

شركة الخليج للكابلات والصناعات المتعددة - الأردن
Gulf Cable & Multi Industries Co. Jordan



شركة الخليج للكابلات والصناعات الكهربائية ش.م.ك. - الكويت
Gulf Cable & Electrical Industries Co. K.S.C.P. - Kuwait

cables that **pulse with life**

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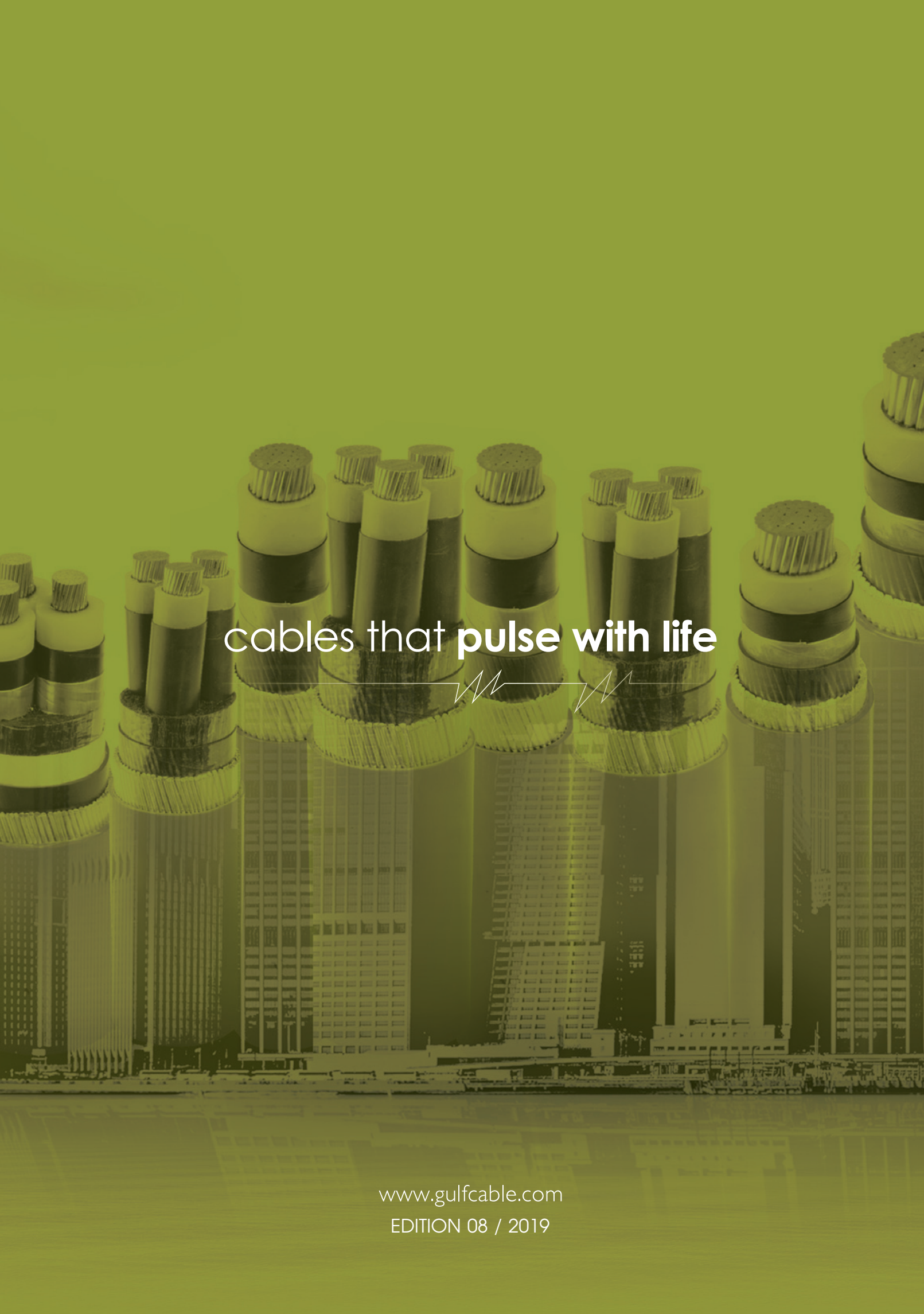
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LSZH Cables

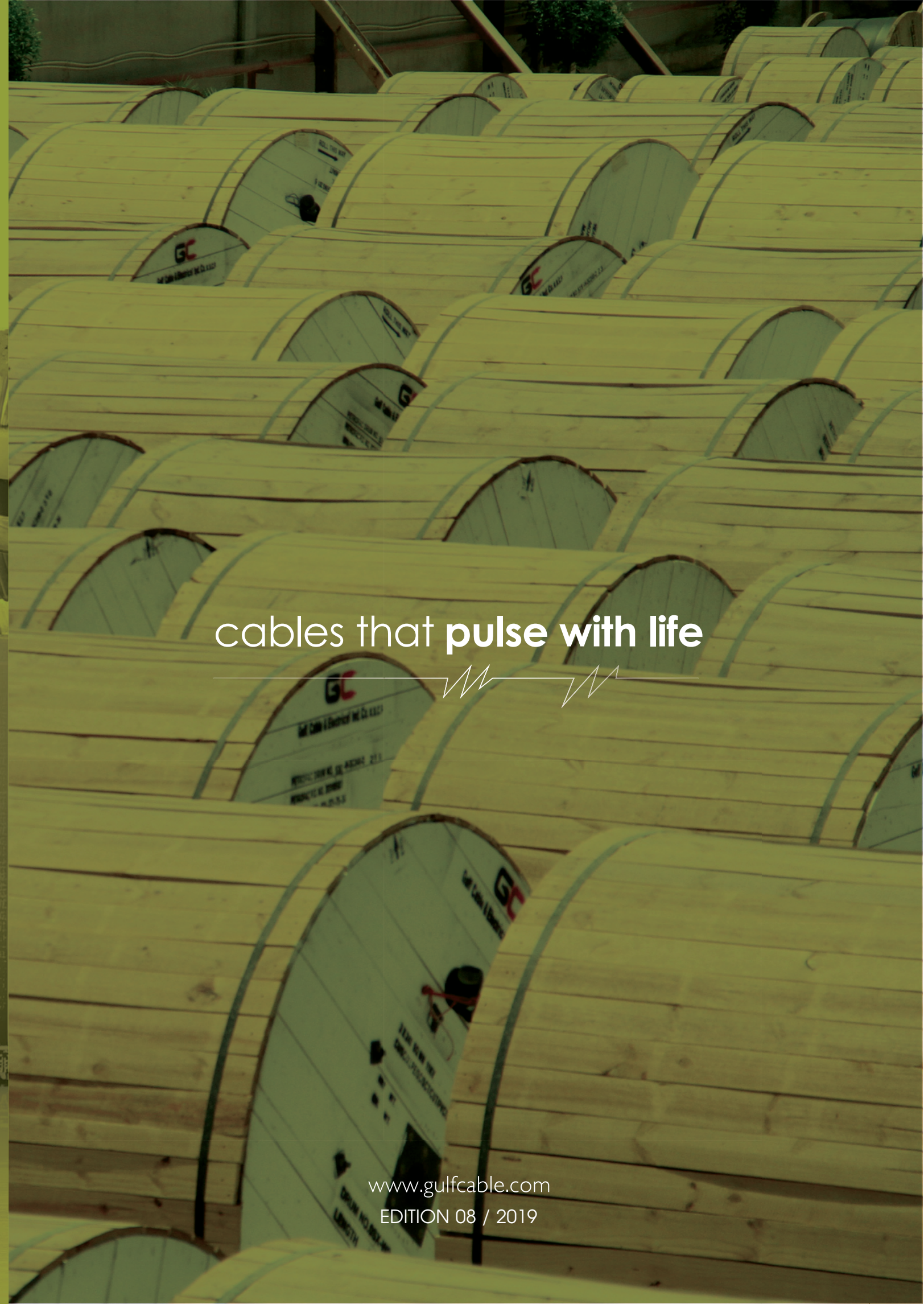
Low Smoke - Zero Halogen Cables



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Low Smoke Zero Halogen Cables (LSZH)

□ About us

Gulf Cable and Electrical Industries Co. K.S.C.P was established in 1975 with objective of meeting growing local and export markets requirements, it owns two factories one located in Kuwait the other in Jordan. Our Vision is to be the leader of Gulf and Middle East region in manufacturing and supplying Cables and Conductors. Through continuous improvements driven by the integrity, teamwork and innovation, we are committed to provide such a Quality that:

- Our customers will receive superior value
- Our shareholders will receive ever exceeding returns on their investments
- Our business partners will share our success
- Our employees will prosper

Our products are designed and manufactured to meet the needs of the Local, regional and International markets. All our products meet the respective world standards.

We handle all available means for exporting products - land, marine and air.

We are also equipped to meet all export requirements and formalities in the local Arab markets, including Saudi Arabia, United Arab Emirates, Oman, Bahrain, Qatar, Jordan , Iraq and MENA. Opportunities to Export to Syria, Lebanon, Yemen and other countries worldwide will also be available soon.

