

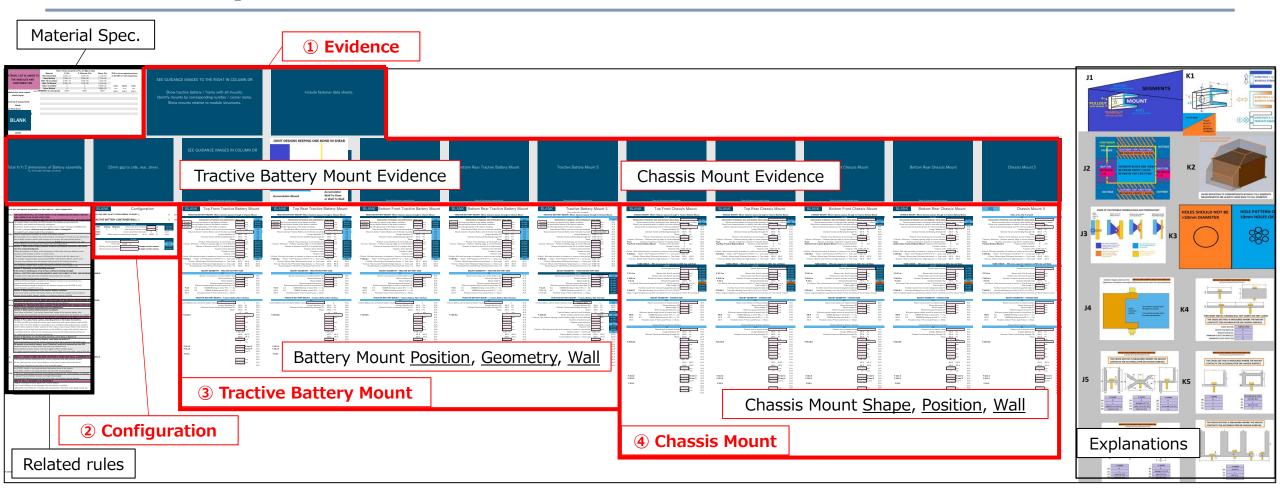
# 07-3\_SES guidance EV Battery Attachment

### F.10-11 **Battery Attachment**

✓ Tractive Battery Mount and Chassis Mount

### **Sheet Map**





- 1 Evidence
- **2 Configuration Mass Based, Corner Attachment**
- 3 Tractive Battery Mount Battery Mount Shape, Position, Wall
- 4 Chassis Mount Chassis Mount Shape, Position, Wall

### 1 Evidence



Mountを明示したTractive Battery、Frameを図示すること

- ・Mount NumberまたはCorner Nameをそれぞれ明示すること
- ・関連するTractive Battery 内部のModulesのStructureが分かるようにすること

Show the Tractive Battery and Frame with Mount

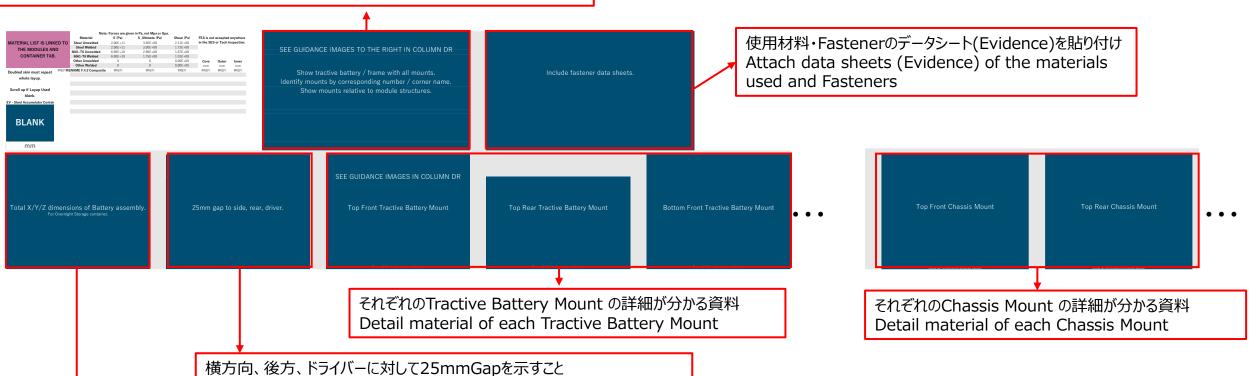
Show the Mount Name or Corner Name Clearly

Show the Relative Module Structure inside of the Tractive Battery

Show the 25mm Gap to Side, Rear, Driver

低画質の画像を添付する場合、文字がつぶれて読めないことがある。その場合は審査不能として 扱われる。

When attaching a low-quality image, characters may be broken and unreadable. In that case, it will be treated as impossible to examine.



Tractive BatteryのX,Y,Z寸法が分かる資料
Total X/Y/Z Dimension of Battery Assembly

スペースが足りない場合は下方空白に添付して良い (但し、審査員が見つけられなかった場合はないものとして扱われる)

If there is not enough space, you can add it in the blank space below. (However, if the judges cannot find it, it will be treated as if it does not exist.)

### 2 Configuration



### **Tractive Battery Attachment calculation in SES**

**Load Based** : いかなる方向へも1か所辺り15kN以上の強度

Minimum 15 kN per location in any direction.

