«MOSKABEL-FUJIKURA»

Manufacturing of fiber-optic communication cables

2015

“MOSKABEL– FUJIKURA”

- ***The purpose*** *of "Moskabel-Fujikura" - to provide customers with competitive products of consistently high quality for business success*

- ***The mission*** *of "Moskabel-Fujikura" - make a worthy contribution to the development of the telecommunications infrastructure and the construction of the information society in Russia and around the world*

ABOUT US

- **"Moskabel-Fujikura" founded September 9, 1999 on the basis of production facilities of "Moskabelmet“ company with the participation of the Japanese firm "Fujikura Ltd".**
- **In 2001 the company took the leading position in the production of optical cable in Russia and keeps them up to date.**
- **"Moskabel-Fujikura" can produce up to 35,000 km of cable per year.**
- **Technological capabilities allow the company to produce all types of optical communication cables with the additional requirements of customers.**

“MOSKABEL– FUJIKURA”

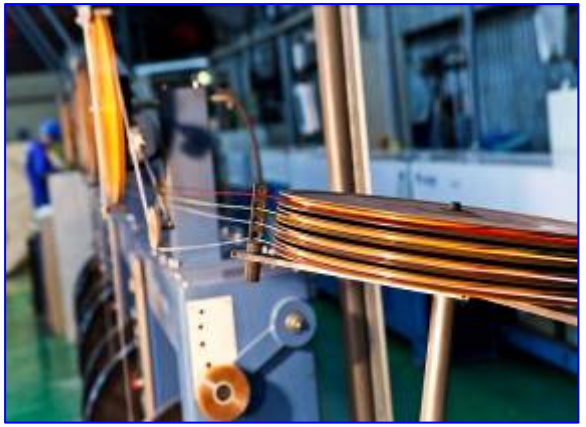
- **Over 160,000 km of optical cable of our production with about 4,000,000 km of fiber are in operation - indicator of demand and reliability of our products.**

Among our customers are :

- **«ROSTELECOM»,**
- **«Mobile TeleSystem»,**
- **«Beeline»,**
- **«Megafon»,**
- **«Transneft»,**
- **«GAZPROM»,**
- **«Beltelecom» ,**
- **«Moscow metropolitan»**
- **Ministry of Defence of the Russian Federation an many others.**

“MOSKABEL– FUJIKURA”

- **We have the most modern equipment by SWISSCAB (Switzerland), ROSENDAHL (Austria), NEXTROM (Finland), MAILLEFER (Finland), MALI (Austria), Dunst (Austria), Sket (Germany), Medek & Schorner (Austria) and others.**



“MOSKABEL– FUJIKURA”

- **for the production of fiber optic cable, we use the highest quality materials from leading world manufacturers such as: Fujikura, Borealis, Du Pont, TEIJIN TWARON, Herkula, BASF, Huls GmbH and others.**

PRODUCT QUALITY

Quality of produced cable confirmed by:

- **Declarations of Conformity to the requirements of “Russian Federal Communications Agency."**
- **Certificate of compliance with the Russian Defense Ministry**

- **Optic cables, on request, can be manufactured with cable sheath made of polymer material flame-retardant for single and bundle installation, HFFR, low smoke emission or with sheath from plastic tracking resistant material.**

ACCREDITED TESTING LABORATORY

To control the quality of manufactured cables there is a testing laboratory. All materials are carefully monitoring the input. Parameters of the optical fiber are controlled after each cable manufacturing operation.

- **Laboratory equipment allows to control**

tensile strength of:

- **Aramid fiber**
- **Steel wire**
- **Fastener threads.**
- **Fiberglass rod**
- **Polymeric materials.**

And also to measure the geometric dimensions by a non-contact method.

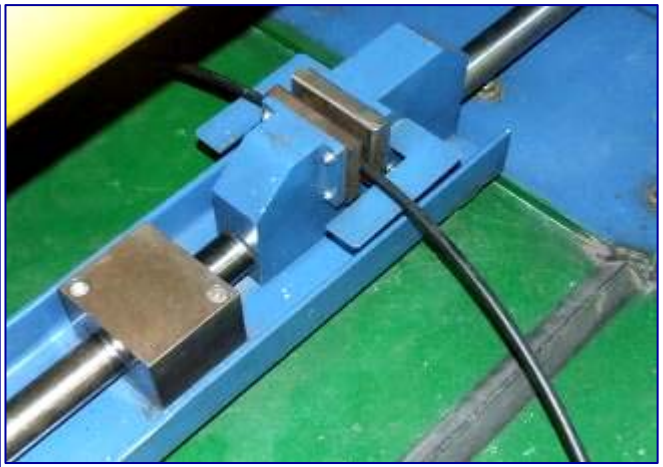
ACCREDITED TESTING LABORATORY

Viscometer **«Brookfield DV-II»** to control parameters for the optical fiber dyes and hydrophobic fillers.

The AQ8603 Optical Strain Analyzer is a dedicated analyzer using special brillouin backscattering detection technology is used for optical fiber strain detection and strain monitoring during cable production, installation and operation

Heating Cabinet «Heraeus» allows the testing of polymers and semi-optic cable when heated to +300 ° C.