We have developed and established communication channels with our customers through which, we constantly get updates and feedbacks on their stated / implied needs and problems. Based on this information, we have devised new modalities to provide better service to our valued customers. Thus, we not only provide Quality Products, but also offer a host of related services before and after the sale.

On a regular basis, we develop new products and enhance our existing ones. We are proud to introduce our new range of Halogen Free Cables.

As you will turn to the following pages, you will appreciate that we have enhanced our in house test facility to add a whole range of Fire Test apparatus.

□ Product Range:

Medium Voltage Power Cables up to 19/33(36) KV
Low Voltage Power Cables up to 600/1000V
Control Cables 600/1000V
Bare Conductors for Overhead Lines
Earthing Conductors
PVC or XLPE Insulated Conductors
Domestic Applications / Internal Wiring
LSZH Cables & Wires
Lead Sheathed Cables
Enamelled Wires
Telephone, communication & Instrumentation Cables
Fire Resistant Cables

□ Quality

Quality has always been our top priority and to meet customer's expectation has been our prime objective; the very basis on which we earned the confidence of our clientele. It is this concern and commitment, rather than just sell of product, has given us a distinct image and competitive advantage.



□ Introduction:

The awareness of fire as a hazard has been known for a long time. However, for several years, this phenomenon had been taken as a natural occurrence which is uncontrollable and it is one's fortune – good or bad that controls the damage. Since last decade and half, this status has changed though. Global awareness regarding Safety, Health and Environment has been on the rise. Cable industry is making notable advances in products and standards in order to address the related issues. Halogen free cables are example of contribution by cable industry towards the global efforts.

□ Traditional cables PVC Insulation / Sheathing : Dangers and risks :

For several years, PVC has been the most widely used Insulation / Sheathing material for the most common types of cables. Because of its good electrical + physical properties and easy availability, it has been a popular choice. Further, it has a degree of flame retardant properties rendered by presence of Chlorine, a member of Halogen family. However, PVC burns readily, and when it does, it gives out large amount of dense black smoke along with vast quantities of Hydrogen Chloride gas.

Thus, the damage caused by burning PVC is two-fold; Firstly, dense black smoke obscures exit routes. Just to give a broad idea, approximately 6/7 kgs of PVC will produce complete obscurity in a room of 1000 cubic meters by the time it is totally burnt.

Hydrogen Chloride is a very toxic and corrosive gas. When mixed with even small amounts of water, like the moisture found in lungs, eyes, and throats, it turns into acid. These chemical reactions can disorient and injure people who are trying to escape a blaze. Clearly, this creates a hazardous situation wherever an accidental fire occurs.

Further the acid gas permeates electronic equipments, causing random, unpredictable failures in computers, security/access control equipments, building management systems, lifts and just about anything else with electronic circuits. Hence, the fire may have been extinguished within minutes with no great risk to life, secondary damage that can be caused to instrumentation, equipments and building structure can be colossal.

All buildings and structures, large or small, are at risk from fire and so are the people who use them. In installations such as power stations, oil and chemical refineries, factories, hospitals, Public and government buildings, supermarkets, airports, control rooms and computer suites etc., kilometers of control, communication and power cables run the length of the structure, interconnecting many rooms and floors.

For ease of installation, the cables are usually collected together in groupings throughout the cable run. During any ensuing fire, the cables and the mode of installation are substantial contributing factors to the spread of that fire, as they traverse from one section to another, through walls and up vertical shafts, carrying smoke and fumes to areas which may not have been affected by the fire itself.

It is therefore of paramount importance that such cables should not propagate fire or give out acid gases or large amount of smoke and fumes.

Gulf Cable's Halogen Free cables precisely serve this purpose.



Low Smoke Zero Halogen Cables (LSZH)

□ Terminology

Measure of Flammability:

Oxygen Index : Oxygen Index is the minimum concentration of Oxygen expressed as volume % in a mixture of Oxygen and Nitrogen that will just support flaming combustion of a material at room temperature. Any material which ignites in normal atmosphere have Oxygen index less than or equal to 21, volume per cent of Oxygen in atmosphere.

A material which can not be ignited in normal atmospheric conditions, can still support combustion if concentration of Oxygen is more than 21.

Temperature Index : Oxygen index of a material tends to decrease with increase in temperature. It is, therefore possible to extrapolate the temperature where Oxygen index of the same will be reduced to 21. The material will then burn at such temperature under normal concentration of Oxygen in atmosphere. This particular temperature is referred as "Temperature index" of the material.

Gulf Cable's Halogen free cables have oxygen index of the order of 30% and Temperature index of the order of 250 °C. This signifies that Jacket material is not ignitable under normal atmospheric conditions and even it catches fire, the flame can not propagate and would be self extinguishable.

Measure of Smoke Emission :

Smoke emission during fire on cables obscure visibility and causes hindrance to easy access for fire fighting to critical area as also enabling people caught into fire move out to safe place.

Smoke density rating of a material provides index of the total smoke generation within test chamber after combustion of the sample.

Gulf Cable's Halogen free cables have minimum light transmission of the order of 70%.

Measure of Acid / Toxic gas emission :

Conventionally, halogenated polymers have been used in Jacketing materials. Halogens eventually get converted into acid gas on decomposition of polymers under fire. Moreover, presence of Nitrogen and Sulphur in the compound also evolves toxic gases like carbon monoxide, hydrogen cyanide, nitrogen oxide, hydrogen sulphide and sulphur dioxide.

Gulf Cable's Halogen free cables emit Acid Gases of the order of < 0.5%

Measure of Propagation of fire on cables :

It is of paramount importance that cables should not propagate fire. The property is verified on Single Vertical Cable / Bunched Vertical Cables

After burning of test sample has ceased, charred portion should not have spread beyond a specified height from bottom edge of the burner.

Gulf Cable's Halogen free cables have excellent results.

Most importantly, Gulf Cable's Halogen free cables have above added characteristics, without impairing the excellent electrical / physical parameters.

Note : The above values are typical values. For specific requirements, please contact us. For cables meeting requirements of IEC:60332 (part 3) Cat-A, please contact us.



Low Smoke Zero Halogen Cables (LSZH)

□ INTERNATIONAL STANDARDS

FOR CABLES HAVING LOW EMISSION OF SMOKE AND CORROSIVE GASES WHEN AFFECTED BY FIRE

1. ARMOURED CABLES FOR VOLTAGES OF 600/1000 V & 1900/3300 V TO BS: 6724
2. ARMOURED CABLES FOR VOLTAGES OF 600/1000 V & 1900/3300 V TO IEC: 60502-1
3. ARMOURED CABLES FOR VOLTAGES FROM 3.8 /6.6 KV TO 19/33 KV TO BS: 7835
4. SINGLE CORE NON-SHEATHED CABLES WITH HALOGEN FREE CROSSLIKED INSULATION AND LOW EMISSION OF SMOKE UP TO AND INCLUDING 450/750 V ACCORDING TO BS EN - 50525 - 3 - 41 & BS: 7211

□ RELATED TEST STANDARD ARE AS BELOW

1. Critical Oxygen Index / Temperature Index Test : ASTM D 2863 / BS EN ISO 4589-1 & 2
2. Smoke Density Test : ASTM D 2843
3. Smoke Density Test (3 M3 Chamber Test) : BS EN/ IEC 61034-1&2
4. Acid Gas Generation Test : BS EN / IEC 60754-1&2
5. Swedish Chimney Test : SS 424-14-75 , Class F3
6. Fire Test : IEC : 60332-1 for single vertical cables
IEC: 60332-3 / BS EN 50266-2 for Bunched vertical
7. Flourine Test : IEC: 60502-1 / IEC: 60684-2





Low Smoke Zero Halogen Cables (LSZH)

□ Quality Assurance

Quality has always been our top priority and to meet customer's expectation has been our prime objective; the very basis on which we earned the confidence of our clientele. It is this concern and commitment, rather than just sell of product, has given us a distinct image and competitive advantage.

Since 1997, we have Quality Assurance System to ISO:9001. The System has been certified by **TUV-Nord**, Germany as well as **BASEC**. The salient features of this system include :

- Well defined and documented system comprising of System manual, Operating procedures, work instructions, Quality Assurance plans, Material specifications, work specifications, design guidelines, traceability system, Design guidelines
- Sound vendor development and approval system
- Systematic scrutiny of customer requirements and internal communication to integrate the same into product
- Thorough incoming material inspection
- Round the clock process checks at defined points and frequencies
- 100% testing before any product leaves our premises
- Well established customer interface

□ Environmental Management System:

We at Gulf Cable recognize that Environmental Issues have become critical challenge globally. We are committed to contributing towards "Leaving a beautiful planet as a legacy to future generations".

For achieving this, we believe that we need to work in harmony with the nature; recognize the environmental impact related to our business activities & products and undertake protection of environment through technologically and economically feasible goals within our scope.

To pursue this, we have implemented Environmental Management System satisfying requirements of ISO:14001. The System has been certified by **TUV-Nord, Germany**.

□ Occupational Health & Safety management System:

We at Gulf Cable recognize that way to greater sustainability is through better Health measures for employees and better Safety measures for protecting men, machines, materials and environment.