Corner Mount : 重量の1/4\*40Gの荷重に対し、所定の強度で良いが取付箇所の指定あり

For a load of 1/4\*40G of the weight, the specified strength is sufficient,

but the mounting point must be specified.

### Mass Based = Load Based

F.10.5.7 Tractive Battery Pack Attachment – Load Based

a. The minimum number of attachment points depends on the total mass of the Pack:

**Pack Weight Minimum Attachment Points** 

< 20 kg 4

20 - 30 kg 6

30 - 40 kg 8

> 40 kg 10

b. Each attachment point, including any brackets, backing plates and inserts, must be able to withstand 15 kN minimum in any direction

### **Corner Attachment**

F.10.5.6 Tractive Battery Pack Attachment – Corner Attachments

- a. Eight or more attachments are required for any configuration
- One attachment for each corner of a rectangular structure of multiple Modules
- More than the minimum number of fasteners may be required for non rectangular arrangements

Examples: If not filled in with additional structure, an extruded L shape would require attachments at 10 convex corners (the corners at the inside of the L are not convex); an extruded hexagon would require 12 attachments

- b. The mechanical connections at each corner must be 50 mm or less from the corner of the Module
- c. Each attachment point must be able to withstand a Test Load equal to 1/4 of total mass of the Tractive Battery Pack accelerating at 40 g

Understand and decide the Rules of Mounting Method. Note that requirements differ depending on the Mounting Method.

# 2 Configuration (Mass Based)



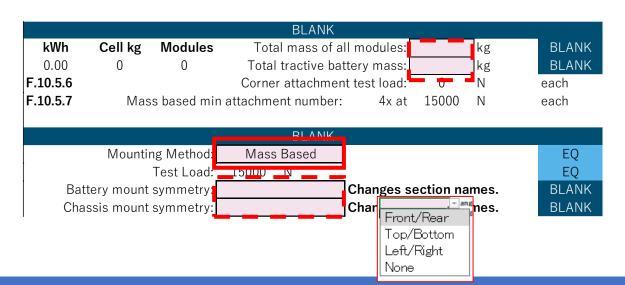
SIDE

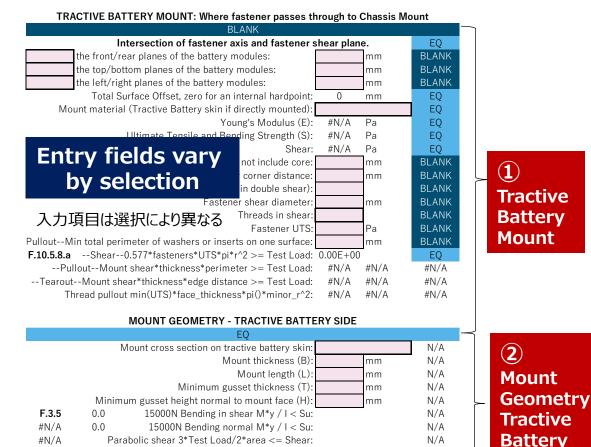
### Mass Based = Load Based

- F.10.5.7 Tractive Battery Pack Attachment Load Based
  - a. The minimum number of attachment points depends on the total mass of the Pack:

**Pack Weight Minimum Attachment Points** 

- < 20 kg 4
- 20 30 kg 6
- 30 40 kg 8
- > 40 kg 10
- b. Each attachment point, including any brackets, backing plates and inserts, must be able to withstand 15 kN minimum in any direction





TRACTIVE BATTERY MOUNT :: Tractive Battery Skin interface

# 2 Configuration (Corner Attachment)



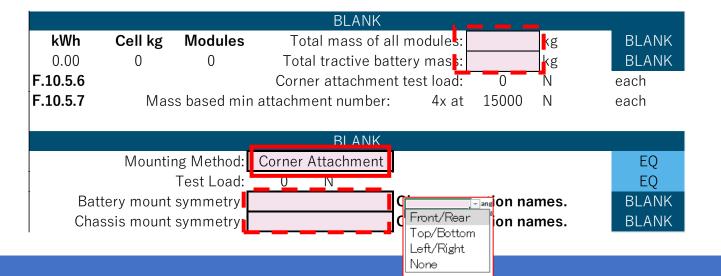
### **Corner Attachment**

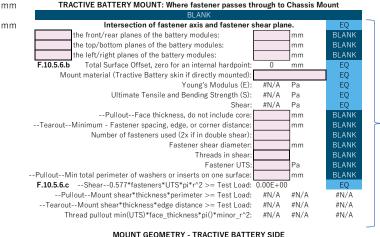
#### F.10.5.6 Tractive Battery Pack Attachment – Corner Attachments

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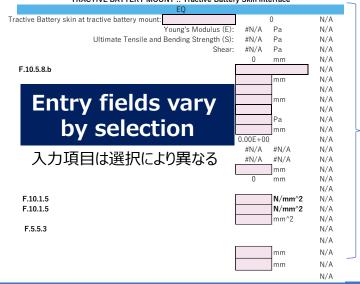
- b. The mechanical connections at each corner must be 50 mm or less from the corner of the Module
- c. Each attachment point must be able to withstand a Test Load equal to 1/4 of total mass of the Tractive Battery Pack accelerating at 40 g





