

# Supplemental Data for Weigh-In Charge Method Subtask 2.3

Work Authorization # 6  
Contract #400-09-001  
Covering Tasks 3 Subtask 2

## 2013 RESIDENTIAL BUILDING ENERGY EFFICIENCY STANDARDS

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By  
Keith A. Temple, P.E.

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## **1. Introduction**

- 1.1. Objective: provide additional information for weigh-in refrigerant charge procedure based on manufacturer data

## **2. Background Research and Information**

- 2.1. Proposed revisions to the Weigh-in Charge Method are presented in the report “Proposed Improvements to Residential HVAC Diagnostic Test” dated June 28, 2011

## **3. Manufacturer Data**

- 3.1. A single model was investigated for each of three manufacturers (Lennox, Trane, and York) and the data related to the weigh-in method are summarized in Table 1. An installation manual could not be obtained for the York model.
- 3.2. Selected data from the manufacturer’s manuals are presented in figures as follows:
  - 3.2.1 Figure 1. Lennox 14ACX – Weigh In Method Instructions [Includes data for lineset length adjustment]
  - 3.2.2 Figure 2. Lennox 14ACX – Approach Method Instructions
  - 3.2.3 Figure 3. Trane XB13 – Charge Adjustment for Lineset Length
  - 3.2.4 Figure 4. York YCJD – Product Data (Physical and Electrical) [Data for nameplate charge and lineset length adjustment]
  - 3.2.5 Figure 5. York YCJD – Product Data (Matched Systems) [Data for indoor coil adjustment and Procedure at the bottom of the table]
- 3.3. The installation manual for the Trane XB13 does not indicate that the weigh-in method can be used; however, a table is included on page 6 for the lineset length adjustment (included in Figure 3). No method is explicitly provided for outdoor air temperature below 55°F. The following notes are taken from the manual.
  - 3.3.1 Page 2 notes: The units are factory charged with the system charge required when using fifteen (15) feet of rated connecting line. Unit nameplate charge is with twenty-five (25) feet of line set. Final refrigerant charge adjustment is necessary. Use the Subcooling Charging procedure on page 6.
  - 3.3.2 Page 6 notes: Subcooling (in the cooling mode) is the only recommended method of charging above 55°F ambient temperatures.

## **4. Additional Guidelines for Weigh-In Procedures**

- 4.1. Based on the manufacturer’s procedures, the total system refrigerant charge should be calculated based on the following components:
  - 4.1.1 The outdoor unit nameplate charge (allows for standard lineset length and matched indoor coil)

4.1.2 The lineset length adjustment for non-standard length (when required)

4.1.3 The indoor coil adjustment for non-matched coil (when available and required)

Table 1. Manufacturer Data for Weigh-In Method

Manufacturer and Model	Weigh-in Procedure	System Nameplate (nominal) Charge	Lineset length Charge Adjustment	Indoor Coil Charge Adjustment	
Lennox 14ACX	Install Manual Fig. 21	Engineering Data pp.6-7	Install Manual Fig. 21	Not available	
Trane XB13 (4TTB3)	Not available	Product Data pp.4-5	Installer's Guide p.6	Not available	
York YCJD	Technical Guide p.4 (bottom of table)	Technical Guide p.2	Technical Guide p.2	Technical Guide pp.3-4	

### WEIGH IN (RFC AND TXV)

#### CALCULATING SYSTEM CHARGE FOR OUTDOOR UNIT VOID OF CHARGE

If the system is void of refrigerant, first, locate and repair any leaks and then weigh in the refrigerant charge into the unit. To calculate the total refrigerant charge:

Amount specified on nameplate  $\pm$  Adjust amount, for variation in line set length listed on line set length table below. = Total charge

Liquid Line Set Diameter	Ounces per 5 feet (g per 1.5 m) adjust from 15 feet (4.6 m) line set*
3/8" (9.5 mm)	3 ounce per 5' (85 g per 1.5 m)

\*If line length is greater than 15 ft. (4.6 m), add this amount. If line length is less than 15 ft. (4.6 m), subtract this amount.

**NOTE** — Insulate liquid line when it is routed through areas where the surrounding ambient temperature could become higher than the temperature of the liquid line or when pressure drop is equal to or greater than 20 psig.