For achieving this, we believe that we need to provide a healthy and safe working habitat at our facility and take adequate steps to prevent accidents and injury arising from the course of our activities, by minimizing, so far as is reasonably practicable, the causes of hazards inherent in the working environment.

To pursue this, we have implemented Occupational Health & Safety Management System satisfying requirements of OHSAS:18001. The System has been certified by **TUV-Nord, Germany**.



Low Smoke Zero Halogen Cables (LSZH)

ISO 9001:2015 Certified by TUV NORD Germany

Quality Management System, ISO 9001:2015, is a system for effectively and efficiently managing the processes that deliver products to customers. To substantiate our Organization approach for quality, we have pursued the certification of our Management System according to the requirements of ISO 9001:2015, which recognizes also our ability for design and development.

ISO 9001:2015, Certified by SGS

Also our Jordan plant Management System is certified according to the requirements of ISO 9001:2015 from SGS.

ISO 14001:2015 Certified by TUV NORD Germany

We at Gulf Cable recognize that environmental issues have become critical challenge globally. We are committed to recognize the environmental impact related to our business activities & products and undertake protection of environment through technologically and economically feasible goals within our scope. To substantiate this, we have pursued the certification of our Environmental Management System according the requirements of ISO 14001:2015.





Low Smoke Zero Halogen Cables (LSZH)

BS OHSAS 18001: 2007 Certified by TUV NORD Germany

We at Gulf Cable recognize that the way to great sustainability is through better Health measures for employee and better safety measures for protecting men, machines, materials and environment. For achieving this, we believe that we need to provide a healthy and safe working habitat at our facility and take adequate steps to prevent accidents and injuries arising from the course of our activities, by minimizing, so far as it is reasonably practicable, the causes of hazards inherent in the working environment.

To substantiate this, we have pursued certification of our occupational Health & Safety Management System according to the requirements of BS OHSAS 18001:2007.



BS EN ISO 9001:2015 Certified by BASEC

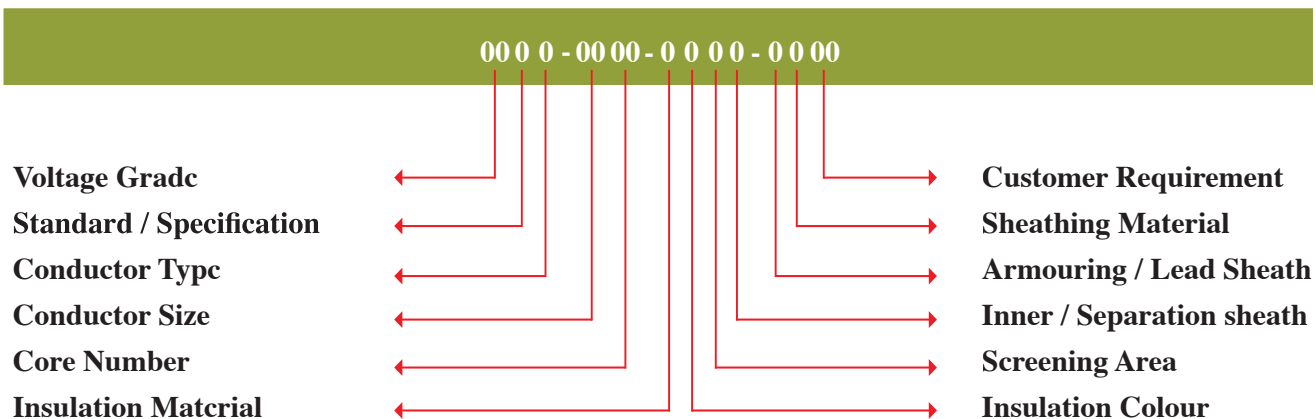
BASEC "BASEC "British Approvals Service for Cables", BASEC was established in 1971 by end users and cables manufacturers as an independent approval body for cable and related products, with the objective of sustaining and improving standards of safety and quality. BASEC is accredited by United Kingdom Accreditation Service (UKAS) to provide Management System Standards. Gulf Cable Kuwait Quality Management System is also certified by BASEC to BS EN ISO 9001:2015 standard.





Low Smoke Zero Halogen Cables (LSZH)

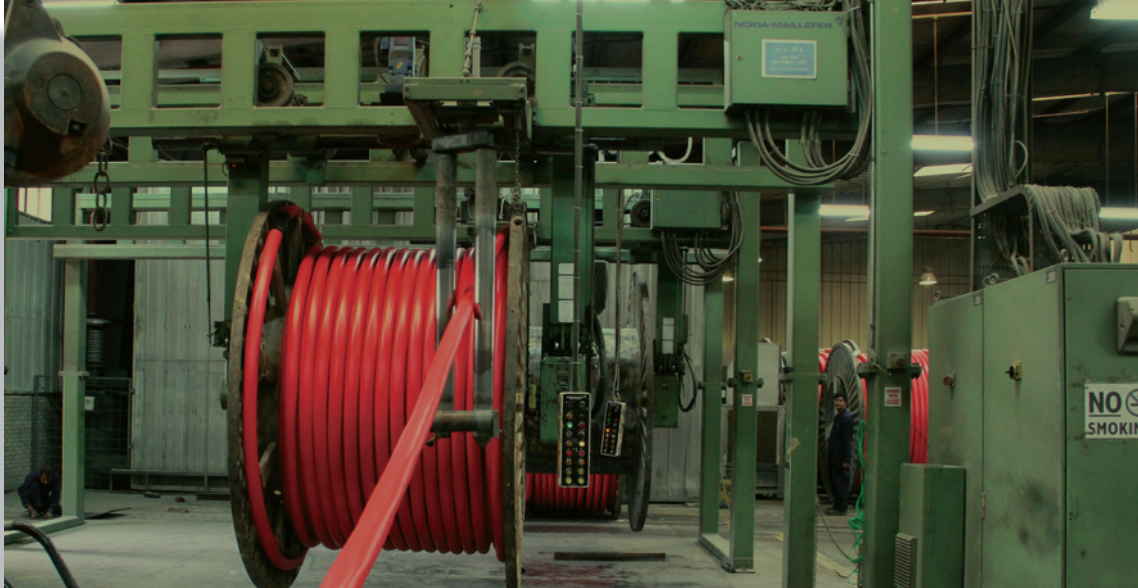
□ Cable Codes Legend



Classification	Code - Identification				
Voltage Grade	<u>01</u> – 300/500 V	<u>02</u> – 450/750 V	<u>03</u> – 600/1000 V		
International Specification	<u>A</u> -- IEC	<u>B</u> -- BS			
Conductor Type	<u>A</u> – Copper solid	<u>B</u> - Copper non compact circular	<u>C</u> - Copper compact circular	<u>D</u> - Copper sector	
Conductor Size	<u>01</u> – 1.0 mm ²	<u>02</u> – 1.5 mm ²	<u>03</u> – 2.5 mm ²	<u>04</u> – 4 mm ²	and so on
Core Number	<u>01</u> – 1	<u>02</u> – 2	<u>03</u> – 3	<u>04</u> – 4	and so on
Insulation Material	<u>A</u> – XLPE	<u>H</u> -- LSZH			
Insulation Colour	Core Colour depending on number of cores				
Screening Area	<u>0</u> – No Screen	<u>A</u> – Copper Wire			
Inner sheath / Separation sheath	<u>0</u> – No Inner Sheath		<u>C</u> - PVC	<u>F</u> -LSZH	
Armouring / Lead Sheath	<u>0</u> -Unarmored & Non Lead	<u>A</u> - Galvanized Steel Wire	<u>B</u> -Aluminum Wire	<u>F</u> – Lead Sheath	
Sheathing Material	<u>0</u> - Non Sheath	<u>A</u> -- PVC	<u>J</u> - LSZH		
Customer / specification, requirement (o/s colour, o/s thickness)	<u>00</u> – GC Standard				



Low Smoke Zero Halogen Cables (LSZH)





Low Smoke Zero Halogen Cables (LSZH)

450/750 V, SINGLE CORE, NON SHEATH WIRING CABLES - CU / LSZH

Description :

Copper conductor, Low Smoke Zero Halogen (LSZH) Insulation

Color : As Per Customer Request

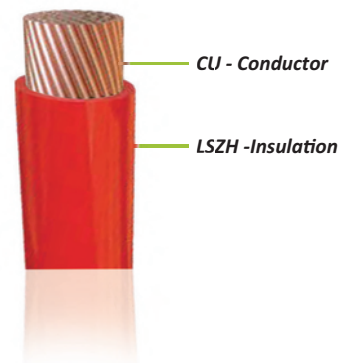
Standards :

Construction : BS 7211, BS EN 50523-3-41

Testing : BS EN/ IEC 61034, BS EN/ IEC 60754, IEC 60332-1

*Circular solid conductor (Class 1).

All other conductors circular stranded or circular stranded compacted (Class 2).



