.1 ±3.4	14,000

Conductor	Tinned copper, class2	Tinned copper, Class2
Conductor screen	Semi-conductive layer	Semi-conductive layer
Insulation	HF-EPR	HF-EPR
Insulation screen	Semi-conductive layer	Semi-conductive layer
Metallic screen	Copper tape	Copper tape
Inner sheath	Not applicable	PVC or SHF1
Armoring	Not applicable	Metal wire braid
Outer sheath	PVC or SHF1	PVC or SHF1

Identification of color

- Insulation
  - 1 core : Black (colored tape under the copper braid screen)
  - 3 core : Black, White, Red (colored tapes under the copper braid screens)
- Outer sheath : Red



Application

- Power circuit above 1kV.
- Fixed installation in both explosion risk and safe areas.
- Medium voltage power cables for general purpose.
- Maximum operating conductor temperature 90℃.

Standard Applied

• Design guideline :	IEC 60092-354
• Material properties :	IEC 60092-351, Insulation, EPR IEC 60092-359, Sheath, ST2 or SHF1
• Flame retardant :	IEC 60332-3, Cat. 'A'
• HCl emission :	IEC 60754-1, 0.5% ↓ for Halogen tree cable
• Smoke emission :	IEC 61034, transmittance 60% ↑ for Halogen free cable
• Cold properties(option) :	IEC 60811-1-4, Upgrade test at -30℃
• Oil resistant(option) :	IEEE Std. 1580-2001 Type T, at 70℃ for 4hours, for PVC sheathed cable
• Paint resistant(option) :	Maker standard (Epoxy, Alkyd paint, at 100℃ for 168hours)

6/10kV Power Cable

Unarmoured Power distribution cables 6/10kV PXY / PXI
Armoured Power distribution cables 6/10kV PBY / PBI

No. of core	Conductor			Thickness of insulation	Unarmoured, PXY Unarmoured, PXI			Armoured, PBY Armoured, PBI			
	Nominal sectional area	Min. No. of wires	Max. overall dia.		Thickness of sheath	Nominal dia. over sheath	Cable weight (approx.)	Dia. of metal wire for braid	Thickness of sheath	Nominal dia. over sheath	Cable weight (approx.)
EA	mm²	EA	mm	mm	mm	mm	kg/km	mm	mm	mm	kg/km
1	16	7	5.3	3.4	1.4	19.0 ±0.8	550	0.30	1.1	22.8 ±0.9	835
	25	7	6.6	3.4	1.5	20.5 ±0.8	710	0.30	1.1	24.3 ±1.0	995
	35	7	7.9	3.4	1.5	21.7 ±0.9	785	0.30	1.2	25.7 ±1.0	1,150
	50	19	9.1	3.4	1.6	23.2 ±0.9	905	0.30	1.2	27.2 ±1.1	1,340
	70	19	11.0	3.4	1.6	25.2 ±1.0	1,070	0.30	1.3	29.4 ±1.2	1,640
	95	19	12.9	3.4	1.7	27.1 ±1.1	1,245	0.30	1.3	31.3 ±1.3	1,970
	120	37	14.5	3.4	1.8	28.9 ±1.2	1,520	0.30	1.4	33.3 ±1.3	2,305
	150	37	16.2	3.4	1.9	30.7 ±1.2	1,830	0.40	1.4	35.5 ±1.4	2,735
	185	37	18.0	3.4	1.9	32.5 ±1.3	2,140	0.40	1.5	37.5 ±1.5	3,185
	240	61	20.6	3.4	2.0	35.4 ±1.4	2,770	0.40	1.5	40.4 ±1.6	3,875
	300	61	23.1	3.4	2.1	38.0 ±1.5	3,220	0.40	1.6	43.2 ±1.7	4,600

Conductor	Tinned copper, class2	Tinned copper, Class2
Conductor screen	Semi-conductive layer	Semi-conductive layer
Insulation	HF-EPR	HF-EPR
Insulation screen	Semi-conductive layer	Semi-conductive layer
Metallic screen	Copper tape	Copper tape
Inner sheath	Not applicable	PVC or SHF1
Armoring	Not applicable	Metal wire braid
Outer sheath	PVC or SHF1	PVC or SHF1

Identification of color

- Insulation
  - 1 core : Black (colored tape under the copper braid screen)
  - 3 core : Black, White, Red (colored tapes under the copper braid screens)
- Outer sheath : Red

Application

- Power circuit above 1kV.
- Fixed installation in both explosion risk and safe areas.
- Medium voltage power cables for general purpose.
- Maximum operating conductor temperature 90℃.

Standard Applied

• Design guideline :	IEC 60092-354
• Material properties :	IEC 60092-351, Insulation, EPR IEC 60092-359, Sheath, ST2 or SHF1
• Flame retardant :	IEC 60332-3, Cat. 'A'
• HCl emission :	IEC 60754-1, 0.5% ↓ for Halogen tree cable
• Smoke emission :	IEC 61034, transmittance 60% ↑ for Halogen free cable
• Cold properties(option) :	IEC 60811-1-4, Upgrade test at -30℃
• Oil resistant(option) :	IEEE Std. 1580-2001 Type T, at 70℃ for 4hours, for PVC sheathed cable
• Paint resistant(option) :	Maker standard (Epoxy, Alkyd paint, at 100℃ for 168hours)

6/10kV Power Cable

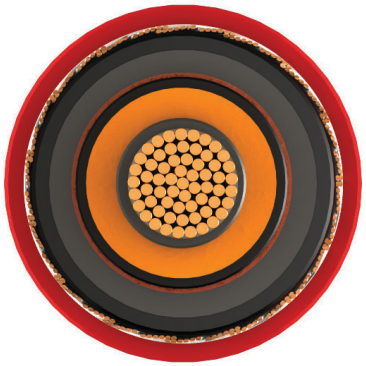
Unarmoured Power distribution cables 6/10kV PXY / PXI
Armoured Power distribution cables 6/10kV PCY / PCI

No. of core	Conductor			Thickness of insulation	Unarmoured, PXY Unarmoured, PXI			Armoured, PCY Armoured, PCI			
	Nominal sectional area	Min. No. of wires	Max. overall dia.		Thickness of sheath	Nominal dia. over sheath	Cable weight (approx.)	Dia. of metal wire for braid	Thickness of sheath	Nominal dia. over sheath	Cable weight (approx.)
EA	mm²	EA	mm	mm	mm	mm	kg/km	mm	mm	mm	kg/km
3	16	7	5.3	3.4	2.2	38.8 ±1.6	1,680	0.40	1.6	44.0 ±1.8	2,455
	25	7	6.6	3.4	2.3	41.9 ±1.7	2,585	0.40	1.7	47.3 ±1.9	2,955
	35	7	7.9	3.4	2.4	44.6 ±1.8	2,900	0.40	1.8	50.2 ±2.0	3,450
	50	19	9.1	3.4	2.5	47.6 ±1.9	3,285	0.40	1.8	53.2 ±2.1	4,025
	70	19	11.0	3.4	2.7	51.9 ±2.1	3,865	0.40	1.9	57.7 ±2.3	4,980
	95	19	12.9	3.4	2.8	56.2 ±2.2	4,505	0.40	2.1	62.4 ±2.5	6,115
	120	37	14.5	3.4	3.0	60.1 ±2.4	5,220	0.40	2.1	66.3 ±2.7	7,150
	150	37	16.2	3.4	3.1	63.7 ±2.5	5,880	0.40	2.2	70.1 ±2.8	8,255
	185	37	18.0	3.4	3.2	67.8 ±2.7	6,715	0.40	2.3	74.4 ±3.0	9,575
	240	61	20.6	3.4	3.5	74.2 ±3.0	8,225	0.40	2.5	81.2 ±3.2	11,875
	300	61	23.1	3.4	3.7	79.8 ±3.2	9,500	0.40	2.6	87.0 ±3.5	14,165

Conductor	Tinned copper, class2	Tinned copper, Class2
Conductor screen	Semi-conductive layer	Semi-conductive layer
Insulation	HF-EPR	HF-EPR
Insulation screen	Semi-conductive layer	Semi-conductive layer
Metallic screen	Copper tape	Copper tape
Inner sheath	Not applicable	PVC or SHF1
Armoring	Not applicable	Metal wire braid
Outer sheath	PVC or SHF1	PVC or SHF1

Identification of color

- Insulation
  - 1 core : Black (colored tape under the copper braid screen)
  - 3 core : Black, White, Red (colored tapes under the copper braid screens)
- Outer sheath : Red



Application

- Power circuit above 1kV.
- Fixed installation in both explosion risk and safe areas.
- Medium voltage power cables for general purpose.
- Maximum operating conductor temperature 90℃.

Standard Applied

• Design guideline :	IEC 60092-354
• Material properties :	IEC 60092-351, Insulation, EPR IEC 60092-359, Sheath, ST2 or SHF1
• Flame retardant :	IEC 60332-3, Cat. 'A'
• HCl emission :	IEC 60754-1, 0.5% ↓ for Halogen tree cable
• Smoke emission :	IEC 61034, transmittance 60% ↑ for Halogen free cable
• Cold properties(option) :	IEC 60811-1-4, Upgrade test at -30℃
• Oil resistant(option) :	IEEE Std. 1580-2001 Type T, at 70℃ for 4hours, for PVC sheathed cable
• Paint resistant(option) :	Maker standard (Epoxy, Alkyd paint, at 100℃ for 168hours)

8.7/15kV Power Cable

Unarmoured Power distribution cables 8.7/15kV PXY / PXI
Armoured Power distribution cables 8.7/15kV PBY / PBI

No. of core	Conductor			Thickness of insulation	Unarmoured, PXY Unarmoured, PXI			Armoured, PBY Armoured, PBI			
	Nominal sectional area	Min. No. of wires	Max. overall dia.		Thickness of sheath	Nominal dia. over sheath	Cable weight (approx.)	Dia. of metal wire for braid	Thickness of sheath	Nominal dia. over sheath	Cable weight (approx.)
EA	mm²	EA	mm	mm	mm	mm	kg/km	mm	mm	mm	kg/km
1	25	7	6.6	4.5	1.6	22.9 ±0.9	800	0.30	1.2	26.9 ±1.1	1,155
	35	7	7.9	4.5	1.6	24.1 ±1.0	935	0.30	1.2	28.1 ±1.1	1,300
	50	19	9.1	4.5	1.7	25.6 ±1.0	1,040	0.30	1.3	29.8 ±1.2	1,510
	70	19	11.0	4.5	1.8	27.6 ±1.1	1,210	0.30	1.3	31.8 ±1.3	1,810
	95	19	12.9	4.5	1.8	29.5 ±1.2	1,385	0.30	1.4	33.9 ±1.4	2,165
	120	37	14.5	4.5	1.9	31.3 ±1.3	1,655	0.40	1.4	36.1 ±1.4	2,580
	150	37	16.2	4.5	2.0	33.1 ±1.3	1,950	0.40	1.5	38.1 ±1.5	2,955
	185	37	18.0	4.5	2.0	34.9 ±1.4	2,205	0.40	1.5	39.9 ±1.6	3,395
	240	61	20.6	4.5	2.1	37.8 ±1.5	2,640	0.40	1.6	43.0 ±1.7	4,120
	300	61	23.1	4.5	2.2	40.4 ±1.6	3,275	0.40	1.7	45.8 ±1.8	4,860

Conductor	Tinned copper, class2	Tinned copper, Class2
Conductor screen	Semi-conductive layer	Semi-conductive layer
Insulation	HF-EPR	HF-EPR
Insulation screen	Semi-conductive layer	Semi-conductive layer
Metallic screen	Copper tape	Copper tape
Inner sheath	Not applicable	PVC or SHF1
Armoring	Not applicable	Metal wire braid
Outer sheath	PVC or SHF1	PVC or SHF1

Identification of color

- Insulation
  - 1 core : Black (colored tape under the copper braid screen)
  - 3 core : Black, White, Red (colored tapes under the copper braid screens)
- Outer sheath : Red

Application

- Power circuit above 1kV.
- Fixed installation in both explosion risk and safe areas.
- Medium voltage power cables for general purpose.
- Maximum operating conductor temperature 90℃.

Standard Applied

• Design guideline :	IEC 60092-354
• Material properties :	IEC 60092-351, Insulation, EPR IEC 60092-359, Sheath, ST2 or SHF1
• Flame retardant :	IEC 60332-3, Cat. 'A'
• HCl emission :	IEC 60754-1, 0.5% ↓ for Halogen tree cable
• Smoke emission :	IEC 61034, transmittance 60% ↑ for Halogen free cable
• Cold properties(option) :	IEC 60811-1-4, Upgrade test at -30℃
• Oil resistant(option) :	IEEE Std. 1580-2001 Type T, at 70℃ for 4hours, for PVC sheathed cable
• Paint resistant(option) :	Maker standard (Epoxy, Alkyd paint, at 100℃ for 168hours)

8.7/15kV Power Cable

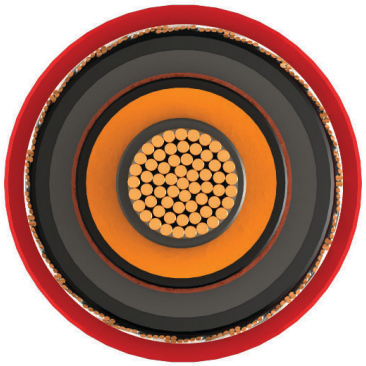
Unarmoured Power distribution cables 8.7/15kV PXY / PXI
Armoured Power distribution cables 8.7/15kV PCY / PCI

No. of core	Conductor			Thickness of insulation	Unarmoured, PXY Unarmoured, PXI			Armoured, PCY Armoured, PCI			
	Nominal sectional area	Min. No. of wires	Max. overall dia.		Thickness of sheath	Nominal dia. over sheath	Cable weight (approx.)	Dia. of metal wire for braid	Thickness of sheath	Nominal dia. over sheath	Cable weight (approx.)
EA	mm²	EA	mm	mm	mm	mm	kg/km	mm	mm	mm	kg/km
3	25	7	6.6	4.5	2.5	47.0 ±1.9	2,400	0.40	1.8	52.6 ±2.1	3,460
	35	7	7.9	4.5	2.6	49.8 ±2.0	3,530	0.40	1.9	55.6 ±2.2	3,985
	50	19	9.1	4.5	2.7	52.8 ±2.1	3,935	0.40	2.0	58.8 ±2.4	4,615
	70	19	11.0	4.5	2.8	56.9 ±2.3	4,535	0.40	2.1	63.1 ±2.5	5,580
	95	19	12.9	4.5	3.0	61.4 ±2.5	5,245	0.40	2.2	67.8 ±2.7	6,760
	120	37	14.5	4.5	3.1	65.0 ±2.6	5,865	0.40	2.3	71.6 ±2.9	7,825
	150	37	16.2	4.5	3.3	68.8 ±2.8	6,645	0.40	2.4	75.6 ±3.0	9,000
	185	37	18.0	4.5	3.4	72.9 ±2.9	7,465	0.40	2.5	79.9 ±3.2	10,395
	240	61	20.6	4.5	3.7	79.3 ±3.2	8,840	0.40	2.6	86.5 ±3.5	12,715
	300	61	23.1	4.5	3.9	84.9 ±3.4	10,355	0.40	2.8	92.5 ±3.7	15,110

Conductor	Tinned copper, class2	Tinned copper, Class2
Conductor screen	Semi-conductive layer	Semi-conductive layer
Insulation	HF-EPR	HF-EPR
Insulation screen	Semi-conductive layer	Semi-conductive layer
Metallic screen	Copper tape	Copper tape
Inner sheath	Not applicable	PVC or SHF1
Armoring	Not applicable	Metal wire braid
Outer sheath	PVC or SHF1	PVC or SHF1

Identification of color

- Insulation
  - 1 core : Black (colored tape under the copper braid screen)
  - 3 core : Black, White, Red (colored tapes under the copper braid screens)
- Outer sheath : Red



Application

- Power circuit above 1kV.
- Fixed installation in both explosion risk and safe areas.
- Medium voltage power cables for general purpose.
- Maximum operating conductor temperature 90℃.

Standard Applied

• Design guideline :	IEC 60092-354
• Material properties :	IEC 60092-351, Insulation, EPR IEC 60092-359, Sheath, ST2 or SHF1
• Flame retardant :	IEC 60332-3, Cat. 'A'
• HCl emission :	IEC 60754-1, 0.5% ↓ for Halogen tree cable
• Smoke emission :	IEC 61034, transmittance 60% ↑ for Halogen free cable
• Cold properties(option) :	IEC 60811-1-4, Upgrade test at -30℃
• Oil resistant(option) :	IEEE Std. 1580-2001 Type T, at 70℃ for 4hours, for PVC sheathed cable
• Paint resistant(option) :	Maker standard (Epoxy, Alkyd paint, at 100℃ for 168hours)

12/20kV Power Cable

Unarmoured Power distribution cables 12/20kV PXY / PXI
Armoured Power distribution cables 12/20kV PBY / PBI

No. of core	Conductor			Thickness of insulation	Unarmoured, PXY Unarmoured, PXI			Armoured, PBY Armoured, PBI			
	Nominal sectional area	Min. No. of wires	Max. overall dia.		Thickness of sheath	Nominal dia. over sheath	Cable weight (approx.)	Dia. of metal wire for braid	Thickness of sheath	Nominal dia. over sheath	Cable weight (approx.)
EA	mm²	EA	mm	mm	mm	mm	kg/km	mm	mm	mm	kg/km
1	35	7	7.9	5.5	1.7	26.3 ±1.1	1,015	0.30	1.3	30.5 ±1.2	1,015
	50	19	9.1	5.5	1.8	27.8 ±1.1	1,175	0.30	1.3	32.0 ±1.3	1,175
	70	19	11.0	5.5	1.8	29.6 ±1.2	1,450	0.30	1.4	34.0 ±1.4	1,450
	95	19	12.9	5.5	1.9	31.7 ±1.3	1,780	0.40	1.4	36.5 ±1.5	1,780
	120	37	14.5	5.5	2.0	33.5 ±1.3	2,075	0.40	1.5	38.5 ±1.5	2,075
	150	37	16.2	5.5	2.0	35.1 ±1.4	2,400	0.40	1.5	40.1 ±1.6	2,400
	185	37	18.0	5.5	2.1	37.1 ±1.5	2,830	0.40	1.6	42.3 ±1.7	2,830
	240	61	20.6	5.5	2.2	40.0 ±1.6	3,485	0.40	1.6	45.2 ±1.8	3,485
	300	61	23.1	5.5	2.3	42.6 ±1.7	4,160	0.40	1.7	48.0 ±1.9	4,160

Conductor	Tinned copper, class2	Tinned copper, Class2
Conductor screen	Semi-conductive layer	Semi-conductive layer
Insulation	HF-EPR	HF-EPR
Insulation screen	Semi-conductive layer	Semi-conductive layer
Metallic screen	Copper tape	Copper tape
Inner sheath	Not applicable	PVC or SHF1
Armoring	Not applicable	Metal wire braid
Outer sheath	PVC or SHF1	PVC or SHF1

Identification of color

- Insulation
  - 1 core : Black (colored tape under the copper braid screen)
  - 3 core : Black, White, Red (colored tapes under the copper braid screens)
- Outer sheath : Red

Application

- Power circuit above 1kV.
- Fixed installation in both explosion risk and safe areas.
- Medium voltage power cables for general purpose.
- Maximum operating conductor temperature 90℃.

Standard Applied

• Design guideline :	IEC 60092-354
• Material properties :	IEC 60092-351, Insulation, EPR IEC 60092-359, Sheath, ST2 or SHF1
• Flame retardant :	IEC 60332-3, Cat. 'A'
• HCl emission :	IEC 60754-1, 0.5% ↓ for Halogen tree cable
• Smoke emission :	IEC 61034, transmittance 60% ↑ for Halogen free cable
• Cold properties(option) :	IEC 60811-1-4, Upgrade test at -30℃
• Oil resistant(option) :	IEEE Std. 1580-2001 Type T, at 70℃ for 4hours, for PVC sheathed cable
• Paint resistant(option) :	Maker standard (Epoxy, Alkyd paint, at 100℃ for 168hours)

12/20kV Power Cable

Unarmoured Power distribution cables 12/20kV PXY / PXI
Armoured Power distribution cables 12/20kV PCY / PCI

No. of core	Conductor			Thickness of insulation	Unarmoured, PXY Unarmoured, PXI			Armoured, PCY Armoured, PCI			
	Nominal sectional area	Min. No. of wires	Max. overall dia.		Thickness of sheath	Nominal dia. over sheath	Cable weight (approx.)	Dia. of metal wire for braid	Thickness of sheath	Nominal dia. over sheath	Cable weight (approx.)
EA	mm²	EA	mm	mm	mm	mm	kg/km	mm	mm	mm	kg/km
3	35	7	7.9	5.5	2.7	54.3 ±2.2	3,535	0.40	2.0	60.3 ±2.4	4,525
	50	19	9.1	5.5	2.9	57.5 ±2.3	4,100	0.40	2.1	63.7 ±2.5	5,225
	70	19	11.0	5.5	3.0	61.6 ±2.5	5,035	0.40	2.2	68.0 ±2.7	6,250
	95	19	12.9	5.5	3.2	66.1 ±2.6	6,120	0.40	2.3	72.7 ±2.9	7,485
	120	37	14.5	5.5	3.3	69.7 ±2.8	7,190	0.40	2.4	76.7 ±3.1	8,520
	150	37	16.2	5.5	3.5	73.6 ±2.9	8,270	0.40	2.5	80.6 ±3.2	9,740
	185	37	18.0	5.5	3.6	77.6 ±3.1	9,705	0.40	2.6	84.8 ±3.4	11,240
	240	61	20.6	5.5	3.8	83.9 ±3.4	11,950	0.40	2.7	91.3 ±3.7	13,615
	300	61	23.1	5.5	4.0	89.4 ±3.6	14,215	0.40	2.9	97.2 ±3.9	16,070

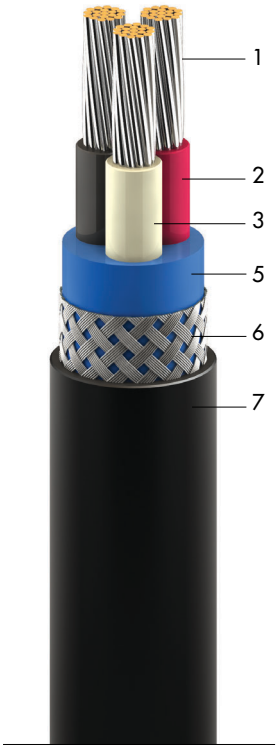
Conductor	Tinned copper, class2	Tinned copper, Class2
Conductor screen	Semi-conductive layer	Semi-conductive layer
Insulation	HF-EPR	HF-EPR
Insulation screen	Semi-conductive layer	Semi-conductive layer
Metallic screen	Copper tape	Copper tape
Inner sheath	Not applicable	PVC or SHF1
Armoring	Not applicable	Metal wire braid
Outer sheath	PVC or SHF1	PVC or SHF1

Identification of color

- Insulation
  - 1 core : Black (colored tape under the copper braid screen)
  - 3 core : Black, White, Red (colored tapes under the copper braid screens)
- Outer sheath : Red

Attached table2

LV Unarmoured Power & Lighting Cables 0.6/1kV PXY / PXI
LV Armoured Power & Lighting Cables 0.6/1kV PCY (PBY:1C) / PCI (PBI:1C)



Construction Details

1 **Conductor** : Stranded tinned annealed copper as per IEC 60228, class 2

2 **Insulation** : High modulus Ethylene-propylene rubber as per IEC 60092-351, HF-HEPR

3 **Cabling (with filler)**

4 **Common screen (Option[1])** : Al/PS tape with drain wire

5 **Inner covering (except PXY, PXI)** : Flexible compound

6 **Amour (Applied to armoured cable)** : Metal wire braid (see note)
1 Core : Bronze (Copper alloy) wire braid as per IEC 60092-353
Multi Core : Galvanized steel wire braid as per IEC 60092-353
A suitable separator tape or tapes may be applied under and/or over the armour.

7 **Outer sheath** : see table
Code PCY : Polyvinyl chloride compound (PVC) as per IEC 60092- 359, ST2
Code PCI : Enhanced Halogen free thermoplastic compound as per IEC 60092-359, SHF1

Type	Sheath material	Type	Sheath material
Basic cable	Flame retardant PVC as per IEC 60092-359, ST2	Paint resistant cable	Paint resistant PVC as per IEC 60092-359, ST2
Normal cable	General PVC as per IEC 60092-359, ST2	Premium	Flame & Paint resistant PVC as per IEC 60092-359, ST2

Note) In case of copper or bronze wire braided armour, the armour designation code is applied "O" or "B" instead of "C"
Option[1]) In case of common screen type, letter "(C)" shall be suffixed to the end letter of cable symbol.

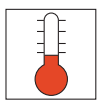
Standard Applied

- **Design guideline** : IEC 60092-353
- **Material properties** : IEC 60092-351, Insulation, HEPR
  IEC 60092-359, Sheath, ST2 or SHF1
- **Flame retardant** : IEC 60332-3, Cat. 'A'
- **HCl emission** : IEC 60754-1, 0.5% ↓ for Halogen free cable
- **Smoke emission** : IEC 61034, transmittance 60% ↑ for Halogen free cable
- **Cold properties(option)** : IEC 60811-1-4, Upgrade test at -30℃
- **Oil resistant(option)** : IEEE Std. 1580-2001 Type T, at 70℃ for 4hours, PVC sheathed cable
- **Paint resistant(option)** : Maker standard (Epoxy, Alkyd paint, at 100℃ for 168hours)

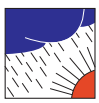
Identification of color

- **Insulation**
  - 1 core : White
  - 2 core : White, Black
  - 3 core : White, Black, Red
  - 4 core : White, Black, Red, Blue
  - Earth wire : Green/Yellow stripe
- **Outer sheath** : Black

Note) Any other colors purchaser required


-30 to 90℃


Flame retardant IEC 60332-3, A


Weather Resistance to severe weather conditions


Flexibility

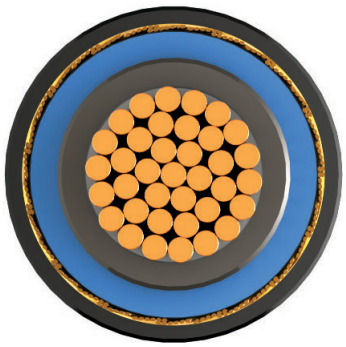
Halogen free IEC 60754-1 (option)


Smoke density IEC 61034 (option)


Gass toxicity No (option)

Approvals

ABS
Lloyd's Register
DNV
BUREAU VERITAS
KR KOREAN REGISTER
ClassNK



Application

- Power circuit below 1kV, Lighting circuits, Trace heating circuits.
- Fixed installation power, control & lighting in safe areas, general purposes.
- Maximum operating conductor temperature 90℃

Standard Applied

• Design guideline :	IEC 60092-353
• Material properties :	IEC 60092-351, Insulation, HF-HEPR IEC 60092-359, Sheath, ST2 or SHF1
• Flame retardant :	IEC 60332-3, Cat. 'A'
• HCl emission :	IEC 60754-1, 0.5% ↓ for Halogen free cable
• Smoke emission :	IEC 61034, transmittance 60% ↑ for Halogen free cable
• Cold properties (Option) :	IEC 60811-1-4, Upgrade test at -30℃
• Oil resistant (Option) :	IEEE Std. 1580-2001 Type T, at 70℃ for 4hours, PVC sheathed cable
• Paint resistant(Option) :	Maker standard (Epoxy, Alkyd paint, at 100℃ for 168hours)

0.6/1kV Power Cable

LV Unarmoured Power & Lighting Cables 0.6/1kV PXY / PXI
LV Armoured Power & Lighting Cables 0.6/1kV PBY / PBI

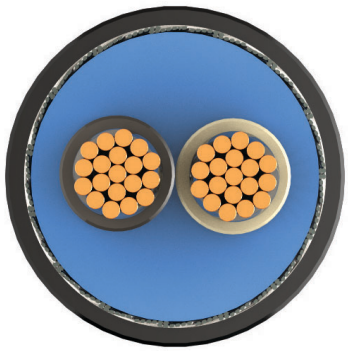
No. of core	Conductor			Thickness of insulation	Unarmoured, PXY Unarmoured, PXI			Armoured, PBY Armoured, PBI					
	Nominal sectional area	Min. No. of wires	Max. overall dia.		Thickness of sheath	Nominal dia. over sheath	Cable weight (approx.)	Thickness of inner covering	Nomina dia. over inner covering	Dia. of metal wire for braid	Thickness of outer sheath	Nominal overall dia.	Cable weight (approx.)
EA	mm²	EA	mm	mm	mm	mm	kg/km	mm	mm	mm	mm	mm	kg/km
1	1.5	7	1.7	0.7	1.0	5.4±0.4	50	1.0	4.4±0.4	0.3	1.0	8.0±0.4	110
	2.5	7	2.2	0.7	1.0	5.8±0.4	60	1.0	4.8±0.4	0.3	1.0	8.4±0.4	130
	4	7	2.7	0.7	1.0	6.4±0.4	80	1.0	5.4±0.4	0.3	1.1	9.2±0.4	155
	6	7	3.3	0.7	1.0	6.9±0.4	100	1.0	5.9±0.4	0.3	1.0	9.7±0.4	185
	10	7	4.2	0.7	1.0	7.9±0.4	145	1.0	6.9±0.4	0.3	1.1	10.7±0.4	240
	16	7	5.3	0.7	1.1	9.1±0.4	215	1.0	7.9±0.4	0.3	1.1	11.9±0.4	325
	25	7	6.6	0.9	1.1	10.8±0.4	325	1.0	9.6±0.4	0.3	1.2	13.6±0.4	450
	35	7	7.9	0.9	1.2	12.4±0.5	435	1.0	11.0±0.4	0.3	1.3	15.2±0.4	575
	50	19	9.1	1.0	1.2	13.8±0.6	565	1.0	12.4±0.5	0.3	1.4	16.8±0.4	730
	70	19	11.0	1.1	1.3	16.0±0.6	790	1.0	14.4±0.6	0.3	1.4	18.8±0.4	980
	95	19	12.9	1.1	1.4	18.1±0.7	1,065	1.0	16.3±0.7	0.3	1.5	20.9±0.4	1,270
	120	37	14.5	1.2	1.5	20.1±0.8	1,325	1.0	18.1±0.7	0.3	1.6	22.9±0.4	1,555
	150	37	16.2	1.4	1.6	22.3±0.9	1,625	1.0	20.1±0.8	0.3	1.7	25.1±0.4	1,880
	185	37	18.0	1.6	1.6	24.5±1.0	2,015	1.0	22.3±0.9	0.3	1.7	27.3±0.4	2,290
	240	61	20.6	1.7	1.8	27.8±1.1	2,615	1.0	25.2±1.0	0.3	1.8	30.6±0.4	2,925
	300	61	23.1	1.8	1.9	30.6±1.2	3,245	1.2	28.0±1.1	0.3	2.0	33.6±0.4	3,600
	400	61	26.1	2.0	2.0	34.2±1.4	4,115	1.2	31.4±1.3	0.4	2.1	37.6±0.4	4,595
	500	61	29.2	2.2	2.1	37.9±1.5	5,145	1.2	34.9±1.4	0.4	2.3	41.5±0.4	5,690
	630	91	33.2	2.4	2.3	42.7±1.7	6,580	1.4	39.6±1.6	0.4	2.5	46.6±0.4	7,225

Conductor	Tinned copper, class2	Tinned copper, Class2
Insulation	HF-HEPR	HF-HEPR
Inner covering	Not applicable	Flexible compound
Armoring	Not applicable	Metal wire braid
Outer sheath	PVC or SHF1	PVC or SHF1

Identification of color

- Insulation
  - 1 core : White
  - 2 core : White, Black
  - 3 core : White, Black, Red
  - 4 core : White, Black, Red, Blue
  - Earth wire : Green/Yellow stripe
- Outer sheath : Black

Note) Any other colors purchaser required



Application

- Power circuit below 1kV, Lighting circuits, Trace heating circuits.
- Fixed installation power, control & lighting in safe areas, general purposes.
- Maximum operating conductor temperature 90℃

Standard Applied

• Design guideline :	IEC 60092-353
• Material properties :	IEC 60092-351, Insulation, HF-HEPR IEC 60092-359, Sheath, ST2 or SHF1
• Flame retardant :	IEC 60332-3, Cat. 'A'
• HCl emission :	IEC 60754-1, 0.5% ↓ for Halogen free cable
• Smoke emission :	IEC 61034, transmittance 60% ↑ for Halogen free cable
• Cold properties (Option) :	IEC 60811-1-4, Upgrade test at -30℃
• Oil resistant (Option) :	IEEE Std. 1580-2001 Type T, at 70℃ for 4hours, PVC sheathed cable
• Paint resistant(Option) :	Maker standard (Epoxy, Alkyd paint, at 100℃ for 168hours)

0.6/1kV Power Cable

LV Unarmoured Power & Lighting Cables 0.6/1kV PXY / PXI
LV Armoured Power & Lighting Cables 0.6/1kV PCY / PCI

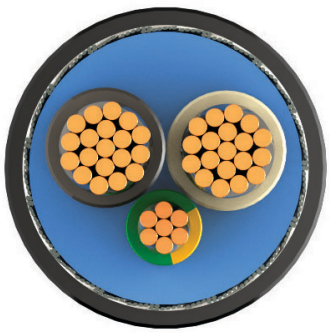
No. of core	Conductor			Thickness of insulation	Unarmoured, PXY Unarmoured, PXI			Armoured, PCY Armoured, PCI					
	Nominal sectional area	Min. No. of wires	Max. overall dia.		Thickness of sheath	Nominal dia. over sheath	Cable weight (approx.)	Thickness of inner covering	Nomina dia. over inner covering	Dia. of metal wire for braid	Thickness of outer sheath	Nominal overall dia.	Cable weight (approx.)
EA	mm²	EA	mm	mm	mm	mm	kg/km	mm	mm	mm	mm	mm	kg/km
2	1.5	7	1.7	0.7	1.1	9.0±0.4	50	1.0	7.8±0.4	0.3	1.2	11.8±0.5	200
	2.5	7	2.2	0.7	1.1	9.8±0.4	60	1.0	8.6±0.4	0.3	1.2	12.6±0.5	235
	4	7	2.7	0.7	1.1	11.0±0.4	80	1.0	9.8±0.4	0.3	1.2	13.8±0.6	295
	6	7	3.3	0.7	1.2	12.2±0.5	100	1.0	10.8±0.4	0.3	1.3	15.0±0.6	365
	10	7	4.2	0.7	1.3	14.4±0.5	145	1.0	12.8±0.5	0.3	1.4	17.2±0.7	500
	16	7	5.3	0.7	1.3	16.4±0.6	215	1.0	14.8±0.6	0.3	1.4	19.2±0.8	660
	25	7	6.6	0.9	1.5	20.2±0.8	325	1.0	18.2±0.7	0.3	1.6	23.0±0.9	970
	35	7	7.9	0.9	1.6	23.2±0.9	435	1.0	21.0±0.8	0.3	1.7	26.0±1.0	1,250
	50	19	9.1	1.0	1.7	26.2±1.0	565	1.0	23.8±1.0	0.3	1.8	29.0±1.2	1,590
	70	19	11.0	1.1	1.9	30.6±1.2	790	1.2	28.0±1.1	0.3	2.0	33.6±1.3	2,175
	95	19	12.9	1.1	2.0	34.6±1.3	1,065	1.2	31.8±1.3	0.4	2.1	38.0±1.5	2,915
	120	37	14.5	1.2	2.2	38.6±1.4	1,325	1.2	35.4±1.4	0.4	2.3	42.0±1.7	3,575
	150	37	16.2	1.4	2.3	42.8±1.6	1,625	1.4	39.7±1.6	0.4	2.5	46.7±1.9	4,370
	185	37	18.0	1.6	2.5	47.6±1.8	2,015	1.4	44.1±1.8	0.4	2.6	51.3±2.1	5,340
	240	61	20.6	1.7	2.7	53.8±2.0	2,615	1.6	50.1±2.0	0.4	2.9	57.9±2.3	6,855
	300	61	23.1	1.8	2.9	59.4±2.3	3,245	1.6	55.3±2.2	0.4	3.1	63.5±2.5	8,385

Conductor	Tinned copper, class2	Tinned copper, Class2
Insulation	HF-HEPR	HF-HEPR
Inner covering	Not applicable	Flexible compound
Armoring	Not applicable	Metal wire braid
Outer sheath	PVC or SHF1	PVC or SHF1

Identification of color

- Insulation
  - 1 core : White
  - 2 core : White, Black
  - 3 core : White, Black, Red
  - 4 core : White, Black, Red, Blue
  - Earth wire : Green/Yellow stripe
- Outer sheath : Black

Note) Any other colors purchaser required



Application

- Power circuit below 1kV, Lighting circuits, Trace heating circuits.
- Fixed installation power, control & lighting in safe areas, general purposes.
- Maximum operating conductor temperature 90℃

Standard Applied

• Design guideline :	IEC 60092-353
• Material properties :	IEC 60092-351, Insulation, HF-HEPR IEC 60092-359, Sheath, ST2 or SHF1
• Flame retardant :	IEC 60332-3, Cat. 'A'
• HCl emission :	IEC 60754-1, 0.5% ↓ for Halogen free cable
• Smoke emission :	IEC 61034, transmittance 60% ↑ for Halogen free cable
• Cold properties (Option) :	IEC 60811-1-4, Upgrade test at -30℃
• Oil resistant (Option) :	IEEE Std. 1580-2001 Type T, at 70℃ for 4hours, PVC sheathed cable
• Paint resistant(Option) :	Maker standard (Epoxy, Alkyd paint, at 100℃ for 168hours)

0.6/1kV Power Cable

LV Unarmoured Power & Lighting Cables 0.6/1kV PXY / PXI
LV Armoured Power & Lighting Cables 0.6/1kV PCY / PCI

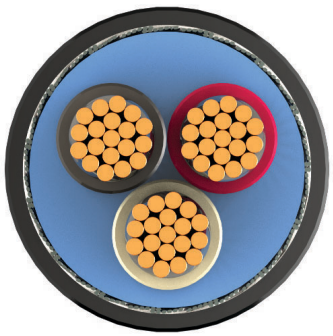
No. of core	Conductor			Thickness of insulation	Unarmoured, PXY Unarmoured, PXI			Armoured, PCY Armoured, PCI					
	Nominal sectional area	Min. No. of wires	Max. overall dia.		Thickness of sheath	Nominal dia. over sheath	Cable weight (approx.)	Thickness of inner covering	Nomina dia. over inner covering	Dia. of metal wire for braid	Thickness of outer sheath	Nominal overall dia.	Cable weight (approx.)
EA	mm²	EA	mm	mm	mm	mm	kg/km	mm	mm	mm	mm	mm	kg/km
2+E	25 16E	7 7	6.6 5.3	0.9 0.7	1.5	21.2 ±0.8	935	1.0	19.6 ±0.8	0.3	1.6	24.4 ±1.0	1175
	35 25E	7 7	7.9 6.6	0.9 0.7	1.6	24.4 ±1.0	1285	1.0	22.6 ±0.9	0.3	1.8	27.8 ±1.1	1570
	50 25E	19 7	9.1 6.6	1.0 0.9	1.8	27.6 ±1.1	1605	1.0	25.4 ±1.0	0.3	1.9	30.8 ±1.2	1915
	70 35E	19 7	11.0 7.9	1.1 0.9	1.9	32.0 ±1.3	2225	1.2	29.9 ±1.2	0.3	2.1	35.7 ±1.4	2620
	95 50E	19 19	12.9 9.1	1.1 1.0	2.1	36.4 ±1.5	2985	1.2	33.9 ±1.4	0.4	2.2	40.3 ±1.6	3495
	120 70E	37 19	14.5 11.0	1.2 1.1	2.2	40.5 ±1.6	3795	1.4	38.1 ±1.5	0.4	2.4	44.9 ±1.8	4410
	150 95E	37 19	16.2 12.9	1.4 1.1	2.4	45.2 ±1.8	4765	1.4	42.4 ±1.7	0.4	2.6	49.6 ±2.0	5445
	185 95E	37 19	18.0 12.9	1.6 1.1	2.6	49.9 ±2.0	5695	1.4	46.7 ±1.9	0.4	2.7	54.1 ±2.2	6420
	240 120E	61 37	20.6 14.5	1.7 1.2	2.8	56.4 ±2.3	7330	1.6	53.2 ±2.1	0.4	3.0	61.2 ±2.4	8220
	300 150E	61 37	23.1 16.2	1.8 1.4	3.0	62.2 ±2.5	9070	1.6	58.6 ±2.3	0.4	3.2	67.0 ±2.7	10045

Conductor	Tinned copper, class2	Tinned copper, Class2
Insulation	HF-HEPR	HF-HEPR
Inner covering	Not applicable	Flexible compound
Armoring	Not applicable	Metal wire braid
Outer sheath	PVC or SHF1	PVC or SHF1

Identification of color

- Insulation
  - 1 core : White
  - 2 core : White, Black
  - 3 core : White, Black, Red
  - 4 core : White, Black, Red, Blue
  - Earth wire : Green/Yellow stripe
- Outer sheath : Black

Note) Any other colors purchaser required



Application

- Power circuit below 1kV, Lighting circuits, Trace heating circuits.
- Fixed installation power, control & lighting in safe areas, general purposes.
- Maximum operating conductor temperature 90℃

Standard Applied

• Design guideline :	IEC 60092-353
• Material properties :	IEC 60092-351, Insulation, HF-HEPR IEC 60092-359, Sheath, ST2 or SHF1
• Flame retardant :	IEC 60332-3, Cat. 'A'
• HCl emission :	IEC 60754-1, 0.5% ↓ for Halogen free cable
• Smoke emission :	IEC 61034, transmittance 60% ↑ for Halogen free cable
• Cold properties (Option) :	IEC 60811-1-4, Upgrade test at -30℃
• Oil resistant (Option) :	IEEE Std. 1580-2001 Type T, at 70℃ for 4hours, PVC sheathed cable
• Paint resistant(Option) :	Maker standard (Epoxy, Alkyd paint, at 100℃ for 168hours)

0.6/1kV Power Cable

LV Unarmoured Power & Lighting Cables 0.6/1kV PXY / PXI
LV Armoured Power & Lighting Cables 0.6/1kV PCY / PCI

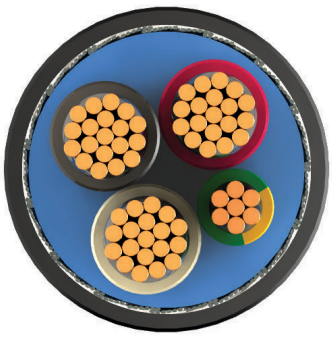
No. of core	Conductor			Thickness of insulation	Unarmoured, PXY Unarmoured, PXI			Armoured, PCY Armoured, PCI					
	Nominal sectional area	Min. No. of wires	Max. overall dia.		Thickness of sheath	Nominal dia. over sheath	Cable weight (approx.)	Thickness of inner covering	Nomina dia. over inner covering	Dia. of metal wire for braid	Thickness of outer sheath	Nominal overall dia.	Cable weight (approx.)
EA	mm²	EA	mm	mm	mm	mm	kg/km	mm	mm	mm	mm	mm	kg/km
3	1.5	7	1.7	0.7	1.1	9.5±0.4	125	1.0	8.3±0.4	0.3	1.2	12.3±0.5	230
	2.5	7	2.2	0.7	1.1	10.4±0.4	165	1.0	9.2±0.4	0.3	1.2	13.2±0.5	275
	4	7	2.7	0.7	1.2	11.9±0.5	230	1.0	10.5±0.4	0.3	1.3	14.7±0.6	360
	6	7	3.3	0.7	1.2	12.9±0.5	300	1.0	11.5±0.5	0.3	1.3	15.7±0.6	440
	10	7	4.2	0.7	1.3	15.3±0.6	460	1.0	13.7±0.5	0.3	1.4	18.1±0.7	620
	16	7	5.3	0.7	1.4	17.6±0.7	665	1.0	15.8±0.6	0.3	1.5	20.4±0.8	850
	25	7	6.6	0.9	1.5	21.5±0.9	1,025	1.0	19.5±0.8	0.3	1.6	24.3±1.0	1,250
	35	7	7.9	0.9	1.7	24.9±1.0	1,385	1.0	22.5±0.9	0.3	1.8	27.7±1.1	1,640
	50	19	9.1	1.0	1.8	28.1±1.1	1,820	1.0	25.5±1.0	0.3	1.9	30.9±1.2	2,110
	70	19	11.0	1.1	1.9	32.6±1.3	2,545	1.2	30.0±1.2	0.3	2.1	35.8±1.4	2,910
	95	19	12.9	1.1	2.1	37.1±1.5	3,430	1.2	34.1±1.4	0.4	2.2	40.5±1.6	3,910
	120	37	14.5	1.2	2.3	41.4±1.7	4,290	1.4	38.3±1.5	0.4	2.4	45.1±1.8	4,850
	150	37	16.2	1.4	2.4	45.9±1.8	5,260	1.4	42.6±1.7	0.4	2.6	49.8±2.0	5,900
	185	37	18.0	1.6	2.6	51.1±2.0	6,555	1.6	47.6±1.9	0.4	2.8	55.2±2.2	7,290
	240	61	20.6	1.7	2.9	57.9±2.3	8,525	1.6	53.8±2.2	0.4	3.0	61.8±2.5	9,325
	300	61	23.1	1.8	3.1	63.9±2.6	10,575	1.6	59.4±2.4	0.4	3.2	67.8±2.7	11,455

Conductor	Tinned copper, class2	Tinned copper, Class2
Insulation	HF-HEPR	HF-HEPR
Inner covering	Not applicable	Flexible compound
Armoring	Not applicable	Metal wire braid
Outer sheath	PVC or SHF1	PVC or SHF1

Identification of color

- Insulation
  - 1 core : White
  - 2 core : White, Black
  - 3 core : White, Black, Red
  - 4 core : White, Black, Red, Blue
  - Earth wire : Green/Yellow stripe
- Outer sheath : Black

Note) Any other colors purchaser required



Application

- Power circuit below 1kV, Lighting circuits, Trace heating circuits.
- Fixed installation power, control & lighting in safe areas, general purposes.
- Maximum operating conductor temperature 90℃

Standard Applied

• Design guideline :	IEC 60092-353
• Material properties :	IEC 60092-351, Insulation, HF-HEPR IEC 60092-359, Sheath, ST2 or SHF1
• Flame retardant :	IEC 60332-3, Cat. 'A'
• HCl emission :	IEC 60754-1, 0.5% ↓ for Halogen free cable
• Smoke emission :	IEC 61034, transmittance 60% ↑ for Halogen free cable
• Cold properties (Option) :	IEC 60811-1-4, Upgrade test at -30℃
• Oil resistant (Option) :	IEEE Std. 1580-2001 Type T, at 70℃ for 4hours, PVC sheathed cable
• Paint resistant(Option) :	Maker standard (Epoxy, Alkyd paint, at 100℃ for 168hours)

0.6/1kV Power Cable

LV Unarmoured Power & Lighting Cables 0.6/1kV PXY / PXI
LV Armoured Power & Lighting Cables 0.6/1kV PCY / PCI

