FAR/Mars Society Launch Competition
Safety Checklist

- ☐ Pressurant Tank Relief Valve
- ☐ Pressurant Tank Proof Test (or Equivalent)
- ☐ Pressurant Remote Vent Valve
- ☐ Pressurant Pressure Transducer
- ☐ Pressurant Fill Port
- ☐ Pressurant Umbilical Pneumatic/Mechanical Release
- ☐ Fuel Tank Relief Valve
- ☐ Fuel Tank Proof Test (or Equivalent)
- ☐ Fuel Remote Vent Valve
- ☐ Fuel Remote Emergency Depressurization System (REDS) Connection
- ☐ Fuel Pressure Transducer
- ☐ Fuel Fill Port at Bottom of Rocket
- ☐ Valve Seals Compatible with Fuel
- ☐ Oxidizer Tank Relief Valve
- ☐ Oxidizer Remote Emergency Depressurization System (REDS) Connection
- ☐ Oxidizer Tank Proof Test (or Equivalent)
- ☐ Oxidizer Remote Vent Valve
- ☐ Oxidizer Pressure Transducer
- ☐ Oxidizer Fill Port at Bottom of Rocket
- ☐ Valve Seals Compatible with Oxidizer
- ☐ Metal Components and Hoses Compatible with Oxidizer
- ☐ Components Cleaned For Oxidizer
- ☐ Pressurant Tank Safety Worksheet
- ☐ Recovery Arming Plug at Bottom of Rocket
- ☐ Pull-Off Electrical Umbilical
- ☐ Ignition Key Lockout Switch at Rocket
- ☐ Ignition Key Lockout Switch at Controller

FAR/Mars Society Launch Competition
Mandatory Pressure Tank Safety Worksheet

Fuel Tank	
Operating Pressure (OP) (psi)	
Test Method**	
Calculated Proof Pressure (CPP) (psi) 1.5 x OP	
Calculated Relief Pressure (CRP) (psi) 1.25 x OP	
Rated or Tested Proof Pressure (TPP) (psi)	
Relief Valve Pressure (RVP) (psi)	
Oxidizer Tank	
Operating Pressure (OP) (psi)	
Test Method**	
Calculated Proof Pressure (psi) 1.5 x OP	
Calculated Relief Pressure (psi) 1.25 x OP	
Rated or Tested Proof Pressure (TPP) (psi)	
Relief Valve Pressure (RVP) (psi)	
Pressurant Tank	
Operating Pressure (OP) (psi)	
Test Method**	
Calculated Proof Pressure (psi) 1.5 x OP	
Calculated Relief Pressure (psi) 1.25 x OP	
Rated or Tested Proof Pressure (TPP) (psi)	
Relief Valve Pressure (RVP) (psi)	
**<u>NOTE</u> -- DOT Rated -- ASTM Rated -- Hydrostatic Test (Professional Only) -- Water Pressure Test	

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Mandatory Pressure Tank Safety Worksheet (Continued)

DANGER: OPERATING PRESSURIZED TANKS OF AN UNKNOWN PRESSURE RATING OR ABOVE THEIR PRESSURE RATING IS EXTREMELY DANGEROUS AND MAY CAUSE SEVERE INJURY OR DEATH.

DANGER: HANDLE PRESSURE TANKS WITH CARE. A DAMAGED TANK CAN EASILY RUPTURE BELOW ITS RATED PRESSURE AND MAY CAUSE SEVERE INJURY OR DEATH.

DANGER: DO NOT USE PRESSURIZED GAS TO PROOF PRESSURE TEST YOUR TANK. EITHER HAVE A HYDROSTATIC TEST DONE BY A PROFESSIONAL OR BUY A TANK OF KNOW PRESSURE RATING. A TANK RUPTURE, WHEN USING COMPRESSED GAS, MAY CAUSE SEVERE INJURY OR DEATH.

