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ACCUMULATOR MOUNTING 02-2024

QUESTION: Aspect Needing Clarification: We are seeking clarification on what the distinction is between the Accumulator Container and associated Accumulator mounts. Current Reasoning for Design and Why We Believe It Meets Rules: As seen in Figure 1, with our current design we have an Accumulator box that extends to the rear impact structure for the purpose of mounting, however the section which contains the cells is spaced 25mm from the rear. As indicated in figure 2 and 3, we consider the section which contains the cells and associated electronics to be the Accumulator Container which is highlighted blue and the section extending rearward to be an Accumulator mount since this section serves no other purpose and is labelled in figure 2. Reason for Needing Rules Clarification: While this design with the Accumulator box extending to the rear for the purpose of mounting and the section containing the cells being spaced forward with an air gap in the box, an alternative interpretation could consider the whole box, including the un-utilized space as the "Accumulator Container".

We are asking if our current design where the Accumulator cells are spaced 25mm forward in the box away from the rear impact structure is compliant with F.11.2.3 for 2024 EV scrutineering, or if adjustment is required.

ANSWER: We accept your design as shown as complying with the intent of the 25 mm clearance rules provided the space between the inner wall at the cells and outer mounting wall is free of any objects and that both walls comply with the structural and fire resistance requirements.

We are, however, concerned that you have an excessive number of ventilation holes in both walls and likely do not meet the requirements of F.10.4. 2 and F.10.4.3 to minimise holes and have 75% wall coverage. Please review this aspect of your design.

MAXIMUM PACK VOLTAGE 03-2024

QUESTION: Our team was looking at operating a 144s configuration in our battery pack this year. The cells maximum rated voltage is 4.2V, this would therefore exceed the 600V limit allowed by EV.3.3.2. This rule does not state that the battery rating must not exceed 600V, but only that the tractive system voltage must not exceed this value.

In order to ensure that the maximum pack voltage is not exceeded, is it sufficient for the team to place a hard limit on the operating voltage of the cells (ie. through the BMS/charger). This would therefore require the cells new maximum voltage rating to be 4.16V, giving a maximum pack voltage of 599.04V.

Alternatively, is it required to remove 2 cells, forming a 142s configuration and allowing the cells to operate over the full voltage range.

If the former is allowed, when submitting documents such as the ESF and SES, what should be stated as the maximum voltage of the cells?

ANSWER: The rules limit the voltage between any two points not just outside the battery container.

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While your suggested approach is theoretically legal, the most reliable approach to compliance with sound design would be to adopt the 142s configuration. This also avoids your issues with the ESF and SES.

Teams should also be aware that we propose to implement spot checks on battery voltage at this year's event.

ACCUMULATOR MOUNTING 04-2024

QUESTION: We are planning on mounting our accumulator to a tube which runs laterally across the bottom of our chassis whilst being welded to a node at each end. As part of the accumulator mounting, we will run two bolts through this tube. Will this meet the current rule set? An image for more clarity is attached, and the bolt positions are highlighted.

ANSWER: We assume you are seeking clarification that your basic design for the mounting of the tube to triangulated nodes and, with just the 2 attachments to that tube, the design meets the intent of the rules.

Also, that the mounting tube and attachments are not required to meet the 25 mm clearance requirement.

If so, then subject to the adequacy of the size of your tube and dimensions complying with the SES inputs, your design should be acceptable.

REAR BULKHEAD FASTENING REQUIREMENTS 05-2024

QUESTION: Our team utilize a space frame chassis, with an aluminium rear bulkhead structure attached to the rear of our chassis frame. For attachment of our rear bulkhead, we require a bolted connection to the rear chassis members.

Is it sufficient for us to bolt into a threaded insert which is welded to the chassis frame? Please see attached photos for insert placement and bolting mechanism. This bolt would then be lock-wired to ensure positive locking as per T.8.3.2.

Alternatively, is it required to have a removable nut for this connection, as per F.5.4.1.

ANSWER: We do not believe either of your approaches comply with the intent of the specific rules nor good engineering practice. In the first case, your welded on insert becomes a Critical Fastener and would have to be proven to meet the strength Grade requirements. In both cases we would regard them as blind nuts/bolts.

What is expected is a tube with insert, or mounting brackets, and a through bolt which can be reliably torqued and locked and such that it is readily verifiable at Technical Inspection.

We would thus expect to see these, with appropriate mountings from your bulkhead, on each of the of the 4 tubes or additional cross tubes.

You also do not seem to have any forward triangulation in side view for the rear bulkhead mounting tubes.

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REGARDING CHAIN GUARD AND CHAIN AS A NON-CRUSHABLE ITEM 06-2024

QUESTION: Rule F.11.2.3 gives some examples for non-crushable items but does not give a definition for a non-crushable item. Therefore, it is unclear if the chain guard or chain is considered a non-crushable item or a crushable item. Thus, is the chain guard and chain a non-crushable item or a crushable item?

ANSWER: It is probably easier to start with defining what we expect to see with a component which is Crushable.

Such would collapse under relatively light loads well below what would be needed to damage the Accumulator case or affect the IA performance. It also must, in its crushed solid state, impinge into the 25 mm clearance zone.

Conversely, a non-crushable item would likely impact or damage the Accumulator Case or affect or interfere with the IA performance and be of relatively solid material.

By the nature of the materials used and their function, the Chain Guard and Chain would definitely be classified as Non-Crushable items.

TRACTIVE SYSTEM TEST LOADS 08-2024

QUESTION: For rule EV.4.8 & by extension, F.10.5.8, it states that mounts must withstand a Test Load in a variety of different load scenarios. Is the Test Load for the Tractive system enclosures identical to the accumulator enclosure? For instance, with a load based analysis, does each mount need to withstand a 15 kN minimum load in any direction (as per F.10.5.7 b)? If not, what is the Test Load supposed to be?

ANSWER: It appears that a wrong reference has been made in the 2024 Rules. In prior years the Clause required compliance with Clause F.11. The reference to F.10.5.8 makes no sense and we will be advising all teams to revert to the reference to Clause F.11 and will update our Local Addendum to correct this.

TEAM MEMBER ELIGIBILITY 09-2024

QUESTION: One of our critical team members that has been heavily involved with the design and construction of our EVs for the past few years is moving away and transferring to another university this year due to personal reasons. Even if the university this member was moving to had an FSAE team, would it be acceptable for this person to compete at comp this year.

ANSWER: Provided your team member remains a student at the new university, and did not transfer only to take up academic employment, then the student would remain eligible to compete as a member of your team.

TOGGLE LATCHES FOR FASTENERS 10-2024

QUESTION: The team would like to know if toggle latches are an acceptable fastener given that the team complies with the number of fasteners for each wall. This is referring to Rule F.10.2.4: "Covers and lids must be attached with a minimum of one fastener for each external vertical wall per section."

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ANSWER: The suitability of different fasteners will depend on the function the lid is performing.

- If it is simply a cover for the Accumulator with no other load being transmitted through the fastener, then an over-centre latch may be used, provided it either has some type of secondary catch to prevent accidental opening, or safety wire, to prevent it being opened unintentionally or in an impact. It would not be regarded as a Critical Fastener.
- If additional loads are carried through the cover and its retentions fasteners, such as retaining the cells or for retaining other parts of the accumulator structure or HV system, then the fasteners must be of the Threaded type and would be classified as Critical Fasteners.

