

Extreme Environment Cabling

Mobile power products are often used in extreme environments. Standard automotive cable becomes the 'weak link' in your electrical system.

Extreme Environments include:

Saltwater Marine - The saltwater environment is one of the most corrosive known to man

High Vibration - Wiring on mobile platforms is subject to high vibration

UV Light - Wiring is exposed to the elements is attacked by UV light, damaging insulations

Oil - Oil penetrates wiring insulation and damages it—creating a serious short-circuit risk

Battery Chemicals - Battery acid and gases are highly corrosive

Chemicals - cleaners, urine and other contaminants damage battery cabling

High Current - High current for inverters, large alternators ect are subject to higher heating

Cable Strain - High current DC cabling is heavy, cable loom are subjected to higher levels of stress

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Why normal cable just wont do...

This standard automotive grade cable was subjected to an Extreme Environment for just 12 months...

Course stranding does not allow cable to flex when subject to vibration and makes a good crimp more difficult to achieve

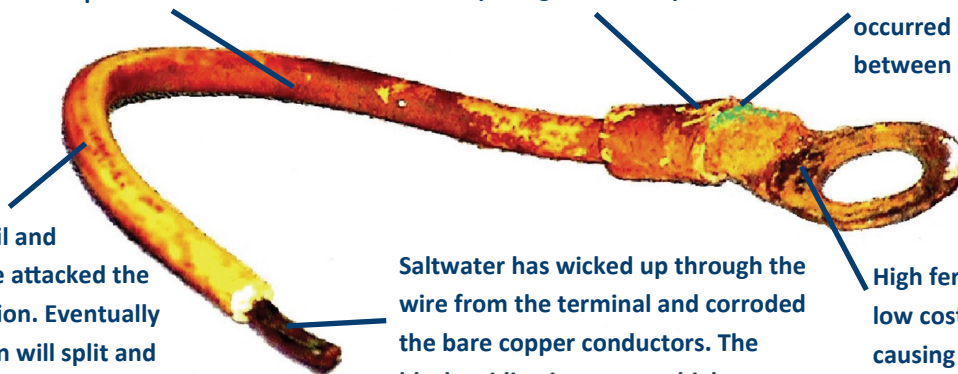
Hard PVC terminal insulator has cracked exposing live metal parts

Electrolysis (green area) within the terminal has occurred due to interaction between different metals

Chemicals, oil and UV light have attacked the cable insulation. Eventually the insulation will split and expose live internal conductors.

Saltwater has wicked up through the wire from the terminal and corroded the bare copper conductors. The black oxidation creates high resistance and hot spots in cables

High ferrous content in the low cost terminal has rusted causing a poor connection



The Lifetime System - Eliminated Weak Links

An electrical system is only as good as its weakest link. This included every wire, terminal and switch. Using incorrect specification of terminals, wire ect is just as crucial as selecting the best battery for your system. Power-Store Lifetime is a system of wiring components that are designed to work together to provide ultimate reliability in extreme environments. Lifetime components are rated at much higher current ratings than standard components (due to less electrical resistance) reducing cable size (and therefore space and weight of cable looms).

Meets & Exceeds Wiring Standards

Lifetime components are individually certified to meet the most stringent wiring standards including:

MCA Approval

Leisure Craft CE

SAE (society of Automotive Engineers) J-1127_201210,

J-1128_201210, J-163_201102, J-2174_200904,

J1292_200801, USCAR21-1

UL Certified for UL1426 Boat Cable (BC-5W2), 105°C 600V

United States Coast Guard CFR Chapter 183.05.45

United States Coast Guard CFR Chapter 46 183.10-20

ABYC—E-8 AC Systems & E-9 DC Systems

Det Nordske Vertas High Speed Part 4/3/7

Lloyds Register Part 6, Chapter 2-1, Section 7

National Fire Prevention Association section 302

Extreme Environment Cabling

Cable

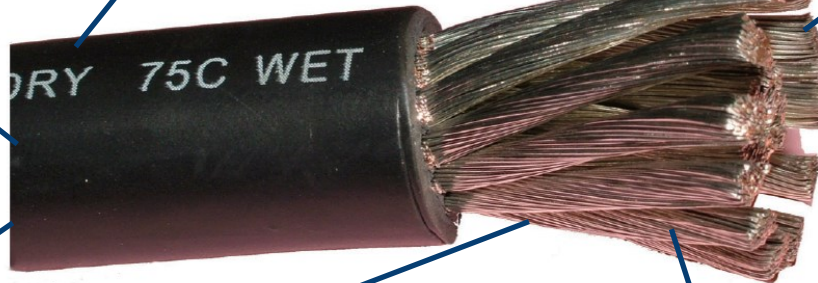
Suitable for DC and AC Systems up to 600V

Self extinguishing, will not melt/drip and fuel fire

Oil, Acid, Chemical and UV light resistant

Ultra-Fine (type 3 size) strands for superb flexibility, vibration resistance and allows for superior strength crimping

Pure Copper Conductors for minimum resistance.



Insulation rated at 105°C (dry) and 75°C (wet) up to 600V (AC or DC)

Larger cables are created using bunches of smaller wires - provides greater flexibility in larger sizes

Each Stand is individually tinned to prevent corrosion - even if water does wick up cable inside

Crimp Terminals

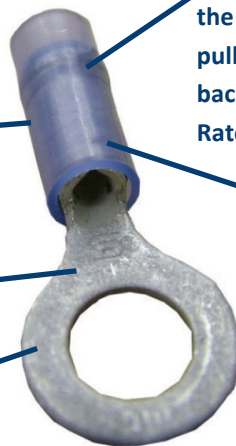
Suitable for DC and AC systems of up to 600V

Nylon insulator - does not split or break during crimping, will not pull back and is fully resistant to oil, acid, chemicals and UV light

Double crimp barrel - forward crimp created the electrical connection, the rearward crimp swages the terminal to cable jacket and provide superior pull out strength. Prevents wire insulation pulling back to reveal conductors (we recommend that a Ratcheting Double crimp tool is used)

Serrated internal face to terminal barrel provides additional grip

All metal parts are tinned to prevent corrosion



Pure copper, Galvanically matched to cable to prevent electrolysis

Double crimping is vastly superior to soldering. We recommend never soldering or using combined crimp/solder on terminals. Solder introduces corrosive chemicals into the terminals and can melt during a short-circuit

Battery Cable lugs

Thin barrel material for superior crimping

Funnel end to facilitate cable entry

Forged end - no access point for water/contaminates



No inspection hole - prevents water/contaminate ingress

Pure Copper for maximum conductivity, tinned to prevent corrosion. Galvanically matched to cable

Adhesive Lined Shrink

3:1 Heatshrink ratio

Adhesive melts on heating to seal the terminal. Using Lifetime lugs (with no inspection hole and forged end) means that water and contaminants cannot enter the cable



Cross-Linked Polyolefin material creates a tough insulator

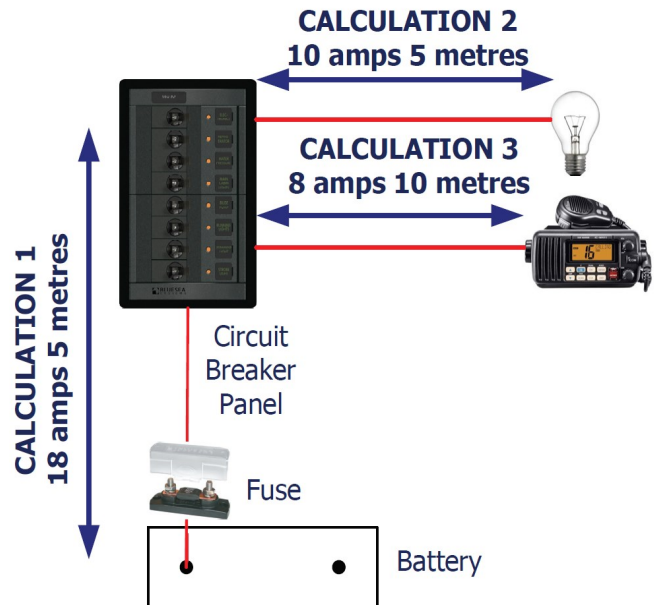
Extreme Environment Cabling

Step 1: Circuit Lengths & Current

Work out cable sizes in steps for each part of your electrical system. For example, in a system that may have a switch panel, first you would work out the cable required for from the batteries to the switch panel (for the maximum load that the switch panel could draw). Then for each load connected to the switch panel, you would work out each (to & from the panel) individually.

