

WIRING STANDARDS FOR RECREATIONAL CRAFT DIRECTIVE

Conductor Requirements
For ISO 10133 AND ISO 13297

This appendix is reproduced from Annex A (normative) of both ISO10133 and 13297. Both ISOs are supporting standards to the Recreational Directive. The use of these Recommendations can be used to demonstrate compliance to this directive.

Section 1

Tables A1 gives allowable continuous current ratings In amperes determined for 30°C ambient temperature

Cross-sectional area mm sq.	Maximum current in amperes, for single conductors At insulation temperature ratings						Minimum Number of strands	
	60 deg. (C)	70 deg. (C)	85 - 90 deg. (C)	105 deg. (C)	125 deg. (C)	200 deg. (C)	Type 1*	Type 2*
0.75	6	10	12	16	20	25	16	
1	8	14	18	20	25	35	16	
1.5	12	18	21	25	30	40	19	26
2.5	17	25	30	35	40	45	19	41
4	22	35	40	45	50	55	19	65
6	39	45	50	60	70	75	19	105
10	40	65	70	90	100	120	19	168
16	54	90	100	130	150	170	37	266
25	71	120	140	170	185	200	49	420
35	87	160	185	210	225	240	127	665
50	105	210	230	270	300	325	127	1064
70	135	265	285	330	360	375	127	1323
95	165	310	330	390	410	430	259	1666
120	190	360	400	450	480	520	418	2107
150	220	380	430	475	520	560	418	2107

Conductors current ratings may be interpolated for cross sectional areas between those shown in Table A1

*Conductors with at least a type 1 stranding shall be used for general craft wiring. Conductors with type 2 stranding shall be used for any wiring where frequent flexing is involved in use

For conductors in engine room(60°C ambient) maximum current rating in table A1 shall be de-rated by the factors:-

Temperature rating of conductor insulation (deg. C)	Multiply maximum current from table A1 by –
70	0.75
85 to 95	0.82
105	0.86
125	0.89
200	1.0

Bundling

For ac Only:-

When More than three ac conductors are bundled together the maximum current ratings in Table A1 shall be de-rated by the factor below:

Number of conductors bundled	Multiply maximum current from A1 by:
4 to 6	0.7
7 to 24	0.6
25 or more	0.5

Note: De-rating reductions for temperature and bundling are cumulative where applicable.

Note: Bundling reduction factors are not normally considered necessary for dc cables in small craft.

For information, (extra low voltage dc only) the volt drop on load may be calculated by using the following formula:

$$E = \frac{0.0164 \times I \times L}{S}$$

Where

E = Volts drop in volts

S = the conductor cross-section area in square millimetres

I = the load current in amperes

L = the total length, in metres, of conductor from the positive power source Connection to the electrical device and back to the negative source connection.

In the UK cables are sold to British Standards and below are some notes:

A. The current ratings are similar to those in BS 7671 (was IEE 16th Edition) Generally speaking the ratings for 60,70,90, and 105 degrees C are those most relevant, and are within 10% of those in BS7671

B. Confusion may occur regarding temperature rating BS 7671 and the other relevant British Standards relate to conductor temperature whereas Table A1 relates to insulation temperature.

Types and Properties of suitable Cables

All cables that are Class 5 Flexible (multi-stranded) to BS6500 will also meet the stranding requirements of the Table A1 in ISO 10133 and ISO 1329

Cables for use as mains shore connections are available designated as Arctic Grade (3183Y/AG) with coloured sheaths as follows:

110/130 volts	Yellow
220/240 volts	Blue
380/415 volts	Red

General Purpose Rubber (60/70°C)

Insulated and sheathed cables (318TRS), is not recommended. Rubber has poor wear characteristics, tears easily and deteriorates due to weather.

Heat Resisting Rubber Cables(85°C)

These cables are more suitable. They are EPR insulated and CSP sheathed but again care must be taken to avoid damage to the sheath. They are also HOFR rated, ie heat resisting oil resisting and flame retardant.

Suitable types are 3182TQ, 3183TQ etc which are class 5 flexible 2 core and 3 core cable etc.

All cables with pvc insulation and sheathed to BS6746 are flame retardant and have good wear and weather resistant properties.

General Purpose PVC (60/70°C)

Insulated and sheathed cables (pvc/pvc), multicore which are class5 flexible meet the requirements of the RCD

Suitable types are:

218*Y – circular pvc/pvc . . . to BS 6500 flexible cord — (*- indicates number of cores)

2196Y – flat 2 core pvc/pvc . . . to BS6500 flexible cord

318*Y – circular pvc/pvc . . . to BS6500 flexible cord — (*- indicates number of cores)

3192Y – flat 2 core pvc/pvc . . . to BS6500 flexible cord

Heat Resisting PVC (85°C)

YY Control Flexible

To BS 6141, insulated and sheathed cables (pvc/pvc) multicore which are classed 5 flexible meet the requirements of ISO 10133 and ISO 13297

This cable is a class 5 flexible, insulated and sheathed multicore cables with coloured and/or numbered cores to German VDE specification.

Suitable types are:

2093Y . . . circular 3 core pvc/pvc . . . to BS 6500 flexible cord

309*Y . . . circular pvc/pvc . . . to BS 6500 flexible cord — (*- indicates number of cores)

Heat Resisting PVC (90/105°C)

Insulated (not sheathed) single core cable known as Tri-Rated cable and is class 5 flexible meeting the requirements of ISO 10133 and ISO 13297.

United States and Canadian rating is to 105°C and UK rating is to 90°C as per BS6231

Type CK is the most widely available version of Tri Rated cable and is rated at 600V ac to earth and 1000V dc to earth

Tri Rated cable is available in sizes from 0.5 mm₂ to 240 mm₂ and is recommended for panel wiring. It can also be used for general wiring if installed in a cable tray, trunking or conduit, and for battery and charging systems

Auto Wiring Table

To BS 6862 is a general purpose 70°C pvc cable The voltage rating of this cable is 100 volts and therefore must only be used for extra low voltage, ie 12/24 volt applications and not for 230volt wiring. Auto wiring is ideal for making up looms using insulated single cores with wide selection of colours available for easy identification.

Available in sizes up to 60 mm₂, but single core 0.5 mm₂, 0.65 mm₂ and 1 mm₂ do Not meet the required minimum number of strands as in Table A1 Conductor Requirements in this appendix

Multicore cables are also available as Auto wiring.

Battery Wiring

Cables to BS 6862 (Auto wiring up to 60 mm sq. are suitable

Tri-rated cable to BS 6231 is multi-stranded with thick pvc insulation suitable for battery wiring

Welding cables to BS 638 has EPR/CSP insulation / sheath but has high number of very fine strands which will break if subjected to movement, so care must be taken regarding installation and use.

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