ELECTRICAL SAFETY CONCERNS 11-2024

QUESTION: In previous rule sets these lights functioned as an indication of the car's current safety status, an IMD or AMS light being on meant that a fault was currently occurring and therefore the car posed an immediate danger. With these new changes however, there is no longer a rule mandated way for the cars danger level to be assessed at any particular instant after a fault has occurred, unless the extra steps are taken to perform further diagnostic measures.

In the case of serious faults performing these diagnostic measures may place students in harms way even with proper safety equipment. Previously whether or not the lights on the dash remained active provided insight into how serious the fault is, a shorted cell or an IMD fault which is still present after opening the SDC, would mean the light remained active while more minor faults or those which pose a less acute risk, such as excess accumulator current draw, would mean the dashboard LED's turned off but the car was still unable to be restarted until after an investigation into the issues. This allowed a more calculated and measured response without the added risk of performing diagnostics on a likely dangerous car.

Our team believes the best safety measures are to prevent risks rather than protect against them and we're unsure of how these rule changes help to prevent risks so would appreciate any clarification on how we may be misunderstanding the rule changes.

ANSWER: We believe you have misinterpreted the situation as the only change in the clauses EV.7.3.5 and EV.7.6.5 are to require the AMS and IMD warning lights to stay on until the AMS and IMD are reset.

This type of "latched" fault indication, stays on even if the fault is transient, until appropriate action is taken. In our opinion this is an improvement in safety, not a reduction. This does not mean the light can be switched off when reset, even if the fault is still active. The rules do not prevent teams from installing other indicators to provide more detailed information to the driver or fault finder.

AIL-SAL CONTROL FUSING 13-2024

QUESTION: We currently run a DC-DC Converter for AIL and TSAL control. According to EV.6.6.6, this system requires overcurrent protection as it connects from the AIR terminals to a thinner wire gauge. However, as a result, when fuses for the DC-DC Converter blow, the system fails with the AIL and TSAL in the 'safe' state (AIL off and TSAL green) regardless of if HV is present or not.

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Additionally, we cannot test the state of the fuse without an unfused wire. For this reason would removing the fuses on these conductors be acceptable according to the rules to ensure AIL and TSAL functions are not compromised?

ANSWER: While the rules do not require the TSAL to display correctly on loss of GLV power, however, the accumulator voltage indicator is required to work regardless of availability of GLV power.

If the DC-DC converter is being used to drive the TSAL (the TSAL shows red only when the DC-DC is active), then this creates a problem.

Removal of the fuses is not a good approach to dealing with such a failure of the DC-DC converter and you should develop another method for driving the TSAL. For example, you might have the TSAL show red whenever the AIRs are closed, either via auxiliary contacts or just when the AIR coils are powered. This would then require a double failure for the TSAL to be inoperative. You could also provide further surety and trigger an alarm if the two sensing methods disagree.

In summary, we do not regard removal of the fuses as a sound engineering solution, and there are other suitable solutions you could develop to address this concern.

COMPOSITE MONOCOQUE 14-2024

QUESTION: The team would like to clarify some of the conditions and reasons for them regarding a composite monocoque: F.2.1.2.b "Uni generally does not touch the core, and balanced plies must enclose all layups."

Due to resource and monetary constraints, the team would like to leave balanced plies (in our case woven twill) off of the SES test panels that are used to meet equivalence, as these are significantly more costly than unidirectional plies. Furthermore, our experience has shown the twill provides only small additional performance due to its lower stiffness and higher strain to failure. To comply with this statement through we would still include balanced plies on the outside of the relevant layups on the chassis. This would be noted as local reinforcement on the composite's chassis tab, as advised by the SES.

We believe this would meet the requirements as the test panels would meet all required equivalence and local reinforcement would be added to the chassis to meet the "good practice" mentioned by SES. We would also note that these statements do not reflect common practice in many high-performance industries and is further limiting the structural engineering innovation available to teams within the rules.

F.4.3.2.d The SES permits skins to be scaled by any positive integer value; as an example, doubling is mentioned. The team would like to clarify that any integer value is permitted as long as both skins are scaled equally.

F.7.1.3 "Corners between panels used for structural equivalence must contain core".

The team would also like to understand the reasoning behind this requirement, as it is standard practice in high-performance motorsport, yachting and many other composite applications to

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taper the core down and leave it out of rounded corners, especially for tight radii when using honeycomb core. This is done as bonding the core effectively into corners is a significant challenge and often can lead to damaging the core, creating a potential defect as the core cannot be bent.

We want to chamfer the core down, leave it out of the corners, and have the skins meet. As the geometry of the corner acts as a natural stiffener, this is standard industry practice.

ANSWER: As a general overview, most of the recent changes in the rules and SES relating to monocoques are based on what has been seen at the US competition to cover a range of failures and poor understanding of by teams on optimising types of layers joints.

Much of this arises from the fact that FSAE vehicles generally have far thinner plies than used in other industrial, aircraft or yachting applications such that their practices may give rise to issues in our applications.

It is sound engineering practice to use a weave on the outer layers as while it may not appear to give a significant improvement on the tested axis, it can significantly improve the off-axis performance to give a better all round composite.

With regards to your specific questions we advise as follows:

1. It is acceptable for you to omit the weave from your test preces provided they are still applied to your actual vehicle lay-ups and you can show them as you suggest as local reinforcements in the SES.
2. Yes, the skins may be scaled by any positive integer value provided the scaling is identical for both skins and the identical ply and count is maintained for each skin (e.g. A/B/G/F- A/B/G/F- A/B/G/F).
3. Cores in corners; This is not a new rule and carryover from the 2023 Rules. Examples of the forms of corners and acceptable and reject configurations are shown in the SES. This requirement is to avoid the presence of voids and recognising the generally thin skins of SAE vehicles and thus must be complied with. It is recognised this is more constraining with an inflexible honeycomb core.

ACCUMULATOR DUCTING 15-2024

QUESTION: Does any ducting for airflow made from either thin carbon or 3d printed material count as non-crushable elements that have to have a 25mm clearance to the surface of the accumulator container? These elements would be easily crushed in the event of a crash and have no ability to penetrate the accumulator container itself, so we are wondering if they would be permitted within 25mm of the accumulator, eg between the seat and the accumulator itself.

ANSWER: If any parts are crushable, and will collapse or shatter at loads significantly below the loads necessary to damage the Accumulator container, they may intrude into the 25 mm zone. As some crushed, collapsed or broken items will effectively act as solid items once deformed, as previously advised, it also must not, in its deformed solid state, impinge into the 25 mm clearance zone.

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AIR COOLING DUCT PASSING THROUGH FIREWALL 16-2024

QUESTION: Would an air duct taking the (Red) pathing similar to the below sketch satisfy rules T.1.8.1.a & T.1.8.1.b given that the inlet of the duct is not facing the driver, and that the passage through the firewall is sealed with grommets as per rule T.1.8.4.b. "Grommets must be used to seal any pass through for wiring, cables, etc". For further clarity on the sketch, the duct I'm referring to is sketch in red, with the path through the interior of the chassis and passing through the firewall, as opposed to the alternate duct that is already CADed in the picture, which sit externally to the chassis and has no interaction with the firewall.

ANSWER: Your proposed design change to the duct shown in Red outline is not acceptable. It negates the firewall by providing a direct path from the container interior to the driver compartment which could allow the reverse transmission of fumes, hot gases, flames, etc. Your existing exterior location would be compliant as it is outside the firewall and not directed towards the driver.