		EQ		
	Mo	unt cross section on tractive battery skin:		N/A
		Mount thickness (B):	mm	N/A
		Mount length (L):	mm	N/A
		Minimum gusset thickness (T):	mm	N/A
	Minimum	gusset height normal to mount face (H):	mm	N/A
F.3.5	0.0	0N Bending in shear M*y / I < Su:	<del></del>	N/A
#N/A	0.0	0N Bending normal M*y / I < Su:		N/A
#N/A	Parab	olic shear 3*Test Load/2*area <= Shear:		N/A

#### TRACTIVE BATTERY MOUNT :: Tractive Battery Skin interface



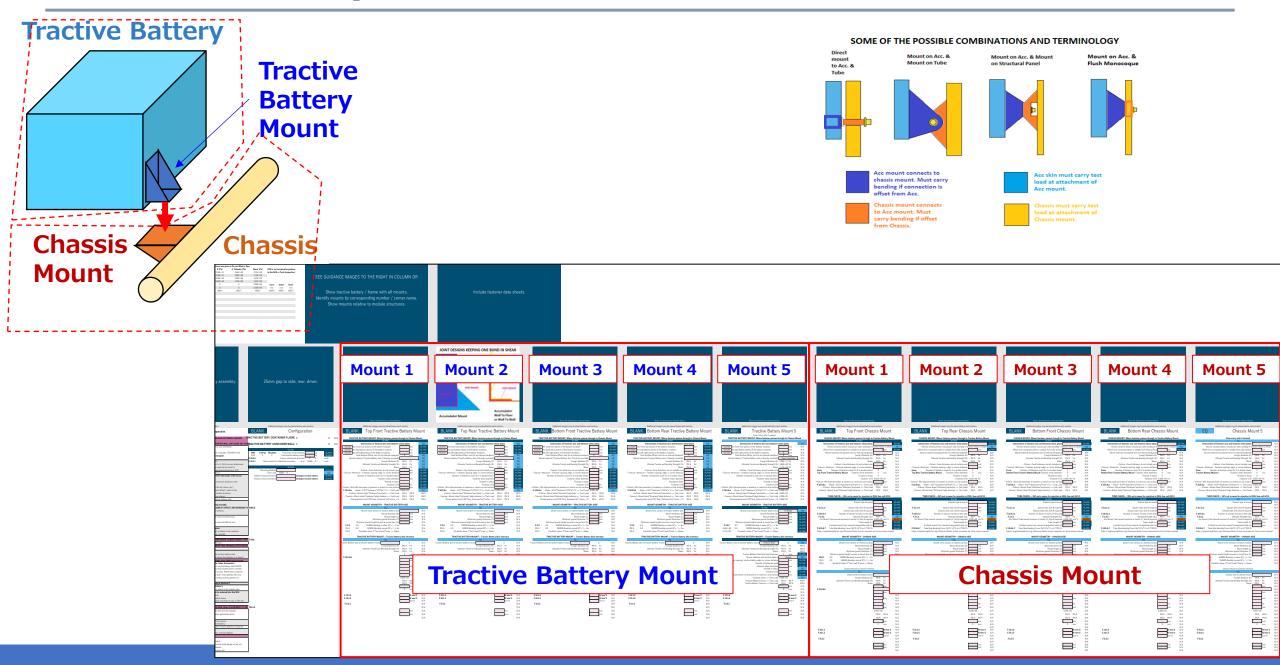
**(1) Tractive Battery** Mount

2 Mount Geometry **Tractive Battery** SIDE

3 **Tractive Battery** Mount **Tractive Battery** Skin interface

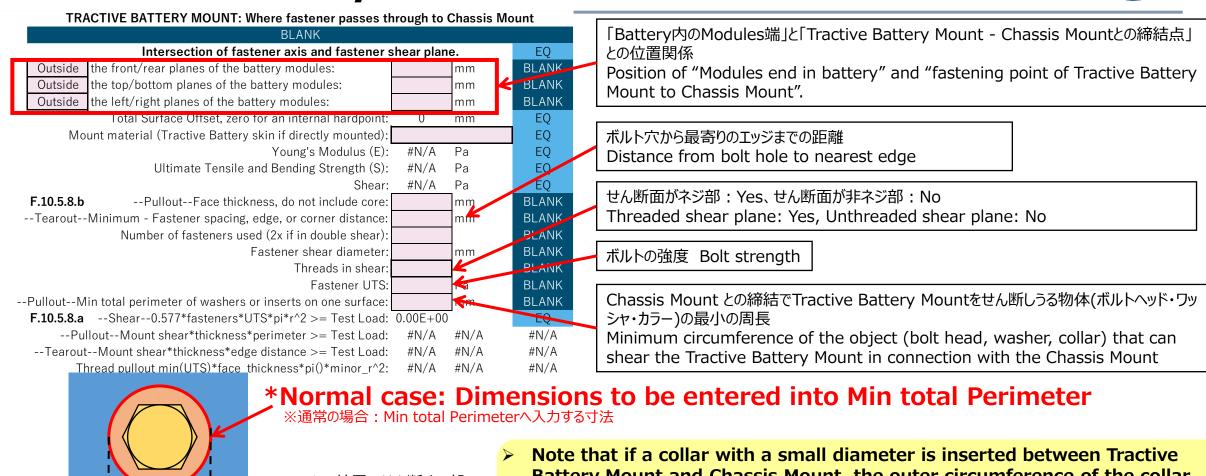
### **Tractive Battery Mount, Chassis Mount**





### **③ Tractive Battery Mount 1-5**





このワッシャ外周でせん断する部 分の強度をみています

Load

**Tractive** 

Battery

Mount

Check the strength of the part to be sheared at the outer circumference of the washer.