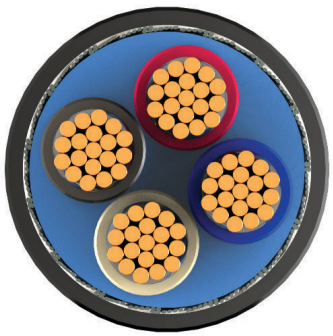
No. of core	Conductor			Thickness of insulation	Unarmoured, PXY Unarmoured, PXI			Armoured, PCY Armoured, PCI					
	Nominal sectional area	Min. No. of wires	Max. overall dia.		Thickness of sheath	Nominal dia. over sheath	Cable weight (approx.)	Thickness of inner covering	Nomina dia. over inner covering	Dia. of metal wire for braid	Thickness of outer sheath	Nominal overall dia.	Cable weight (approx.)
EA	mm²	EA	mm	mm	mm	mm	kg/km	mm	mm	mm	mm	mm	kg/km
3+E	25 16E	7 7	6.6 5.3	0.9 0.7	1.6	23.0±0.9	1215	1.0	21.2±0.8	0.3	1.7	26.2±1.0	1475
	35 25E	7 7	7.9 6.6	0.9 0.7	1.7	26.8±1.1	1665	1.0	24.8±1.0	0.3	1.8	30.0±1.2	1970
	50 25E	19 7	9.1 6.6	1.0 0.9	1.8	29.6±1.2	2100	1.2	27.7±1.1	0.3	2.0	33.3±1.3	2465
	70 35E	19 7	11.0 7.9	1.1 0.9	2.0	34.6±1.4	2940	1.2	32.3±1.3	0.4	2.2	38.7±1.5	3440
	95 50E	19 19	12.9 9.1	1.1 1.0	2.2	39.3±1.6	3955	1.2	36.6±1.5	0.4	2.3	43.2±1.7	4505
	120 70E	37 19	14.5 11.0	1.2 1.1	2.4	44.1±1.8	5030	1.4	41.3±1.7	0.4	2.5	48.3±1.9	5670
	150 95E	37 19	16.2 12.9	1.4 1.1	2.6	49.3±2.0	6280	1.4	46.1±1.8	0.4	2.7	53.5±2.1	7000
	185 95E	37 19	18.0 12.9	1.6 1.1	2.7	53.7±2.1	7555	1.6	50.7±2.0	0.4	2.9	58.5±2.3	8405
	240 120E	61 37	20.6 14.5	1.7 1.2	3.0	60.8±2.4	9780	1.6	57.2±2.3	0.4	3.2	65.6±2.6	10735
	300 150E	61 37	23.1 16.2	1.8 1.4	3.2	67.2±2.7	12115	1.8	63.5±2.5	0.4	3.4	72.3±2.9	13210

Conductor	Tinned copper, class2	Tinned copper, Class2
Insulation	HF-HEPR	HF-HEPR
Inner covering	Not applicable	Flexible compound
Armoring	Not applicable	Metal wire braid
Outer sheath	PVC or SHF1	PVC or SHF1

Identification of color

- Insulation
  - 1 core : White
  - 2 core : White, Black
  - 3 core : White, Black, Red
  - 4 core : White, Black, Red, Blue
  - Earth wire : Green/Yellow stripe
- Outer sheath : Black

Note) Any other colors purchaser required



Application

- Power circuit below 1kV, Lighting circuits, Trace heating circuits.
- Fixed installation power, control & lighting in safe areas, general purposes.
- Maximum operating conductor temperature 90℃

Standard Applied

• Design guideline :	IEC 60092-353
• Material properties :	IEC 60092-351, Insulation, HF-HEPR IEC 60092-359, Sheath, ST2 or SHF1
• Flame retardant :	IEC 60332-3, Cat. 'A'
• HCl emission :	IEC 60754-1, 0.5% ↓ for Halogen free cable
• Smoke emission :	IEC 61034, transmittance 60% ↑ for Halogen free cable
• Cold properties (Option) :	IEC 60811-1-4, Upgrade test at -30℃
• Oil resistant (Option) :	IEEE Std. 1580-2001 Type T, at 70℃ for 4hours, PVC sheathed cable
• Paint resistant(Option) :	Maker standard (Epoxy, Alkyd paint, at 100℃ for 168hours)

0.6/1kV Power Cable

LV Unarmoured Power & Lighting Cables 0.6/1kV PXY / PXI
LV Armoured Power & Lighting Cables 0.6/1kV PCY / PCI

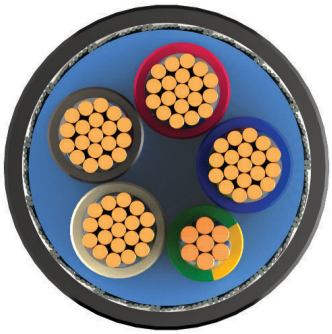
No. of core	Conductor			Thickness of insulation	Unarmoured, PXY Unarmoured, PXI			Armoured, PCY Armoured, PCI					
	Nominal sectional area	Min. No. of wires	Max. overall dia.		Thickness of sheath	Nominal dia. over sheath	Cable weight (approx.)	Thickness of inner covering	Nomina dia. over inner covering	Dia. of metal wire for braid	Thickness of outer sheath	Nominal overall dia.	Cable weight (approx.)
EA	mm²	EA	mm	mm	mm	mm	kg/km	mm	mm	mm	mm	mm	kg/km
4	1.5	7	1.7	0.7	1.1	10.3±0.4	155	1.0	5.4±0.4	0.3	1.2	13.1±0.5	265
	2.5	7	2.2	0.7	1.2	11.5±0.5	205	1.0	5.8±0.4	0.3	1.3	14.3±0.6	335
	4	7	2.7	0.7	1.2	12.9±0.5	285	1.0	6.4±0.4	0.3	1.3	15.7±0.6	430
	6	7	3.3	0.7	1.3	14.3±0.6	385	1.0	6.9±0.4	0.3	1.4	17.1±0.7	540
	10	7	4.2	0.7	1.4	17.0±0.7	590	1.0	7.9±0.4	0.3	1.5	19.8±0.8	770
	16	7	5.3	0.7	1.5	19.6±0.8	860	1.0	9.1±0.4	0.3	1.6	22.4±0.9	1,070
	25	7	6.6	0.9	1.6	23.9±1.0	1,330	1.0	10.8±0.4	0.3	1.7	26.7±1.1	1,580
	35	7	7.9	0.9	1.8	27.7±1.1	1,795	1.0	12.4±0.5	0.3	1.9	30.5±1.2	2,080
	50	19	9.1	1.0	1.9	31.2±1.2	2,365	1.2	13.8±0.6	0.3	2.0	34.2±1.4	2,700
	70	19	11.0	1.1	2.1	36.5±1.5	3,330	1.2	16.0±0.6	0.4	2.2	39.9±1.6	3,805
	95	19	12.9	1.1	2.3	41.5±1.7	4,495	1.4	18.1±0.7	0.4	2.4	45.2±1.8	5,055
	120	37	14.5	1.2	2.4	46.0±1.8	5,595	1.4	20.1±0.8	0.4	2.6	49.9±2.0	6,235
	150	37	16.2	1.4	2.6	51.2±2.0	6,890	1.6	22.3±0.9	0.4	2.8	55.3±2.2	7,620
	185	37	18.0	1.6	2.8	56.9±2.3	8,585	1.6	24.5±1.0	0.4	3.0	61.0±2.4	9,395
	240	61	20.6	1.7	3.1	64.5±2.6	11,165	1.6	27.8±1.1	0.4	3.3	68.6±2.7	12,080
	300	61	23.1	1.8	3.4	71.4±2.9	13,875	1.8	30.6±1.2	0.4	3.5	75.6±3.0	14,905

Conductor	Tinned copper, class2	Tinned copper, Class2
Insulation	HF-HEPR	HF-HEPR
Inner covering	Not applicable	Flexible compound
Armoring	Not applicable	Metal wire braid
Outer sheath	PVC or SHF1	PVC or SHF1

Identification of color

- Insulation
  - 1 core : White
  - 2 core : White, Black
  - 3 core : White, Black, Red
  - 4 core : White, Black, Red, Blue
  - Earth wire : Green/Yellow stripe
- Outer sheath : Black

Note) Any other colors purchaser required



Application

- Power circuit below 1kV, Lighting circuits, Trace heating circuits.
- Fixed installation power, control & lighting in safe areas, general purposes.
- Maximum operating conductor temperature 90℃

Standard Applied

• Design guideline :	IEC 60092-353
• Material properties :	IEC 60092-351, Insulation, HF-HEPR IEC 60092-359, Sheath, ST2 or SHF1
• Flame retardant :	IEC 60332-3, Cat. 'A'
• HCl emission :	IEC 60754-1, 0.5% ↓ for Halogen free cable
• Smoke emission :	IEC 61034, transmittance 60% ↑ for Halogen free cable
• Cold properties (Option) :	IEC 60811-1-4, Upgrade test at -30℃
• Oil resistant (Option) :	IEEE Std. 1580-2001 Type T, at 70℃ for 4hours, PVC sheathed cable
• Paint resistant(Option) :	Maker standard (Epoxy, Alkyd paint, at 100℃ for 168hours)

0.6/1kV Power Cable

LV Unarmoured Power & Lighting Cables 0.6/1kV PXY / PXI
LV Armoured Power & Lighting Cables 0.6/1kV PCY / PCI

No. of core	Conductor			Thickness of insulation	Unarmoured, PXY Unarmoured, PXI			Armoured, PCY Armoured, PCI					
	Nominal sectional area	Min. No. of wires	Max. overall dia.		Thickness of sheath	Nominal dia. over sheath	Cable weight (approx.)	Thickness of inner covering	Nomina dia. over inner covering	Dia. of metal wire for braid	Thickness of outer sheath	Nominal overall dia.	Cable weight (approx.)
EA	mm²	EA	mm	mm	mm	mm	kg/km	mm	mm	mm	mm	mm	kg/km
4+E	25 16E	7 7	6.6 5.3	0.9 0.7	1.7	26.1 ±1.0	1525	1.0	24.1 ±1.0	0.3	1.8	29.3 ±1.2	1820
	35 25E	7 7	7.9 6.6	0.9 0.7	1.9	30.4 ±1.2	2095	1.2	28.3 ±1.1	0.3	2.0	33.9 ±1.4	2455
	50 25E	19 7	9.1 6.6	1.0 0.9	2.0	34.0 ±1.4	2665	1.2	31.7 ±1.3	0.4	2.1	37.9 ±1.5	3145
	70 35E	19 7	11.0 7.9	1.1 0.9	2.2	39.7 ±1.6	3740	1.4	37.3 ±1.5	0.4	2.4	44.1 ±1.8	4340
	95 50E	19 19	12.9 9.1	1.1 1.0	2.4	45.1 ±1.8	5030	1.4	42.3 ±1.7	0.4	2.6	49.5 ±2.0	5710
	120 70E	37 19	14.5 11.0	1.2 1.1	2.6	50.5 ±2.0	6375	1.6	47.7 ±1.9	0.4	2.8	55.3 ±2.2	7175
	150 95E	37 19	16.2 12.9	1.4 1.1	2.8	56.3 ±2.3	7935	1.6	53.1 ±2.1	0.4	3.0	61.1 ±2.4	8820
	185 95E	37 19	18.0 12.9	1.6 1.1	3.0	62.0 ±2.5	9640	1.6	58.4 ±2.3	0.4	3.2	66.8 ±2.7	10615
	240 120E	61 37	20.6 14.5	1.7 1.2	3.3	70.2 ±2.8	12480	1.8	66.3 ±2.7	0.4	3.5	75.3 ±3.0	13625
	300 150E	61 37	23.1 16.2	1.8 1.4	3.6	77.7 ±3.1	15495	1.8	73.2 ±2.9	0.4	3.8	82.8 ±3.3	16755

Conductor	Tinned copper, class2	Tinned copper, Class2
Insulation	HF-HEPR	HF-HEPR
Inner covering	Not applicable	Flexible compound
Armoring	Not applicable	Metal wire braid
Outer sheath	PVC or SHF1	PVC or SHF1

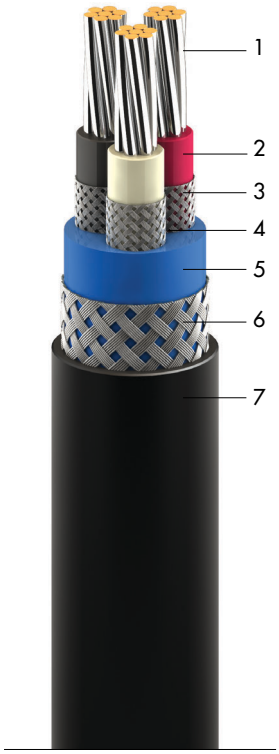
Identification of color

- Insulation
  - 1 core : White
  - 2 core : White, Black
  - 3 core : White, Black, Red
  - 4 core : White, Black, Red, Blue
  - Earth wire : Green/Yellow stripe
- Outer sheath : Black

Note) Any other colors purchaser required

Attached table3

LV Unarmoured Power & Lighting Cables With Individual Shield 0.6/1kV PXY-S / PXI-S
LV Armoured Power & Lighting Cables With Individual Shield 0.6/1kV PCY-S (PBY-S:1C) / PCI-S (PBI-S:1C)



Construction Details

1 **Conductor** : Stranded tinned annealed copper as per IEC 60228, class 2

2 **Insulation** : High modulus Ethylene-propylene rubber as per IEC 60092-351, HF-HEPR

3 **Individual screen** : Tinned annealed copper wire braid at least 0.1mm
A suitable separator tape or tapes may be applied under and/or over the braid screen

4 **Cabling (with filler)**

5 **Inner covering (except PXY-S, PXI-S)** : Flexible compound covering

6 **Amour (Applied to armoured cable)** : Metal wire braid
1 Core : Bronze (Copper alloy) wire braid as per IEC 60092-353
Multi Core : Galvanized steel wire braid as per IEC 60092-353
A suitable separator tape or tapes may be applied under and/or over the armour.

7 **Outer sheath** : see table
Code PXY-S & PCY-S : Premium Polyvinyl chloride compound (PVC) as per IEC 60092-359, ST2
Code PXI-S & PCI-S : Enhanced Halogen free thermoplastic compound as per IEC 60092-359, SHF1

Type	Sheath material	Type	Sheath material
Basic cable	Flame retardant PVC as per IEC 60092-359, ST2	Paint resistant cable	Paint resistant PVC as per IEC 60092-359, ST2
Normal cable	General PVC as per IEC 60092-359, ST2	Premium	Flame & Paint resistant PVC as per IEC 60092-359, ST2

Note) In case of copper or bronze wire braided armour, the armour designation code is applied "O" or "B" instead of "C"

Standard Applied

- **Design guideline** : IEC 60092-353
- **Material properties** : IEC 60092-351, Insulation, HEPR
  IEC 60092-359, Sheath, ST2 or SHF1
- **Flame retardant** : IEC 60332-3, Cat. 'A'
- **HCl emission** : IEC 60754-1, 0.5% ↓ for PXI, PCI
- **Smoke emission** : IEC 61034, transmittance 60% ↑ for PXI, PCI
- **Cold properties(option)** : IEC 60811-1-4, Upgrade test at -30℃
- **Oil resistant(option)** : IEEE Std. 1580-2001 Type T, at 70℃ for 4hours
- **Paint resistant(option)** : Maker standard (Epoxy, Alkyd paint, at 100℃ for 168hours)

Identification of color

- **Insulation**
  - 1 core : White
  - 2 core : White, Black
  - 3 core : White, Black, Red
  - 4 core : White, Black, Red, Blue
  - Earth wire : Green/Yellow stripe
- **Outer sheath** : Black

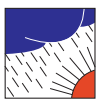
Note) Any other colors purchaser required

Approvals

ABS, Lloyd's Register, DNV, Bureau Veritas, Germanischer Lloyd, KR Korean Register, ClassNK


-30 to 90℃


Flame retardant IEC 60332-3, A

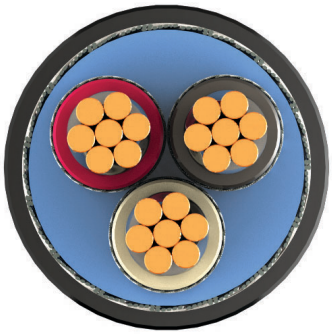

Weather Resistance to severe weather conditions


Flexibility

Halogen free IEC 60754-1 (option)


Smoke density IEC 61034 (option)


Gass toxicity No (option)



Application

- Power circuit below 1kV, Lighting circuits, Trace heating circuits.
- Fixed installation power, control & lighting in safe areas, general purposes.
- Maximum operating conductor temperature 90℃

Standard Applied

• Design guideline :	IEC 60092-353
• Material properties :	IEC 60092-351, Insulation, HF-HEPR IEC 60092-359, Sheath, ST2 or SHF1
• Flame retardant :	IEC 60332-3, Cat. 'A'
• HCl emission :	IEC 60754-1, 0.5% ↓ for PXI, PCI
• Smoke emission :	IEC 61034, transmittance 60% ↑ for PXI, PCI
• Cold properties (Option) :	IEC 60811-1-4, Upgrade test at -30℃
• Oil resistant (Option) :	IEEE Std. 1580-2001 Type T, at 70℃ for 4hours
• Paint resistant(Option) :	Maker standard (Epoxy, Alkyd paint, at 100℃ for 168hours)

0.6/1kV Lighting Cable

LV Unarmoured Power & Lighting Cables With Individual Shield 0.6/1kV PXY-S / PXI-S
LV Armoured Power & Lighting Cables With Individual Shield 0.6/1kV PCY-S (PBY-S:1C) / PCI-S (PBI-S:1C)

No. of core	Conductor			Thickness of insulation	Unarmoured, PXY-S Unarmoured, PXI-S			Armoured, PCY-S(PBY-S:1C) Armoured, PCI-S(PBI-S:1C)					
	Nominal sectional area	Min. No. of wires	Max. overall dia.		Thickness of sheath	Nominal dia. over sheath	Cable weight (approx.)	Thickness of inner covering	Nomina dia. over inner covering	Dia. of metal wire for braid	Thickness of outer sheath	Nominal overall dia.	Cable weight (approx.)
EA	mm²	EA	mm	mm	mm	mm	kg/km	mm	mm	mm	mm	mm	kg/km
1	1.5	7	1.7	0.7	1.0	6.0±0.4	65	1.0	5.0±0.4	0.3	1.1	8.8±0.4	135
	2.5	7	2.2	0.7	1.0	6.4±0.4	75	1.0	5.4±0.4	0.3	1.1	9.2±0.4	155
	4	7	2.7	0.7	1.0	7.0±0.4	95	1.0	6.0±0.4	0.3	1.1	9.8±0.4	180
	6	7	3.3	0.7	1.0	7.5±0.4	120	1.0	6.5±0.4	0.3	1.1	10.3±0.4	210
	10	7	4.2	0.7	1.1	8.8±0.4	180	1.0	7.6±0.4	0.3	1.2	11.6±0.5	280
	16	7	5.3	0.7	1.1	9.8±0.4	245	1.0	8.6±0.4	0.3	1.2	12.6±0.5	365
2	1.5	7	1.7	0.7	1.1	10.2±0.4	140	1.0	9.0±0.4	0.3	1.2	13.0±0.5	250
	2.5	7	2.2	0.7	1.1	11.0±0.4	170	1.0	9.8±0.4	0.3	1.2	13.8±0.6	290
	4	7	2.7	0.7	1.2	12.4±0.5	220	1.0	11.0±0.4	0.3	1.3	15.2±0.6	360
	6	7	3.3	0.7	1.2	13.4±0.5	275	1.0	12.0±0.5	0.3	1.3	16.2±0.6	425
	10	7	4.2	0.7	1.3	15.8±0.6	415	1.0	14.2±0.6	0.3	1.4	18.6±0.7	580
	16	7	5.3	0.7	1.4	18.0±0.7	575	1.0	16.2±0.6	0.3	1.5	20.8±0.8	765
3	1.5	7	1.7	0.7	1.1	10.8±0.4	175	1.0	9.6±0.4	0.3	1.2	13.6±0.5	295
	2.5	7	2.2	0.7	1.2	11.9±0.5	225	1.0	10.5±0.4	0.3	1.3	14.7±0.6	355
	4	7	2.7	0.7	1.2	13.1±0.5	290	1.0	11.7±0.5	0.3	1.3	15.9±0.6	435
	6	7	3.3	0.7	1.3	14.4±0.6	380	1.0	12.8±0.5	0.3	1.4	17.2±0.7	530
	10	7	4.2	0.7	1.4	17.0±0.7	565	1.0	15.2±0.6	0.3	1.5	19.8±0.8	740
	16	7	5.3	0.7	1.4	19.1±0.8	780	1.0	17.3±0.7	0.3	1.5	21.9±0.9	985
4	1.5	7	1.7	0.7	1.2	12.0±0.5	225	1.0	10.6±0.4	0.3	1.3	14.8±0.6	360
	2.5	7	2.2	0.7	1.2	12.9±0.5	280	1.0	11.5±0.5	0.3	1.3	15.7±0.6	425
	4	7	2.7	0.7	1.3	14.6±0.6	385	1.0	13.0±0.5	0.3	1.4	17.4±0.7	535
	6	7	3.3	0.7	1.3	15.8±0.6	485	1.0	14.2±0.6	0.3	1.4	18.6±0.7	650
	10	7	4.2	0.7	1.4	18.6±0.7	725	1.0	16.8±0.7	0.3	1.5	21.4±0.9	925
	16	7	5.3	0.7	1.5	21.3±0.9	1,020	1.0	19.3±0.8	0.3	1.6	24.1±1.0	1,245

Conductor	Tinned copper, class2	Tinned copper, Class2
Insulation	HF-HEPR	HF-HEPR
Individual screen	Tinned copper wire braid	Tinned copper wire braid
Inner covering	Not applicable	Flexible compound
Armoring	Not applicable	Metal wire braid
Outer sheath	PVC or SHF1	PVC or SHF1

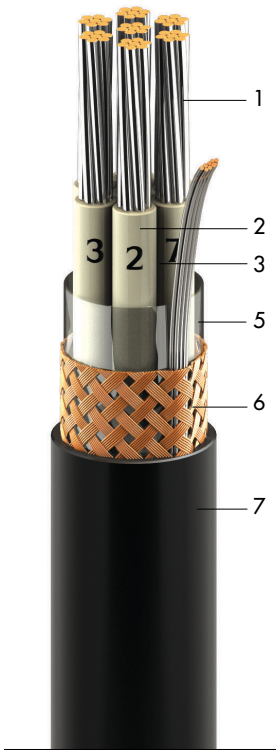
Identification of color

- Insulation
  - 1 core : White
  - 2 core : White, Black
  - 3 core : White, Black, Red
  - 4 core : White, Black, Red, Blue
  - Earth wire : Green/Yellow stripe
- Outer sheath : Black

Note) Any other colors purchaser required

Attached table4

LV Unarmoured Control Cables 250V PXY / PXI
LV Armoured Control Cables 250V POY / POI



Construction Details

1 **Conductor** : Stranded tinned annealed copper as per IEC 60228, class 2

2 **Insulation** : High modulus Ethylene-propylene rubber as per IEC 60092-351, HF-HEPR

3 **Cabling (with filler)**

4 **Common screen (Option[1])** : Al/PS tape with drain wire

5 **Inner covering (except PXY, PXI)** : Lapped covering

6 **Amour (Applied to armoured cable)** : Copper wire braid as per IEC 60092-376
A suitable separator tape or tapes may be applied under and/or over the armour.

7 **Outer sheath** : see table
Code PXY & POY : Premium Polyvinyl chloride compound (PVC) as per IEC 60092-359, ST2
Code PXI & POI : Enhanced Halogen free thermoplastic compound as per IEC 60092-359, SHF1

Type	Sheath material	Type	Sheath material
Basic cable	Flame retardant PVC as per IEC 60092-359, ST2	Paint resistant cable	Paint resistant PVC as per IEC 60092-359, ST2
Normal cable	General PVC as per IEC 60092-359, ST2	Premium	Flame & Paint resistant PVC as per IEC 60092-359, ST2

Note) In case of copper or bronze wire braided armour, the armour designation code is applied "O" or "B" instead of "C"
Option[1]) In case of common screen type, letter "(C)" shall be suffixed to the end letter of cable symbol.

Standard Applied

- **Design guideline** : IEC 60092-376
- **Material properties** : IEC 60092-351, Insulation, HEPR
  IEC 60092-359, Sheath, ST2 or SHF1
- **Flame retardant** : IEC 60332-3, Cat. 'A'
- **HCl emission** : IEC 60754-1, 0.5% ↓ for Halogen free cable
- **Smoke emission** : IEC 61034, transmittance 60% ↑ for Halogen free cable
- **Cold properties(option)** : IEC 60811-1-4, Upgrade test at -30℃
- **Oil resistant(option)** : IEEE Std. 1580-2001 Type T, at 70℃ for 4hours, for PVC sheathed cable
- **Paint resistant(option)** : Maker standard (Epoxy, Alkyd paint, at 100℃ for 168hours)

Identification of color

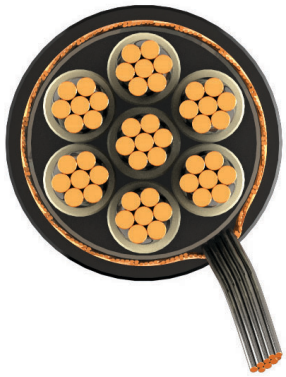
- **Insulation**
  - By numbering on white colored insulation
- **Outer sheath** : Black

Note) Any other colors purchaser required

Approvals

ABS, Lloyd's Register, DNV, Bureau Veritas, Germanischer Lloyd, KR Korean Register, ClassNK

-30 to 90℃ | Flame retardant IEC 60332-3, A | Weather Resistance to severe weather conditions | Flexibility | Halogen free IEC 60754-1 (option) | Smoke density IEC 61034 (option) | Gass toxicity No (option)



Application

- Instrument circuit upto 250V, instrument safe systems.
- Fixed installation for instrument, communication, control and alarm systems in both explosion risk and safe areas, general purposes.
- Maximum operating conductor temperature 90℃

Standard Applied

• Design guideline :	IEC 60092-376
• Material properties :	IEC 60092-351, Insulation, HF-HEPR IEC 60092-359, Sheath, ST2 or SHF1
• Flame retardant :	IEC 60332-3, Cat. 'A'
• HCl emission :	IEC 60754-1, 0.5% ↓ for Halogen free cable
• Smoke emission :	IEC 61034, transmittance 60% ↑ for Halogen free cable
• Cold properties (Option) :	IEC 60811-1-4, Upgrade test at -30℃
• Oil resistant (Option) :	IEEE Std. 1580-2001 Type T, at 70℃ for 4hours, PVC sheathed cable
• Paint resistant(Option) :	Maker standard (Epoxy, Alkyd paint, at 100℃ for 168hours)

250V Control Cable

LV Unarmoured Control Cables 250V PXY / PXI
LV Armoured Control Cables 250V POY / POI

No. of core	Conductor			Thickness of insulation	Unarmoured, PXY Unarmoured, PXI			Armoured, POY Armoured, POI				
	Nominal sectional area	Min. No. of wires	Max. overall dia.		Thickness of sheath	Nominal dia. over sheath	Cable weight (approx.)	Nomina dia. over inner covering	Dia. of metal wire for braid	Thickness of outer sheath	Nominal overall dia.	Cable weight (approx.)
EA	mm²	EA	mm	mm	mm	mm	kg/km	mm	mm	mm	mm	kg/km
2	1.0	7	1.4	0.5	1.0	7.6±0.4	80	5.6±0.4	0.2	1.1	9.1±0.4	130
3	1.0	7	1.4	0.5	1.0	8.0±0.4	100	6.0±0.4	0.2	1.1	9.5±0.4	150
4	1.0	7	1.4	0.5	1.1	8.9±0.4	120	6.7±0.4	0.2	1.1	10.2±0.4	175
5	1.0	7	1.4	0.5	1.1	9.6±0.4	145	7.4±0.4	0.2	1.1	10.9±0.4	200
7	1.0	7	1.4	0.5	1.1	10.4±0.4	180	8.2±0.4	0.2	1.2	11.9±0.5	245
9	1.0	7	1.4	0.5	1.2	12.2±0.5	230	9.8±0.4	0.2	1.2	13.5±0.5	305
12	1.0	7	1.4	0.5	1.2	13.6±0.5	280	11.2±0.4	0.3	1.3	15.6±0.6	420
16	1.0	7	1.4	0.5	1.3	15.2±0.6	365	12.6±0.5	0.3	1.4	17.2±0.7	515
19	1.0	7	1.4	0.5	1.3	16.0±0.6	410	13.4±0.5	0.3	1.4	18.0±0.7	565
23	1.0	7	1.4	0.5	1.4	17.8±0.7	505	15.0±0.6	0.3	1.5	19.8±0.8	675
27	1.0	7	1.4	0.5	1.4	19.2±0.8	575	16.4±0.7	0.3	1.5	21.2±0.8	760
33	1.0	7	1.4	0.5	1.5	20.8±0.8	690	17.8±0.7	0.3	1.6	22.8±0.9	890
37	1.0	7	1.4	0.5	1.5	21.6±0.9	750	18.6±0.7	0.3	1.6	23.6±0.9	965
44	1.0	7	1.4	0.5	1.6	24.4±1.0	900	21.2±0.8	0.3	1.7	26.4±1.1	1,140
77	1.0	7	1.4	0.5	1.9	30.6±1.2	1,515	26.8±1.1	0.3	1.9	32.4±1.3	1,795

Conductor	Tinned copper, class2	Tinned copper, Class2
Insulation	HF-HEPR	HF-HEPR
Inner covering	Not applicable	Flexible compound
Armoring	Not applicable	Metal wire braid
Outer sheath	PVC or SHF1	PVC or SHF1

Identification of color

- Insulation
  - By numbering on white colored insulation
- Outer sheath : Black
  Note) Any other colors purchaser required

Attached table5

LV Unarmoured Control Cables With individual shield 250V PXY-S / PXI-S
LV Armoured Control Cables With individual shield 250V POY-S / POI-S

Construction Details

1 **Conductor** : Stranded tinned annealed copper as per IEC 60228, class 2

2 **Insulation** : High modulus Ethylene-propylene rubber as per IEC 60092-351, HF-HEPR

3 **Individual screen** : Tinned annealed copper wire braid at least 0.1mm
A suitable separator tape or tapes may be applied under and/or over the braid screen.

4 **Cabling (with filler)**

5 **Inner covering (except PXY, PXI)** : Lapped covering

6 **Amour (Applied to armoured cable)** : Copper wire braid as per IEC 60092-376
A suitable separator tape or tapes may be applied under and/or over the armour.

7 **Outer sheath** : see table
Code PXY & POY : Polyvinyl chloride compound(PVC) as per IEC 60092-359, ST2
Code PXI-S & POI-S : Enhanced Halogen free thermoplastic compound as per IEC 60092-359, SHF1

Type	Sheath material	Type	Sheath material
Basic cable	Flame retardant PVC as per IEC 60092-359, ST2	Paint resistant cable	Paint resistant PVC as per IEC 60092-359, ST2
Normal cable	General PVC as per IEC 60092-359, ST2	Premium	Flame & Paint resistant PVC as per IEC 60092-359, ST2

Standard Applied

- **Design guideline** : IEC 60092-376
- **Material properties** : IEC 60092-351, Insulation, HEPR
  IEC 60092-359, Sheath, ST2 or SHF1
- **Flame retardant** : IEC 60332-3, Cat. 'A'
- **HCl emission** : IEC 60754-1, 0.5% ↓ for Halogen free cable
- **Smoke emission** : IEC 61034, transmittance 60% ↑ for Halogen free cable
- **Cold properties(option)** : IEC 60811-1-4, Upgrade test at -30℃
- **Oil resistant(option)** : IEEE Std. 1580-2001 Type T, at 70℃ for 4hours, for PVC sheathed cable
- **Paint resistant(option)** : Maker standard (Epoxy, Alkyd paint, at 100℃ for 168hours)

Identification of color

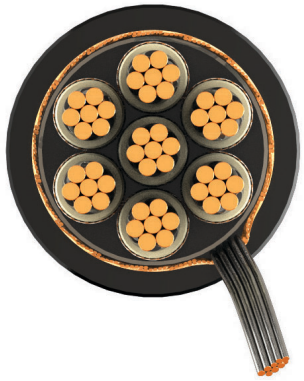
- **Insulation**
  - By numbering on white colored insulation
- **Outer sheath** : Black

Note) Any other colors purchaser required

Approvals

ABS, Lloyd's Register, DNV, Bureau Veritas, Germanischer Lloyd, KR Korean Register, ClassNK

-30 to 90℃ | Flame retardant IEC 60332-3, A | Weather Resistance to severe weather conditions | Flexibility | Halogen free IEC 60754-1 (option) | Smoke density IEC 61034 (option) | Gass toxicity No (option)



Application

- Instrument circuit upto 250V, instrument safe systems.
- Fixed installation for instrument, communication, control and alarm systems in both explosion risk and safe areas, general purposes.
- Maximum operating conductor temperature 90℃

Standard Applied

• Design guideline :	IEC 60092-376
• Material properties :	IEC 60092-351, Insulation, HF-HEPR IEC 60092-359, Sheath, ST2 or SHF1
• Flame retardant :	IEC 60332-3, Cat. 'A'
• HCl emission :	IEC 60754-1, 0.5% ↓ for Halogen free cable
• Smoke emission :	IEC 61034, transmittance 60% ↑ for Halogen free cable
• Cold properties (Option) :	IEC 60811-1-4, Upgrade test at -30℃
• Oil resistant (Option) :	IEEE Std. 1580-2001 Type T, at 70℃ for 4hours, PVC sheathed cable
• Paint resistant(Option) :	Maker standard (Epoxy, Alkyd paint, at 100℃ for 168hours)

250V Control Cable

LV Unarmoured Control Cables With individual shield 250V PXY-S / PXI-S
LV Armoured Control Cables With individual shield 250V POY-S / POI-S

No. of core	Conductor			Thickness of insulation	Unarmoured, PXY-S Unarmoured, PXI-S			Armoured, POY-S Armoured, POI-S				
	Nominal sectional area	Min. No. of wires	Max. overall dia.		Thickness of sheath	Nominal dia. over sheath	Cable weight (approx.)	Nomina dia. over inner covering	Dia. of metal wire for braid	Thickness of outer sheath	Nominal overall dia.	Cable weight (approx.)
EA	mm²	EA	mm	mm	mm	mm	kg/km	mm	mm	mm	mm	kg/km
2	1.0	7	1.4	0.5	1.1	9.0±0.4	115	7.0±0.4	0.2	1.1	10.3±0.4	170
3	1.0	7	1.4	0.5	1.1	9.5±0.4	145	7.5±0.4	0.2	1.1	10.8±0.4	205
4	1.0	7	1.4	0.5	1.1	10.3±0.4	180	8.3±0.4	0.2	1.2	11.8±0.5	250
5	1.0	7	1.4	0.5	1.2	11.4±0.5	225	9.2±0.4	0.2	1.2	12.7±0.5	295
7	1.0	7	1.4	0.5	1.2	12.4±0.5	290	10.2±0.4	0.3	1.3	14.4±0.6	415
9	1.0	7	1.4	0.5	1.3	14.6±0.6	395	12.2±0.5	0.3	1.3	16.4±0.7	530
12	1.0	7	1.4	0.5	1.3	16.3±0.7	510	13.9±0.6	0.3	1.4	18.3±0.7	665
16	1.0	7	1.4	0.5	1.4	18.2±0.7	695	15.6±0.6	0.3	1.5	20.2±0.8	870
19	1.0	7	1.4	0.5	1.4	19.2±0.8	830	16.6±0.7	0.3	1.5	21.2±0.8	1,020
23	1.0	7	1.4	0.5	1.5	21.4±0.9	1,070	18.6±0.7	0.3	1.6	23.4±0.9	1,275
27	1.0	7	1.4	0.5	1.6	23.3±0.9	1,305	20.3±0.8	0.3	1.7	25.3±1.0	1,525
33	1.0	7	1.4	0.5	1.7	25.2±1.0	1,690	22.0±0.9	0.3	1.7	27.0±1.1	1,915
37	1.0	7	1.4	0.5	1.7	26.2±1.0	1,945	23.0±0.9	0.3	1.8	28.2±1.1	2,195
44	1.0	7	1.4	0.5	1.8	29.6±1.2	2,500	26.2±1.0	0.3	1.9	31.6±1.3	2,780
77	1.0	7	1.4	0.5	2.1	37.1±1.5	5,720	33.1±1.3	0.4	2.2	39.5±1.6	6,165

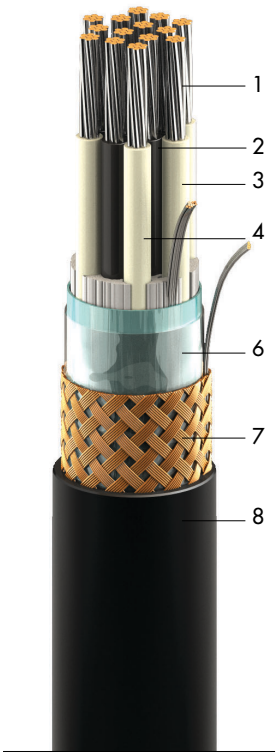
Conductor	Tinned copper, class2	Tinned copper, Class2
Insulation	HF-HEPR	HF-HEPR
Individual screen	Tinned copper wire braid	Tinned copper wire braid
Inner covering	Not applicable	Flexible compound
Armoring	Not applicable	Metal wire braid
Outer sheath	PVC or SHF1	PVC or SHF1

Identification of color

- Insulation
  - By numbering on white colored insulation
- Outer sheath : Black
  Note) Any other colors purchaser required

Attached table6

LV Unarmoured Instrument Cables With Common Shield 250V PXY(C) / PXI(C)
LV Armoured Instrument Cables With Common Shield 250V POY(C) / POI(C)



Construction Details

1 **Conductor** : Stranded tinned annealed copper as per IEC 60228, class 2

2 **Insulation** : High modulus Ethylene-propylene rubber as per IEC 60092-351, HF-HEPR

3 **Pair twisting**

4 **Cabling (with filler)**

5 **Common screen** : AL/PS tape with drain wire at least 0.5mm
A suitable tape or tapes may be applied over the collective screen.

6 **Inner covering (except PXY, PXI)** : Lapped covering

7 **Amour (Applied to armoured cable)** : Copper wire braid as per IEC 60092-376
A suitable separator tape or tapes may be applied under and/or over the armour.

8 **Outer sheath** : see table
Code PXY & POY : Polyvinyl chloride compound(PVC) as per IEC 60092-359, ST2
Code PXI & POI : Enhanced Halogen free thermoplastic compound as per IEC 60092-359, SHF1

Type	Sheath material	Type	Sheath material
Basic cable	Flame retardant PVC as per IEC 60092-359, ST2	Paint resistant cable	Paint resistant PVC as per IEC 60092-359, ST2
Normal cable	General PVC as per IEC 60092-359, ST2	Premium	Flame & Paint resistant PVC as per IEC 60092-359, ST2

Standard Applied

- **Design guideline** : IEC 60092-376
- **Material properties** : IEC 60092-351, Insulation, HEPR
  IEC 60092-359, Sheath, ST2 or SHF1
- **Flame retardant** : IEC 60332-3, Cat. 'A'
- **HCl emission** : IEC 60754-1, 0.5% ↓ for Halogen free cable
- **Smoke emission** : IEC 61034, transmittance 60% ↑ for Halogen free cable
- **Cold properties(option)** : IEC 60811-1-4, Upgrade test at -30℃
- **Oil resistant(option)** : IEEE Std. 1580-2001 Type T, at 70℃ for 4hours, for PVC sheathed cable
- **Paint resistant(option)** : Maker standard (Epoxy, Alkyd paint, at 100℃ for 168hours)

Identification of color

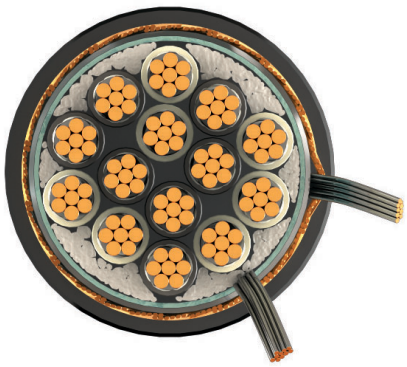
- **Insulation**
  - 1Pr : White-Black, 1Tr : White-Black-Red, 1Qd : White-Black-Red-Blue
  - 2Pr and above : Lettering on black/white insulation (pair number)
- **Outer sheath**
  - Non-IS(intrinsically safe) : Black
  - IS(intrinsically safe) type : Blue

Note) Any other colors purchaser required

Approvals

ABS, Lloyd's Register, DNV, Bureau Veritas, Germanischer Lloyd, KR Korean Register, ClassNK

-30 to 90℃ | Flame retardant IEC 60332-3, A | Weather Resistance to severe weather conditions | Flexibility | Halogen free IEC 60754-1 (option) | Smoke density IEC 61034 (option) | Gass toxicity No (option)



Application

- Instrument circuit upto 250V, instrument safe systems.
- Fixed installation for instrument, communication, control and alarm systems in both explosion risk and safe areas, general purposes.
- Maximum operating conductor temperature 90℃

Standard Applied

• Design guideline :	IEC 60092-376
• Material properties :	IEC 60092-351, Insulation, HF-HEPR IEC 60092-359, Sheath, ST2 or SHF1
• Flame retardant :	IEC 60332-3, Cat. 'A'
• HCl emission :	IEC 60754-1, 0.5% ↓ for Halogen free cable
• Smoke emission :	IEC 61034, transmittance 60% ↑ for Halogen free cable
• Cold properties (Option) :	IEC 60811-1-4, Upgrade test at -30℃
• Oil resistant (Option) :	IEEE Std. 1580-2001 Type T, at 70℃ for 4hours, PVC sheathed cable
• Paint resistant(Option) :	Maker standard (Epoxy, Alkyd paint, at 100℃ for 168hours)

250V Instrument Cable

LV Unarmoured Instrument Cables With Common Shield 250V PXY(C) / PXI(C)
LV Armoured Instrument Cables With Common Shield 250V POY(C) / POI(C)

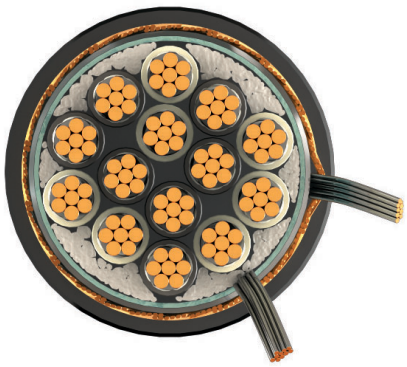
No. of pair	Conductor			Thickness of insulation	Unarmoured, PXY(C) Unarmoured, PXI(C)			Armoured, POY(C) Armoured, POI(C)				
	Nominal sectional area	Min. No. of wires	Max. overall dia.		Thickness of sheath	Nominal dia. over sheath	Cable weight (approx.)	Nomina dia. over inner covering	Dia. of metal wire for braid	Thickness of outer sheath	Nominal overall dia.	Cable weight (approx.)
PR	mm²	EA	mm	mm	mm	mm	kg/km	mm	mm	mm	mm	kg/km
1	0.75	7	1.2	0.5	1.0	7.2±0.4	70	5.4±0.4	0.2	1.1	8.7±0.4	120
2	0.75	7	1.2	0.5	1.2	10.9±0.4	140	8.9±0.4	0.2	1.2	12.4±0.5	210
3	0.75	7	1.2	0.5	1.2	11.7±0.5	170	9.5±0.4	0.2	1.2	13.0±0.5	240
4	0.75	7	1.2	0.5	1.2	12.7±0.5	205	10.5±0.4	0.3	1.3	14.7±0.6	330
5	0.75	7	1.2	0.5	1.3	14.1±0.6	245	11.7±0.4	0.3	1.3	15.9±0.6	380
7	0.75	7	1.2	0.5	1.3	15.3±0.6	300	12.9±0.5	0.3	1.4	17.3±0.7	455
10	0.75	7	1.2	0.5	1.5	18.7±0.7	415	16.1±0.6	0.3	1.5	20.7±0.8	595
12	0.75	7	1.2	0.5	1.5	19.7±0.8	480	16.9±0.6	0.3	1.5	21.5±0.9	660
14	0.75	7	1.2	0.5	1.5	21.0±0.8	540	18.2±0.7	0.3	1.6	23.0±0.9	745
15	0.75	7	1.2	0.5	1.6	21.6±0.9	580	18.8±0.7	0.3	1.6	23.6±0.9	790
19	0.75	7	1.2	0.5	1.7	24.1±1.0	690	21.1±0.8	0.3	1.7	26.1±1.0	925
20	0.75	7	1.2	0.5	1.7	24.6±1.0	740	21.6±0.9	0.3	1.7	26.6±1.1	980
24	0.75	7	1.2	0.5	1.8	26.8±1.1	860	23.6±0.9	0.3	1.8	28.8±1.2	1,125
27	0.75	7	1.2	0.5	1.8	28.4±1.1	965	25.0±1.0	0.3	1.9	30.4±1.2	1,240
30	0.75	7	1.2	0.5	1.9	29.7±1.2	1,055	26.3±0.7	0.3	1.9	31.7±1.3	1,340
33	0.75	7	1.2	0.5	1.9	31.2±1.2	1,160	27.6±0.7	0.3	2.0	33.2±1.3	1,460
37	0.75	7	1.2	0.5	2.0	33.0±1.3	1,275	29.2±0.8	0.3	2.0	34.8±1.4	1,575
48	0.75	7	1.2	0.5	2.2	37.1±1.5	1,620	33.1±0.9	0.4	2.2	39.5±1.6	2,065

Conductor	Tinned copper, class2	Tinned copper, Class2
Insulation	HF-HEPR	HF-HEPR
Pair/Triad twisting	Pair twisting	Pair twisting
Cabling	If necessary with filler	If necessary with filler
Common screen	AL/PS tape with drain wire	AL/PS tape with drain wire
Inner covering	Not applicable	Lapped covering
Armoring	Not applicable	Annealed copper wire braid
Outer sheath	PVC or SHF1	PVC or SHF1

Identification of color

- Insulation
  - 1Pr : White-Black, 1Tr : White-Black-Red, 1Qd : White-Black-Red-Blue
  - 2Pr and above : Lettering on black/white insulation (pair number)
- Outer sheath
  - Non-IS(intrinsically safe) : Black
  - IS(intrinsically safe) type : Blue

  Note) Any other colors purchaser required



Application

- Instrument circuit upto 250V, instrument safe systems.
- Fixed installation for instrument, communication, control and alarm systems in both explosion risk and safe areas, general purposes.
- Maximum operating conductor temperature 90℃

Standard Applied

• Design guideline :	IEC 60092-376
• Material properties :	IEC 60092-351, Insulation, HF-HEPR IEC 60092-359, Sheath, ST2 or SHF1
• Flame retardant :	IEC 60332-3, Cat. 'A'
• HCl emission :	IEC 60754-1, 0.5% ↓ for Halogen free cable
• Smoke emission :	IEC 61034, transmittance 60% ↑ for Halogen free cable
• Cold properties (Option) :	IEC 60811-1-4, Upgrade test at -30℃
• Oil resistant (Option) :	IEEE Std. 1580-2001 Type T, at 70℃ for 4hours, PVC sheathed cable
• Paint resistant(Option) :	Maker standard (Epoxy, Alkyd paint, at 100℃ for 168hours)

250V Instrument Cable

LV Unarmoured Instrument Cables With Common Shield 250V PXY(C) / PXI(C)
LV Armoured Instrument Cables With Common Shield 250V POY(C) / POI(C)