NONFLAMMABLE RELAY CASING MATERIALS 17-2024

QUESTION: The switching element of the relays we use in our accumulator come insulated from the manufacturer with DuPont Zytel FR50 NC010 (UL94-V0 rated material). This leaves the terminals as the only exposed part of the relay - does this mean we are able to install non-flammable material covers over only the terminals of the relay, provided they seal against the relay body?

ANSWER: The intention of the rule is to prevent major internal failure of the relay or fuse causing damage to the rest of the pack. Recognising this, we regard the casing as part of the relay and therefore cannot be relied upon to perform the function of the barrier. Accordingly, a separate barrier is required between the relay and terminals and the battery.

RULES CLARIFICATION FOR F.10.3.1 WALLS 18-2024

QUESTION: Part (d) of this rule refers to a section on each external vertical wall, what defines a 'section'? Is a section referring to the accumulator segments?

For example, we have 5 segments with 4 external vertical walls, does this mean:

- a. we would need 5 fasteners on each external vertical wall, or
- b. do we need a minimum of 4 fasteners connected from the removable horizontal wall to any external wall, or
- c. do we need a minimum of one fastener per external wall.

ANSWER: In terms of definition, Sections limit the allowable weight and Segments limit the maximum voltage/energy, but for all practical designs they are the same thing.

You did not include a picture or drawing to help explain your design but we offer the following advice on how to interpret the rules whereby one fastener is required for each section for each external wall for that section/segment.

Accordingly, if your accumulator had 5 sections/segments per the simple example below, you would require a minimum of 12 fixings (f).

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f				f
f	f	f	f	f

In response to your further queries on the fixings we advise as follows. We hope this is sufficient for you to proceed.

1. As the issue relates to horizontal walls or covers, the sketch was a top view.
2. Our response relates to top fasteners and not to the fixings for the walls.

In line with this, to comply you would need to have a minimum of two fixings for each segment (one for each external wall).

We note, however, that this is your segment retention plate. In that case, this may require additional and/or differently located fasteners and adequate plate thickness to meet the specified load requirements if this plate is retaining your segments. Refer to the Clause F.10.3.4.

So, in summary, a minimum of two appropriately sized fasteners per segment but you must also ensure there are adequate size and number of fasteners and cover strength to meet the specified acceleration load requirements for segment/cell retention.

COMPRESSIBLE MATERIAL IN TRACTIVE SYSTEM 19-2024

QUESTION: The rule EV 6.4.1 specifies that: "All Tractive System connections must: c. Not include compressible material such as plastic in the stack-up"

In FSG Rules: EV 4.5.12 "All TS connections must not include compressible material such as plastic in the stack-up or as a fastener. FR-4 is allowed." Would the FSAE-A rules committee allow the use of FR-4 within the stack-up to match and align with the FSG rules?

ANSWER: FR-4 is not an acceptable material to use in a connection stack as it is not durably incompressible to ensure the ongoing adequacy of the electrical connection. Therefore, the published FSAE Rules apply and not the FS dispensation.

INQUIRY REGARDING STICKER PLACEMENT ON BUSBAR 20-2024

QUESTION: The competition rules specify a sticker size of 55mm x 20mm for the judge-provided sticker to be placed on the negative terminal battery busbar. We are seeking clarification on the placement requirements. Our current design has limited surface area on the terminal for the most negative cell's busbar, which may not accommodate the full dimensions of the sticker.

We would like to confirm if partial contact, such as a 13mm long gap, would be acceptable for the sticker placement on the busbar. Alternatively, if full adherence is mandatory, we would like to

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inquire about the possibility of using a self-provided sticker that adheres to the specifications but with the dimensions that better fit the available surface area.

ANSWER: Restricting to a partial contact would not be acceptable. The stickers, however, do not need to be on a linear face - wrapped around a circular conductor or post that has a circumference of 55mm is fine (i.e. 20mm diameter post or lug). We can locate the strip so we can see the part that matters - we only need to see about 40% of the 55mm length, effectively only one side of a circular section.

Alternatively, if you can locate a smaller sticker that is of equivalent specifications and provide us with the details (Manufacturer; Part Number; etc.) we may be able to accept that for installation during Electrical Technical Inspection.

ALUMINIUM FRONT HOOP PROFILE 21-2024

QUESTION: Can aluminium front hoops have a rectangular or trapezoidal profile, so that it fits against the curvature of the chassis better, if we can prove that it still meets all the minimum dimension requirements (area moment of inertia, cross sectional area, square width, and wall thickness) stated in F.3.2.1.c, F.3.4.1.a and F.3.5.3. The SES only allows for square or round profiles.

ANSWER: Alternative profiles are allowed but are obviously not set up for simple adequacy checks and equivalence per the SES input format. The simplest alternative would be for you to use a pure rectangular profile of dimensions of $L \times W$, where L is the longer side and W is at least 25 mm or greater. Provided you use an adequate thickness T and dimension W , then you can select "Square" and enter the dimension W and if EQ results are obtained, we will accept this, as we know with $L > W$, then your actual hoop will be stronger.

If you cannot adopt this simplified approach, then you will need to calculate the values required for your cross-section separately (the material properties specified in the Rules and the Second Moment of Inertia and Young's modulus as used in the SES to calculate bending and buckling) to prove equivalence to the accepted steel tube size and attach this to your SES submission.

RULES CLARIFICATION T.1.6.3.B 22-2024

QUESTION: Does the below firewall location (which will be designed to act as thermal protection) satisfy rule T.1.6.3.b.? The main heat sources such as the accumulator are well outside 25mm of the firewall, the only component coming closer to the thermal protection (firewall panel in this case) is part of the outside container for the inverter, of which the bottom is water cooled, as some components inside further away do generate some heat but should not be reaching temperatures near 60 degrees.

ANSWER: For Electric Vehicles we require that the accumulator container be at least 25 mm from the firewall but will accept other components encroaching into this space provided that they are not in contact with the firewall, and it is certain they will not generate sufficient heat to exceed a maximum temperature of 60 degrees Celsius.

Your firewall must also protect the driver's harness, which is not shown on your drawing.

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ACCUMULATOR MOUNTING 23-2024

QUESTION: In relation to F10.5.6, section b, does the 50mm distance count from the surface of the monocoque to the segment corner (for reference, we are using corner attachments)? We are exploring packaging options and were wondering if it would be possible to mount the accumulator fixture, which is within 50mm of a corner of a segment, to another fixture bolted to the monocoque, instead of the accumulator fixture directly to the monocoque? This would mean that the distance from the accumulator segment corner to the monocoque wall is larger than 50mm, however the connection to this second fixture is still within 50mm. This extra fixture would still be designed and validated to be strong enough to take the required force at the interface between said fixture and the fixture on the accumulator.

The specifics of this rule lie within the definition of 'mechanical connection'. We would still have a mechanically disconnectable mount at less than 50mm from the segment corner, but in addition to this connection, there will also be another mechanically disconnectable mount at the monocoque. We were wondering if this is allowed? If this is allowed, what standard would the bolts have to conform to? Can these bolts also be shared with main roll hoop mounts?

ANSWER: With regard to the mount location of “within 50 mm of the corner or less”, as you are using

the corner attachment approach, this refers to the location of the mount on the container to ensure it is close to the stiffer structure at the corner, not to where the ultimate fixing to the main structure is located. Provided your container mount meets this dimension, it will be acceptable.

