

42 V PowerNet Battery Connection System Specification Workgroup

Vehicle OEM feedback
Traub clarifications in blue type
Customer quotes in bold

Design Requirements

DaimlerChrysler (Europe)

Agrees with all design requirements except “Separate connections will be specified for positive and negative terminals” DCX has stated a desire to have a single plug of a 2 way connector.

“Our intention is, that the standards for the battery connectors will allow to make a bipolar connector based on that standard.”

DaimlerChrysler (USA)

“USCAR will respond to the proposals collectively”

General Motors

Agrees with all design requirements

PSA

Rates all design requirements **“Strong agreement – a must have requirement”**

“Two additional important specifications”

- **“all connectors under bonnet have to be sealed at immersion”**
- **“for the mating of the housing, we recommend at PSA a “go no go system”. This system provide (prevents?) the housing to stay in a middle position, it means the housing is locked or unlocked but it can not stay between these two positions.”**

Honda

“We agree with the design requirements”

“However, as far as the last 3 items (50 mate/unmate, <75 N of mating force and 0.5mohm), we haven’t verified the validity of numerical value yet. (We don’t have concrete specifications)”

“The prototypes, which every Japanese battery supplier made, are threaded stud type. But there are some points which should be improved, and we don’t think that it can be mass-produced as it is.”

“As for other proposal, it is very difficult to judge because test data is not shown here. Please send it if there is more information.”

Ford

Agrees with all design requirements

Toyota

number of cycles:10-20

maximum current: 200A, 5 sec

voltage drop: 0.5 mohm

ambient temperature: -40C to 70C continuous

prevent electrical access to terminals: yes

**mate/unmate without tools: desirable under the condition that less cost
and mating force assured.**

accommodate electronic module: desirable

index for battery technology: yes

No response from Audi, BMW, Hyundai, Renault & Volvo

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Design feedback

DaimlerChrysler (Europe)

“My personal feeling is, that we should not allow the Yazaki approach with terminals open for alligator clamps, since this will surely lead to problems with some vehicle users connecting it to the 12 V system. There are people who say “don’t care, that’s the customer’s problem”. But I believe, the AMP or Delphi approach should be equivalent or only little different in cost, and it is better or equal in the other functions. Finally cost will make the decision.”

“With respect to the ranking of the different approaches for battery contacts we refer to our Power-Point slides presented in Vancouver. As you see from our presentation, we prefer a hand-mated solution; this means the Yazaki approach with threaded bolts is on last position. The other solutions are not too far from each other, but the horizontal arrangement of Amphenol is better with respect to packaging (limited height). Flat or round bolts should be decided based on electrical performance and cost.

We know of a solution which is in development with Hoppecke, which is very similar to the Amphenol solution, but uses a bipolar connector. This approach is best suiting our needs and would be our first choice for a standardization.”

GM

A threaded stud is not an acceptable choice. Problems exist today with under torque, over torque and cross threading of nuts on threaded studs. Hand plug connections are preferred.

Side terminal or top post connections are acceptable for flooded or AGM batteries

Prefer a sealed connection. Must not use doubles at the battery connection to get a sealed connection.

No preference on pin vs. blade. Will choose based on cost and performance.

No preference on locking mechanism except that the number of operations required to reliably make the connection should be minimized. No loose piece parts should be required. CPA?s or other locking features should be tethered to the cable or attached to the connector if required.

Audi

“We are currently developing a battery connection for a 36 V battery. We will probably be the first or one of the first car-manufacturer, that puts a 36 V battery into series production because of our development of - - - -. For this purpose, a screwed connection is discussed.”

Honda

I've ranked the proposed designs as shown below.

- 1. Yazaki**
- 2. Delphi**
- 3. ITT Cannon**
- 4. AMP**
- 5. Amphenol**

I gave an order with the following viewpoint.

Cost

Reliability of the lock mechanism

Diversion possibility

PSA

1. AMP

Strong agreement

- It is designed like a typical connector used in the car industry

Uncertain or neutral position

- In PSA specifications (B217050), if the mating force > 80 N, a mechanical assist on connection is needed. Is this system really usefull in AMP proposal (we specified : « Hand mated connection systems must have < 75 N of mating force ») ?

Disagreement

- No sealing

Commentary

At first sight, this proposal looks like the most appropriate according to PSA specifications.

AMP should be able to modify easily the housing in order to integrate the sealing.

2. DELPHI

Strong agreement

- The mating force < 75 N (PSA specification is : < 80 N).

- The primary lock arm which can be designed for a go no go system. This system is required at PSA and prevent the housing from staying in a

middle position, it means the housing is locked or unlocked but it can not stay between these two positions.

- The sealing (for all connectors in the engine compartment).
- It is designed like a typical connector used in the car industry.

Uncertain or neutral position

Disagreement

- On the first slide : « A CPA can be added to the harness connector for added system reliability » : we do not use this kind of system at PSA, we recommend a go no go system for our connectors.

Commentary

This proposal looks correct but it's a pity that there are not more slides, more information on the housing (female part), on the terminal, compared to some others proposals.

3. AMPHENOL

Strong agreement

Uncertain or neutral position

Disagreement

Commentary

The slides with the concepts 2 and 3 are not really clear, it is hard to say something about them.

The first concept looks interesting but there are a lack of details and information on the terminals and the locking system, is it a mechanical assist on connection ? just a security for the locking ?

4. ITT Cannon

Strong agreement

Uncertain or neutral position

Disagreement

In the slide 8, we can see that old kinds of connections (battery clamps, bolded connections) are kept. This intermediate connection could be eliminated.

Commentary

It would be better to integrate the male part of the terminal into the battery as it is done in AMP, DELPHI and AMPHENOL proposals in order to connect directly the wires to the battery without extra-connections.

5. YAZAKI

Strong agreement

Uncertain or neutral position

Disagreement

- Bolded connection**
- It requires tool**
- No sealing**

Commentary

This concept of connection is prohibited because of the bad quality of bolded connections like mass terminations.

A new connector will be developed for the future battery connection, it would be better to use a technology more reliable and advanced which is able to respond to all specifications of car manufacturers.

Conclusion

Nearly all the proposals are able to respect the specifications of the 42V PowerNet Battery Connection System Workgroup.

On a technical point, three suppliers (AMP, DELPHI, AMPHENOL) seem to be the most interesting in order to respect our specifications. Moreover, we are used to working with these companies and we know them.

That is a little bit disappointed that major connector suppliers like FCI, BOSCH, SUMITOMO and YAZAKI had not or did not present their products.

This is the first commentaries we can do on the first proposals. It will be interesting to see the next evolutions and proposals and to receive the first tests results according to environmental conditions, electrical, physico-chemical and mechanical characteristics.

For the type of terminal (flat blade or round pin), PSA has a neutral position with, maybe, a little preference for round pin terminals.

Toyota

The following is the comment on the connection design.

Toyota prefers the stud bolt type.

The connection process without tools is desirable only when the mating force and its reliability is assured and the structure is less costly.

In another word, we don't think a tool-less connection is a must.

Based on our experience, the multi contact design is effective to assure the contact reliability for high current application without tools but it is costly and we don't think the proposals other than the stud bolt type are less costly.