ACCREDITED TESTING LABORATORY



Mechanical tests

Cable samples are tested for resistance to:

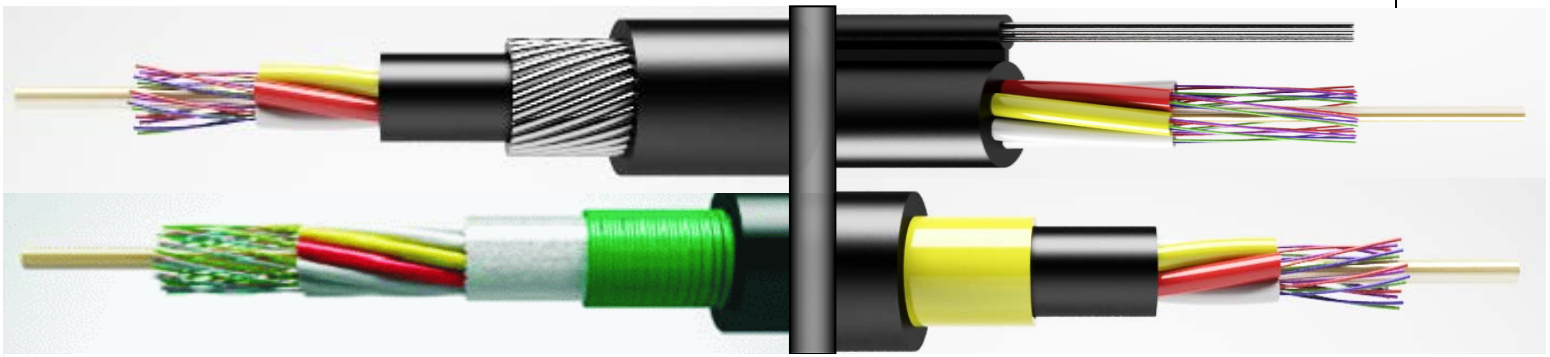
- **Impact**
- **Torsion**
- **Crush**

ACCREDITED TESTING LABORATORY

- **Test of resistance to a tensile force for self-supporting and suspended optic cables are carried out using the accessories, ensuring a correct estimate of the resistance of cables during operation.**

- **Environmental testing - checking optical cables resistance to mechanical stress at low temperatures.**
- **Our “aerial” cables may be mounted at a temperature of -30 °C.**

“MOSKABEL– FUJIKURA” MANUFACTURES THE FOLLOWING OPTICAL CABLES



- Outdoor fiber optic cable for laying in ground
- Outdoor fiber optic cable for laying in duct
- Outdoor fiber optic cable hanging on a rope and suspended flat
- Outdoor fiber optic cable for overhead installation dielectric self-supporting
- Outdoor fiber optic cable for blowing in plastic tubes
- Indoor fiber optic cables (distribution, subscriber)

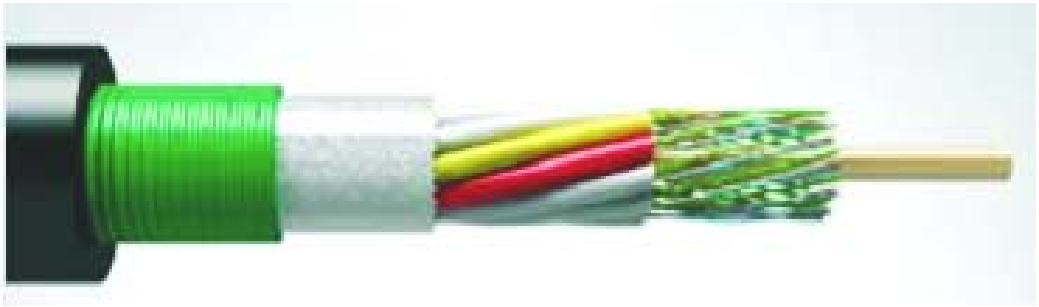
NEW

FIBER OPTIC CABLE FOR LAYING IN GROUND

- **Outdoor fiber optic cable armored with round galvanized steel wires used for laying in the ground all categories except subject to low temperature deformation, in cable ducts, pipes, blocks, reservoirs, tunnels, bridges and underground mines in the water while crossing bogs, lakes and rivers with a maximum depth of no more than 10m.**

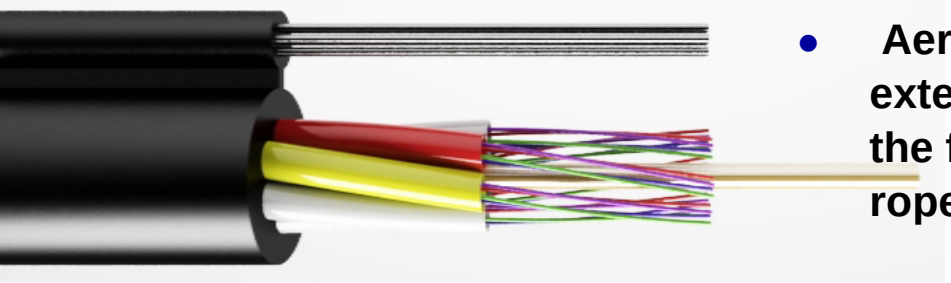
- **Operating temperature of the cable: -40°C to +70°C.**

FIBER OPTIC CABLE FOR LAYING IN CABLE DUCTS



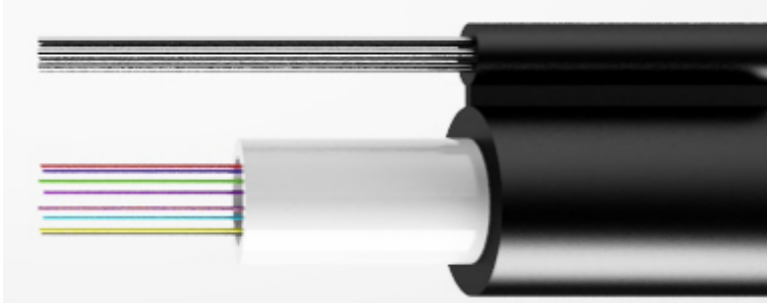
- **Outdoor fiber optic cable armored with corrugated steel tape and polyethylene outer sheath. Designed for installation in cable ducts, pipes, blocks, reservoirs, tunnels, bridges and mines.**
- **Operating temperature of the cable: -40°C to +70°C.**

AERIAL FIBER OPTIC CABLE WITH EXTERNAL STRENGTH MEMBER

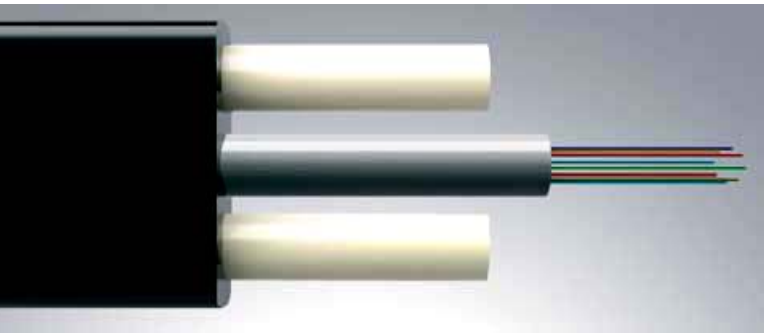


- Aerial optical cable with external strength member of the fiberglass rod, steel wire rope or steel wire.