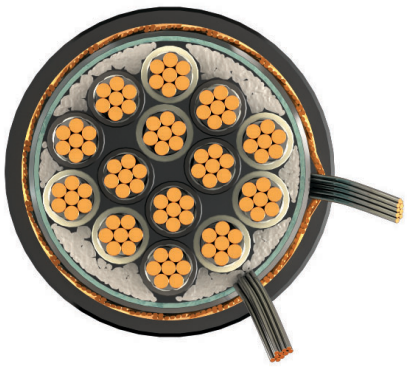
No. of pair	Conductor			Thickness of insulation	Unarmoured, PXY(C) Unarmoured, PXI(C)			Armoured, POY(C) Armoured, POI(C)				
	Nominal sectional area	Min. No. of wires	Max. overall dia.		Thickness of sheath	Nominal dia. over sheath	Cable weight (approx.)	Nomina dia. over inner covering	Dia. of metal wire for braid	Thickness of outer sheath	Nominal overall dia.	Cable weight (approx.)
PR	mm²	EA	mm	mm	mm	mm	kg/km	mm	mm	mm	mm	kg/km
1	1.0	7	1.4	0.5	1.0	7.6±0.4	85	5.8±0.4	0.2	1.1	9.1±0.4	135
2	1.0	7	1.4	0.5	1.2	11.7±0.5	165	9.5±0.4	0.2	1.2	13.0±0.5	240
3	1.0	7	1.4	0.5	1.2	12.4±0.5	200	10.2±0.4	0.3	1.3	14.4±0.6	325
4	1.0	7	1.4	0.5	1.2	13.6±0.5	245	11.4±0.5	0.3	1.3	15.6±0.6	380
5	1.0	7	1.4	0.5	1.3	15.1±0.6	295	12.7±0.5	0.3	1.4	17.1±0.7	445
7	1.0	7	1.4	0.5	1.3	16.4±0.7	370	14.0±0.6	0.3	1.4	18.4±0.7	530
10	1.0	7	1.4	0.5	1.5	20.1±0.8	510	17.3±0.7	0.3	1.5	21.9±0.9	695
12	1.0	7	1.4	0.5	1.5	21.1±0.8	580	18.3±0.7	0.3	1.6	23.1±0.9	785
14	1.0	7	1.4	0.5	1.6	22.7±0.9	670	19.7±0.8	0.3	1.6	24.5±1.0	875
15	1.0	7	1.4	0.5	1.6	23.3±0.9	720	20.3±0.8	0.3	1.7	25.3±1.0	945
19	1.0	7	1.4	0.5	1.7	26.0±1.0	855	22.8±0.9	0.3	1.8	28.0±1.1	1,110
20	1.0	7	1.4	0.5	1.7	26.6±1.1	925	23.4±0.9	0.3	1.8	28.6±1.1	1,180
24	1.0	7	1.4	0.5	1.8	28.9±1.2	1,075	25.5±1.0	0.3	1.9	30.9±1.2	1,355
27	1.0	7	1.4	0.5	1.9	30.6±1.2	1,200	27.0±1.1	0.3	1.9	32.4±1.3	1,475
30	1.0	7	1.4	0.5	1.9	32.1±1.3	1,310	28.5±1.1	0.3	2.0	34.1±1.4	1,620
33	1.0	7	1.4	0.5	2.0	33.6±1.3	1,440	29.8±1.2	0.3	2.0	35.4±1.4	1,745
37	1.0	7	1.4	0.5	2.0	35.3±1.4	1,570	31.5±1.3	0.4	2.1	37.7±1.5	1,995
48	1.0	7	1.4	0.5	2.2	40.0±1.6	2,020	35.8±1.4	0.4	2.3	42.4±1.7	2,500

Conductor	Tinned copper, class2	Tinned copper, Class2
Insulation	HF-HEPR	HF-HEPR
Pair/Triad twisting	Pair twisting	Pair twisting
Cabling	If necessary with filler	If necessary with filler
Common screen	AL/PS tape with drain wire	AL/PS tape with drain wire
Inner covering	Not applicable	Lapped covering
Armoring	Not applicable	Annealed copper wire braid
Outer sheath	PVC or SHF1	PVC or SHF1

Identification of color

- Insulation
  - 1Pr : White-Black, 1Tr : White-Black-Red, 1Qd : White-Black-Red-Blue
  - 2Pr and above : Lettering on black/white insulation (pair number)
- Outer sheath
  - Non-IS(intrinsically safe) : Black
  - IS(intrinsically safe) type : Blue

  Note) Any other colors purchaser required



Application

- Instrument circuit upto 250V, instrument safe systems.
- Fixed installation for instrument, communication, control and alarm systems in both explosion risk and safe areas, general purposes.
- Maximum operating conductor temperature 90℃

Standard Applied

• Design guideline :	IEC 60092-376
• Material properties :	IEC 60092-351, Insulation, HF-HEPR IEC 60092-359, Sheath, ST2 or SHF1
• Flame retardant :	IEC 60332-3, Cat. 'A'
• HCl emission :	IEC 60754-1, 0.5% ↓ for Halogen free cable
• Smoke emission :	IEC 61034, transmittance 60% ↑ for Halogen free cable
• Cold properties (Option) :	IEC 60811-1-4, Upgrade test at -30℃
• Oil resistant (Option) :	IEEE Std. 1580-2001 Type T, at 70℃ for 4hours, PVC sheathed cable
• Paint resistant(Option) :	Maker standard (Epoxy, Alkyd paint, at 100℃ for 168hours)

250V Instrument Cable

LV Unarmoured Instrument Cables With Common Shield 250V PXY(C) / PXI(C)
LV Armoured Instrument Cables With Common Shield 250V POY(C) / POI(C)

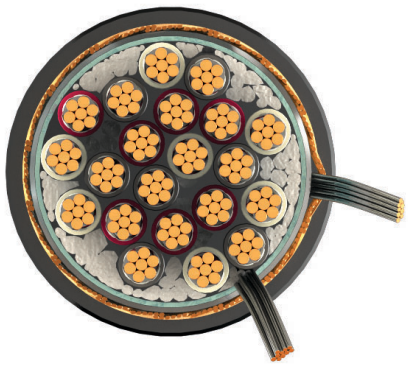
No. of pair	Conductor			Thickness of insulation	Unarmoured, PXY(C) Unarmoured, PXI(C)			Armoured, POY(C) Armoured, POI(C)				
	Nominal sectional area	Min. No. of wires	Max. overall dia.		Thickness of sheath	Nominal dia. over sheath	Cable weight (approx.)	Nomina dia. over inner covering	Dia. of metal wire for braid	Thickness of outer sheath	Nominal overall dia.	Cable weight (approx.)
PR	mm²	EA	mm	mm	mm	mm	kg/km	mm	mm	mm	mm	kg/km
1	1.5	7	1.7	0.6	1.1	8.8±0.4	110	6.8±0.4	0.3	1.1	10.1±0.4	160
2	1.5	7	1.7	0.6	1.2	13.4±0.5	215	11.2±0.4	0.3	1.3	15.4±0.6	350
3	1.5	7	1.7	0.6	1.3	14.4±0.6	270	12.0±0.5	0.3	1.3	16.2±0.6	405
4	1.5	7	1.7	0.6	1.3	15.8±0.6	330	13.4±0.5	0.3	1.4	17.8±0.7	485
5	1.5	7	1.7	0.6	1.4	17.6±0.7	405	15.0±0.6	0.3	1.5	19.6±0.8	575
7	1.5	7	1.7	0.6	1.4	19.1±0.8	500	16.5±0.7	0.3	1.5	21.1±0.8	685
10	1.5	7	1.7	0.6	1.6	23.5±0.9	695	20.5±0.8	0.3	1.7	25.5±1.0	925
12	1.5	7	1.7	0.6	1.6	24.6±1.0	795	21.6±0.9	0.3	1.7	26.6±1.1	1,035
14	1.5	7	1.7	0.6	1.7	26.5±1.1	920	23.3±0.9	0.3	1.8	28.5±1.1	1,175
15	1.5	7	1.7	0.6	1.7	27.3±1.1	990	24.1±1.0	0.3	1.8	29.3±1.2	1,255
19	1.5	7	1.7	0.6	1.9	30.7±1.2	1,195	27.1±1.1	0.3	1.9	32.5±1.3	1,470
20	1.5	7	1.7	0.6	1.9	31.3±1.3	1,285	27.7±1.1	0.3	2.0	33.3±1.3	1,585
24	1.5	7	1.7	0.6	2.0	34.1±1.4	1,500	30.3±1.2	0.4	2.1	36.5±1.5	1,905
27	1.5	7	1.7	0.6	2.1	36.1±1.4	1,670	32.1±1.3	0.4	2.2	38.5±1.5	2,100
30	1.5	7	1.7	0.6	2.1	37.8±1.5	1,830	33.8±1.4	0.4	2.2	40.2±1.6	2,280
33	1.5	7	1.7	0.6	2.2	39.6±1.6	2,010	35.4±1.4	0.4	2.3	42.0±1.7	2,485
37	1.5	7	1.7	0.6	2.3	41.9±1.7	2,210	37.5±1.5	0.4	2.4	44.3±1.8	2,710
48	1.5	7	1.7	0.6	2.5	47.4±1.9	2,845	42.6±1.7	0.4	2.6	49.8±2.0	3,410

Conductor	Tinned copper, class2	Tinned copper, Class2
Insulation	HF-HEPR	HF-HEPR
Pair/Triad twisting	Pair twisting	Pair twisting
Cabling	If necessary with filler	If necessary with filler
Common screen	AL/PS tape with drain wire	AL/PS tape with drain wire
Inner covering	Not applicable	Lapped covering
Armoring	Not applicable	Annealed copper wire braid
Outer sheath	PVC or SHF1	PVC or SHF1

Identification of color

- Insulation
  - 1Pr : White-Black, 1Tr : White-Black-Red, 1Qd : White-Black-Red-Blue
  - 2Pr and above : Lettering on black/white insulation (pair number)
- Outer sheath
  - Non-IS(intrinsically safe) : Black
  - IS(intrinsically safe) type : Blue

  Note) Any other colors purchaser required



Application

- Instrument circuit upto 250V, instrument safe systems.
- Fixed installation for instrument, communication, control and alarm systems in both explosion risk and safe areas, general purposes.
- Maximum operating conductor temperature 90℃

Standard Applied

- Design guideline : IEC 60092-376
- Material properties : IEC 60092-351, Insulation, HF-HEPR
  IEC 60092-359, Sheath, ST2 or SHF1
- Flame retardant : IEC 60332-3, Cat. 'A'
- HCl emission : IEC 60754-1, 0.5% ↓ for Halogen free cable
- Smoke emission : IEC 61034, transmittance 60% ↑ for Halogen free cable
- Cold properties (Option) : IEC 60811-1-4, Upgrade test at -30℃
- Oil resistant (Option) : IEEE Std. 1580-2001 Type T, at 70℃ for 4hours, PVC sheathed cable
- Paint resistant(Option) : Maker standard (Epoxy, Alkyd paint, at 100℃ for 168hours)

250V Instrument Cable

LV Unarmoured Instrument Cables With Common Shield 250V PXY(C) / PXI(C)
LV Armoured Instrument Cables With Common Shield 250V POY(C) / POI(C)

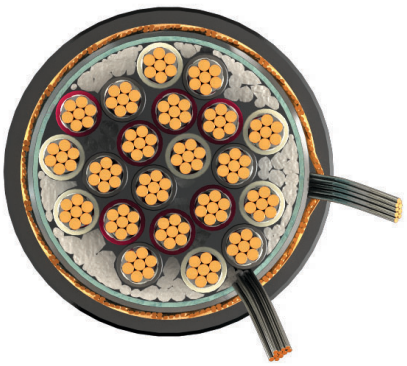
No. of triad	Conductor			Thickness of insulation	Unarmoured, PXY(C) Unarmoured, PXI(C)			Armoured, POY(C) Armoured, POI(C)				
	Nominal sectional area	Min. No. of wires	Max. overall dia.		Thickness of sheath	Nominal dia. over sheath	Cable weight (approx.)	Nomina dia. over inner covering	Dia. of metal wire for braid	Thickness of outer sheath	Nominal overall dia.	Cable weight (approx.)
TR	mm²	EA	mm	mm	mm	mm	kg/km	mm	mm	mm	mm	kg/km
1	0.75	7	1.2	0.5	1.0	7.6±0.4	85	5.8±0.4	0.2	1.1	9.1±0.4	135
2	0.75	7	1.2	0.5	1.2	12.0±0.5	180	9.8±0.4	0.2	1.2	13.3±0.5	250
3	0.75	7	1.2	0.5	1.2	12.7±0.5	215	10.5±0.4	0.3	1.3	14.7±0.6	345
4	0.75	7	1.2	0.5	1.3	14.1±0.6	270	11.7±0.5	0.3	1.3	15.9±0.6	405
5	0.75	7	1.2	0.5	1.3	15.6±0.6	330	13.2±0.5	0.3	1.4	17.6±0.7	480
7	0.75	7	1.2	0.5	1.4	17.7±0.7	420	15.1±0.6	0.3	1.5	19.7±0.7	590
10	0.75	7	1.2	0.5	1.5	21.5±0.9	575	18.7±0.7	0.3	1.6	23.5±0.9	780
12	0.75	7	1.2	0.5	1.5	22.4±0.9	660	19.4±0.7	0.3	1.6	24.2±1.0	865
14	0.75	7	1.2	0.5	1.6	23.9±1.0	750	20.9±0.8	0.3	1.7	25.9±1.0	985
15	0.75	7	1.2	0.5	1.6	24.6±1.1	805	21.6±0.8	0.3	1.7	26.6±1.1	1,050
19	0.75	7	1.2	0.5	1.8	27.6±1.1	985	24.2±0.9	0.3	1.8	29.4±1.2	1,235
20	0.75	7	1.2	0.5	1.8	28.2±1.1	1,055	24.8±0.9	0.3	1.8	30.0±1.2	1,310
24	0.75	7	1.2	0.5	1.9	30.8±1.2	1,230	27.2±1.0	0.3	1.9	32.6±1.3	1,510
27	0.75	7	1.2	0.5	1.9	32.4±1.3	1,360	28.8±1.1	0.3	2.0	34.4±1.4	1,670
30	0.75	7	1.2	0.5	2.0	34.1±1.4	1,505	30.3±1.1	0.4	2.1	36.5±1.5	1,915
33	0.75	7	1.2	0.5	2.1	35.7±1.4	1,650	31.7±1.2	0.4	2.1	37.9±1.5	2,060
37	0.75	7	1.2	0.5	2.1	37.6±1.5	1,805	33.6±1.3	0.4	2.2	40.0±1.6	2,255
48	0.75	7	1.2	0.5	2.3	42.5±1.7	2,320	38.1±1.4	0.4	2.4	44.9±1.8	2,830

Conductor	Tinned copper, class2	Tinned copper, Class2
Insulation	HF-HEPR	HF-HEPR
Pair/Triad twisting	Triad twisting	Triad twisting
Cabling	If necessary with filler	If necessary with filler
Common screen	AL/PS tape with drain wire	AL/PS tape with drain wire
Inner covering	Not applicable	Lapped covering
Armoring	Not applicable	Annealed copper wire braid
Outer sheath	PVC or SHF1	PVC or SHF1

Identification of color

- Insulation
  - 1Pr : White-Black, 1Tr : White-Black-Red, 1Qd : White-Black-Red-Blue
  - 2Pr and above : Lettering on black/white insulation (pair number)
- Outer sheath
  - Non-IS(intrinsically safe) : Black
  - IS(intrinsically safe) type : Blue

  Note) Any other colors purchaser required



Application

- Instrument circuit upto 250V, instrument safe systems.
- Fixed installation for instrument, communication, control and alarm systems in both explosion risk and safe areas, general purposes.
- Maximum operating conductor temperature 90℃

Standard Applied

• Design guideline :	IEC 60092-376
• Material properties :	IEC 60092-351, Insulation, HF-HEPR IEC 60092-359, Sheath, ST2 or SHF1
• Flame retardant :	IEC 60332-3, Cat. 'A'
• HCl emission :	IEC 60754-1, 0.5% ↓ for Halogen free cable
• Smoke emission :	IEC 61034, transmittance 60% ↑ for Halogen free cable
• Cold properties (Option) :	IEC 60811-1-4, Upgrade test at -30℃
• Oil resistant (Option) :	IEEE Std. 1580-2001 Type T, at 70℃ for 4hours, PVC sheathed cable
• Paint resistant(Option) :	Maker standard (Epoxy, Alkyd paint, at 100℃ for 168hours)

250V Instrument Cable

LV Unarmoured Instrument Cables With Common Shield 250V PXY(C) / PXI(C)
LV Armoured Instrument Cables With Common Shield 250V POY(C) / POI(C)

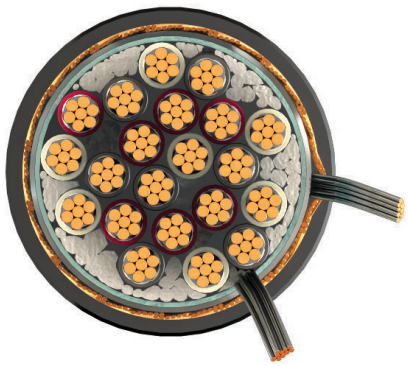
No. of triad	Conductor			Thickness of insulation	Unarmoured, PXY(C) Unarmoured, PXI(C)			Armoured, POY(C) Armoured, POI(C)				
	Nominal sectional area	Min. No. of wires	Max. overall dia.		Thickness of sheath	Nominal dia. over sheath	Cable weight (approx.)	Nomina dia. over inner covering	Dia. of metal wire for braid	Thickness of outer sheath	Nominal overall dia.	Cable weight (approx.)
TR	mm²	EA	mm	mm	mm	mm	kg/km	mm	mm	mm	mm	kg/km
1	1.0	7	1.4	0.5	1.0	8.0±0.4	100	6.2±0.4	0.2	1.1	9.5±0.4	155
2	1.0	7	1.4	0.5	1.2	12.8±0.5	210	10.6±0.4	0.3	1.3	14.8±0.6	340
3	1.0	7	1.4	0.5	1.2	13.6±0.5	260	11.4±0.5	0.3	1.3	15.6±0.6	395
4	1.0	7	1.4	0.5	1.3	15.1±0.6	330	12.7±0.5	0.3	1.4	17.1±0.7	475
5	1.0	7	1.4	0.5	1.4	16.8±0.7	405	14.2±0.6	0.3	1.4	18.6±0.7	555
7	1.0	7	1.4	0.5	1.4	18.9±0.8	510	16.3±0.7	0.3	1.5	20.9±0.8	690
10	1.0	7	1.4	0.5	1.6	23.2±0.9	710	20.2±0.8	0.3	1.7	25.2±1.0	940
12	1.0	7	1.4	0.5	1.6	24.0±1.0	810	21.0±0.8	0.3	1.7	26.0±1.0	1,045
14	1.0	7	1.4	0.5	1.7	25.8±1.1	940	22.6±0.9	0.3	1.8	27.8±1.1	1,185
15	1.0	7	1.4	0.5	1.7	26.6±1.1	1,010	23.4±0.9	0.3	1.8	28.6±1.1	1,265
19	1.0	7	1.4	0.5	1.8	29.6±1.2	1,210	26.2±1.0	0.3	1.9	31.6±1.3	1,495
20	1.0	7	1.4	0.5	1.9	30.5±1.2	1,310	26.9±1.1	0.3	1.9	32.3±1.3	1,585
24	1.0	7	1.4	0.5	2.0	33.2±1.3	1,535	29.4±1.2	0.3	2.0	35.0±1.4	1,835
27	1.0	7	1.4	0.5	2.0	34.9±1.4	1,695	31.1±1.2	0.4	2.1	37.3±1.5	2,115
30	1.0	7	1.4	0.5	2.1	36.7±1.5	1,875	32.7±1.3	0.4	2.2	39.1±1.6	2,315
33	1.0	7	1.4	0.5	2.2	38.5±1.5	2,060	34.3±1.4	0.4	2.2	40.7±1.6	2,505
37	1.0	7	1.4	0.5	2.2	40.5±1.6	2,255	36.3±1.5	0.4	2.3	42.9±1.7	2,740
48	1.0	7	1.4	0.5	2.4	45.8±1.8	2,905	41.2±1.6	0.4	2.5	48.2±1.9	3,450

Conductor	Tinned copper, class2	Tinned copper, Class2
Insulation	HF-HEPR	HF-HEPR
Pair/Triad twisting	Triad twisting	Triad twisting
Cabling	If necessary with filler	If necessary with filler
Common screen	AL/PS tape with drain wire	AL/PS tape with drain wire
Inner covering	Not applicable	Lapped covering
Armoring	Not applicable	Annealed copper wire braid
Outer sheath	PVC or SHF1	PVC or SHF1

Identification of color

- Insulation
  - 1Pr : White-Black, 1Tr : White-Black-Red, 1Qd : White-Black-Red-Blue
  - 2Pr and above : Lettering on black/white insulation (pair number)
- Outer sheath
  - Non-IS(intrinsically safe) : Black
  - IS(intrinsically safe) type : Blue

  Note) Any other colors purchaser required



Application

- Instrument circuit upto 250V, instrument safe systems.
- Fixed installation for instrument, communication, control and alarm systems in both explosion risk and safe areas, general purposes.
- Maximum operating conductor temperature 90℃

Standard Applied

• Design guideline :	IEC 60092-376
• Material properties :	IEC 60092-351, Insulation, HF-HEPR IEC 60092-359, Sheath, ST2 or SHF1
• Flame retardant :	IEC 60332-3, Cat. 'A'
• HCl emission :	IEC 60754-1, 0.5% ↓ for Halogen free cable
• Smoke emission :	IEC 61034, transmittance 60% ↑ for Halogen free cable
• Cold properties (Option) :	IEC 60811-1-4, Upgrade test at -30℃
• Oil resistant (Option) :	IEEE Std. 1580-2001 Type T, at 70℃ for 4hours, PVC sheathed cable
• Paint resistant(Option) :	Maker standard (Epoxy, Alkyd paint, at 100℃ for 168hours)

250V Instrument Cable

LV Unarmoured Instrument Cables With Common Shield 250V PXY(C) / PXI(C)
LV Armoured Instrument Cables With Common Shield 250V POY(C) / POI(C)

No. of triad	Conductor			Thickness of insulation	Unarmoured, PXY(C) Unarmoured, PXI(C)			Armoured, POY(C) Armoured, POI(C)				
	Nominal sectional area	Min. No. of wires	Max. overall dia.		Thickness of sheath	Nominal dia. over sheath	Cable weight (approx.)	Nomina dia. over inner covering	Dia. of metal wire for braid	Thickness of outer sheath	Nominal overall dia.	Cable weight (approx.)
TR	mm²	EA	mm	mm	mm	mm	kg/km	mm	mm	mm	mm	kg/km
1	1.5	7	1.7	0.6	1.1	9.3 ±0.4	135	7.3 ±0.4	0.2	1.1	10.6 ±0.4	190
2	1.5	7	1.7	0.6	1.3	14.9 ±0.6	280	12.5 ±0.5	0.3	1.4	16.9 ±0.7	430
3	1.5	7	1.7	0.6	1.3	15.8 ±0.6	355	13.4 ±0.5	0.3	1.4	17.8 ±0.7	510
4	1.5	7	1.7	0.6	1.4	17.6 ±0.7	450	15.0 ±0.6	0.3	1.5	19.6 ±0.8	615
5	1.5	7	1.7	0.6	1.5	19.6 ±0.8	550	16.8 ±0.7	0.3	1.5	21.4 ±0.9	725
7	1.5	7	1.7	0.6	1.6	22.3 ±0.9	710	19.3 ±0.8	0.3	1.6	24.1 ±1.0	910
10	1.5	7	1.7	0.6	1.7	27.2 ±1.1	980	24.0 ±1.0	0.3	1.8	29.2 ±1.2	1,240
12	1.5	7	1.7	0.6	1.8	28.3 ±1.1	1,135	24.9 ±1.0	0.3	1.9	30.3 ±1.2	1,405
14	1.5	7	1.7	0.6	1.9	30.4 ±1.2	1,310	26.8 ±1.1	0.3	1.9	32.2 ±1.3	1,585
15	1.5	7	1.7	0.6	1.9	31.3 ±1.3	1,405	27.7 ±1.1	0.3	2.0	33.3 ±1.3	1,705
19	1.5	7	1.7	0.6	2.0	34.9 ±1.4	1,690	31.1 ±1.2	0.4	2.1	37.3 ±1.5	2,110
20	1.5	7	1.7	0.6	2.1	35.9 ±1.4	1,830	31.9 ±1.3	0.4	2.1	38.1 ±1.5	2,240
24	1.5	7	1.7	0.6	2.2	39.1 ±1.6	2,145	34.9 ±1.4	0.4	2.3	41.5 ±1.7	2,610
27	1.5	7	1.7	0.6	2.3	41.3 ±1.7	2,390	36.9 ±1.5	0.4	2.3	43.5 ±1.7	2,860
30	1.5	7	1.7	0.6	2.3	43.3 ±1.7	2,625	38.9 ±1.6	0.4	2.4	45.7 ±1.8	3,140
33	1.5	7	1.7	0.6	2.4	45.4 ±1.8	2,880	40.8 ±1.6	0.4	2.5	47.8 ±1.9	3,425
37	1.5	7	1.7	0.6	2.5	47.9 ±1.9	3,175	43.1 ±1.7	0.4	2.6	50.3 ±2.0	3,750
48	1.5	7	1.7	0.6	2.7	54.2 ±2.2	4,090	49.0 ±2.0	0.4	2.8	56.6 ±2.3	4,740

Conductor	Tinned copper, class2	Tinned copper, Class2
Insulation	HF-HEPR	HF-HEPR
Pair/Triad twisting	Triad twisting	Triad twisting
Cabling	If necessary with filler	If necessary with filler
Common screen	AL/PS tape with drain wire	AL/PS tape with drain wire
Inner covering	Not applicable	Lapped covering
Armoring	Not applicable	Annealed copper wire braid
Outer sheath	PVC or SHF1	PVC or SHF1

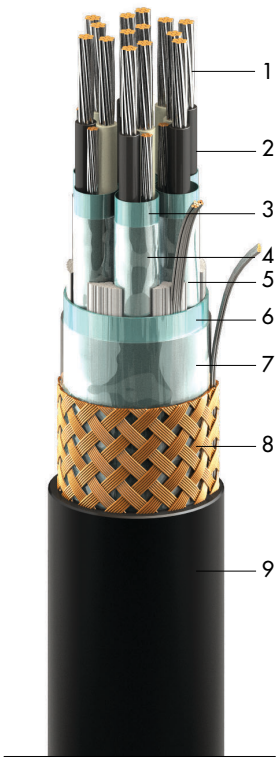
Identification of color

- Insulation
  - 1Pr : White-Black, 1Tr : White-Black-Red, 1Qd : White-Black-Red-Blue
  - 2Pr and above : Lettering on black/white insulation (pair number)
- Outer sheath
  - Non-IS(intrinsically safe) : Black
  - IS(intrinsically safe) type : Blue

  Note) Any other colors purchaser required

Attached table7

LV Unarmoured Instrument Cables With Individual or/and Common Shield 250V PXY(I/C) / PXI(I/C)
LV Armoured Instrument Cables With Individual or/and Common Shield 250V POY(I/C) / POI(I/C)



Construction Details

1 **Conductor** : Stranded tinned annealed copper as per IEC 60228, class 2

2 **Insulation** : High modulus Ethylene-propylene rubber as per IEC 60092-351, HF-HEPR

3 **Pair twisting**

4 **Individual screen** : AL/PS tape with drain wire at least 0.5mm

5 **Cabling (with filler)**

6 **Common screen(Option[1])** : AL/PS tape with drain wire at least 0.5mm
A suitable tape or tapes may be applied over the collective screen.

7 **Inner covering (except PXY, PXI)** : Lapped covering

8 **Amour (Applied to armoured cable)** : Copper wire braid as per IEC 60092-376
A suitable separator tape or tapes may be applied under and/or over the armour.

9 **Outer sheath** : see table
Code PXY & POY : Polyvinyl chloride compound(PVC) as per IEC 60092-359, ST2
Code PXI & POI : Enhanced Halogen free thermoplastic compound as per IEC 60092-359, SHF1

Type	Sheath material	Type	Sheath material
Basic cable	Flame retardant PVC as per IEC 60092-359, ST2	Paint resistant cable	Paint resistant PVC as per IEC 60092-359, ST2
Normal cable	General PVC as per IEC 60092-359, ST2	Premium	Flame & Paint resistant PVC as per IEC 60092-359, ST2

Option[1]) In case of common screen type, letter "(C)" shall be suffixed to the end letter of cable symbol.

Approvals

ABS, Lloyd's Register, DNV, Bureau Veritas, Germanischer Lloyd, KR Korean Register, ClassNK

Standard Applied

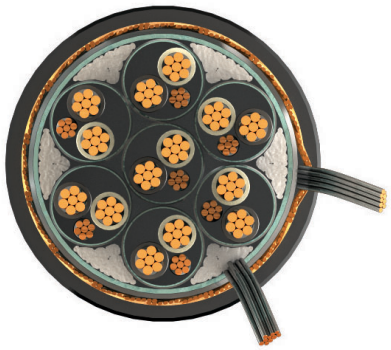
- **Design guideline** : IEC 60092-376
- **Material properties** : IEC 60092-351, Insulation, HEPR
  IEC 60092-359, Sheath, ST2 or SHF1
- **Flame retardant** : IEC 60332-3, Cat. 'A'
- **HCl emission** : IEC 60754-1, 0.5% ↓ for Halogen free cable
- **Smoke emission** : IEC 61034, transmittance 60% ↑ for Halogen free cable
- **Cold properties(option)** : IEC 60811-1-4, Upgrade test at -30℃
- **Oil resistant(option)** : IEEE Std. 1580-2001 Type T, at 70℃ for 4hours, for PVC sheathed cable
- **Paint resistant(option)** : Maker standard (Epoxy, Alkyd paint, at 100℃ for 168hours)

Identification of color

- **Insulation**
  - 1Pr : White-Black, 1Tr : White-Black-Red, 1Qd : White-Black-Red-Blue
  - 2Pr and above : Lettering on black/white insulation (pair number)
- **Outer sheath**
  - Non-IS(intrinsically safe) : Black
  - IS(intrinsically safe) type : Blue

Note) Any other colors purchaser required

-30 to 90℃ | Flame retardant IEC 60332-3, A | Weather Resistance to severe weather conditions | Flexibility | Halogen free IEC 60754-1 (option) | Smoke density IEC 61034 (option) | Gass toxicity No (option)



Application

- Instrument circuit upto 250V, instrument safe systems.
- Fixed installation for instrument, communication, control and alarm systems in both explosion risk and safe areas, general purposes.
- Maximum operating conductor temperature 90℃

Standard Applied

- Design guideline : IEC 60092-376
- Material properties : IEC 60092-351, Insulation, HF-HEPR
  IEC 60092-359, Sheath, ST2 or SHF1
- Flame retardant : IEC 60332-3, Cat. 'A'
- HCl emission : IEC 60754-1, 0.5% ↓ for Halogen free cable
- Smoke emission : IEC 61034, transmittance 60% ↑ for Halogen free cable
- Cold properties (Option) : IEC 60811-1-4, Upgrade test at -30℃
- Oil resistant (Option) : IEEE Std. 1580-2001 Type T, at 70℃ for 4hours, PVC sheathed cable
- Paint resistant(Option) : Maker standard (Epoxy, Alkyd paint, at 100℃ for 168hours)

250V Instrument Cable

LV Unarmoured Instrument Cables With Individual or/and Common Shield 250V PXY(I/C) / PXI(I/C)
LV Armoured Instrument Cables With Individual or/and Common Shield 250V POY(I/C) / POI(I/C)

No. of pair	Conductor			Thickness of insulation	Unarmoured, PXY(I/C) Unarmoured, PXI(I/C)			Armoured, POY(I/C) Armoured, POI(I/C)				
	Nominal sectional area	Min. No. of wires	Max. overall dia.		Thickness of sheath	Nominal dia. over sheath	Cable weight (approx.)	Nomina dia. over inner covering	Dia. of metal wire for braid	Thickness of outer sheath	Nominal overall dia.	Cable weight (approx.)
PR	mm²	EA	mm	mm	mm	mm	kg/km	mm	mm	mm	mm	kg/km
1	0.75	7	1.2	0.5	1.0	7.3±0.4	75	5.5±0.4	0.2	1.1	8.8±0.4	125
2	0.75	7	1.2	0.5	1.2	11.4±0.5	165	9.2±0.4	0.2	1.2	12.7±0.5	235
3	0.75	7	1.2	0.5	1.2	12.0±0.5	200	9.8±0.4	0.2	1.2	13.3±0.5	275
4	0.75	7	1.2	0.5	1.2	13.2±0.5	245	11.0±0.4	0.3	1.3	15.2±0.6	375
5	0.75	7	1.2	0.5	1.3	14.6±0.6	295	12.2±0.5	0.3	1.3	16.4±0.7	435
7	0.75	7	1.2	0.5	1.3	15.9±0.6	375	13.5±0.5	0.3	1.4	17.9±0.7	530
10	0.75	7	1.2	0.5	1.5	19.5±0.8	520	16.7±0.7	0.3	1.5	21.3±0.9	700
12	0.75	7	1.2	0.5	1.5	20.4±0.8	595	17.6±0.7	0.3	1.6	22.4±0.9	790
14	0.75	7	1.2	0.5	1.5	21.8±0.9	675	19.0±0.8	0.3	1.6	23.8±1.0	885
15	0.75	7	1.2	0.5	1.6	22.6±0.9	735	19.6±0.8	0.3	1.6	24.4±1.0	945
19	0.75	7	1.2	0.5	1.7	25.2±1.0	880	22.0±0.9	0.3	1.7	27.0±1.1	1,115
20	0.75	7	1.2	0.5	1.7	25.7±1.0	950	22.5±0.9	0.3	1.8	27.7±1.1	1,195
24	0.75	7	1.2	0.5	1.8	28.0±1.1	1,110	24.6±1.0	0.3	1.8	29.8±1.2	1,360
27	0.75	7	1.2	0.5	1.8	29.4±1.2	1,220	26.0±1.0	0.3	1.9	31.4±1.3	1,505
30	0.75	7	1.2	0.5	1.9	31.0±1.2	1,355	27.4±1.1	0.3	2.0	33.0±1.3	1,650
33	0.75	7	1.2	0.5	1.9	32.3±1.3	1,470	28.7±1.1	0.3	2.0	34.3±1.4	1,780
37	0.75	7	1.2	0.5	2.0	34.2±1.4	1,625	30.4±1.2	0.4	2.1	36.6±1.5	2,035
48	0.75	7	1.2	0.5	2.2	38.7±1.5	2,090	34.5±1.4	0.4	2.3	41.1±1.6	2,555

Conductor	Tinned copper, class2	Tinned copper, Class2
Insulation	HF-HEPR	HF-HEPR
Pair/Triad twisting	Pair twisting	Pair twisting
Individual screen	AL/PS tape with drain wire	AL/PS tape with drain wire
Cabling	If necessary with filler	If necessary with filler
Common screen	AL/PS tape with drain wire	AL/PS tape with drain wire
Inner covering	Not applicable	Lapped covering
Armoring	Not applicable	Annealed copper wire braid
Outer sheath	PVC or SHF1	PVC or SHF1

Identification of color

- Insulation
  - 1Pr : White-Black, 1Tr : White-Black-Red, 1Qd : White-Black-Red-Blue
  - 2Pr and above : Lettering on black/white insulation (pair number)
- Outer sheath
  - Non-IS(intrinsically safe) : Black
  - IS(intrinsically safe) type : Blue

  Note) Any other colors purchaser required

Application

- Instrument circuit upto 250V, instrument safe systems.
- Fixed installation for instrument, communication, control and alarm systems in both explosion risk and safe areas, general purposes.
- Maximum operating conductor temperature 90℃

Standard Applied

• Design guideline :	IEC 60092-376
• Material properties :	IEC 60092-351, Insulation, HF-HEPR IEC 60092-359, Sheath, ST2 or SHF1
• Flame retardant :	IEC 60332-3, Cat. 'A'
• HCl emission :	IEC 60754-1, 0.5% ↓ for Halogen free cable
• Smoke emission :	IEC 61034, transmittance 60% ↑ for Halogen free cable
• Cold properties (Option) :	IEC 60811-1-4, Upgrade test at -30℃
• Oil resistant (Option) :	IEEE Std. 1580-2001 Type T, at 70℃ for 4hours, PVC sheathed cable
• Paint resistant(Option) :	Maker standard (Epoxy, Alkyd paint, at 100℃ for 168hours)

250V Instrument Cable

LV Unarmoured Instrument Cables With Individual or/and Common Shield 250V PXY(I/C) / PXI(I/C)
LV Armoured Instrument Cables With Individual or/and Common Shield 250V POY(I/C) / POI(I/C)

No. of pair	Conductor			Thickness of insulation	Unarmoured, PXY(I/C) Unarmoured, PXI(I/C)			Armoured, POY(I/C) Armoured, POI(I/C)				
	Nominal sectional area	Min. No. of wires	Max. overall dia.		Thickness of sheath	Nominal dia. over sheath	Cable weight (approx.)	Nomina dia. over inner covering	Dia. of metal wire for braid	Thickness of outer sheath	Nominal overall dia.	Cable weight (approx.)
PR	mm²	EA	mm	mm	mm	mm	kg/km	mm	mm	mm	mm	kg/km
1	1.0	7	1.4	0.5	1.0	7.7±0.4	85	5.9±0.4	0.2	1.1	9.2±0.4	135
2	1.0	7	1.4	0.5	1.2	12.1±0.5	195	9.9±0.4	0.2	1.2	13.4±0.5	265
3	1.0	7	1.4	0.5	1.2	12.8±0.5	240	10.6±0.4	0.3	1.3	14.8±0.6	370
4	1.0	7	1.4	0.5	1.3	14.2±0.6	300	11.8±0.5	0.3	1.3	16.0±0.6	435
5	1.0	7	1.4	0.5	1.3	15.5±0.6	360	13.1±0.5	0.3	1.4	17.5±0.7	510
7	1.0	7	1.4	0.5	1.4	17.1±0.7	460	14.5±0.6	0.3	1.4	18.9±0.8	620
10	1.0	7	1.4	0.5	1.5	20.8±0.8	635	18.0±0.7	0.3	1.6	22.8±0.9	835
12	1.0	7	1.4	0.5	1.5	21.7±0.9	725	18.9±0.7	0.3	1.6	23.7±0.9	940
14	1.0	7	1.4	0.5	1.6	23.4±0.9	840	20.4±0.8	0.3	1.7	25.4±1.0	1,065
15	1.0	7	1.4	0.5	1.6	24.1±1.0	900	21.1±0.8	0.3	1.7	26.1±1.0	1,135
19	1.0	7	1.4	0.5	1.7	26.9±1.1	1,085	23.7±0.9	0.3	1.8	28.9±1.2	1,345
20	1.0	7	1.4	0.5	1.8	27.6±1.1	1,175	24.2±1.0	0.3	1.8	29.4±1.2	1,425
24	1.0	7	1.4	0.5	1.8	29.9±1.2	1,360	26.5±1.1	0.3	1.9	31.9±1.3	1,650
27	1.0	7	1.4	0.5	1.9	31.7±1.3	1,520	28.1±1.1	0.3	2.0	33.7±1.3	1,825
30	1.0	7	1.4	0.5	2.0	33.3±1.3	1,685	29.5±1.2	0.3	2.0	35.1±1.4	1,985
33	1.0	7	1.4	0.5	2.0	34.7±1.4	1,835	30.9±1.2	0.4	2.1	37.1±1.5	2,250
37	1.0	7	1.4	0.5	2.1	36.7±1.5	2,025	32.7±1.3	0.4	2.2	39.1±1.6	2,465
48	1.0	7	1.4	0.5	2.3	41.6±1.7	2,610	37.2±1.5	0.4	2.4	44.0±1.8	3,105

Conductor	Tinned copper, class2	Tinned copper, Class2
Insulation	HF-HEPR	HF-HEPR
Pair/Triad twisting	Pair twisting	Pair twisting
Individual screen	AL/PS tape with drain wire	AL/PS tape with drain wire
Cabling	If necessary with filler	If necessary with filler
Common screen	AL/PS tape with drain wire	AL/PS tape with drain wire
Inner covering	Not applicable	Lapped covering
Armoring	Not applicable	Annealed copper wire braid
Outer sheath	PVC or SHF1	PVC or SHF1

Identification of color

- Insulation
  - 1Pr : White-Black, 1Tr : White-Black-Red, 1Qd : White-Black-Red-Blue
  - 2Pr and above : Lettering on black/white insulation (pair number)
- Outer sheath
  - Non-IS(intrinsically safe) : Black
  - IS(intrinsically safe) type : Blue

  Note) Any other colors purchaser required

Application

- Instrument circuit upto 250V, instrument safe systems.
- Fixed installation for instrument, communication, control and alarm systems in both explosion risk and safe areas, general purposes.
- Maximum operating conductor temperature 90℃

Standard Applied

- Design guideline : IEC 60092-376
- Material properties : IEC 60092-351, Insulation, HF-HEPR
  IEC 60092-359, Sheath, ST2 or SHF1
- Flame retardant : IEC 60332-3, Cat. 'A'
- HCl emission : IEC 60754-1, 0.5% ↓ for Halogen free cable
- Smoke emission : IEC 61034, transmittance 60% ↑ for Halogen free cable
- Cold properties (Option) : IEC 60811-1-4, Upgrade test at -30℃
- Oil resistant (Option) : IEEE Std. 1580-2001 Type T, at 70℃ for 4hours, PVC sheathed cable
- Paint resistant(Option) : Maker standard (Epoxy, Alkyd paint, at 100℃ for 168hours)

250V Instrument Cable

LV Unarmoured Instrument Cables With Individual or/and Common Shield 250V PXY(I/C) / PXI(I/C)
LV Armoured Instrument Cables With Individual or/and Common Shield 250V POY(I/C) / POI(I/C)

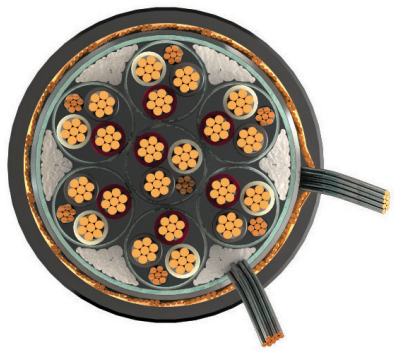
No. of pair	Conductor			Thickness of insulation	Unarmoured, PXY(I/C) Unarmoured, PXI(I/C)			Armoured, POY(I/C) Armoured, POI(I/C)				
	Nominal sectional area	Min. No. of wires	Max. overall dia.		Thickness of sheath	Nominal dia. over sheath	Cable weight (approx.)	Nomina dia. over inner covering	Dia. of metal wire for braid	Thickness of outer sheath	Nominal overall dia.	Cable weight (approx.)
PR	mm²	EA	mm	mm	mm	mm	kg/km	mm	mm	mm	mm	kg/km
1	1.0	7	1.7	0.6	1.1	8.9 ±0.4	110	6.9 ±0.4	0.2	1.1	10.2 ±0.4	165
2	1.0	7	1.7	0.6	1.2	13.8 ±0.6	245	11.6 ±0.5	0.2	1.3	15.8 ±0.6	380
3	1.0	7	1.7	0.6	1.3	14.8 ±0.6	315	12.4 ±0.5	0.3	1.4	16.8 ±0.7	455
4	1.0	7	1.7	0.6	1.3	16.2 ±0.6	385	13.8 ±0.6	0.3	1.4	18.2 ±0.7	540
5	1.0	7	1.7	0.6	1.4	18.0 ±0.7	470	15.4 ±0.6	0.3	1.5	20.0 ±0.8	645
7	1.0	7	1.7	0.6	1.5	19.8 ±0.8	600	17.0 ±0.7	0.3	1.5	21.6 ±0.9	780
10	1.0	7	1.7	0.6	1.6	24.2 ±1.0	825	21.2 ±0.8	0.3	1.7	26.2 ±1.0	1,065
12	1.0	7	1.7	0.6	1.7	25.5 ±1.0	965	22.3 ±0.9	0.3	1.7	27.3 ±1.1	1,195
14	1.0	7	1.7	0.6	1.7	27.3 ±1.1	1,100	24.1 ±1.0	0.3	1.8	29.3 ±1.2	1,365
15	1.0	7	1.7	0.6	1.8	28.3 ±1.1	1,200	24.9 ±1.0	0.3	1.9	30.3 ±1.2	1,470
19	1.0	7	1.7	0.6	1.9	31.5 ±1.3	1,435	27.9 ±1.1	0.3	2.0	33.5 ±1.3	1,735
20	1.0	7	1.7	0.6	1.9	32.5 ±1.3	1,540	28.6 ±1.1	0.3	2.0	34.2 ±1.4	1,850
24	1.0	7	1.7	0.6	2.0	35.1 ±1.4	1,805	31.3 ±1.3	0.4	2.1	37.5 ±1.5	2,225
27	1.0	7	1.7	0.6	2.1	37.1 ±1.5	2,015	33.1 ±1.3	0.4	2.2	39.5 ±1.6	2,460
30	1.0	7	1.7	0.6	2.2	39.1 ±1.6	2,230	34.9 ±1.4	0.4	2.3	41.5 ±1.7	2,695
33	1.0	7	1.7	0.6	2.2	40.7 ±1.6	2,430	36.5 ±1.5	0.4	2.3	43.1 ±1.7	2,915
37	1.0	7	1.7	0.6	2.3	43.1 ±1.7	2,680	38.7 ±1.5	0.4	2.4	45.5 ±1.8	3,195
48	1.0	7	1.7	0.6	2.5	48.7 ±1.9	3,450	43.9 ±1.8	0.4	2.6	51.1 ±2.0	4,035

Conductor	Tinned copper, class2	Tinned copper, Class2
Insulation	HF-HEPR	HF-HEPR
Pair/Triad twisting	Pair twisting	Pair twisting
Individual screen	AL/PS tape with drain wire	AL/PS tape with drain wire
Cabling	If necessary with filler	If necessary with filler
Common screen	AL/PS tape with drain wire	AL/PS tape with drain wire
Inner covering	Not applicable	Lapped covering
Armoring	Not applicable	Annealed copper wire braid
Outer sheath	PVC or SHF1	PVC or SHF1

Identification of color

- Insulation
  - 1Pr : White-Black, 1Tr : White-Black-Red, 1Qd : White-Black-Red-Blue
  - 2Pr and above : Lettering on black/white insulation (pair number)
- Outer sheath
  - Non-IS(intrinsically safe) : Black
  - IS(intrinsically safe) type : Blue

  Note) Any other colors purchaser required



Application

- Instrument circuit upto 250V, instrument safe systems.
- Fixed installation for instrument, communication, control and alarm systems in both explosion risk and safe areas, general purposes.
- Maximum operating conductor temperature 90℃

Standard Applied

• Design guideline :	IEC 60092-376
• Material properties :	IEC 60092-351, Insulation, HF-HEPR IEC 60092-359, Sheath, ST2 or SHF1
• Flame retardant :	IEC 60332-3, Cat. 'A'
• HCl emission :	IEC 60754-1, 0.5% ↓ for Halogen free cable
• Smoke emission :	IEC 61034, transmittance 60% ↑ for Halogen free cable
• Cold properties (Option) :	IEC 60811-1-4, Upgrade test at -30℃
• Oil resistant (Option) :	IEEE Std. 1580-2001 Type T, at 70℃ for 4hours, PVC sheathed cable
• Paint resistant(Option) :	Maker standard (Epoxy, Alkyd paint, at 100℃ for 168hours)

250V Instrument Cable

LV Unarmoured Instrument Cables With Individual or/and Common Shield 250V PXY(I/C) / PXI(I/C)
LV Armoured Instrument Cables With Individual or/and Common Shield 250V POY(I/C) / POI(I/C)