Note that if a collar with a small diameter is inserted between Tractive Battery Mount and Chassis Mount, the outer circumference of the collar may become the Min Perimeter.

Tractive Battery Mount & Chassis Mount間に径の小さいカラーを挟む場合はそのカラーの外周がMin Perimeterになる場合があるので注意

If the bracket is directly female threaded, enter the circumference of the bolt diameter and enter the thread depth for Thickness. (This is a general female thread pullout strength calculation.)

ブラケットに直接雌ねじを切った場合は、ボルト径の周長を入力し、Thicknessにはねじ部深さを入力する (一般的な雌ねじ引抜強度の計算になる)

### **3 Tractive Battery Mount - Position**



	BLANK				
	Intersection of fastener axis and fastene	er shear plane	EQ		
ı	Outside the front/rear planes of the battery modules:	mm	BLANK		
ı	Outside the top/bottom planes of the battery modules:	mm	BLANK		
L	Outside the left/right planes of the battery modules:	mm	BLANK		

距離:最寄りのModule↔締結点間の距離を入力のこと

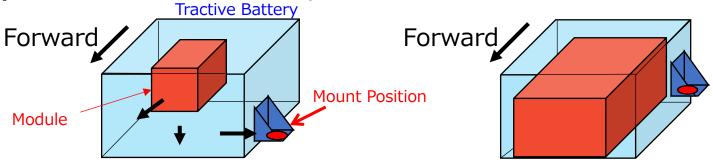
(全部Betweenになる事はほぼあり得ない)

Distance: Enter the distance between the nearest

**Modules** ↔ **Conclusion point.** 

(It is almost impossible for all of them to be Between)

**Exp:** How to choose Outside, Between



the front/rear "Outside" the top/bottom "Outside" the left/right "Outside"

前後:締結点はModuleよりも前なので

Front/Rear → Outside

上下:締結点は床板分だけModuleより

も下なので

**Top/Bottom** → **Outside** 

**左右**:締結点はModuleよりも左なので **Left/Right** → **Outside**  the front/rear "Between" the top/bottom "Between" the left/right "Outside"

**前後**:締結点はModuleの間

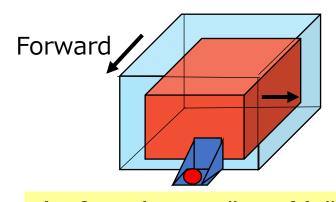
Front/Rear → Between

上下:締結点はModuleの間

**Top/Bottom** → **Between** 

左右:締結点はModuleよりも左なので

**Left/Right** → **Outside** 



the front/rear "Outside" the top/bottom "Outside" the left/right "Between"

前後:締結点はModuleよりも前なので

Front/Rear → Outside

**上下**:締結点は床板分だけModuleよりも

下なので

**Top/Bottom** → **Outside** 

左右:締結点はModuleの間

**Left/Right** → **Between** 

# 3 Tractive Battery Mount – Mount Geometry

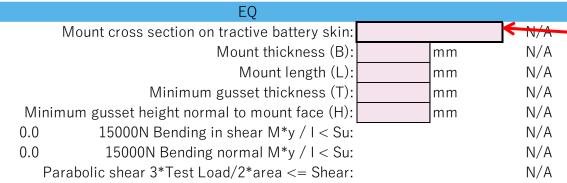


#### **MOUNT GEOMETRY - TRACTIVE BATTERY SIDE**

F.3.5

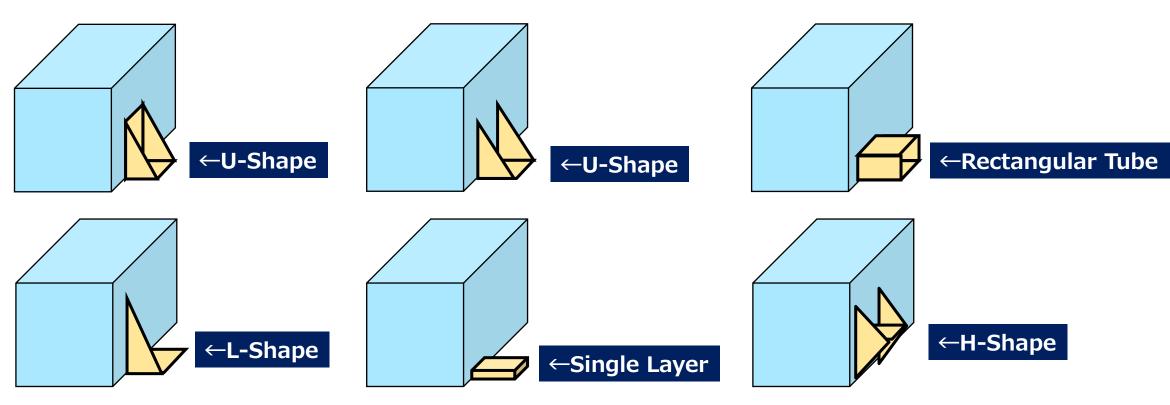
#N/A

#N/A



Decide by referring to the sample below or the input example attached to the SES.

