

KCI

Kerman & Kavian Cable Industries

Instrument Cable Catalogue





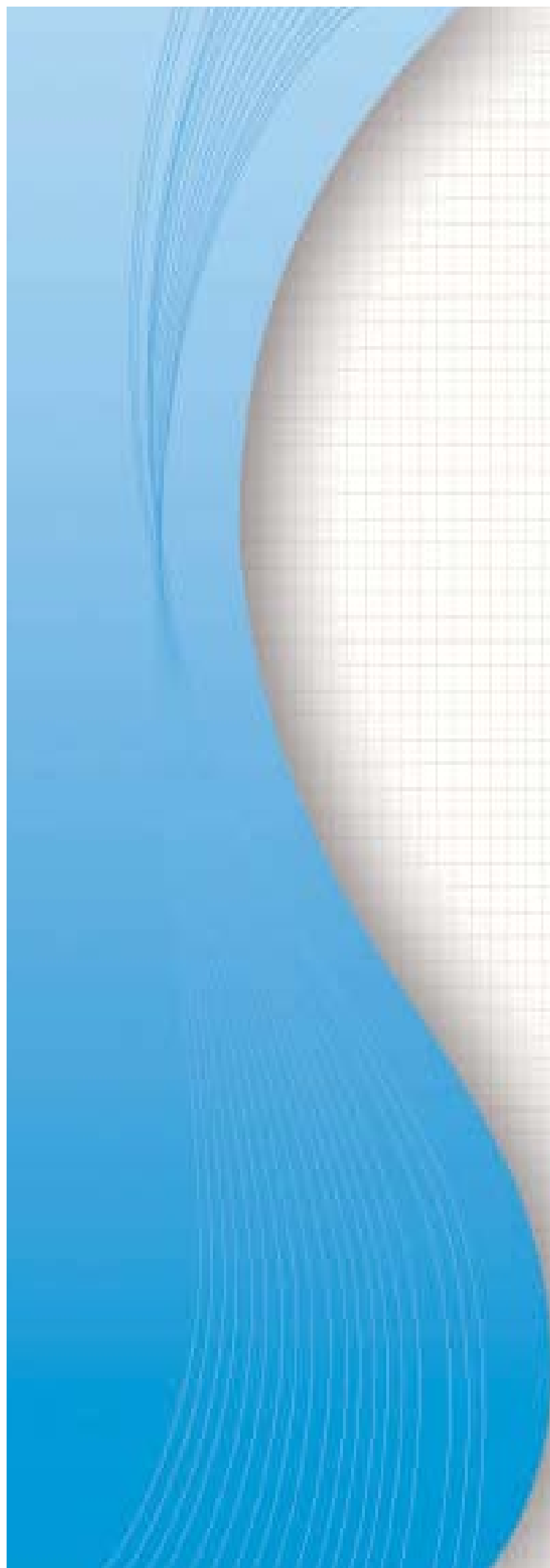
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**Cables for control and instrumentation circuits 150/250 V (300 V)
According to of IEC 60092-376 (2003)
Electrical installations in ships - Part 376:**

A Summary of IEC 60092-376 (2003) Electrical installations in ships - Part 376: Cables for control and instrumentation circuits 150/250 V (300 V)

Scope and object :

This part of IEC 60092 is applicable to screened and unscreened cables for control and instrumentation circuits on ships and offshore units.

The cables have extruded solid insulation with a voltage rating of 150/250V (300V) and are intended for fixed installations.

Rated voltage :

The standard rated voltage U_0/U (U_M) is as follows:

$$U_0/U (U_M) = 150 \text{ V}/250 \text{ V} (300 \text{ V}) \text{ a.c.}$$

In the voltage designation of cables ;

U_0 : is the rated power-frequency voltage between the conductor and the earth or metallic covering for which the cable is designed;

U : is the rated power-frequency voltage between conductors for which the cable is designed.

U_M : is the maximum value of the highest system voltage for which the equipment may be used.

A d.c. voltage up to a maximum of 1.5 times the a.c. voltage may be used, provided that the voltage to earth does not exceed 250 V.

1) Conductors :

The material, metal coating, separator, class and form of the conductors shall be in accordance with IEC 60092-350 and shall be circular Class 2 or Class 5 constructions of cross-sectional area

0.50 mm², 0.75 mm², 1.0 mm², 1.5 mm² or 2.5 mm².

Note : The preferred conductor sizes are 0.75 mm² and 1.5 mm².