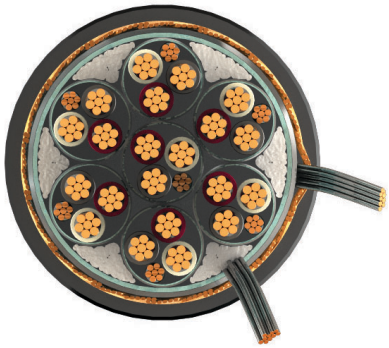
No. of triad	Conductor			Thickness of insulation	Unarmoured, PXY(I/C) Unarmoured, PXI(I/C)			Armoured, POY(I/C) Armoured, POI(I/C)				
	Nominal sectional area	Min. No. of wires	Max. overall dia.		Thickness of sheath	Nominal dia. over sheath	Cable weight (approx.)	Nomina dia. over inner covering	Dia. of metal wire for braid	Thickness of outer sheath	Nominal overall dia.	Cable weight (approx.)
TR	mm²	EA	mm	mm	mm	mm	kg/km	mm	mm	mm	mm	kg/km
1	0.75	7	1.2	0.5	1.0	7.7±0.4	90	5.9±0.4	0.2	1.1	9.2±0.4	140
2	0.75	7	1.2	0.5	1.2	12.4±0.5	200	10.2±0.4	0.3	1.3	14.4±0.6	325
3	0.75	7	1.2	0.5	1.2	13.2±0.5	250	11.0±0.4	0.3	1.3	15.2±0.6	380
4	0.75	7	1.2	0.5	1.3	14.6±0.6	320	12.2±0.5	0.3	1.3	16.4±0.7	450
5	0.75	7	1.2	0.5	1.3	16.1±0.6	380	13.7±0.5	0.3	1.4	18.1±0.7	535
7	0.75	7	1.2	0.5	1.4	18.3±0.7	490	15.7±0.6	0.3	1.5	20.3±0.8	670
10	0.75	7	1.2	0.5	1.6	22.5±0.9	685	19.5±0.8	0.3	1.6	24.3±1.0	890
12	0.75	7	1.2	0.5	1.6	23.2±0.9	785	20.2±0.8	0.3	1.7	25.2±1.0	1,010
14	0.75	7	1.2	0.5	1.7	25.0±1.0	905	21.8±0.9	0.3	1.7	26.8±1.1	1,135
15	0.75	7	1.2	0.5	1.7	25.7±1.0	975	22.5±0.9	0.3	1.8	27.7±1.1	1,220
19	0.75	7	1.2	0.5	1.8	28.6±1.1	1,170	25.2±1.0	0.3	1.9	30.6±1.2	1,445
20	0.75	7	1.2	0.5	1.8	29.3±1.2	1,255	25.9±1.0	0.3	1.9	31.3±1.3	1,535
24	0.75	7	1.2	0.5	1.9	31.9±1.3	1,470	28.3±1.1	0.3	2.0	33.9±1.4	1,775
27	0.75	7	1.2	0.5	2.0	33.7±1.3	1,640	29.9±1.2	0.3	2.1	35.7±1.4	1,960
30	0.75	7	1.2	0.5	2.0	35.3±1.4	1,800	31.5±1.3	0.4	2.1	37.7±1.5	2,225
33	0.75	7	1.2	0.5	2.1	37.0±1.5	1,975	33.0±1.3	0.4	2.2	39.4±1.6	2,420
37	0.75	7	1.2	0.5	2.2	39.1±1.6	2,180	34.9±1.4	0.4	2.3	41.5±1.7	2,650
48	0.75	7	1.2	0.5	2.4	44.3±1.8	2,810	39.7±1.6	0.4	2.5	46.7±1.9	3,340

Conductor	Tinned copper, class2	Tinned copper, Class2
Insulation	HF-HEPR	HF-HEPR
Pair/Triad twisting	Pair twisting	Pair twisting
Individual screen	AL/PS tape with drain wire	AL/PS tape with drain wire
Cabling	If necessary with filler	If necessary with filler
Common screen	AL/PS tape with drain wire	AL/PS tape with drain wire
Inner covering	Not applicable	Lapped covering
Armoring	Not applicable	Annealed copper wire braid
Outer sheath	PVC or SHF1	PVC or SHF1

Identification of color

- Insulation
  - 1Pr : White-Black, 1Tr : White-Black-Red, 1Qd : White-Black-Red-Blue
  - 2Pr and above : Lettering on black/white insulation (pair number)
- Outer sheath
  - Non-IS(intrinsically safe) : Black
  - IS(intrinsically safe) type : Blue

  Note) Any other colors purchaser required



Application

- Instrument circuit upto 250V, instrument safe systems.
- Fixed installation for instrument, communication, control and alarm systems in both explosion risk and safe areas, general purposes.
- Maximum operating conductor temperature 90℃

Standard Applied

- Design guideline : IEC 60092-376
- Material properties : IEC 60092-351, Insulation, HF-HEPR
  IEC 60092-359, Sheath, ST2 or SHF1
- Flame retardant : IEC 60332-3, Cat. 'A'
- HCl emission : IEC 60754-1, 0.5% ↓ for Halogen free cable
- Smoke emission : IEC 61034, transmittance 60% ↑ for Halogen free cable
- Cold properties (Option) : IEC 60811-1-4, Upgrade test at -30℃
- Oil resistant (Option) : IEEE Std. 1580-2001 Type T, at 70℃ for 4hours, PVC sheathed cable
- Paint resistant(Option) : Maker standard (Epoxy, Alkyd paint, at 100℃ for 168hours)

250V Instrument Cable

LV Unarmoured Instrument Cables With Individual or/and Common Shield 250V PXY(I/C) / PXI(I/C)
LV Armoured Instrument Cables With Individual or/and Common Shield 250V POY(I/C) / POI(I/C)

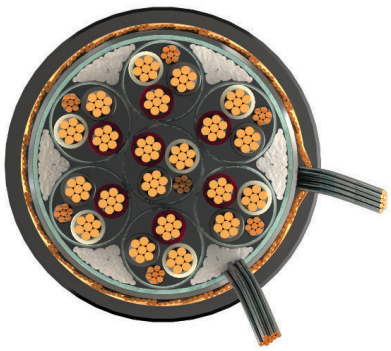
No. of triad	Conductor			Thickness of insulation	Unarmoured, PXY(I/C) Unarmoured, PXI(I/C)			Armoured, POY(I/C) Armoured, POI(I/C)				
	Nominal sectional area	Min. No. of wires	Max. overall dia.		Thickness of sheath	Nominal dia. over sheath	Cable weight (approx.)	Nomina dia. over inner covering	Dia. of metal wire for braid	Thickness of outer sheath	Nominal overall dia.	Cable weight (approx.)
TR	mm²	EA	mm	mm	mm	mm	kg/km	mm	mm	mm	mm	kg/km
1	1.0	7	1.4	0.5	1.0	8.1 ±0.4	105	6.3 ±0.4	0.2	1.1	9.6 ±0.4	160
2	1.0	7	1.4	0.5	1.2	13.2 ±0.5	240	11.0 ±0.4	0.3	1.3	15.2 ±0.6	370
3	1.0	7	1.4	0.5	1.3	14.2 ±0.6	305	11.8 ±0.5	0.3	1.3	16.0 ±0.6	440
4	1.0	7	1.4	0.5	1.3	15.5 ±0.6	385	13.1 ±0.5	0.3	1.4	17.5 ±0.7	530
5	1.0	7	1.4	0.5	1.4	17.3 ±0.7	470	14.7 ±0.6	0.3	1.4	19.1 ±0.8	625
7	1.0	7	1.4	0.5	1.5	19.7 ±0.8	610	16.9 ±0.7	0.3	1.5	21.5 ±0.9	785
10	1.0	7	1.4	0.5	1.6	24.0 ±1.0	835	21.0 ±0.8	0.3	1.7	26.0 ±1.0	1,070
12	1.0	7	1.4	0.5	1.7	24.9 ±1.0	975	21.7 ±0.9	0.3	1.7	26.7 ±1.1	1,200
14	1.0	7	1.4	0.5	1.7	26.6 ±1.1	1,115	23.4 ±0.9	0.3	1.8	28.6 ±1.1	1,370
15	1.0	7	1.4	0.5	1.8	27.6 ±1.1	1,210	24.2 ±1.0	0.3	1.8	29.4 ±1.2	1,460
19	1.0	7	1.4	0.5	1.9	30.8 ±1.2	1,460	27.2 ±1.1	0.3	1.9	32.6 ±1.3	1,740
20	1.0	7	1.4	0.5	1.9	31.5 ±1.3	1,560	27.9 ±1.1	0.3	2.0	33.5 ±1.3	1,860
24	1.0	7	1.4	0.5	2.0	34.3 ±1.4	1,830	30.5 ±1.2	0.4	2.1	36.7 ±1.5	2,245
27	1.0	7	1.4	0.5	2.1	36.3 ±1.5	2,045	32.3 ±1.3	0.4	2.2	38.7 ±1.5	2,480
30	1.0	7	1.4	0.5	2.1	38.0 ±1.5	2,245	34.0 ±1.4	0.4	2.2	40.4 ±1.6	2,700
33	1.0	7	1.4	0.5	2.2	39.8 ±1.6	2,465	35.6 ±1.4	0.4	2.3	42.2 ±1.7	2,945
37	1.0	7	1.4	0.5	2.3	42.1 ±1.7	2,725	37.7 ±1.5	0.4	2.4	44.5 ±1.8	3,230
48	1.0	7	1.4	0.5	2.5	47.6 ±1.9	3,510	42.8 ±1.7	0.4	2.6	50.0 ±2.0	4,080

Conductor	Tinned copper, class2	Tinned copper, Class2
Insulation	HF-HEPR	HF-HEPR
Pair/Triad twisting	Triad twisting	Triad twisting
Individual screen	AL/PS tape with drain wire	AL/PS tape with drain wire
Cabling	If necessary with filler	If necessary with filler
Common screen	AL/PS tape with drain wire	AL/PS tape with drain wire
Inner covering	Not applicable	Lapped covering
Armoring	Not applicable	Annealed copper wire braid
Outer sheath	PVC or SHF1	PVC or SHF1

Identification of color

- Insulation
  - 1Pr : White-Black, 1Tr : White-Black-Red, 1Qd : White-Black-Red-Blue
  - 2Pr and above : Lettering on black/white insulation (pair number)
- Outer sheath
  - Non-IS(intrinsically safe) : Black
  - IS(intrinsically safe) type : Blue

  Note) Any other colors purchaser required



Application

- Instrument circuit upto 250V, instrument safe systems.
- Fixed installation for instrument, communication, control and alarm systems in both explosion risk and safe areas, general purposes.
- Maximum operating conductor temperature 90℃

Standard Applied

• Design guideline :	IEC 60092-376
• Material properties :	IEC 60092-351, Insulation, HF-HEPR IEC 60092-359, Sheath, ST2 or SHF1
• Flame retardant :	IEC 60332-3, Cat. 'A'
• HCl emission :	IEC 60754-1, 0.5% ↓ for Halogen free cable
• Smoke emission :	IEC 61034, transmittance 60% ↑ for Halogen free cable
• Cold properties (Option) :	IEC 60811-1-4, Upgrade test at -30℃
• Oil resistant (Option) :	IEEE Std. 1580-2001 Type T, at 70℃ for 4hours, PVC sheathed cable
• Paint resistant(Option) :	Maker standard (Epoxy, Alkyd paint, at 100℃ for 168hours)

250V Instrument Cable

LV Unarmoured Instrument Cables With Individual or/and Common Shield 250V PXY(I/C) / PXI(I/C)
LV Armoured Instrument Cables With Individual or/and Common Shield 250V POY(I/C) / POI(I/C)

No. of triad	Conductor			Thickness of insulation	Unarmoured, PXY(I/C) Unarmoured, PXI(I/C)			Armoured, POY(I/C) Armoured, POI(I/C)				
	Nominal sectional area	Min. No. of wires	Max. overall dia.		Thickness of sheath	Nominal dia. over sheath	Cable weight (approx.)	Nomina dia. over inner covering	Dia. of metal wire for braid	Thickness of outer sheath	Nominal overall dia.	Cable weight (approx.)
TR	mm²	EA	mm	mm	mm	mm	kg/km	mm	mm	mm	mm	kg/km
1	1.5	7	1.7	0.6	1.1	9.4±0.4	135	7.4±0.4	0.2	1.1	10.7±0.4	195
2	1.5	7	1.7	0.6	1.3	15.3±0.6	315	12.9±0.5	0.3	1.4	17.3±0.7	465
3	1.5	7	1.7	0.6	1.3	16.2±0.6	400	13.8±0.6	0.3	1.4	18.2±0.7	555
4	1.5	7	1.7	0.6	1.4	18.0±0.7	505	15.4±0.6	0.3	1.5	20.0±0.8	675
5	1.5	7	1.7	0.6	1.5	20.1±0.8	620	17.3±0.7	0.3	1.5	21.9±0.9	800
7	1.5	7	1.7	0.6	1.6	22.9±0.9	805	19.9±0.8	0.3	1.7	24.9±1.0	1,030
10	1.5	7	1.7	0.6	1.8	28.1±1.1	1,130	24.7±1.0	0.3	1.8	29.9±1.2	1,385
12	1.5	7	1.7	0.6	1.8	29.0±1.2	1,295	25.6±1.0	0.3	1.9	31.0±1.2	1,575
14	1.5	7	1.7	0.6	1.9	31.2±1.2	1,495	27.6±1.1	0.3	2.0	33.2±1.3	1,795
15	1.5	7	1.7	0.6	1.9	32.2±1.3	1,610	28.6±1.1	0.3	2.0	34.2±1.4	1,915
19	1.5	7	1.7	0.6	2.1	36.1±1.4	1,960	32.1±1.3	0.4	2.2	38.5±1.5	2,390
20	1.5	7	1.7	0.6	2.1	36.9±1.5	2,095	32.9±1.3	0.4	2.2	39.3±1.6	2,540
24	1.5	7	1.7	0.6	2.2	40.2±1.6	2,460	36.0±1.4	0.4	2.3	42.6±1.7	2,945
27	1.5	7	1.7	0.6	2.3	42.5±1.7	2,745	38.1±1.5	0.4	2.4	44.9±1.8	3,255
30	1.5	7	1.7	0.6	2.4	44.7±1.8	3,040	40.1±1.6	0.4	2.5	47.1±1.9	3,575
33	1.5	7	1.7	0.6	2.5	46.9±1.9	3,340	42.1±1.7	0.4	2.6	49.3±2.0	3,900
37	1.5	7	1.7	0.6	2.6	49.5±2.0	3,690	44.5±1.8	0.4	2.7	51.9±2.1	4,280
48	1.5	7	1.7	0.6	2.8	56.0±2.2	4,750	50.6±2.0	0.4	2.9	58.4±2.3	5,420

Conductor	Tinned copper, class2	Tinned copper, Class2
Insulation	HF-HEPR	HF-HEPR
Pair/Triad twisting	Triad twisting	Triad twisting
Individual screen	AL/PS tape with drain wire	AL/PS tape with drain wire
Cabling	If necessary with filler	If necessary with filler
Common screen	AL/PS tape with drain wire	AL/PS tape with drain wire
Inner covering	Not applicable	Lapped covering
Armoring	Not applicable	Annealed copper wire braid
Outer sheath	PVC or SHF1	PVC or SHF1

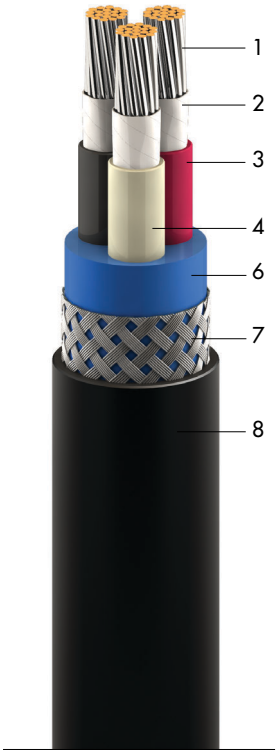
Identification of color

- Insulation
  - 1Pr : White-Black, 1Tr : White-Black-Red, 1Qd : White-Black-Red-Blue
  - 2Pr and above : Lettering on black/white insulation (pair number)
- Outer sheath
  - Non-IS(intrinsically safe) : Black
  - IS(intrinsically safe) type : Blue

  Note) Any other colors purchaser required

Attached table8 Fire resistance

LV Unarmoured Power & Lighting Cables 0.6/1kV EXY / EXI
LV Armoured Power & Lighting Cables 0.6/1kV ECY (EBY:1C) / ECI (EBI:1C)



Construction Details

1 **Conductor** : Stranded tinned annealed copper as per IEC 60228, class 2

2 **Fire proof layer** : Mica/Glass tape

3 **Insulation** : High modulus Ethylene-propylene rubber as per IEC 60092-351, HF-HEPR

4 **Cabling (with filler)**

5 **Common screen(Option[1])** : Al/PS tape with drain wire

6 **Inner covering (except EXY, EXI)** : Flexible compound covering

7 **Amour (Applied to armoured cable)** : Metal wire braid
1Core : Bronze(Copper alloy) wire braid as per IEC 60092-353
Multi Core : Galvanized steel wire braid as per IEC 60092-353
A suitable separator tape or tapes may be applied under and/or over the armour.

8 **Outer sheath** : see table
Code EXY & ECY : Premium Polyvinyl chloride compound (PVC) as per IEC 60092-359, ST2
Code EXI & ECI : Enhanced Halogen free thermoplastic compound as per IEC 60092-359, SHF1

Type	Sheath material	Type	Sheath material
Basic cable	Flame retardant PVC as per IEC 60092-359, ST2	Paint resistant cable	Paint resistant PVC as per IEC 60092-359, ST2
Normal cable	General PVC as per IEC 60092-359, ST2	Premium	Flame & Paint resistant PVC as per IEC 60092-359, ST2

Note) In case of copper or bronze wire braided armour, the armour designation code is applied "O" or "B" instead of "C"
Option[1]) In case of common screen type, letter "(C)" shall be suffixed to the end letter of cable symbol.

Standard Applied

- **Design guideline** : IEC 60092-353
- **Material properties** : IEC 60092-351, Insulation, HEPR
  IEC 60092-359, Sheath, ST2 or SHF1
- **Flame retardant** : IEC 60332-3, Cat. 'A'
- **Fire resistant** : IEC 60331-21(for cable overall dia. ≤ 20mm)
  IEC 60331-31(for cable overall dia. ›20mm)
- **HCl emission** : IEC 60754-1, 0.5% ↓ for Halogen free cable
- **Smoke emission** : IEC 61034, transmittance 60% ↑ for Halogen free cable
- **Cold properties(option)** : IEC 60811-1-4, Upgrade test at -30℃
- **Oil resistant(option)** : IEEE Std. 1580-2001 Type T, at 70℃ for 4hours, for PVC sheathed cable
- **Paint resistant(option)** : Maker standard (Epoxy, Alkyd paint, at 100℃ for 168hours)

Identification of color

- **Insulation**
  - 1 core : White
  - 2 core : White, Black
  - 3 core : White, Black, Red
  - 4 core : White, Black, Red, Blue
  - Earth wire : Green/Yellow stripe

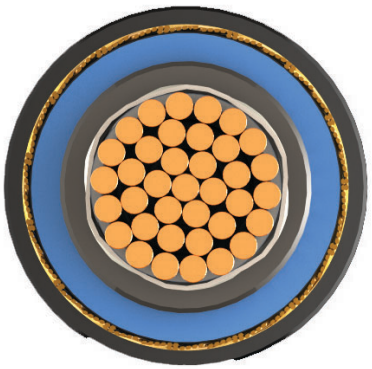
- **Outer sheath** : Black

Note) Any other colors purchaser required

Approvals

ABS, Lloyd's Register, DNV, Bureau Veritas, Germanischer Lloyd, KR Korean Register, ClassNK

-30 to 90℃ | Flame retardant IEC 60332-3, A & IEC 60331-31 | Weather Resistance to severe weather conditions | Flexibility | Halogen free IEC 60754-1 (option) | Smoke density IEC 61034 (option) | Gass toxicity No (option)



Application

- Power circuit below 1kV, Lighting circuits, Trace heating circuits.
- Fixed installation power, control & lighting in safe areas, general purposes.
- Maximum operating conductor temperature 90℃

Standard Applied

• Design guideline :	IEC 60092-353
• Material properties :	IEC 60092-351, Insulation, HF-HEPR IEC 60092-359, Sheath, ST2 or SHF1
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• Paint resistant(option) :	Maker standard (Epoxy, Alkyd paint, at 100℃ for 168hours)

0.6/1kV Power Cable Fire resistance

LV Unarmoured Power & Lighting Cables 0.6/1kV EXY / EXI
LV Armoured Power & Lighting Cables 0.6/1kV EBY / EBI

No. of core	Conductor			Thickness of insulation	Unarmoured, EXY Unarmoured, EXI			Armoured, EBY Armoured, EBI					
	Nominal sectional area	Min. No. of wires	Max. overall dia.		Thickness of sheath	Nominal dia. over sheath	Cable weight (approx.)	Thickness of inner covering	Nomina dia. over inner covering	Dia. of metal wire for braid	Thickness of outer sheath	Nominal overall dia.	Cable weight (approx.)
EA	mm²	EA	mm	mm	mm	mm	kg/km	mm	mm	mm	mm	mm	kg/km
1	1.5	7	1.7	0.7	1.0	6.2±0.4	60	1.0	5.2±0.4	0.3	1.1	9.0±0.4	135
	2.5	7	2.2	0.7	1.0	6.6±0.4	70	1.0	5.6±0.4	0.3	1.1	9.4±0.4	150
	4	7	2.7	0.7	1.0	7.2±0.4	90	1.0	6.2±0.4	0.3	1.1	10.0±0.4	180
	6	7	3.3	0.7	1.0	7.7±0.4	115	1.0	6.7±0.4	0.3	1.1	10.5±0.4	205
	10	7	4.2	0.7	1.1	8.9±0.4	165	1.0	7.7±0.4	0.3	1.2	11.7±0.5	270
	16	7	5.3	0.7	1.1	9.9±0.4	230	1.0	8.7±0.4	0.3	1.2	12.7±0.5	350
	25	7	6.6	0.9	1.2	11.8±0.5	350	1.0	10.4±0.4	0.3	1.3	14.6±0.6	485
	35	7	7.9	0.9	1.2	13.2±0.5	455	1.0	11.8±0.5	0.3	1.3	16.0±0.6	610
	50	19	9.1	1.0	1.3	14.8±0.6	595	1.0	13.2±0.5	0.3	1.4	17.6±0.7	765
	70	19	11.0	1.1	1.4	17.0±0.7	825	1.0	15.2±0.6	0.3	1.5	19.8±0.8	1,020
	95	19	12.9	1.1	1.4	18.9±0.8	1,095	1.0	17.1±0.7	0.3	1.5	21.7±0.9	1,310
	120	37	14.5	1.2	1.5	20.9±0.8	1,360	1.0	18.9±0.8	0.3	1.6	23.7±0.9	1,600
	150	37	16.2	1.4	1.6	23.1±0.9	1,665	1.0	20.9±0.8	0.3	1.7	25.9±1.0	1,925
	185	37	18.0	1.6	1.7	25.5±1.0	2,060	1.0	23.1±0.9	0.3	1.8	28.3±1.1	2,345
	240	61	20.6	1.7	1.8	28.6±1.1	2,665	1.0	26.0±1.0	0.3	1.9	31.4±1.3	2,985
	300	61	23.1	1.8	1.9	31.4±1.3	3,290	1.2	28.8±1.2	0.3	2.0	34.4±1.4	3,655
	400	61	26.1	2.0	2.0	35.0±1.4	4,165	1.2	32.2±1.3	0.4	2.2	38.6±1.5	4,670
	500	61	29.2	2.2	2.2	38.9±1.6	5,210	1.2	35.7±1.4	0.4	2.3	42.3±1.7	5,755
	630	91	33.2	2.4	2.3	43.5±1.7	6,660	1.4	40.4±1.6	0.4	2.5	47.4±1.9	7,310

Conductor	Tinned copper, class2	Tinned copper, Class2
Fire proof layer	Mica/glass tape	Mica/glass tape
Insulation	HF-HEPR	HF-HEPR
Inner covering	Not applicable	Flexible compound
Armoring	Not applicable	Metal wire braid
Outer sheath	PVC or SHF1	PVC or SHF1

Identification of color

- Insulation
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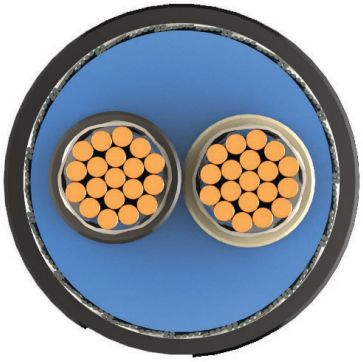

Application

- Power circuit below 1kV, Lighting circuits, Trace heating circuits.
- Fixed installation power, control & lighting in safe areas, general purposes.
- Maximum operating conductor temperature 90℃

Standard Applied

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• Fire resistant :	IEC 60331-21(for cable overall dia. ≤ 20mm) IEC 60331-31(for cable overall dia. ›20mm)
• HCl emission :	IEC 60754-1, 0.5% ↓ for Halogen free cable
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0.6/1kV Power Cable Fire resistance

LV Unarmoured Power & Lighting Cables 0.6/1kV EXY / EXI
LV Armoured Power & Lighting Cables 0.6/1kV ECY / ECI

No. of core	Conductor			Thickness of insulation	Unarmoured, EXY Unarmoured, EXI			Armoured, ECY Armoured, ECI					
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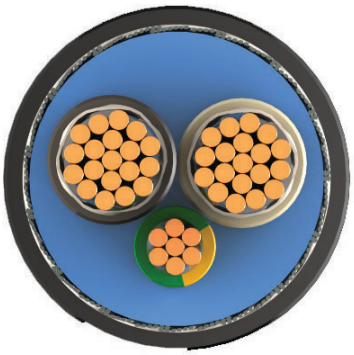
EA	mm²	EA	mm	mm	mm	mm	kg/km	mm	mm	mm	mm	mm	kg/km
2	1.5	7	1.7	0.7	1.1	10.6±0.4	130	1.0	9.4 ±0.4	0.3	1.2	13.4 ±0.5	245
	2.5	7	2.2	0.7	1.2	11.6±0.5	165	1.0	10.2 ±0.4	0.3	1.2	14.4 ±0.6	290
	4	7	2.7	0.7	1.2	12.8±0.5	210	1.0	11.4 ±0.5	0.3	1.2	15.6 ±0.6	355
	6	7	3.3	0.7	1.2	13.8±0.6	265	1.0	12.4 ±0.5	0.3	1.4	16.8 ±0.7	425
	10	7	4.2	0.7	1.3	16.0±0.6	385	1.0	14.4 ±0.6	0.3	1.4	18.8 ±0.8	555
	16	7	5.3	0.7	1.4	18.2±0.7	540	1.0	16.4 ±0.7	0.3	1.5	21.0 ±0.8	730
	25	7	6.6	0.9	1.5	21.8±0.9	805	1.0	19.8 ±0.8	0.3	1.6	24.6 ±1.0	1,040
	35	7	7.9	0.9	1.7	25.0±1.0	1,085	1.0	22.6 ±0.9	0.3	1.8	27.8 ±1.1	1,340
	50	19	9.1	1.0	1.8	28.0±1.1	1,400	1.0	25.4 ±1.0	0.3	1.9	30.8 ±1.2	1,690
	70	19	11.0	1.1	1.9	32.2±1.3	1,930	1.2	29.6 ±1.2	0.3	2.0	35.2 ±1.4	2,275
	95	19	12.9	1.1	2.1	36.4±1.5	2,565	1.2	33.4 ±1.3	0.4	2.2	39.8 ±1.6	3,035
	120	37	14.5	1.2	2.2	40.2±1.6	3,180	1.4	37.3 ±1.5	0.4	2.4	44.1 ±1.8	3,745
	150	37	16.2	1.4	2.4	44.6±1.8	3,900	1.4	41.3 ±1.7	0.4	2.5	48.3 ±1.9	4,505
	185	37	18.0	1.6	2.6	49.4±2.0	4,835	1.4	45.7 ±1.8	0.4	2.7	53.1 ±2.1	5,505
	240	61	20.6	1.7	2.8	55.6±2.2	6,245	1.6	51.7 ±2.1	0.4	2.9	59.5 ±2.4	7,015
	300	61	23.1	1.8	3.0	61.2±2.4	7,710	1.6	56.9 ±2.3	0.4	3.1	65.1 ±2.6	8,555

Conductor	Tinned copper, class2	Tinned copper, Class2
Fire proof layer	Mica/glass tape	Mica/glass tape
Insulation	HF-HEPR	HF-HEPR
Cabling	If necessary with filler	If necessary with filler
Inner covering	Not applicable	Flexible compound
Armoring	Not applicable	Metal wire braid
Outer sheath	PVC or SHF1	PVC or SHF1

Identification of color

- Insulation
  - 1 core : White
  - 2 core : White, Black
  - 3 core : White, Black, Red
  - 4 core : White, Black, Red, Blue
  - Earth wire : Green/Yellow stripe
- Outer sheath : Black

Note) Any other colors purchaser required



Application

- Power circuit below 1kV, Lighting circuits, Trace heating circuits.
- Fixed installation power, control & lighting in safe areas, general purposes.
- Maximum operating conductor temperature 90℃

Standard Applied

• Design guideline :	IEC 60092-353
• Material properties :	IEC 60092-351, Insulation, HF-HEPR IEC 60092-359, Sheath, ST2 or SHF1
• Flame retardant :	IEC 60332-3, Cat. 'A'
• Fire resistant :	IEC 60331-21(for cable overall dia. ≤ 20mm) IEC 60331-31(for cable overall dia. ›20mm)
• HCl emission :	IEC 60754-1, 0.5% ↓ for Halogen free cable
• Smoke emission :	IEC 61034, transmittance 60% ↑ for Halogen free cable
• Cold properties(option) :	IEC 60811-1-4, Upgrade test at -30℃
• Oil resistant(option) :	IEEE Std. 1580-2001 Type T, at 70℃ for 4hours, for PVC sheathed cable
• Paint resistant(option) :	Maker standard (Epoxy, Alkyd paint, at 100℃ for 168hours)

0.6/1kV Power Cable Fire resistance

LV Unarmoured Power & Lighting Cables 0.6/1kV EXY / EXI
LV Armoured Power & Lighting Cables 0.6/1kV ECY / ECI

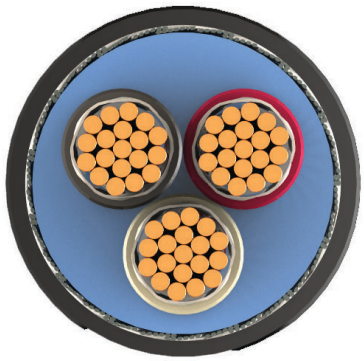
No. of core	Conductor			Thickness of insulation	Unarmoured, EXY Unarmoured, EXI			Armoured, ECY Armoured, ECI					
	Nominal sectional area	Min. No. of wires	Max. overall dia.		Thickness of sheath	Nominal dia. over sheath	Cable weight (approx.)	Thickness of inner covering	Nomina dia. over inner covering	Dia. of metal wire for braid	Thickness of outer sheath	Nominal overall dia.	Cable weight (approx.)
EA	mm²	EA	mm	mm	mm	mm	kg/km	mm	mm	mm	mm	mm	kg/km
2+E	25 16E	7 7	6.6 5.3	0.9 0.7	1.6	23.1 ±0.9	1005	1.0	21.3 ±0.9	0.3	1.7	26.3 ±1.1	1270
	35 25E	7 7	7.9 6.6	0.9 0.7	1.7	26.4 ±1.1	1375	1.0	24.4 ±1.0	0.3	1.8	29.6 ±1.2	1675
	50 25E	19 7	9.1 6.6	1.0 0.9	1.8	29.3 ±1.2	1695	1.2	27.4 ±1.1	0.3	2.0	33.0 ±1.3	2055
	70 35E	19 7	11.0 7.9	1.1 0.9	2.0	33.9 ±1.4	2340	1.2	31.6 ±1.3	0.4	2.1	37.8 ±1.5	2815
	95 50E	19 19	12.9 9.1	1.1 1.0	2.1	38.1 ±1.5	3090	1.2	35.6 ±1.4	0.4	2.3	42.2 ±1.7	3645
	120 70E	37 19	14.5 11.0	1.2 1.1	2.3	42.4 ±1.7	3940	1.4	39.8 ±1.6	0.4	2.5	46.8 ±1.9	4580
	150 95E	37 19	16.2 12.9	1.4 1.1	2.5	47.1 ±1.9	4920	1.4	44.1 ±1.8	0.4	2.6	51.3 ±2.1	5610
	185 95E	37 19	18.0 12.9	1.6 1.1	2.6	51.6 ±2.1	5840	1.6	48.8 ±2.0	0.4	2.8	56.4 ±2.3	6655
	240 120E	61 37	20.6 14.5	1.7 1.2	2.9	58.3 ±2.3	7525	1.6	54.9 ±2.2	0.4	3.1	63.1 ±2.5	8440
	300 150E	61 37	23.1 16.2	1.8 1.4	3.1	64.2 ±2.6	9275	1.6	60.4 ±2.4	0.4	3.3	69.0 ±2.8	10285

Conductor	Tinned copper, class2	Tinned copper, Class2
Fire proof layer	Mica/glass tape	Mica/glass tape
Insulation	HF-HEPR	HF-HEPR
Cabling	If necessary with filler	If necessary with filler
Inner covering	Not applicable	Flexible compound
Armoring	Not applicable	Metal wire braid
Outer sheath	PVC or SHF1	PVC or SHF1

Identification of color

- Insulation
  - 1 core : White
  - 2 core : White, Black
  - 3 core : White, Black, Red
  - 4 core : White, Black, Red, Blue
  - Earth wire : Green/Yellow stripe
- Outer sheath : Black

Note) Any other colors purchaser required



Application

- Power circuit below 1kV, Lighting circuits, Trace heating circuits.
- Fixed installation power, control & lighting in safe areas, general purposes.
- Maximum operating conductor temperature 90℃

Standard Applied

• Design guideline :	IEC 60092-353
• Material properties :	IEC 60092-351, Insulation, HF-HEPR IEC 60092-359, Sheath, ST2 or SHF1
• Flame retardant :	IEC 60332-3, Cat. 'A'
• Fire resistant :	IEC 60331-21(for cable overall dia. ≤ 20mm) IEC 60331-31(for cable overall dia. ⟩20mm)
• HCl emission :	IEC 60754-1, 0.5% ↓ for Halogen free cable
• Smoke emission :	IEC 61034, transmittance 60% ↑ for Halogen free cable
• Cold properties(option) :	IEC 60811-1-4, Upgrade test at -30℃
• Oil resistant(option) :	IEEE Std. 1580-2001 Type T, at 70℃ for 4hours, for PVC sheathed cable
• Paint resistant(option) :	Maker standard (Epoxy, Alkyd paint, at 100℃ for 168hours)

0.6/1kV Power Cable Fire resistance

LV Unarmoured Power & Lighting Cables 0.6/1kV EXY / EXI
LV Armoured Power & Lighting Cables 0.6/1kV ECY / ECI

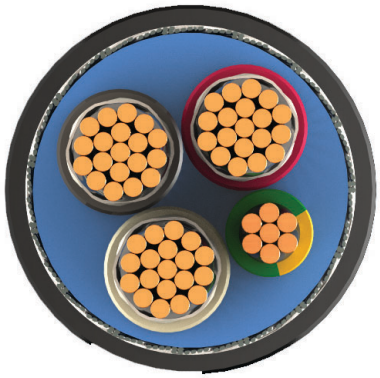
No. of core	Conductor			Thickness of insulation	Unarmoured, EXY Unarmoured, EXI			Armoured, ECY Armoured, ECI					
	Nominal sectional area	Min. No. of wires	Max. overall dia.		Thickness of sheath	Nominal dia. over sheath	Cable weight (approx.)	Thickness of inner covering	Nomina dia. over inner covering	Dia. of metal wire for braid	Thickness of outer sheath	Nominal overall dia.	Cable weight (approx.)
EA	mm²	EA	mm	mm	mm	mm	kg/km	mm	mm	mm	mm	mm	kg/km
3	1.5	7	1.7	0.7	1.2	11.4±0.5	165	1.0	10.0±0.4	0.3	1.3	14.2±0.6	290
	2.5	7	2.2	0.7	1.2	12.3±0.5	205	1.0	10.9±0.4	0.3	1.3	15.1±0.6	345
	4	7	2.7	0.7	1.2	13.6±0.5	270	1.0	12.2±0.5	0.3	1.3	16.4±0.7	420
	6	7	3.3	0.7	1.3	14.9±0.6	355	1.0	13.3±0.5	0.3	1.4	17.7±0.7	515
	10	7	4.2	0.7	1.4	17.2±0.7	515	1.0	15.4±0.6	0.3	1.5	20.0±0.8	695
	16	7	5.3	0.7	1.5	19.6±0.8	730	1.0	17.6±0.7	0.3	1.6	22.4±0.9	940
	25	7	6.6	0.9	1.6	23.4±0.9	1,100	1.0	21.2±0.8	0.3	1.7	26.2±1.0	1,345
	35	7	7.9	0.9	1.7	26.6±1.1	1,465	1.0	24.2±1.0	0.3	1.8	29.4±1.2	1,740
	50	19	9.1	1.0	1.8	29.9±1.2	1,910	1.2	27.5±1.1	0.3	2.0	33.1±1.3	2,245
	70	19	11.0	1.1	2.0	34.6±1.4	2,660	1.2	31.8±1.3	0.4	2.1	38.0±1.5	3,110
	95	19	12.9	1.1	2.2	39.1±1.6	3,555	1.2	35.9±1.4	0.4	2.3	42.5±1.7	4,060
	120	37	14.5	1.2	2.3	43.1±1.7	4,420	1.4	40.0±1.5	0.4	2.5	47.0±1.9	5,020
	150	37	16.2	1.4	2.5	47.9±1.9	5,420	1.4	44.4±1.8	0.4	2.6	51.6±2.1	6,065
	185	37	18.0	1.6	2.7	53.0±2.1	6,725	1.6	49.3±2.0	0.4	2.8	56.9±2.3	7,460
	240	61	20.6	1.7	2.9	59.6±2.4	8,700	1.6	55.5±2.2	0.4	3.1	63.7±2.5	9,550
	300	61	23.1	1.8	3.2	65.8±2.6	10,785	1.6	61.1±2.4	0.4	3.3	69.7±2.8	11,695

Conductor	Tinned copper, class2	Tinned copper, Class2
Fire proof layer	Mica/glass tape	Mica/glass tape
Insulation	HF-HEPR	HF-HEPR
Cabling	If necessary with filler	If necessary with filler
Inner covering	Not applicable	Flexible compound
Armoring	Not applicable	Metal wire braid
Outer sheath	PVC or SHF1	PVC or SHF1

Identification of color

- Insulation
  - 1 core : White
  - 2 core : White, Black
  - 3 core : White, Black, Red
  - 4 core : White, Black, Red, Blue
  - Earth wire : Green/Yellow stripe
- Outer sheath : Black

Note) Any other colors purchaser required



Application

- Power circuit below 1kV, Lighting circuits, Trace heating circuits.
- Fixed installation power, control & lighting in safe areas, general purposes.
- Maximum operating conductor temperature 90℃

Standard Applied

• Design guideline :	IEC 60092-353
• Material properties :	IEC 60092-351, Insulation, HF-HEPR IEC 60092-359, Sheath, ST2 or SHF1
• Flame retardant :	IEC 60332-3, Cat. 'A'
• Fire resistant :	IEC 60331-21(for cable overall dia. ≤ 20mm) IEC 60331-31(for cable overall dia. ›20mm)
• HCl emission :	IEC 60754-1, 0.5% ↓ for Halogen free cable
• Smoke emission :	IEC 61034, transmittance 60% ↑ for Halogen free cable
• Cold properties(option) :	IEC 60811-1-4, Upgrade test at -30℃
• Oil resistant(option) :	IEEE Std. 1580-2001 Type T, at 70℃ for 4hours, for PVC sheathed cable
• Paint resistant(option) :	Maker standard (Epoxy, Alkyd paint, at 100℃ for 168hours)

0.6/1kV Power Cable Fire resistance

LV Unarmoured Power & Lighting Cables 0.6/1kV EXY / EXI
LV Armoured Power & Lighting Cables 0.6/1kV ECY / ECI

No. of core	Conductor			Thickness of insulation	Unarmoured, EXY Unarmoured, EXI			Armoured, ECY Armoured, ECI					
	Nominal sectional area	Min. No. of wires	Max. overall dia.		Thickness of sheath	Nominal dia. over sheath	Cable weight (approx.)	Thickness of inner covering	Nomina dia. over inner covering	Dia. of metal wire for braid	Thickness of outer sheath	Nominal overall dia.	Cable weight (approx.)
EA	mm²	EA	mm	mm	mm	mm	kg/km	mm	mm	mm	mm	mm	kg/km
3+E	25 16E	7 7	6.6 5.3	0.9 0.7	1.7	25.2±1.0	1305	1.0	23.2±0.9	0.3	1.8	28.4±1.1	1590
	35 25E	7 7	7.9 6.6	0.9 0.7	1.8	28.9±1.2	1775	1.2	27.0±1.1	0.3	1.9	32.4±1.3	2120
	50 25E	19 7	9.1 6.6	1.0 0.9	1.9	31.8±1.3	2220	1.2	29.7±1.2	0.3	2.0	35.3±1.4	2595
	70 35E	19 7	11.0 7.9	1.1 0.9	2.1	36.7±1.5	3075	1.2	34.2±1.4	0.4	2.2	40.6±1.6	3590
	95 50E	19 19	12.9 9.1	1.1 1.0	2.3	41.4±1.7	4100	1.4	38.8±1.6	0.4	2.4	45.6±1.8	4705
	120 70E	37 19	14.5 11.0	1.2 1.1	2.4	46.1±1.8	5185	1.4	43.3±1.7	0.4	2.6	50.5±2.0	5875
	150 95E	37 19	16.2 12.9	1.4 1.1	2.6	51.2±2.0	6450	1.6	48.4±1.9	0.4	2.8	56.0±2.2	7260
	185 95E	37 19	18.0 12.9	1.6 1.1	2.8	55.8±2.2	7755	1.6	52.6±2.1	0.4	3.0	60.6±2.4	8635
	240 120E	61 37	20.6 14.5	1.7 1.2	3.1	62.9±2.5	10010	1.6	59.1±2.4	0.4	3.2	67.5±2.7	10970
	300 150E	61 37	23.1 16.2	1.8 1.4	3.3	69.3±2.8	12365	1.8	65.4±2.6	0.4	3.5	74.4±3.0	13490

Conductor	Tinned copper, class2	Tinned copper, Class2
Fire proof layer	Mica/glass tape	Mica/glass tape
Insulation	HF-HEPR	HF-HEPR
Cabling	If necessary with filler	If necessary with filler
Inner covering	Not applicable	Flexible compound
Armoring	Not applicable	Metal wire braid
Outer sheath	PVC or SHF1	PVC or SHF1

Identification of color

- Insulation
  - 1 core : White
  - 2 core : White, Black
  - 3 core : White, Black, Red
  - 4 core : White, Black, Red, Blue
  - Earth wire : Green/Yellow stripe
- Outer sheath : Black

Note) Any other colors purchaser required

Application

- Power circuit below 1kV, Lighting circuits, Trace heating circuits.
- Fixed installation power, control & lighting in safe areas, general purposes.
- Maximum operating conductor temperature 90℃

Standard Applied

• Design guideline :	IEC 60092-353
• Material properties :	IEC 60092-351, Insulation, HF-HEPR IEC 60092-359, Sheath, ST2 or SHF1
• Flame retardant :	IEC 60332-3, Cat. 'A'
• Fire resistant :	IEC 60331-21(for cable overall dia. ≤ 20mm) IEC 60331-31(for cable overall dia. ⟩20mm)
• HCl emission :	IEC 60754-1, 0.5% ↓ for Halogen free cable
• Smoke emission :	IEC 61034, transmittance 60% ↑ for Halogen free cable
• Cold properties(option) :	IEC 60811-1-4, Upgrade test at -30℃
• Oil resistant(option) :	IEEE Std. 1580-2001 Type T, at 70℃ for 4hours, for PVC sheathed cable
• Paint resistant(option) :	Maker standard (Epoxy, Alkyd paint, at 100℃ for 168hours)

0.6/1kV Power Cable Fire resistance

LV Unarmoured Power & Lighting Cables 0.6/1kV EXY / EXI
LV Armoured Power & Lighting Cables 0.6/1kV ECY / ECI

No. of core	Conductor			Thickness of insulation	Unarmoured, EXY Unarmoured, EXI			Armoured, ECY Armoured, ECI					
	Nominal sectional area	Min. No. of wires	Max. overall dia.		Thickness of sheath	Nominal dia. over sheath	Cable weight (approx.)	Thickness of inner covering	Nomina dia. over inner covering	Dia. of metal wire for braid	Thickness of outer sheath	Nominal overall dia.	Cable weight (approx.)
EA	mm²	EA	mm	mm	mm	mm	kg/km	mm	mm	mm	mm	mm	kg/km
4	1.5	7	1.7	0.7	1.2	12.5±0.5	205	1.0	11.1±0.4	0.3	1.3	15.3±0.6	345
	2.5	7	2.2	0.7	1.2	13.4±0.5	255	1.0	12.0±0.5	0.3	1.3	16.2±0.6	405
	4	7	2.7	0.7	1.3	15.1±0.6	350	1.0	13.5±0.5	0.3	1.4	17.9±0.7	510
	6	7	3.3	0.7	1.3	16.3±0.7	445	1.0	14.7±0.6	0.3	1.4	19.1±0.8	620
	10	7	4.2	0.7	1.4	18.9±0.8	655	1.0	17.1±0.7	0.3	1.5	21.7±0.9	855
	16	7	5.3	0.7	1.5	21.5±0.9	935	1.0	19.5±0.8	0.3	1.6	24.3±1.0	1,160
	25	7	6.6	0.9	1.7	26.0±1.0	1,425	1.0	23.6±0.9	0.3	1.8	28.8±1.2	1,695
	35	7	7.9	0.9	1.8	29.6±1.2	1,900	1.2	27.2±1.1	0.3	1.9	32.6±1.3	2,220
	50	19	9.1	1.0	2.0	33.4±1.3	2,495	1.2	30.6±1.2	0.4	2.1	36.8±1.5	2,925
	70	19	11.0	1.1	2.2	38.6±1.5	3,475	1.2	35.4±1.4	0.4	2.3	42.0±1.7	3,975
	95	19	12.9	1.1	2.3	43.4±1.7	4,630	1.4	40.3±1.6	0.4	2.5	47.3±1.9	5,235
	120	37	14.5	1.2	2.5	48.1±1.9	5,780	1.4	44.6±1.8	0.4	2.7	52.0±2.1	6,450
	150	37	16.2	1.4	2.7	53.4±2.1	7,085	1.6	49.7±2.0	0.4	2.9	57.5±2.3	7,850
	185	37	18.0	1.6	2.9	59.1±2.4	8,800	1.6	55.0±2.2	0.4	3.1	63.2±2.5	9,640
	240	61	20.6	1.7	3.2	66.7±2.7	11,415	1.8	62.3±2.5	0.4	3.4	71.1±2.8	12,405
	300	61	23.1	1.8	3.5	73.5±2.9	14,145	1.8	68.5±2.7	0.4	3.6	77.7±3.1	15,200

Conductor	Tinned copper, class2	Tinned copper, Class2
Fire proof layer	Mica/glass tape	Mica/glass tape
Insulation	HF-HEPR	HF-HEPR
Cabling	If necessary with filler	If necessary with filler
Inner covering	Not applicable	Flexible compound
Armoring	Not applicable	Metal wire braid
Outer sheath	PVC or SHF1	PVC or SHF1

Identification of color

- Insulation
  - 1 core : White
  - 2 core : White, Black
  - 3 core : White, Black, Red
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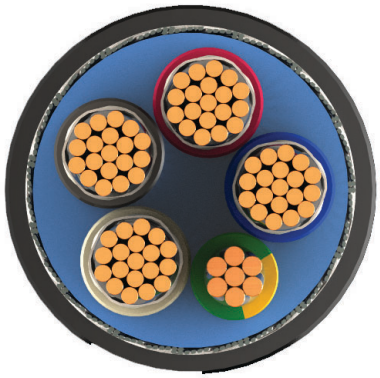
  - Earth wire : Green/Yellow stripe
- Outer sheath : Black