Each circuit length must include the run of the cable TO the load and BACK again. Therefore, the distances shown in the example would be doubled.

Next - determine the maximum voltage drop allowable on each circuit. For critical loads (radios, bilge pumps, nav equipment inverters, charge sources and main battery cabling), this should be 3%. For non-critical loads (such as refrigeration, internal lighting etc) this should be 10%.



Step 2: Calculate

Calculations provided using data from this factsheet are suitable only for Power-Store Lifetime cables. There are 3 methods of sizing cable. A) Using WireSizer software B) read off the cable size charts (next page) C) Manually calculate using the following formula.

$$CM = \frac{K \times I \times L}{E}$$

CM = Circular Mils (CM Area). Once calculated use Table 1 (next page) to determine cable size (if the CM value is between cable sizes, always opt for the cable size above). K = 10.75 (constant value), I = Current in amps, L = length (in feet, there and back) and E = Voltage Drop (for 12V - 0.36 (3%) or 1.2 (10%). For 24V - 0.72 (3%) or 2.4 (10%).

Example (calculation 1 in step 1): $10.75 \times 18 \times 32$ (5 meters $\times 2 = 10$ meters = 32') / 0.36 = 17'200. Using table 1 (next page), this is between size 6 and 8 AWG. Therefore, you would opt for the 6AWG cable. Never exceed the cable amperage rating (increase cable size if required). To convert meters to feet divide by 0.3048.

Table 1:

Lifetime AWG Cable Size	Equivalent in sq mm	CM Area	Max Amps Hot	Max Amps Normal	Lifetime AWG Cable Size	Equivalent in sq mm	CM Area	Max Amps Hot	Max Amps Normal
Note			1	2	Note			1	2
18	0.8	1600	17	20	4	19	42000	136	160
16	1	2600	21	25	2	32	66500	178	210
14	2	4100	30	35	1	40	83690	208	245
12	3	6500	38	45	1 / 0	50	105600	242	285
10	5	10500	51	60	2 / 0	62	133100	280	330
8	8	16800	68	80	3 / 0	81	167800	327	385
6	13	26600	102	120	4 / 0	103	211600	378	445

12V - 3% Voltage Drop

Length (Meter)	Current (Amps)											
	5	10	15	20	25	30	40	50	60	80	90	100
3.0	18	14	12	12	10	10	8	8	6	6	4	4
4.5	16	12	10	10	8	8	6	6	4	4	2	2
6.0	14	12	10	8	8	6	6	4	4	2	2	2
7.5	14	10	8	8	6	6	4	4	2	2	1	1
9.0	12	10	8	6	6	4	4	2	2	1	1/0	1/0
12.0	12	8	6	6	4	4	2	2	1	1/0	2/0	2/0
15.0	10	8	6	4	4	2	2	1	1/0	2/0	3/0	3/0
18.0	10	6	6	4	2	2	1	1/0	2/0	3/0	3/0	3/0
21.0	10	6	4	2	2	2	1/0	2/0	2/0	3/0	4/0	4/0
24.0	8	6	4	2	2	1	1/0	2/0	3/0	4/0		
27.0	8	4	4	2	1	1/0	2/0	3/0	3/0			
30.0	8	4	2	2	1/0	1/0	2/0	3/0	4/0			
33.5	8	4	2	2	1/0	1/0	2/0	3/0	4/0			
36.5	6	4	2	1	2/0	2/0	3/0	4/0	4/0			
39.5	6	4	2	1	2/0	2/0	3/0	4/0				
42.5	6	2	2	1/0	2/0	2/0	3/0	4/0				

