1 HV - Accumulator

The HV - Accumulator is mounted by bolting 4 aluminium blocks to the main structure. The aluminum blocks are welded to the Accumulator housing. Each block is bold to a steel plate (4 mm thick) with one M10 bolt. See figure 1.1 and 1.2

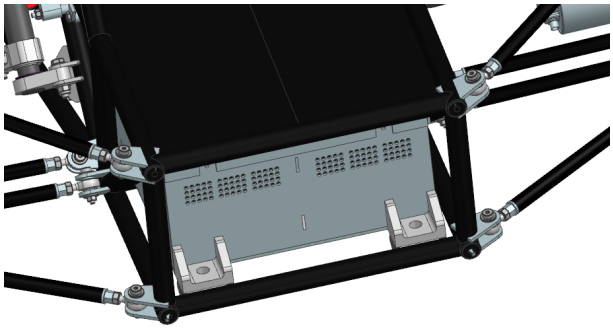

Abbildung 1.1: accumulator mounting: rear

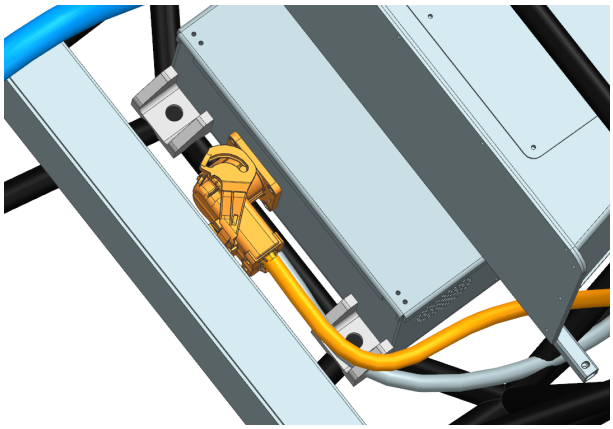

Abbildung 1.2: accumulator mounting: front

Figure 1.3 shows the face whom is welded to the accumulator housing. Figure 1.4 shows the technical drawing of the aluminium support.

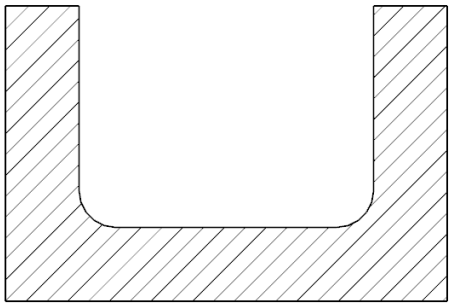

Abbildung 1.3: face welded to the accumulator housing

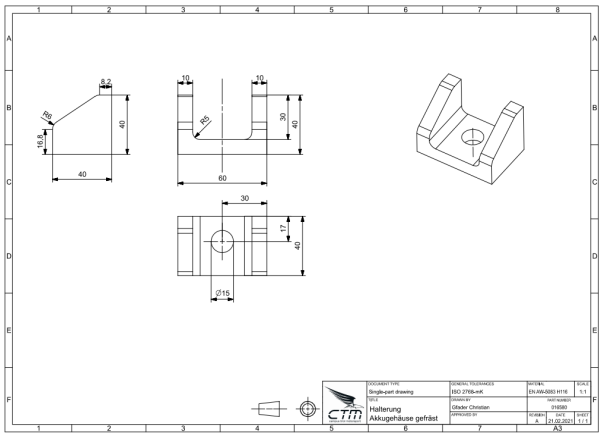

Abbildung 1.4: technical drawing

The accumulator has a weight of ca. 60 kg. The longitudinal and the lateral force, generated form the $40g$, is 23 544 N. Devided by four blocks, each block has to carry 5886 N. The tension cross section A_s of a M10 screw is $58\,\mathrm{mm}^2$. The shear stress in the screw can be calculated with the following formula:

$$\tau_s = \frac{F_s}{A_s} = \frac{5886\,\mathrm{N}}{58\,\mathrm{mm}^2} = 101.5\,\mathrm{N\,mm}^{-2}$$

The normal stress will be the half of the shear stress. A M10 screw, mounted with rated tourqe, will generate a clamping force (in the worst case) of 42.3 kN. The grade of the screw is 10.9;

Figure 1.5 shows the welding instructions of the aluminium block.