- Cables are designed for suspension and operation on aerial communication lines and street lighting poles, urban transport contact network , supports broadcasting network, between the buildings.
- Operating temperature of the cable: -60°C to +70°C.



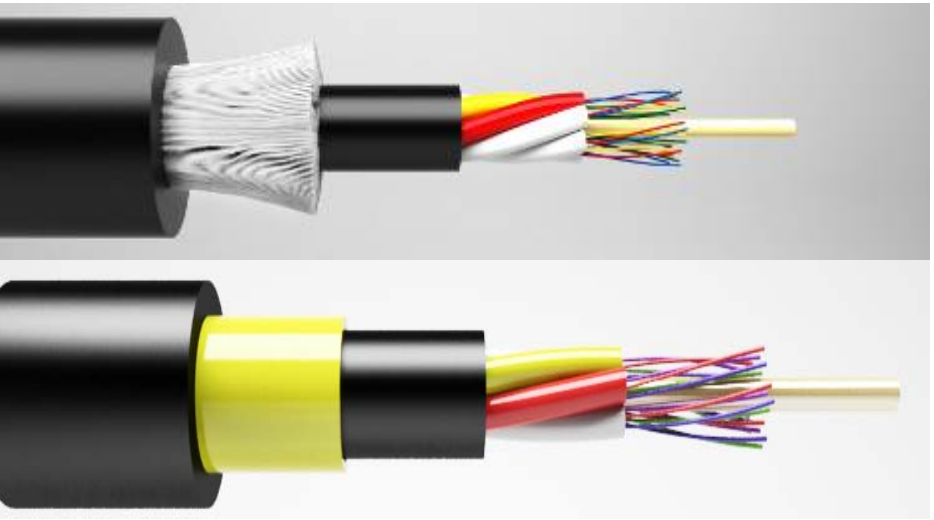
AERIAL FLAT FIBER OPTIC CABLE



- **Suspended optical cable with the central tube containing up to 48 optical fibers and strength member of the two fiberglass rods.**

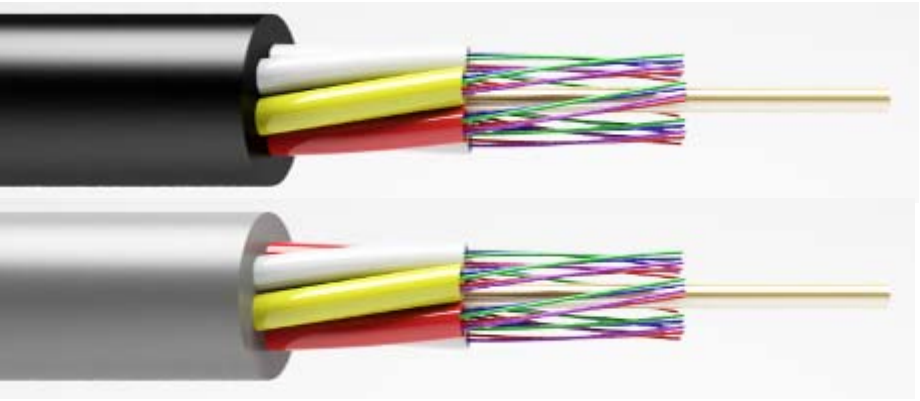
- **Cables are designed for suspension and operation on aerial communication lines and street lighting poles, urban transport contact network , supports broadcasting network, between the buildings.**
- **Operating temperature of the cable: -60°C to +70°C.**

ALL DIELECTRIC SELF-SUPPORTING OPTICAL CABLE



- **Suspended optical cable, self-supporting, dielectric, with a central strength member of the fiberglass rod with additional strength member of aramid yarns or glass yarns.**
- **Cable is designed for suspension on the poles of communication lines, contact network of railways, public lighting poles and overhead power lines.**
- **Operating temperature of the cable: -60°C to +70°C.**

OUTDOOR FIBER OPTIC CABLE FOR INSTALLATION IN PLASTIC PIPES AND ALSO FOR INDOOR INSTALLATION



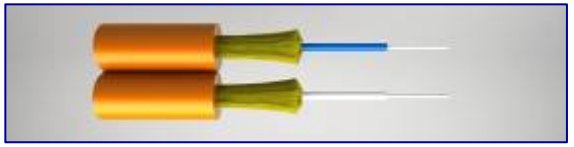
- **Optical cable is designed for installation in cable ducts and plastic pipes by blowing method.**
- **Operating temperature of the cable: -40°C to +70°C.**

- **At the request of the customer cable can be produced with outer sheath made of polymer material flame-retardant for bundle installation, HFFR, low smoke emission (LSZH).**

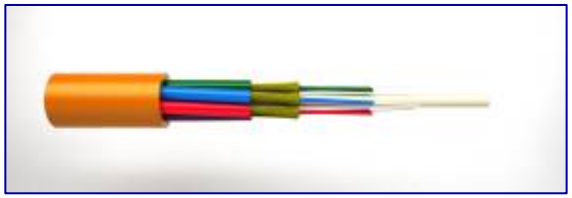
FIBER OPTIC CABLE FOR LOCAL AREA NETWORKS

In 2012, "Moskabel-Fujikura" purchased new equipment and started the production of new types of optical cables:

