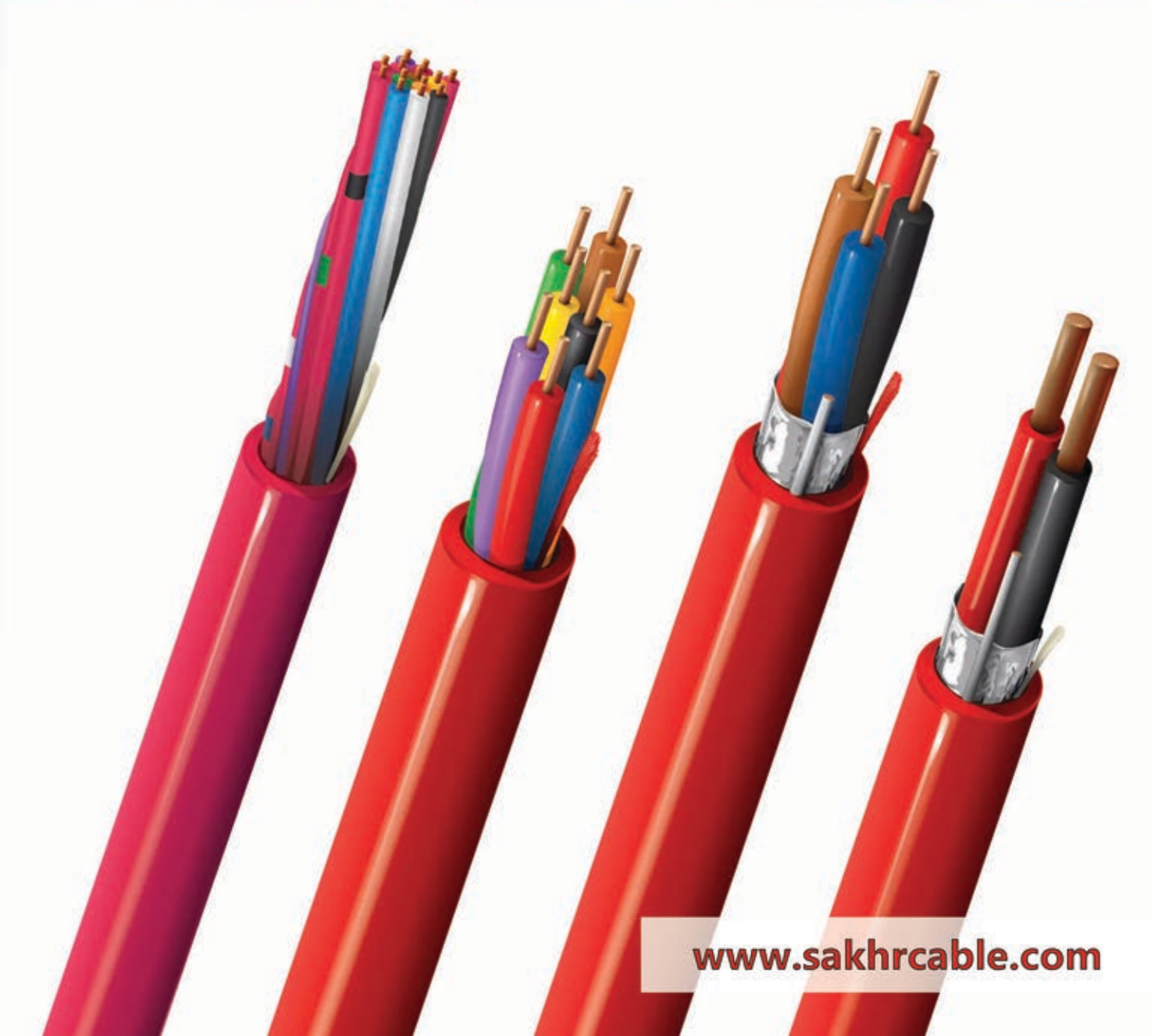
Fire Resistant Cables & Fire Alarm Cables



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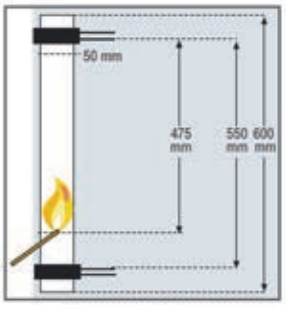
Fire Resistant & Fire Alarm



Fire Fighting Cables

Flame Retardant Cables

In Fire condition; traditional cables act as a network to propagate the flame along their length to distances far from the fire area.