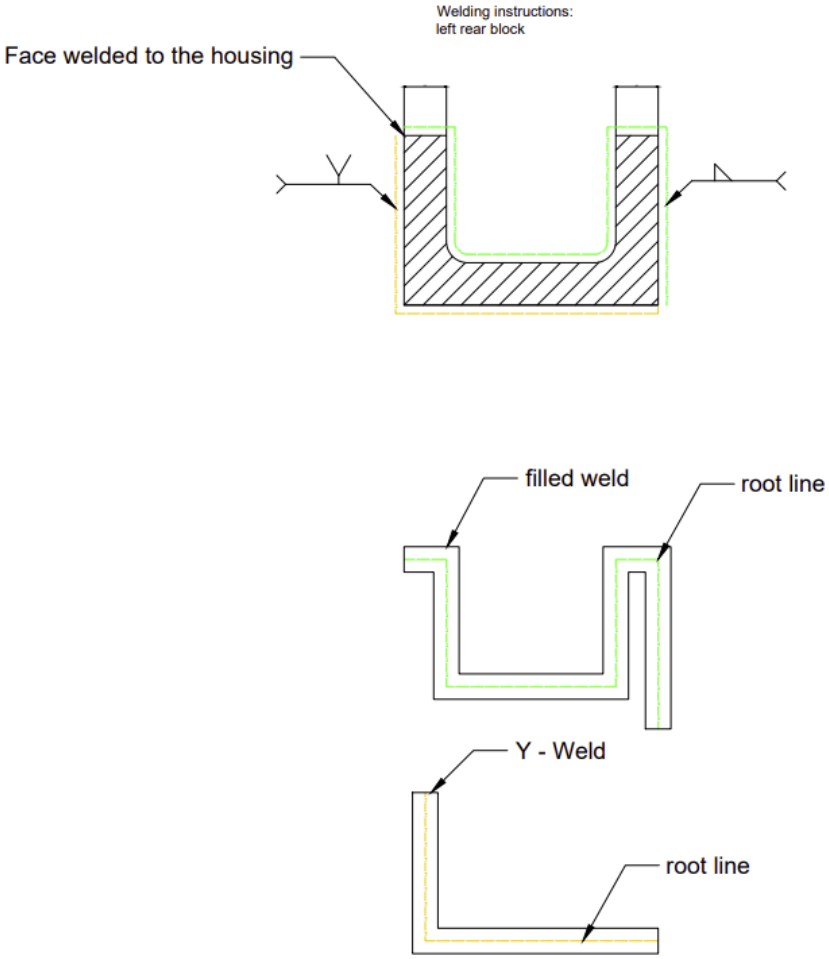

Abbildung 1.5: welding instructions

The welds are calculated as follows.

$$\sigma_{\perp}, \tau_{\perp}, \tau_{\parallel} = \frac{F}{a \cdot n \cdot l}$$

a = 4, thickness of the weld, n = 4, amount of attachments,l = welding distance longitudinal:

$$\sigma_{\perp}, \tau_{\perp} = \frac{23\,544\,\mathrm{N}}{4\mathrm{mm} \cdot 4 \cdot 250\mathrm{mm}} = 5.89\,\mathrm{N\,mm^{-2}}$$

$$\tau_{\parallel} = 0$$

lateral:

$$\sigma_{\perp}, \tau_{\perp} = \frac{23\,544\,\mathrm{N}}{4\mathrm{mm} \cdot 4 \cdot 135\mathrm{mm}} = 10.90\,\mathrm{N\,mm^{-2}}$$

$$\tau_{\parallel} = \frac{23\,544\,\mathrm{N}}{4\mathrm{mm} \cdot 4 \cdot 115\mathrm{mm}} = 12.80\,\mathrm{N\,mm^{-2}}$$

vertical:

$$\sigma_{\perp}, \tau_{\perp} = \frac{11\,772\,\mathrm{N}}{4\mathrm{mm} \cdot 4 \cdot 115\mathrm{mm}} = 6.37\,\mathrm{N\,mm^{-2}}$$

$$\tau_{\parallel} = \frac{11\,772\,\mathrm{N}}{4\mathrm{mm} \cdot 4 \cdot 135\mathrm{mm}} = 5.43\,\mathrm{N\,mm^{-2}}$$

Given how small all these values are it is save to say that the welds will withstand the acceleration of 40 g longitudinally and laterally and 20 g vertically.