Cable Code	Conductor Size	Max. Conductor DC Resistance at 20°C	Insulation Thickness	Approx. Overall Diameter	Current Rating (A.C.)		Voltage Drop (A.C.)		Approx. Cable Weight	Packing Length (±5%)	Drum Size
					Two Cables 1 Ph	Three Cables 3 Ph	Two Cables 1 Ph	Three Cables 3 Ph			
	Sqmm	Ohm/Km	mm	mm	Amps	Amps	V/A/KM	V/A/KM	Kg/Km	Metre	
02BA-0201-HA00-0000	1.5*	12.1	0.7	3	23	20	31	27	21	100Y	COIL
02BB-0201-HA00-0000	1.5	12.1	0.7	3.2	23	20	31	27	22	100Y	"
02BA-0301-HA00-0000	2.5*	7.41	0.8	3.6	31	28	19	16	32	100Y	"
02BB-0301-HA00-0000	2.5	7.41	0.8	3.8	31	28	19	16	34	100Y	"
02BB-0401-HA00-0000	4	4.61	0.8	4.3	42	37	12	10	49	100Y	"
02BB-0501-HA00-0000	6	3.08	0.8	4.9	54	48	7.9	6.8	68	100Y	"
02BC-0601-HA00-0000	10	1.83	1.0	6.0	75	66	4.7	4	115	100Y	"
02BC-0701-HA00-0000	16	1.15	1.0	7.1	100	88	2.9	2.5	170	100Y	"
02BC-0801-HA00-0000	25	0.727	1.2	8.8	133	117	1.9	1.65	265	1000M	D-9
02BC-0901-HA00-0000	35	0.524	1.2	9.9	164	144	1.35	1.15	360	1000M	D-10
02BC-1001-HA00-0000	50	0.387	1.4	11.4	198	175	1.05	0.9	490	1000M	D-10
02BC-1101-HA00-0000	70	0.268	1.4	13.0	253	222	0.75	0.65	690	1000M	D-10
02BC-1201-HA00-0000	95	0.193	1.6	15.3	306	269	0.58	0.5	950	500M	D-9
02BC-1301-HA00-0000	120	0.153	1.6	16.8	354	312	0.48	0.42	1180	500M	D-10
02BC-1401-HA00-0000	150	0.124	1.8	18.6	393	342	0.43	0.37	1480	500M	D-10
02BC-1501-HA00-0000	185	0.0991	2.0	20.6	449	384	0.37	0.32	1810	500M	D-11
02BC-1601-HA00-0000	240	0.0754	2.2	23.5	528	450	0.33	0.29	2360	500M	D-12
02BC-1701-HA00-0000	300	0.0601	2.4	25.9	603	514	0.31	0.27	2960	500M	D-12
02BC-1801-HA00-0000	400	0.047	2.6	29.2	683	584	0.29	0.25	3820	500M	D-16
02BC-1901-HA00-0000	500	0.0366	2.8	32.6	783	666	0.28	0.24	4810	500M	D-18
02BC-2001-HA00-0000	630	0.0283	2.8	38.2	900	764	0.27	0.23	6180	250M	D-14

Installation Condition:

cables bunched and enclosed in conduit on a wall, or enclosed in trunking.

Ambient Air temperature : 30 °C

Conductor operating temperature : 90 °C



Low Smoke Zero Halogen Cables (LSZH)

600/1000 V, SINGLE CORE, ARMOURED CABLES CU / XLPE / LSZH / AWA / LSZH

Description :

Copper conductor, XLPE Insulated,
Extruded LSZH bedding, Round aluminium wire
armoured and LSZH outer sheathed cable.

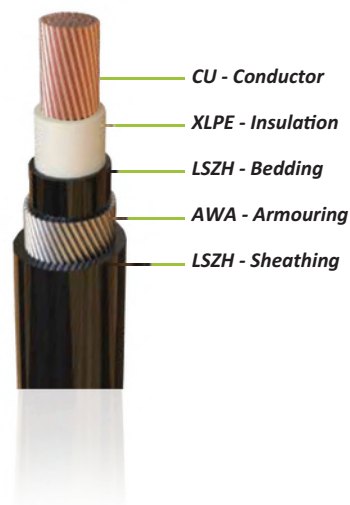
Color : Natural for insulation and black for sheathing

Standards :

Construction : BS 6724 , Generally confirm to IEC 60502-1

Testing : BS EN/IEC 61034, BS EN/IEC 60754, IEC 60332-3

*Circular Stranded or Circular stranded compacted (class 2).



Cable Code	Conductor Size	Max. (DC) Conductor Resistance at 20°C	Insulation Thickness	Approx. Overall Diameter	Current Rating (A.C)	Voltage Drop (A.C)	Approx. Cable Weight	Packing Length (±5%)	Drum Size
	Sqmm	Ohm/Km	mm	mm	Amp	V/A/KM	Kg/Km	Metre	
03BC-1001-A00F-BJ00	50	0.387	1.0	18.8	222	0.87	765	500	D-10
03BC-1101-A00F-BJ00	70	0.268	1.1	20.6	285	0.62	1000	500	D-10
03BC-1201-A00F-BJ00	95	0.193	1.1	22.7	346	0.47	1300	500	D-11
03BC-1301-A00F-BJ00	120	0.153	1.2	24.4	402	0.39	1560	500	D-12
03BC-1401-A00F-BJ00	150	0.124	1.4	26.8	463	0.33	1920	500	D-12
03BC-1501-A00F-BJ00	185	0.0991	1.6	29.0	529	0.28	2300	500	D-12
03BC-1601-A00F-BJ00	240	0.0754	1.7	31.7	625	0.24	2890	500	D-14
03BC-1701-A00F-BJ00	300	0.0601	1.8	34.1	720	0.21	3530	500	D-16
03BC-1801-A00F-BJ00	400	0.047	2.0	38.8	815	0.195	4590	500	D-18
03BC-1901-A00F-BJ00	500	0.0366	2.2	42.4	918	0.18	5660	500	D-18
03BC-2001-A00F-BJ00	630	0.0283	2.4	48.6	1027	0.17	7100	250	D-16
03BC-2101-A00F-BJ00	800	0.0221	2.6	54.0	1119	0.165	9030	250	D-18
03BC-2201-A00F-BJ00	1000	0.0176	2.8	60.8	1214	0.155	11500	250	D-18

Installation Condition:

Three Phase, Trefoil In free air

Ambient Air Temperature : 30°C

Conductor operating Temperature : 90°C



Low Smoke Zero Halogen Cables (LSZH)

600/1000 V, TWO CORE, ARMoured CABLES CU / XLPE / LSZH / SWA / LSZH

Description :

copper conductor, XLPE Insulated, Extruded LSZH bedding, Round Steel wire armoured and LSZH outer sheathed cable.

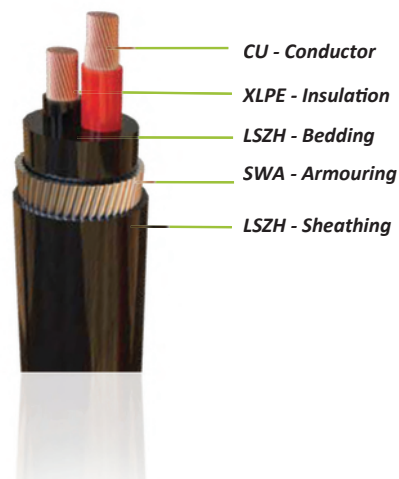
Color : Red & Black for insulation and Black for sheathing

Standards :

Construction : BS 6724, Generally confirm to IEC 60502-1

Testing : BS EN/ IEC 61034, BS EN/ IEC 60754, IEC 60332-3

All conductors circular stranded or circular stranded compacted (class-2)



Cable Code	Conductor Size	Max. (DC) Conductor Resistance at 20°C	Insulation Thickness	Approx. Overall Diameter	Current Rating (A.C)	Voltage Drop (A.C)	Approx. Cable Weight	Packing Length (±5%)	Drum Size
	Sqmm	Ohm/Km	mm	mm	Amp	V/A/KM	Kg/Km	Metre	
03BB-0202-A00F-AJ00	1.5	12.1	0.7	13.2	29	31	325	1000	D-10
03BB-0302-A00F-AJ00	2.5	7.41	0.7	14.2	39	19	375	1000	D-10
03BB-0402-A00F-AJ00	4	4.61	0.7	15.2	52	12	440	1000	D-11
03BB-0502-A00F-AJ00	6	3.08	0.7	16.4	66	7.9	520	1000	D-11
03BC-0602-A00F-AJ00	10	1.83	0.7	18.0	90	4.7	670	1000	D-12
03BC-0702-A00F-AJ00	16	1.15	0.7	20.9	115	2.9	965	1000	D-12
03BC-0802-A00F-AJ00	25	0.727	0.9	24.3	152	1.9	1310	1000	D-14
03BC-0902-A00F-AJ00	35	0.524	0.9	27.8	188	1.35	1810	1000	D-18
03BC-1002-A00F-AJ00	50	0.387	1.0	30.9	228	1	2070	500	D-14
03BC-1102-A00F-AJ00	70	0.268	1.1	34.7	291	0.69	2650	500	D-16
03BC-1202-A00F-AJ00	95	0.193	1.1	39.9	354	0.52	3640	500	D-18
03BC-1302-A00F-AJ00	120	0.153	1.2	43.5	410	0.42	4330	500	D-18
03BC-1402-A00F-AJ00	150	0.124	1.4	47.3	472	0.35	5140	500	D-19
03BC-1502-A00F-AJ00	185	0.0991	1.6	53.1	539	0.29	6570	250	D-18
03BC-1602-A00F-AJ00	240	0.0754	1.7	58.7	636	0.24	8050	250	D-18
03BC-1702-A00F-AJ00	300	0.0601	1.8	63.7	732	0.21	9610	250	D-18
03BC-1802-A00F-AJ00	400	0.047	2	70.7	847	0.19	11900	250	D-21

Installation Condition:

Single phase, In free air or on a perforated cable tray

Ambient Air Temperature : 30°C

Conductor operating Temperature : 90°C



Low Smoke Zero Halogen Cables (LSZH)

600/1000 V, Three CORE, ARMoured CABLES CU / XLPE / LSZH / SWA / LSZH

Description :

Copper conductor, XLPE Insulated, Extruded LSZH bedding, Round Steel wire armoured and LSZH outer sheathed cable.