**NOTE** — The above nameplate is for illustration purposes only. Go to actual nameplate on outdoor unit for charge information.

Figure 21. Using HFC-410A Weigh In Method

Figure 1. Lennox 14ACX – Weigh In Method Instructions

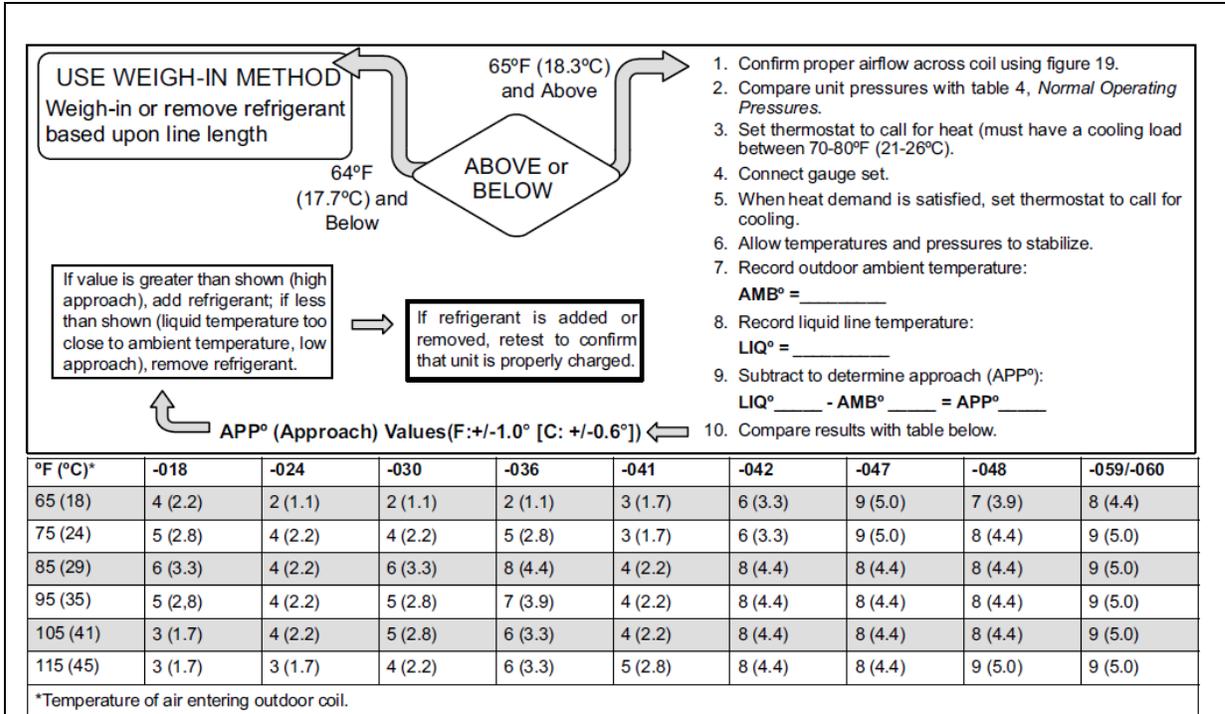


Figure 22. HFC-410A Approach TXV Charge

Figure 2. Lennox 14ACX – Approach Method Instructions

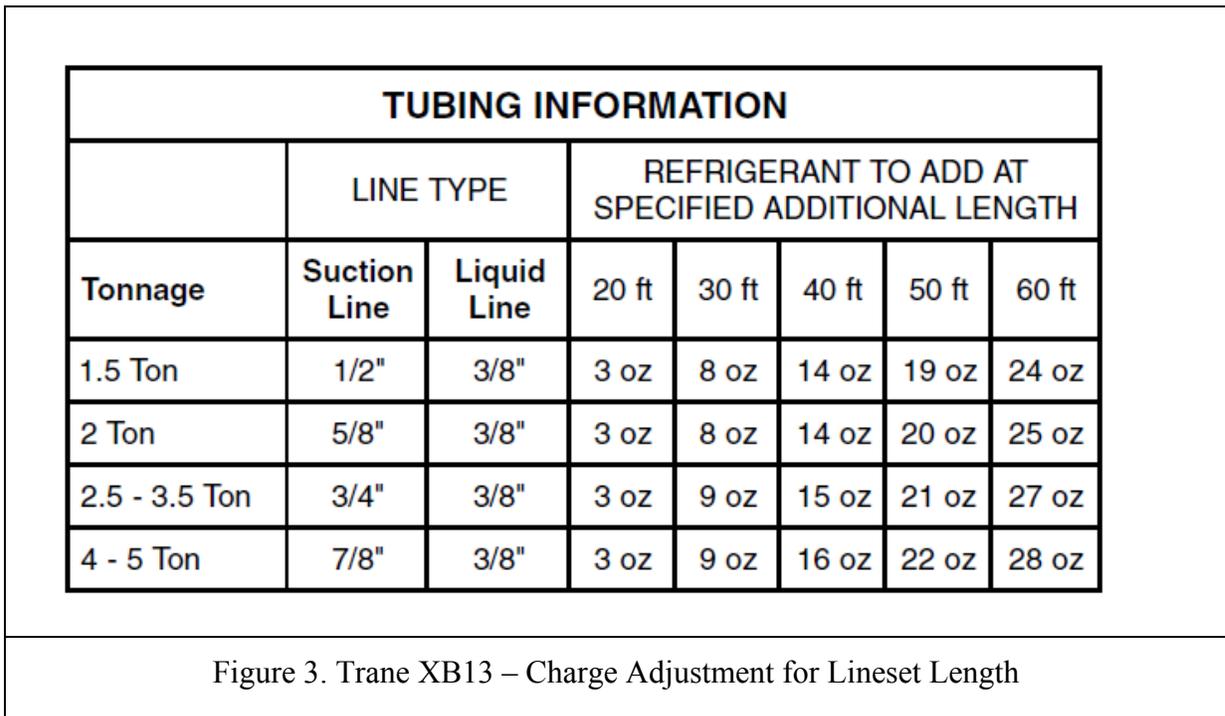


Figure 3. Trane XB13 – Charge Adjustment for Lineset Length

MODEL	YCJD18 S41S1(H)	YCJD24 S41S1(H)	YCJD30 S41S1(H)	YCJD36 S41S1(H)	YCJD42 S41S1(H)	YCJD48 S41S1(H)	YCJD60 S41S1
Unit Supply Voltage	208-230V, 1 $\phi$ , 60Hz						
Normal Voltage Range <sup>1</sup>	187 to 252						
Minimum Circuit Ampacity	9.8	12.4	14.7	17.9	21.5	21.1	34.3
Max. Overcurrent Device Amps <sup>2</sup>	15	20	25	30	35	35	60
Min. Overcurrent Device Amps <sup>3</sup>	15	15	15	20	25	25	35