With regards to the other aspects raised by your proposed two part design, this will probably require more fields per mount location than is available in the SES, particularly if there is no symmetry within the intermediate bracket design.

If you cannot enter all necessary data into the SES, you should provide additional calculations to show equivalency for every interface in the system. This could be done by duplicating the SES input section and inputting those unique values, below the primary calculations in the SES. Some marked up drawings of which interface goes with which set of calculations would assist the review of your SES input.

Note the minimum dimensions required for brackets and supports and minimum sizes for all fasteners

which are regarded as Critical for the Accumulator mounting.

We would not like to see a combined mount with the Roll Hoop, as the rules' minimum sizes for fasteners

and related fixings, assume a single purpose loading.

ACCUMULATOR HOLES AND OPENINGS 24-2024

QUESTION: With reference to rule F10.4.4, section c, does this mean that the seat is able to count as an obstruction for the holes to the driver? We also have carbon fibre ducting on the front of the container for airflow, would this also count as an obstruction?

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To summarise, does either the ducting for airflow or the seat mean that if the accumulator container structure has open holes on the front, it would be rules compliant as a result of these features in reference to this rule?

ANSWER: As you provided no drawings or pictures to clarify your desired approach it is difficult to assess

in detail, however, as a general approach we would not accept this as complying with the intent of the rules and providing adequate protection.

The intention here is that holes in the accumulator need to be positioned such that flame ejected from the holes will not directly impinge on the firewall in a line towards the driver. We would not regard the seat as being an additional or adequate flame and heat resistant obstruction.

The intent is that regardless of barriers, the holes should not be directed toward the driver. If this cannot be achieved, then a robust heat barrier (of a minimum equivalent to the material of the accumulator container) of sufficient size/shape to contain any flame exiting the holes.

You also refer to a Carbon Fibre duct on the front of the container. This would not be regarded as adequate but, without a drawing, this also raises concerns as to its location and sealing. The entry must be from the side and could not open into the driver compartment.

HARNES REQUIREMENTS T.2.3 25-2024

QUESTION: We are just a little confused with the "Y type" and "H type" shoulder straps. Am I right to assume (Y_type_question) is not compliant? And despite being a 4-point and shoulder straps are attached (H_type_question) shoulder straps are considered "H type"? Finally, will "Harness compliant question" be acceptable with the T.2.3.3?

ANSWER: A 'Y' type harness is one which joins the shoulder straps into a single rear attachment as shown in the diagram below. An 'H' type maintains the two shoulder straps through to two rear attachment points. Some will also have a strap joining the straps across the chest giving the classic H appearance. Your third image is therefore acceptable as compliant (as are the other two images you submitted) provided the Specification requirements of the Rules and/or Local Addendum are also met.

VOLTAGE TAP RING TERMINAL INSULATION 26-2024

QUESTION: With reference to EV.6.4.1.c, the ring terminals being used for our voltage tap connections (directly from our accumulator cell modules) into our BMS are insulated with a plastic casing (see attached photo). The connection still relies on metallic material being crimped and the plastic is rated for 105 degrees C; the plastic is also not directly in the stack up through the current path -- is this compliant for use or do the voltage tap ring terminals need to be bare metal terminals?

ANSWER: If the plastic insulation is not part of the clamping stack, such that electrical connection pressure is not reduced by change or failure in the plastic, it will be compliant with the rules.

TRACTIVE SYSTEM FIREWALL - ALUMINUM THICKNESS REQUIREMENT 27-2024

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QUESTION: The rule specifies that a tractive system firewall, i.e the firewall behind the driver in an EV is required to be made of aluminium. Does this need to be a specified thickness (as it has been in the past)? If not, would it be permitted to reinforce the firewall on one side with a composite material for added rigidity and strength, thus reducing the thickness of the aluminium?

ANSWER: We agree that the rules change is confusing. We will issue a clarification of our expectations for the firewall in the Local Addendum in line with this response. Both T.1.9 and T.1.8 must be met with the latter requiring that the firewall must be made from a rigid non-flammable material and rigidly mounted.

To comply with this, we expect that the firewall itself meets these requirements, not through an added composite support with inadequately thick Aluminium section.

We therefore require that the Al be a minimum of 0.5mm thickness and the traditionally used and readily available 1 mm thick Al sheet would be preferred. Rigidity may be obtained by structural shaping and/or via the edge mounting or addition of Al bracing.

The firewall should not deflect into the accumulator clearance zone under a reasonable load such as from seated driver - refer also to the Local Addendum under T.1.8 on Seat Structure.

THERMALLY SENSITIVE STICKER FOR COMPETITION TEMPERATURE MONITORING 28-2024

QUESTION: Is the 4mm thickness of the thermal sensitive sticker an error? We believe this is supposed to be 0.4mm but we were hoping to clarify this.

We are using the Enepaq 5P 18650 modules and are wondering if it would be permissible to mount the sticker onto side of the cell in the middle of the module as shown in Figure 1. As we understand, the metal casing of the cell is its negative terminal, and so this location would be ideal for temperature monitoring. However, we have a couple of questions regarding this:

Would it be permissible to leave the green casing around the cell on? This means the sticker would not be in direct contact with the cell terminal, however we believe it is better practice to leave this covering on the cell.

Would it be permissible to slightly trim the edges of the temperature sticker in order to fit between the side walls of the Enepaq module? As labelled in the figure, this length is 53.5mm which is 1.5mm shorter than the specified 55mm.

Alternatively, if the size of the sticker cannot be altered, would it be permissible to mount the sticker vertically along 3 of the cells as shown in Figure 2 (attached)?

The sticker would be viewable via a removable bolted aluminium or makrolon hatch on the side of the accumulator casing.

ANSWER: In response to your questions, we advise as follows:

1. The dimensions quoted were for maximum allowances and the stickers will in fact be closer to 1mm in thickness.

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2. We are awaiting our supply of stickers to arrive to verify if some level of edge trimming is possible, but your question may be a moot point anyway, as your proposed location and preferred methods of mounting do not meet the rules requirements.

“The device must be placed on the warmest negative cell terminal of the TSAC and in direct contact with the terminal or less than 30mm away from it on the busbar”.

Placing it on covering material or cell in the middle of a segment or across a number of cells clearly does not meet the above or requirement for uninterrupted contact with a continuous piece of metal.

If you modify your design to mount in on the bus bar or most negative or warmest cell terminal, your dimensional restrictions may likely not arise.

EV.7.5.8 INDEPENDENT CELL TEMPERATURE MONITORING DEVICE ACCESS 29-2024

QUESTION: Is removing the lid of the accumulator classed as an “easy way” for the thermal strip to be accessed?

ANSWER: As indicated in the Rules Addendum, the intent is to have simple access to read the strip via a hatch or window without requiring tools and removal of numerous bolts and major covers. You should see if you can provide an adequate window or small hatch in your cover to achieve this. If not, then as a new requirement, we will accept alternative methods, for this year only. This should be made as simple and expedient to access as possible.

IMPACT ATTENUATOR AND ANTI-INTRUSION PLATE TESTING 31-2024

QUESTION: For F.8.8.7 - This year we aim to use a composite Anti-Intrusion Plate that is bolted onto the monocoque front bulkhead and an Impact Attenuator that is a 3D printed gyroid structure that was developed for a QUT honours thesis. Due to the nature of the geometry being a gyroid, does that constitute a "composite" Impact Attenuator? And as such, does this need to be Dynamically tested? For reference, the custom impact attenuator has been tested Quasi-Statically and passed all criteria.

