

CABLE PRODUCTS

TS 3581-012-76960731-2008 KVIP high speed data-transmission cable.

The product series include flame retardant “НГ” “НГ-LS”, “НГ-НН”, fire-resistant “НГ-FR”, “НГ-FRLS”, and “НГ-FRHF”, UV- resistant “УФ”, steel-armored, and unarmored cables

ООО «Donkabel» - quality management system certified according to ISO 9001

KVIP high speed data-transmission cable is designed for data transmission in the frequency range of up to 1 MHz and is used for building digital databuses, and connecting frequency-modulated digital sensors through RS-485, RS-482, RS-422 interfaces in Foundation Fieldbus, PROFIBUS, HART, Ethernet and other systems that require the “twisted pair” fiber cable to be used as a data transfer channel. The cables are designed for fixed and mobile installations, indoors and outdoors if protected from direct exposure to solar radiation, on the shelves, in trays, chests, ducts, tunnels, earth (trenches), and areas exposed to ground currents. “YΦ” marked cables are UV-resistant cables that can be installed outdoors without solar radiation protection. The cables can be used in 0, 1, 2 hazardous zones (in accordance with IEC 60079-14-2008 requirements), as well as in the nuclear power plant safety systems.

Cable design features, materials and types

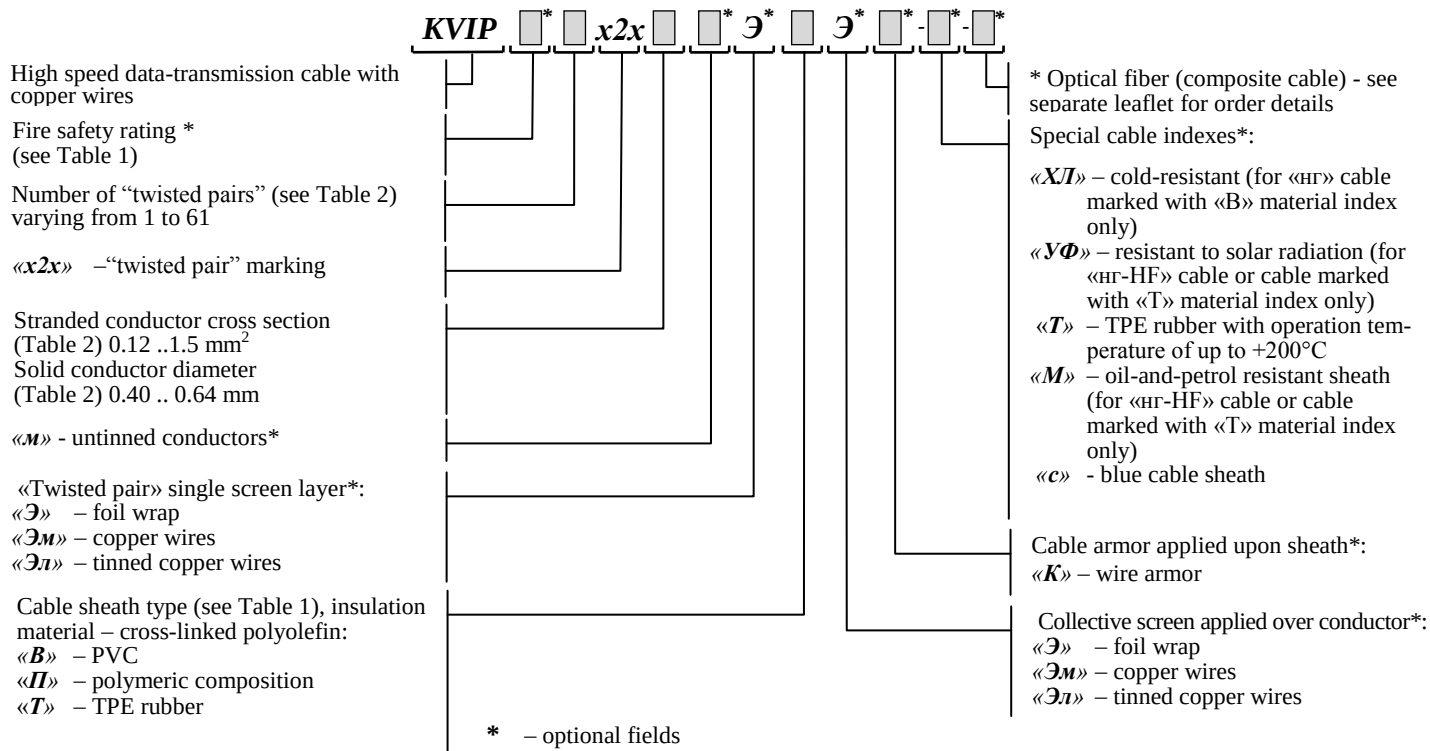
KVIP cables are available with stranded tinned copper (at least Class 4) conductors with cross-section of 0,12 .. 1,5 mm², and solid (Class 1) conductors with a diameter of 0,40, 0,51, 0,64 mm. All cables have cross-linked polyolefin insulation, fully meeting the «RS» standards for wave resistance. Cables marked with "B" material index are covered with flexible PVC sheathing material, "HF" material index stands for flame-retardant PVC composition used as sheathing material, and "HF-LS" material index means the sheathing material is flame-retardant and low-smoke. Cables marked with "IT" material index are made of polymer compositions that do not contain halogens ("HF-HF"). Cables marked with "T" material index have sheath made of thermoplastic elastomer, so the cables have the increased durability and extended range of operating temperature. All cables can also be covered with fire resistant ("FR") sheath.