Using special flame retardant grades of the non-metallic components of the cable will significantly increase the cable ability to prevent flame spread "this is called flame retardant"

The key definitions of the flame retardant cables are:

Cables which do not spread fire

Cables which are self-extinguishing

Testing flame retardant cables is done in accordance with BS EN 60332 or IEC 60332 (the most widely applied tests) which specifies different parts for the test depending on the number of cables or wires, single or bunched as the following:

BS EN / IEC 60332-1 & 2: it's a test on a single insulated vertical wire or electric and fiber optic cable. A 60 cm long cable sample is fixed vertically inside a metallic box and the lower end is exposed to a gas burner angled at 45° to the horizontal. After burning cease, the charred or affected position does not reach within 50mm of the lower edge of the top clamp which is equivalent to 425mm above the point of flame application.

The test method is not suitable for the testing of some small wires due to the melting of the conductors during the time of application of the flame.

BS EN /IEC 60332-3: it's a test for bunched wires and cables and basically categorized in three grades A, B & C, the three grades have the same test procedures and the same test purpose, the cable is considered as flame retardant if the flame did not propagate along the cable for more than 2.5 m after the flame is ceased but it all depends on the number of samples as above:

BS EN / IEC 60332-3-22 (CAT A): it's the most severe test and the number of test samples requires providing a total volume of 7 liters of non-metallic material which shall be bunched on a ladder exposed to flame for 40 minutes.

BS EN / IEC 60332-3-23 (CAT B): The number of test samples requires providing a total volume of 3.5 liters of non-metallic material which shall be bunched on a ladder and exposed to flame for 40 minutes.

BS EN / IEC 60332-3-24 (CAT C): The number of test samples requires providing a total volume of 1.5 liters of non-metallic material which shall be bunched on a ladder and exposed to flame for 20 minutes

Fire Resistant & Fire Alarm

Fire Resistant Cables

- Fire resistant cables: are used when the cables are required to keep circuit integrity and continue to operate in the presence of a fire for a specified time under defined conditions, these cables are called fire resistant cables.
- The cables are tested based on the following standards:

IEC 60331 Fire Resistance Test

- A sample is connected to an electrical supply at its rated voltage. Fire is applied for a period of 1.5 hours. The temperature on the cable is 830°C, The test shall continue for the flame application time , after which the flame shall be extinguished but the cable sample shall remain energized for a further 15 min.
- The cable must maintain its circuit integrity.

BS6387 Fire Resistance Test

- The test method given in this British Standard consists of three component Protocols, designated C, W and Z.
- When separate test pieces from the same sample of cable are tested to each of these three protocols, these together comprise the full test. When the requirements of each one of the protocols are met, the cable may be designated as "category CWZ".
- It details the following methods to categorize the cables according to cable withstand capacities.

Resistance to fire alone

- **Protocol C: subjects the cable under test to a flame via direct impingement corresponding to a temperature attack of 950 °C ±40 °C for 3 hours.**

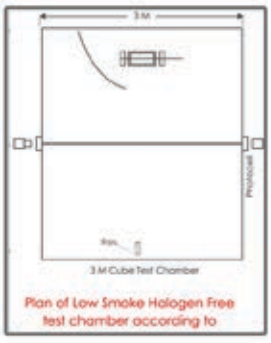
Resistance to fire with water

- **Category W: Cables are subjected to fire at 650°C±40 °C for 15 minutes, then at 650°C with water spray for a further 15 minutes.**

Resistance to fire with mechanical shock

- Protocol Z: subjects the cable under test to a flame via direct impingement corresponding to a temperature attack of 950 °C ±40 °C for 15 min. with indirect application of mechanical shock.
- Product standards might refer to only one of the protocols C or W or Z,but, in such cases, may not use the designation"Category CWZ".