For F.8.4.3 and F.8.8.6-7 - As we are moving to a composite Anti-Intrusion Plate, we will need to test the AIP and IA as an assembly to ensure that the AIP does not deflect more than 25mm. As per F.8.8.6b, we require a rig that replicates the first 50mm of the front bulkhead. Due to budget constraints, we cannot manufacture a composite replica of the front bulkhead. Are we instead able to use the first 50mm of a steel spaceframe layout given in SES as our testing rig? All mounting holes, and AIP attachment methods will replicate that of the monocoque chassis.

If we were to instead run the standard aluminium honeycomb impact attenuator with the composite anti-intrusion plate, do we still need to test the AIP and IA together with a rig, or would we just be able to test the AIP using the methods under F.4.3.2 and F.4.3.5 (3-point bend test and laminate shear) as stated in F.8.3.2.

Our aim is to eliminate the need for having a steel cross brace mounted to our front bulkhead, as it is a significant weight penalty.

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ANSWER: With regards to the separate queries contained in your submission, we advise as follows:

F.8.8.7: The rules apply to the material of the Attenuator, not its design or shape. Therefore, your gyroid Attenuator, which we assume will be constructed from some type of composite material, not foam block or honeycomb, must be dynamically tested.

F.8.4.3 and F.8.8.6: It is acceptable to use an alternative support versus an exact replication of the front bulkhead of your vehicle. Desirably for equivalence it should have similar strength and deflection to your actual vehicle. Use of the steel baseline section is acceptable but may give different results to your actual design (greater deflection of the AIP if bulkhead is too stiff) and you should do some calculations to check this.

F.8.3.2: If you use a Composite Impact Attenuator Plate, this can either be physically tested or verified via Laminate Material Testing per F.4.3.2 and F.4.3.5.

Whether you require a diagonal support or not is a separate question. If you are using the Standard Honeycomb IA, then there must be a diagonal brace or you must do a physical test per F.8.8.6 and F.8.8.7.

M4 BOLTS FOR RETAINING ACCUMULATOR CELLS 33-2024

QUESTION: Part d of the referenced rule states that "Any fasteners must be 6 mm or 1/4" minimum diameter". In our design, due to space constraints, it is not possible to use 6mm bolts for the purpose of retaining cells to their casing. Instead, we have used M4 bolts that we have tested to failure to verify their suitability for use. Attached is the test protocol/report detailing that the strength of the used bolts are enough. Is it okay to use these bolts given the evidence of suitability?

ANSWER: We are concerned with your proposed design. The assumption is that the attachments would usually be steel bolts but in this case they are not specifically specified as Critical Fasteners. If you want to try and prove equivalence by showing ability to meet the load requirements, you need to look at the total system. The Rules require this in any event; to show the total pack will withstand the specified G forces - not just individual attachments. You also did not test for shear loads.

If you use a plastic type of material, as they are subject to strength variation with temperature, you would need to test at a temperature of 60 deg C.

You cannot assume that all attachments will simply share 1/7 of the total pack loading. A system analysis of the loads through the pack and resultant forces which occur at each of the different fasteners needs to be done. Have you checked that your skeletal structure itself will carry the required loads?

Obviously if you use 6 mm fasteners you simplify the task but you must show in the SES that the total pack will meet the required loads and if you wish to continue to use only 4 mm fasteners, then a much more comprehensive test needs to be developed considering shear/bending also and the attachments heated to 60 degrees.

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MAIN HOOP ATTACHMENT, CRUSHABLE ITEM DEFINITION 34-2024

QUESTION: F.7.6.2: how to measure 25mm. Given Figure 1, is the bend in the main hoop below the top of the side impact structure considered to be re-enforced by the middle attachment, per F.7.6.2?

Also, is the firewall classified as a crushable item per F.11.2.3, given it is made from 0.5-0.7mm aluminium sheet with Nomex attached?

ANSWER: The intent of this rule is to ensure that any of the bends below the top of the SIS are located close to a mount for support. A dimension of 25 mm was therefore selected but it is not clear how this was to be measured. We would accept a system where the distance from the start of the bend is within 25 mm of the Centreline of the attaching bolts on the mount. Dependent on individual designs, if the clamp were then forced to be on the bend, then we would accept a small tolerance to move the edge of the clamp to the start of the bend.

With regards to the Firewall, you seem to be referring to the 2023 Rules, as this area was changed in the 2024 Rules and clarified in the local Addendum. Therefore, we would regard the Firewall as Non-Crushable and, in any event, a space is required to allow for convective heat insulation, refer to T.1.6.3.b, so the 25 mm is required to be met.

COCKPIT FLOOR PANELS 35-2024

QUESTION: Would you be able to give us some clarification on rule T.1.7.3, there are two aspects we are seeking clarification. For reference we looking to use a Carbon Fibre Floor reinforced with either a foam core or aluminium honeycomb core depending on how our testing goes.

1. What are the requirements for "non-brittle", is there a standard or a basis this rule has been created around which we would be able to follow and implement with our designs. Carbon Fibre is a material that can have brittle properties so our question here is where is the line drawn?
2. With the possibility of us using a aluminium honeycomb core for our carbon fibre floor, there will be small pockets of air throughout the material thus by definition making it no longer "solid". What are the requirements and intent behind the "solid" component of that rule?

ANSWER: In the context of the intent to provide reasonable protection to keep out track debris (which could include dropped hardware or parts from other vehicles as well as stones), we offer the following guidance.

A simple floor regarded as adequate would be 2 mm Steel or 3 mm Aluminium which are clearly non-brittle and solid. We are looking for materials that will not readily shatter into small fragments on impact. Generally, a composite material with a honeycomb or woven material internal core (e.g. Kevlar) or other flexible core, would be considered a non-brittle component. "Solid" refers to the strength and continuity of the material to ensure continuous coverage over an area with no large holes and ability to transfer load to the surrounding material. Holes within a conventional honeycomb inside an outer skin, would not be regarded as negating the ability to consider the overall component as "solid".

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MINOR DETAILS FIREWALL EV 37-2024

QUESTION: We have 3 clarifying questions:

The first 2 are in regards to the overlapping from part a) of rule T.1.8.4:

1. Is the overlapping seen by the selected (Blue) panel and the grey panel in (FIREWALL INQUIRY IMAGE 1) sufficient to meet that rule? (Note we are going to use a sealant as per T.1.8.4.c)
2. For Sections of the firewall which pass over a tube of our Space Frame (Space Frame material is Mild Steel and will be painted) is the lack of overlapping as seen in FIREWALL INQUIRY IMAGE 2 sufficient to meet the spirit of the rules or would it be more acceptable to add an additional round panel which overlaps both panels to meet this rule?

The last question is in relation to T.1.8.4.b for our brake lines we are planning to use a standard firewall grommet to pass through so that isn't an issue but for our loom we would like to use a disconnect which is rated for the environment instead. While it is not named a grommet it does do the same job. Is this disconnect acceptable to meet the requirements of T.1.8.4.b?

ANSWER: With your un-dimensioned and un-annotated pictures it is impossible to make specific conclusions on the first two items but we can provide the following guidance.

In the first case, the overlap appears to be about the same as the tube diameter so around 25mm which should be sufficient with use of an appropriate sealant and provided the joint is not in stressed area (which cannot be deduced from your drawing). We note there is a small hole showing in your drawing which must also be eliminated or sealed.

In the second case, as there is some doubt about the adequacy of coverage, we suggest you should proceed to add the extra panel you are considering to ensure there are no surprises at Technical Inspection.

