

Specification for a 42V battery connection

Requirement	Solution
SYSTEM	
Electrical shorts between terminals of different voltage potential and between positive and vehicle ground must be minimized if using simple metal tools for assembly or disconnect	No tools will be needed - connection will be hand pluggable and enclosed in a plastic connector body
	Power circuits (+ and -) will be designed to pass the UL finger-proof test
Possibility of accidental electrical shorts between the harness positive terminal and vehicle ground must be minimized when disconnected	Harness positive (+) terminal will be recessed in a plastic connector body
Battery connections must be designed to prevent direct connection of standard automotive ("alligator" type) jumper cables, either with the connection mated or unmated	Both male and female terminals will be recessed in plastic housings to prevent connection of standard automotive jumper cables
Battery connections must be designed to prevent electrical access (current carrying) when connected	Terminals will be completely enclosed in a plastic connector body and therefore inaccessible when mated
Battery connections must be designed to prevent connecting to a battery of different voltage potential	Connector indexing will prevent connecting to a battery of different voltage potential
Battery connections must be designed to prevent reverse polarity battery installation	Connector indexing will prevent reverse polarity battery installation
Battery connections must be designed to prevent connecting to a battery of different technology	Connector indexing will prevent connecting to a battery of different technology
Number of connections to the battery should be minimized	A single connector will be used for both power and signal circuits

A means of detecting an impending battery disconnection must be available to allow an external mechanism to shut off current before opening the battery connection	A shorter, signal pin (1) will be provided that will open before the power pins to allow time to remove current prior to the power pins opening.
	The signal pin (1) will be connected internally to battery + through a 5 KO - 1/2 W resistor
	No other electrical usage of signal pin (1) is allowed
	A lever lock will be used to disengage the connection sufficiently to open the signal pin (1) but not the power pins. Power pins will be disconnected by manually pulling the connection apart after the lever lock is opened. (Targeted delay is 75 ms or greater)
A means of providing an additional signal for battery parametric monitoring should be provided	Provisions will be provided for a second signal level pin (2). Until defined/needed, the cavity on the connector will be flashed over
	Connector indexing will distinguish a battery with/without a signal pin (2)
Should allow for connection of an electrical module between the battery and wiring harness	Standard battery connection interface should be moved to the electrical module

PHYSICAL

Standardization of design must allow for interchangeability of batteries without a need to change the harness connection	Battery side of connection will be standardized (even if connection is a panel mount on a "battery box" containing other features)
	Location of connection on the battery will be the responsibility of the appropriate storage battery standardization committee
	The male terminal will be on the battery
	One size terminal should cover all current ranges
	Male power terminals will be 8 mm diameter, solid, round pin with conductivity of 80% IACS or greater. Plating will be specified.
	Male signal terminals will be 2.8 mm blade
	All dimensions required for standardization will be specified

Parameter

Specification

TERMINAL MECHANICAL

Terminal-terminal engage/disengage cycles	50 mate and unmate cycles?
Terminal bend resistance	TBD

TERMINAL ELECTRICAL

Dry circuit resistance	Not needed
Nominal current resistance	Power pins - < 0.5 mΩ
Maximum current capability	Power pins 600 Amps for 10 seconds, 120 Amps for 44 minutes and 50 seconds, 0 Amps for 15 minutes
	Signal pin (1) - limited by 5KΩ resistor in series with battery +
	Signal pin (2) - TBD

CONNECTION SYSTEM MECHANICAL

Connection system mating/unmating force (battery case to harness connector)	Hand mating to engage/disengage power pins must require < 75 Newtons of force. Mechanically assisted lever lock to engage/disengage signal pins and lock connection in place must require < 75 Newtons of force.
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CONNECTION SYSTEM ELECTRICAL

Isolation resistance	> 20MΩ @ 500 VDC between any two terminals
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CONNECTION SYSTEM ENVIRONMENTAL

Temperature range	-40°C to +85°C (ISO temperature class 2)
Sealing	Required to TBD specification
Unmated battery connector corrosion	Unmated battery must pass a salt fog/contamination test (TBD specification)

TEST PLAN

A validation test plan "Performance Specification for Automotive 42V Battery Electrical Connector Systems" is being generated with detailed test procedures and test levels