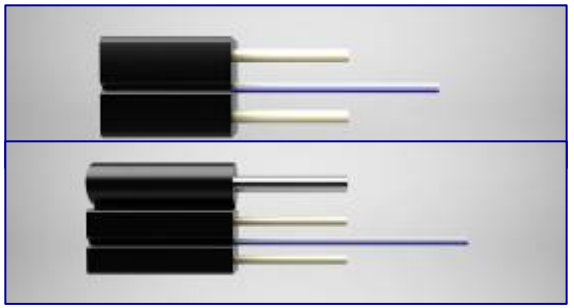
- **Simplex**
  - **Duplex**



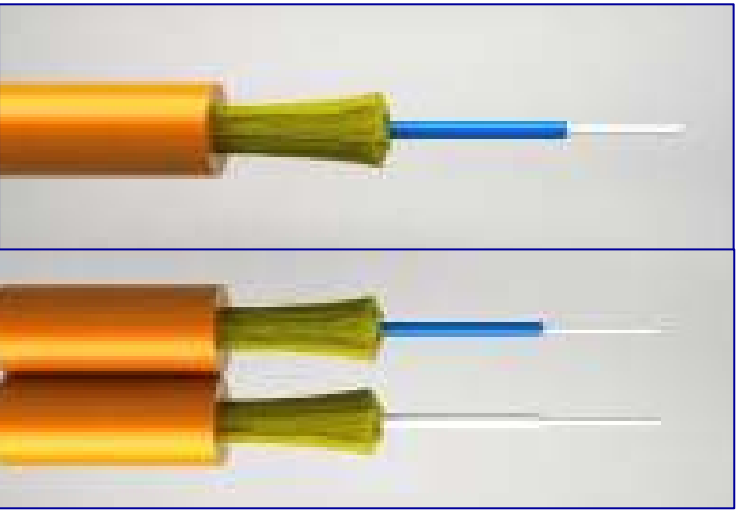
- **Distribution**
  - **Riser**



- **Breakout**
  - **Drop-cable subscriber and for suspension**



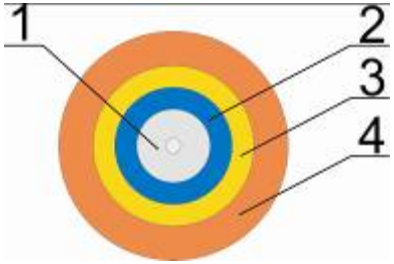
FIBER OPTIC INDOOR CABLE (SIMPLEX, DUPLEX)

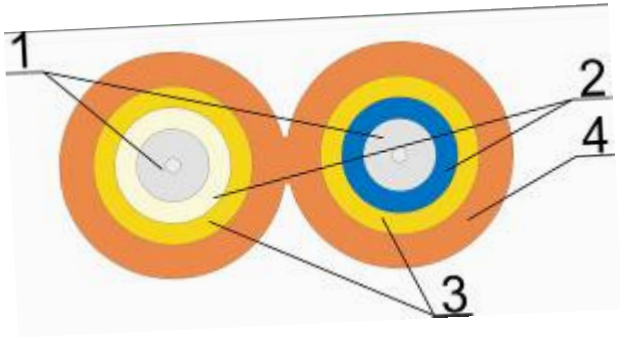


Indoor fiber optic cable with one or two Tight Buffered fibers, with aramid yarn strength member, with outer sheath made of polymer material flame-retardant, low smoke, zero halogen (LSZH).

The cable is designed for indoor installation, for production of optical cords and pigtails.

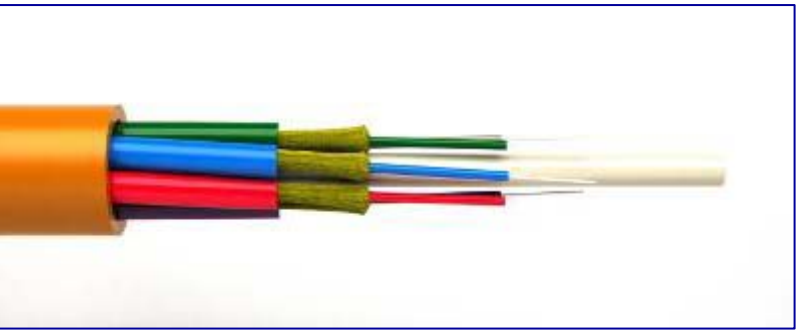
Operating temperature of the cable: -10°C to +50°C.



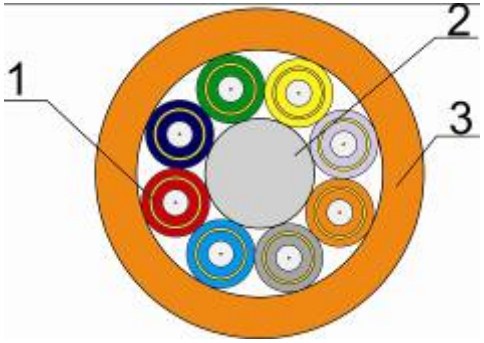


1. Undyed fiber
2. The buffer layer of polyamide, polyethylene, PVC.
3. Aramid yarn strength member.
4. FR PE LSZH sheath.

FIBER OPTIC INDOOR CABLE (BREAKOUT)



Indoor distribution optical cable containing from 1 to 24 Simplex cables, stranded around the strength member - fiberglass rod, with outer sheath made of polymer material flame-retardant, low smoke, zero halogen (LSZH).

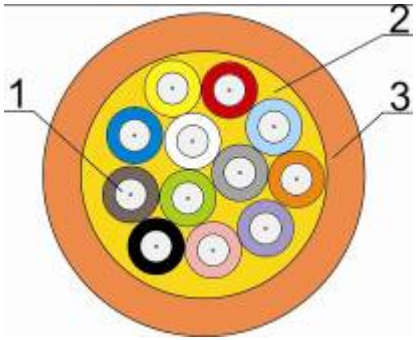


The cable is designed for horizontal and vertical indoor installation in special boxes.
Operating temperature of the cable: -10°C to +50°C.