Your proposal to use a fully obscuring disconnect for the wiring is acceptable provided it is rated for the environment.

BATTERY CHARGER RCD OR RCBO 38-2024

QUESTION: Is the Residual Circuit Breaker (RCB) required as part of the charger circuit (and must be provided by teams independently), or is this already built into the charging infrastructure on-site as per Australian legal requirements?

ANSWER: You are incorrect in assuming that all facilities will have an earth leakage device fitted. AS3000 relates to installation wiring, not connected equipment and also only applies to new and recently upgraded facilities to include earth leakage on appliance outlets, so you may encounter an outlet which has no earth leakage protection. Your safety strategy should also consider all failure modes and include the case that an earth leakage device may be non-functional. In almost all cases, you will not have access to the switchboard feeding the outlet, so it might not be possible for the team to use the "test" function on an installed device, so you cannot be confident if the installed device is functioning correctly.

We therefore require all teams to have their own earth leakage device (RCBO or RCD)

When selecting an RCBO or RCD for your team, you should consider the normal leakage current of the equipment and select a unit which provides the best possible protection without unintended

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trips. For most circumstances, this means that teams should utilise a trip sensitivity of substantially less than 30mA.”

NON-CRUSHABLE ITEM DEFINITION ENQUIRY 38-2024

QUESTION: Could you please further clarify what constitutes a crushable or non-crushable item. For reference, we wish to mount a PLA plastic shroud/duct with small server fans to the side of our accumulator container (shown in attached images) and would like to know if it complies with F.11.2.3.

Specifically, we would like clarification on the following:

- Are the fans classified as non-crushable?
- Would the fan shroud be classified as non-crushable?
- What is the test used to check the clearance compliance in scrutineering?

According to our interpretation of F.11.2.3, if both items are considered non-crushable, they must have at least 25mm clearance to the wall of the accumulator (cannot be mounted against it). Alternatively, if both are considered crushable and can hence be mounted against the side of the accumulator, would they be considered part of the accumulator regardless of their crushability? Would this mean that the current 23mm clearance between the fan and side impact structure (see image 2) is not rules compliant?

ANSWER: As it is almost certain that the majority of a fan would be metal and with a metal fan shaft, even if the blades were flexible plastic, it would be a non-crushable item and must be allowed for.

If parts will collapse or shatter at loads significantly below the loads necessary to damage the Accumulator container, they may intrude into the 25 mm zone and may be regarded as crushable. For your fan shroud, it appears that due to its dimensions and shape it is likely to transfer any impact loads into the side wall of the Accumulator.

In Technical Inspection a measurement of the distance from the surface of the part to a vertical plane touching the inside of the Side Impact structure would be taken, which appears to be what you have followed in showing the 23.3 mm clearance in your attached drawing.

In your situation, as the fans are mounted to the accumulator case, rather than having a clearance between the container wall and the fan, then a clearance of at least 25 mm must be provided between the fan/shroud exterior face and the chassis structure or any other non-crushable items.

Your 23.3 mm is close to meeting the 25 mm. If you were able to make minor changes to the shroud to achieve the extra clearance, or ensure it would partially crush, it would be acceptable.

If only plastic fan blades and not the shaft extended into the 25 mm zone, they could be ignored.

NOSE CONE RULE ENQUIRY 40-2024

QUESTION: Does the below nose cone satisfy the rule T.7.2.1 given that the design of the nose cone is to enclose the chassis and IA, following its shape and does not provide any aerodynamic advantage? And given this is not an aerodynamic device it is permitted to protrude past the

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700mm limit? If a typical front wing was to be added, and mounted to the chassis does this nose cone still satisfy these rules?

ANSWER: We confirm that your conventional nose cone is not an aerodynamic device and therefore may extend further than 700 mm of the vertical plane at the front of the front tyres.

If a front wing is added, it must comply with the 700 mm requirement but would not affect the situation regarding your nose cone, unless the cone were integrated in some way to provide aerodynamic function in combination with the wing. A fully separated wing would not be an issue.

SES REAR IMPACT STRUCTURE 42-2024

QUESTION: We are just wondering about the SES section involving the rear impact protection for EV's. Our team is running steel tube chassis with a billet plate equivalent for our structure which would be mounted to the chassis frame via 12 M5 bolted connections.

Since the SES only goes up to a selection of 8 fasteners are we limited to using only 8? Or can we run more than 8?

Also, we can see that rule F.7.8.7 specifies the use of an M10 bolt for the fasteners of the impact structure. Does this mean that it is not possible to run any bolt size below M10 without supporting evidence?

ANSWER: You may have more than 8 fasteners in total but are restricted to showing a maximum of 8 in the SES input. Also, per F.7.8.5, 2xM8 fasteners are acceptable versus a single M10.

Despite halving the test load, this however will result in a "Check" flag in the SES but will nevertheless be accepted.

If your fasteners are smaller than M8, then you will need to submit a supporting calculation to show that your fastener system is equal to or better than 4 M10 or 8 M8 fasteners.

It is recommended that you provide some brief comments in the free cells of the SES highlighting where your design deviates from the standard M10 configuration, since the SES does not allow you to input this information directly.

SAFE METHOD OF DISCHARGE 43-2024

QUESTION: Do teams need to bring a discharge unit to safely be able to discharge the accumulator? Is it acceptable to say that as long as the accumulator is already at less than 50% that a method of discharge is not required? Previously this section of the addendum has not been included in technical inspections although it has remained in the addendum.

ANSWER: Yes; you will need to demonstrate at the event that you can safely discharge the battery in case the need arises. You therefore will need to attend the competition with your discharge unit. A load bank that can rapidly discharge the battery is not required but a capability to discharge in a "reasonable" time, so it does not need to be a high-power resistor.

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TRACTIVE SYSTEM WIRING 44-2024

QUESTION: What constitutes a "orange shielded cable". For example, the AMK motor comes with 3x4mm² wires covered with shielding and heatshrink. Provided each individual phase wire and the heatshrink are 600V rated, does this constitute a "orange shielded cable", or would orange conduit be required regardless?

ANSWER: Regardless of the rating of the wiring/connections, the outermost surface of the cable or conduit must be orange in colour. It is acceptable to use a secondary material in order to achieve this such as Orange Heat Shrink or Conduit.

REQUIREMENTS FOR STANDARD HONEYCOMB AND FOAM IMPACT ATTENUATORS WITH AN OVERSIZE FRONT BULKHEAD 45-2024

QUESTION: Our team would like to clarify some of the requirements for standard honeycomb and foam Impact attenuators with an oversize Front Bulkhead.

F.8.4.3: If the outside profile of the Front Bulkhead is more than 400 mm x 350 mm, or the team uses the Standard Honeycomb Impact Attenuator, and then one of the two must be met:

- a. The Front Bulkhead must include an additional support that is a diagonal or X-brace that meets F.3.2.1.b or Equivalent (integral or attached) for Monocoque bulkheads F.2.3.1 • The structure must go across the entire Front Bulkhead opening on the diagonal • Attachment points at both ends must carry a minimum load of 30 kN in any direction
- b. Physical testing per F.8.8.6 and F.8.8.7 must be performed to prove that the Anti Intrusion Plate does not permanently deflect more than 25 mm"

We have an oversize front bulkhead profile and would like to meet requirement A mentioned above so that no testing is required. Per the requirements of the SES, we're intending to bond a composite diagonal panel to the AIP. However, the SES does not ask for the layout of the composite diagonal panel, we believe it is intended to be the same as what's used in the layout for the front bulkhead. For more information about how we're setting up the IA we've attached screenshots of how the SES is filled out showing equivalency is met. We want to clarify that our interpretation of the requirements for a composite diagonal is correct for both standard foam and honeycomb attenuators.