Cable conductors are twisted into pairs with a pitch of less than 40 mm (no more than 60 mm for «FR» cables) and are color or numerical marked. Cables can also feature a shared and/or a separate screen layer for each twisted pair made of braided copper wire or foil wrap with a drain wire, or may have no screen layer applied at all. All cables have a round cross-section and a substrate, which is obtained by extrusion, making them fully compatible with requirements of art.9.3.1 IEC 60079-14-2008 as a result.

Cable marking when ordering:



- Meets all “RS” requirements of EIA/TIA association
- Cross-linked polyolefin core insulation has much better frequency response if compared to PVC insulation
- Copper stranded (Class 4) conductor with color or numerical marking
- Each “twisted pair” can have single or shared screen
- Conductor cross-section varying from 0,12mm² to 1,5mm² with a number of twisted pairs from 1 to 61
- Wide operating temperature range varying from -60° to +200°C
- Cable marked with special “M” index is oil- and-petrol resistant
- Cable marked with «FR» index is fire-resistant
- Cable marked with “YΦ” index is resistant to solar radiation
- New materials are applied to provide the best fire safety characteristics for “hr-LS” and “hr-HF” cable
- Cable moisture protection technology is applied
- Wide range of applications, including all hazardous areas
- Combined cable option - copper wires and optical fibers are put together in a single cable



An example of cable marking when ordering: «Кабель КВИП нг 10х2х0,75 ВЭ-ХЛ ТУ 3581-012-76960731-2008»

– the cold-resistant (operating temperature varying from -60° to +80°C), unarmored, and flame-retardant cable with PVC sheath and insulation applied, featuring foil wrap screen layer, and ten “twisted pairs” of copper tinned conductors with cross-

Sheath material index	Fire safety index	Sheath material (insulation material for all cable types is cross-linked polyolefin)	Marking example
В	– (no index)	polyvinylchloride (PVC) plastic compounds	КВИП 4х2х1,0 ВК
	нг	flame retardant PVC compounds	КВИП нг 12х2х0,64м В
	нг-LS	flame retardant and low smoke PVC compounds	КВИП нг-LS 7х2х0,5 ЭВЭ
	нг-FRLS	flame retardant, fire-resistant and low smoke PVC compounds	КВИП нг-FRLS 10х2х0,75 ВЭК
П	нг-HF	halogen-free PVC compounds	КВИП нг-HF 4х2х0,5м П-УФ
	нг-FRHF	fire-resistant and halogen-free PVC compounds	КВИП нг-FRHF 2х2х1,0 П-М
Т	нг	flame retardant TPE rubber	КВИП нг 6х2х0,12 ТЭ
	нг-FR	flame retardant and fire-resistant TPE rubber	КВИП нг-FR 5х2х1,0 Т-Т-М

section of 0,75 mm².

Table 1 Insulation and sheath material, cable fire safety rating

Fire-resistant cable (“нг-FR”, “нг-FRLS” and “нг-FRHF” indexes)

Conductor insulation of fire-resistant cables (“нг-FR”, “нг-FRLS” and “нг-FRHF” indexes) is covered with two additional layers of mica tape. Cable maintains working efficiency for at least 90 minutes even if being exposed to an open fire and a minimum temperature of +750° C. This feature will help to avoid the emergency power cut-off in case of a fire. Fire-resistant cable requirements for alarm, emergency lighting, and smoke exhaust systems, as well as for fire pumps and elevators circuits, etc. are described in GOST R 53315-2009 and "Technical Regulations for Fire Safety Requirements" of 22 July 2008. No. 123-F3.

Manufacture of custom cable

Custom cables can be manufactured:

- with colored outer sheath (red, yellow or any other color);
- with different cross-section of "twisted pair" conductors ("twisted pair" UNEQUAL);
- as combined cable - single cable simultaneously transmits electrical energy (through electric conductor) and optical signals (through optical fiber).