Fire Resistant & Fire Alarm



Plan of Low Smoke Halogen Free test chamber according to

Fire alarm cables

In addition to the fire resistant cables in the fire and emergency systems, another type of cables is required which transmit signals to the notification (Indicating) device Circuits such as alarm sounders, horns, strobes and other remote signaling equipment.

Fire alarm cables work under high temperature each to 105°C to do it is function in energizing or send the signals to specific device and it is observed that the fire resistant cables work under extreme conditions, the main difference between fire alarm and fire resistance cables is that fire alarm cables doesn't require to maintain circuit integrity under fire conditions; it only turns on the alarm systems at the beginning of the fire.

Fire alarm cable is specified in the article 760 of the American national electric code "NEC" and SAKHR CABLES is a UL certified as recognized manufacturer.

Low Smoke and Halogen free Cables

In all fire disasters, smoke, halogen and toxic fumes of traditional PVC sheathed cables are the main obstacles to safe evacuation of a building or an area. In addition to the fire resistance and flame retardant tests there are some tests to ensure maximum safe evacuation of people with no harmful effects.

Smoke Emission Tests: (IEC 61034, BS EN 61034)

This test is for determination of smoke density. A 1m length of cable is placed in a 3 m3 enclosures (It is called 3 meter cube test) and exposed to a beam of light through a clear window. This light travels across the enclosure to a photocell connected to recording equipment in the window on the other

end. A minimum light transmission value greater than 60% is acceptable after a fire is generated. The higher the light transmittance, the less smoke emitted during a fire.

Acid Gas Emission Tests: (IEC 60754, BS EN 50267)

A corrosive halogen gases can be generated by burning PVC or chlorine containing material. HCL gas combines with the water in the eyes, mouth, throat, nose and lungs to form hydrochloric acid that has harmful effects and increasing potential fatalities by inhalation of carbon monoxide and oxygen depletion, additional dangers exist on all metallic materials and devices in the proximity of a fire.

IEC 60754-1, BE EN 50267 specifies a method in determining the amount of halogen acid gas other than the hydrofluoric acid evolved during combustion of compound based on halogenated polymers and compounds containing halogenated additives taken from cable constructions. Halogen includes Fluorine,* Chlorine, Bromine, Iodine and Astatine. If the hydrochloric acid yield is less than 5 mg/g, the cable specimen is categorized as LSZH.

IEC 60754-2 specifies a method in determining the degree of acidity of gases evolved during the combustion of materials taken from electric cables by measuring pH and conductivity. This standard requires the weighted pH value of not less than 4.3 when related to 1 liter of water, and the weighted value of conductivity should not exceed 10µS/mm.

Single Core - Cu/MICA/LS0H

Fire Guard 100 - LPCB

Single core with copper conductors to BS 6387

Cable Description

Conductor	**Plain annealed copper**
Core Insulation	**Flame barrier mica tape & LS0H**
Insulation Color	**as per customer request**
Cable Marking	**SAKHR CABLES, Size, Description, Voltage, Manufacturing Year**
Operation Voltage	**0.45/0.75 KV**

Application

These cables are used in hazardous areas where safety and circuit integrity are highly required during fire conditions.