Note) Any other colors purchaser required



Application

- Power circuit below 1kV, Lighting circuits, Trace heating circuits.
- Fixed installation power, control & lighting in safe areas, general purposes.
- Maximum operating conductor temperature 90℃

Standard Applied

• Design guideline :	IEC 60092-353
• Material properties :	IEC 60092-351, Insulation, HF-HEPR IEC 60092-359, Sheath, ST2 or SHF1
• Flame retardant :	IEC 60332-3, Cat. 'A'
• Fire resistant :	IEC 60331-21(for cable overall dia. ≤ 20mm) IEC 60331-31(for cable overall dia. ›20mm)
• HCl emission :	IEC 60754-1, 0.5% ↓ for Halogen free cable
• Smoke emission :	IEC 61034, transmittance 60% ↑ for Halogen free cable
• Cold properties(option) :	IEC 60811-1-4, Upgrade test at -30℃
• Oil resistant(option) :	IEEE Std. 1580-2001 Type T, at 70℃ for 4hours, for PVC sheathed cable
• Paint resistant(option) :	Maker standard (Epoxy, Alkyd paint, at 100℃ for 168hours)

0.6/1kV Power Cable Fire resistance

LV Unarmoured Power & Lighting Cables 0.6/1kV EXY / EXI
LV Armoured Power & Lighting Cables 0.6/1kV ECY / ECI

No. of core	Conductor			Thickness of insulation	Unarmoured, EXY Unarmoured, EXI			Armoured, ECY Armoured, ECI					
	Nominal sectional area	Min. No. of wires	Max. overall dia.		Thickness of sheath	Nominal dia. over sheath	Cable weight (approx.)	Thickness of inner covering	Nomina dia. over inner covering	Dia. of metal wire for braid	Thickness of outer sheath	Nominal overall dia.	Cable weight (approx.)
EA	mm²	EA	mm	mm	mm	mm	kg/km	mm	mm	mm	mm	mm	kg/km
4+E	25 16E	7 7	6.6 5.3	0.9 0.7	1.8	28.5 ±1.1	1635	1.0	26.3 ±1.1	0.3	1.9	31.7±1.3	1955
	35 25E	7 7	7.9 6.6	0.9 0.7	1.9	32.6 ±1.3	2220	1.2	30.5 ±1.2	0.4	2.1	36.7±1.5	2695
	50 25E	19 7	9.1 6.6	1.0 0.9	2.1	36.4 ±1.5	2815	1.2	33.9 ±1.4	0.4	2.2	40.3±1.6	3325
	70 35E	19 7	11.0 7.9	1.1 0.9	2.3	42.1 ±1.7	3905	1.4	39.5 ±1.6	0.4	2.5	46.5±1.9	4540
	95 50E	19 19	12.9 9.1	1.1 1.0	2.5	47.5 ±1.9	5210	1.4	44.5 ±1.8	0.4	2.7	51.9±2.1	5925
	120 70E	37 19	14.5 11.0	1.2 1.1	2.7	52.8 ±2.1	6585	1.6	49.8 ±2.0	0.4	2.9	57.6±2.3	7420
	150 95E	37 19	16.2 12.9	1.4 1.1	2.9	58.7 ±2.3	8165	1.6	55.3 ±2.2	0.4	3.1	63.5±2.5	9090
	185 95E	37 19	18.0 12.9	1.6 1.1	3.1	64.4 ±2.6	9880	1.6	60.6 ±2.4	0.4	3.3	69.2±2.8	10895
	240 120E	61 37	20.6 14.5	1.7 1.2	3.4	72.5 ±2.9	12765	1.8	68.4 ±2.7	0.4	3.6	77.6±3.1	13945
	300 150E	61 37	23.1 16.2	1.8 1.4	3.7	80.1± 3.2	15800	1.8	75.4 ±3.0	0.4	3.9	85.2±3.4	17100

Conductor	Tinned copper, class2	Tinned copper, Class2
Fire proof layer	Mica/glass tape	Mica/glass tape
Insulation	HF-HEPR	HF-HEPR
Cabling	If necessary with filler	If necessary with filler
Inner covering	Not applicable	Flexible compound
Armoring	Not applicable	Metal wire braid
Outer sheath	PVC or SHF1	PVC or SHF1

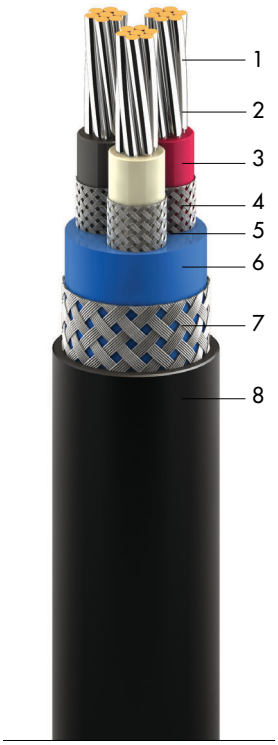
Identification of color

- Insulation
  - 1 core : White
  - 2 core : White, Black
  - 3 core : White, Black, Red
  - 4 core : White, Black, Red, Blue
  - Earth wire : Green/Yellow stripe
- Outer sheath : Black

Note) Any other colors purchaser required

Attached table9 Fire resistance

LV Unarmoured Power & Lighting Cables with Individual Shield 0.6/1kV EXY-S / EXI-S
LV Armoured Power & Lighting Cables with Individual Shield 0.6/1kV ECY-S (EBY-S:1C) / ECI-S (EBI-S:1C)



Construction Details

1 **Conductor** : Stranded tinned annealed copper as per IEC 60228, class 2
2 **Fire proof layer** : Mica/Glass tape
3 **Insulation** : High modulus Ethylene-propylene rubber as per IEC 60092-351, HF-HEPR
4 **Individual screen** : Tinned annealed copper wire braid at least 0.1mm
A suitable separator tape or tapes may be applied under and/or over the braid screen.
5 **Cabling (with filler)**
6 **Inner covering (except EXY-S, EXI-S)** : Flexible compound covering
7 **Amour (Applied to armoured cable)** : Metal wire braid
1 Core : Bronze (Copper alloy) wire braid as per IEC 60092-353
Multi Core : Galvanized steel wire braid as per IEC 60092-353
A suitable separator tape or tapes may be applied under and/or over the armour.
8 **Outer sheath** : see table
Code EXY-S & ECY-S : Premium Polyvinyl chloride compound (PVC) as per IEC 60092-359, ST2
Code EXI-S & ECI-S : Enhanced Halogen free thermoplastic compound as per IEC 60092-359, SHF1

Type	Sheath material	Type	Sheath material
Basic cable	Flame retardant PVC as per IEC 60092-359, ST2	Paint resistant cable	Paint resistant PVC as per IEC 60092-359, ST2
Normal cable	General PVC as per IEC 60092-359, ST2	Premium	Flame & Paint resistant PVC as per IEC 60092-359, ST2

Note) In case of copper or bronze wire braided armour, the armour designation code is applied "O" or "B" instead of "C"

Approvals

ABS, Lloyd's Register, DNV, Bureau Veritas, Germanischer Lloyd, KR Korean Register, ClassNK

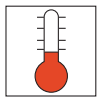
Standard Applied

- **Design guideline** : IEC 60092-353
- **Material properties** : IEC 60092-351, Insulation, HEPR
  IEC 60092-359, Sheath, ST2 or SHF1
- **Flame retardant** : IEC 60332-3, Cat. 'A'
- **Fire resistant** : IEC 60331-21(for cable overall dia. ≤ 20mm)
  IEC 60331-31(for cable overall dia. ›20mm)
- **HCl emission** : IEC 60754-1, 0.5% ↓ for Halogen free cable
- **Smoke emission** : IEC 61034, transmittance 60% ↑ for Halogen free cable
- **Cold properties(option)** : IEC 60811-1-4, Upgrade test at -30℃
- **Oil resistant(option)** : IEEE Std. 1580-2001 Type T, at 70℃ for 4hours, for PVC sheathed cable
- **Paint resistant(option)** : Maker standard (Epoxy, Alkyd paint, at 100℃ for 168hours)

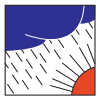
Identification of color

- **Insulation**
  - 1 core : White
  - 2 core : White, Black
  - 3 core : White, Black, Red
  - 4 core : White, Black, Red, Blue
  - Earth wire : Green/Yellow stripe
- **Outer sheath** : Black

Note) Any other colors purchaser required


-30 to 90℃


Flame retardant IEC 60332-3, A & IEC 60331-31

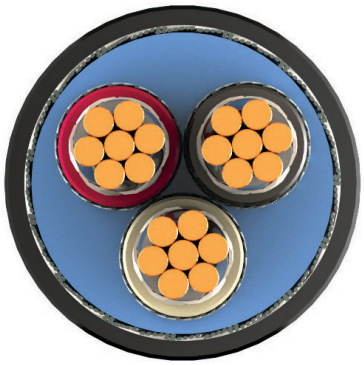

Weather Resistance to severe weather conditions


Flexibility

Halogen free IEC 60754-1 (option)


Smoke density IEC 61034 (option)


Gass toxicity No (option)



Application

- Power circuit below 1kV, Lighting circuits, Trace heating circuits.
- Fixed installation power, control & lighting in safe areas, general purposes.
- Maximum operating conductor temperature 90℃

Standard Applied

• Design guideline :	IEC 60092-353
• Material properties :	IEC 60092-351, Insulation, HF-HEPR IEC 60092-359, Sheath, ST2 or SHF1
• Flame retardant :	IEC 60332-3, Cat. 'A'
• Fire resistant :	IEC 60331-21(for cable overall dia. ≤ 20mm) IEC 60331-31(for cable overall dia. ›20mm)
• HCl emission :	IEC 60754-1, 0.5% ↓ for Halogen free cable
• Smoke emission :	IEC 61034, transmittance 60% ↑ for Halogen free cable
• Cold properties(option) :	IEC 60811-1-4, Upgrade test at -30℃
• Oil resistant(option) :	IEEE Std. 1580-2001 Type T, at 70℃ for 4hours, for PVC sheathed cable
• Paint resistant(option) :	Maker standard (Epoxy, Alkyd paint, at 100℃ for 168hours)

0.6/1kV Lighting Cable Fire resistance

LV Unarmoured Power & Lighting Cables with Individual Shield 0.6/1kV EXY-S / EXI-S
LV Armoured Power & Lighting Cables with Individual Shield 0.6/1kV ECY-S (EBY-S:1C) / ECI-S (EBI-S:1C)

No. of core	Conductor			Thickness of insulation	Unarmoured, EXY-S Unarmoured, EXI-S			Armoured, ECY-S(EBY-S:1C) Armoured, ECI-S(EBI-S:1C)					
	Nominal sectional area	Min. No. of wires	Max. overall dia.		Thickness of sheath	Nominal dia. over sheath	Cable weight (approx.)	Thickness of inner covering	Nomina dia. over inner covering	Dia. of metal wire for braid	Thickness of outer sheath	Nominal overall dia.	Cable weight (approx.)
EA	mm²	EA	mm	mm	mm	mm	kg/km	mm	mm	mm	mm	mm	kg/km
1	1.5	7	1.7	0.7	1.0	6.8±0.4	75	1.0	5.8±0.4	0.3	1.1	9.6±0.4	160
	2.5	7	2.2	0.7	1.0	7.2±0.4	90	1.0	6.2±0.4	0.3	1.1	10.0±0.4	175
	4	7	2.7	0.7	1.0	7.9±0.4	115	1.0	6.9±0.4	0.3	1.1	10.7±0.4	210
	6	7	3.3	0.7	1.0	8.4±0.4	140	1.0	7.4±0.4	0.3	1.2	11.4±0.5	245
	10	7	4.2	0.7	1.1	9.6±0.4	195	1.0	8.4±0.4	0.3	1.2	12.4±0.5	315
	16	7	5.3	0.7	1.1	10.6±0.4	265	1.0	9.4±0.4	0.3	1.2	13.4±0.5	395
2	1.5	7	1.7	0.7	1.2	12.0±0.5	180	1.0	10.6±0.4	0.3	1.3	14.8±0.6	305
	2.5	7	2.2	0.7	1.2	12.8±0.5	210	1.0	11.4±0.5	0.3	1.3	15.6±0.6	355
	4	7	2.7	0.7	1.3	14.4±0.6	280	1.0	12.8±0.5	0.3	1.4	17.2±0.7	435
	6	7	3.3	0.7	1.3	15.4±0.6	340	1.0	13.8±0.6	0.3	1.4	18.2±0.7	505
	10	7	4.2	0.7	1.4	17.6±0.7	470	1.0	15.8±0.6	0.3	1.5	20.4±0.8	655
	16	7	5.3	0.7	1.5	19.8±0.8	635	1.0	17.8±0.7	0.3	1.6	22.6±0.9	840
3	1.5	7	1.7	0.7	1.2	12.7±0.5	225	1.0	11.3±0.5	0.3	1.3	15.5±0.6	370
	2.5	7	2.2	0.7	1.2	13.6±0.5	275	1.0	12.2±0.5	0.3	1.3	16.4±0.7	425
	4	7	2.7	0.7	1.3	15.3±0.6	370	1.0	13.7±0.5	0.3	1.4	18.1±0.7	530
	6	7	3.3	0.7	1.3	16.4±0.7	450	1.0	14.8±0.6	0.3	1.4	19.2±0.8	625
	10	7	4.2	0.7	1.4	18.7±0.7	630	1.0	16.9±0.7	0.3	1.5	21.5±0.9	825
	16	7	5.3	0.7	1.5	21.1±0.8	855	1.0	19.1±0.8	0.3	1.6	23.9±1.0	1,080
4	1.5	7	1.7	0.7	1.3	14.1±0.6	290	1.0	12.5±0.5	0.3	1.4	16.9±0.7	445
	2.5	7	2.2	0.7	1.3	15.1±0.6	355	1.0	13.5±0.5	0.3	1.4	17.9±0.7	515
	4	7	2.7	0.7	1.4	17.0±0.7	475	1.0	15.2±0.6	0.3	1.5	19.8±0.8	655
	6	7	3.3	0.7	1.4	18.2±0.7	585	1.0	16.4±0.7	0.3	1.5	21.0±0.8	775
	10	7	4.2	0.7	1.5	20.8±0.8	815	1.0	18.8±0.8	0.3	1.6	23.6±0.9	1,035
	16	7	5.3	0.7	1.6	23.4±0.9	1,120	1.0	21.2±0.8	0.3	1.7	26.2±1.0	1,360

Conductor	Tinned copper, class2	Tinned copper, Class2
Fire proof layer	Mica/glass tape	Mica/glass tape
Insulation	HF-HEPR	HF-HEPR
Individual screen	Tinned copper wire braid	Tinned copper wire braid
Cabling	If necessary with filler	If necessary with filler
Inner covering	Not applicable	Flexible compound
Armoring	Not applicable	Metal wire braid
Outer sheath	PVC or SHF1	PVC or SHF1

Identification of color

- Insulation
  - 1 core : White
  - 2 core : White, Black
  - 3 core : White, Black, Red
  - 4 core : White, Black, Red, Blue
  - Earth wire : Green/Yellow stripe
- Outer sheath : Black

Note) Any other colors purchaser required

Attached table10 Fire resistance

LV Unarmoured Control Cables 250V EXY / EXI
LV Armoured Control Cables 250V EOY / EOI

Construction Details

1 **Conductor** : Stranded tinned annealed copper as per IEC 60228, class 2

2 **Fire proof layer** : Mica/Glass tape

3 **Insulation** : High modulus Ethylene-propylene rubber as per IEC 60092-351, HF-HEPR

4 **Cabling (with filler)**

5 **Common screen (Option[1])** : AL/PS tape with drain wire
A suitable separator tape or tapes may be applied under and/or over the braid screen.

6 **Inner covering (except EXY, EXI)** : Lapped covering

7 **Amour (Applied to armoured cable)** : Copper wire braid as per IEC 60092-376
A suitable separator tape or tapes may be applied under and/or over the armour.

8 **Outer sheath** : see table
Code EXY & EOY : Premium Polyvinyl chloride compound (PVC) as per IEC 60092-359, ST2
Code EXI & EOI : Enhanced Halogen free thermoplastic compound as per IEC 60092-359, SHF1

Type	Sheath material	Type	Sheath material
Basic cable	Flame retardant PVC as per IEC 60092-359, ST2	Paint resistant cable	Paint resistant PVC as per IEC 60092-359, ST2
Normal cable	General PVC as per IEC 60092-359, ST2	Premium	Flame & Paint resistant PVC as per IEC 60092-359, ST2

Note) Option[1]) In case of common screen type, letter "(C)" shall be suffixed to the end letter of cable symbol.

Standard Applied

- **Design guideline** : IEC 60092-376
- **Material properties** : IEC 60092-351, Insulation, HEPR
  IEC 60092-359, Sheath, ST2 or SHF1
- **Flame retardant** : IEC 60332-3, Cat. 'A'
- **Fire resistant** : IEC 60331-21(for cable overall dia. ≤ 20mm)
  IEC 60331-31(for cable overall dia. ›20mm)
- **HCl emission** : IEC 60754-1, 0.5% ↓ for Halogen free cable
- **Smoke emission** : IEC 61034, transmittance 60% ↑ for Halogen free cable
- **Cold properties(option)** : IEC 60811-1-4, Upgrade test at -30℃
- **Oil resistant(option)** : IEEE Std. 1580-2001 Type T, at 70℃ for 4hours, for PVC sheathed cable
- **Paint resistant(option)** : Maker standard (Epoxy, Alkyd paint, at 100℃ for 168hours)

Identification of color

- **Insulation**
  - By numbering on white colored insulation
- **Outer sheath** : Black

Note) Any other colors purchaser required

Approvals

ABS, Lloyd's Register, DNV, Bureau Veritas, Germanischer Lloyd, KR Korean Register, ClassNK


-30 to 90℃


Flame retardant IEC 60332-3, A & IEC 60331-31


Weather Resistance to severe weather conditions


Flexibility

Halogen free IEC 60754-1 (option)


Smoke density IEC 61034 (option)


Gass toxicity No (option)

Application

- Instrument circuit upto 250V, instrument safe systems.
- Fixed installation for instrument, communication, control and alarm systems in both explosion risk and safe areas, general purposes.
- Maximum operating conductor temperature 90℃

Standard Applied

• Design guideline :	IEC 60092-376
• Material properties :	IEC 60092-351, Insulation, HF-HEPR IEC 60092-359, Sheath, ST2 or SHF1
• Flame retardant :	IEC 60332-3, Cat. 'A'
• Fire resistant :	IEC 60331-21(for cable overall dia. ≤ 20mm) IEC 60331-31(for cable overall dia. >20mm)
• HCl emission :	IEC 60754-1, 0.5% ↓ for Halogen free cable
• Smoke emission :	IEC 61034, transmittance 60% ↑ for Halogen free cable
• Cold properties(option) :	IEC 60811-1-4, Upgrade test at -30℃
• Oil resistant(option) :	IEEE Std. 1580-2001 Type T, at 70℃ for 4hours, for PVC sheathed cable
• Paint resistant(option) :	Maker standard (Epoxy, Alkyd paint, at 100℃ for 168hours)

250V Instrument Cable Fire resistance

LV Unarmoured Instrument Contral Cable 250V EXY / EXI
LV Armoured 250V EOY/ EOI

No. of core	Conductor			Thickness of insulation	Unarmoured, EXY Unarmoured, EXI			Armoured, EOY Armoured, EOI				
	Nominal sectional area	Min. No. of wires	Max. overall dia.		Thickness of sheath	Nominal dia. over sheath	Cable weight (approx.)	Nomina dia. over inner covering	Dia. of metal wire for braid	Thickness of outer sheath	Nominal overall dia.	Cable weight (approx.)
EA	mm²	EA	mm	mm	mm	mm	kg/km	mm	mm	mm	mm	kg/km
2	1.0	7	1.4	0.5	1.0	8.4±0.4	95	6.6±0.4	0.2	1.1	9.9±0.4	150
3	1.0	7	1.4	0.5	1.1	9.1±0.4	115	7.1±0.4	0.2	1.1	10.4±0.4	170
4	1.0	7	1.4	0.5	1.1	9.8±0.4	140	7.8±0.4	0.2	1.2	11.1±0.4	200
5	1.0	7	1.4	0.5	1.1	10.7±0.5	165	8.7±0.4	0.2	1.2	12.2±0.5	235
7	1.0	7	1.4	0.5	1.2	11.8±0.5	210	9.6±0.4	0.3	1.2	13.1±0.5	285
9	1.0	7	1.4	0.5	1.2	13.6±0.6	270	11.4±0.5	0.3	1.3	15.6±0.6	405
12	1.0	7	1.4	0.5	1.3	15.5±0.6	340	13.1±0.5	0.3	1.4	17.5±0.7	490
16	1.0	7	1.4	0.5	1.4	17.3±0.7	435	14.7±0.6	0.3	1.4	19.1±0.8	595
19	1.0	7	1.4	0.5	1.4	18.2±0.8	490	15.6±0.6	0.3	1.5	20.2±0.8	665
23	1.0	7	1.4	0.5	1.5	20.2±0.8	595	17.4±0.7	0.3	1.6	22.2±0.9	790
27	1.0	7	1.4	0.5	1.5	21.9±0.9	680	19.1±0.8	0.3	1.6	23.9±1.0	890
33	1.0	7	1.4	0.5	1.6	23.7±1.0	820	20.7±0.8	0.3	1.7	25.7±1.0	1,050
37	1.0	7	1.4	0.5	1.6	24.6±1.0	890	21.6±0.9	0.3	1.7	26.6±1.1	1,130
44	1.0	7	1.4	0.5	1.8	28.0±1.2	1,085	24.6±1.0	0.3	1.8	29.8±1.2	1,340
77	1.0	7	1.4	0.5	2.0	34.9±1.4	1,790	31.1±1.2	0.4	2.1	37.3±1.5	2,210

Conductor	Tinned copper, class2	Tinned copper, Class2
Fire proof layer	Mica/glass tape	Mica/glass tape
Insulation	HF-HEPR	HF-HEPR
Inner covering	Not applicable	Lapped covering
Armoring	Not applicable	Annealed copper wire braid
Outer sheath	PVC or SHF1	PVC or SHF1

Identification of color

- Insulation
  - By numbering on white colored insulation
- Outer sheath : Black
  Note) Any other colors purchaser required

Attached table11 Fire resistance

LV Unarmoured Control Cables with Individual Shield 250V EXY-S / EXI-S
LV Armoured Control Cables with Individual Shield 250V EOY-S / EOI-S

Construction Details

1 **Conductor** : Stranded tinned annealed copper as per IEC 60228, class 2

2 **Fire proof layer** : Mica/Glass tape

3 **Insulation** : High modulus Ethylene-propylene rubber as per IEC 60092-351, HF-HEPR

4 **Individual screen** : Tinned annealed copper wire braid at least 0.1mm
A suitable separator tape or tapes may be applied under and/or over the braid screen.

5 **Cabling (with filler)**

6 **Inner covering (except EXY-S, EXI-S)** : Lapped covering

7 **Amour (Applied to armoured cable)** : Copper wire braid as per IEC 60092-376
A suitable separator tape or tapes may be applied under and/or over the armour.

8 **Outer sheath** : see table
Code EXY-S & EOY-S : Premium Polyvinyl chloride compound (PVC) as per IEC 60092-359, ST2
Code EXI-S & EOI-S : Enhanced Halogen free thermoplastic compound as per IEC 60092-359, SHF1

Type	Sheath material	Type	Sheath material
Basic cable	Flame retardant PVC as per IEC 60092-359, ST2	Paint resistant cable	Paint resistant PVC as per IEC 60092-359, ST2
Normal cable	General PVC as per IEC 60092-359, ST2	Premium	Flame & Paint resistant PVC as per IEC 60092-359, ST2

Approvals

ABS, Lloyd's Register, DNV, Bureau Veritas, Germanischer Lloyd, KR Korean Register, ClassNK

Standard Applied

- **Design guideline** : IEC 60092-376
- **Material properties** : IEC 60092-351, Insulation, HEPR
  IEC 60092-359, Sheath, ST2 or SHF1
- **Flame retardant** : IEC 60332-3, Cat. 'A'
- **Fire resistant** : IEC 60331-21(for cable overall dia. ≤ 20mm)
  IEC 60331-31(for cable overall dia. ›20mm)
- **HCl emission** : IEC 60754-1, 0.5% ↓ for Halogen free cable
- **Smoke emission** : IEC 61034, transmittance 60% ↑ for Halogen free cable
- **Cold properties(option)** : IEC 60811-1-4, Upgrade test at -30℃
- **Oil resistant(option)** : IEEE Std. 1580-2001 Type T, at 70℃ for 4hours, for PVC sheathed cable
- **Paint resistant(option)** : Maker standard (Epoxy, Alkyd paint, at 100℃ for 168hours)

Identification of color

- **Insulation**
  - By numbering on white colored insulation
- **Outer sheath** : Black

Note) Any other colors purchaser required

-30 to 90℃ | Flame retardant IEC 60332-3, A & IEC 60331-31 | Weather Resistance to severe weather conditions | Flexibility | Halogen free IEC 60754-1 (option) | Smoke density IEC 61034 (option) | Gass toxicity No (option)

Application

- Instrument circuit upto 250V, instrument safe systems.
- Fixed installation for instrument, communication, control and alarm systems in both explosion risk and safe areas, general purposes.
- Maximum operating conductor temperature 90℃

Standard Applied

• Design guideline :	IEC 60092-376
• Material properties :	IEC 60092-351, Insulation, HF-HEPR IEC 60092-359, Sheath, ST2 or SHF1
• Flame retardant :	IEC 60332-3, Cat. 'A'
• Fire resistant :	IEC 60331-21(for cable overall dia. ≤ 20mm) IEC 60331-31(for cable overall dia. >20mm)
• HCl emission :	IEC 60754-1, 0.5% ↓ for Halogen free cable
• Smoke emission :	IEC 61034, transmittance 60% ↑ for Halogen free cable
• Cold properties(option) :	IEC 60811-1-4, Upgrade test at -30℃
• Oil resistant(option) :	IEEE Std. 1580-2001 Type T, at 70℃ for 4hours, for PVC sheathed cable
• Paint resistant(option) :	Maker standard (Epoxy, Alkyd paint, at 100℃ for 168hours)

250V Control Cable Fire resistance

LV Unarmoured Control Cables with Individual Shield 250V EXY-S / EXI-S
LV Armoured Control Cables with Individual Shield 250V EOY-S / EOI-S

No. of core	Conductor			Thickness of insulation	Unarmoured, EXY-S Unarmoured, EXI-S			Armoured, EOY-S Armoured, EOI-S				
	Nominal sectional area	Min. No. of wires	Max. overall dia.		Thickness of sheath	Nominal dia. over sheath	Cable weight (approx.)	Nomina dia. over inner covering	Dia. of metal wire for braid	Thickness of outer sheath	Nominal overall dia.	Cable weight (approx.)
EA	mm²	EA	mm	mm	mm	mm	kg/km	mm	mm	mm	mm	kg/km
2	1.0	7	1.4	0.5	1.1	9.8±0.4	135	7.8±0.4	0.2	1.1	11.1±0.4	190
3	1.0	7	1.4	0.5	1.1	10.4±0.4	165	8.4±0.4	0.2	1.2	11.9±0.5	235
4	1.0	7	1.4	0.5	1.2	11.5±0.5	210	9.3±0.4	0.2	1.2	12.8±0.5	280
5	1.0	7	1.4	0.5	1.2	12.5±0.5	340	10.3±0.4	0.3	1.3	14.5±0.6	385
7	1.0	7	1.4	0.5	1.2	13.6±0.5	455	11.4±0.5	0.3	1.3	15.6±0.6	470
9	1.0	7	1.4	0.5	1.3	16.0±0.6	590	13.6±0.5	0.3	1.4	18.0±0.7	610
12	1.0	7	1.4	0.5	1.4	18.2±0.7	810	15.6±0.6	0.3	1.5	20.2±0.8	765
16	1.0	7	1.4	0.5	1.5	20.3±0.8	965	17.5±0.7	0.3	1.6	22.3±0.9	1,010
19	1.0	7	1.4	0.5	1.5	21.4±0.9	1,240	18.6±0.7	0.3	1.6	23.4±0.9	1,170
23	1.0	7	1.4	0.5	1.6	23.8±1.0	1,510	20.8±0.8	0.3	1.7	25.8±1.0	1,465
27	1.0	7	1.4	0.5	1.7	26.0±1.0	1,955	22.8±0.9	0.3	1.8	28.0±1.1	1,755
33	1.0	7	1.4	0.5	1.8	28.1±1.1	2,250	24.7±1.0	0.3	1.8	29.9±1.2	2,210
37	1.0	7	1.4	0.5	1.8	29.2±1.2	2,900	25.8±1.0	0.3	1.9	31.2±1.2	2,525
44	1.0	7	1.4	0.5	2.0	33.2±1.3	2,250	29.4±1.2	0.3	2.0	35.0±1.4	3,200
77	1.0	7	1.4	0.5	2.3	41.6±1.7	6,600	37.2±1.5	0.4	2.4	44.0±1.8	7,100

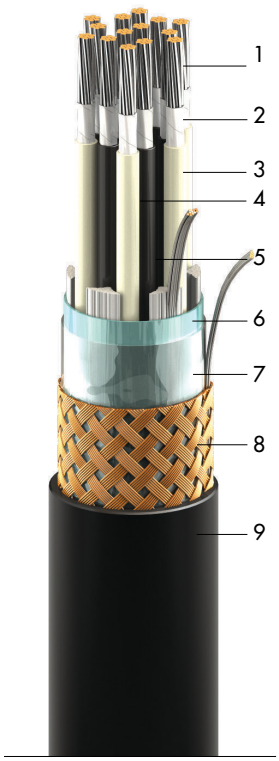
Conductor	Tinned copper, class2	Tinned copper, Class2
Fire proof layer	Mica/glass tape	Mica/glass tape
Insulation	HF-HEPR	HF-HEPR
Individual screen	Tinned copper wire braid	Tinned copper wire barid
Inner covering	Not applicable	Lapped covering
Armoring	Not applicable	Annealed copper wire braid
Outer sheath	PVC or SHF1	PVC or SHF1

Identification of color

- Insulation
  - By numbering on white colored insulation
- Outer sheath : Black
  Note) Any other colors purchaser required

Attached table12 Fire resistance

LV Unarmoured Instrument Cables with Common Shield 250V EXY(C) / EXI(C)
LV Armoured Instrument Cables with Common Shield 250V EOY(C) / EOI(C)



Construction Details

1 **Conductor** : Stranded tinned annealed copper as per IEC 60228, class 2
2 **Fire proof layer** : Mica/Glass tape
3 **Insulation** : High modulus Ethylene-propylene rubber as per IEC 60092-351, HF-HEPR
4 **Pair twisting**
5 **Cabling (with filler)**
6 **Common screen** : AL/PS tape with drain wire at least 0.5mm²
A suitable tape or tapes may be applied over the collective screen.
7 **Inner covering (except EXY, EXI)** : Lapped covering
8 **Amour (Applied to armoured cable)** : Copper wire braid as per IEC 60092-376
A suitable separator tape or tapes may be applied under and/or over the armour.
9 **Outer sheath** : see table
Code EXY & EOY : Premium Polyvinyl chloride compound (PVC) as per IEC 60092-359, ST2
Code EXI & EOI : Enhanced Halogen free thermoplastic compound as per IEC 60092-359, SHF1

Type	Sheath material	Type	Sheath material
Basic cable	Flame retardant PVC as per IEC 60092-359, ST2	Paint resistant cable	Paint resistant PVC as per IEC 60092-359, ST2
Normal cable	General PVC as per IEC 60092-359, ST2	Premium	Flame & Paint resistant PVC as per IEC 60092-359, ST2

Approvals

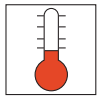
ABS, Lloyd's Register, DNV, Bureau Veritas, Germanischer Lloyd, KR Korean Register, ClassNK

Standard Applied

- **Design guideline** : IEC 60092-376
- **Material properties** : IEC 60092-351, Insulation, HEPR
  IEC 60092-359, Sheath, ST2 or SHF1
- **Flame retardant** : IEC 60332-3, Cat. 'A'
- **Fire resistant** : IEC 60331-21(for cable overall dia. ≤ 20mm)
  IEC 60331-31(for cable overall dia. ›20mm)
- **HCl emission** : IEC 60754-1, 0.5% ↓ for Halogen free cable
- **Smoke emission** : IEC 61034, transmittance 60% ↑ for Halogen free cable
- **Cold properties(option)** : IEC 60811-1-4, Upgrade test at -30℃
- **Oil resistant(option)** : IEEE Std. 1580-2001 Type T, at 70℃ for 4hours, for PVC sheathed cable
- **Paint resistant(option)** : Maker standard (Epoxy, Alkyd paint, at 100℃ for 168hours)

Identification of color

- **Insulation**
  -1Pr : White-Black, 1Tr : White-Black-Red, 1Qd : White-Black-Red-Blue
  -2Pr and above : Lettering on black/white insulation (pair number)
  Note) Any other colors purchaser required
- **Outer sheath**
  - Non-IS(intrinsically safe) : Black
  - IS(intrinsically safe) type : Blue


-30 to 90℃


Flame retardant IEC 60332-3, A & IEC 60331-31

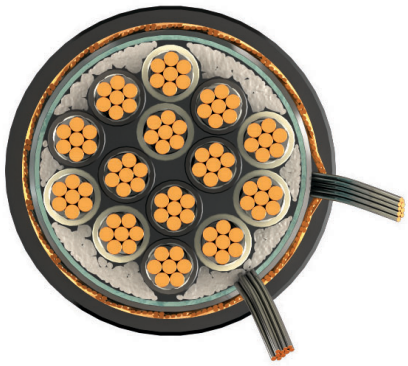

Weather Resistance to severe weather conditions


Flexibility

Halogen free IEC 60754-1 (option)


Smoke density IEC 61034 (option)


Gass toxicity No (option)



Application

- Instrument circuit upto 250V, instrument safe systems.
- Fixed installation for instrument, communication, control and alarm systems in both explosion risk and safe areas, general purposes.
- Maximum operating conductor temperature 90℃

Standard Applied

• Design guideline :	IEC 60092-376
• Material properties :	IEC 60092-351, Insulation, HF-HEPR IEC 60092-359, Sheath, ST2 or SHF1
• Flame retardant :	IEC 60332-3, Cat. 'A'
• Fire resistant :	IEC 60331-21(for cable overall dia. ≤ 20mm) IEC 60331-31(for cable overall dia. ›20mm)
• HCl emission :	IEC 60754-1, 0.5% ↓ for Halogen free cable
• Smoke emission :	IEC 61034, transmittance 60% ↑ for Halogen free cable
• Cold properties(option) :	IEC 60811-1-4, Upgrade test at -30℃
• Oil resistant(option) :	IEEE Std. 1580-2001 Type T, at 70℃ for 4hours, for PVC sheathed cable
• Paint resistant(option) :	Maker standard (Epoxy, Alkyd paint, at 100℃ for 168hours)

250V Instrument Cable Fire resistance

LV Unarmoured Instrument Cables with Common Shield 250V EXY(C) / EXI(C)
LV Armoured Instrument Cables with Common Shield 250V EOY(C) / EOI(C)

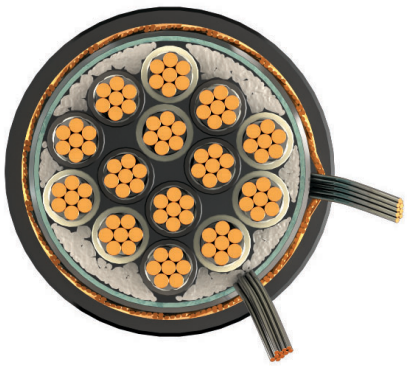
No. of pair	Conductor			Thickness of insulation	Unarmoured, EXY(C) Unarmoured, EXI(C)			Armoured, EOY(C) Armoured, EOI(C)				
	Nominal sectional area	Min. No. of wires	Max. overall dia.		Thickness of sheath	Nominal dia. over sheath	Cable weight (approx.)	Nomina dia. over inner covering	Dia. of metal wire for braid	Thickness of outer sheath	Nominal overall dia.	Cable weight (approx.)
PR	mm²	EA	mm	mm	mm	mm	kg/km	mm	mm	mm	mm	kg/km
1	0.75	7	1.2	0.5	1.0	8.0±0.4	80	6.2±0.4	0.2	1.1	9.5±0.4	135
2	0.75	7	1.2	0.5	1.2	12.4±0.5	170	10.2±0.4	0.3	1.3	14.4±0.6	290
3	0.75	7	1.2	0.5	1.2	13.1±0.5	200	10.9±0.4	0.3	1.3	15.1±0.6	330
4	0.75	7	1.2	0.5	1.3	14.6±0.6	250	12.2±0.4	0.3	1.3	16.4±0.7	385
5	0.75	7	1.2	0.5	1.3	16.0±0.6	295	13.6±0.5	0.3	1.4	18.0±0.7	455
7	0.75	7	1.2	0.5	1.4	17.6±0.7	370	15.0±0.5	0.3	1.5	19.6±0.8	540
10	0.75	7	1.2	0.5	1.5	21.4±0.9	505	18.6±0.7	0.3	1.6	23.4±0.9	710
12	0.75	7	1.2	0.5	1.6	22.6±0.9	580	19.6±0.7	0.3	1.6	24.4±1.0	785
14	0.75	7	1.2	0.5	1.6	24.1±1.0	655	21.1±0.8	0.3	1.7	26.1±1.0	890
15	0.75	7	1.2	0.5	1.7	25.0±1.0	720	21.8±0.8	0.3	1.7	26.8±1.1	950
19	0.75	7	1.2	0.5	1.8	27.9±1.1	845	24.5±0.9	0.3	1.8	29.7±1.2	1,105
20	0.75	7	1.2	0.5	1.8	28.5±1.1	920	25.1±0.9	0.3	1.9	30.5±1.2	1,190
24	0.75	7	1.2	0.5	1.9	31.0±1.2	1,065	27.4±1.0	0.3	2.0	33.0±1.3	1,360
27	0.75	7	1.2	0.5	1.9	32.7±1.3	1,170	29.1±1.0	0.3	2.0	34.7±1.4	1,485
30	0.75	7	1.2	0.5	2.0	34.4±1.4	1,295	30.6±1.1	0.4	2.1	36.8±1.5	1,710
33	0.75	7	1.2	0.5	2.1	36.1±1.4	1,425	32.1±1.1	0.4	2.2	38.5±1.5	1,855
37	0.75	7	1.2	0.5	2.1	37.9±1.5	1,540	33.9±1.2	0.4	2.2	40.3±1.6	1,995
48	0.75	7	1.2	0.5	2.3	42.9±1.7	1,985	38.5±1.4	0.4	2.4	45.3±1.8	2,500

Conductor	Tinned copper, class2	Tinned copper, Class2
Fire proof layer	Mica/glass tape	Mica/glass tape
Insulation	HF-HEPR	HF-HEPR
Pair/Triad twisting	Pair twisting	Pair twisting
Cabling	If necessary with filler	If necessary with filler
Common screen	AL/PS tape with drain wire	AL/PS tape with drain wire
Inner covering	Not applicable	Lapped covering
Armoring	Not applicable	Annealed copper wire braid
Outer sheath	PVC or SHF1	PVC or SHF1

Identification of color

- Insulation
  - 1Pr : White-Black, 1Tr : White-Black-Red, 1Qd : White-Black-Red-Blue
  - 2Pr and above : Lettering on black/white insulation (pair number)
- Outer sheath :
  - Non-IS(intrinsically safe) : Black
  - IS(intrinsically safe) type : Blue

  Note) Any other colors purchaser required



Application

- Instrument circuit upto 250V, instrument safe systems.
- Fixed installation for instrument, communication, control and alarm systems in both explosion risk and safe areas, general purposes.
- Maximum operating conductor temperature 90℃

Standard Applied

• Design guideline :	IEC 60092-376
• Material properties :	IEC 60092-351, Insulation, HF-HEPR IEC 60092-359, Sheath, ST2 or SHF1
• Flame retardant :	IEC 60332-3, Cat. 'A'
• Fire resistant :	IEC 60331-21(for cable overall dia. ≤ 20mm) IEC 60331-31(for cable overall dia. ›20mm)
• HCl emission :	IEC 60754-1, 0.5% ↓ for Halogen free cable
• Smoke emission :	IEC 61034, transmittance 60% ↑ for Halogen free cable
• Cold properties(option) :	IEC 60811-1-4, Upgrade test at -30℃
• Oil resistant(option) :	IEEE Std. 1580-2001 Type T, at 70℃ for 4hours, for PVC sheathed cable
• Paint resistant(option) :	Maker standard (Epoxy, Alkyd paint, at 100℃ for 168hours)

250V Control Cable Fire resistance

LV Unarmoured Instrument Cables with Common Shield 250V EXY(C) / EXI(C)
LV Armoured Instrument Cables with Common Shield 250V EOY(C) / EOI(C)

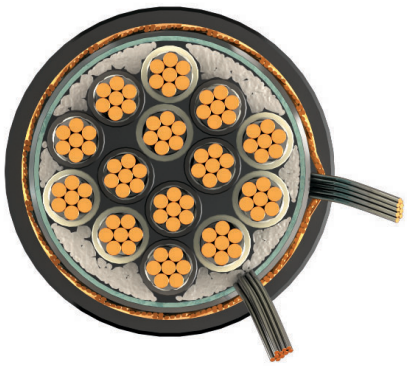
No. of pair	Conductor			Thickness of insulation	Unarmoured, EXY(C) Unarmoured, EXI(C)			Armoured, EOY(C) Armoured, EOI(C)				
	Nominal sectional area	Min. No. of wires	Max. overall dia.		Thickness of sheath	Nominal dia. over sheath	Cable weight (approx.)	Nomina dia. over inner covering	Dia. of metal wire for braid	Thickness of outer sheath	Nominal overall dia.	Cable weight (approx.)
PR	mm²	EA	mm	mm	mm	mm	kg/km	mm	mm	mm	mm	kg/km
1	1.0	7	1.4	0.5	1.1	8.4±0.4	95	6.6±0.4	0.2	1.1	9.9±0.4	150
2	1.0	7	1.4	0.5	1.2	13.1±0.5	195	10.9±0.4	0.3	1.3	15.1±0.6	325
3	1.0	7	1.4	0.5	1.3	14.1±0.6	240	11.7±0.5	0.3	1.3	15.9±0.6	375
4	1.0	7	1.4	0.5	1.3	15.4±0.6	290	13.0±0.5	0.3	1.4	17.4±0.7	445
5	1.0	7	1.4	0.5	1.4	17.1±0.7	355	14.5±0.6	0.3	1.5	18.9±0.8	510
7	1.0	7	1.4	0.5	1.4	18.6±0.7	440	16.0±0.6	0.3	1.6	20.6±0.8	615
10	1.0	7	1.4	0.5	1.6	22.9±0.9	605	19.9±0.8	0.3	1.7	24.9±1.0	825
12	1.0	7	1.4	0.5	1.6	24.0±1.0	690	21.0±0.8	0.3	1.7	26.0±1.0	925
14	1.0	7	1.4	0.5	1.7	25.8±1.0	795	22.6±0.9	0.3	1.8	27.8±1.1	1,045
15	1.0	7	1.4	0.5	1.7	26.6±1.1	855	23.4±0.9	0.3	1.8	28.6±1.1	1,110
19	1.0	7	1.4	0.5	1.8	29.6±1.2	1,015	26.2±1.0	0.3	1.9	31.6±1.3	1,295
20	1.0	7	1.4	0.5	1.9	30.5±1.2	1,105	26.9±1.1	0.3	1.9	32.3±1.3	1,385
24	1.0	7	1.4	0.5	2.0	33.2±1.3	1,290	29.4±1.2	0.3	2.0	35.0±1.4	1,590
27	1.0	7	1.4	0.5	2.0	34.9±1.4	1,415	31.1±1.2	0.4	2.1	37.3±1.5	1,835
30	1.0	7	1.4	0.5	2.1	36.7±1.5	1,565	32.7±1.3	0.4	2.2	39.1±1.6	2,005
33	1.0	7	1.4	0.5	2.2	38.5±1.5	1,720	34.3±1.4	0.4	2.2	40.7±1.6	2,165
37	1.0	7	1.4	0.5	2.3	40.5±1.6	1,870	36.3±1.5	0.4	2.3	42.9±1.7	2,355
48	1.0	7	1.4	0.5	2.4	45.8±1.8	2,405	41.2±1.6	0.4	2.5	48.2±1.9	2,955

Conductor	Tinned copper, class2	Tinned copper, Class2
Fire proof layer	Mica/glass tape	Mica/glass tape
Insulation	HF-HEPR	HF-HEPR
Pair/Triad twisting	Pair twisting	Pair twisting
Cabling	If necessary with filler	If necessary with filler
Common screen	AL/PS tape with drain wire	AL/PS tape with drain wire
Inner covering	Not applicable	Lapped covering
Armoring	Not applicable	Annealed copper wire braid
Outer sheath	PVC or SHF1	PVC or SHF1

Identification of color

- Insulation
  - 1Pr : White-Black, 1Tr : White-Black-Red, 1Qd : White-Black-Red-Blue
  - 2Pr and above : Lettering on black/white insulation (pair number)
- Outer sheath :
  - Non-IS(intrinsically safe) : Black
  - IS(intrinsically safe) type : Blue

  Note) Any other colors purchaser required



Application

- Instrument circuit upto 250V, instrument safe systems.
- Fixed installation for instrument, communication, control and alarm systems in both explosion risk and safe areas, general purposes.
- Maximum operating conductor temperature 90℃

Standard Applied

• Design guideline :	IEC 60092-376
• Material properties :	IEC 60092-351, Insulation, HF-HEPR IEC 60092-359, Sheath, ST2 or SHF1
• Flame retardant :	IEC 60332-3, Cat. 'A'
• Fire resistant :	IEC 60331-21(for cable overall dia. ≤ 20mm) IEC 60331-31(for cable overall dia. ›20mm)
• HCl emission :	IEC 60754-1, 0.5% ↓ for Halogen free cable
• Smoke emission :	IEC 61034, transmittance 60% ↑ for Halogen free cable
• Cold properties(option) :	IEC 60811-1-4, Upgrade test at -30℃
• Oil resistant(option) :	IEEE Std. 1580-2001 Type T, at 70℃ for 4hours, for PVC sheathed cable
• Paint resistant(option) :	Maker standard (Epoxy, Alkyd paint, at 100℃ for 168hours)

250V Instrument Cable Fire resistance

LV Unarmoured Instrument Cables with Common Shield 250V EXY(C) / EXI(C)
LV Armoured Instrument Cables with Common Shield 250V EOY(C) / EOI(C)