ANSWER: As you will have also proven equivalence of your bulkhead layup, use of the same layup for your diagonal is acceptable. You should note this as being the case in your SES submission.

COMPETITION LOGO PLACEMENT AND SPACE 46-2024

QUESTION: The Rule VE.1.3 states: "The logos of the major sponsors of the competition, as well as the SAE-A logo, must be displayed on the nose cone of the vehicle, symmetric about the centreline of the vehicle and in a clear space of 210mm wide by 500mm long."

Is a total area that is equivalent or greater than the specified area (210mm x 500mm) satisfactory, for instance a clear space of 320mm by 330mm. Layout of sponsor logos would be structured in the following image. Original Area (210x500): 105000mm squared. Area Proposed (320x330): 105600mm squared.

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ANSWER: Your suggested alternative dimensions are not acceptable. It is not the area but the rectangular layout which is required (as in all prior years) to affix the set of Sponsor logos which are supplied by SAE-A and must be adhered to or penalty points will be applied.

The latest issue of the Addendum V 4.0, (about to be issued) clarifies this further and a typical example of the appearance and required location is available on the Formula SAE-A web site.

ESF AND THE RUNNING OF LAST YEAR'S ACCUMULATOR 47-2024

QUESTION: We would like to get 2 accumulators scrutineered this year, the one that we are building this year and the one we made last year. The question is, what do we have to do regarding the ESF to make this possible. Is it possible to submit 2 ESF's for our entry this year as the accumulators are not identical?

If so, our previous years accumulator passed scrutineering and competed last year and has a complete 2023 ESF associated with it. Do we just submit this as well as the ESF for this years accumulator or do we have to fill out and submit a full 2024 ESF for both our 2024 and 2023 accumulators.

If not, are there provisions in the ESF for us to submit diagrams and the like relevant to both accumulators?

ANSWER: The intent of the rules is that if a spare accumulator is used by the team, it must be identical to the Accumulator installed in the vehicle and reviewed at Technical Inspection. This maintains identical interfaces and total system conditions.

Accordingly, if your prior year Accumulator is not identical, it cannot be used as per EV.5.1.4 and your question regarding two different ESF's is not relevant to the event.

SHOULDER BELT ATTACHMENT 52-2024

QUESTION: May we utilise an eye bolt fastener for shoulder belt attachment coupled with a clip on bracket as approved in the lap belt attachment. More explanation in the file below.

ANSWER: You have not identified why you want to introduce an eye bolt in this location nor given us an overall understanding of your design and what you are trying to achieve.

Unlike the prior situation for a lap strap, where an eye bolt is referred to in the rules and is often used in that location and facilitates alignment, this is not the case with the Shoulder Straps.

A common design is the strap wrapped around the bar. This optimises the angle of the strap and the load on the bar. If your certified harness as received from the manufacturer includes clip-on attachments, then the rule also cater for that with an appropriate tab or bracket.

You refer to a separate clip but you must use the belt as supplied by the manufacturer without change and installed using the manufacturer's supplied hardware and installation instructions (T2.2.5.6).

Accordingly, we do not see any justification for use of an eye bolt in this location, whether your chassis is a Tube/Frame or Monocoque.'

SOLDERING VOLTAGE TAPS FOR AMS VOLTAGE MONITORING 53-2024

QUESTION: We are wondering if our method of monitoring voltage for the AMS is acceptable; we run short wires that are soldered from our "terminal boards" (red PCB) to the "voltage tap

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busbar”, which is a 0.55mm thick copper tab located on top of our 2mm thick copper busbar. As EV.5.2.4 notes the exception for soldering wires for voltage monitoring of the AMS, we believe this to be acceptable, however are seeking clarification on this.

ANSWER: Your proposed circuit layout and use of solder in this configuration is acceptable. We would remind you of the EV.6.6.6 overcurrent protection requirements for conductor lengths of over 150 mm.

HEAT SOURCE CONVECTION ISOLATION AIRGAP 58-2024

QUESTION: Is the 25 mm air gap required for convection isolation measured through any intermediary panels (the firewall) to the panel the driver can contact (the seat), i.e. a straight line between the two, or is it measured around these intermediary panels to the panel the driver could contact. i.e the shortest path that air could take between the two?

ANSWER: The intent of the rule is to provide a free space of at least 25 mm for convective air flow between the heat source and any adjacent panels or the area being protected.

Therefore, there must be a minimum space of 25mm from the heat source to the nearest panels or other components or between a secondary panel and the area being protected. The space cannot be sub-divided.

AV- 01-2024 – RULES ENQUIRY

QUESTION: With reference to rule T.14.8 Actuator Decoupling in the FSG AV rules, it specifies that the Autonomous system is not permitted to be removed from the car during dynamic events, which includes Driver-operated events. Due to the separation between EV and AV competitions for the FSAE-A Competition, would it be aligned with the competition to assume that autonomous systems are permitted to be removed for EV dynamic events and all EV Technical Inspections?

ANSWER: With regards to your query on relationship to the FS rules and decoupling of AV components when running as an EV, for this year we will be following the European FS approach as it would otherwise require additional Technical Inspection which is one of the bottle-necks at our event. Accordingly, you should design the vehicle and systems for dual purpose use and ensure that all the rules relating to a driver in the vehicle are met with the AV components in place.

The Cost Event will allow for elimination of the costs relating to unique to AV operation components when competing in the EV segment of the competition.

AV-03-2024 -DRIVER DISPLAY AMI

QUESTION: The team would like to know if the driver display can be used as an Autonomous Mission Indicator (AMI). This is related to Rule T14.11.5 from the FSG 2024 Rules. The data is transmitted over CAN which will allow the team to fulfil error checking and correction in alignment with System Critical Signal (SCS) rules.

ANSWER: It is acceptable for your AMI to use the Driver Display, provided this is located on the instrument panel/dashboard and complies with T.14.11.5 (which also allows placement next to the ASMS).

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It must be clearly readable in bright sunlight by a person standing outside the driver's cockpit, with the required display information per T.14.11.4.

COST PART AND ASSEMBLY NAMING CONVENTION C-01-2024

QUESTION: The eBOM Template specifies the following naming convention:

For Assemblies: FSAEA-24-E63-XX-AXXXX

For Parts: FSAEA-24-E63-XX-AXXXX-XXXXX

However, the 2023 FSAE-A Rules Addendum V2.2 Line 119 specifies:

For Parts: FSAEA-24-E63-XX-XXXXX-XX

This convention uses the first 3 digits to specify the assembly and the last two digits to specify the part ID.

The team would like clarification on two things:

1. If the conventions outlined in eBOM templates and the Rules addendum are recommendations or requirements
2. If there is a strictly required convention to be followed, which out of the eBOM template and the Rules addendum shall be followed?

ANSWER: The 2024 Local Rules Addendum which will be released in the next few weeks covers the Part Numbering system and recommended approach to be followed. It is not mandatory but should assist teams if followed in creating a logical readily traceable system.

The new matching EBOM template for the local 2024 competition which also be loaded to the website in the near future, so you may like to review these before finalising your system. Teams may develop their own numbering system but it is essential that it is consistent throughout the report and produces the unique identifiable reference ID. It should also not result in absurdly long numbers.