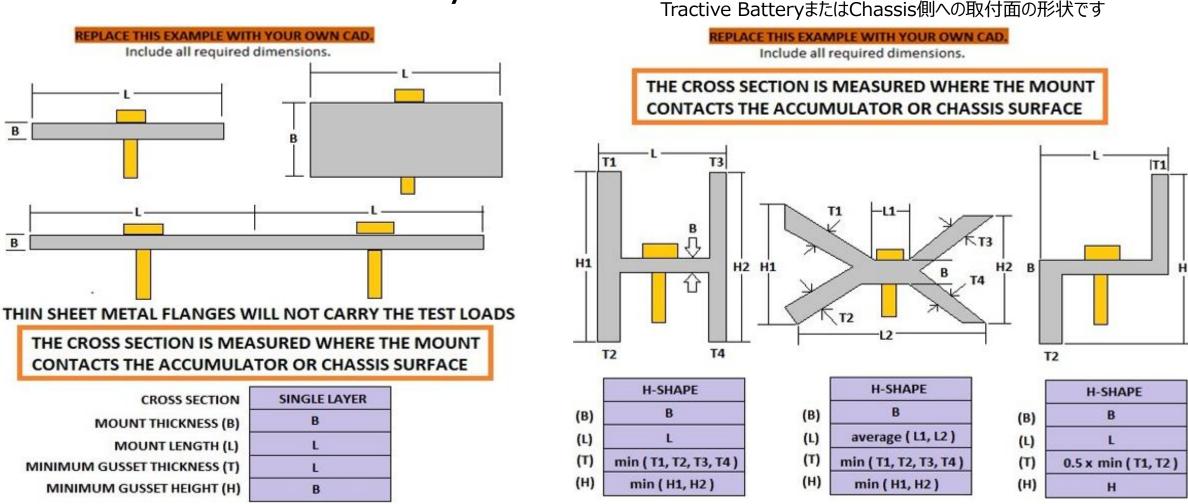
下図のサンプルやSESに添付された入力例を参考に決めること



# **3 Tractive Battery Mount – Mount Geometry**



# These are the shapes of the mounting surface to Tractive Battery or Chassis side



# **3 Tractive Battery Mount – Mount Geometry**



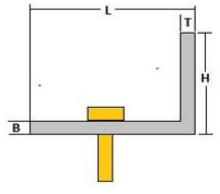
These are the shapes of the mounting surface to Tractive Battery or Chassis side

Tractive BatteryまたはChassis側への取付面の形状です

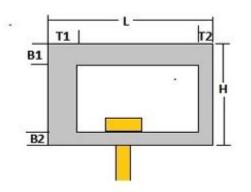
#### REPLACE THIS EXAMPLE WITH YOUR OWN CAD

Include all required dimensions.

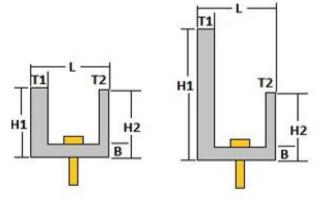
THE CROSS SECTION IS MEASURED WHERE THE MOUNT CONTACTS THE ACCUMULATOR OR CHASSIS SURFACE

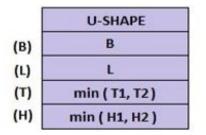


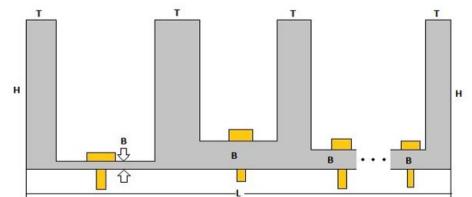
	L-SHAPE		
(B)	В		
(L)	L		
(T)	T		
(H)	н		

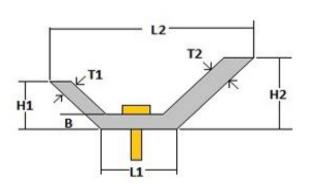


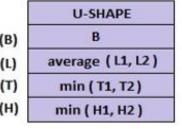
	RECTANGULAR TUBE
(B)	min ( B1, B2 )
(L)	L
(T)	min (T1, T2)
(H)	н

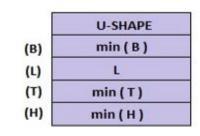






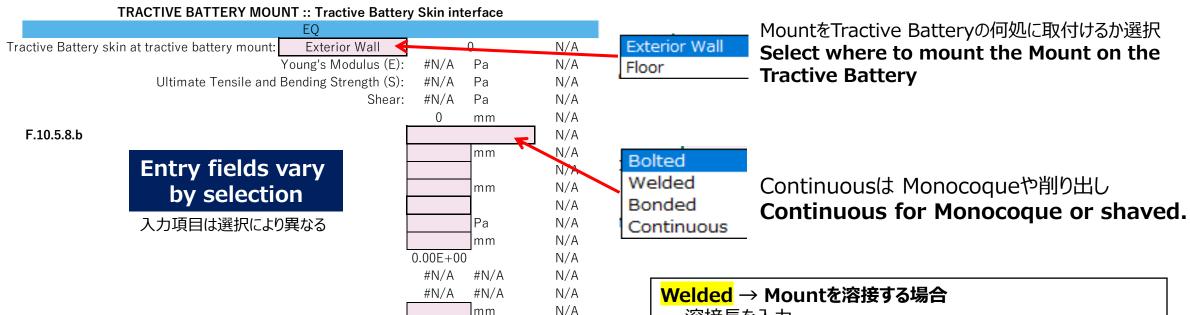






# **③ Tractive Battery Mount – Wall**





N/A

mm

Welded → For welding a Mount.