Single Core Cables, Fire Resistance Wires, With Stranded Copper Conductor Mica Glass Tape, and LS0H Insulated (FIRE GUARD 100)

Product Code	Nominal Cross Sectional Area	Max. Conductor Resistance		Current Rating		Approx-imate overall Diameter	Approximate Weight
		DC at 20°C	AC at 90°C	Air			
				Free Air	Pipes		
	mm2	Ω/km	Ω/km	A	A	mm	kg/km
code: FA-18-02-LS-NS-IN	1.5	12.1	15.430	21	19	3.9	30
code: FA-18-02-LS-SH-IN	2.5	7.41	9.450	30	25	4.5	40
code: FA-18-04-LS-NS-IN	4	4.61	5.880	40	33	5.0	55
code: FA-18-04-LS-SH-IN	6	3.08	3.930	49	43	5.6	75
code: FA-16-02-LS-NS-IN	10	1.83	2.330	69	62	6.6	120
code: FA-16-02-LS-SH-IN	16	1.15	1.470	94	84	7.6	175
code: FA-16-04-LS-NS-IN	25	0.727	0.927	118	81	9.1	270
code: FA-16-04-LS-SH-IN	35	0.524	0.669	147	100	10.2	360
code: FA-14-02-LS-NS-IN	50	0.387	0.494	197	122	11.9	490
code: FA-14-02-LS-SH-IN	70	0.268	0.343	230	151	13.8	685
code: FA-14-04-LS-NS-IN	95	0.193	0.247	289	191	15.4	940
code: FA-14-04-LS-SH-IN	120	0.153	0.197	337	219	16.8	1165
code: FA-18-02-LS-NS-OU	150	0.124	0.160	385	252	18.6	1430
code: FA-18-02-LS-SH-OU	185	0.099	0.129	449	288	20.7	1795
code: FA-16-02-LS-NS-OU	240	0.075	0.099	542	345	23.5	2335
code: FA-16-02-LS-SH-OU	300	0.060	0.081	621	391	26.3	2920
code: FA-16-04-LS-NS-OU	400	0.047	0.065	681	582	29.3	3730
code: FA-16-04-LS-NS-OU	500	0.037	0.053	760	629	33.1	4800
code: FA-16-04-LS-SH-OU	630	0.0283	0.044	853	714	36.6	6055

Single Core - Cu/MICA/LS0H

Fire Guard 100 - LPCB

Single core with copper conductors to BS 6387

Cable Description

Conductor	**Plain annealed copper**
Core Insulation	**Flame barrier mica tape & LS0H**
Insulation Color	**as per customer request**
Cable Marking	**SAKHR CABLES, Size, Description, Voltage, Manufacturing Year**
Operation Voltage	**0.6/1 KV**

Application

These cables are used in hazardous areas where safety and circuit integrity are highly required during fire conditions.

Single Core Cables, Fire Resistance Wires, With Stranded Copper Conductor Mica Glass Tape, and LS0H Insulated (FIRE GUARD 100)

Product Code	Nominal Cross Sectional Area	Max. Conductor Resistance		Current Rating		Approx-imate overall Diameter	Approximate Weight
		DC at 20°C	AC at 90°C	Air			
				Free Air	Pipes		
	mm2	Ω/km	Ω/km	A	A	mm	kg/km
code: FA-18-06-LS-NS-IN	1.5	12.1	15.430	21	19	3.9	30
code: FA-16-06-LS-SH-IN	2.5	7.41	9.450	30	25	4.5	40
code: FA-12-02-LS-NS-IN	4	4.61	5.880	40	33	5.0	55
code: FA-18-08-LS-SH-OU	6	3.08	3.930	49	43	5.6	75
code: FA-14-04-LS-SH-OU	10	1.83	2.330	69	62	6.6	120
code: FA-18-10-LS-NS-IN	16	1.15	1.470	94	84	7.6	175

Fire Resistant Cores - Cu/MICA/XLPE/OS/LS0H

Un-Armored Fire Resistant Cables 0.6/1 kV Collective Screen Multi-Core cables to IEC 60502 & IEC 60331*

