

## Overview

Czero designs and builds a wide range of equipment and systems for our customers, and we often test this equipment and these systems at our facility. Czero has built up a range of testing capabilities that can be adapted to our customer's needs.

Czero is also open to discussing project specific needs outside of our current capabilities to see if we can provide what is required. Because our customers and their technologies vary so widely, we are not specifically set up for any particular testing; we have a wide range of experience testing many different things.

## Examples of equipment and systems that have been tested

**Hydraulic valves:** leakage rates, flow characterization, actuation forces, solenoid performance, durability

**Hydraulic actuators:** standard hydraulic oils, Skydrol, Red Oil, leakage rates, flow characterization, motion profile verification, actuation force, output force characterization

**Motors:** electric motor performance in cold ambient conditions

**Custom gas compressors:** valve testing

**Fuel injectors**

**Engines**

**Custom gensets**

**Custom EV charging systems**

**Materials testing at extreme temperatures**

**Solid Oxide Fuel Cells**

**Energy Storage Systems**

## General Facility Capabilities

**Power:** Up to 680A of 480VAC 3PH (facility) and 400A of 208CAV 3PH, we rent gensets to supplement this as needed

**Air:** 35 SCFM at 100 psi

**Natural Gas:** We have a natural gas compressor that can boost our building gas to about 100psi. We can support up to 5.9 MBTU/hr

**Gas:** 6000 psi gas booster (methane compatible)

**Cold chamber:** Chamber Volume 4ftx4ftx4ft (LxWxH), -40C Temp (-60C might be possible). Built in hydraulic pump cart for hydraulic testing at low temperatures

**Chiller:** 10-ton capacity

**Furnace:** 2192°F (1200°C), 12"x12"x18" (HxWxD), Box Furnace

**Hydraulics:** We have several Hydraulic Power Units (HPU) and test chambers with various accessories for testing hydraulic equipment. We have tested up to 7000 psi

**Fuel Injector Testing:** Two closed loop test stands, one for up to 3000 psi of liquid propane, one for up to 5000 psi of gas (methane compatible)

**Test cells:** We currently have 3 testing bays in our lab area with garage doors and 2 outdoor test cells

**Equipment Handling:** We have a 7000 lb. forklift and a 3-ton chain fall gantry crane. We also have access to larger forklifts, cranes, etc. as needed

**Electrical Testing Equipment:** Insulation resistance tester, process meter, various multimeters and power supplies

**Data Acquisition and Controls:** Speedgoat system, dSPACE Control and DAQ system, and Configurable National Instruments equipment

*We regularly rent and buy equipment for specific testing as projects require.*