No. of pair	Conductor			Thickness of insulation	Unarmoured, EXY(C) Unarmoured, EXI(C)			Armoured, EOY(C) Armoured, EOI(C)				
	Nominal sectional area	Min. No. of wires	Max. overall dia.		Thickness of sheath	Nominal dia. over sheath	Cable weight (approx.)	Nomina dia. over inner covering	Dia. of metal wire for braid	Thickness of outer sheath	Nominal overall dia.	Cable weight (approx.)
PR	mm²	EA	mm	mm	mm	mm	kg/km	mm	mm	mm	mm	kg/km
1	1.5	7	1.7	0.6	1.1	9.6±0.4	120	7.6±0.4	0.2	1.1	10.9±0.4	175
2	1.5	7	1.7	0.6	1.3	15.0±0.6	250	12.6±0.5	0.3	1.4	17.0±0.7	400
3	1.5	7	1.7	0.6	1.3	15.9±0.6	305	13.5±0.5	0.3	1.4	17.0±0.7	465
4	1.5	7	1.7	0.6	1.4	17.7±0.7	385	15.1±0.6	0.3	1.5	19.7±0.8	555
5	1.5	7	1.7	0.6	1.5	19.6±0.8	470	16.8±0.7	0.3	1.5	21.4±0.9	645
7	1.5	7	1.7	0.6	1.5	21.4±0.9	580	18.6±0.7	0.3	1.6	23.4±0.9	785
10	1.5	7	1.7	0.6	1.7	26.3±1.1	805	23.1±0.9	0.3	1.8	28.3±1.1	1,060
12	1.5	7	1.7	0.6	1.8	27.7±1.1	935	24.3±1.0	0.3	1.8	29.5±1.2	1,185
14	1.5	7	1.7	0.6	1.8	29.7±1.2	1,060	26.3±1.1	0.3	1.9	31.7±1.3	1,345
15	1.5	7	1.7	0.6	1.9	30.7±1.2	1,155	27.1±1.1	0.3	1.9	32.5±1.3	1,435
19	1.5	7	1.7	0.6	2.0	34.3±1.4	1,370	30.5±1.2	0.4	2.1	36.7±1.5	1,780
20	1.5	7	1.7	0.6	2.0	35.0±1.4	1,475	31.2±1.2	0.4	2.1	37.4±1.5	1,895
24	1.5	7	1.7	0.6	2.1	38.1±1.5	1,720	34.1±1.4	0.4	2.2	40.5±1.6	2,180
27	1.5	7	1.7	0.6	2.2	40.4±1.6	1,915	36.2±1.4	0.4	2.3	42.8±1.7	2,400
30	1.5	7	1.7	0.6	2.3	42.5±1.7	2,120	38.1±1.5	0.4	2.4	44.9±1.8	2,630
33	1.5	7	1.7	0.6	2.4	44.5±1.8	2,330	39.0±1.6	0.4	2.5	46.9±1.9	2,860
37	1.5	7	1.7	0.6	2.5	47.0±1.9	2,555	42.2±1.7	0.4	2.6	49.4±2.0	3,115
48	1.5	7	1.7	0.6	2.7	53.2±2.1	3,285	48.0±1.9	0.4	2.8	55.6±2.2	3,920

Conductor	Tinned copper, class2	Tinned copper, Class2
Fire proof layer	Mica/glass tape	Mica/glass tape
Insulation	HF-HEPR	HF-HEPR
Pair/Triad twisting	Pair twisting	Pair twisting
Cabling	If necessary with filler	If necessary with filler
Common screen	AL/PS tape with drain wire	AL/PS tape with drain wire
Inner covering	Not applicable	Lapped covering
Armoring	Not applicable	Annealed copper wire braid
Outer sheath	PVC or SHF1	PVC or SHF1

Identification of color

- Insulation
  - 1Pr : White-Black, 1Tr : White-Black-Red, 1Qd : White-Black-Red-Blue
  - 2Pr and above : Lettering on black/white insulation (pair number)
- Outer sheath :
  - Non-IS(intrinsically safe) : Black
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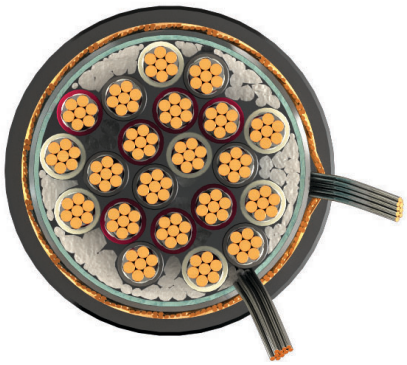
  Note) Any other colors purchaser required



Application

- Instrument circuit upto 250V, instrument safe systems.
- Fixed installation for instrument, communication, control and alarm systems in both explosion risk and safe areas, general purposes.
- Maximum operating conductor temperature 90℃

Standard Applied

• Design guideline :	IEC 60092-376
• Material properties :	IEC 60092-351, Insulation, HF-HEPR IEC 60092-359, Sheath, ST2 or SHF1
• Flame retardant :	IEC 60332-3, Cat. 'A'
• Fire resistant :	IEC 60331-21(for cable overall dia. ≤ 20mm) IEC 60331-31(for cable overall dia. ›20mm)
• HCl emission :	IEC 60754-1, 0.5% ↓ for Halogen free cable
• Smoke emission :	IEC 61034, transmittance 60% ↑ for Halogen free cable
• Cold properties(option) :	IEC 60811-1-4, Upgrade test at -30℃
• Oil resistant(option) :	IEEE Std. 1580-2001 Type T, at 70℃ for 4hours, for PVC sheathed cable
• Paint resistant(option) :	Maker standard (Epoxy, Alkyd paint, at 100℃ for 168hours)

250V Instrument Cable Fire resistance

LV Unarmoured Instrument Cables with Common Shield 250V EXY(C) / EXI(C)
LV Armoured Instrument Cables with Common Shield 250V EOY(C) / EOI(C)

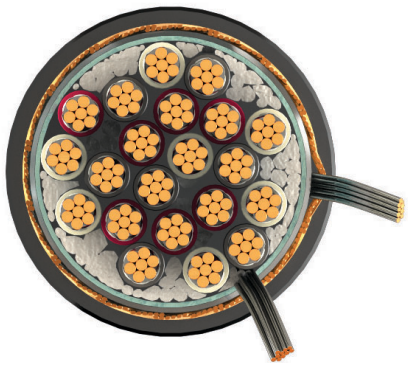
No. of triad	Conductor			Thickness of insulation	Unarmoured, EXY(C) Unarmoured, EXI(C)			Armoured, EOY(C) Armoured, EOI(C)				
	Nominal sectional area	Min. No. of wires	Max. overall dia.		Thickness of sheath	Nominal dia. over sheath	Cable weight (approx.)	Nomina dia. over inner covering	Dia. of metal wire for braid	Thickness of outer sheath	Nominal overall dia.	Cable weight (approx.)
TR	mm²	EA	mm	mm	mm	mm	kg/km	mm	mm	mm	mm	kg/km
1	0.75	7	1.2	0.5	1.0	8.4±0.4	0.4	6.6±0.4	0.2	1.1	9.9±0.4	155
2	0.75	7	1.2	0.5	1.2	13.5±0.6	0.5	11.3±0.5	0.3	1.3	15.5±0.6	345
3	0.75	7	1.2	0.5	1.3	14.6±0.6	0.6	12.2±0.5	0.3	1.3	16.4±0.7	400
4	0.75	7	1.2	0.5	1.3	16.0±0.7	0.6	13.6±0.5	0.3	1.4	18.0±0.7	480
5	0.75	7	1.2	0.5	1.4	17.9±0.7	0.7	15.3±0.6	0.3	1.5	19.9±0.8	570
7	0.75	7	1.2	0.5	1.5	20.3±0.8	0.8	17.5±0.7	0.3	1.6	22.3±0.9	705
10	0.75	7	1.2	0.5	1.7	24.9±1.0	1.0	21.7±0.9	0.3	1.7	26.7±1.1	940
12	0.75	7	1.2	0.5	1.7	25.7±1.0	1.0	22.5±0.9	0.3	1.8	27.7±1.1	1,055
14	0.75	7	1.2	0.5	1.8	27.7±1.1	1.1	24.3±1.0	0.3	1.8	29.5±1.2	1,180
15	0.75	7	1.2	0.5	1.8	28.5±1.2	1.1	25.1±1.0	0.3	1.9	30.5±1.2	1,270
19	0.75	7	1.2	0.5	1.9	31.8±1.3	1.3	28.2±1.1	0.3	2.0	33.8±1.4	1,495
20	0.75	7	1.2	0.5	1.9	32.5±1.3	1.3	28.9±1.2	0.3	2.0	34.5±1.4	1,590
24	0.75	7	1.2	0.5	2.0	35.4±1.4	1.4	31.6±1.3	0.4	2.1	37.8±1.5	1,920
27	0.75	7	1.2	0.5	2.1	37.4±1.5	1.5	33.4±1.3	0.4	2.2	39.8±1.6	2,110
30	0.75	7	1.2	0.5	2.2	39.4±1.6	1.6	35.2±1.4	0.4	2.3	41.8±1.7	2,310
33	0.75	7	1.2	0.5	2.3	41.3±1.7	1.7	36.9±1.5	0.4	2.3	43.5±1.7	2,495
37	0.75	7	1.2	0.5	2.3	43.4±1.8	1.7	39.0±1.6	0.4	2.4	45.8±1.8	2,720
48	0.75	7	1.2	0.5	2.6	49.4±2.0	2.0	44.4±1.8	0.4	2.6	51.6±2.1	3,425

Conductor	Tinned copper, class2	Tinned copper, Class2
Fire proof layer	Mica/glass tape	Mica/glass tape
Insulation	HF-HEPR	HF-HEPR
Pair/Triad twisting	Triad twisting	Triad twisting
Cabling	If necessary with filler	If necessary with filler
Common screen	AL/PS tape with drain wire	AL/PS tape with drain wire
Inner covering	Not applicable	Lapped covering
Armoring	Not applicable	Annealed copper wire braid
Outer sheath	PVC or SHF1	PVC or SHF1

Identification of color

- Insulation
  - 1Pr : White-Black, 1Tr : White-Black-Red, 1Qd : White-Black-Red-Blue
  - 2Pr and above : Lettering on black/white insulation (pair number)
- Outer sheath :
  - Non-IS(intrinsically safe) : Black
  - IS(intrinsically safe) type : Blue

  Note) Any other colors purchaser required



Application

- Instrument circuit upto 250V, instrument safe systems.
- Fixed installation for instrument, communication, control and alarm systems in both explosion risk and safe areas, general purposes.
- Maximum operating conductor temperature 90℃

Standard Applied

• Design guideline :	IEC 60092-376
• Material properties :	IEC 60092-351, Insulation, HF-HEPR IEC 60092-359, Sheath, ST2 or SHF1
• Flame retardant :	IEC 60332-3, Cat. 'A'
• Fire resistant :	IEC 60331-21(for cable overall dia. ≤ 20mm) IEC 60331-31(for cable overall dia. >20mm)
• HCl emission :	IEC 60754-1, 0.5% ↓ for Halogen free cable
• Smoke emission :	IEC 61034, transmittance 60% ↑ for Halogen free cable
• Cold properties(option) :	IEC 60811-1-4, Upgrade test at -30℃
• Oil resistant(option) :	IEEE Std. 1580-2001 Type T, at 70℃ for 4hours, for PVC sheathed cable
• Paint resistant(option) :	Maker standard (Epoxy, Alkyd paint, at 100℃ for 168hours)

250V Instrument Cable Fire resistance

LV Unarmoured Instrument Cables with Common Shield 250V EXY(C) / EXI(C)
LV Armoured Instrument Cables with Common Shield 250V EOY(C) / EOI(C)

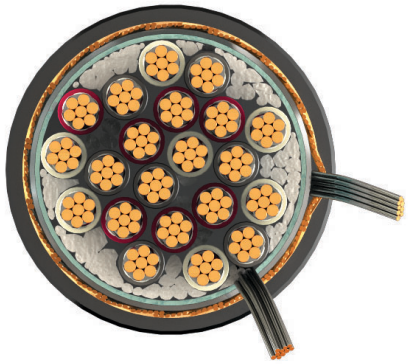
No. of triad	Conductor			Thickness of insulation	Unarmoured, EXY(C) Unarmoured, EXI(C)			Armoured, EOY(C) Armoured, EOI(C)				
	Nominal sectional area	Min. No. of wires	Max. overall dia.		Thickness of sheath	Nominal dia. over sheath	Cable weight (approx.)	Nomina dia. over inner covering	Dia. of metal wire for braid	Thickness of outer sheath	Nominal overall dia.	Cable weight (approx.)
TR	mm²	EA	mm	mm	mm	mm	kg/km	mm	mm	mm	mm	kg/km
1	1.0	7	1.4	0.5	1.1	9.1±0.4	120	7.1±0.4	0.2	1.1	10.4±0.4	175
2	1.0	7	1.4	0.5	1.3	14.5±0.6	250	12.1±0.5	0.3	1.3	16.3±0.7	395
3	1.0	7	1.4	0.5	1.3	15.4±0.6	315	13.0±0.5	0.3	1.4	17.4±0.7	465
4	1.0	7	1.4	0.5	1.4	17.1±0.7	395	14.5±0.6	0.3	1.4	18.9±0.8	550
5	1.0	7	1.4	0.5	1.4	18.9±0.8	470	16.3±0.7	0.3	1.5	20.9±0.8	655
7	1.0	7	1.4	0.5	1.5	21.5±0.9	605	18.7±0.7	0.3	1.6	23.5±0.9	810
10	1.0	7	1.4	0.5	1.7	26.4±1.1	840	23.2±0.9	0.3	1.8	28.4±1.1	1,100
12	1.0	7	1.4	0.5	1.7	27.3±1.1	965	24.1±1.0	0.3	1.8	29.3±1.2	1,255
14	1.0	7	1.4	0.5	1.8	29.4±1.2	1,110	26.0±1.0	0.3	1.9	31.4±1.3	1,395
15	1.0	7	1.4	0.5	1.9	30.4±1.2	1,445	26.8±1.1	0.3	1.9	32.2±1.3	1,485
19	1.0	7	1.4	0.5	2.0	33.9±1.4	1,550	30.1±1.2	0.4	2.1	36.3±1.5	1,850
20	1.0	7	1.4	0.5	2.0	34.7±1.4	1,815	30.9±1.2	0.4	2.1	37.1±1.5	1,965
24	1.0	7	1.4	0.5	2.1	37.8±1.5	2,020	33.8±1.4	0.4	2.2	40.2±1.6	2,265
27	1.0	7	1.4	0.5	2.2	40.0±1.6	2,235	35.8±1.4	0.4	2.3	42.4±1.7	2,500
30	1.0	7	1.4	0.5	2.3	42.1±1.7	2,120	37.7±1.5	0.4	2.4	44.5±1.8	2,740
33	1.0	7	1.4	0.5	2.4	44.1±1.8	2,455	39.5±1.6	0.4	2.5	46.5±1.9	2,980
37	1.0	7	1.4	0.5	2.5	46.6±1.9	2,700	41.8±1.7	0.4	2.5	48.9±2.0	3,235
48	1.0	7	1.4	0.5	2.7	52.7±2.1	3,475	47.5±1.9	0.4	2.8	55.1±2.2	4,105

Conductor	Tinned copper, class2	Tinned copper, Class2
Fire proof layer	Mica/glass tape	Mica/glass tape
Insulation	HF-HEPR	HF-HEPR
Pair/Triad twisting	Triad twisting	Triad twisting
Cabling	If necessary with filler	If necessary with filler
Common screen	AL/PS tape with drain wire	AL/PS tape with drain wire
Inner covering	Not applicable	Lapped covering
Armoring	Not applicable	Annealed copper wire braid
Outer sheath	PVC or SHF1	PVC or SHF1

Identification of color

- Insulation
  - 1Pr : White-Black, 1Tr : White-Black-Red, 1Qd : White-Black-Red-Blue
  - 2Pr and above : Lettering on black/white insulation (pair number)
- Outer sheath :
  - Non-IS(intrinsically safe) : Black
  - IS(intrinsically safe) type : Blue

  Note) Any other colors purchaser required



Application

- Instrument circuit upto 250V, instrument safe systems.
- Fixed installation for instrument, communication, control and alarm systems in both explosion risk and safe areas, general purposes.
- Maximum operating conductor temperature 90℃

Standard Applied

• Design guideline :	IEC 60092-376
• Material properties :	IEC 60092-351, Insulation, HF-HEPR IEC 60092-359, Sheath, ST2 or SHF1
• Flame retardant :	IEC 60332-3, Cat. 'A'
• Fire resistant :	IEC 60331-21(for cable overall dia. ≤ 20mm) IEC 60331-31(for cable overall dia. ›20mm)
• HCl emission :	IEC 60754-1, 0.5% ↓ for Halogen free cable
• Smoke emission :	IEC 61034, transmittance 60% ↑ for Halogen free cable
• Cold properties(option) :	IEC 60811-1-4, Upgrade test at -30℃
• Oil resistant(option) :	IEEE Std. 1580-2001 Type T, at 70℃ for 4hours, for PVC sheathed cable
• Paint resistant(option) :	Maker standard (Epoxy, Alkyd paint, at 100℃ for 168hours)

250V Instrument Cable Fire resistance

LV Unarmoured Instrument Cables with Common Shield 250V EXY(C) / EXI(C)
LV Armoured Instrument Cables with Common Shield 250V EOY(C) / EOI(C)

No. of triad	Conductor			Thickness of insulation	Unarmoured, EXY(C) Unarmoured, EXI(C)			Armoured, EOY(C) Armoured, EOI(C)				
	Nominal sectional area	Min. No. of wires	Max. overall dia.		Thickness of sheath	Nominal dia. over sheath	Cable weight (approx.)	Nomina dia. over inner covering	Dia. of metal wire for braid	Thickness of outer sheath	Nominal overall dia.	Cable weight (approx.)
TR	mm²	EA	mm	mm	mm	mm	kg/km	mm	mm	mm	mm	kg/km
1	1.5	7	1.7	0.6	1.1	10.1±0.4	150	8.1±0.4	0.2	1.2	11.6±0.5	215
2	1.5	7	1.7	0.6	1.3	16.4±0.7	325	14.0±0.6	0.3	1.4	18.4±0.7	480
3	1.5	7	1.7	0.6	1.4	17.7±0.7	415	15.1±0.6	0.3	1.5	19.7±0.8	585
4	1.5	7	1.7	0.6	1.5	19.6±0.8	520	16.8±0.7	0.3	1.5	21.4±0.9	685
5	1.5	7	1.7	0.6	1.5	21.7±0.9	625	18.9±0.8	0.3	1.6	23.7±0.9	830
7	1.5	7	1.7	0.6	1.7	24.9±1.0	815	21.7±0.9	0.3	1.7	26.7±1.1	1,050
10	1.5	7	1.7	0.6	1.9	30.6±1.2	1,145	27.0±1.1	0.3	1.9	32.4±1.3	1,420
12	1.5	7	1.7	0.6	1.9	31.6±1.3	1,305	28.0±1.1	0.3	2.0	33.6±1.3	1,605
14	1.5	7	1.7	0.6	2.0	34.0±1.4	1,505	30.2±1.2	0.4	2.1	36.4±1.5	1,915
15	1.5	7	1.7	0.6	2.0	35.0±1.4	1,620	31.2±1.2	0.4	2.1	37.4±1.5	2,040
19	1.5	7	1.7	0.6	2.2	39.2±1.6	1,955	35.0±1.4	0.4	2.3	41.6±1.7	2,425
20	1.5	7	1.7	0.6	2.2	40.1±1.6	2,100	35.9±1.4	0.4	2.3	42.5±1.7	2,580
24	1.5	7	1.7	0.6	2.4	43.9±1.8	2,480	39.3±1.6	0.4	2.4	46.1±1.8	2,980
27	1.5	7	1.7	0.6	2.4	46.2±1.8	2,740	41.6±1.7	0.4	2.5	48.6±1.9	3,290
30	1.5	7	1.7	0.6	2.5	48.6±1.9	3,030	43.8±1.8	0.4	2.6	51.0±2.0	3,610
33	1.5	7	1.7	0.6	2.6	51.0±2.0	3,330	46.0±1.8	0.4	2.7	53.4±2.1	3,940
37	1.5	7	1.7	0.6	2.7	53.8±2.2	3,665	48.6±1.9	0.4	2.8	56.2±2.2	4,305
48	1.5	7	1.7	0.6	3.0	61.1±2.4	4,745	55.3±2.2	0.4	3.1	63.5±2.5	5,475

Conductor	Tinned copper, class2	Tinned copper, Class2
Fire proof layer	Mica/glass tape	Mica/glass tape
Insulation	HF-HEPR	HF-HEPR
Pair/Triad twisting	Triad twisting	Triad twisting
Cabling	If necessary with filler	If necessary with filler
Common screen	AL/PS tape with drain wire	AL/PS tape with drain wire
Inner covering	Not applicable	Lapped covering
Armoring	Not applicable	Annealed copper wire braid
Outer sheath	PVC or SHF1	PVC or SHF1

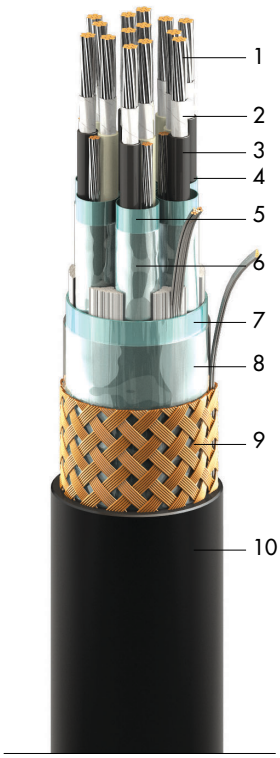
Identification of color

- Insulation
  - 1Pr : White-Black, 1Tr : White-Black-Red, 1Qd : White-Black-Red-Blue
  - 2Pr and above : Lettering on black/white insulation (pair number)
- Outer sheath :
  - Non-IS(intrinsically safe) : Black
  - IS(intrinsically safe) type : Blue

  Note) Any other colors purchaser required

Attached table13 Fire resistance

LV Unarmoured Instrument Cables with Individual and/or Common Shield 250V EXY(I/C) / EXI(I/C)
LV Armoured Control Cables with Individual and/or Common Shield 250V EOY(I/C) / EOI(I/C)



Construction Details

1. **Conductor** : Stranded tinned annealed copper as per IEC 60228, class 2
2. **Fire proof layer** : Mica/Glass tape
3. **Insulation** : High modulus Ethylene-propylene rubber as per IEC 60092-351, HF-HEPR
4. **Pair twisting**
5. **Individual screen** : AL/PS tape with drain wire at least 0.5mm²
6. **Cabling (with filler)**
7. **Common screen(Option¹)** : AL/PS tape with drain wire at least 0.5mm²
   A suitable tape or tapes may be applied over the collective screen.
8. **Inner covering (except EXY, EXI)** : Lapped covering
9. **Amour (Applied to armoured cable)** : Copper wire braid as per IEC 60092-376
   A suitable separator tape or tapes may be applied under and/or over the armour.
10. **Outer sheath** : see table
    Code EXY & EOY : Polyvinyl chloride compound (PVC) as per IEC 60092-359, ST2
    Code EXI & EOI : Enhanced Halogen free thermoplastic compound as per IEC 60092-359, SHF1

Type	Sheath material	Type	Sheath material
Basic cable	Flame retardant PVC as per IEC 60092-359, ST2	Paint resistant cable	Paint resistant PVC as per IEC 60092-359, ST2
Normal cable	General PVC as per IEC 60092-359, ST2	Premium	Flame & Paint resistant PVC as per IEC 60092-359, ST2

Option¹) In case of common screen type, letter "(C)" shall be suffixed to the end letter of cable symbol.

Approvals

ABS, Lloyd's Register, DNV, Bureau Veritas, Germanischer Lloyd, KR Korean Register, ClassNK

Standard Applied

- **Design guideline** : IEC 60092-376
- **Material properties** : IEC 60092-351, Insulation, HEPR
  IEC 60092-359, Sheath, ST2 or SHF1
- **Flame retardant** : IEC 60332-3, Cat. 'A'
- **Fire resistant** : IEC 60331-21(for cable overall dia. ≤ 20mm)
  IEC 60331-31(for cable overall dia. ›20mm)
- **HCl emission** : IEC 60754-1, 0.5% ↓ for Halogen free cable
- **Smoke emission** : IEC 61034, transmittance 60% ↑ for Halogen free cable
- **Cold properties(option)** : IEC 60811-1-4, Upgrade test at -30℃
- **Oil resistant(option)** : IEEE Std. 1580-2001 Type T, at 70℃ for 4hours, for PVC sheathed cable
- **Paint resistant(option)** : Maker standard (Epoxy, Alkyd paint, at 100℃ for 168hours)

Identification of color

- **Insulation**
  -1Pr : White-Black, 1Tr : White-Black-Red, 1Qd : White-Black-Red-Blue
  -2Pr and above : Lettering on black/white insulation (pair number)
  Note) Any other colors purchaser required
- **Outer sheath**
  - Non-IS(intrinsically safe) : Black
  - IS(intrinsically safe) type : Blue

-30 to 90℃ | Flame retardant IEC 60332-3, A & IEC 60331-31 | Weather Resistance to severe weather conditions | Flexibility | Halogen free IEC 60754-1 (option) | Smoke density IEC 61034 (option) | Gass toxicity No (option)

Application

- Instrument circuit upto 250V, instrument safe systems.
- Fixed installation for instrument, communication, control and alarm systems in both explosion risk and safe areas, general purposes.
- Maximum operating conductor temperature 90℃

Standard Applied

• Design guideline :	IEC 60092-376
• Material properties :	IEC 60092-351, Insulation, HF-HEPR IEC 60092-359, Sheath, ST2 or SHF1
• Flame retardant :	IEC 60332-3, Cat. 'A'
• Fire resistant :	IEC 60331-21(for cable overall dia. ≤ 20mm) IEC 60331-31(for cable overall dia. ›20mm)
• HCl emission :	IEC 60754-1, 0.5% ↓ for Halogen free cable
• Smoke emission :	IEC 61034, transmittance 60% ↑ for Halogen free cable
• Cold properties(option) :	IEC 60811-1-4, Upgrade test at -30℃
• Oil resistant(option) :	IEEE Std. 1580-2001 Type T, at 70℃ for 4hours, for PVC sheathed cable
• Paint resistant(option) :	Maker standard (Epoxy, Alkyd paint, at 100℃ for 168hours)

250V Instrument Cable Fire resistance

LV Unarmoured Instrument Cables with Individual or/and Common Shield 250V EXY(I/C) / EXI(I/C)
LV Armoured Instrument Cables with Individual or/and Common Shield 250V EOY(I/C) / EOI(I/C)

No. of pair	Conductor			Thickness of insulation	Unarmoured, EXY(I/C) Unarmoured, EXI(I/C)			Armoured, EOY(I/C) Armoured, EOI(I/C)				
	Nominal sectional area	Min. No. of wires	Max. overall dia.		Thickness of sheath	Nominal dia. over sheath	Cable weight (approx.)	Nomina dia. over inner covering	Dia. of metal wire for braid	Thickness of outer sheath	Nominal overall dia.	Cable weight (approx.)
PR	mm²	EA	mm	mm	mm	mm	kg/km	mm	mm	mm	mm	kg/km
1	0.75	7	1.2	0.5	1.0	8.1±0.4	85	6.3±0.4	0.2	1.1	9.6±0.4	140
2	0.75	7	1.2	0.5	1.2	12.8±0.5	195	10.6±0.4	0.3	1.3	14.8±0.6	320
3	0.75	7	1.2	0.5	1.2	13.5±0.5	235	11.3±0.5	0.3	1.3	15.5±0.6	370
4	0.75	7	1.2	0.5	1.3	15.0±0.6	290	12.6±0.5	0.3	1.4	17.0±0.7	440
5	0.75	7	1.2	0.5	1.3	16.4±0.7	350	14.0±0.6	0.3	1.4	18.4±0.7	510
7	0.75	7	1.2	0.5	1.4	18.1±0.7	445	15.5±0.6	0.3	1.5	20.1±0.8	620
10	0.75	7	1.2	0.5	1.6	22.3±0.9	620	19.3±0.8	0.3	1.6	24.1±1.0	820
12	0.75	7	1.2	0.5	1.6	23.3±0.9	705	20.3±0.8	0.3	1.7	25.3±1.0	935
14	0.75	7	1.2	0.5	1.7	25.1±1.0	815	21.9±0.9	0.3	1.7	26.9±1.1	1,045
15	0.75	7	1.2	0.5	1.7	25.8±1.0	875	22.6±0.9	0.3	1.8	27.8±1.1	1,125
19	0.75	7	1.2	0.5	1.8	28.8±1.2	1,045	25.4±1.0	0.3	1.9	30.8±1.2	1,320
20	0.75	7	1.2	0.5	1.8	29.4±1.2	1,125	26.0±1.0	0.3	1.9	31.4±1.3	1,405
24	0.75	7	1.2	0.5	1.9	32.0±1.3	1,310	28.4±1.1	0.3	2.0	34.0±1.4	1,615
27	0.75	7	1.2	0.5	2.0	33.9±1.4	1,460	30.1±1.2	0.4	2.1	36.3±1.5	1,865
30	0.75	7	1.2	0.5	2.1	35.7±1.4	1,615	31.7±1.3	0.4	2.1	37.9±1.5	2,025
33	0.75	7	1.2	0.5	2.1	37.2±1.5	1,760	33.2±1.3	0.4	2.2	39.6±1.6	2,205
37	0.75	7	1.2	0.5	2.2	39.3±1.6	1,935	35.1±1.4	0.4	2.3	41.7±1.7	2,405
48	0.75	7	1.2	0.5	2.4	44.5±1.8	2,490	39.9±1.6	0.4	2.5	46.9±1.9	3,020

Conductor	Tinned copper, class2	Tinned copper, Class2
Fire proof layer	Mica/glass tape	Mica/glass tape
Insulation	HF-HEPR	HF-HEPR
Pair/Triad twisting	Pair twisting	Pair twisting
Individual screen	AL/PS tape with drain wire	AL/PS tape with drain wire
Cabling	If necessary with filler	If necessary with filler
Common screen	AL/PS tape with drain wire	AL/PS tape with drain wire
Inner covering	Not applicable	Lapped covering
Armoring	Not applicable	Annealed copper wire braid
Outer sheath	PVC or SHF1	PVC or SHF1

Identification of color

- Insulation
  - 1Pr : White-Black, 1Tr : White-Black-Red, 1Qd : White-Black-Red-Blue
  - 2Pr and above : Lettering on black/white insulation (pair number)
- Outer sheath :
  - Non-IS(intrinsically safe) : Black
  - IS(intrinsically safe) type : Blue

  Note) Any other colors purchaser required

Application

- Instrument circuit upto 250V, instrument safe systems.
- Fixed installation for instrument, communication, control and alarm systems in both explosion risk and safe areas, general purposes.
- Maximum operating conductor temperature 90℃

Standard Applied

• Design guideline :	IEC 60092-376
• Material properties :	IEC 60092-351, Insulation, HF-HEPR IEC 60092-359, Sheath, ST2 or SHF1
• Flame retardant :	IEC 60332-3, Cat. 'A'
• Fire resistant :	IEC 60331-21(for cable overall dia. ≤ 20mm) IEC 60331-31(for cable overall dia. ›20mm)
• HCl emission :	IEC 60754-1, 0.5% ↓ for Halogen free cable
• Smoke emission :	IEC 61034, transmittance 60% ↑ for Halogen free cable
• Cold properties(option) :	IEC 60811-1-4, Upgrade test at -30℃
• Oil resistant(option) :	IEEE Std. 1580-2001 Type T, at 70℃ for 4hours, for PVC sheathed cable
• Paint resistant(option) :	Maker standard (Epoxy, Alkyd paint, at 100℃ for 168hours)

250V Instrument Cable Fire resistance

LV Unarmoured Instrument Cables with Individual or/and OS 250V EXY(I/C) / EXI(I/C)
LV Armoured Instrument Cables with Individual or/and OS 250V EOY(I/C) / EOI(I/C)

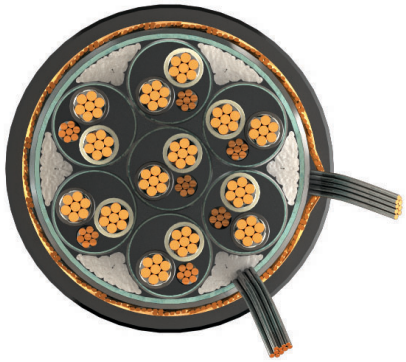
No. of pair	Conductor			Thickness of insulation	Unarmoured, EXY(I/C) Unarmoured, EXI(I/C)			Armoured, EOY(I/C) Armoured, EOI(I/C)				
	Nominal sectional area	Min. No. of wires	Max. overall dia.		Thickness of sheath	Nominal dia. over sheath	Cable weight (approx.)	Nomina dia. over inner covering	Dia. of metal wire for braid	Thickness of outer sheath	Nominal overall dia.	Cable weight (approx.)
PR	mm²	EA	mm	mm	mm	mm	kg/km	mm	mm	mm	mm	kg/km
1	1.0	7	1.4	0.5	1.1	8.7±0.4	100	6.7±0.4	0.2	1.1	10.0±0.4	155
2	1.0	7	1.4	0.5	1.2	13.4±0.5	220	11.2±0.4	0.3	1.3	15.4±0.6	355
3	1.0	7	1.4	0.5	1.3	14.4±0.6	280	12.0±0.5	0.3	1.3	16.2±0.6	415
4	1.0	7	1.4	0.5	1.3	15.8±0.6	345	13.4±0.5	0.3	1.4	17.8±0.7	500
5	1.0	7	1.4	0.5	1.4	17.6±0.7	425	15.0±0.6	0.3	1.4	19.6±0.8	590
7	1.0	7	1.4	0.5	1.4	19.1±0.8	530	16.5±0.7	0.3	1.5	21.1±0.8	710
10	1.0	7	1.4	0.5	1.6	23.5±0.9	735	20.5±0.8	0.3	1.7	25.5±1.0	965
12	1.0	7	1.4	0.5	1.6	24.6±1.0	840	21.6±0.9	0.3	1.7	26.6±1.1	1,080
14	1.0	7	1.4	0.5	1.7	26.5±1.1	975	23.3±0.9	0.3	1.8	28.5±1.1	1,230
15	1.0	7	1.4	0.5	1.7	27.3±1.1	1,050	24.1±1.0	0.3	1.8	29.3±1.2	1,310
19	1.0	7	1.4	0.5	1.9	30.7±1.2	1,265	27.1±1.1	0.3	1.9	32.5±1.3	1,545
20	1.0	7	1.4	0.5	1.9	31.3±1.3	1,360	27.7±1.1	0.3	2.0	33.3±1.3	1,660
24	1.0	7	1.4	0.5	2.0	33.1±1.4	1,590	30.3±1.2	0.4	2.1	36.5±1.5	2,000
27	1.0	7	1.4	0.5	2.1	36.1±1.4	1,770	32.1±1.3	0.4	2.2	38.5±1.5	2,205
30	1.0	7	1.4	0.5	2.1	37.8±1.5	1,945	33.8±1.4	0.4	2.2	40.2±1.6	2,395
33	1.0	7	1.4	0.5	2.2	39.6±1.6	2,135	35.4±1.4	0.4	2.3	42.0±1.7	2,610
37	1.0	7	1.4	0.5	2.3	41.9±1.7	2,350	37.5±1.5	0.4	2.4	44.3±1.8	2,855
48	1.0	7	1.4	0.5	2.5	47.4±1.9	3,030	42.6±1.7	0.4	2.6	49.8±2.0	3,595

Conductor	Tinned copper, class2	Tinned copper, Class2
Fire proof layer	Mica/glass tape	Mica/glass tape
Insulation	HF-HEPR	HF-HEPR
Pair/Triad twisting	Pair twisting	Pair twisting
Individual screen	AL/PS tape with drain wire	AL/PS tape with drain wire
Cabling	If necessary with filler	If necessary with filler
Common screen	AL/PS tape with drain wire	AL/PS tape with drain wire
Inner covering	Not applicable	Lapped covering
Armoring	Not applicable	Annealed copper wire braid
Outer sheath	PVC or SHF1	PVC or SHF1

Identification of color

- Insulation
  - 1Pr : White-Black, 1Tr : White-Black-Red, 1Qd : White-Black-Red-Blue
  - 2Pr and above : Lettering on black/white insulation (pair number)
- Outer sheath :
  - Non-IS(intrinsically safe) : Black
  - IS(intrinsically safe) type : Blue

  Note) Any other colors purchaser required



Application

- Instrument circuit upto 250V, instrument safe systems.
- Fixed installation for instrument, communication, control and alarm systems in both explosion risk and safe areas, general purposes.
- Maximum operating conductor temperature 90℃

Standard Applied

• Design guideline :	IEC 60092-376
• Material properties :	IEC 60092-351, Insulation, HF-HEPR IEC 60092-359, Sheath, ST2 or SHF1
• Flame retardant :	IEC 60332-3, Cat. 'A'
• Fire resistant :	IEC 60331-21(for cable overall dia. ≤ 20mm) IEC 60331-31(for cable overall dia. ›20mm)
• HCl emission :	IEC 60754-1, 0.5% ↓ for Halogen free cable
• Smoke emission :	IEC 61034, transmittance 60% ↑ for Halogen free cable
• Cold properties(option) :	IEC 60811-1-4, Upgrade test at -30℃
• Oil resistant(option) :	IEEE Std. 1580-2001 Type T, at 70℃ for 4hours, for PVC sheathed cable
• Paint resistant(option) :	Maker standard (Epoxy, Alkyd paint, at 100℃ for 168hours)

250V Instrument Cable Fire resistance

LV Unarmoured Instrument Cables with Individual or/and OS 250V EXY(I/C) / EXI(I/C)
LV Armoured Instrument Cables with Individual or/and OS 250V EOY(I/C) / EOI(I/C)

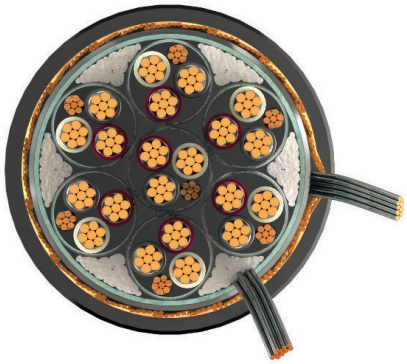
No. of pair	Conductor			Thickness of insulation	Unarmoured, EXY(I/C) Unarmoured, EXI(I/C)			Armoured, EOY(I/C) Armoured, EOI(I/C)				
	Nominal sectional area	Min. No. of wires	Max. overall dia.		Thickness of sheath	Nominal dia. over sheath	Cable weight (approx.)	Nomina dia. over inner covering	Dia. of metal wire for braid	Thickness of outer sheath	Nominal overall dia.	Cable weight (approx.)
PR	mm²	EA	mm	mm	mm	mm	kg/km	mm	mm	mm	mm	kg/km
1	1.5	7	1.7	0.6	1.1	9.7±0.4	120	7.7±0.4	0.2	1.1	11.0±0.4	180
2	1.5	7	1.7	0.6	1.3	15.3±0.6	280	12.9±0.5	0.3	1.4	17.3±0.7	435
3	1.5	7	1.7	0.6	1.3	16.2±0.6	350	13.8±0.6	0.3	1.4	18.2±0.7	510
4	1.5	7	1.7	0.6	1.4	18.1±0.7	440	15.5±0.6	0.3	1.5	20.1±0.8	615
5	1.5	7	1.7	0.6	1.5	20.1±0.8	540	17.3±0.7	0.3	1.5	21.9±0.9	720
7	1.5	7	1.7	0.6	1.5	21.9±0.9	675	19.1±0.8	0.3	1.6	23.9±1.0	885
10	1.5	7	1.7	0.6	1.7	26.9±1.1	945	23.7±0.9	0.3	1.8	28.9±1.2	1,205
12	1.5	7	1.7	0.6	1.8	28.4±1.1	1,095	25.0±1.0	0.3	1.9	30.4±1.2	1,370
14	1.5	7	1.7	0.6	1.9	30.6±1.2	1,265	27.0±1.1	0.3	1.9	32.4±1.3	1,540
15	1.5	7	1.7	0.6	1.9	31.5±1.3	1,360	27.9±1.1	0.3	2.0	33.5±1.3	1,665
19	1.5	7	1.7	0.6	2.0	35.1±1.4	1,625	31.3±1.3	0.4	2.1	37.5±1.5	2,045
20	1.5	7	1.7	0.6	2.1	36.1±1.4	1,765	32.1±1.3	0.4	2.2	38.5±1.5	2,195
24	1.5	7	1.7	0.6	2.2	39.3±1.6	2,065	35.1±1.4	0.4	2.3	41.7±1.7	2,535
27	1.5	7	1.7	0.6	2.3	41.6±1.7	2,300	37.2±1.5	0.4	2.4	44.0±1.8	2,795
30	1.5	7	1.7	0.6	2.4	43.8±1.8	2,545	39.2±1.6	0.4	2.4	46.0±1.8	3,045
33	1.5	7	1.7	0.6	2.4	45.6±1.8	2,770	41.0±1.6	0.4	2.5	48.0±1.9	3,315
37	1.5	7	1.7	0.6	2.5	48.2±1.9	3,045	43.4±1.7	0.4	2.6	50.6±2.0	3,625
48	1.5	7	1.7	0.6	2.8	54.7±2.2	3,950	49.3±2.0	0.4	2.8	56.9±2.3	4,580

Conductor	Tinned copper, class2	Tinned copper, Class2
Fire proof layer	Mica/glass tape	Mica/glass tape
Insulation	HF-HEPR	HF-HEPR
Pair/Triad twisting	Pair twisting	Pair twisting
Individual screen	AL/PS tape with drain wire	AL/PS tape with drain wire
Cabling	If necessary with filler	If necessary with filler
Common screen	AL/PS tape with drain wire	AL/PS tape with drain wire
Inner covering	Not applicable	Lapped covering
Armoring	Not applicable	Annealed copper wire braid
Outer sheath	PVC or SHF1	PVC or SHF1

Identification of color

- Insulation
  - 1Pr : White-Black, 1Tr : White-Black-Red, 1Qd : White-Black-Red-Blue
  - 2Pr and above : Lettering on black/white insulation (pair number)
- Outer sheath :
  - Non-IS(intrinsically safe) : Black
  - IS(intrinsically safe) type : Blue

  Note) Any other colors purchaser required



Application

- Instrument circuit upto 250V, instrument safe systems.
- Fixed installation for instrument, communication, control and alarm systems in both explosion risk and safe areas, general purposes.
- Maximum operating conductor temperature 90℃

Standard Applied

• Design guideline :	IEC 60092-376
• Material properties :	IEC 60092-351, Insulation, HF-HEPR IEC 60092-359, Sheath, ST2 or SHF1
• Flame retardant :	IEC 60332-3, Cat. 'A'
• Fire resistant :	IEC 60331-21(for cable overall dia. ≤ 20mm) IEC 60331-31(for cable overall dia. >20mm)
• HCl emission :	IEC 60754-1, 0.5% ↓ for Halogen free cable
• Smoke emission :	IEC 61034, transmittance 60% ↑ for Halogen free cable
• Cold properties(option) :	IEC 60811-1-4, Upgrade test at -30℃
• Oil resistant(option) :	IEEE Std. 1580-2001 Type T, at 70℃ for 4hours, for PVC sheathed cable
• Paint resistant(option) :	Maker standard (Epoxy, Alkyd paint, at 100℃ for 168hours)

250V Instrument Cable Fire resistance

LV Unarmoured Instrument Cables with Individual or/and OS 250V EXY(I/C) / EXI(I/C)
LV Armoured Instrument Cables with Individual or/and OS 250V EOY(I/C) / EOI(I/C)

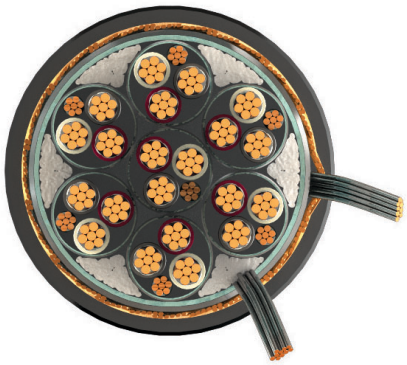
No. of triad	Conductor			Thickness of insulation	Unarmoured, EXY(I/C) Unarmoured, EXI(I/C)			Armoured, EOY(I/C) Armoured, EOI(I/C)				
	Nominal sectional area	Min. No. of wires	Max. overall dia.		Thickness of sheath	Nominal dia. over sheath	Cable weight (approx.)	Nomina dia. over inner covering	Dia. of metal wire for braid	Thickness of outer sheath	Nominal overall dia.	Cable weight (approx.)
TR	mm²	EA	mm	mm	mm	mm	kg/km	mm	mm	mm	mm	kg/km
1	0.75	7	1.2	0.5	1.1	8.7±0.4	105	6.7±0.4	0.2	1.1	10.0±0.4	160
2	0.75	7	1.2	0.5	1.3	14.1±0.6	240	11.7±0.5	0.3	1.3	15.9±0.6	375
3	0.75	7	1.2	0.5	1.3	15.0±0.6	300	12.6±0.5	0.3	1.4	17.0±0.7	450
4	0.75	7	1.2	0.5	1.3	16.4±0.7	370	14.0±0.6	0.3	1.4	18.4±0.7	530
5	0.75	7	1.2	0.5	1.4	18.4±0.7	455	15.8±0.6	0.3	1.5	20.4±0.8	630
7	0.75	7	1.2	0.5	1.5	20.9±0.8	585	18.1±0.7	0.3	1.6	22.9±0.9	790
10	0.75	7	1.2	0.5	1.7	25.7±1.0	820	22.5±0.9	0.3	1.8	27.7±1.1	1,070
12	0.75	7	1.2	0.5	1.7	26.5±1.1	935	23.3±0.9	0.3	1.8	28.5±1.1	1,190
14	0.75	7	1.2	0.5	1.8	28.5±1.1	1,080	25.1±1.0	0.3	1.9	30.5±1.2	1,355
15	0.75	7	1.2	0.5	1.8	29.4±1.2	1,160	26.0±1.0	0.3	1.9	31.4±1.3	1,440
19	0.75	7	1.2	0.5	2.0	33.0±1.3	1,405	29.2±1.2	0.3	2.0	34.8±1.4	1,705
20	0.75	7	1.2	0.5	2.0	33.7±1.3	1,505	29.9±1.2	0.3	2.1	35.7±1.4	1,830
24	0.75	7	1.2	0.5	2.1	36.7±1.5	1,765	32.7±1.3	0.4	2.2	39.1±1.6	2,205
27	0.75	7	1.2	0.5	2.2	38.8±1.6	1,965	34.6±1.4	0.4	2.3	41.2±1.6	2,430
30	0.75	7	1.2	0.5	2.3	40.6±1.6	2,155	36.4±1.5	0.4	2.3	43.0±1.7	2,645
33	0.75	7	1.2	0.5	2.3	42.6±1.7	2,370	38.2±1.5	0.4	2.4	45.0±1.8	2,880
37	0.75	7	1.2	0.5	2.4	45.0±1.8	2,610	40.4±1.6	0.4	2.5	47.4±1.9	3,150
48	0.75	7	1.2	0.5	2.6	50.9±2.0	3,360	45.9±1.8	0.4	2.7	53.3±2.1	3,970

Conductor	Tinned copper, class2	Tinned copper, Class2
Fire proof layer	Mica/glass tape	Mica/glass tape
Insulation	HF-HEPR	HF-HEPR
Pair/Triad twisting	Pair twisting	Pair twisting
Individual screen	AL/PS tape with drain wire	AL/PS tape with drain wire
Cabling	If necessary with filler	If necessary with filler
Common screen	AL/PS tape with drain wire	AL/PS tape with drain wire
Inner covering	Not applicable	Lapped covering
Armoring	Not applicable	Annealed copper wire braid
Outer sheath	PVC or SHF1	PVC or SHF1

Identification of color

- Insulation
  - 1Pr : White-Black, 1Tr : White-Black-Red, 1Qd : White-Black-Red-Blue
  - 2Pr and above : Lettering on black/white insulation (pair number)
- Outer sheath :
  - Non-IS(intrinsically safe) : Black
  - IS(intrinsically safe) type : Blue

  Note) Any other colors purchaser required



Application

- Instrument circuit upto 250V, instrument safe systems.
- Fixed installation for instrument, communication, control and alarm systems in both explosion risk and safe areas, general purposes.
- Maximum operating conductor temperature 90℃

Standard Applied

• Design guideline :	IEC 60092-376
• Material properties :	IEC 60092-351, Insulation, HF-HEPR IEC 60092-359, Sheath, ST2 or SHF1
• Flame retardant :	IEC 60332-3, Cat. 'A'
• Fire resistant :	IEC 60331-21(for cable overall dia. ≤ 20mm) IEC 60331-31(for cable overall dia. ›20mm)
• HCl emission :	IEC 60754-1, 0.5% ↓ for Halogen free cable
• Smoke emission :	IEC 61034, transmittance 60% ↑ for Halogen free cable
• Cold properties(option) :	IEC 60811-1-4, Upgrade test at -30℃
• Oil resistant(option) :	IEEE Std. 1580-2001 Type T, at 70℃ for 4hours, for PVC sheathed cable
• Paint resistant(option) :	Maker standard (Epoxy, Alkyd paint, at 100℃ for 168hours)