Cable Description

Conductor	**Plain annealed stranded copper**
Core Insulation	**Flame barrier Mica tape, XLPE (Cross linked polyethylene)**
Color coding	**Color coded or Black cores continuously numbered**
Assembly	**Cores twisted together to form round cable with fillers and binders if necessary.**
Collective Screen	**Aluminum / PET tape in contact with tinned copper drain wire**
Outer Sheath	**LSOH (Low smoke Zero Halogen)**
Cable Marking	**= SAKHR CABLES = , Size , Cable short description, Voltage, manufacturing year , meter marking**

Application

These cables are used in hazardous area where safety and circuit integrity are highly required during fire conditions

Product Code	No. of cores	Nominal Cross sectional area (mm²)	Nominal Thickness of Insulation (mm)	Approx. Overall Diameter (mm)	Approx. Net Weight (kg/km)
code:1802-LN-I	2	1.50	0.7	9.79	111.55
code:1802-LS-I	3			10.32	139.53
code:1804-LN-I	4			11.17	169.83
code:1804-LS-I	5			12.09	206.98
code:1602-LN-I	7			13.08	256.09
code:1602-LS-I	10			16.37	352.12
code:1604-LN-I	12			16.90	404.35
code:1604-LS-I	19			19.66	593.69
code:1402-LN-I	24			22.95	738.23
code:1402-LS-I	30			24.30	893.31
code:1802-LN-O	37			26.24	1076.83
code:1802-LS-O	2	2.50	0.7	10.69	138.13
code:1602-LN-O	3			11.29	176.73
code:1602-LS-O	4			12.26	217.97
code:1202-LN-I	5			13.31	267.97
code:1204-LN-I	7			14.43	336.4
code:1806-LN-I	10			18.17	465.93
code:1806-LS-I	12			18.77	538.9
code:1404-LN-O	19			21.91	801.67
code:1404-LS-O	24			25.65	999.93
code:1002-LN-I	30			27.18	1216.97
code:1004-LS-O	37			29.39	1473.13

Fire Resistant Cores - Cu/MICA/XLPE/OS/SWA/LS0H
Armored Fire Resistant Cables 0.6/1 kV
Collective Screen Multi-Core cables to IEC 60502 & IEC 60331*

Cable Description

Conductor	**Plain annealed stranded copper**
Core Insulation	**Flame barrier Mica tape,**
Color coding	**XLPE (Cross linked polyethylene)**
Assembly	**Color coded or Black cores continuously numbered**
Collective Screen	**Cores twisted together to form round cable with fillers and binders if necessary.**
Inner Sheath	**Aluminum / PET tape in contact with tinned copper drain wire LS0H (Low Smoke Zero Halogen)**
Armor	**Single layer of steel wires**
Outer Sheath	**LSOH (Low smoke Zero Halogen)**
Cable Marking	**= SAKHR CABLES = , Size , Cable short description, Voltage, manufacturing year , meter marking**

Application

These cables are used in hazardous area where safety and circuit integrity are highly required during fire conditions

Product Code	No. of cores	Nominal Cross sectional area (mm²)	Nominal Thickness of Insulation (mm)	Approx. Overall Diameter (mm)	Approx. Net Weight (kg/km)
MOD-26-001	2	1.50	0.7	13.25	296.59
MOD-26-002	3			13.78	334.53
MOD-26-003	4			14.63	380.03
MOD-26-004	5			15.55	432.65
MOD-26-005	7			16.54	497.49
MOD-26-110	10			20.73	795.16
MOD-26-115	12			21.26	859.09
MOD-26-120	19			24.02	1117
MOD-26-125	24			28.01	1501.94
MOD-26-130	30			29.42	1698.09
MOD-26-210	37			31.47	1960.53
MOD-26-215	2	2.50	0.7	14.15	338.55
MOD-26-220	3			14.75	387.4
MOD-26-225	4			15.72	444.31
MOD-26-230	5			16.77	514.21
MOD-26-310	7			18.79	733.33
MOD-26-315	10			22.53	954.52
MOD-26-320	12			23.13	1039.47
MOD-26-325	19			26.97	1529.81
MOD-26-330	24			30.85	1862.93
MOD-26-410	30			32.47	2140.27
MOD-26-415	37			34.80	2463.66

