Fexa

QUICK GUIDE

How To Calculate Your Refrigerant Charge

(Essential Tools for Facility Managers)

Table of Contents

Introduction

“How do I determine the refrigerant charge of my HVAC/R system?”

It’s a common question that can cause a lot of mishap, especially when it comes field-assembled equipment. That’s why we created this simple quick guide, so you can accurately determine the refrigerant charges in your HVAC/R units.

1 You Have to Know the Total Charge Equation

Total Charge = Condensor/ Compressor + Evaporator + Piping

2 You Need to Take Into Account The Condensor and Evaporator Are Connected By Piping

There are many ways your tech staff are charging these systems; however, disregard the technicality of the process and focus instead on the weight/ results.

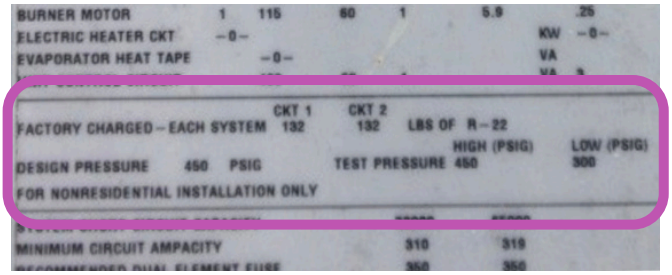
#HVACTips:

1. Ask for the end weight of all cylinders—Only allow the net gas to be listed as the charge amount.
2. Ask your service provider if he used a scale while filling.
3. Ensure that you do no over calculate the charge, add only the name plate + make up gas as

A. The Condensor/Compressor Section

There are **three options** to determine the capacity:

- Read the nameplate—It can be very hard but start here:
- Remove all refrigerant and recharge into system.
- Estimate charge based on tonnage/size.



BURNER MOTOR	1	115	60	1	5.9	.25	
ELECTRIC HEATER CKT	–0–					KW	–0–
EVAPORATOR HEAT TAPE		–0–				VA	
		CKT 1	CKT 2				
FACTORY CHARGED – EACH SYSTEM		132	132	LBS OF	R–22		
						HIGH (PSIG)	LOW (PSIG)
DESIGN PRESSURE	450	PSIG		TEST PRESSURE	450		300
FOR NONRESIDENTIAL INSTALLATION ONLY							
MINIMUM CIRCUIT AMPACITY					310		310

B. Piping

Refrigerant charge as this chart shows vary by type these are examples of common refrigerants.

ESTIMATED WEIGHT OF REFRIGERANT IN LIQUID LINE (POUNDS PER 100 LINEAL FEET OF TUBING).