250V Instrument Cable Fire resistance

LV Unarmoured Instrument Cables with Individual or/and OS 250V EXY(I/C) / EXI(I/C)
LV Armoured Instrument Cables with Individual or/and OS 250V EOY(I/C) / EOI(I/C)

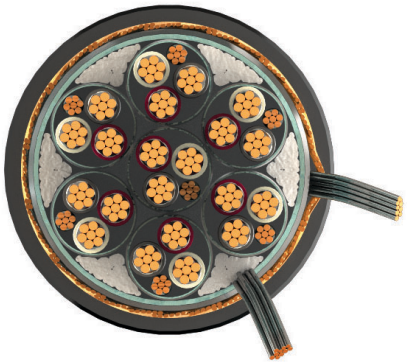
No. of triad	Conductor			Thickness of insulation	Unarmoured, EXY(I/C) Unarmoured, EXI(I/C)			Armoured, EOY(I/C) Armoured, EOI(I/C)				
	Nominal sectional area	Min. No. of wires	Max. overall dia.		Thickness of sheath	Nominal dia. over sheath	Cable weight (approx.)	Nomina dia. over inner covering	Dia. of metal wire for braid	Thickness of outer sheath	Nominal overall dia.	Cable weight (approx.)
TR	mm²	EA	mm	mm	mm	mm	kg/km	mm	mm	mm	mm	kg/km
1	1.0	7	1.4	0.5	1.1	9.2 ±0.4	125	7.2 ±0.4	0.2	1.1	10.5 ±0.4	180
2	1.0	7	1.4	0.5	1.3	14.9 ±0.6	280	12.5 ±0.5	0.3	1.4	16.9 ±0.7	430
3	1.0	7	1.4	0.5	1.3	15.8 ±0.6	355	13.4 ±0.5	0.3	1.4	17.8 ±0.7	510
4	1.0	7	1.4	0.5	1.4	17.6 ±0.7	450	15.0 ±0.6	0.3	1.5	19.6 ±0.8	620
5	1.0	7	1.4	0.5	1.5	19.6 ±0.8	550	16.8 ±0.7	0.3	1.5	21.4 ±0.9	725
7	1.0	7	1.4	0.5	1.6	22.3 ±0.9	710	19.3 ±0.8	0.3	1.6	24.1 ±1.0	910
10	1.0	7	1.4	0.5	1.7	27.2 ±1.1	980	24.0 ±1.0	0.3	1.8	29.2 ±1.2	1,240
12	1.0	7	1.4	0.5	1.8	28.3 ±1.1	1,135	24.9 ±1.0	0.3	1.9	30.3 ±1.2	1,410
14	1.0	7	1.4	0.5	1.9	30.4 ±1.2	1,310	26.8 ±1.1	0.3	1.9	32.2 ±1.3	1,585
15	1.0	7	1.4	0.5	1.9	31.3 ±1.3	1,410	27.7 ±1.1	0.3	2.0	33.3 ±1.3	1,710
19	1.0	7	1.4	0.5	2.0	34.9 ±1.4	1,690	31.1 ±1.2	0.4	2.1	37.3 ±1.5	2,110
20	1.0	7	1.4	0.5	2.1	35.9 ±1.4	1,830	31.9 ±1.3	0.4	2.1	38.1 ±1.5	2,245
24	1.0	7	1.4	0.5	2.2	39.1 ±1.6	2,145	34.9 ±1.4	0.4	2.3	41.5 ±1.7	2,615
27	1.0	7	1.4	0.5	2.3	41.3 ±1.7	2,390	36.9 ±1.5	0.4	2.3	43.5 ±1.7	2,865
30	1.0	7	1.4	0.5	2.3	43.3 ±1.7	2,625	38.9 ±1.6	0.4	2.4	45.7 ±1.8	3,145
33	1.0	7	1.4	0.5	2.4	45.4 ±1.8	2,885	40.8 ±1.6	0.4	2.5	47.8 ±1.9	3,430
37	1.0	7	1.4	0.5	2.5	47.9 ±1.9	3,180	43.1 ±1.7	0.4	2.6	50.3 ±2.0	3,755
48	1.0	7	1.4	0.5	2.7	54.2 ±2.2	4,095	49.0 ±2.0	0.4	2.8	56.6 ±2.3	4,745

Conductor	Tinned copper, class2	Tinned copper, Class2
Fire proof layer	Mica/glass tape	Mica/glass tape
Insulation	HF-HEPR	HF-HEPR
Pair/Triad twisting	Pair twisting	Pair twisting
Individual screen	AL/PS tape with drain wire	AL/PS tape with drain wire
Cabling	If necessary with filler	If necessary with filler
Common screen	AL/PS tape with drain wire	AL/PS tape with drain wire
Inner covering	Not applicable	Lapped covering
Armoring	Not applicable	Annealed copper wire braid
Outer sheath	PVC or SHF1	PVC or SHF1

Identification of color

- Insulation
  - 1Pr : White-Black, 1Tr : White-Black-Red, 1Qd : White-Black-Red-Blue
  - 2Pr and above : Lettering on black/white insulation (pair number)
- Outer sheath :
  - Non-IS(intrinsically safe) : Black
  - IS(intrinsically safe) type : Blue

  Note) Any other colors purchaser required



Application

- Instrument circuit upto 250V, instrument safe systems.
- Fixed installation for instrument, communication, control and alarm systems in both explosion risk and safe areas, general purposes.
- Maximum operating conductor temperature 90℃

Standard Applied

• Design guideline :	IEC 60092-376
• Material properties :	IEC 60092-351, Insulation, HF-HEPR IEC 60092-359, Sheath, ST2 or SHF1
• Flame retardant :	IEC 60332-3, Cat. 'A'
• Fire resistant :	IEC 60331-21(for cable overall dia. ≤ 20mm) IEC 60331-31(for cable overall dia. ›20mm)
• HCl emission :	IEC 60754-1, 0.5% ↓ for Halogen free cable
• Smoke emission :	IEC 61034, transmittance 60% ↑ for Halogen free cable
• Cold properties(option) :	IEC 60811-1-4, Upgrade test at -30℃
• Oil resistant(option) :	IEEE Std. 1580-2001 Type T, at 70℃ for 4hours, for PVC sheathed cable
• Paint resistant(option) :	Maker standard (Epoxy, Alkyd paint, at 100℃ for 168hours)

250V Instrument Cable Fire resistance

LV Unarmoured Instrument Cables with Individual or/and OS 250V EXY(I/C) / EXI(I/C)
LV Armoured Instrument Cables with Individual or/and OS 250V EOY(I/C) / EOI(I/C)

No. of triad	Conductor			Thickness of insulation	Unarmoured, EXY(I/C) Unarmoured, EXI(I/C)			Armoured, EOY(I/C) Armoured, EOI(I/C)				
	Nominal sectional area	Min. No. of wires	Max. overall dia.		Thickness of sheath	Nominal dia. over sheath	Cable weight (approx.)	Nomina dia. over inner covering	Dia. of metal wire for braid	Thickness of outer sheath	Nominal overall dia.	Cable weight (approx.)
TR	mm²	EA	mm	mm	mm	mm	kg/km	mm	mm	mm	mm	kg/km
1	1.5	7	1.7	0.6	1.1	10.2±0.4	150	8.2±0.4	0.2	1.2	11.7±0.5	220
2	1.5	7	1.7	0.6	1.4	17.0±0.7	365	14.4±0.6	0.3	1.4	18.8±0.8	520
3	1.5	7	1.7	0.6	1.4	18.1±0.7	460	15.5±0.6	0.3	1.5	20.1±0.8	630
4	1.5	7	1.7	0.6	1.5	20.1±0.8	575	17.3±0.7	0.3	1.5	21.9±0.9	760
5	1.5	7	1.7	0.6	1.6	22.4±0.9	705	19.4±0.8	0.3	1.6	24.2±1.0	910
7	1.5	7	1.7	0.6	1.7	25.5±1.0	925	22.3±0.9	0.3	1.7	27.3±1.1	1,155
10	1.5	7	1.7	0.6	1.9	31.3±1.3	1,285	27.7±1.1	0.3	2.0	33.3±1.3	1,585
12	1.5	7	1.7	0.6	1.9	32.3±1.3	1,475	28.7±1.1	0.3	2.0	34.3±1.4	1,785
14	1.5	7	1.7	0.6	2.0	34.8±1.4	1,700	31.0±1.2	0.4	2.1	37.2±1.5	2,120
15	1.5	7	1.7	0.6	2.1	36.1±1.4	1,845	32.1±1.3	0.4	2.2	38.5±1.5	2,280
19	1.5	7	1.7	0.6	2.2	40.2±1.6	2,220	36.0±1.4	0.4	2.3	42.6±1.7	2,700
20	1.5	7	1.7	0.6	2.3	41.3±1.7	2,400	36.9±1.5	0.4	2.3	43.5±1.7	2,875
24	1.5	7	1.7	0.6	2.4	45.0±1.8	2,815	40.4±1.6	0.4	2.5	47.4±1.9	3,355
27	1.5	7	1.7	0.6	2.5	47.6±1.9	3,140	42.8±1.7	0.4	2.6	50.0±2.0	3,705
30	1.5	7	1.7	0.6	2.6	50.1±2.0	3,470	45.1±1.8	0.4	2.7	52.5±2.1	4,070
33	1.5	7	1.7	0.6	2.7	52.5±2.1	3,815	47.3±1.9	0.4	2.8	54.9±2.2	4,440
37	1.5	7	1.7	0.6	2.8	55.4±2.2	4,205	50.0±2.0	0.4	2.9	57.8±2.3	4,865
48	1.5	7	1.7	0.6	3.1	62.8±2.5	5,440	56.8±2.3	0.4	3.1	65.0±2.6	6,155

Conductor	Tinned copper, class2	Tinned copper, Class2
Fire proof layer	Mica/glass tape	Mica/glass tape
Insulation	HF-HEPR	HF-HEPR
Pair/Triad twisting	Pair twisting	Pair twisting
Individual screen	AL/PS tape with drain wire	AL/PS tape with drain wire
Cabling	If necessary with filler	If necessary with filler
Common screen	AL/PS tape with drain wire	AL/PS tape with drain wire
Inner covering	Not applicable	Lapped covering
Armoring	Not applicable	Annealed copper wire braid
Outer sheath	PVC or SHF1	PVC or SHF1

Identification of color

- Insulation
  - 1Pr : White-Black, 1Tr : White-Black-Red, 1Qd : White-Black-Red-Blue
  - 2Pr and above : Lettering on black/white insulation (pair number)
- Outer sheath :
  - Non-IS(intrinsically safe) : Black
  - IS(intrinsically safe) type : Blue

  Note) Any other colors purchaser required

0.6/1kV Rating | Low voltage switchboard & bonding wire

Application

Fixed installation for bonding services, panels and control desks, etc. on general purpose.

Construction Details

1 **Conductor** : Tinned annealed copper wire stranded as per IEC 60228, Class5

2 **Insulation** : SCP : FR - XLPE insulation
SYP : PVC insulation
HF - SCP : halogen - free, FR - XLPE insulation

Standard Applied

- **Design guideline** : SCP & SYP : JIS C 3410
  HF - SCP : IEC 60092-353
- **Material properties** : SCP : JIS C 3410 Insulation, FR - XLPE
  SYP : JIS C 3410 Insulation, PVC
  HF - SCP : IEC 60092-351 Insulation, HF - XLPE
- **Flame retardant** : IEC 60332-1
  For HF - SCP cable
  HCl emission : IEC 60754-1, 0.5% ↓
  IEC 60754-2, pH:4.3% ↑ ,
  conductivity : 10uSmm - 1 ↓
  Smoke emission : IEC 61034, transmittance 60% ↓

Identification of color

- **Insulation**

-1C : Black

Note) Any other colors purchaser required

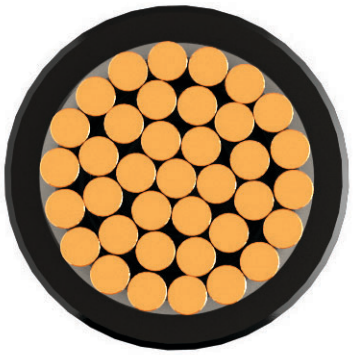
Approvals

ABS, Lloyd's Register, DNV, Bureau Veritas, Germanischer Lloyd, KR Korean Register, ClassNK

-30 to 75℃(SYP)
-30 to 90℃
(SCP & HF-SCP)

Flame retardant
IEC 60332-1

Flexibility



Application

- Fixed installation for bonding services, panels and control desks, etc. on general purpose.

Standard Applied

- Design guideline : JIS C 3410
- Material properties : JIS C 3410 Insulation, FR - XLPE
- Flame retardant : IEC 60332-1

0.6/1kV SCP

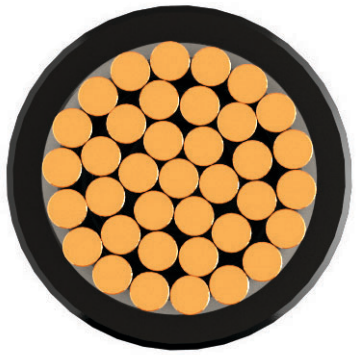
FR-XLPE insulated flexible switchboard wire

No. of core	Conductor			Thickness of insulation	Nominal overall dia.	Tolerance of overall dia.	Conductor resistance (20℃)	Test voltage	Insulation resistance (20℃)	Approx weight
	Nominal sectional area	Min. No. of wire	Max. overall dia.							
EA	mm²	mm	mm	mm	mm	±mm	Ω/km	V/5mm	MΩ·km	kg/km
1	1.5	30/0.25	1.58	0.9	3.7	0.4	13.7	3,500	70	26
	2.5	49/0.25	2.02	1.0	4.3		8.21			38
	4	55/0.30	2.57		4.8		5.09		60	55
	6	82/0.30	3.14		5.3		3.39		50	75
	10	80/0.40	4.13	1.1	6.6		1.95		40	125
	16	7/18/0.40	5.88		8.3		1.24		30	190
	25	7/28/0.40	7.32	1.2	10.0		0.795			280
	35	7/29/0.40	8.67	1.4	11.8	0.5	0.565			390
	50	19/21/0.40	10.3		13.4		0.393			550
	70	19/19/0.50	12.2	1.6	15.7	0.6	0.2/7			770
	95	19/25/0.50	14.0	1.7	17.7	0.7	0.210			1,000

Conductor Tinned copper, class5

Insulation FR-XLPE

Reference : 1. Nominal voltage : a.c. 0.6/1kV or less, d.c. 0.9/1.5kV or less
2. Maximum rated conductor temperature : 90℃



Application

- Fixed installation for bonding services, panels and control desks, etc. on general purpose.

Standard Applied

- Design guideline : JIS C 3410
- Material properties : JIS C 3410 Insulation, PVC
- Flame retardant : IEC 60332-1

0.6/1kV SYP

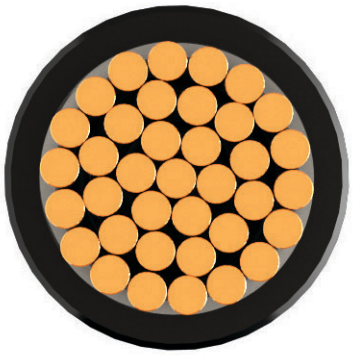
PVC insulated wire for machines and apparatus control

No. of core	Conductor			Thickness of insulation	Nominal overall dia.	Tolerance of overall dia.	Conductor resistance (20℃)	Test voltage	Insulation resistance (20℃)	Approx weight
	Nominal sectional area	Min. No. of wire	Max. overall dia.							
EA	mm²	mm	mm	mm	mm	±mm	Ω/km	V/5mm	MΩ·km	kg/km
1	0.75	24/0.20	1.13	1.2	3.8	0.4	26.70	3,500	400	21
	1	32/0.20	1.27		3.9		20.00		370	24
	1.5	30/0.25	1.58		4.2		13.70		320	30
	2	49/0.25	2.02		4.7		8.21		280	41
	4	55/0.30	2.57		5.2		5.09		230	60
	6	82/0.30	3.14		5.8		3.39		200	80
	10	80/0.40	4.13		6.8		1.95		170	125
	16	7/18/0.40	5.88	1.3	8.7		1.24		130	195

Conductor Tinned copper, class5

Insulation PVC

Reference : 1. Nominal voltage : a.c. 0.6/1kV or less, d.c. 0.9/1.5kV or less
2. Maximum rated conductor temperature : 75℃



Application

• Fixed installation for bonding services, panels and control desks, etc. on general purpose.

Standard Applied

• Design guideline :	IEC 60092-353
• Material properties :	IEC 60092-351 Insulation, HF - XLPE
• Flame retardant :	IEC 60332-1
	IEC 60754-1, 0.5% ↓
	IEC 60754-2, pH:4.3% ↑, conductivity : 10uSmm - 1 ↓
	IEC 61034, transmittance 60% ↓

0.6/1kV HF-SCP

Haglogen - free, FR - XKPE insulated flexible switchboard wire

No. of core	Conductor			Thickness of insulation	Nominal overall dia.	Tolerance of overall dia.	Conductor resistance (20℃)	Test voltage	Insulation resistance (20℃)	Approx weight
	Nominal sectional area	Min. No. of wire	Max. overall dia.							
EA	mm²	mm	mm	mm	mm	±mm	Ω/km	V/5mm	MΩ·km	kg/km
1	1.0	32/0.2	1.31	0.7	2.9	0.2	20	3,500	1160	25
	1.5	30/0.2	1.58	0.7	3.2	0.2	13.7		1010	30
	2.5	49/0.2	2.04	0.7	3.6	0.2	8.21		860	40
	4	55/0.3	2.59	0.7	4.2	0.2	5.09		700	55
	6	82/0.3	3.17	0.7	5.2	0.3	3.39		535	80
	10	80/0.4	4.13	0.7	6.2	0.3	1.95		435	120
	16	7/18/0.4	1.96	0.7	7.3	0.3	1.24		360	175
	25	7/28/0.4	2.44	0.9	9.1	0.4	0.795		370	275
	35	7/29/0.4	2.92	0.9	10.5	0.5	0.565		320	380
	50	19/21/0.4	3.49	1.0	12.5	0.5	0.393		295	530
	70	19/19/0.5	4.16	1.1	14.8	0.6	0.277		270	740
	95	19/25/0.5	2.89	1.1	16.9	0.7	0.21		240	985
	120	19/32/0.5	3.26	1.2	18.6	0.8	0.164		235	1,225
	150	19/40/0.5	3.65	1.4	21.0	0.9	0.132		240	1,520
	185	37/25/0.5	2.89	1.6	23.4	1.0	0.108		250	1,860
	240	37/33/0.5	3.31	1.7	26.6	1.1	0.0817		230	2,435
	300	61/25/0.5	2.89	1.8	29.8	1.2	0.0654		220	3,020

Conductor	Tinned copper, class5
Insulation	HF-XLPE

Reference : 1. Nominal voltage : a.c. 0.6/1kV or less, d.c. 0.9/1.5kV or less
2. Maximum rated conductor temperature : 90℃

Contents

Installation Recommendations

The following installation recommendations are in accordance with IEC 60092-352 and the relevant class regulations;

1. Minimum bending radius

The minimum recommended installation bending radius shall be as following table;

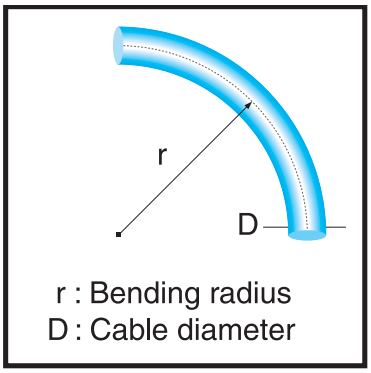


Table 4 - Bending radii for cables rated up to 1, 8/3 kV

Cable construction		Overall diameter of cable (D)	Minimum internal radius of bend
Insulation	**Covering**		
Thermoplastic or thermosetting with circular copper conductors	Unarmoured or unbraided	≤25 mm	4Da
		>25 mm	6D
	Metal braid screened or armoured	Any	6D
	Metal wire armoured Metal tape armoured or metal - sheathed	Any	6D
	Composite polyester/metal laminate tape screened units or collective tape screening	Any	8D
Thermoplastic or thermosetting with sector shaped copper conductors	Any	Any	8D
Mineral	Hard metal sheathed	Any	6D

[a] 6D for defined circuit integrity

Table 4A - Bending radii for cables rated at 3,6/6,0(7,2) kV and above

Cable construction	Overall diameter of cable (D)	Minimum internal radius of bend
Single Core Cable	Any	12D
3 - Core cables	Any	9D

2. Minimum temperature during installation

The minimum recommended temperature during installation cables should not be installed at the following temperature;

- *Medium Voltage Power Cables* *-20℃*
- *Low Voltage Power Cables* *-20℃*
- *Low Voltage Control Cables* *-20℃*

3. Cable pulling tension during installation

The cable pulling tension during installation can be estimated by the following formula;

- *For Armoured Cables*
  Pulling Tension(kg) = 5kg ×Total Cross Section of Conductors
- *For Unarmoured Cables*
  Pulling Tension(kg) = 2.5kg ×Total Cross Section of Conductors

Additional tension will be supplied from the braid, insulation and sheathing compound.

4. Explosion risk areas

4.1 Areas

The areas on board are usually classified in two main categories as regards the explosion risk ;

- Hazardous areas ; Areas in which explosive gas-air mixtures are, or may be expected to be, present in quantities such as to required special precautions for the construction and use of electrical apparatus.
- Safe areas (non-hazardous areas) ; Areas in which explosive gas-air mixtures are not expected to be present in quantities such as to required special precautions for the construction and use of electrical apparatus.

A hazardous area is divided into three zones ;

- Zone 0 ; in which an explosive gas-air mixture is continuously present or present for long periods.
- Zone 1 ; in which an explosive gas-air mixture is likely to occur in normal operation.
- Zone 2 ; in which an explosive gas-air mixture is not likely to occur, and if occurs it will only exist for a short time.

4.2 Installation of cables

- For cables to be used in zone 0 and zone 1, one of the following types of protection is required ;
  - A non-metallic outer sheath in combination with braiding or other metallic covering for earth fault detection and mechanical protection. A non-metallic outer sheath is, however, not required if the screen or armouring consists of a corrosion resistant bronze alloy.
  - A lead sheathing in addition to further mechanical protection, for example armour braiding or non-metallic impervious sheath.
  - For mineral insulated cables, a copper or stainless steel sheath.
  - Single core cables in installations with A.C. or D.C. current with a high ripple content should be of types without screen or armouring. Where mechanical damage is possible, such cables should otherwise be mechanically protected or installed in ducts or similar.
- For installations in zone 2, cables without screen or armour can be used.

5. Earthing of metal coverings of cables

5.1 General requirements

- All metal coverings of cables, armouring or shielding shall be earthed. Earthing must be provided at both ends except for final sub-circuits where earthing at only one end at supply is sufficient.
- Earthing at one end is permitted where it is required for technical or safety reasons, control and instrumentation cables, mineral insulated cables, intrinsically safe circuits, control circuits, etc.
- Metal covering of single core cables for A.C. and single core cables for D.C. with ripple content exceeding 10% and having a current rating exceeding 20 ampere are to be earthed at one end only.
- When single core cables for A.C. and D.C. with ripple content higher than 10% are installed in or passing through hazardous areas, the metal screen or armour is to be earthed inside the hazardous area to avoid dangerous potential between armour and earthed installation.

5.2 Cross section of earth connections

- Earth connections for metal coverings shall be carried out with conductors having cross sectional areas related to the cross sectional areas of the phase conductors and the current ratings of the cable, or at least the same cross sectional area as the metal covering itself.

5.3 Earthing through metal clamps, etc.

- Metal covering of cables may be earthed through clamps. The clamps must grip the metal covering of the cable and must be connected to the hull and provide a good conductive connection between the metal covering and the hull. The metal clamps must be corrosion resistant.

5.4 Earthing through cable glands

- The metal coverings of cables may be earthed by means of glands intended for the purpose and so designed as to ensure an effective earth connection. The glands shall be firmly attached to, and in effective electrical contact with, a metal structure earthed in accordance with these regulations.

5.5 Earthing of metal pipes, conduits, etc.

- Metal pipes and cable conduits are to be earthed. Pipes and conduits may be earthed by being screwed into a metal enclosure, or by nuts on both sides of the wall of the metallic enclosure, provided that the surface is clean and free from rust, scale or paint.

Importance

For Intrinsically safe circuits, it is important to separate the earth conductor from the protective earthing. The resistance between a zener barrier earth and protective earth must be max. 1.0 Ω and preferably less then 0.1 Ω to avoid that possible fault current does not lead to a potential increase in the system.

6. Fixing of cables

- With the exception of cables for portable appliances and those installed in pipes, conduits, trunkings or special casings, cables shall be fixed by means of clips, saddles or straps of suitable material which if ignited, shall not contribute to any spread of flame along the cables or insulated wire. The material shall have a surface area sufficiently large and be shaped such that the cables remain tight without their coverings being damaged.
- The distances between supports shall be chosen according to the type of cable and the probability of vibration. It shall not exceed 400mm for a horizontal cable run where the cables are laid on cable supports in the form of tray plates, separate support brackets or hanger ladders. The spacing between the fixing points may be up to 900mm, provided that there are supports with maximum spacing as specified above. This exemption shall not apply to cable runs along weather decks, when the cable run is arranged so that the cables can be subjected to forces by water washing over the deck.
- Note 1 When designing a cable support system for single core cables consideration shall also be given to the effects of electrodynamic forces developing on the occurrence of a short circuit. The distances between cable supports given above are not necessarily adequate for these forces.
- Note 2 Cables with class 5 conductors may require additional support to prevent sagging.
- The supports and the corresponding accessories shall be robust and shall be of corrosion resistant material or suitably treated before erection to resist corrosion.
- Note 3 Cable clips or straps made from a material other than metal may be used. Requirements concerning the characteristics of the material are under consideration.
- When cables are fixed by means of non-metallic clips or straps, and are not laid on top of horizontal cable trays or cable supports, suitable metal cable clips or saddles shall be added at regular distances not greater than 1 m in order to prevent the release of cables during a fire. This also applies to the fixing of non-metallic conduits or pipes.
- Cable clips or straps used to support cable for use in high fire risk areas and safety escape routes shall be metallic.

7. Mechanical protection of cables

- Cables are to be installed in such a way that they are not subject to damaging mechanical stresses. Where this can not be obtained, the cables are to be protected.
- Unless the cables itself, for example armour or sheath, provides adequate protection, the cables should be;
  - enclosed in suitable conduits or casings
  - covered by steelplates or profiles
  - steel pipes in which the cables are run.
- In areas which there is an exceptional risk of mechanical damage, for example in cargo hold area or different storage areas, the cables always have to be protected, even when the cables are armoured.
- The thickness of the protective conduits must be at least 4.0 mm. The wall thickness of the protective conduit must be at least 2.0 mm.
- Cables laid on aluminum supports may have a corresponding protection of aluminum. The thickness of aluminum supports must be at least 4.0 mm.
- Metal of casing used for mechanical protection of cables should be efficiently protected against corrosion.

8. Installation of cables for fire precaution

- Cables must at least meet the flame retardant requirements. On board passenger ships, cargo ships, mobile offshore and drilling units, where not otherwise stated cables must be installed as not to impair the original flame retarding properties. These requirements are considered to be satisfied if the cables have characteristics complying with the cable bunch test in IEC 60332-3.
- Cables in cable bunches serving essential or emergency power, lighting, signals or internal communications, which pass through galleys, laundries, machine spaces of category A according to SOLAS convention 1974 & its amendments and their casings and other high fire risk areas, shall be required the flame retarding characteristics in accordance with IEC 60332-1 and in addition to be;
  - of a fire resisting type according to IEC60331, and
  - of a non fire propagating type according to Category A of IEC 60332-3, and
  - mechanically protected against casualties which may occur on the site of their installation, unless they are routed clear of such spaces or areas.
- When cables are used which do not pass any of the tests (either category 'A', 'B' or 'C') of IEC 60332-3, the following method of installation may be adopted that the cables;
  - pass the test of IEC 60332-1
  - the fire stops in enclosed or semi-enclosed spaces, as follows;

  a) For vertical cable run
    - with a max. distance between fire stops of two decks or 6 meters, unless installed in totally enclosed cable trunks.
    - at the main and the emergency switchboards.
    - where cables enter into an engine control room.
    - at centralized control panels for propulsion machinery and essential auxiliaries.
    - at the entrance to cable trunks.

  b) For horizontal cable run
    - as a) above, but the max. distance between fire stops may be increased to 14 meters.

  c) In cargo holds and underneck passageways in the cargo area, fire stops need be fitted only at boundaries of the compartment.
- When choosing cable types special attention should be paid to reduce possible damage due to corrosion in case of a fire. Non-halogen free cables will give off corrosive gases during a fire.
  The corrosion effect depends on the amount of halogens in the materials used.
- Cables connecting fire pumps to the emergency switchboard should be a fire resistant type where they pass through high fire risk areas, such as;
  - cables for emergency power systems e.g. fire pumps.
  - cables for fire extinguishing systems.
  - control cables for water tight doors.
  - control cables for ballast system unless when these are duplicated.
  - essential alarms cables.
  - fire and gas detection systems.
  - cables for lifts.

9. Intrinsically safe installations

- Cables and flexible cables for intrinsically safe circuits must have screen or similar of a conducting material and the outer sheath must be of an non-metallic material. A non-metallic outer sheath is, however, not required if the screen or armour consists of a corrosion resistant bronze alloy. Where there is no danger of interference from the external electrical or magnetic fields, short flexible cables may be used without screen.

9.1 Associated equipment

Associated equipment (e.g. power supply units) shall be situated in a safe area or have protection as mentioned in clause 4 (Explosion risk areas).

9.2 Connection of equipment

Within limitations laid down in 3., ordinary non-explosion protected equipment may be connected to intrinsically safe equipment, provided that it is designed to meet regulations in other respects.

9.3 Compliance with any limitations in the certificate

With intrinsically safe circuits special considerations must be given to ensure that the circuit characteristics (including connected equipment, cables, conductors, etc.) satisfy any limitations in the test certificate.
Such limitations may be maximum values for capacitance and inductance, etc. It is pointed out, there is a danger of damage to intrinsically safe equipment when using normal equipment for insulation testing.

9.4 Adjacent location

Conductors for intrinsically safe circuits and conductors for non-intrinsically safe circuits shall not be run together in the same cable, flexible cable, conduit, cable bunch, etc.

9.5 Protection against electrical and magnetic fields

Where intrinsically safe circuits are exposed to magnetic or electrical fields that may destroy the intrinsic safety of the system, precautions must be taken during installation.
Such precautions may be;

- Cables for intrinsically safe circuits and non-intrinsically safe circuits to be installed a minimum distance of 50 mm apart. The minimum distance to heavy current cables using D.C. with a high ripple content should be 300 mm.
- Cables for intrinsically safe circuits and non-intrinsically safe circuits to be separated by a mechanical, separating panel of conducting material which is earthed.
- Cables for intrinsically safe circuits to have effective transposition.

9.6 Marking

The marking may be a marking plate or by color marking of the cables, when using color marking, the color should be light blue.

10. Installation in refrigeration spaces

- Cables to be installed in refrigeration spaces should include an impervious sheath and should be protected against mechanical damage. Cables insulated or sheathed with PVC should not be used in refrigeration spaces unless the relevant PVC compounds are appropriate to the low temperature expected.
- If the armour is made of non-corrosion-resisting material, it should be protected against corrosion by a moisture-resisting and low-temperature resisting covering.
- Cables installed in refrigeration spaces should not be covered by thermal insulation. If a cable has thermoplastic or elastomeric extruded sheath, it may be placed directly on the face of the refrigeration chamber. The casual use of cables as a means of suspension should be obviated by the provision of guards surrounding the cables.
  Care should be taken to avoid the possibility of electrolytic action if the refrigeration chamber has an aluminum facing.
- If the cables must pass through the thermal insulation of the compartments, they should do so at right angles, in tubes provided with entries of material protected against oxidation.

11. Special precaution for single-core cables for a.c. wiring

A.C. wiring should be carried out, as far as possible, in twin or multicore cable. When, however, it is necessary to use single-core cables for circuits rated in excess of 20 A, the following precautions should be observed;

- The cables should either be non-armoured or they should be armoured with non-magnetic material. In order to avoid current loops, the metallic screen should be earthed at one point only.
- Conductors belonging to the same circuit should be contained within the same pipe, conduit or trunking, or the clamps which fix them should include all the phases, unless they are made of non-magnetic material.
- In the installing of two, three, or four single-core cables forming respectively single phase-circuits, three-phase circuits, or three-phase and neutral circuits, the cables should, as far as possible, be in contact with one another.
- In every case, the distance measured between the external covering of two adjacent cables should not be greater than one cable diameter.
- When single-core cables having a current rating greater than 250 A must be installed near a steel bulkhead, the clearance between the cables and the bulkhead should be at least 50 mm, unless the cables belonging to the same A.C. circuit are installed in trefoil formation.
- Magnetic material should not be used between single-core cables of a group. Where cables pass through steel plates, all the conductors of the same circuit should pass through a plate or gland, so made that there is no magnetic material between the cables, and the clearance between the cables and the magnetic material should be not less than 75 mm, unless the cables belonging to the same A.C. circuit are installed in trefoil formation.
- In order to equalize to some degree the impedance of three-phase circuits of considerable length consisting of single-core cables of a conductor cross-section of 185 mm^2 or over, a transposition of the phases should be effected at intervals not exceeding 15 m.
  Alternatively, the cables may be installed in trefoil formation.
  The above precautions are, however, not necessary when the length of the run is less than 30m.
- In circuits involving several single-core cables in parallel per phase, all cables should follow the same route and have the same cross-sectional area.

Electrical Data

1. Construction and resistance of conductor

(1) Resistance Formula;

$$R = \rho \frac{L}{A}$$

R = resistance in ohm per phase
ρ = specific resistance, $\Omega \cdot mm^2/m$
A = conductor area, mm^2
L = conductor length, m

(2) Resistance as a function of temperature

$$R = R_0 [1 + \alpha (t - 20)]$$

R_0 = resistance at t =20℃
t = conductor temperature, ℃
α = 0.00393 for copper

(3) Construction and Resistance in accordance with IEC 60228(BS 6360)

Solid and Stranded copper conductors

Nominal cross sectional area	Solid copper (class 1)	Circular stranded copper (class 2)					Maximum Resistance			
		Non-compacted		Compacted			Plain		Metal coated	
	Conductor diameter (max.)	Minimum number of wires	Conductor diameter (max.)	Minimum number of wires	Conductor diameter (min.)	Conductor diameter (max.)	at 20℃	at 90℃	at 20℃	at 90℃
mm^2	mm		mm		mm	mm	Ω/km	Ω/km	Ω/km	Ω/km
0.5	0.9	7	1.1	-	-	-	36.0	45.9	36.7	46.8
0.75	1.0	7	1.2	-	-	-	24.5	31.2	24.8	31.6
1.0	1.2	7	1.4	-	-	-	18.1	23.1	18.2	23.2
1.5	1.5	7	1.7	-	-	-	12.1	15.4	12.2	15.6
2.5	1.9	7	2.2	-	-	-	7.41	9.45	7.56	9.64
4	2.4	7	2.7	-	-	-	4.61	5.88	4.70	5.99
6	2.9	7	3.3	-	-	-	3.08	3.93	3.11	3.97
10	3.7	7	4.2	-	-	-	1.83	2.33	1.84	2.35
16	4.6	7	5.3	-	-	-	1.15	1.47	1.16	1.48
25	-	7	6.6	6	5.6	6.5	0.727	0.927	0.734	0.936
35	-	7	7.9	6	6.6	7.5	0.524	0.668	0.529	0.674
50	-	19	9.1	6	7.7	8.6	0.387	0.493	0.391	0.499
70	-	19	11.0	12	9.3	10.2	0.286	0.365	0.270	0.344
95	-	19	12.9	15	11.0	12.0	0.193	0.246	0.195	0.249
120	-	37	14.5	18	12.5	13.5	0.153	0.195	0.154	0.196
150	-	37	16.2	18	13.9	15.0	0.124	0.158	0.126	0.161
185	-	37	18.0	30	15.5	16.8	0.0991	0.1264	0.1000	0.128
240	-	61	20.6	34	17.8	19.2	0.0754	0.0961	0.0762	0.097
300	-	61	23.1	34	20.0	21.6	0.0601	0.0766	0.0607	0.077
400	-	61	26.1	53	22.9	24.6	0.04701	0.0599	0.0475	0.061
500	-	61	29.2	53	25.7	27.6	0.0366	0.0467	0.0369	0.047
630	-	91	33.2	53	29.3	32.5	0.0283	0.0361	0.0286	0.037

Flexible Copper Conductors

Nominal cross sectional area	Maximum diameter of Strands		Maximum diameter of conductor	Maximum Resistance			
				Plain		Metal coated	
	Class 5	Class 6	Class 5 and Class 6	at 20℃	at 90℃	at 20℃	at 90℃
mm²	mm	mm	mm	Ω/km	Ω/km	Ω/km	Ω/km
0.5	0.21	0.16	1.1	39.0	49.7	40.1	51.1
0.75	0.21	0.16	1.3	26.0	33.2	26.7	34.0
1.0	0.21	0.16	1.5	19.5	24.9	20.0	25.5
1.5	0.26	0.16	1.8	13.3	17.0	13.7	17.5
2.5	0.26	0.16	2.6	7.98	10.17	8.21	10.47
4	0.31	0.16	3.2	4.95	6.31	5.09	6.49
6	0.31	0.21	3.9	3.30	4.21	3.39	4.32
10	0.41	0.21	5.1	1.91	2.44	1.95	2.49
16	0.41	0.21	6.3	1.21	1.54	1.24	1.58
25	0.41	0.21	7.8	0.780	0.995	0.795	1.014
35	0.41	0.21	9.2	0.554	0.706	0.565	0.720
50	0.41	0.31	11.0	0.386	0.492	0.393	0.501
70	0.51	0.31	13.1	0.272	0.347	0.277	0.353
95	0.51	0.31	15.1	0.206	0.263	0.210	0.268
120	0.51	0.31	17.0	0.161	0.205	0.164	0.209
150	0.51	0.31	19.0	0.129	0.164	0.132	0.168
185	0.51	0.41	21.0	0.106	0.1352	0.108	0.138
240	0.51	0.41	24.0	0.0801	0.1021	0.0817	0.104
300	0.51	0.41	27.0	0.0641	0.0817	0.0654	0.083
400	0.51	-	31.0	0.0486	0.0620	0.0495	0.063
500	0.61	-	35.0	0.0384	0.0490	0.0391	0.050
630	0.61	-	39.0	0.0287	0.0366	0.0292	0.037

2. Wire gauge conversion table

U.S. standard		IEC and BS
AWG/MCM	**Equivalent cross-section area mm²**	**Nearest available cross-section area mm²**
20 AWG	0.519	1.5 or 0.75
18	0.823	1.0
16	1.31	1.5
14	2.08	2.5
12	3.31	4
10	5.26	6
8	8.37	10
6	13.30	16
4	21.15	25
2	33.62	35
1	42.41	50
1/0	53.49	50
2/0	67.23	70
3/0	85.01	95
4/0	107.2	120
250 MCM	126.7	120 or 150
300	152.0	150
350	177.3	185
400	202.7	185
450	228.0	240
500	253.4	240 or 300
550	278.7	300
600	304.0	300
650	329.4	300 or 400
700	354.7	400
750	380.0	400
800	405.4	400
850	430.7	400
900	456.0	400 or 500
950	481.4	500
1,000	506.7	500
1,250	633.4	630

3. Current ratings

(1) Current ratings in accordance with IEC 60092-352 based on ambient air temperature of 45℃ and a conductor temperature of the maximum rated temperature of the 90℃ insulation.

Nominal cross sectional area mm²	Current carrying capacity					
	Single core		2 core		3 & 4 core	
	A		A		A	
1.5	23		20		16	
2.5	30		26		21	
4	40		34		28	
6	52		44		36	
10	72		61		50	
16	96		82		67	
25	127		108		89	
35	157		133		110	
50	196		167		137	
70	242		206		169	
95	293		249		205	
120	339		288		237	
150	389		331		272	
185	444		444		311	
240	522		444		365	
300	601		511		421	
	d.c.	a.c.	d.c.	a.c.	d.c.	a.c.
400	690	670	587	570	483	469
500	780	720	663	612	546	504
630	890	780	757	663	623	546

(2) For more than 4-cores, the current ratings are given by the following formula;

$$I_N = \frac{I_1}{\sqrt[3]{N}}$$

I_1 = Current rating for 1-core
N = Number of cores

No. of cores	1.0 mm²	1.5 mm²	2.5 mm²
5	9	13	17
7	8	12	15
10	7	10	13
12	7	10	13
14	7	9	12
16	6	9	11
19	6	8	11
24	6	7	10
30	5	7	9
33	5	7	9
37	5	6	9

(3) The tabled current ratings must be adjusted for ambient air temperature other than 45℃ as follows;

Correction Factor for Various Ambient Air Temperatures

Ambient Temperature	35℃	40℃	45℃	50℃	55℃	60℃	65℃	70℃	75℃	80℃	85℃
Multiply Factor	1.10	1.05	1.00	0.94	0.88	0.82	0.74	0.67	0.58	0.47	-

4. Short circuit current ratings

(1) The following short current ratings are for cables normally operating at a maximum conductor temperature of 85℃

(2) The theoretical temperature that arises in the conductor during a short circuit, which is used as a basis of the calculation, is 250℃ in accordance with IEC 60724.

(3) EPR and XLPE insulation are capable of withstanding of short term temperature up to 250℃

(4) The short circuit current ratings for copper conductors given in the table are values for one second for other duration the current may be calculated from the following formula;

$$I_t = \frac{I_1}{\sqrt{t}}$$

I_t = short circuit current for t second(kA)
I_1 = short circuit current for one second(kA)
t = short circuit duration(second)

(5) The duration of the short circuit based on these assumptions should be between 0.2 sec .and 5 sec.

Nominal cross section area mm²	Short circuit current 1 second (kA)	Nominal cross section area mm²	Short circuit current 1 second (kA)
1.5	0.21	70	10.02
2.5	0.36	95	13.59
4	0.57	120	17.17
6	0.86	150	21.46
10	1.43	185	26.47
16	2.29	240	34.34
25	3.58	300	42.93
35	5.01	400	57.23
50	7.15	500	71.54
-	-	630	90.14

5. Reactance

(1) The reactance of a cable operating in an A.C. system depends on many factors, including, in particular, the axial spacing between conductors and the proximity and magnetic properties of adjacent steelwork. The former is known for multicore cable, but may vary for single core cables depending upon the spacing between them and their disposition when installed.

(2) Reactance of cables in certain dispositions remote from steelwork are calculable and are shown. The values specified in cable construction details are for cables with circular conductors. The value for a sector-shaped conductor should be taken as 90% of the calculated value.

(3) Inductance for 2-, 3- and 4- core cables is given by the formula;

$$L = 0.2 \times \left[ln \left(\frac{2S}{d} \right) + 0.25 \right] \times 10^{-6}$$

L = inductance in H/m and phase
S = axial space between conductors in mm
d = conductor diameter in mm

(4) Reactance for 2-, 3- and 4-core cables is given by the formula;

$$X = 2 \times f \times \pi \times L \times l$$

X = reactance in Ω per phase
f = frequence in Hz
L = inductance in H/m and phase
l = conductor length in meter

6. Impedance

Impedance for 2-,3-and 4-core cables is given by the formula ;

$$Z = \sqrt{(R^2 + X^2)}$$

Z =impedance in Ω per phase
R =resistance at operating temperature in Ω per phase
X =reactance on Ω per phase

7. Electrical circuit formulas

For determining amperes, horsepower, kilowatts and kilovolt-amperes

Desired data	Alternating Current			Direct Current
	Single-Phase	Two-Phase, Four-Wire	Three-Phase	
Amperes when kVA is known	$\frac{kVA \times 1000}{E}$	$\frac{kVA \times 1000}{2 \times E}$	$\frac{kVA \times 1000}{1.732 \times E}$	$\frac{kVA \times 1000}{E}$
Amperes when kW is known	$\frac{kW \times 1000}{E \times pf}$	$\frac{kW \times 1000}{2 \times E \times pf}$	$\frac{kW \times 1000}{1.732 \times E \times pf}$	$\frac{kW \times 1000}{E}$
Amperes when HP is known	$\frac{HP \times 746}{E \times \%Eff \times pf}$	$\frac{HP \times 746}{2 \times E \times \%Eff \times pf}$	$\frac{HP \times 746}{1.732 \times E \times \%Eff \times pf}$	$\frac{HP \times 746}{E \times \%Eff}$
Kilovolt-Amperes	$\frac{I \times E}{1000}$	$\frac{2 \times I \times E}{1000}$	$\frac{1.732 \times I \times E}{1000}$	$\frac{I \times E}{1000}$
Kilowatts	$\frac{I \times E \times pf}{1000}$	$\frac{2 \times I \times E \times pf}{1000}$	$\frac{1.732 \times I \times E \times pf}{1000}$	$\frac{I \times E}{1000}$
Horsepower	$\frac{I \times E \times \%Eff \times pf}{746}$	$\frac{2 \times I \times E \times \%Eff \times pf}{746}$	$\frac{1.732 \times I \times E \times \%Eff \times pf}{746}$	$\frac{I \times E \times \%Eff}{746}$

Where, E =volts between conductors
I =line current amperes
%Eff =percent efficiency of motor in decimal
pf =power factor(cos θ) in decimal
kVA=kilovolt-amperes
kW =kilowatts
HP =horsepower

Note) In two-phase, three-wire balanced circuits, the current in the common conductor is 1.414 times of formulas of two-phase, four-wire in either of the other conductors.

Core Colors

1. Medium voltage power cables

1-core : Natural + Black semi-conductive layer
identified by Black thread under or over the metallic screen on core

3-core : Natural + Black semi-conductive layer
identified by Black - White - Red threads
under or over the metallic screen on core

Earth core : Green /Yellow strip

Other core colors on request

2. Low voltage power and control cables

1-core : White
2-cores : White, Black
3-cores : White, Black, Red
4-cores : White, Black, Red, Blue

The above 5-core and : Black numbering on White base

Earth core : Green/Yellow

Other core colors on request

3. Instrumentation and communication Cables

Pair : White - Black

Triple : White, Black, Blue

The cores forming a pair or triple shall be identified by having the same number printed in a contrasting color on the insulation of each core

Other core colors on request

Material Properties

1.Insulating materials

- EPDM or EPR

  EPDM is a hydrocarbon rubber that combines electrical performance suitable for fire resistance cables with mechanical toughness and resistance to ozone, UV light and heat, and meets the requirements of IEC 60092-351.

  This material is intend to be used for the flexible cables in low and medium voltage range, and increasing use as a blend component with EVA as a sheath material for halogen-free cables with good fire protection behavior and low smoke generation.

  The maximum allowable operating temperature of the EPR insulated conductor is 90℃ in normal condition and 250℃ in short-circuit condition.

- XLPE

  XLPE, Cross-lined Polyethylene, has excellent mechanical, chemical and electrical characteristics and meets the requirements of IEC 60092-351.

  This material provides very low dielectric losses and low water absorption, thus, intend to be used for power, coaxial, instrumentation, telecommunication cables have very good transmission of electric energy and information.

  The maximum allowable operating temperature of the XLPE insulated conductor is 90℃ in normal condition and 250℃ in short-circuit condition.