Instructions for each tank

1. Write in your tank expected operating pressure (OP).
2. Write in the test method for your tank: DOT rated, ASTM rated, professional hydrostatic tested, or water pressure tested.
3. Write in the tank calculated proof pressure: OP times 1.5
4. Write in the tank rated or tested proof pressure.
5. If your tank is DOT, ASTM, or professionally hydrostatic tested and the tank pressure rating is above the calculated proof pressure; you do not need to test it any further. **DANGER:** DO NOT TRY TO PERFORM A HYDROSTATIC TEST YOURSELF. IF THE TANK FAILS IT CAN KILL YOU. Water pressure testing with a hand pump will need to be performed on any self-fabricated tanks or prefabricated tanks of unknown pressure rating.
6. Write in the calculated relief pressure: OP times 1.25
7. Select a relief valve with a relief pressure as close to the calculated relief valve pressure as possible. The relief valve pressure must be greater than or equal to the calculated relief pressure. The relief valve pressure must be less than or equal to the rated or tested tank pressure.

FAR/Mars Society Launch Competition
Water Proof Test

DANGER: HANDLE PRESSURE TANKS WITH CARE. A DAMAGED TANK CAN EASILY RUPTURE BELOW ITS RATED PRESSURE AND MAY CAUSE SEVERE INJURY OR DEATH.

WARNING: YOU MAY GET WET. TO PROOF TEST A TANK OF UNKNOWN PRESSURE RATING, A TANK THAT YOU HAVE FABRICATED YOURSLF, OR UTILIZING A TANK ABOVE ITS RATED PRESSURE; PERFORM A WATER PRESSURE TEST USING A HAND-PUMP. WATER IS INCOMPRRESSIBLE AND THE PRESSURE WILL DROP RAPIDLY AND NOT HAVE PROPULSIVE FORCE WHEN THE TANK RUPTURES.

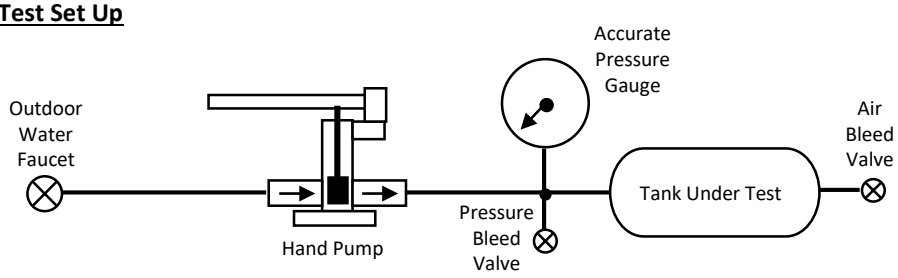
DANGER: KEEP EXTENSION CORDS, POWER STRIPS, LIGHTS, AND ELECTRIC POWER TOOLS AWAY FROM THIS TEST. YOU COULD POSSIBLY GET ELECTRICUTED WHILE STANDING IN WATER OR TOUCHING ELECTRIC EQUIPMENT WITH WET HANDS CAUSING SEVERE INJURY AND DEATH.

Water Proof Test Procedure

1. Set up the pressure tank to be tested with a hand-pump, pressure bleed valve, air bleed valve, and accurate pressure gauge. **WARNING:** VERIFY THAT THE ACCURATE PRESSURE GAUGE IS FUNCTIONAL BEFORE YOU TEST A TANK, YOU CAN OVERPRESSURE AND DAMAGE YOUR TANK.
2. Turn on the outdoor water faucet, fill the tank with water, tip the tank up, and bleed out all the air using the air bleed valve. Close the air bleed valve when no more air bubbles come out.
3. Lay the tank under test on its side and block the tank to prevent it from rolling and damage.
4. Utilizing the hand pump, slowly pump up the water pressure in the tank under test.
5. The pressure should increase with each cycle of the hand pump.
6. Stop pumping when you reach the desired proof pressure.
7. While you are pumping and the pressure stops increasing and you have not reached your proof pressure goal, stop pumping, turn off the outdoor water faucet, and relieve the pressure on the tank under test with the pressure bleed valve. **DANGER:** DO NOT USE THIS TANK FOR YOUR ROCKET. THE TANK IS YIELDING AND MAY BURST.
8. Allow your tank to sit at the proof pressure for one-minute.
9. Bleed the tank under test pressure with the pressure bleed valve to about half the proof pressure.
10. Repeat steps 3 through 9 two more times.
11. Turn off the outdoor water faucet.
12. Bleed the pressure to zero using the air pressure bleed valve.
13. Drain the water from the tank under test.
14. Dry the tank thoroughly.