Compressor Type	Rotary	Recip	Recip	Recip	Recip	Recip	Scroll
Compressor Amps	Rated Load	7.4	9.3	10.6	13.1	16.0	26.2
	Locked Rotor	40	43	54	74	84	150
Crankcase Heater	No	No	No	No	No	No	No
Fan Motor Amps	Rated Load	0.5	0.8	1.4	1.5	1.5	1.5
Fan Diameter Inches	17.5	17.5	17.5	22	22	22	24
Fan Motor	Rated HP	1/12	1/8	1/4	1/4	1/4	1/4
	Nominal RPM	1100	1075	1100	850	850	850
	Nominal CFM	1400	1950	2050	3200	2950	3600
Coil	Face Area Sq. Ft.	9.60	9.60	9.60	13.07	14.16	18.68
	Rows Deep	1	1	1	1	1	1
	Fin / Inches	23	23	23	23	23	23
Liquid Line Set OD (Field Installed)	3/8	3/8	3/8	3/8	3/8	3/8	3/8
Vapor Line Set OD (Field Installed)	5/8	3/4	3/4	3/4	7/8	7/8	7/8
Unit Charge (Lbs. - Oz.) <sup>4</sup>	3 - 3	3 - 13	3 - 14	4 - 9	4 - 5	4 - 9	5 - 6
Charge Per Foot, Oz.	0.58	0.62	0.62	0.62	0.67	0.67	0.67
Operating Weight Lbs.	97	129	131	145	173	173	195

