COLDCHECK · EPA SECTION 608 CERTIFICATION

The Ultimate Charging & Diagnosis Cheat Sheet

Tape this to the inside of your gauge case.

1 Charging and diagnosis targets

Typical field values. The equipment data plate is always the authority for a specific unit.

MEASUREMENT	TYPICAL TARGET	WHAT IT MEANS
Superheat, TXV, at the coil	8 to 14 F	The valve holds this itself
Superheat, at the condensing unit	10 to 30 F	Includes suction line heat pickup
Superheat, fixed orifice	Calculated target	(3 x indoor WB - 80 - outdoor DB) / 2
Subcooling	8 to 12 F	Charges a TXV system
Airflow	350 to 450 cfm per ton	Below 350 the coil can freeze
Total external static	At or under the blower rating	Often 0.5 in wg
Compression ratio, air conditioning	2 to 4 to 1	Above 10 is a problem
Capacitor tolerance	Plus or minus 6%	uF = 2652 x amps / volts
Voltage imbalance	Under 2%	Many makers' limit; NEMA derates above 1%

Source: Common manufacturer practice

2 Constants and formulas

The numbers that appear in field calculations, and where each one comes from.

CONSTANT	VALUE	USED FOR
Sensible heat factor	1.08	Btu/h = 1.08 x cfm x dT, at sea level
Latent heat factor	0.68	Btu/h = 0.68 x cfm x grains difference
Total heat factor	4.5	Btu/h = 4.5 x cfm x enthalpy difference
Capacitance at 60 Hz	2652	uF = 2652 x amps / volts
One ton of refrigeration	12,000 Btu/h	Melting one ton of ice in 24 hours
Standard atmosphere	14.696 psi	Added to psig to get psia
Natural gas heating value	~1,030 Btu/cu ft	Local utility publishes the exact figure
Round duct friction	0.109136 x Q^1.9 / D^5.02	in wg per 100 ft, galvanised
Rectangular equivalent	1.30 x (ab)^0.625 / (a+b)^0.25	Equivalent round diameter

Source: Standard engineering values

3 Reading superheat and subcooling together

Neither number diagnoses anything alone. This is the whole reason both are measured on the same visit.

SUPERHEAT	SUBCOOLING	MOST LIKELY CAUSE
High	Low	Undercharge, so find the leak
High	High	Restriction between condenser and coil
Low	High	Overcharge, so recover down
Low	Low	Compressor not pumping, or valve overfeeding
Normal	Normal	Charge is right, so confirm against the data plate

Source: Standard refrigeration diagnosis

4 Leak rate triggers

Exceeding the trigger starts the repair clock.

APPLIANCE TYPE	TRIGGER	EXAMPLE
Comfort cooling	10% per year	Office rooftop unit, chiller
Commercial refrigeration	20% per year	Supermarket rack
Industrial process refrigeration	30% per year	Chemical plant
Repair deadline once triggered	30 days	From date of discovery
Retrofit or retirement plan, if not repaired	30 days to plan	One year to complete
Charge that brings a system under the rules	50 lb, ozone-depleting refrigerants; 15 lb, HFCs with a GWP above 53 (since 1 Jan 2026)	40 CFR 82.157 and 84.106

Source: 40 CFR 82.157

5 Evacuation and vacuum reference

A compound gauge cannot resolve any of this. Below atmospheric, a micron gauge is the only instrument that reads the useful range.

LEVEL	EQUIVALENT	MEANING
760,000 microns	0 in Hg	Atmospheric pressure
25,400 microns	29 in Hg	About as far as a compound gauge reads
5,000 microns	-	Water still boiling at room temperature
1,000 microns	-	Acceptable on some service work
500 microns	-	Common target before charging
Rises then levels off	-	Moisture still boiling off
Rises steadily, never levels	-	A leak
25 mm Hg absolute	25,000 microns	Low pressure appliance requirement

Source: Standard service practice

Doing this by hand on site?

- Superheat and subcooling read together, with the fault named
- Pressure and temperature for 22 refrigerants, bubble and dew
- 450 EPA 608 practice questions, flashcards and a timed mock test
- Free in your browser, and it works offline once opened

xernaitech.com/coldcheck

A study and field aid. Check every figure against the regulations that apply where you work, the equipment data plate and the manufacturer's instructions before you rely on it.