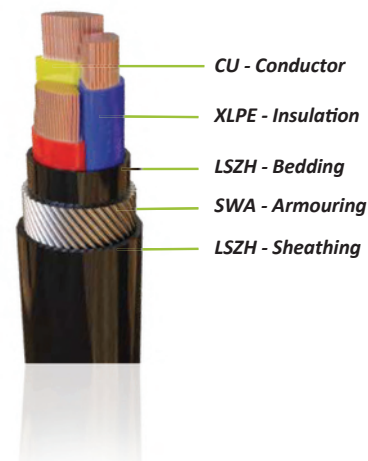
Color : Red, Yellow & Blue for insulation and black for sheathing

Standards :

Construction : BS 6724, Generally confirm to IEC 60502-1

Testing : BS EN/ IEC 61034, BS EN/ IEC 60754, IEC 60332-3

Conductors including 16 Sqmm circular stranded (class 2).
25 Sqmm and above Sector shaped stranded conductors (class 2).



Cable Code	Conductor Size	Max. (DC) Conductor Resistance at 20°C	Insulation Thickness	Approx. Overall Diameter	Current Rating (A.C)	Voltage Drop (A.C)	Approx. Cable Weight	Packing Length (±5%)	Drum Size
	Sqmm	Ohm/Km	mm	mm	Amp	V/A/KM	Kg/Km	Metre	
03BB-0203-A00F-AJ00	1.5	12.1	0.7	13.7	25	27	350	1000	D-10
03BB-0303-A00F-AJ00	2.5	7.41	0.7	14.8	33	16	415	1000	D-10
03BB-0403-A00F-AJ00	4	4.61	0.7	15.9	44	10	490	1000	D-11
03BB-0503-A00F-AJ00	6	3.08	0.7	17.2	56	6.8	580	1000	D-12
03BC-0603-A00F-AJ00	10	1.83	0.7	19.6	78	4	850	1000	D-12
03BC-0703-A00F-AJ00	16	1.15	0.7	22.2	99	2.5	1110	1000	D-14
03BD-0803-A00F-AJ00	25	0.727	0.9	24.3	131	1.65	1520	500	D-11
03BD-0903-A00F-AJ00	35	0.524	0.9	26.9	162	1.15	1910	500	D-12
03BD-1003-A00F-AJ00	50	0.387	1.0	30.1	197	0.87	2400	500	D-12
03BD-1103-A00F-AJ00	70	0.268	1.1	32.8	251	0.6	3100	500	D-14
03BD-1203-A00F-AJ00	95	0.193	1.1	38.2	304	0.45	4310	500	D-16
03BD-1303-A00F-AJ00	120	0.153	1.2	41.8	353	0.37	5170	500	D-18
03BD-1403-A00F-AJ00	150	0.124	1.4	46.4	406	0.3	6620	500	D-18
03BD-1503-A00F-AJ00	185	0.0991	1.6	50.8	463	0.26	7860	250	D-18
03BD-1603-A00F-AJ00	240	0.0754	1.7	56.9	546	0.21	9810	250	D-18
03BD-1703-A00F-AJ00	300	0.0601	1.8	61.8	628	0.185	11910	250	D-18
03BD-1803-A00F-AJ00	400	0.047	2.0	69.2	728	0.165	14910	200	D-19

Installation Condition:

Three Phase, In free air or on a perforated cable tray

Ambient Air Temperature : 30°C

Conductor operating Temperature : 90°C



Low Smoke Zero Halogen Cables (LSZH)

600/1000 V, Four CORE, ARMoured CABLES CU / XLPE / LSZH / SWA / LSZH

Description :

Copper conductor, XLPE Insulated, Extruded LSZH bedding, Round Steel wire armoured and LSZH outer sheathed cable.

Color : Red, Yellow, Blue & Black for insulation and black for sheathing

Standards :

Construction : BS 6724, Generally confirm IEC 60502-1

Testing : BS EN/ IEC 61034, BS EN/ IEC 60754, IEC 60332-3

Conductors including 16 Sqmm circular stranded (class 2).
25 Sqmm and above Sector shaped stranded conductors (class 2).



CU - Conductor

XLPE - Insulation

LSZH - Bedding

SWA - Armouring

LSZH - Sheathing

Cable Code	Conductor Size	Max. (DC) Conductor Resistance at 20°C	Insulation Thickness	Approx. Overall Diameter	Current Rating (A.C)	Voltage Drop (A.C)	Approx. Cable Weight	Packing Length (±5%)	Drum Size
	Sqmm	Ohm/Km	mm	mm	Amp	V/A/KM	Kg/Km	Metre	
03BB-0204-A00F-AJ00	1.5	12.1	0.7	14.6	25	27	390	1000	D-10
03BB-0304-A00F-AJ00	2.5	7.41	0.7	15.8	33	16	470	1000	D-11
03BB-0404-A00F-AJ00	4	4.61	0.7	17.0	44	10	570	1000	D-11
03BB-0504-A00F-AJ00	6	3.08	0.7	18.3	56	6.8	790	1000	D-12
03BC-0604-A00F-AJ00	10	1.83	0.7	21.0	78	4	1020	1000	D-12
03BC-0704-A00F-AJ00	16	1.15	0.7	23.9	99	2.5	1350	1000	D-14
03BD-0804-A00F-AJ00	25	0.727	0.9	26.4	131	1.65	1850	500	D-12
03BD-0904-A00F-AJ00	35	0.524	0.9	30.0	162	1.15	2360	500	D-12
03BD-1004-A00F-AJ00	50	0.387	1.0	33.1	197	0.87	2970	500	D-16
03BD-1104-A00F-AJ00	70	0.268	1.1	38.1	251	0.6	4190	500	D-18
03BD-1204-A00F-AJ00	95	0.193	1.1	42.3	304	0.45	5370	500	D-18
03BD-1304-A00F-AJ00	120	0.153	1.2	47.1	353	0.37	6910	500	D-19
03BD-1404-A00F-AJ00	150	0.124	1.4	52.0	406	0.3	8340	500	D-19
03BD-1504-A00F-AJ00	185	0.0991	1.6	56.9	463	0.26	9980	250	D-18
03BD-1604-A00F-AJ00	240	0.0754	1.7	62.2	546	0.21	12400	250	D-18
03BD-1704-A00F-AJ00	300	0.0601	1.8	68.0	628	0.185	15130	250	D-18
03BD-1804-A00F-AJ00	400	0.047	2.0	77.1	728	0.165	19850	200	D-19

Installation Condition:

Three Phase, In free air or on a perforated cable tray

Ambient Air Temperature : 30°C

Conductor operating Temperature : 90°C



Low Smoke Zero Halogen Cables (LSZH)

600/1000 V, ARMOURED AUXILIARY CABLES (CONTROL CABLES) SIZE : 1.5 SQ.MM CU / XLPE / LSZH / SWA / LSZH

Description :

Copper conductor, XLPE Insulated, Extruded LSZH bedding, Round Steel wire armoured and LSZH outer sheathed cable.