Instrument Cables

100

Nominal cross section of conductors (mm ²)	Class 2 Stranding		Class 5 Stranding	
	DC resistance of (conductors)			
	plain copper	tinned copper	plain copper	tinned copper
Ohm/kM at 20°C				
0.5	40.4	41.6	41.4	42.5
0.75	26	26.3	27.6	28.3
1.0	19.2	19.3	20.7	21.2
1.5	12.8	12.9	14.1	14.5
2.5	7.86	8.02	8.47	8.71

2) Insulation system

The insulation system shall consist of either;

2-1) one of the insulating compounds indicated in following Table

2-2) a combination of one or more layers of inorganic tape(s) and a layer of one of the insulating compounds indicated in following Table (example Mica-Glass Tape + XLPE)



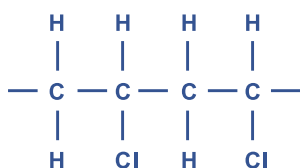
2-1) An Insulated Conductor



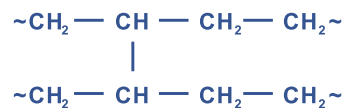
2-2) A Conductor Insulated by
by Mica-glass and an extruded Insulation

Used as insulation of Fire-Resistance Cables

Nominal cross section of conductors	PVC/A	EPR	XLPE	HEPR	HF 85	S 95
mm ²	mm	mm	mm	mm	mm	mm
0.5	0.6	0.6	0.4	0.4	0.6	0.6
0.75	0.6	0.6	0.5	0.5	0.6	0.6
1.0	0.6	0.6	0.5	0.5	0.6	0.6
1.5	0.7	0.7	0.6	0.6	0.7	0.7
2.5	0.7	0.7	0.6	0.6	0.7	0.7



PVC : Poly vinyl chloride



XLPE : Cross-linked Polyethylene

3) Cabling

3-1) Core assembly (multicore cables)

The individual cores shall be twisted together in concentric layers.

3-2) Forming pair, triple or quad units ;

Cores shall be twisted together with either a left hand or right hand lay to form a pair, triple or quad unit.

The lay length of the cores individually or collectively screened shall not exceed 120 mm for sizes below 1.5 mm² and 150 mm for sizes 1.5 mm² and above.



Core (Unit)



Pair (Unit)



Triple (Unit)

3-3) Typical colour code for single unit cables

Unit element	Wire a	Wire b	Wire c	Wire d
Pair unit	Black	White	-	-
Triple unit	Black	White	Red	-
Quad unit	Black	White	Red	Blue

3-4) Number of cores

It is recommended that the number of cores shall be selected from one of the following:
2, 4, 7, 12, 19, 27, 37.

3-5) Number of pair, triple or quad units

It is recommended that the number of pair units shall be selected from one of the following:
1, 3, 7, 12, 19, 27, 37.

4) Electrostatic screen

4-1) Individually taped screened pair, triple or quad constructions

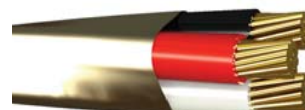
When an individual taped screened pair, triple or quad construction is required, each pair, triple or quad shall have a laminated electrostatic screening tape applied with the metallic side in electrical contact with a drain wire. The nominal overlap shall not be less than 25 %.

The laminated electrostatic screening tape shall be either aluminium bonded to polyester having a minimum thickness of aluminium of 0.008 mm and a minimum thickness of polyester of 0.010 mm, or copper bonded to polyester having a minimum thickness of copper of 0.018 mm and a minimum thickness of polyester of 0.023 mm.

The drain wire shall be composed of a number of strands of tinned annealed copper wires in the case of aluminium laminate tape and either plain or tinned annealed copper wires in the case of copper laminate tape. The drain wire shall have a maximum resistance in accordance with following Table .



Pair (Unit) Individually Screened
in Metallic Foil (PiMF)



Triple (Unit) Individually Screened
in Metallic Foil (TiMF)

4-2) Individually braided screened pair, triple or quad constructions

When an individual braided screened pair, triple or quad construction is required, each pair, triple or quad shall have a non-hygroscopic separator tape applied over the cores and under the braid.

The nominal overlap shall not be less than 25 %.

The braid shall be either plain or metal coated copper wires; the minimum diameter of the braid wire shall be: When required, to aid termination, a drain wire may be applied under and in direct contact with the braid screen. The drain wire shall be composed of a number of strands of tinned or plain annealed copper wires. The drain wire shall have a maximum resistance in accordance with following Table .

Nominal cross section of conductors	Maximum drain wire resistance
mm ²	Ohm/km
0.5	61.2
0.75	42.5
1.0	28.3
1.5	28.3
2.5	21.2



Braid (Screen)



Static Tape (Screen)

4-3) Collectively screened constructions

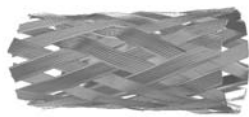
Similar to 4-1) and 4-2) ; both taped and braided screen's type is permitted .

5) Metal braid armour

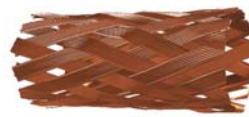
In this standard the braid wires are either:

- zinc coated (galvanised) steel , or
- copper (plain or tinned),

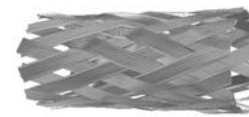
Note : In the case of plain or tinned copper wire braids, these may also provide the function of an electrostatic collective screen providing they are terminated to earth.



Zinc coated (galvanized)
Steel wires Braid



Plain Copper wires
Braid



Tinned Plain Copper
wires Braid

6) Sheath(s)

Could be one of following materials ; PVC , PE , Halogen Free .

The sheath shall be coloured black or grey unless otherwise specified.

Note : The sheath may be of other colours, thereby providing a visual difference to that of LV and MV Power cables.