1. **Simplex cable;**
2. **Fiberglass rod;**
3. **Outer sheath made of polymer material flame-retardant, low smoke, zero halogen (LSZH).**

FIBER OPTIC INDOOR CABLE (DISTRIBUTION)

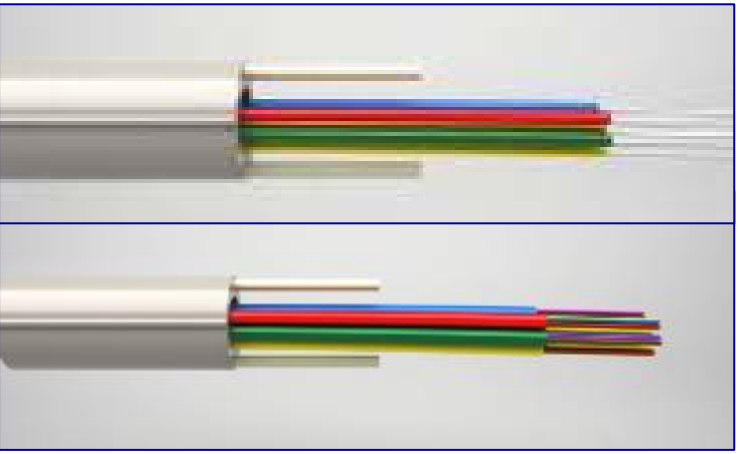
Indoor distribution optical cable containing up to 288 optical fibers in Tight Buffer sheath or micro loose tubes with optical fiber, with aramid yarn strength member and outer sheath made of polymer material flame-retardant, low smoke, zero halogen (LSZH).



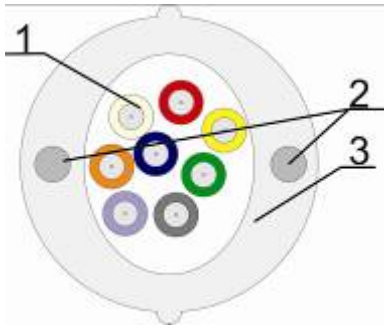
The cable is designed for horizontal and vertical installation inside and outside of buildings in special boxes.
Operating temperature of the cable: -40°C to +50°C.

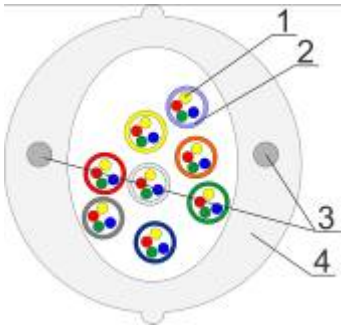
1. **Tight Buffered fiber;**
2. **Aramid yarn;**
3. **Outer sheath made of polymer material flame-retardant, low smoke, zero halogen (LSZH).**

FIBER OPTIC INDOOR CABLE WITH DIRECT ACCESS TO FIBER (RISER)



Indoor distribution optical cable with direct access to fiber containing up to 24 optical fibers in Tight Buffer sheath or up to 288 optical fibers in micro loose tubes, with outer sheath made of polymer material flame-retardant, low smoke, zero halogen (LSZH).



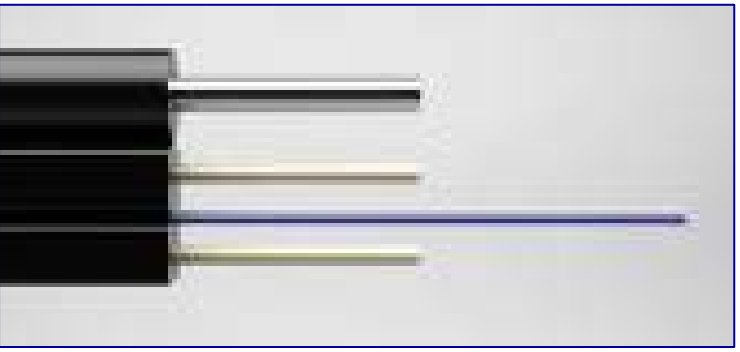


The cable is designed for vertical installation inside of buildings.
Operating temperature of the cable: -10°C to +50°C.

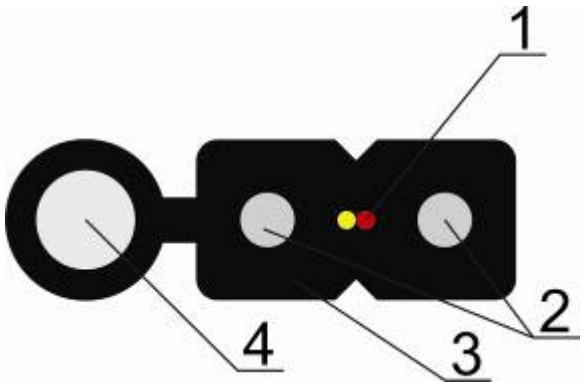
1. Tight Buffered fiber;
2. Fiberglass rods;
3. Outer sheath made of polymer material flame-retardant, low smoke, zero halogen (LSZH).

1. Optical fiber;
2. Micro loose tubes;
3. Fiberglass rods;
4. Outer sheath made of polymer material flame-retardant, low smoke, zero halogen (LSZH).

AERIAL DISTRIBUTION OPTICAL FIBER CABLE



Optical cable with external strength member made of galvanized steel wire or fiberglass rod. Optical fibers are in the center of the cable, the outer sheath is made of flame retardant polyethylene with two strength members inside (fiberglass rods or galvanized steel wires).