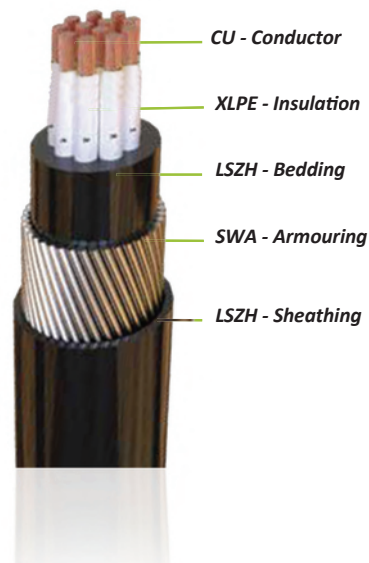
Color : For 5 Core cables, Red, Yellow, Blue, Black & Green for insulation, Above 5 cores core identification by Number printing on white cores, and Black colour for sheathing

Standards :

Construction : Generally confirm to BS 6724, IEC 60502-1

Testing : BS EN/ IEC 61034, BS EN/ IEC 60754, IEC 60332-3

All conductors circular stranded (class 2)



Cable Code	Number of cores	Max. (DC) Conductor Resistance at 20°C	Insulation Thickness	Approx. Overall Diameter	Current Rating (A.C)	Voltage Drop (A.C)	Approx. Cable Weight	Packing Length (±5%)	Drum Size
Sqmm	No	Ohm/Km	mm	mm	Amp	V/A/KM	Kg/Km	Metre	
03BB-0205-A00F-AJ00	5	12.1	0.7	15.7	19	27	450	1000	D-11
03BB-0207-A00F-AJ00	7	12.1	0.7	16.7	17	27	510	1000	D-11
03BB-0212-A00F-AJ00	12	12.1	0.7	21.4	14	27	845	500	D-10
03BB-0219-A00F-AJ00	19	12.1	0.7	24.4	12	27	1080	500	D-12
03BB-0227-A00F-AJ00	27	12.1	0.7	29.5	11	27	1590	500	D-12
03BB-0237-A00F-AJ00	37	12.1	0.7	32.5	10	27	1900	500	D-16
03BB-0248-A00F-AJ00	48	12.1	0.7	36.5	9	27	2300	500	D-18
03AB-0261-A00F-AJ00	61	12.1	0.7	40.9	8	27	3010	500	D-18
03AB-02A1-A00F-AJ00	91	12.1	0.7	47.7	7	27	3970	500	D-19

Installation Condition:

Three Phase, In free air or on a perforated cable tray

Ambient Air Temperature : 30°C

Conductor operating Temperature : 90°C



Low Smoke Zero Halogen Cables (LSZH)

600/1000 V, ARMoured AUXILIARY CABLES (CONTROL CABLES)

SIZE : 2.5 SQ.MM CU / XLPE / LSZH / SWA / LSZH

Description :

Copper conductor, XLPE Insulated, Extruded LSZH bedding, Round Steel wire armoured and LSZH outer sheathed cable.

Color : For 5 Core cables Red, Yellow, Blue, Black & Green for insulation, Above 5 cores core identification by Number printing on white cores, and black colour for sheathing

Standards :

Construction : Generally confirm to BS 6724, IEC 60502-1

Testing : BS EN/ IEC 61034, BS EN/ IEC 60754, IEC 60332-3

All conductors are circular stranded (class 2)



Cable Code	Number of cores	Max. (DC) Conductor Resistance at 20°C	Insulation Thickness	Approx. Overall Diameter	Current Rating (A.C)	Voltage Drop (A.C)	Approx. Cable Weight	Packing Length (±5%)	Drum Size
Sqmm	No	Ohm/Km	mm	mm	Amp	V/A/KM	Kg/Km	Metre	
03BB-0305-A00F-AJ00	5	7.41	0.7	16.8	26	16	530	1000	D-11
03BB-0307-A00F-AJ00	7	7.41	0.7	17.9	23	16	615	1000	D-12
03BB-0312-A00F-AJ00	12	7.41	0.7	23.3	19	16	1030	500	D-11
03BB-0319-A00F-AJ00	19	7.41	0.7	27.7	16	16	1520	500	D-12
03BB-0327-A00F-AJ00	27	7.41	0.7	32.2	14	16	1950	500	D-16
03BB-0337-A00F-AJ00	37	7.41	0.7	35.3	13	16	2360	500	D-18
03BB-0348-A00F-AJ00	48	7.41	0.7	41.4	12	16	3230	500	D-18
03AB-0361-A00F-AJ00	61	7.41	0.7	44.7	11	16	3760	500	D-18
03AB-03A1-A00F-AJ00	91	7.41	0.7	53.9	10	16	5540	500	D-21

Installation Condition:

Three Phase, In free air or on a perforated cable tray

Ambient Air Temperature : 30°C

Conductor operating Temperature : 90°C



Low Smoke Zero Halogen Cables (LSZH)

600/1000 V, ARMOURED AUXILIARY CABLES (CONTROL CABLES)

SIZE : 4 SQ.MM CU / XLPE / LSZH / SWA / LSZH

Description :

Copper conductor, XLPE Insulated, Extruded LSZH bedding, Round Steel wire armoured and LSZH outer sheathed cable.

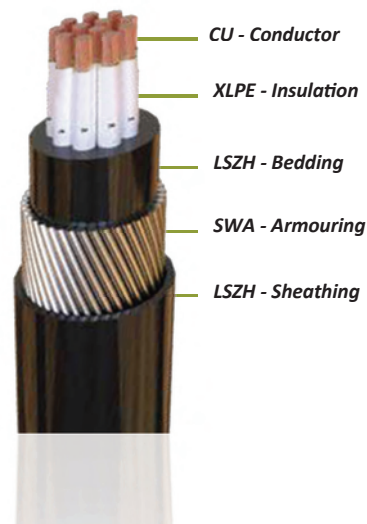
Color : For 5 Core cables Red, Yellow, Blue, Black & Green for insulation, Above 5 cores core identification by Number printing on white cores, and Black colour for sheathing

Standards :

Construction : Generally confirm to BS 6724, IEC 60502-1

Testing : BS EN/ IEC 61034, BS EN/ IEC 60754, IEC 60332-3

All conductors are circular stranded (class 2)



Cable Code	Number of cores	Max. (DC) Conductor Resistance at 20°C	Insulation Thickness	Approx. Overall Diameter	Current Rating (A.C)	Voltage Drop (A.C)	Approx. Cable Weight	Packing Length (±5%)	Drum Size
Sqmm	No	Ohm/Km	mm	mm	Amp	V/A/KM	Kg/Km	Metre	
03BB-0405-A00F-AJ00	5	4.61	0.7	19	35	10	755	500	D-10
03BB-0407-A00F-AJ00	7	4.61	0.7	20.3	31	10	880	500	D-10
03BB-0412-A00F-AJ00	12	4.61	0.7	26.5	26	10	1460	500	D-12
03BB-0419-A00F-AJ00	19	4.61	0.7	30.2	22	10	1920	500	D-12
03BB-0427-A00F-AJ00	27	4.61	0.7	35.5	20	10	2500	500	D-16
03BB-0437-A00F-AJ00	37	4.61	0.7	40.4	18	10	3400	500	D-18
03BB-0448-A00F-AJ00	48	4.61	0.7	45.7	16	10	4180	500	D-19

Installation Condition:

Three Phase, In free air or on a perforated cable tray

Ambient Air Temperature : 30°C

Conductor operating Temperature : 90°C



Low Smoke Zero Halogen Cables (LSZH)





Low Smoke Zero Halogen Cables (LSZH)

Rating Factors

The current rating mentioned in above tables based on ambient temperature 30°C in accordance with IET Wiring regulations for Electrical Installations, BS 7671.

Rating Factor for variation in Ambient Air Temperature.

Air Temperature (°C)	25	30	35	40	45	50	55	60
Rating Factor	1.02	1.00	0.96	0.91	0.87	0.82	0.76	0.71

Rating Factor for one circuit or one multicore cable or for group of circuits or a group of multicore cables.

Arrangement (cable Touching)	Number of Circuits or Multicore Cables											
	1	2	3	4	5	6	7	8	9	12	16	20
Bunched in Air, on a surface, embedded or enclosed	1.00	0.80	0.70	0.65	0.60	0.57	0.54	0.52	0.50	0.45	0.41	0.38
Single layer on wall or floor	1.00	0.85	0.79	0.75	0.73	0.72	0.72	0.71	0.70	0.70	0.70	0.70
Single layer multicore on a perforated horizontal or vertical cable tray system	1.00	0.88	0.82	0.77	0.75	0.73	0.73	0.72	0.72	0.72	0.72	0.72
Single layer multicore on cable ladder system or cleats etc.	1.00	0.87	0.82	0.80	0.80	0.79	0.79	0.78	0.78	0.78	0.78	0.78

Minimum Bending Radius:

Single core

Armoured -8 x OD
Un Armoured - 6 x OD
Where 'OD' is overall diameter of cable

Multi Core Cable

Armoured -8 x OD
Un Armoured - 8 x OD
Where 'OD' is overall diameter of cable



Low Smoke Zero Halogen Cables (LSZH)