Nominal conductor cross-section and diameter, number of “twisted pairs”

Table 2

Cable marking	Nominal conductor cross-section and diameter		Number of “twisted pairs”
	Solid conductor diameter, mm	Stranded conductor cross-section, mm²	
КВИП xxx В (К, ЭВ, ЭВК, ВЭ, ВЭК, ЭВЭ, ЭВЭК); КВИП нг xxx В (К, ЭВ, ЭВК, ВЭ, ВЭК, ЭВЭ, ЭВЭК); КВИП нг-LS xxx В (К, ЭВ, ЭВК, ВЭ, ВЭК, ЭВЭ, ЭВЭК); КВИП нг-HF xxx П (К, ЭП, ЭПК, ПЭ, ПЭК, ЭПЭ, ЭПЭК); КВИП нг xxx Т (К, ЭТ, ЭТК, ТЭ, ТЭК, ЭТЭ, ЭТЭК)	0,40; 0,51; 0,64	0,12; 0,20; 0,35	1х2; 2х2; 3х2; 4х2; 5х2; 6х2; 7х2; 8х2; 10х2; 12х2; 14х2; 16х2; 18х2; 19х2; 20х2; 24х2; 27х2; 30х2; 37х2; 40х2; 44х2; 48х2; 52х2; 61х2
КВИП нг-FRLS xxx В (К, ЭВ, ЭВК, ВЭ, ВЭК, ЭВЭ, ЭВЭК); КВИП нг-FRHF xxx П (К, ЭП, ЭПК, ПЭ, ПЭК, ЭПЭ, ЭПЭК); КВИП нг-FR xxx Т (К, ЭТ, ЭТК, ТЭ, ТЭК, ЭТЭ, ЭТЭК)	-	0,5; 0,75; 1,0; 1,2; 1,5	1х2; 2х2; 3х2; 4х2; 5х2; 6х2; 7х2; 8х2; 10х2; 12х2; 14х2; 16х2; 18х2; 19х2; 20х2; 24х2; 27х2; 30х2; 37х2; 40х2
КВИП нг-FRLS xxx В (К, ЭВ, ЭВК, ВЭ, ВЭК, ЭВЭ, ЭВЭК); КВИП нг-FRHF xxx П (К, ЭП, ЭПК, ПЭ, ПЭК, ЭПЭ, ЭПЭК); КВИП нг-FR xxx Т (К, ЭТ, ЭТК, ТЭ, ТЭК, ЭТЭ, ЭТЭК)	-	0,5; 0,75; 1,0; 1,2; 1,5	1х2; 2х2; 3х2; 4х2; 5х2; 6х2; 7х2; 8х2; 10х2; 12х2; 14х2; 16х2; 18х2; 19х2; 20х2; 24х2; 27х2; 30х2; 37х2; 40х2

Cable characteristics

Table 3

Operating temperature	- from -60° to $+70^{\circ}\text{C}$ for “XJ” cables - from -60° to $+125^{\circ}\text{C}$ for cables marked with “T” material index - from -50° to $+200^{\circ}\text{C}$ for cables marked with “T-T” material index - from -50° to $+80^{\circ}\text{C}$ for other cable types
Minimum cable installation temperature	- 30°C or higher for «XJ» cables marked with «T» material index - 15°C or higher for other cable types
Rated voltage	- up to 600V AC at frequencies of up to 1MHz - up to 1000V DC
Insulation resistance during operation $t = +20^{\circ}\text{C}$ $t = +80^{\circ}\text{C}$ (+125 or $+200^{\circ}\text{C}$ for “T” and “T-T” cable types)	- at least $1000\text{ M}\Omega\cdot\text{km}$ - at least $10\text{ M}\Omega\cdot\text{km}$
DC resistance of conductors	meets the requirements of GOST 22483-77 standard
Cable bend radius (D –outside diameter of cable)	- at least 5D for unarmored cables - at least 10D for armored cables
Climatic category	“B” index, with the categories of placement 2 and 5 (according to GOST 15150-69 standard). Can be used in any climatic region, including tropics.
Resistance to longitudinal water propagation under the cable sheath	moisture is completely blocked
Fire-resistance (for “FR” cables)	can be exposed to an open fire and temperatures of $+750^{\circ}\text{C}$ and higher for at least 90 minutes
Mold resistance	mold resistance factor – up to 2
Cable service life	- at least 30 years - at least 25 years for cables marked with “T” material index

Cable electrical specification

Table 4 Maximum operating capacity and inductance of a “twisted pair” at 20°C , calculated for 1 km of cable length

Frequency, kHz	Maximum operating capacity, nF				Maximum inductances, mH			
Cross-section, mm^2	0,50	0,75	1,00	1,50	0,50	0,75	1,00	1,50
0,05	99	113	122	124	0,73	0,68	0,66	0,62
8,00	97	109	117	118	0,71	0,67	0,64	0,61
16,00	95	106	113	114	0,71	0,67	0,64	0,59
64,00	88	97	104	105	0,70	0,64	0,60	0,54
256,00	86	93	99	100	0,65	0,59	0,55	0,49

Table 5 Maximum cable inductance to resistance ratio at 20°C , calculated for 1 km of cable length

Frequency, kHz	Maximum cable inductance to resistance ratio, $\mu\text{H}/\Omega$			
Cross-section, mm^2	0,50	0,75	1,00	1,50
0,05	9,3	13,2	17,3	24,6
8,00	8,9	12,5	16,2	22,4
16,00	7,9	10,8	13,3	16,6
64,00	6,2	7,4	7,7	8,2
256,00	3,2	3,2	3,2	3,3