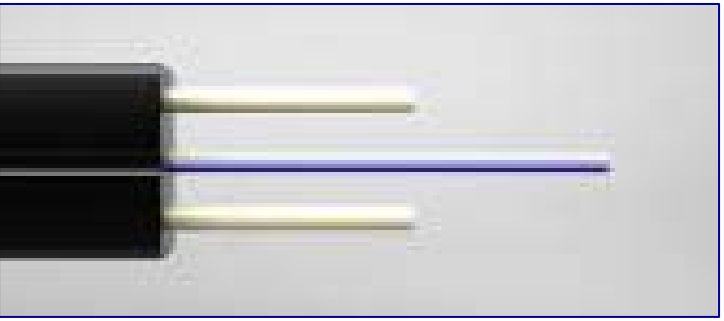


1. Optical fiber
2. Strength members
3. Outer sheath
4. External strength member

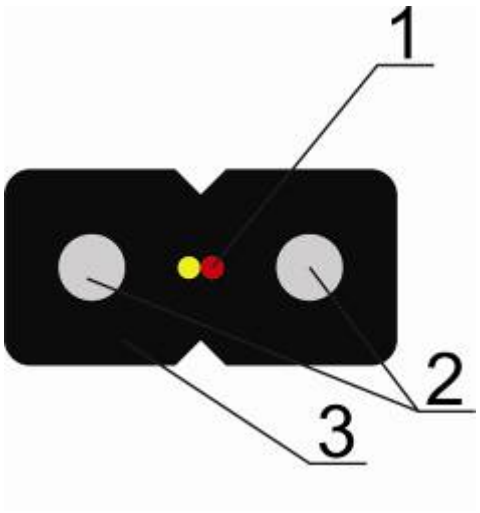
Cable is designed for suspension and operation on aerial communication lines and street lighting poles, urban transport contact network , supports broadcasting network, for installation inside and outside of buildings.

Operating temperature of the cable for outdoor installation: -60°C to +70°C.

FIBER OPTIC INDOOR CABLE (DROP)



Indoor fiber optic cable. Optical fibers are in the center of the cable, the outer sheath is made of flame retardant polyethylene with two strength members inside (fiberglass rods or galvanized steel wires).



The cable is designed for suspension and installation in special boxes outside and inside of buildings.
Operating temperature of the cable for outdoor installation : -60°C to +70°C.

1. Optical fiber
2. Strength members
3. Outer sheath

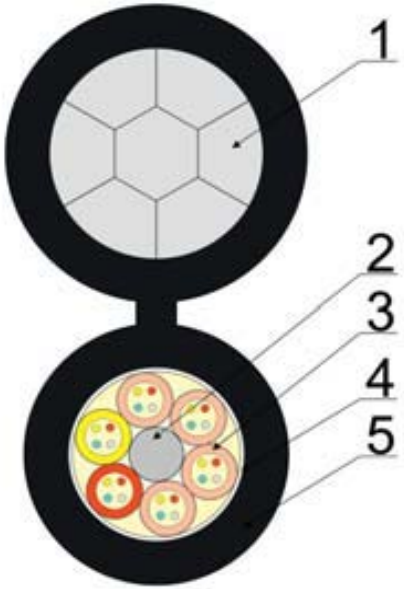
COMBINED OPTICAL CABLES

"Moskabel-Fujikura" produces combined optic cables:

- **Suspended optical cable with external power element with aluminum core and with copper cores**
- **Optical cable for pneumatic installation in tubes with copper cores**
- **Optical cable for duct installation with copper cores**
- **Optical cable for installation in ground with copper cores**

COMBINED OPTICAL CABLE

OPTICAL CABLE COMBINED WITH THE INSULATED ALUMINUM ALLOY CONDUCTOR



1. Insulated aluminum alloy conductor as a external strength member.
2. Central strength member.
3. Optical fibers in loose tubes filled with hydrophobic compound.
4. Loose tubes are stranded around central strength member forming cable core. Optical fibers are placed inside loose tubes. Interstice between loose tubes is filled with hydrophobic compound. Insulating tapes are imposed on the cable core.
5. Outer XLPE sheath.

Application:

Fiber-optic cable of loose tube design combined with the conductor, for suspension on overhead lines with a nominal voltage of 10-35 kV in different areas including sea coasts, salt lakes, in industrial areas and areas with salinized sands.

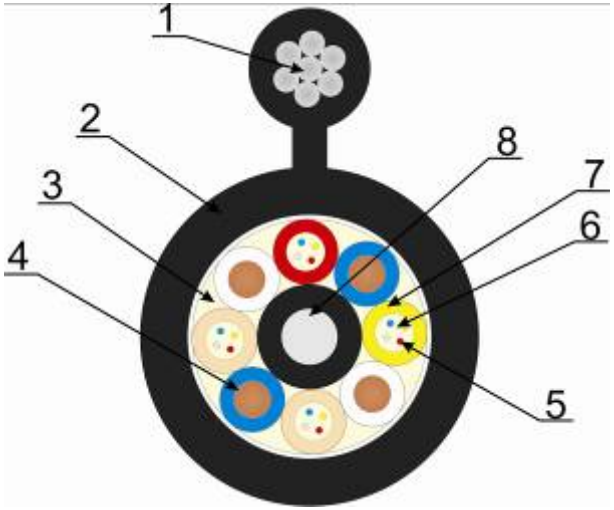
OPTICAL CABLE COMBINED WITH THE INSULATED ALUMINUM ALLOY CONDUCTOR

TECHNICAL DATA

Parameters of FOC	Measurement units	Value
Number of fibers	Pcs.	from 2 up to 432
Nominal tention	kV	from 10 up to v 35
Nominal frequency	Hz	50
Tensile Strength	N	≥13000
Permissible crushing load	N/100 mm	≥ 3000
Resistance to a single impact	J.	≥ 30
Operating Temperature	°C	-60 to +70
Installation Temperature	°C	≥ -20
The bend radius at maximum load	-	20 x cable diameter

COMBINED OPTICAL CABLE

COMBINED OPTICAL CABLES WITH COPPER CONDUCTORS SUSPENDED



1. External strength member made of the fiberglass rod or steel wire rope, or aramid yarns or steel wire .
2. The outer sheath of high density polyethylene.
3. Hydrophobic compound.
4. Insulated copper conductors.
5. Optical fiber.
6. Hydrophobic compound.
7. Loose tube.
8. Central strength member made of the fiberglass rod.

Application:

Cables are designed for suspension and operation on aerial communication lines and street lighting poles, urban transport contact network , supports broadcasting network.

