

## Application Brief: Introduction to Blue Sea Systems' New Online DC Circuit Wizard

Blue Sea Systems' **DC Circuit Wizard** simplifies the calculations necessary to choose appropriate DC circuit protection and wire size. The DC Circuit Wizard is available at <http://dc.circuitwizard.bluesea.com>. It offers choices for circuit protection and the correct wire gauge.

### DC Wire and Circuit Protection Selection

Enter information about the boat's electrical system.

#### 1. DC Wire Selection

- Information required to meet ABYC Standards—based on guidelines in ABYC E-11.
- Additional derating factors—factors not considered in ABYC Standards when determining wire size. Blue Sea Systems' engineers have identified additional derating factors from experience in the field and by experimenting in the laboratory, that can significantly influence the proper wire size required in a circuit.

#### 2. DC Circuit Protection Selection

- Enter the Cold Cranking Amps (CCA) rating of battery.
- Choose Main or Branch circuit.

#### 3. Click Calculate

The screenshot shows the DC Circuit Wizard interface. It is divided into two main sections: "DC Wire Selection" on the left and "DC Circuit Protection Selection" on the right. The "DC Wire Selection" section is further divided into "Information required to meet ABYC Standards" (highlighted with a red box) and "Additional derating factors" (also highlighted with a red box). The "DC Circuit Protection Selection" section includes a "Battery CCA" input field (set to 450) and a "Main or Branch" dropdown menu (set to Main). A yellow box labeled "Circuit Voltage" is highlighted, containing a "Hide help" link and an explanation of the nominal voltage. At the bottom, there are "Calculate" and "Reset" buttons. Three callout boxes with arrows point to the ABYC Standards section, the derating factors section, and the Circuit Voltage section.

**DC Wire Selection:**

**Information required to meet ABYC Standards:**

Circuit Voltage: 12 V  
Load Current: 20 amps  
Length of Conductor: 18 feet  
Allowable Voltage Drop: 3 %  
Type of Load: Fixed  
Wire Insulation Temperature Rating: 90 (°C)  
In Engine Room?

**Additional derating factors:**

Duration: 30 minutes  
Terminated on Fuse?   
In Conduit or Sheath?   
Extra Thermal Insulation?

**DC Circuit Protection Selection:**

Battery CCA: 450  
Main or Branch: Main

**Circuit Voltage**

The nominal voltage in the circuit for which you are choosing wire and circuit protection. Lower voltage systems tolerate less voltage drop.

Buttons: Calculate, Reset

Callout 1: Circuit selection factors based on ABYC E-11 guidelines

Callout 2: Additional factors that should be considered when selecting wire and circuit protection

Callout 3: When the mouse cursor is on a data entry field or section heading, an explanation is displayed in this window. Click Hide Help or Show Help.

## Wire Selection Results

The DC Circuit Wizard displays the recommended wire size. Notice that the recommended wire based on ABYC Standards and additional derating factors may be larger than the recommendation based on ABYC Standards alone.

Wire Capacity – Estimated amperage capacity of the selected wire, given the installation conditions. Also the highest rated circuit protector to use with that wire.

Minimum Rating – Smallest rated circuit protector that will not overheat in normal use or cause nuisance trips.

The screenshot shows two panels. The left panel, titled "DC Wire Selection:", displays "Recommended Wire: AWG 10" and notes it meets ampacity and voltage drop requirements with a capacity of 38 amps. Below this, three boxes show wire sizes: "Selected for ampacity including derating factors: AWG 12", "Required for ampacity using only ABYC Standards: AWG 16", and "Voltage drop met (regardless of ampacity) with: AWG 10". The right panel, titled "DC Circuit Protection Selection:", shows "Minimum Rating: 25 amps" and "Suggested Rating: 31A" on the left, and "Wire Capacity: 38 amps" and "Minimum AIC: 650" on the right. A "Show help" button is at the bottom.









Wire size recommendation to meet voltage drop in circuit with no consideration for ampacity.

Wire size recommendation based on ABYC guidelines.

Wire size recommendation based on ABYC guidelines and additional derating factors.






## Circuit Protection Results

The DC Circuit Wizard displays all of the acceptable fuse and circuit breaker options that meet the entered values. Choose a device according to its blow/trip value, AIC rating, cost, and preferences. For complete product information, click each option to link to the product page on Blue Sea Systems' website.

	Amperage:	20	25	30	35	40	50	60	70	80	90
<b>Maxi</b> AIC: 1000@32V				• S138		• S139	• S140	• S141	• S142	• S143	
<b>SEA</b> AIC: 2000@48V											
<b>ANL</b> AIC: 6000@48V					• S164	• S165	• S127	• S123		• S124	
<b>Class-T</b> AIC: 20000@160V											
<b>Push Button Reset-Only</b> AIC: 2500@28V		• 7057	• 7058	• 7059	• 7060	• 7061					
<b>185 Thermal</b> AIC: 3000@42V			• 7008	• 7009	• 7010	• 7005	• 7000	• 7011	• 7012	• 7014	• 7002
<b>187 Thermal</b> AIC: 1500@48V			• 7035	• 7036	• 7037	• 7038	• 7039	• 7040	• 7041	• 7042	• 7044
<b>A-Series Toggle</b>		•	•	•		•	•				

Suitable fuses and circuit breakers to meet circuit voltage, current and load values. Click each cell to view product page on Blue Sea Systems' website.

If there are no results displayed in light green, there are no suitable circuit protection devices that meet system requirements.

	Amperage too low to avoid nuisance blows.
	Amperage and AIC within acceptable range.
	Nearest to calculated optimal amperage rating.
	Amperage too high to provide overload protection.
	Insufficient AIC.

The DC Circuit Wizard will be helpful for boat owners and boat builders to quickly perform calculations and eliminate many unsuitable circuit protection choices. The final decision on wire and circuit protection should come after a review based on additional sources such as the ABYC standards or the many books on the subject.