12V - 10% Voltage Drop

Length (Meter)	Current (Amps)											
	5	10	15	20	25	30	40	50	60	80	90	100
3.0	18	18	18	16	16	14	14	12	10	8	6	6
4.5	18	18	16	16	14	14	12	12	10	8	6	6
6.0	18	16	16	14	12	12	10	10	8	8	6	6
7.5	18	16	14	12	12	10	10	8	8	6	6	6
9.0	18	16	14	12	10	10	8	8	8	6	6	4
12.0	16	14	12	10	10	8	8	6	6	4	4	4
15.0	16	12	10	10	8	8	6	6	4	4	4	2
18.0	16	12	10	8	8	8	6	4	4	2	2	2
21.0	14	12	10	8	8	6	6	4	4	2	2	2
24.0	14	10	8	8	6	6	4	4	2	2	2	1
27.0	14	10	8	8	6	6	4	4	2	2	1	1
30.0	12	10	8	6	6	4	4	2	2	1	1	1/0
33.5	12	10	8	6	6	4	4	2	2	1	1/0	1/0
36.5	12	8	8	6	4	4	2	2	2	1/0	1/0	2/0
39.5	12	8	8	6	4	4	2	2	1	1/0	2/0	2/0
42.5	12	8	6	6	4	4	2	2	1	1/0	2/0	2/0

24V - 3% Voltage Drop

Length (Meter)	Current (Amps)											
	5	10	15	20	25	30	40	50	60	80	90	100
3.0	18	18	16	14	12	12	10	10	10	8	8	6
4.5	18	16	14	12	12	10	10	8	8	6	6	6
6.0	18	14	12	10	10	10	8	6	6	6	4	4
7.5	16	12	12	10	10	8	6	6	6	4	4	4
9.0	16	12	10	10	8	8	6	6	4	4	2	2
12.0	14	10	10	8	6	6	6	4	4	2	2	2
15.0	12	10	8	6	6	6	4	4	2	2	1	1
18.0	12	10	8	6	6	4	4	2	2	1	1/0	1/0
21.0	12	8	6	6	4	4	2	2	1	1/0	1/0	2/0
24.0	10	8	6	6	4	4	2	2	1	1/0	2/0	2/0
27.0	10	8	6	4	4	2	2	1	1/0	2/0	2/0	3/0
30.0	10	6	6	4	4	2	2	1	1/0	2/0	3/0	3/0
33.5	10	6	6	4	2	2	1	1/0	1/0	3/0	3/0	4/0
36.5	10	6	4	4	2	2	1	1/0	2/0	3/0	4/0	4/0
39.5	8	6	4	2	2	2	1	1/0	2/0	3/0	4/0	4/0
42.5	8	6	4	2	2	1	1/0	2/0	3/0	4/0	4/0	

24V - 10% Voltage Drop

Length (Meter)	Current (Amps)											
	5	10	15	20	25	30	40	50	60	80	90	100
3.0	18	18	18	18	16	14	12	10	10	8	6	6
4.5	18	18	18	18	16	14	12	10	10	8	6	6
6.0	18	18	18	16	16	14	12	10	10	8	6	6
7.5	18	18	16	16	14	14	12	10	10	8	6	6
9.0	18	18	16	14	14	12	12	10	10	8	6	6
12.0	18	16	14	14	12	12	10	10	8	8	6	6
15.0	18	16	14	12	12	10	10	8	8	6	6	6
18.0	18	14	12	12	10	10	8	8	6	6	6	4
21.0	16	14	12	10	10	8	8	6	6	6	4	4
24.0	16	14	12	10	10	8	8	6	6	4	4	4
27.0	16	12	10	10	8	8	6	6	6	4	4	2
30.0	16	12	10	10	8	8	6	6	4	4	2	2
33.5	14	12	10	8	8	8	6	6	4	2	2	2
36.5	14	12	10	8	8	6	6	4	4	2	2	2
39.5	14	12	10	8	8	6	6	4	4	2	2	2
42.5	14	10	8	8	6	6	6	4	2	2	2	1