COMBINED OPTICAL CABLES WITH COPPER CONDUCTORS

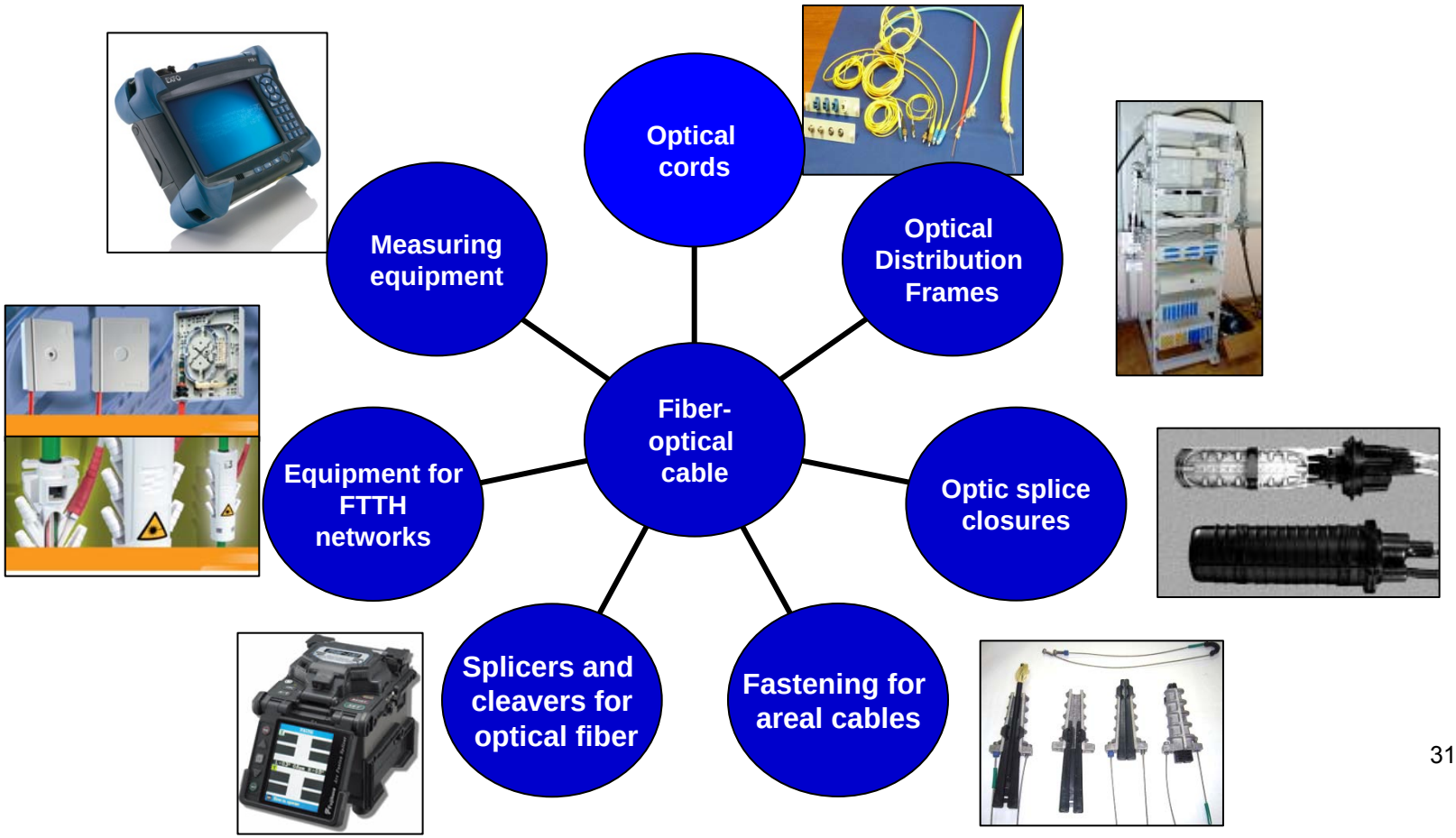
TECHNICAL DATA

Parameters of FOC	Measurement units	Value
Number of fibers	Pcs.	от 2 до 384
Number of conductors	Pcs.	От 2 до 4
Tensile Strength	N	≥ 2700
Permissible crushing load	N/100 mm	≥ 3000
Resistance to a single impact	J.	≥ 10
Operating Temperature	°C	-60 to +70
Installation Temperature	°C	-30 to +50
The bend radius at maximum load	-	20 x cable diameter

INTEGRATED SUPPLY SERVICES

Moskabel-Fujikura provides customers with comprehensive service supply a wide range of additional equipment for the construction of Fiber Optic Lines (FOL):

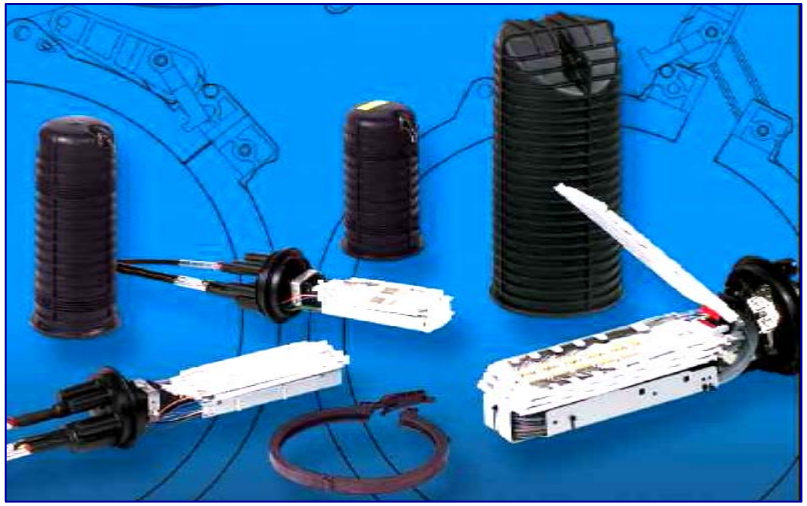
- **Passive and active equipment for commutation.**
- **Instruments, tools and equipment for the installation and monitoring of FOL.**