Figure 4. York YCJD – Product Data (Physical and Electrical)

System Charge for Various Matched Systems							
Outdoor Unit	YCJD18 S41S1(H)	YCJD24 S41S1(H)	YCJD30 S41S1(H)	YCJD36 S41S1(H)	YCJD42 S41S1(H)	YCJD48 S41S1(H)	YCJD60 S41S1
Required Orifice or TXV <sup>1,2</sup>	.048/4F1	.055/4F1	.061/4F1	.065/4G1	.075/4G1	.073/4H1	.087/4J1
Factory Charge, lbs-oz	3 - 3	3 - 13	3 - 14	4 - 9	4 - 5	4 - 9	5 - 6
Indoor Coil <sup>3,4</sup>	Additional Charge, oz						
AHP18	0	-	-	-	-	-	-
AHP30	-	4	0	-	-	-	-
AHP36	-	-	2	0	-	-	-
AHP42	-	-	-	0	0	-	-
AHP60	-	-	-	-	-	0	0
AHR18	0	-	-	-	-	-	-
AHR24	-	4	-	-	-	-	-
AHR30	-	-	-	-	-	-	-
AHR36	-	-	2	0	-	-	-
AHR42	-	-	-	8	2	-	-
AHR48	-	-	-	-	-	0	-
AHR60	-	-	-	-	-	-	4
AHE18	0	-	-	-	-	-	-
AHE24	-	4	-	-	-	-	-
AHE30	-	4	0	-	-	-	-
AHE36	-	4	2	0	-	-	-
AHE42	-	-	-	8	2	-	-
AHE48	-	-	-	-	-	0	-
AHE60	-	-	-	-	-	-	4
AHX18	0	-	-	-	-	-	-
AHX30	-	4	0	-	-	-	-
AHX36	-	4	2	0	-	-	-
AHX42	-	-	-	8	2	-	-
AHX48	-	-	-	-	-	0	-
AHX60	-	-	-	-	-	-	4

**PROCEDURES:**

- Unit factory charge listed on the unit nameplate includes refrigerant for the condenser, the smallest evaporator, and 15 feet of interconnecting line tubing.
- Verify the TXV and additional charge required for specific evaporator coil in the system using the above table.
- Additional charge for the amount of interconnecting line tubing greater than 15 feet at the rate specified in Physical and Electrical Data Table.
- For orifice or TXV matches requiring additional charge, the refrigerant needs to be weighed in for specific coil match and lineset length.
- Permanently mark the unit nameplate with the total system charge. Total System Charge = Base Charge (as shipped) + adder for evaporator + adder for line set.

**Figure 5. York YCJD – Product Data (Matched Systems)**

**5. References**

5.1. Current Work Authorization (RWA06 Temple)

5.1.1 Temple, K, 2011. Proposed Improvements to Residential HVAC Diagnostic Test Protocols, Subtasks 2.1A and 2.1E (Work Authorization # 6, Contract #400-09-001, Covering Tasks 3 Subtask 2), June 28, 2011

## 5.2. Product Data

### 5.2.1 Lennox 14ACX

5.2.1.1 Engineering Data: 14ACX, MERIT® Series, R-410A, Engineering Data, Bulletin No. 210565, July 2011.

5.2.1.2 Installation Manual: Installation Instructions, Merit® Series 14ACX Units Condensing Units, 506645-01, July 2011.

### 5.2.2 Trane

5.2.2.1 Engineering Data: Split System Cooling Product Data, XB 13, 4TTB3018-060D, 1½ – 5 Tons, PUB. NO. 22-1843-06, October 2010.

5.2.2.2 Installation Manual: Installer's Guide, Condensing Units 4TTB3, 18-AC59D1-5, May 2009.

### 5.2.3 York

5.2.3.1 Engineering Data: Technical Guide, SPLIT-SYSTEM AIR CONDITIONERS, 13 SEER – R-410A – 1 Phase, Models: YCJD18 THRU 60 (1.5 thru 5 Nominal Tons), 561908-YTG-D-0611, June 2011.