WARNING: IT IS VERY IMPORTANT TO DRY YOUR TANKS WHEN THEY ARE USED TO HOLD OR PRESSURIZE LIQUID-OXYGEN OR LIQUID-METHANE. WATER OR WATER VAPOR, WHEN EXPOSED TO LIQUID-OXYGEN OR LIQUID-METHANE TEMPRATURES, WILL FREEZE AND CAUSE ICE YOUR ROCKET FROM OPERATING PROPERLY.

Water Proof Test Set Up



NOTE: Make sure that your hand pump, pressure gauge, valves, and lines are rated for the more than the desired proof pressure. Any leaks in your plumbing will make it difficult to attain the desired proof pressure and hold that pressure. Make sure all fittings and connections are leak tight.

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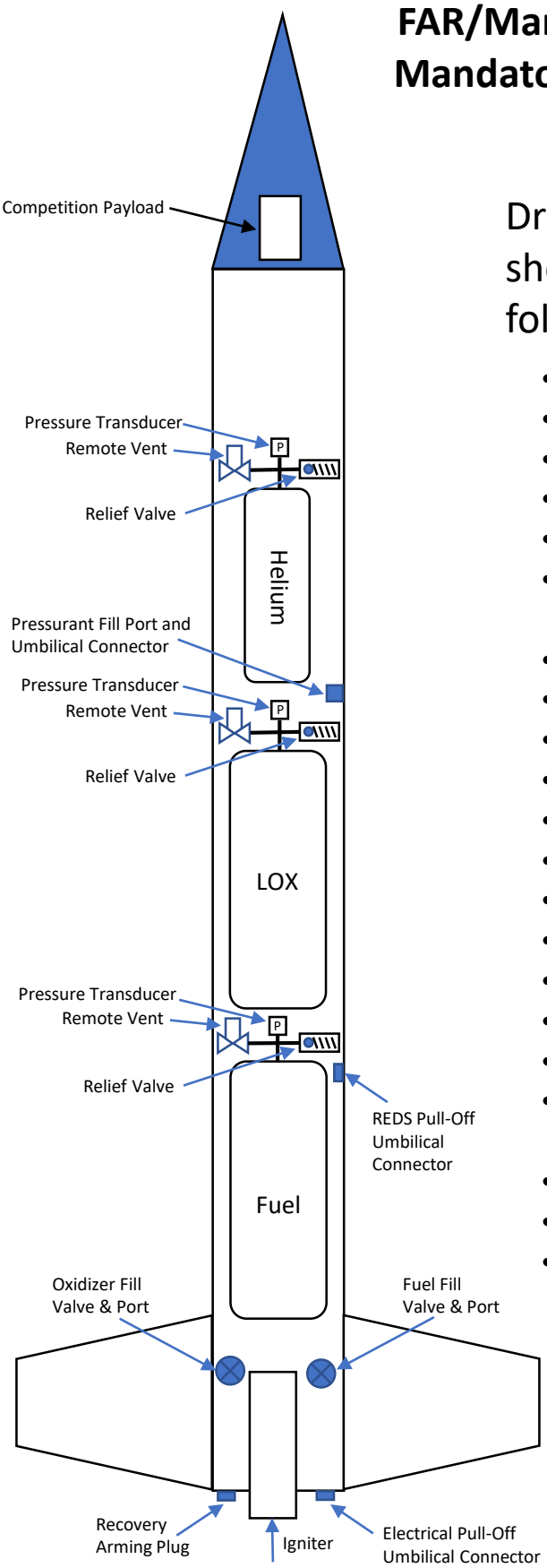
Mandatory Rocket Safety Layout Sheet



Sample Diagram

Draw a diagram of your rocket showing the location of the following:

- Pressurant Tank
- Pressurant Tank Relief Valve
- Pressurant Remote Vent Valve
- Pressurant Pressure Transducer
- Pressurant Fill Port
- Pressurant Fill Port and Umbilical Connector
- Fuel Tank
- Fuel Tank Relief Valve
- Fuel Remote Vent Valve
- Fuel Pressure Transducer
- Fuel Fill Valve & Port at Bottom
- Oxidizer Tank
- Oxidizer Tank Relief Valve
- Oxidizer Remote Vent Valve
- Oxidizer Pressure Transducer
- Oxidizer Fill Valve & Port at Bottom
- Recovery Arming Plug
- Electrical Pull-Off Umbilical Connector
- REDS Pull-Off Umbilical Connector
- Igniter
- Competition Payload