Enter the length of the weld.

**Bonded**  $\rightarrow$  If the mount is bonded.

Enter the strength of the adhesive (shear & T-Peel), the bonded area, the perimeter length of the bonded area, and the thickness of the outer container wall/floor to which it is bonded.

**Continuous** → For one-piece molding.

Enter the centerline length of the mount shape.

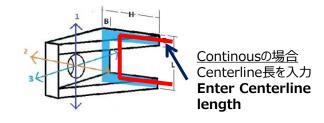
溶接長を入力

Bonded → Mountを接着する場合

接着剤の強度(せん断&T-Peel強度)、接着面積接着部の外周長、接着したContainer外壁/床の厚さを入力

**Continuous** → 一体成型の場合

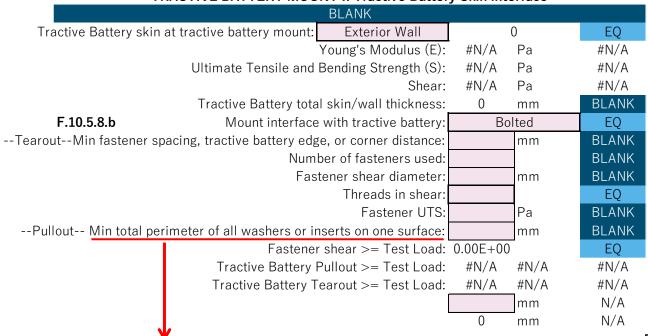
Mount部形状のMount長を入力



### **3 Battery Mount Wall - Bolted**



#### TRACTIVE BATTERY MOUNT :: Tractive Battery Skin interface



### Min Total Perimeter of ~ とは Skin(wall)をせん断しうる最小周長

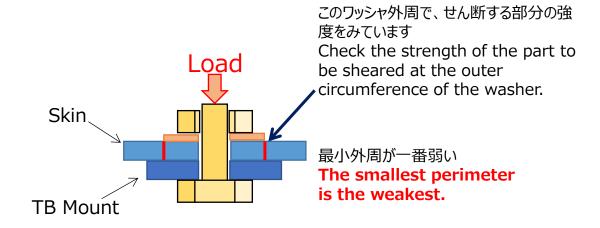
Tubeの場合

- ・ワッシャ外周長(Backing Plateの場合も)
- ・Bolt Head / Nut座面の外周長
- ・Mount の Skinとの接触部外周長
  - →この中の最小値

Monocoque時

- ・インサートの外周
- ・Tractive Batter Mount の Skinとの接触部外周長
- ・Backing Plate の外周長
  - →この中の最小値

### To fasten Mount to Tractive Battery Wall with bolt and nut



#### Min Total Perimeter of ∼:

Minimum perimeter of skin (wall) that can be sheared.

#### In case of Tube

- Outside circumference of Washer (also in case of Backing Plate).
- The circumference of the bolt head/nut seating surface.
- The circumference of the contact area with the skin of the mount.
  - → Minimum value in the above.

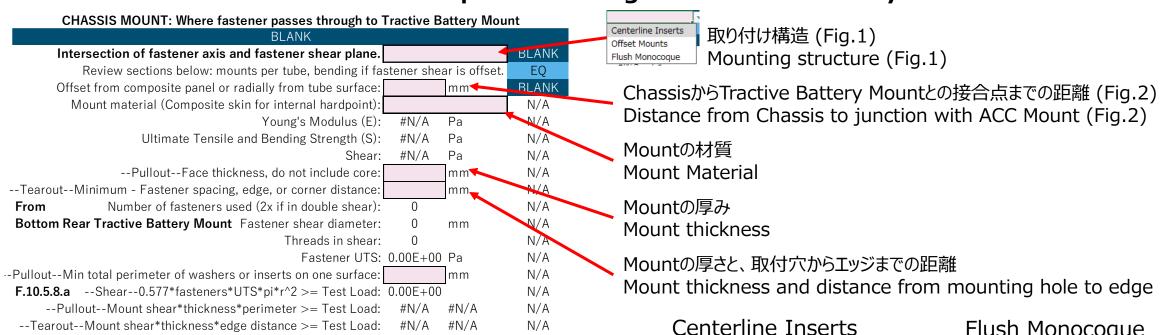
#### In case of Monocoque

- · Outer circumference of insert.
- · Outer circumference of Acc. Mount in contact with Skin
- · Outer circumference of the backing plate
  - → Minimum value in the above

### 4 Chassis Mount 1-5



### Where fastener passes through to Tractive Battery Mount

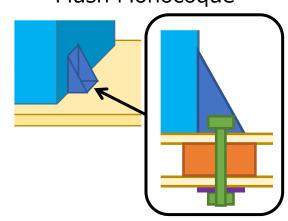


# Tractive Battery Mount Tractive Battery

Chassis Mount

Tube

Flush Monocoque



上記以外は全てOffset Mounts Fig.1 All others are Offset Mounts.

