CLAIMS

1. A detector testing system for testing a gas detector (200) used in a heating, ventilation, and air conditioning, or refrigeration (HVAC/R) system (300), the detector testing system comprising:

a testing chamber (110:610) configured to receive the gas detector through an orifice (118:618) in the detector testing system, the testing chamber being configured to at least partially enclose the gas detector within the testing chamber;

a receiving port (102) fluidly connected to the testing chamber;

and a target gas cartridge (150) fluidly connected to the receiving port, wherein the target gas cartridge contains a known concentration of a refrigerant as a target gas, wherein the known concentration of the refrigerant within the target gas cartridge is a lower flammability limit of the refrigerant and/or wherein the refrigerant within the target gas cartridge is diluted to a lower flammability limit of the refrigerant prior to the refrigerant entering the testing chamber;

wherein the receiving port is configured to deliver the target gas to the testing chamber.

2. The detector testing system of claim 1, comprising:

a door (112) configured to seal against the orifice (118:618) and fully enclose the gas detector (200) within the testing chamber (110:610).

3. The detector testing system as in any of the preceding claims, wherein the orifice (118:618) is configured to seal against a mounting surface (302) of the HVAC/R system (300) and enclose the gas detector (200) within the testing chamber (110:610).

4. The detector testing system as in any of the preceding claims, comprising:

a communication device (114) in electronic communication with a communication device (214) of the gas detector (200).

5. The detector testing system as in any of the preceding claims, comprising:

a display device configured to display detector readings detected by the gas detector (200).

6. The detector testing system as in any of the preceding claims, wherein the target gas is a mildly flammable refrigerant.

7. The detector testing system as in any of the preceding claims, wherein the target gas is an A2 refrigerant, A2L refrigerant, or an A3 refrigerant.

8. The detector testing system as in any of the preceding claims, comprising:

an environmental control (510) configured to adjust an environmental condition within the testing chamber (110:610); and

an environmental sensor (520) configured to detect the environmental condition within the testing chamber.

9. The detector testing system as in any of the preceding claims, comprising:

a communication device (114) in electronic communication with a communication device (214) of the gas detector (200), wherein the communication device is configured to receive readings detected by the gas detector and transmit the readings to a cloud server (900).

10. The detector testing system as in any of the preceding claims, comprising:

a communication device (114) in electronic communication with a communication device (214) of the gas detector (200), wherein the communication device is configured to communicate with the gas detector for recalibration of the gas detector.

11. A method of testing a gas detector (200) of a heating, ventilation, and air conditioning, or refrigeration (HVAC/R) system (300), the method comprising:

inserting the gas detector through an orifice (118:618) in a detector testing system and at least partially into a testing chamber (110:610) within the detector testing system, the testing chamber being configured to at least partially enclose the gas detector within the testing chamber;

sealing the testing chamber off from external environments;

providing a target gas into the testing chamber; wherein the target gas is a refrigerant at a known concentration, and wherein the known concentration is a lower flammability limit of the refrigerant: and

receiving one or more readings from the HVAC/R system.

12. The method as in claim 11, wherein sealing the testing chamber (110:610) off from external environments comprises:

removing the gas detector (200) from the HVAC/R system (300);

inserting the gas detector fully into the testing chamber; and

closing a door (112) of the testing chamber, the door being configured to seal against the orifice (118:618)and fully enclose the gas detector within the testing chamber.

13. The method as in claim 11 or 12, wherein sealing the testing chamber (110:610) off from external environments comprises:

sealing the orifice (118:618) against a mounting surface (302) of the HVAC/R system (300), the gas detector (200) remaining attached to the mounting surface; and

enclosing the gas detector within the testing chamber.

14. The method as in claim 11,12 or 13, comprising:

displaying the one or more detector readings detected by the gas detector (200) within the detector testing system.

15. The method as in any of claims 11 to 14, comprising:

receiving response data from the HVAC/R system (300); and

determining whether the HVAC/R system has performed or is performing an isolation and pump down procedure following the introduction of the target gas into the testing chamber (110:610).