The following is the recommended approach which will be included in the definition of the Cost Event in the 2024 Local Addendum.

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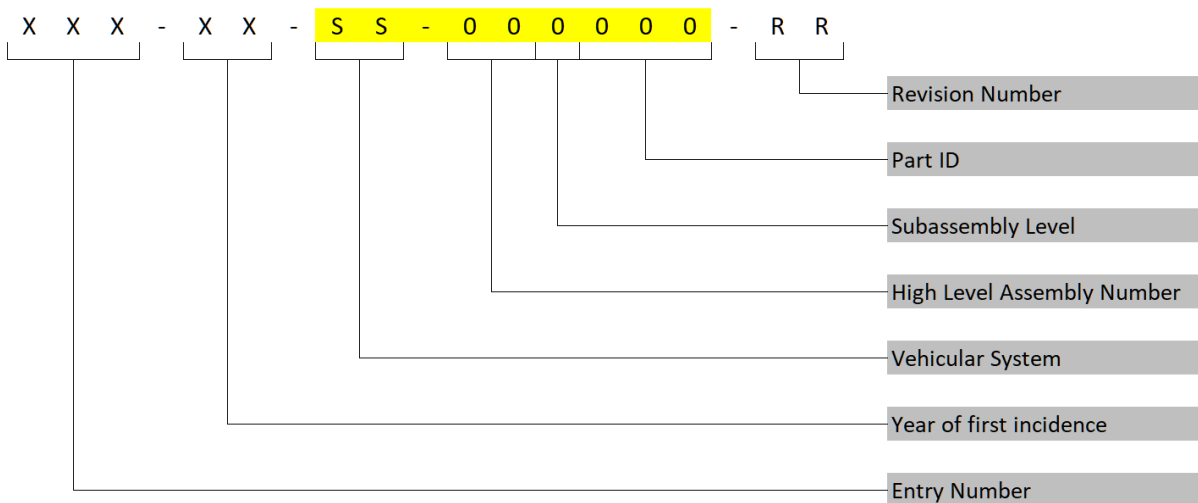


Image S3-1: Recommended part numbering convention for the FSAE-A competition

GENERAL QUERY 01-2024

QUESTION: I want to create a Carbon Fibre upright for the next Formula student vehicle and was wondering if this is allowed since the rules don't say anything against composite material for suspension components for that nature.

ANSWER: Alternative materials, such as Carbon Fibre composites, may be used for the manufacture of components in Formula vehicles except where another material is specifically required in the Rules. Accordingly, its use for manufacture of an upright is allowable. You should be able to derive the appropriate manufacturing cost from the Cost Table which will shortly be loaded to the local FSAE-A website. Once you have finalised your design and process and if you find any issues with costing, please submit those details in a Cost Enquiry for assistance if necessary

Obviously careful manufacture will be required to avoid any defects and you should establish how the team will verify adequate strength in the finished parts before use on a vehicle.

ESO Labelling for Accumulator Containers 62-2024

QUESTION: According to EV.11.5.4, "Each Accumulator Container(s) must have a label with the following data during charging: Team name and Electrical System Officer phone number(s)." Is it acceptable to list only 3 ESO phone numbers, rather than every ESO from our team, on the label? Our team has more than 3 ESOs, but we're considering listing just 3 for practical purposes.

ANSWER: While it is acceptable (and a good situation) to have multiple team members trained to be capable of undertaking the role of the ESO, it is preferred that there be only one designated ESO, or Principal ESO, to ensure there is a clearly defined single authority to oversee and approve the required actions per EV.11.1.1. Accordingly, only that one person should be designated as your principal ESO and their contact details should be on the battery box.

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Low Voltage without Accumulator – 66-2024

QUESTION: We would like to inquire about the intention of the rule EV4.4.1b.

In future vehicle concepts, we are investigating the possibility of using a galvanically isolated high-to-low voltage converter, powered by the accumulator, to provide low voltage power to the vehicle.

When the accumulator is removed from the vehicle for scrutineering or otherwise, we would propose to use an independent and rules compliant low voltage battery to power the car. We would like to know if this is compliant with the intention of EV4.4.1b as the GLV system is still able to operate with the Accumulator removed.

ANSWER: What you are proposing with an alternative LV battery to provide LV power when the Accumulator is removed would be acceptable provided that the battery:

- Is permanently installed in the vehicle in compliance with all of the Low Voltage rules and is present at TI
- Operates through the GLVMS
- Has the required over-current protection

Clarification on Rule F.11.2.3. Accumulator Clearance – 69-2024

QUESTION: The team aims to seek clarification on the interpretation on Rule F.11.2.3, and hence check the legality and adequacy of A63's chassis design and compliance with outlined rule.

ANSWER: The rule is based on a simple dimensional criterion which is readily verifiable at Technical Inspection and not based on defined performance criteria, which would be difficult to verify for all teams. You refer in your submission that there is ambiguity in the rules but such does not exist. It states a clearance of 25 mm must exist around the accumulator container to all non-crushable items and then lists a selection of items, which includes the impact structures.

Accordingly, while we commend the work done by your team to analyse your design, you must nevertheless comply with the 25 mm dimensional requirement stated in the rules. This is in keeping with prior rulings given to other teams.

Note that the clearance requirement does not apply to the Accumulator Mounts or related tubes/structure to which they are attached.

Galvanic Isolation – 70-2024

QUESTION: In our accumulator, we are running a 110s4p configuration of cells, split over 5 segments, making each segment 22s4p. The maximum voltage of a segment is 92.4V. For our AMS, we are using the Orion BMS 2, which provides 2.5kV isolation between each connector, organized in groups of 36 cells. Due to our segment arrangement and the BMS selection (144s configuration), the BMS comes with 4 connectors. This forces us to split each connector across 2 segments, with 2 cell groups from one segment and 1 cell group from the other segment.

The cell groups have 100V isolation between them as seen in the Orion BMS 2 specifications sheet. For each of the 3 cell groups per connector, the maximum voltage produced by our segments is

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under 50V (46.2V exactly). This provides a margin of 216% between segments within the AMS. Will this configuration of segments adhere to rule EV.7.3.2?

ANSWER: Unfortunately, it appears that you have procured the wrong Orion BMs for your system.

To provide adequate isolation you need to have only one plug per segment and the Orion is available in a 5-plug model and each plug has 2.5kV isolation to the other plugs, which meets the requirements.

In your design the 36 cells per plug are divided into 3 groups of 12, each of which has an isolation of 100Volts. This is insufficient as the isolation between segments needs to be higher than the total pack voltage. You cannot therefore rearrange your wiring as proposed, while still meeting the Galvanic isolation rules.

Accordingly, there appear to be two options available:

1. reduce your accumulator down to 4 segments to match your existing Orion BMs, reducing the capacity and maximum voltage by 20%, or
2. expeditiously purchase a new BMS with the correct number of input plugs.
The unit size should be similar to your existing unit and not require major packaging redesign.

Shutdown Circuit Manual Reset – 72-2024

QUESTION: What is considered a "manual reset" of the shutdown circuit? Could a separate external button be used given it will not be accessible to the driver sitting in the cockpit?

ANSWER: As you have deduced, the rule requires reset manually by someone external to the vehicle and at the vehicle. Remote activation or by driver in the cockpit is not allowed. Your proposed solution should therefore be acceptable.