2. Sheathing materials

- EMA or EVA

  EMA, ethylene methyl acrylic, and EVA, ethylene vinyl acetate, are both multi-functional elastomeres, which resist the combined deteriorating influences of heat, oil and water in accordance with IEC 60092-359 type SHF2.

  This material can be compounded to produce high quality cable sheathing with low smoke, low toxicity and flame retardance with no halogen acid gas emission.

- CSP

  CSP, chlorosulphonated polyethylene, is the most useful balance of properties for cable sheath which has excellent mechanical properties such as high tensile strength, abrasion and flex-fatigue resistance, extremely good flame and oil resistance, weather resistance, ozone, oxygen and oxidizing chemicals resistance in accordance with IEC 60092-359 type SH.

- POLYOLEFIN

  Polyolefin is the thermoplastic halogen-free compound having a excellent mechanical and chemical properties, and meets the requirements of IEC 60092-359 type SHF1.

  If oil resistance is required for a halogen-free compound, SHF2 compound recommended.

  Fire performance of sheathed cables with polyolefin meets the requirements of IEC 60332-3 category A and IEC 60331 for fire resisting cable.

- PVC

  PVC polymer cannot be processed by extrusion without the addition of materials which, inter alia, act as processing aids, e.g. plasticizers and lubricants. PVC is also strongly polar, because of the C-Cl aipole moment, and the addition of plasticizers also shifts the electrical loss peaks to a lower temperature at constant frequency.

Test Methods

IEC 60331-1, -2, -3 & -21
Fire Resisting Test for Electric Cables

• Specimens

A specimen of the completed cable 1,200 or 1700 mm long shall have 100 mm of sheath or outer coverings removed from each end.

• Test Conditions

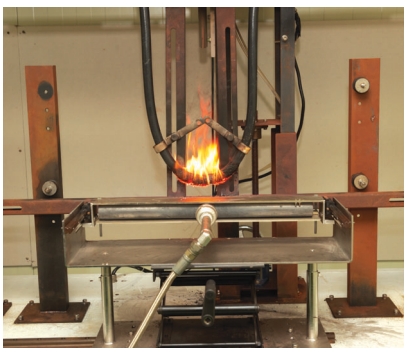
(1) The specimen shall be held horizontally by means of suitable clamps at each end of the sheath or protected portion.
(2) The transformer shall be connected to the specimen through a 3A fuse in each phase and a 5A fuse shall be inserted in the neutral circuit which shall be earthed.
(3) Adjacent conductors shall be connected to the different phases.
(4) In case of -3, specimen shall be drawn into the appropriate metal enclosure.

• Ignition Source

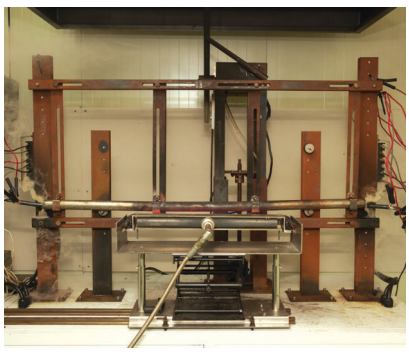
(1) The source of ignition shall be a 610 mm long tube type burner which produces a line of closely spaced flames.
(2) The flame temperature shall maintain 750℃ - 830℃ during the test.

• Shock-producing device

(1) Mild steel bar (25.0 ± 1) mm in diameter and (600 ± 5) mm long.
(2) Drop under its own weight from of (60 ± 5, - 0) to the horizontal to strike the upper steel support of the wall.


IEC 60331-1


IEC 60331-2


IEC 60331-3

• Test Procedure

(1) The electrical supply shall be switched on and the voltage adjusted to that of the rated voltage of the specimen and this shall be applied continuously during the test.
(2) The gas flame and test voltage shall be applied continuously for a period of 30 - 120 minutes.

(3) In case of -21, Not less than 15 minute hours after flame has been extinguished, the specimen shall again be energized as described above.
(4) Shock apply alter 5 min ± 10 s from activation and subsequently at 5 min ± 10s interval.

- Requirement

No failure of any of the 2A fuses occurs, when the withstand voltage is applied exceeding the rated voltage.

- Performance

KUKDONG HIS Fire resisting cables have been passed.
Also, we offer fire resisting cables to 1000℃ for 3 hours with an upgraded IEC 60331 test as an option.

IEC 60332-1
Flame Retardant Test for Single Vertical Insulated Wire or Cable

• Specimens
A specimen shall be a piece of the finished wire or cable 600±25 mm long.

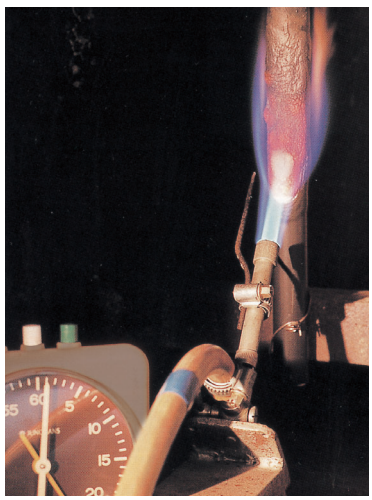
• Test Conditions
(1) The specimen shall be kept at a temperature of 23±5℃ for minimum 16hours at a relative humidity of 50± 20% before testing.
(2) The specimen shall be fixed at two positions and aligned vertically within a 3-side metallic screen 1,200± 25 mm high, 300±25 mm wide and 450±25 mm deep with open front and closed top and bottom.
(3) Distance between the top clamp and the bottom clamp is 550±25 mm.
(4) Distance between the bottom of specimen and the base of the screen is approximately 50 mm.

• Ignition Source
(1) When propane gas is used, the bunsen burner shall be adjusted to give a flame approximately 175 mm long with an inner blue cone approximately 55 mm long.
(2) When natural gas is used, the bunsen burner shall be adjusted to give a flame approximately 125 mm long with an inner blue cone approximately 40 mm long.

• Test Procedure
(1) The axis angle between the burner tube and the specimen is 45°.
(2) The continuous period of time corresponding to the diameter as following table ;

Overall Diameter of test specimen (mm)	Time for flame application (second)
O.D. ≤ 25	60
25 < O.D. ≤ 50	120
50 < O.D. ≤ 75	240
O.D. > 75	480

• Requirement
After all burning has ceased, the surface of the specimen shall be wiped clean and (1) the charred or affected portion shall not have reached within 50 mm of the lower edge of the top clamp, and (2) maximum length of downward charred surface shall not exceed 540 mm from the lower edge of the top clamp.



IEC 60332-3
Flame Retardant Test for Bunched Wires or Cables

• Specimens, Category & Designation

The specimens shall be a number of finished wire or cable in minimum 3,500 mm long, and the total number of 3.5 m test pieces in the test sample should be in accordance with one of the three categories as follows;

Category and Designation		AF / R	A			B		C	
Range of conductor cross-sections(mm^2)		> 35	≤ 35	> 35		≤ 35	> 35	≤ 35	> 35
Non-metallic volume per metre of specimens(ℓ)		7.0	7.0	7.0	7.0	3.5	3.5	1.5	1.5
Number of layer	For the standard ladder(300 mm)	2	≥1	1	-	≥1	1	≥1	1
	For the wide ladder(600 mm)	-	-	-	1	-	-	-	-
Positioning of the test pieces		spaced	touching	spaced		touching	spaced	touching	spaced
Flame application time(minutes)		40	40	40	40	40	40	20	20
Number of burners		1	1	1	2	1	1	1	1

• Test Conditions

(1) The vertical test chamber shall have a width of 1.0 m, a depth of 2.0 m and a height of 4.0 m, and the floor of the chamber should be raised above ground level, and air being admitted at the base of the test chamber through an aperture of 800 mm ×400 mm situated 150mm from the front wall of the test chamber.

(2) The ladder shall be have a height of 3.5 m, 9 rungs, and two types such as standard ladder of 500 mm width and wide ladder of 800 mm width.

• Ignition Source

(1) The ignition source shall be of ribbon-type propane gas burner, flow meters, venturi mixer and whose flame-producing surface consist of a flat metal 341 mm long, 30 mm wide.

(2) The air input rate should be 76.7 ℓ/min, and the propane flow rate should be 13.3 ℓ/min at one atmosphere and 20℃ to provide a nominal 73.7 ×10^6 J/h(70,000Btu/h) to each burner.

(3) The burner shall be arranged horizontally at a distance 75 mm from the front surface of the specimen and 600 mm above the floor of the test chamber.

(4) The point of application of the burner flame shall lie in the center between two cross-bars on the ladder and at least 500 mm above the lower end of the specimen.

• Test Procedure

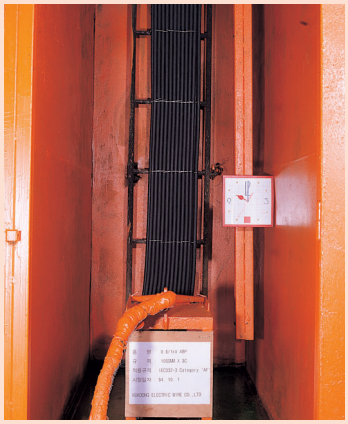
(1) Determine the total volume per metre of non-metallic material of one test piece and the number of specimens to be mounted.

(2) After mounted, the flame shall be applied for a period of specified flame application times.

• Requirement

After burning has ceased, the charred portion shall not have reached a height exceeding 2.5 m above the bottom edge of the burner, neither at the front nor the rear of ladder.

Simulation for IEC 60332-3 A/F Flame Retardant Test



Start

After 15 min.

After 30 min.

Flame travel very little and die out immediately after fire is extinguished.

Finish

After 40 min.

Simulation for Ordinary Cables

Flame are propagate to the top of the tray within 5 minutes.

IEEE 383
Vertical Tray Flame Test for Bunched Wires or Cables

- Specimens

The specimens shall be a number of finished cable in 8 feet(2.43 m) long.

- Test Conditions

(1) The test should be conducted in a naturally ventilated room or enclosure free from excessive drafts and spurious air currents.
(2) The tray shall be have a vertical, metal, ladder type 3 inch deep, 12 inch wide and 8 feet long.
(3) The ribbon gas burner shall be mounted horizontally such that the flame impinges on the specimen midway between the tray rungs, and so that the burner face is 3 inch behind and approx. 2 feet above the bottom of the vertical tray.

- Ignition Source

(1) The ignition source shall be of American Gas Furnace Co 10 inch, 11~55 drilling ribbon type with an air-gas venturi mixer.
(2) The flame temperature should be approx. 815℃ when measured by a thermocouple located in the flame close to about $\frac{1}{8}$inch, but not touching the surface of the test specimens.
(3) The flame length shall be approximately 15 inch when measured along its path.

- Test Procedure

(1) Determine the number of specimens to be arranged in a single layer filling at least the center six inch portion of the tray with a separation of approx. $\frac{1}{2}$ the cable diameter between each cable.
(2) After mounted, the flame shall be applied continuously 20 minutes.

- Requirement

After burning has ceased, the flame should be self-extinguished, and the charred portion shall not have reached the total height of the tray above the flame source.

Comparison Table IEEE 383 & IEC 60332-3

	IEEE 383	IEC 60332-3
Number of specimen	N≥(152.4+0.5D) / (1.5D) (N is integer, D is dia. in mm)	Category A : N≥7.0 liter / (Volume/m of one cable) Category B : N≥3.5 liter / (Volume/m of one cable) Category C : N≥1.5 liter / (Volume/m of one cable)
Length of specimen	8 feet(2.43m)	3.5 m
Ignition source	Ribbon burner	Ribbon burner
Test chamber	Not Specified	H : 4 m, W : 1 m, D : 2 m
Burning times	20 minutes	Category A & B ; 40 minutes Category C ; 20 minutes
Requirement	Not reach the top of the specimen	Not reach above 2.5 m of the specimen

IEC 60754-1
Determination of the Amount of Halogen Acid Gas

- Specimens

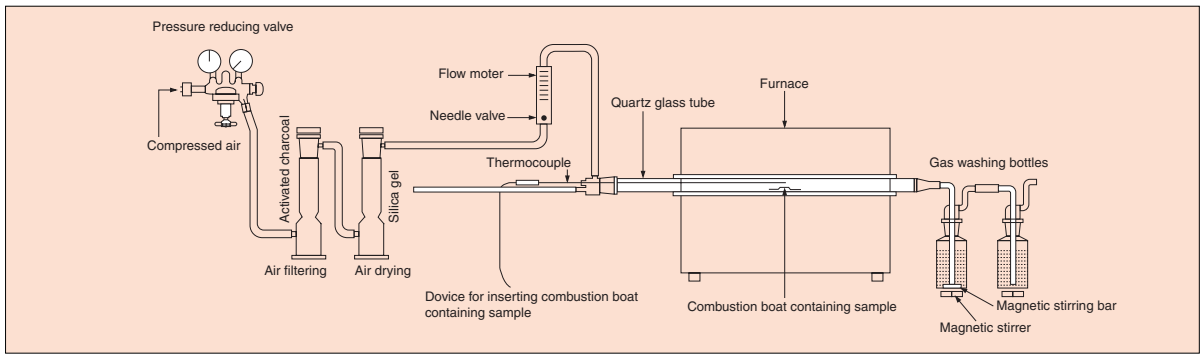
The specimen shall be of compound for insulation and jacket in weight of 500 mg to 1000 mg.

- Test Conditions

(1) The combustion boat (L :76 mm, W :15 mm, D :10 mm) with the specimen shall be placed in the combustion tube(L :700 mm, Inside dia :40 mm).
(2) The combustion tube shall be placed in the tube furnace with thermocouple.
(3) Two wash bottles having a containing at least 220㎖ of 0.1M sodium hydroxide shall be connected to the combustion tube.

- Test Procedure

(1) The temperature of tube furnace shall be maintained at 800±10℃ for 20 minutes.
(2) The combustion gas shall be filtered through the sintered glass crucible and titrating 0.1M.



- Determination of Halogen Acid Content

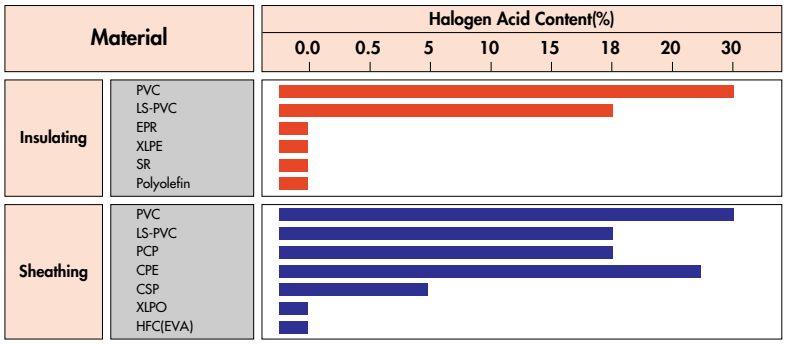
The amount of halogen acid, expressed as milligrams of hydrochloric acid per gram, is ;

$$\% \text{ Weight} = \frac{36.5 \times (B - A) \times M \times 1000/200}{m} \times 100$$

Where, A : Volume of 0.1 M ammonium thiocyanate solution used in the test.
B : Volume of 0.1 M ammonium thiocyanate solution use in the blank test.
m : Mass of sample taken grams.
M : Molarity of ammonium thiocyanate solution.

The materials, containing less than 5mg/g(0.5%) halogen acid equivalent, shall be demonstrated in accordance with IEC 60754-2

Comparison chart for Halogen Acid Content



IEC 60754-2
Degree of Acidity Gases Evolved(pH & Conductivity)

• Specimens

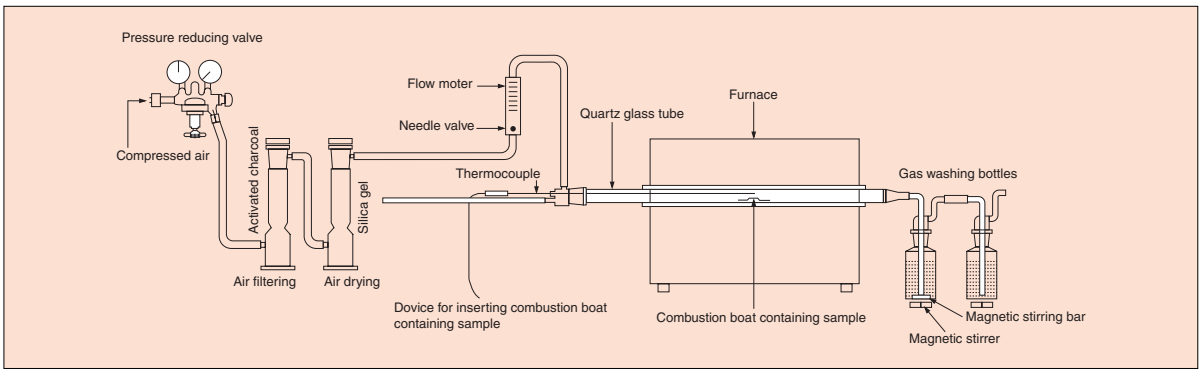
The specimen shall be of compound for insulation and jacket in weight of 1,000±5 mg.

• Test Conditions

(1) The combustion boat (L : 76 mm, W : 15 mm, D : 10 mm) with the specimen shall be placed in the combustion tube(L : 700 mm, Inside dia : 40 mm).
(2) The combustion tube shall be placed in the tube furnace with thermocouple.
(3) Two wash bottles having a containing at least 220㎖ of 0.1M sodium hydroxide shall be connected to the combustion tube.

• Test Procedure

(1) The temperature at the position of the boat shall be not less than 935℃ and the temperature at position 300 mm from the boat in direction of the air flow shall be not less than 900℃ for 30 minutes.
(2) The air flow shall be adjusted by means of needle valve at 0.0155 ×D^2 ℓ/h±10%(D : tube inner dia. in mm) and is kept constant during the test.
(3) The pH value and conductivity shall be determined at the end of the test.

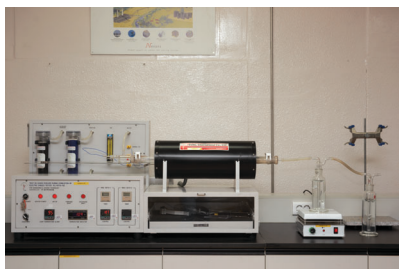


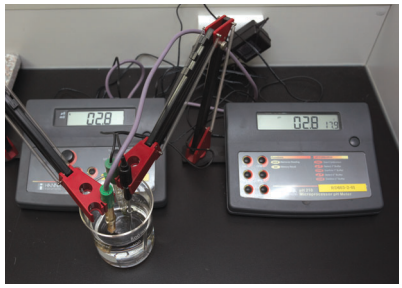
• Determination of pH value and conductivity

The weighted value of pH and conductivity are calculated as follows;

$$pH = \log_{10}\left[\frac{\Sigma iw_i}{\Sigma i(w_i/10^x)}\right], \quad Conductivity = \frac{\Sigma ic \times w_i}{\Sigma iw_i}$$

Where, x is the pH value of each non-metallic material i.
c is conductivity of each non-metallic material i.
wi is the weight of each metallic material i per unit length of cable.





• Requirements

(1) The weighted pH value should not be less than 4.3, when related to 1 ℓ of water.
(2) The weighted value of conductivity should not exceed 10㎲/mm.

ASTM D 2863
Oxygen Index Test

• Specimens
The specimen shall be compound taken from cable in length of 70~150 mm, width of 6.5 ±0.5 mm, thickness 3.0 ±0.5 mm.

• Test Conditions
(1) The column shall be of a heat-resistant glass tube(H :450 mm, Inside dia:75 mm) having the supplier of oxygen and nitrogen with flow measurement and control devices.
(2) The specimen holder shall hold the specimen vertically in the center of test column.

• Ignition Source
(1) The ignited shall be a tube with a small orifice(1~3 mm in diameter) having a gas flame.

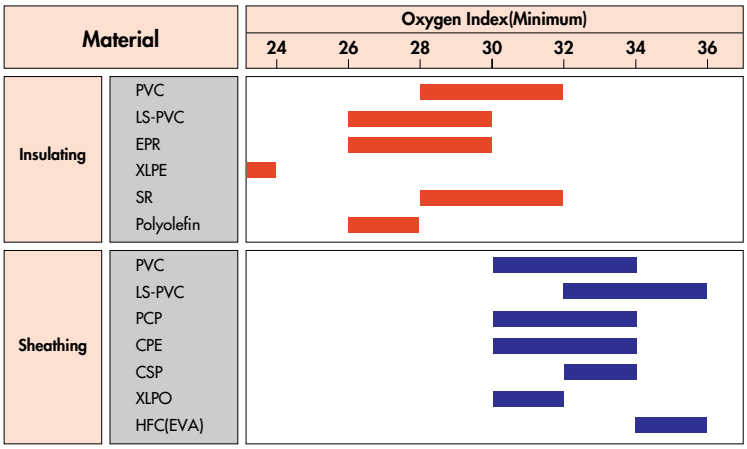
• Test Procedure
(1) The oxygen gas shall flow in the column at the rate of 4 ±1 cm/sec. at 0℃ temperature and pressure 101.3 kPa until the suitable concentration of it.
(2) The specimen shall be ignited and if it burns for at least 3 minutes or length of flame is more than 50 mm, the concentration of oxygen shall be reduced.
(3) The concentration of oxygen when the burning is extinguished shall be checked.

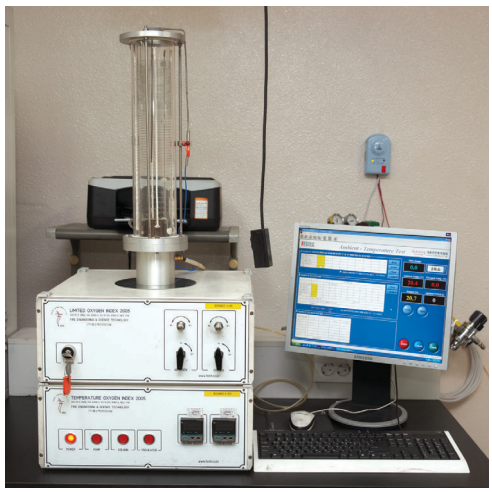
• Calculation of Result
The oxygen Index(O. I) shall be obtained by the formula;

$$O.\,I(\%) = \frac{O_2}{O_2 + N_2} \times 100$$

Where, O_2 = Volumetric flow of oxygen, cm^3/s
N_2 = Volumetric flow of nitrogen, cm^3/s

Comparison chart for Oxygen Index





NES 713
Toxicity Index Test

• Specimens
The specimen shall be compound for insulation and jacket in weight of 1.0 gram to 2.0 gram.

• Test Condition
(1) Non-combustible specimen holder shall be located in the chamber of an air tight enclosure of at least 0.7 cubic meter volume.
(2) The specimen holder shall be at over the burner in the center of the chamber.

• Ignition Source
(1) A burner of internal barrel diameter 9.5±0.5 mm and jet size 0.3±0.1 mm shall be used.
(2) The burner when lit shall be capable of being extinguished from outside the test chamber.
(3) The burner fuel may be natural gas or any hydrocarbon gas as convenient.

• Test Procedure
(1) The specimen holder with specimen of known mass shall be adjusted the height and position so that the bottom edge is 45±2 mm from the burner.
(2) The burner shall be ignited.
(3) After completely burned, the specimen shall be analyzed with calorimetric gas reaction tubes.

• Calculation of Result
The toxicity index are derived from the calculated quantity of each gas that would be produced when 100g of the material is burnt in air in a volume of 1 cubic meter and the resulting
concentration expressed as a factor of the concentration fatal to man at a 30 minute exposure time as follows;

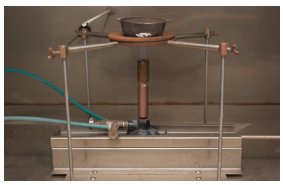
Combustion product $C_\theta = \frac{C \times 100}{m} \times V\ (ppm)$

Toxicity Index $= \Sigma \left(\frac{C_{\theta 1}}{C_{f1}} + \frac{C_{\theta 2}}{C_{f2}} + \cdots + \frac{C_{\theta n}}{C_{fn}} \right)$

Where, C_θ = Combustion products diffused in air(ppm/m³)
C = Concentration of gas in test chamber(ppm)
m = Fire test mass(g)
V = Volume of test chamber(m³)
C_f = Concentration of the gas considered fatal to man for a 30 minute exposure time(ppm)

Comparison table for Toxicity Gas Generation

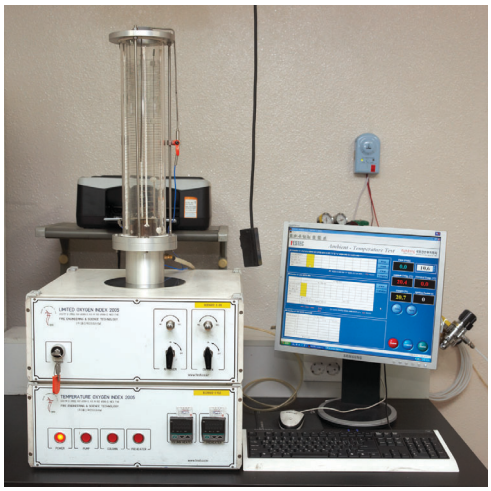
Kinds of Toxicity Gas		Fatal value C ppm/m³	Toxicity Gas Generation(ppm/m³)				
			PVC	XLPE	PCP	CSP	HFC
Carbon dioxide	CO_2	100,000	46,300	125,400	57,200	39,500	43,500
Carbon monoxide	CO	4,000	5,525	1,971	4,300	3,640	1,405
Hydrogen sulphide	H_2S	750	0	0	0	0	0
Ammonia	NH_3	750	0	0	0	0	0
Formaldehyde	HCHO	500	0	0	0	0	0
Hydrogen chloride	HCl	500	6,173	0	3,086	4,124	0
Acrylonitrile	CH_2CHCN	400	0	0	0	0	0
Sulphur dioxide	SO_2	400	324	1.8	152	640	0
Nitrogen oxides	$NO+NO_2$	250	1.5	3.6	1.7	2.3	1.4
Hydrogen cyanide	HCN	150	0	0	0	0	0
Hydrogen bromide	HBr	150	0	0	0	0	0
Hydrogen fluoride	HF	100	0	0	0	0	0



NES 715
Temperature Index Test

• Specimens

The specimen shall be compound taken from cable in length of 70~150 mm, width of 6.5 ±0.5 mm, thickness 3.0 ±0.5 mm.



• Test Conditions

(1) The column shall be of a heat-resistant glass tube(H : 450 mm, Inside dia. : 75 mm) having the supplier of oxygen and nitrogen with flow measurement and control devices.
(2) The specimen holder shall hold the specimen vertically in the center of test column.

• Ignition Source

(1) The ignited shall be a tube with a small orifice(1~3 mm in diameter) having a gas flame.

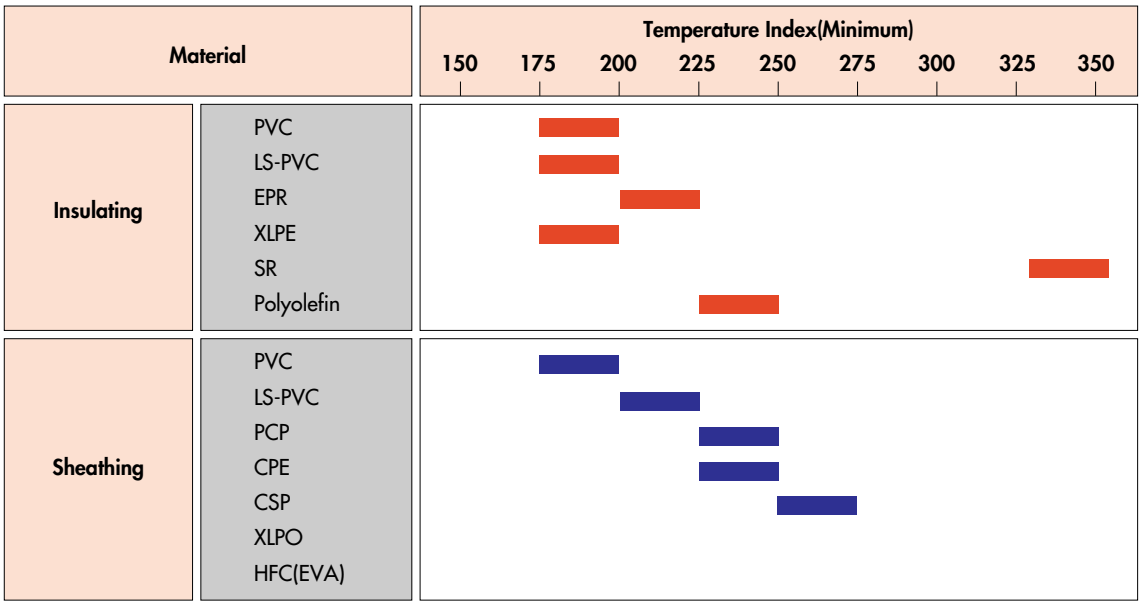
• Test Procedure

(1) The inside temperature of test column shall be adjusted to desired temperature and the inside column shall be maintained in a gas stream of 21% oxygen.
(2) The specimen shall be attached specimen holder and ignited with ignited.
(3) If the specimen will continue to burn for 3 minutes or for a 50 mm distance, retest shall be carried out with new specimen and reduced temperature.
(4) If the specimen will be extinguished immediately, retest shall be carried out with new specimen and raised temperature.

• Result

The Temperature Index is the maximum temperature at which the specimen will not continue to burn for 3 minutes or for a 50 mm distance in a gas stream of 21% oxygen.

Comparison chart for Temperature Index



ASTM E 662
Smoke density Test

• Specimens

The specimen shall be the sheet of 3 inch by 3 inch(76.2 mm ×76.2 mm) or a number of insulation in length of 3 inch.

• Test Conditions

(1) The test apparatus shall consist of test chamber, radiant heat furnace, specimen holder, photo metric system and recorder.
(2) The furnace control system shall maintain the required irradiance level, under steady-state conditions with the chamber door closed, of 2.50±0.05 W/cm^2 for 20 minutes.
(3) The test specimens are exposed to the two test conditions within a closed chamber as follows;
A) Non-flaming condition : An electrically heated radiant-energy source mount.
B) Flaming condition : A six-tube burner flame in addition to the specified irradiance level from the heating element constitutes the flame combustion exposure.

• Test Procedure

(1) The specimen shall be attached to the specimen holder and placed in the test chamber.
(2) The photo-metric system and recorder shall be started and at that time ignite the radiant heat furnace.
(3) After exposure of 20 minutes or until minimum light transmittance level have been reached over exposure of 20 minutes, the radiant heat furnace shall be extinguished and the gas in the chamber shall be exhausted until maximum transmittance is reached.

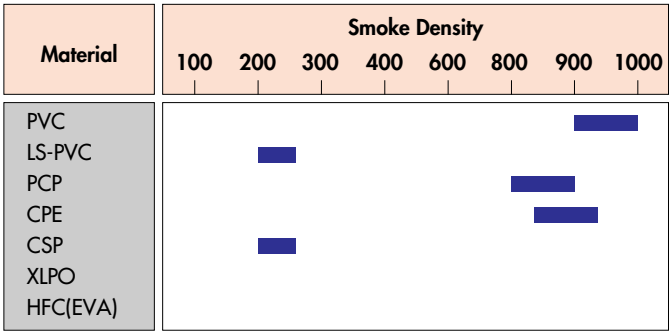
• Calculation of Result

Calculate the maximum specific optical density(Dm) with a light transmittance corresponding to the minimum level reached during the test as follows;

$$Dm = \frac{V}{A \cdot L} \cdot \left[\log_{10}\left(\frac{100}{T}\right) \right]$$

Where;
V = Volume of the closed chamber, ft^3(or m^3)
A = Exposed area of the specimen, ft^2(or m^2)
L = Length of the light path through the smoke, ft(or m)
T = Percent light transmittance as read from the light-sensing instrument.

Comparison chart for Smoke Density



IEC 61034-2
Smoke Density Test of Electric Cables Burning

• Specimens

(1) The specimen shall consist of one or more samples of cable 1.00±0.05 m long which shall be carefully straightened and then conditioned for at least 16 hours at 23±5℃.

(2) The selection of number of test pieces shall be as following table;

Overall Diameter of the cable(D) mm	Number of test pieces	
	Cables	Bundles
D>40	1	-
20<D≤40	2	-
10<D≤20	3	-
5<D≤10	N_1	-
2<D≤5	-	N_2

Notes; 1. N_1 =integer(45 ÷D) cables
2. N_2 =integer(45 ÷3D) bundles
3. The value of N_1 and N_2 shall be rounded downwards to the integer to give the number of cables or bundles.
4. Each bundle shall consist of seven cables twisted together with a lay between 20D and 30D and bound with two turns of approximately 0.5 mm diameter wire in the center and at every 100 mm each side from the center.

(3) The test pieces shall remain in situ during the test as follows:
- cables shall be bound together at the ends, and at 300 mm from each end, at which place they shall be clamped to the support by means of wire binders.
- bundles shall be tensioned at one or both ends by means of an appropriate device, e.g. a spring or weight.

NOTE; It is recommended that small cables and flexible cables should be tensioned.

• Test Apparatus

(1) Test enclosure ; a cubic enclosure with inside dimensions of 3,000±30 mm and one side shall have a door with a glass inspection window.

(2) Photometric system ; the light source and the receiver shall be placed externally in the center of both windows in the two opposite walls of the cube without making physical contact.

(3) Standard fire source ; 1.00±0.01 ℓ of alcohol having no effect on the smoke emission of any cable under test.

• Test Procedure

(1) Before each test, clean the windows of the photometric system to regain 100% light transmission after stabilization of the voltage.

(2) The test samples supported above the tray, start the air circulation and ignite the alcohol and that the door is closed.

(3) The test is considered as ended when there is no decrease in light transmittance for 5 minutes after the fire source has extinguished or when the test duration reaches 40 minutes.

27 m^3 cube smoke chamber

• Requirement

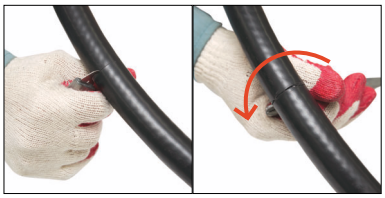
The minimum light transmittance shall be not less than 60%.

CSA C 22.2 No. 38
Cold Impact & Cold Bending Test for Wires or Cables

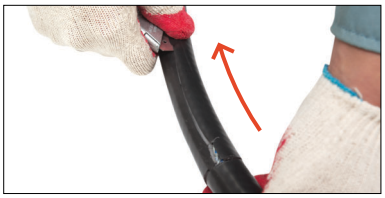
	Cold Impact Test	Cold Bending Test
Specimen	The specimen shall be ten straight lengths of 5 inch(12.7 cm).	The specimen shall be straight.
Test Condition	(1) The refrigerator shall be with a rigid post having a solid base and maintain the specific temperature. (2) The impact component shall be used a steel ball of 3 pounds in weight.	(1) The refrigerator shall maintain the specific temperature. (2) The mandrel to wind the specimen shall be specified in proportion to the diameter of specimen.
Test Procedure	(1) The specimen shall be placed in the refrigerator in temperature -40℃ for 4 hours (2) The specimen shall be subjected to the impact component falling freely from a height of 36 inch(914 cm).	(1) The specimen and the subjected mandrel shall be placed in refrigerator in a subjected temperature for 4 hours. (2) The specimen, while still in the refrigerator, shall be rewound in subjected mandrel in the opposite direction between 30 and 60 seconds at subjected temperature.
Requirement	Not exceeding two among the ten specimens shall crack or rupture.	Neither the insulation nor jacket shall crack or rupture when wound or around the mandrel.

Cable strip

• Removing the outer sheath

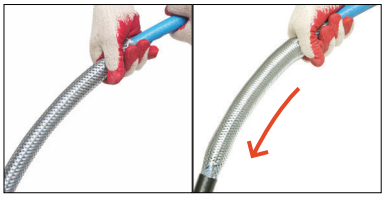


Cut the sheath with a knife in parallel

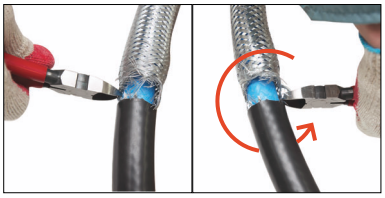


Cut it down in straight

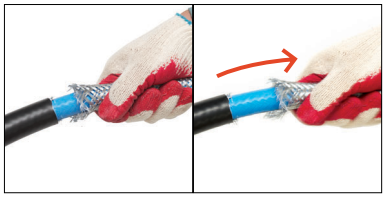
• Removing the steel wire braid



Push the steel wire braid to the inside of cable to separate from the sheath

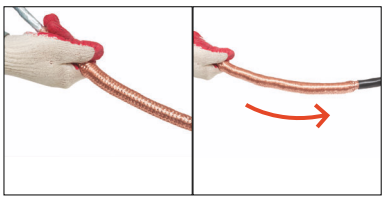


Cut in parallel the separated braid

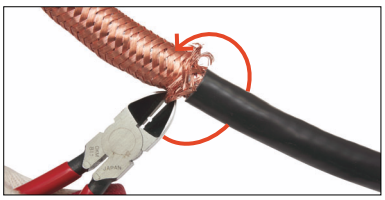


Pull the cut braid

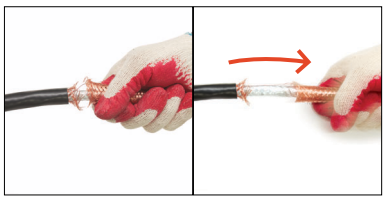
• Removing the copper wire braid



Push the copper wire braid from the outside to the inside to narrow the gap between the strand

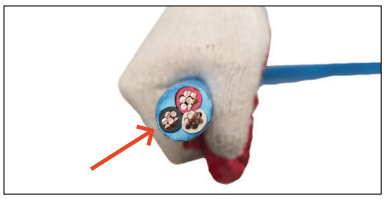


Cut the braid
Make the notch at least 3points with 120 degree

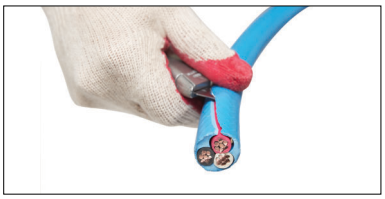


Pull the braid to the outside

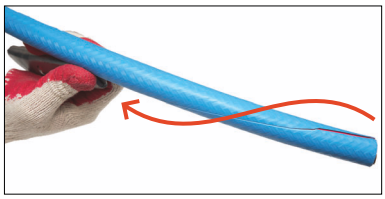
• Removing the bedding



Find the thinnest point of the bedding on the section

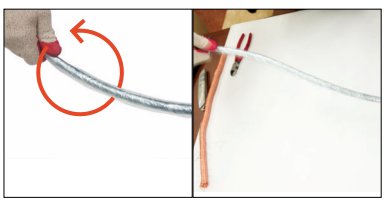


Cut down the sheath from the thinnest point

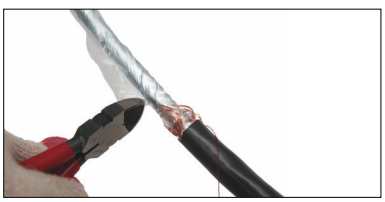


When cutting, follow the direction of the twist form of cable core

• Removing the tapping



Keep a loose tape with the twisting 1 or 2 times in the opposite direction



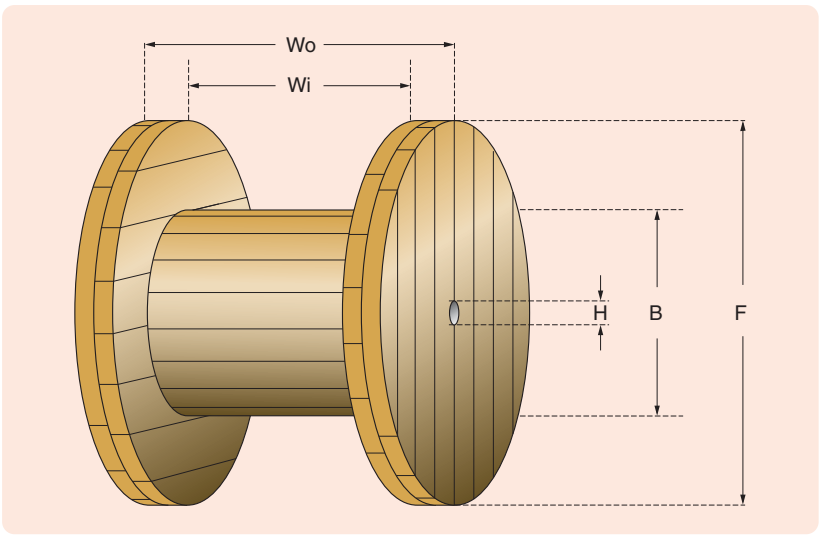
Find and cut the overlapped point of tapping

Pull the cut tape to the outside

Drum Capacity

Drum dimensions and weights

KUKDONG Drum No.	Outer drum dia. (D) mm	Flange dia. (F) mm	Barrel dia. (B) mm	Inner width (Wi) mm	Outer width (Wo) mm	Centre hole dia. (H) mm	Free space (S) mm	Thick. of lagging (T) mm	CBM m^3	Weight without lagging kg	Weight with lagging kg
3-5	700	640	300	328	400	80	30	30	0.20	19	33
4-7	850	790	350	328	400	80	30	30	0.29	25	43
6-2	910	850	450	400	500	80	50	30	0.41	44	68
7-3	1,040	970	500	500	600	80	50	35	0.65	60	98
7-4	1,070	1,000	500	500	600	80	50	35	0.69	61	101
9-1	1,170	1,100	600	630	750	110	65	35	1.03	95	150
9-3	1,270	1,200	600	630	750	110	65	35	1.21	108	168
9-7	1,370	1,300	700	630	750	110	65	35	1.41	129	193
11-1	1,470	1,400	800	750	900	110	85	35	1.94	184	267
11-3	1,570	1,500	800	750	900	110	85	35	2.22	202	292
11-5	1,670	1,600	800	750	900	110	85	35	2.51	221	317
13-5	1,790	1,700	1,000	750	900	110	85	45	2.88	264	395
13-7	1,890	1,800	1,000	750	900	110	85	45	3.21	287	427
14-5	1,990	1,900	1,200	870	1,050	110	100	45	4.16	410	580
14-6	2,090	2,000	1,200	870	1,050	110	100	45	4.59	423	599
16-2	2,190	2,100	1,400	1,020	1,200	110	100	45	5.76	518	735
16-3	2,290	2,200	1,400	1,020	1,200	110	100	45	6.29	556	780
16-4	2,390	2,300	1,400	1,020	1,200	110	100	45	6.85	590	825
17-4	2,490	2,400	1,600	1,020	1,200	110	100	45	7.44	662	901
17-5	2,590	2,500	1,600	1,020	1,200	110	100	45	8.05	740	997
17-6	2,690	2,600	1,600	1,020	1,200	110	100	45	8.68	740	1,008



Drum code	3-5	4-7	6-2	7-3	7-4	9-1	9-3	9-7	11-1	11-3	11-5	13-5	13-7	14-5	14-6	16-2	16-3	16-4	17-4	17-5	17-6	Drum code
Cable Dia. (mm)	Reel Capacity in Meters (Free Space 90% Application)																					Cable Dia. (mm)
6	2,005																					6
7	1,457																					7
8	1,105	1,826	2,044																			8
9	884	1,437	1,553																			9
10	703	1,191	1,247																			10
11	551	981	1,072	1,809	2,055																	11
12	469	801	848	1,581	1,694																	12
13	399	647	725	1,282	1,490	1,863																13
14	337	563	619	1,118	1,214	1,625																14
15	282	488	526	972	1,061	1,414	1,938															15
16	270	424	501	842	925	1,224	1,713	1,918														16
17	224	363	424	727	805	1,057	1,516	1,697	2,078													17
18	215	350	355	694	694	1,012	1,340	1,500	1,823													18
19		299	340	598	668	869	1,176	1,317	1,594	2,057												19
20		254	282	510	575	743	1,031	1,156	1,390	1,827												20
21		245	271	490	554	715	994	1,112	1,336	1,614												21
22			220	414	473	604	865	969	1,155	1,553	1,838											22
23			212	399	457	582	747	838	1,116	1,371	1,782											23
24			205	333	386	563	724	811	959	1,324	1,587	1,571										24
25			200	323	375	472	704	787	929	1,162	1,411	1,381										25
26			159	313	313	457	604	677	791	1,010	1,368	1,202	1,612									26
27			154	257	304	443	587	657	766	979	1,208	1,163	1,426	1,409								27
28			149	249	295	366	500	560	743	951	1,174	1,128	1,384	1,363								28
29				242	287	355	486	544	626	822	1,033	978	1,220	1,326								29
30				235	235	346	474	530	610	802	1,010	953	1,190	1,138								30
31				189	230	278	397	446	592	778	878	924	1,037	1,104	1,399							31
32						270	386	433	492	667	859	794	1,013	1,073	1,361							32
33						263	377	422	479	651	839	774	989	911	1,184							33
34						258	369	413	467	635	725	754	857	887	1,154	1,195						34
35						252	305	343	456	537	710	639	838	866	1,127	1,163						35
36						202	255	285	379	458	541	545	641	738	864	992						36
37						197	249	278	370	447	529	532	625	722	846	967						37
38								271	291	438	519	521	613	587	824	792	1,105					38
39								266	284	429	509	510	600	576	690	773	923					39
40								260	278	347	498	414	587	562	674	757	905					40
41								203	272	339	411	404	487	551	661	738	883					41
42								200	267	333	404	396	478	539	647	722	864	1,012				42

Drum code	3-5	4-7	6-2	7-3	7-4	9-1	9-3	9-7	11-1	11-3	11-5	13-5	13-7	14-5	14-6	16-2	16-3	16-4	17-4	17-5	17-6	Drum code
Cable Dia. (mm)	Reel Capacity in Meters (Free Space 90% Application)																					Cable Dia. (mm)
43								195	261	327	397	389	469	528	634	709	849	995				43
44									256	321	390	381	460	417	620	562	830	973				44
45									192	315	383	373	451	410	507	551	680	955	761			45
46									189	248	378	296	445	402	498	540	667	799	746			46
47									185	242	304	289	360	394	489	532	656	787	734			47
48									182	239	299	284	354	387	480	520	643	771	719	860		48
49									179	235	295	280	349	379	470	512	632	759	707	846		49
50									176	231	290	275	343	374	464	503	622	747	695	832		50
51												270	337	366	454	494	611	734	683	818		51
52												265	331	360	360	485	485	600	543	670	803	52
53												260	325	273	354	369	476	589	533	658	789	53
54												255	255	269	349	361	467	578	523	646	774	54
55												193	252	264	343	356	460	571	515	637	764	55
56												189	247	259	337	351	454	563	508	628	753	56
57												187	244	255	331	344	445	552	497	615	739	57
58												184	241	252	328	338	438	544	490	606	728	58
59												182	238	247	322	333	431	536	482	597	597	59
60												179	235	244	318	330	427	531	478	591	591	60
61												175	230	240	312	324	420	420	470	470	582	61
62												173	226	237	308	319	414	414	462	462	574	62
63														234	234	313	313	407	351	454	563	63
64														229	229	310	310	403	348	449	557	64
65														226	226	305	305	396	341	441	548	65
66														159	223	217	301	391	337	437	542	66
67														157	220	214	298	387	333	432	536	67
68														155	216	212	294	383	329	427	530	68
69														154	215	207	289	376	323	419	419	69
70														151	212	205	285	371	319	414	414	70
71														149	209	202	281	367	315	408	408	71
72														147	206	200	278	362	311	403	403	72
73														146	204	197	274	274	307	307	398	73
74														143	201	194	271	271	303	303	393	74
75														142	200	193	269	269	301	301	391	75
76																190	266	266	297	297	386	76
77																188	262	262	293	293	380	77
78																185	185	258	207	288	375	78
79																184	184	257	206	287	373	79
80																181	181	253	203	282	368	80