Fire Resistant Pairs - Cu/MICA/OS/LS0H

Un-Armored Fire Resistant Cables 500 V Collective
Screen Multi-Pair cables to BS EN 50288-7 & IEC 60331*

Cable Description

Conductor	**Plain annealed stranded copper**
Core Insulation	**Flame barrier Mica tape, XLPE (Cross linked polyethylene)**
Color coding	**Color Coded 1 Black, 1 White cores continuously numbered**
Assembly	**Pairs twisted together to form round cable with fillers and binders if necessary.**
Collective Screen	**Aluminum / PET tape in contact with tinned copper drain wire.**
Outer Sheath	**LSOH (Low smoke Zero Halogen)**
Cable Marking	**= SAKHR CABLES = , Size , Cable short description, Voltage, manufacturing year , meter marking**

Application

These cables are used in hazardous area where safety and circuit integrity are highly required during fire conditions

Product Code	No. of Pairs	Nominal Cross sectional area (mm^2)	Nominal Thickness of Insulation (mm)	Approx. Overall Diameter (mm)	Approx. Net Weight (kg/km)
MOD-26-801	1	1.00	0.44	7.41	71.07
MOD-26-802	2			11.07	130.66
MOD-26-803	5			14.37	266.41
MOD-26-804	10			20.52	507.08
MOD-26-805	20			26.81	947.3
MOD-26-812	50			40.98	2253.38
MOD-26-814	1	1.50	0.44	7.95	85.17
MOD-26-816	2			11.95	158.38
MOD-26-818	5			15.76	338.69
MOD-26-820	10			22.49	645.73
MOD-26-905	20			29.37	1210.95
MOD-26-910	40			39.71	2328.52
MOD-26-915	1	2.50	0.53	9.21	118.18
MOD-26-920	2			14.22	230.55
MOD-26-925	5			18.75	500.96
MOD-26-771	10			26.38	959.08
MOD-26-772	20			35.28	1831.51
MOD-26-773	30			42.05	2691.19

Fire Resistant Pairs - Cu/MICA/OS/SWA/LS0H

Armored Fire Resistant Cables 500 V Collective Screen Multi-Pair cables to BS EN 50288-7 & IEC 60331*

Cable Description

Conductor	**Plain annealed stranded copper**
Core Insulation	**Flame barrier Mica tape, XLPE (Cross linked polyethylene)**
Color coding	**color coded 1 Black, 1 White cores continuously numbered**
Assembly	**Pairs twisted together to form round cable with fillers and binders if necessary.**
Collective Screen	**Aluminum / PET tape in contact with tinned copper drain wire LSOH (Low smoke Zero Halogen)**
Inner Sheath	**Single layer of steel wires**
Armor	**LSOH (Low smoke Zero Halogen)**
Outer Sheath	**= SAKHR CABLES = , Size , Cable short description, Voltage, manufacturing year**
Cable Marking	**, meter marking**

Application

These cables are used in hazardous area where safety and circuit integrity are highly required during fire conditions

Product Code	No. of Pairs	Nominal Cross sectional area (mm²)	Nominal Thickness of Insulation (mm)	Approx. Overall Diameter (mm)	Approx. Net Weight (kg/km)
SYS-26-501	1	1.00	0.44	12.67	300.63
SYS-26-502	2			15.93	427.97
SYS-26-503	5			19.43	648.16
SYS-26-504	10			26.68	1202.35
SYS-26-505	20			33.17	1850.8
SYS-26-551	40			43.73	3311.5
SYS-26-552	1	1.50	0.44	13.01	318.7
SYS-26-553	2			16.81	472.27
SYS-26-554	5			20.83	751.49
SYS-26-555	10			28.65	1406.75
SYS-26-601	20			36.63	2424.42
SYS-26-602	30			42.49	3227.81
SYS-26-603	1	2.50	0.53	14.07	371.77
SYS-26-604	2			19.28	606.14
SYS-26-605	5			24.71	1129
SYS-26-651	10			33.19	1872.31
SYS-26-652	20			42.94	3305.89