□ Short Circuit Curve

$$I_{sc} = 0.143 \frac{A}{\sqrt{t}}$$

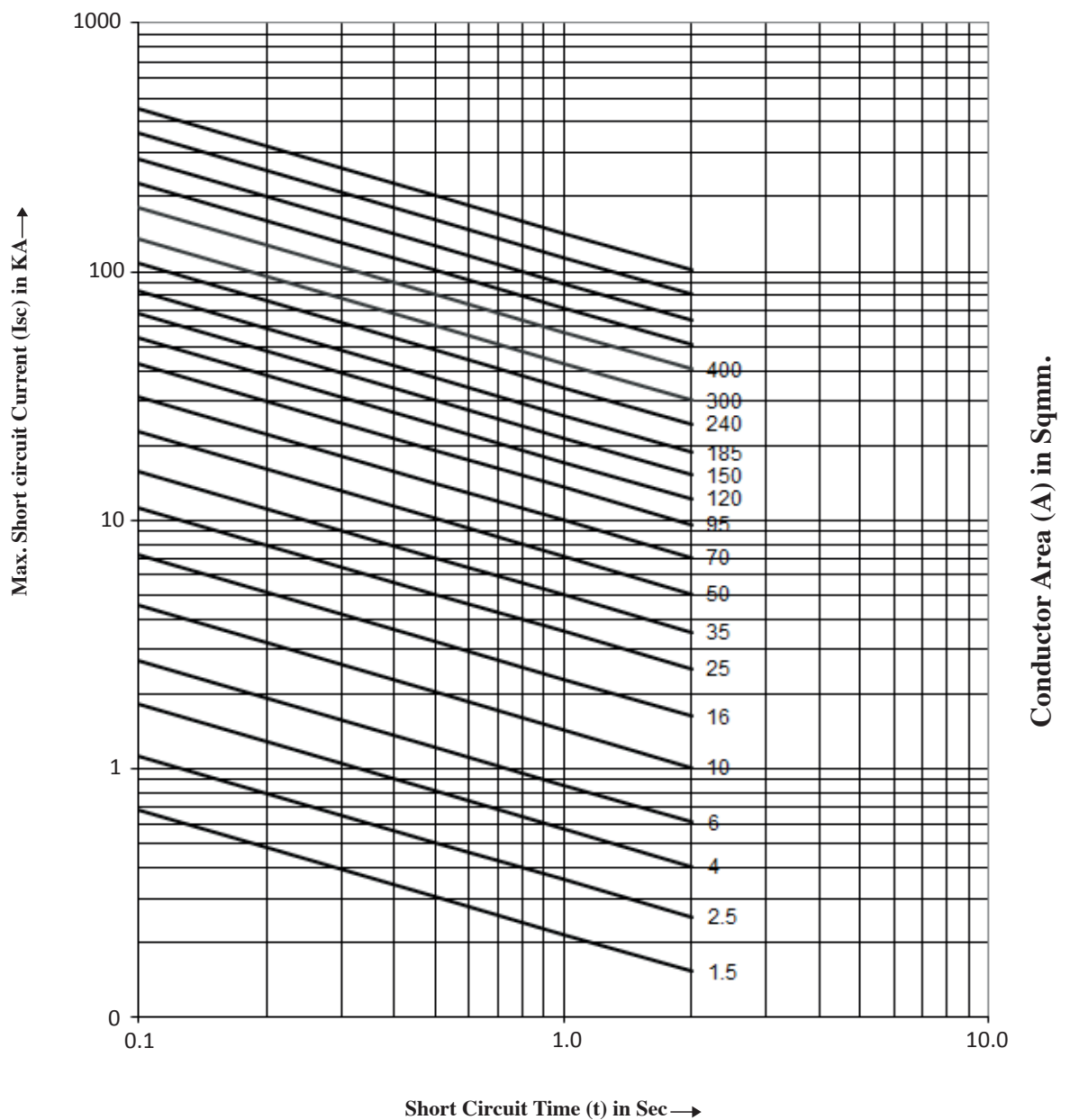
Where,

I_{sc} = Short Circuit current of copper conductor in KA

A = Conductor Area in Sq.mm

t = Short circuit duration in Sec.

Note : Max. permissible conductor temperature during short circuit = 250 °C





Low Smoke Zero Halogen Cables (LSZH)

□ Test Facilities at Gulf Cable

Oxygen Index Test Apparatus

To determine the minimum percentage of Oxygen required to just support flaming combustion of a material at Room Temp. in FTA mode or at a Higher Temp.

Conforms to ASTM D 2863 / BS EN ISO 4589-1 & 2



Smoke Density Test Apparatus

For measuring & observing the relative amounts (Density) of Smoke produced by the burning (combustion) or decomposition of plastics, cables etc., under controlled & standardized conditions.

Conforms to ASTM D 2843



3 Meter Cube Smoke Test Apparatus

The 3 Metre Cube is used for measuring smoke emission when electric cables are burned under defined conditions, for example, a few cables burned horizontally. The equipment comprises a cubic enclosure and a photometric system.

Conforms to BS EN/ IEC 61034-1&2





□ Test Facilities at Gulf Cable

Acid Gas Test Apparatus

To determine the degree of acidity of gases evolved during the combustion of materials taken from electric cables by measuring the pH & conductivity.

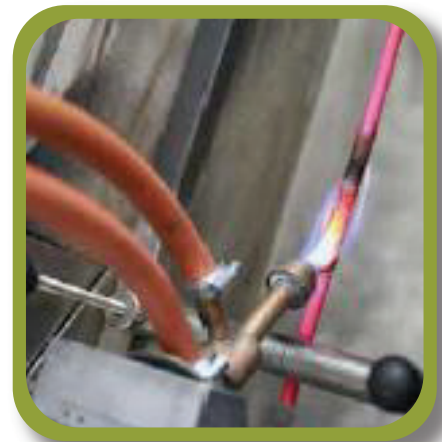
Conforms to BS EN 50267-1 & 2 /
IEC 60754-1&2



Flammability Test Apparatus

To determine the resistance to vertical flame propagation for a single vertical insulated conductor or cable

Conforms to : IEC 60332 part 1



Flammability Test Apparatus

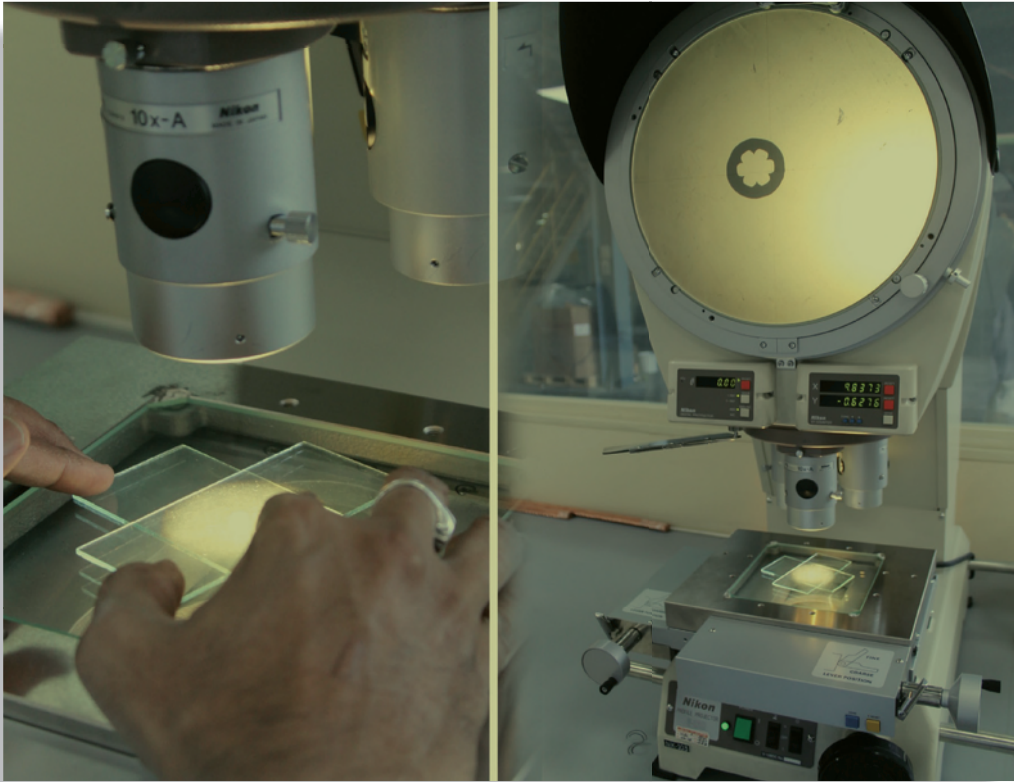
Test for assessment of vertical flame spread of vertically mounted bunched cable or wires. The Test Apparatus comprises of a 4m x 2m x 1m Chamber duly insulated. The Equipment is provided with a Ribbon Type Burner with Stand & Ladder. The quantum of gas is controlled & measured by means of a Flowmeter provided for air & fuel gas respectively.

