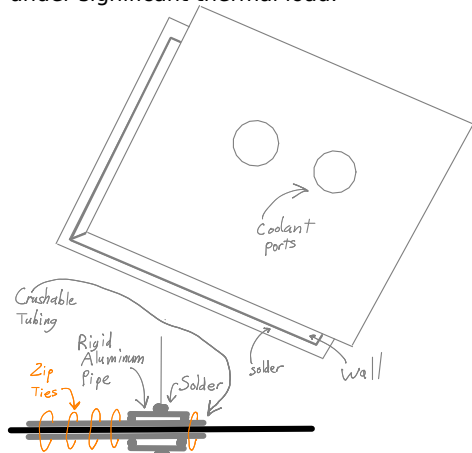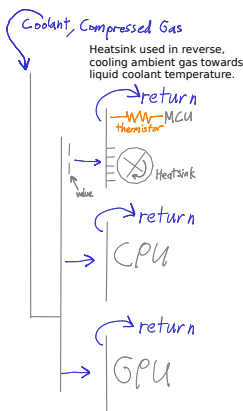Soldered metal box. Gas tight if electrical wiring openings are appropriately sealed. Helium tight sealing may be required if ambient component temperatures may need to be kept at <-25degC under significant thermal load.

Crushable Tubing

Zip Ties

Rigid Aluminum Pipe

Solder

solder

Wall

Coolant ports

Unlike coolant, which only contacts a solid metal heatsink, power and data cables must contact innumerable insulated connectors. Helium tight sealing around commodity cables may be necessary. Expoxy fill between bundled cables and around cables may be added if appropriate.

Coolant, Compressed Gas

Heatsink used in reverse, cooling ambient gas towards liquid coolant temperature.

return
MCU
thermistor
valve
Heatsink

return
CPU

return
GPU

Combined parallel liquid coolant loop. Pump and radiator (if appropriate) are mounted to another flat external box.

Water/Alcohol/Glycol may be switched to cryogenic (ie. LN2, LHe) fluid after confirmed shutdown/suspend of computer (reducing thermal power dissipation to negligible), and compressed gas purge of significant freezeable liquids (ie. water). Subsequently, computer should be notified of (or detect) cryogenic temperature availablility, to allow ~50% increased core clock frequency. Memory clock not a priority.

Reservoir of cryogenic fluid may be sufficient for only a limited number (eg. 15hour tank at 2kW), used only for demanding 'flight hours' (eg. flight sim, tournament competition, etc), slowly replenished at few liters per day.

Internal LiPo float battery is far more efficient, especially for portable computers (small desktops and laptops). Much better ripple attenuation, reduced power transistor heatsinking, reduced filtering, and far more compact than lead-acid UPS battery backup.

PicoPSU converts all low-wattage power rails to +12V, drastically simplifying the high-wattage supply. All power connectors may be adapted to an XT60 hub.

XT60
full power
1.5C Charge Resistor
Self-discharge, at >12V.
200   12V
UVLO
Current Sense
12V LiPo Float
Current Sense
12.5Vmax
11.8Vmin
UVLO
MCU (optional)
PicoPSU
~12V
+3.3V
+5V
+12V → NO
+12V
Motherboard
CPU GPU

Power, Reset, HDD LED, Buzzer
WiFi
Ethernet
Audio
USB3
PCI-E (one NVMe)
DisplayPort, HDMI