### Fig.2

コンポジットパネルまたはチューブ表面 から半径方向にオフセット。 Offset from composite panel or radically from tube surface

### 4 Chassis Mount 1-5



### Where fastener passes through to Tractive Battery Mount

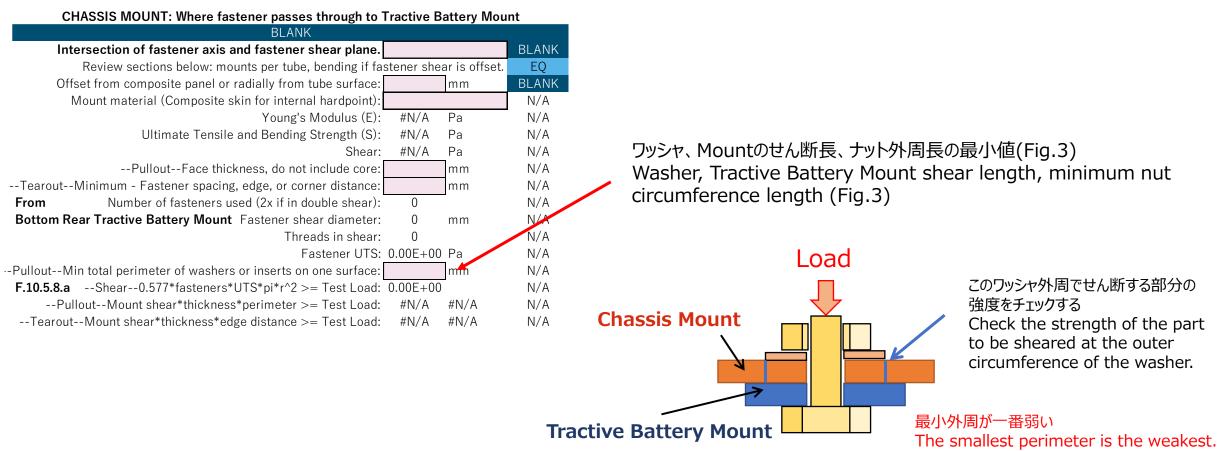
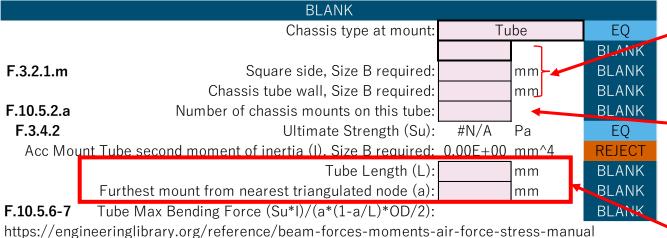


Fig.3 Min-Perimeter of Chassis Mount

### 4 Chassis Mount 1-5 - Tube Frame



TUBE CHECK: < 95% not a cause for rejection in 2026. See cell AC12.

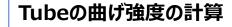


Mount する部分のTubeの情報 The tube details of mounting point

F.10.5.2b

1本のTubeに取り付け可能なChassis Mountsは2個まで Up to 2 Chassis Mounts can be installed on one Tube.

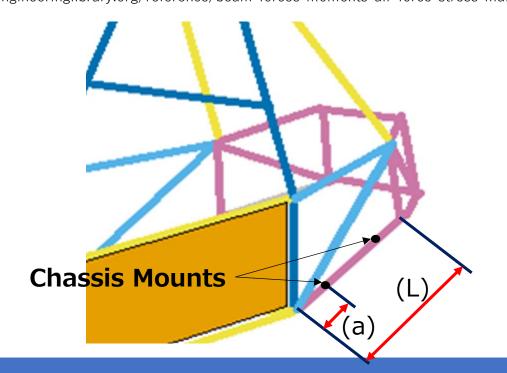
Tubeの長さ(L)と、ノードからの近傍距離(a) 下図参照 Tube length (L) and proximity to the node (a) See below figure



- ✓ Chassis Mountsが1Tubeに2か所あるとノードでのモーメントがかなり大きくなるため 少なくとも1か所はノードに設けることが望ましい
- ✓ 一方をノードに設けた場合、Tubeには1点だけとなるので個数を1にし、もう片方の Chassis Mountについて記述すること

#### Calculation of Bending Strength of Tube.

- ✓ If there are two Chassis Mounts on a tube, the moment at the node will be guite large. Therefore, it is desirable to have at least one Chassis Mounts at each node.
- If one of the Chassis Mounts is located at a node, there will be only one Chassis Mount on the tube, so the number of Chassis Mounts should be set to 1.