REFRIGERANT *R-22*

LINE SIZE; (O.D. / IN.)	POUNDS
3/8”	3.9
1/2”	7.3
5/8”	11.7
7/8”	24.5
1-1/8”	41.0
1-3/8”	63.0
1-5/8”	90.0

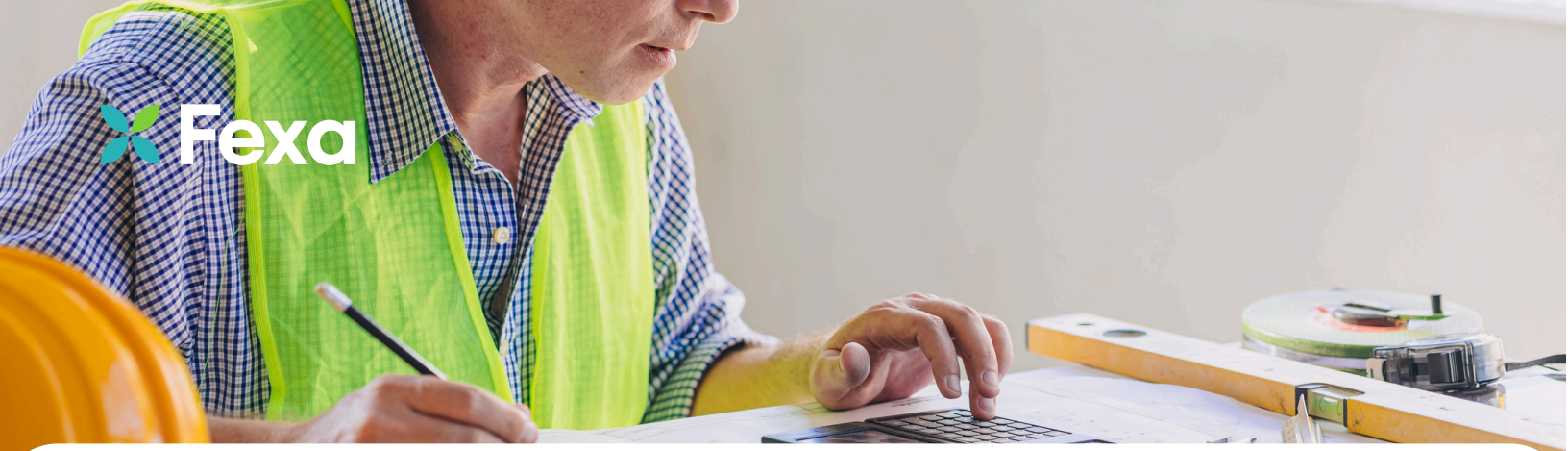
REFRIGERANT *R-404A / R-507*

LINE SIZE; (O.D. / IN.)	POUNDS
3/8”	3.6
1/2”	6.6
5/8”	10.8
7/8”	22.3
1-1/8”	38.0
1-3/8"	58.0
1-5/8"	82.0

https://www.arb.ca.gov/cc/rmp/Refrigerant_Weight_Calculator.xls
http://efficientcomfort.net/asp/LineSetCalc_Web/LineSetCalc_Web.asp

C. Evaporator

The Evaporator is where the cooing is delivered into the building or the food processing area. Usually smaller than the condenser, it can contain a significant amount of refrigerant depending on the type of cooling device used to convert from liquid to vapor. Other components to keep in mind when determining system charge include, receiver, accumulators and any traps or heat transfer devices.



3 Now, Combine A + B + C to Get Full Weight (aka, System Charge)!

Yes, now that you've looked at the Condensor/Compressor, the Piping, and the Evaporator, you can add them all up to get the system charge.

A + B + C = System Charge

See how simple and quick that was?

Achieving optimal and consistent HVAC/R outcomes doesn't have to be difficult. You just have to make sure you're always up to date with regulatory requirements and industry best practices. And that's why we're here at **Trakref**!

Need additional resources on this topic?

Many times people have questions about the piping. Typically if you know the refrigerant weight of the Condenser & Evaporator (AHU), then you can estimate that the piping (based on Section B).

However, the California Air Resources Board (CARB) has a handy Refrigerant Charge Calculator that is much more precise and can be useful for accuracy. It's available to download **here** in excel format.

For your convenience, we have provided this calculator on the next page.

CARB Refrigerant Charge Calculator Template

Date: _____

Inspection Site: _____

Refrigerant:			Input	Calculated Value
System Size:		Btuh	0.0	Tons

		Density	
	°F	Liquid lbs/ft³	Vapor lbs/ft³
Suction Temperature:			
Liquid Line Temperature:			
Condensing Temperature:			

				Inches Decimal	Cross Sectional Area in²
Suction Line OD:		Type:		ID:	0
Hot Gas Line OD:		Type:		ID:	0
Liquid Line OD:		Type:		ID:	0
				Other:	0

	Cross Sectional Area in²	Pipe Length Ft	Refrigerant Density lbs/ft³	Lbs of Refrigerant	
Suction Line OD:	0	0	0	0.0	
Hot Gas Line OD:	0	0	0	0.0	
Liquid Line OD:	0	0	0	0.0	% Capcity
Liquid Receiver:				0.0	
	0	0	0	0.0	
			Total:	0.0	

Note: Liquid receiver calcution ewrwerew awewill be a little high (□10%), as calculations do not take in account for convex ends.

Copper ACR - Type	
O.D. - in.	Area - in²
7/8	0.484
1 - 1/8	0.825
1 - 3/8	1.26
1 - 5/8	1.78
2 - 1/8	3.1
2 - 5/8	4.77

Copper ACR - Type	
O.D. - in.	Area - in²
3 - 1/8	6.81
3 - 5/8	9.21
4 - 1/8	12
5 - 1/8	18.7
6 - 1/8	26.8
8 - 1/8	46.9

Cross Sectional Area Formula:

Area = r² x 3.14

Online Calculator:

http://www.enginengineeringcalculator.net/cross_section_properties.htmlengineeringcalculator.net/cross_section_properties.html

Managing your HVAC/R does not need to be complicated. In fact, we want to make it as simple as possible for you.

That's the goal we deliver on every day at Fexa Trakref. Learn more by visiting https://info.fexa.io/lp/tr-request-a-demo.