Fire Resistant Triples - Cu/MICA/XLPE/OS/LS0H

Un-Armored Fire Resistant Cables 500 V Collective Screen Multi-Triple cables to BS EN 50288-7 & IEC 60331*

Cable Description

Conductor	**Plain annealed stranded copper**
Core Insulation	**Flame barrier Mica tape, XLPE (Cross linked polyethylene)**
Color coding	**1 Black, 1 White and 1 Red cores continuously numbered**
Assembly	**Triples twisted together to form round cable with fillers and binders if necessary.**
Collective Screen	**Aluminum / PET tape in contact with tinned copper drain wire**
Outer Sheath	**LSOH (Low smoke Zero Halogen)**
Cable Marking	**= SAKHR CABLES = , Size , Cable short description, Voltage, manufacturing year , meter marking**

Application

These cables are used in hazardous area where safety and circuit integrity are highly required during fire conditions

Product Code	No. of Triples	Nominal Cross sectional area (mm²)	Nominal Thickness of Insulation (mm)	Approx. Overall Diameter (mm)	Approx. Net Weight (kg/km)
PRO26111	1	1.00	0.44	7.84	91.77
PRO26112	2			12.3	174.43
PRO26113	5			16.23	377.5
PRO26114	10			23.19	721.86
PRO26115	20			30.3	1361.1
PRO26221	40			40.99	2625.46
PRO26222	1	1.50	0.44	8.43	111.84
PRO26223	2			13.51	221.28
PRO26224	5			17.59	472.46
PRO26225	10			25.41	922.2
PRO26331	20			33.19	1745.56
PRO26332	30			39.58	2570.35
PRO26333	1	2.50	0.53	9.79	158.8
PRO26334	2			16.06	323.99
PRO26335	5			20.97	705.31
PRO26441	10			30.31	1378.87
PRO26442	20			39.86	2649.62

Fire Resistant Triples - Cu/MICA/XLPE/OS/SWA/LS0H

Armored Fire Resistant Cables 500 V
Collective Screen Multi-Triple cables to BS EN 50288-7 & IEC 60331*

Cable Description

Conductor	**Plain annealed stranded copper**
Core Insulation	**Flame barrier Mica tape, XLPE (Cross linked polyethylene)**
Color coding	**1 Black, 1 White & Red cores continuously numbered or ID tapes**
Assembly	**Triples twisted together to form round cable with fillers and binders if necessary.**
Collective Screen	**Aluminum/PET tape in contact with tinned copper drain wire**
Inner Sheath	**LSOH (Low smoke Zero Halogen)**
Armor	**Single layer of steel wires**
Outer Sheath	**LSOH (Low smoke Zero Halogen)**
Cable Marking	**= SAKHR CABLES = , Size , Cable short description, Voltage, manufacturing year , meter marking**

Application

These cables are used in hazardous area where safety and circuit integrity are highly required during fire conditions

Product Code	No. of Triples	Nominal Cross sectional area (mm²)	Nominal Thicknes of Insulatio (mm)	Approx. Overall Diameter (mm)	Approx. Net Weight (kg/km)
TEC26810	1	1.00	0.44	12.5	303.74
TEC26820	2			17.16	495.9
TEC26830	5			21.29	804
TEC26840	10			29.35	1498.77
TEC26850	20			37.56	2599.62
TEC26911	30			43.61	3494.75
TEC26922	1	1.50	0.44	13.09	337.82
TEC26933	2			18.57	581.24
TEC26944	5			23.55	1071.47
TEC26955	10			31.77	1783.51
TEC26701	20			40.65	3112.75
TEC26702	1	2.50	0.53	14.65	426.65
TEC26703	2			21.32	755.17
TEC26704	5			27.13	1414.23
TEC26705	10			37.57	2617.55
TEC26412	15			43.08	3497.63