Conforms to IEC-60332 Part 3

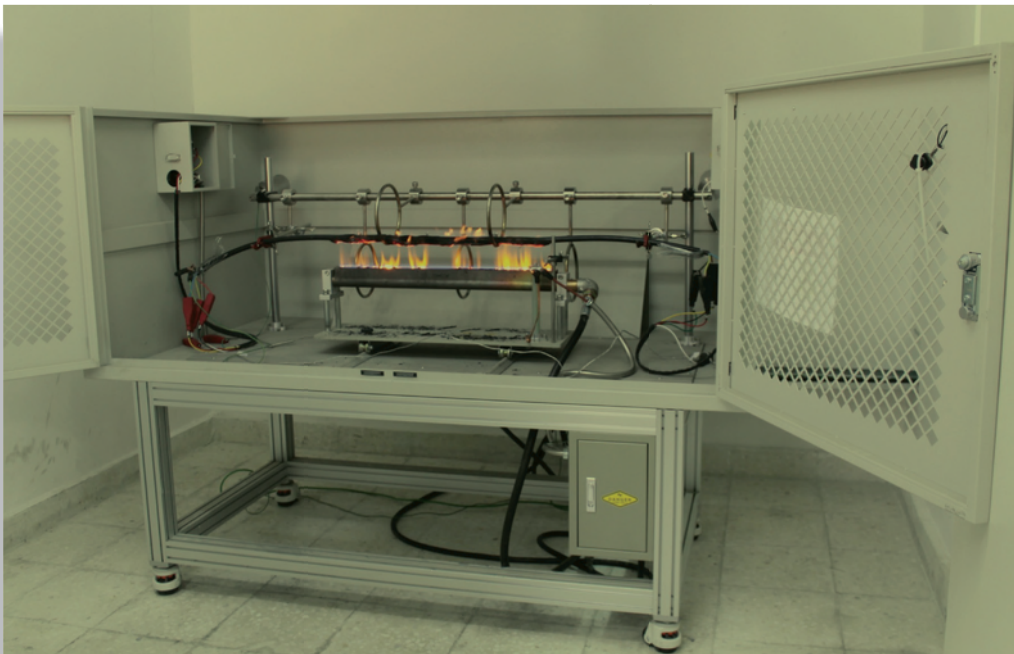




Low Smoke Zero Halogen Cables (LSZH)



Thickness measurements



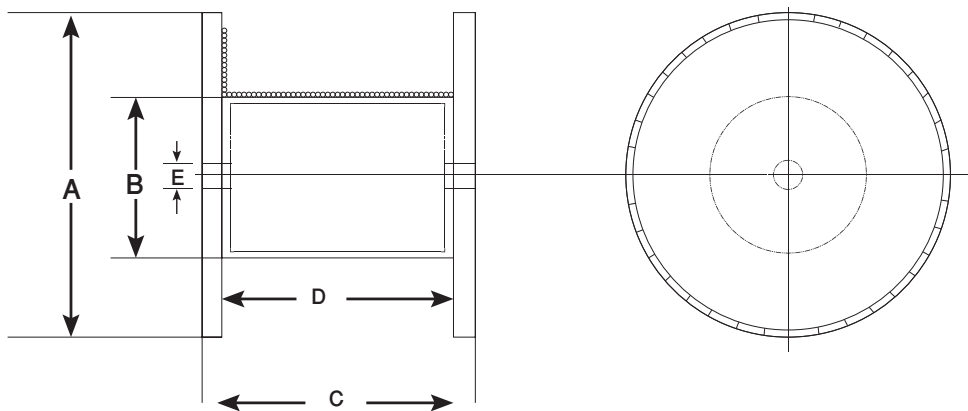
Fire Resistant Apparatus



Low Smoke Zero Halogen Cables (LSZH)

□ DRUM SIZES AND DIMENSIONS

- A-** Flange diameter (Excluding Lagging), mm
- B-** Barrel diameter, mm
- C-** Overall width, mm
- D-** Traves width, mm
- E-** Minimum spindle hole diameter, mm



DIMENSIONS

Drum size D-No	A	B	C	D	E
D-6	600	250	470	400	110
D-7	700	325	570	500	110
D-8	800	375	570	500	110
D-9	900	425	620	550	110
D-10	1000	500	690	600	110
D-11	1100	575	740	650	110
D-12	1200	675	950	850	110
D-14	1400	800	950	850	110
D-16	1600	950	970	850	110
D-18	1800	1100	1220	1100	110
D-19	1900	1100	1230	1100	110
D-20	2000	1300	1235	1100	110
D-21	2100	1150	1290	1100	110
D-22	2200	1400	1390	1250	110
D-23	2340	1200	1795	1625	110
D-24	2400	1200	1795	1625	110
D-25-S	2540	1200	1825	1625	110
D-25	2540	1400	1800	1625	110
D-26	2600	1400	1970	1800	110

Drum Dimensions in actual deliveries are subject to change without notice.



Low Smoke Zero Halogen Cables (LSZH)

□ Special Precaution During Installation & Storage for longer periods.

Cables with LSZH sheath need to be handled with care during Installation. Since Special additives are used in the formulation of LSZH compound to give the typical flame retardant characteristics of Halogen free polymers (Ex. High Oxygen Index, very Low smoke density, no acid gas liberation and retardance to flame propagation) some mechanical properties deteriorates. The following points shall be noted:

- Cable shall not be exposed to sunlight for considerable period before installation i.e., the temperature of sheath should be below 40°C
- Preferably the installation is done when the ambient temperature is low.
- Wire/Rope should not be used directly on cable sheath for pulling.
- The cable should not be bend more than the specified Minimum Bending radius.
- When pulled on cable trays/or any uneven surface, special attention is needed to weldings/ or unusually rough terrains.
- Rollers and bends should not have any sharpness which may damage sheath.
- Special LSZH compatible accessories and fixings are recommended for installations requiring enhanced fire performance.

The site chosen for storage of cable drums must be level and dry. It should have a firm, preferably concreted surface. This will avoid sinking of the drums and difficulty in subsequent shifting. All drums should be stored in such a manner as to leave sufficient space between them for air circulation.

During storage, the drum should be rolled to an angle of 90° once every three months. Also, tie bolts shall be checked and tightened at regular intervals.

Always turn a cable drum using turn table. Never use crow bar if turn table is not available. Two well greased plates can be used instead.

Storage of cable drums under shed is not essential unless the storage is for very long period. However, the cable drums shall be protected from direct sun light by covering them by tarpaulin or thick black polyethylene sheet.



Low Smoke Zero Halogen Cables (LSZH)

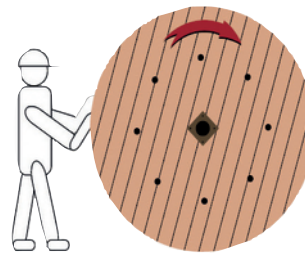
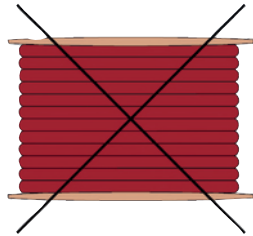
□ Drum Handling

A Cable is a valuable product. If handling is not done correctly, the drum and in turn the Cable wound over it can be damaged. At times, damage might not be discovered until after installation, when repairs can be extremely difficult / expensive.

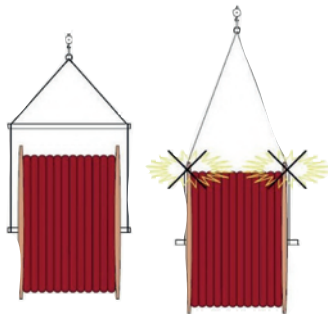
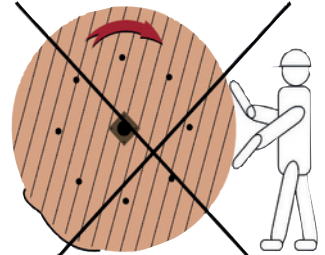
The purpose of this guide is to illustrate, how damages can be avoided by correct handling.



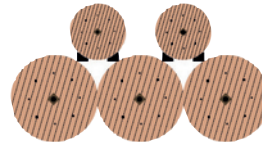
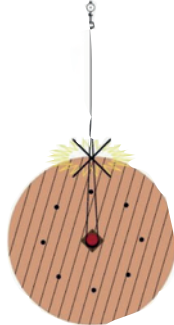
Keep the drum upright



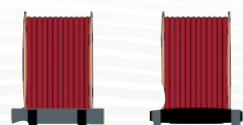
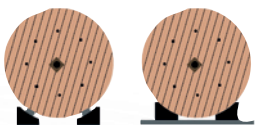
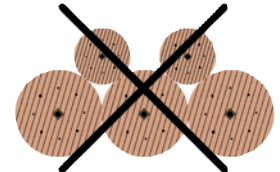
Roll in direction of arrows only



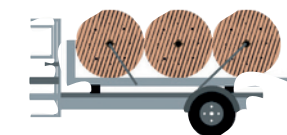
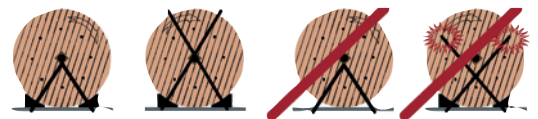
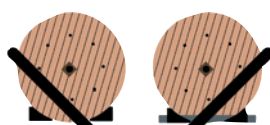
Lift the drum without damage



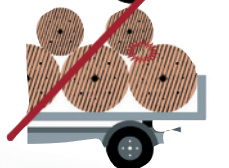
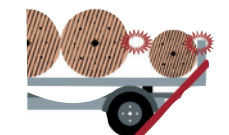
Avoid stacking



Secure the drums firmly



Fasten the drums firmly



NOTES

[illegible]

NOTES

[illegible]

The background of the entire page is a photograph of a large stack of yellow cable coils. Each coil is wrapped in yellow material and has a white label with the 'GC' logo and some text. The coils are stacked in a way that creates a strong sense of depth and repetition. The text 'cables that pulse with life' is overlaid on the middle of the image.

cables that **pulse with life**



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