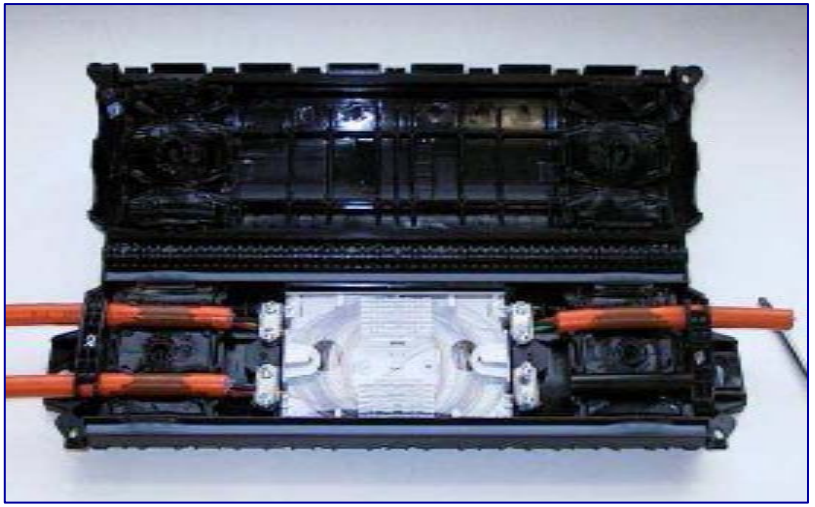


FIBER OPTIC SPLICE CLOSURE

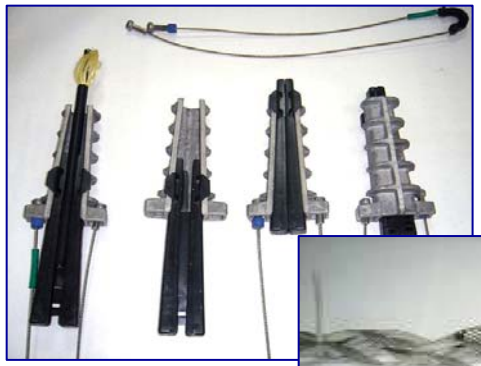
Moskabel-Fujikura supplies high quality fiber optic splice closures by TyCo Electronics (Belgium):

- End and Straight-through
- With 1 and up to 112 trays
- Up to 1152 optical fibers
- With possibility of splitter modules mounting with various splitter configurations





ACCESSORIES FOR AERIAL FIBER OPTICAL CABLE



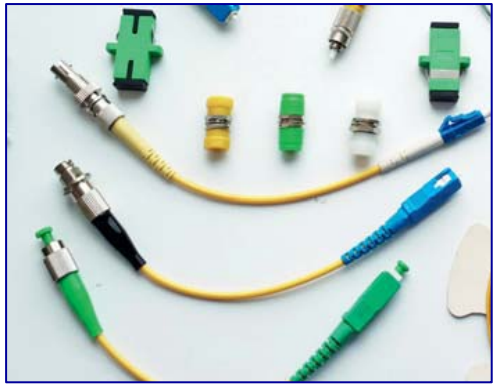
Moskabel-Fujikura supplies wide range of fittings for optical fiber aerial cables:

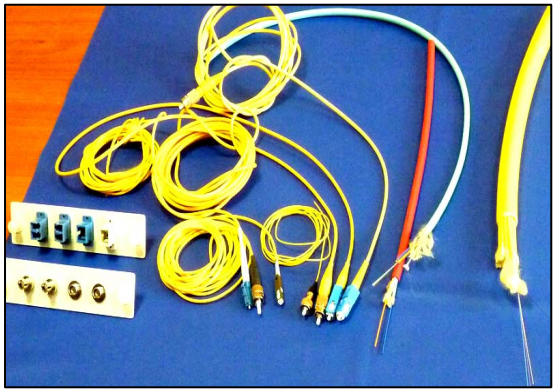
- Anchor staining clamps
- Suspension clamps
- TG/LG suspension rods
- Suspension pulleys with helical rods
- AG helical dead ends
- Thimbles
- Vibration dampers
- UTA protection rods
- Armor grip suspension clamps
- Spiral basin suspension clamps
- Brackets
- Tools for capturing, cable tension, to install the steel tape, steel tape and locks, and many others.

OPTICAL CONNECTORS, PIGTAILS, OPTICAL DISRTIBUTION FRAMES

Moskabel-Fujikura supplies:

- **Optical Distribution Frames equipped with the necessary elements for termination, stacking and distribution of optical cables.**
- **Wall Mount and Rack Mount, from 4 up to 288 adaptors**
- **Optic cords to connect the active and passive equipment, on the basis of a single-mode and multimode fiber.**
- **Simplex and Duplex Cable Assemblies with FC, SC, LC single fiber connectors, cord sizes diameter 0.9mm, 2mm, 3mm.**





OPTICAL FIBER FUSION SPLICERS AND CLEAVERS

Fusion splicers by FUJIKURA (Japan) FSM-80S

designed for splicing of all types of optical fibers – SM, MM, DS, NZDS, CS, G.657.

Has a high level of protection against dust and moisture,

Not afraid of bumps and falls.

Operating temperature: -10°C to +50°C.

Fusion splicers by SUMITOMO TYPE-71C with a touchscreen

designed for ultra-fast optical fiber connection in the local and trunk lines of communication.

- **Compact and lightweight, designed to work with different types of optical fibers (MM, SM, DS, NRZ, G.657 (A,B)).**
- **Durable and reliable (preserves the integrity when falling from a height of 0.76 m).**

TEST EQUIPMENT

Moskabel-Fujikura offers measuring equipment of the company EXFO - a leading supplier of equipment for testing of optical and copper networks, supporting 3G, 4G/LTE, IMS, Ethernet, OTN, FTTx ant the other optical technologies:

- Multifunction measuring platforms for fast, efficient testing of optical networks
- Optical testers for measuring optical loss in the fiber optic lines
- The radiation sources
- Power Meters
- OTDR modules for measurements in both local and in the trunk fiber optic lines
- OTDRs

THANK YOU FOR ATTENTION!

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