## **4** Chassis Mount – Mount Geometry

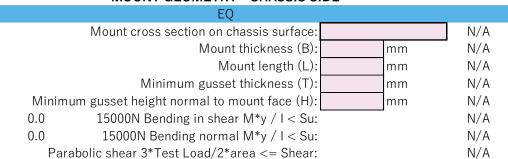


#### MOUNT GEOMETRY - CHASSIS SIDE

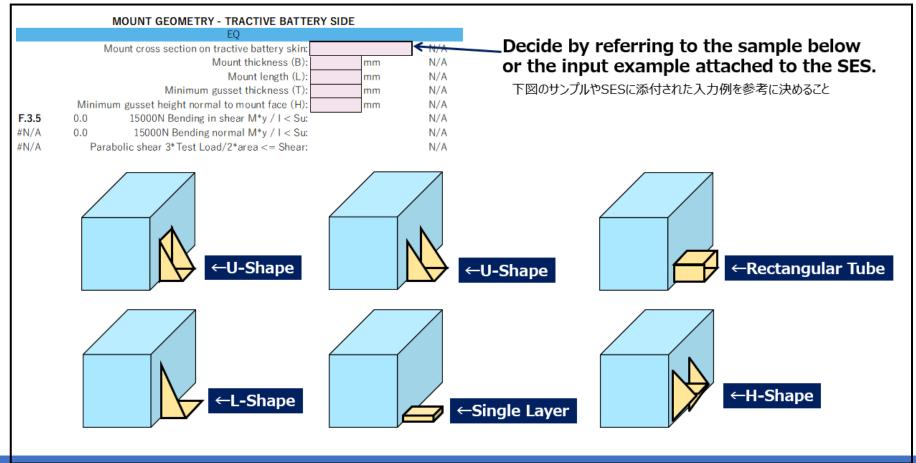
#N/A

#N/A

#N/A



Same as Tractive Battery Side.
Refer to the guidance for inputting the data.



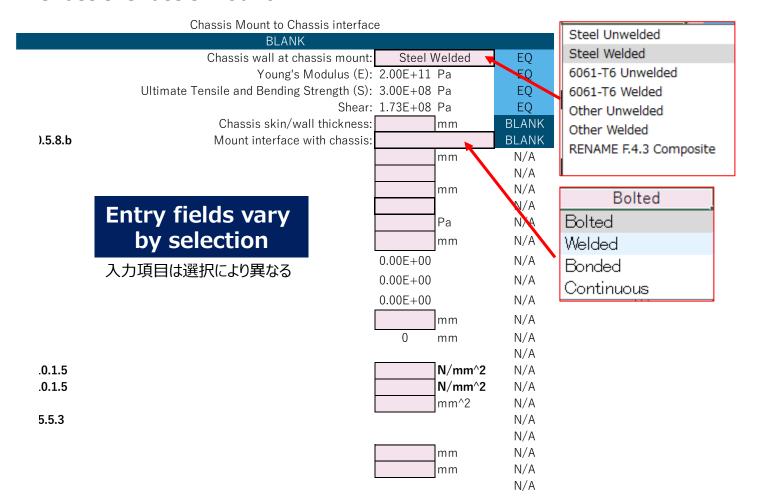


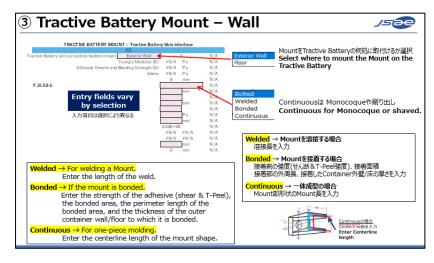
### 4) Chassis Mount – Offset Mount



Offset Mounts または Centerline Insertsか Flush Monocoqueで Offset≠0 の場合は, Chassis-Chassis Mount 間の強度を計算する

If Offset Mounts, Centerline Inserts or Flush Monocogue and Offset≠0, calculate the strength between Chassis-Chassis Mount.





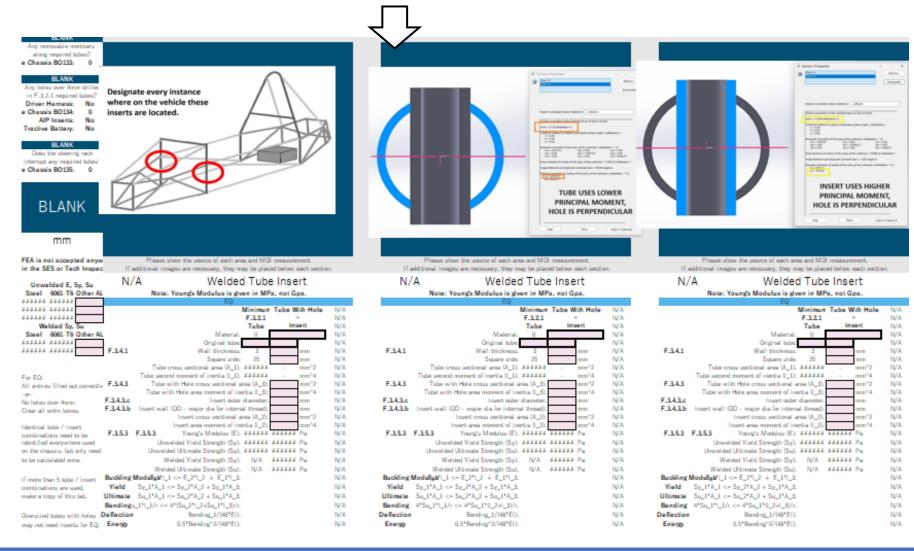


### 4 Chassis Mount - Centerline Insert



Centerline InsertsでOffset=0の場合は F.3.4.3 Welded Insertsシートの[Welded Tube Insert] で強度を示す。 If Offset=0 in Centerline Inserts.

F.3.4.3 Indicate the strength in [Welded Tube Insert] on the Welded Inserts sheet.





Fin.