



HVAC Performance Toolkit
Tim Hanes
May 14, 2019

2019 Furnace Prequalify & New Furnace

This new job type has 3 different sections

Customer: wis, test (wis, test) ([View More](#)) ([View / Edit Customer Info](#))
ID / Job / Job Type: 3087 / contractor test / 2019 Furn Prequalify & New Furnace

Ameren IL

Existing Equipment

Existing Testing

Equipment Selection

New Equipment

New Testing

Reports

Comments

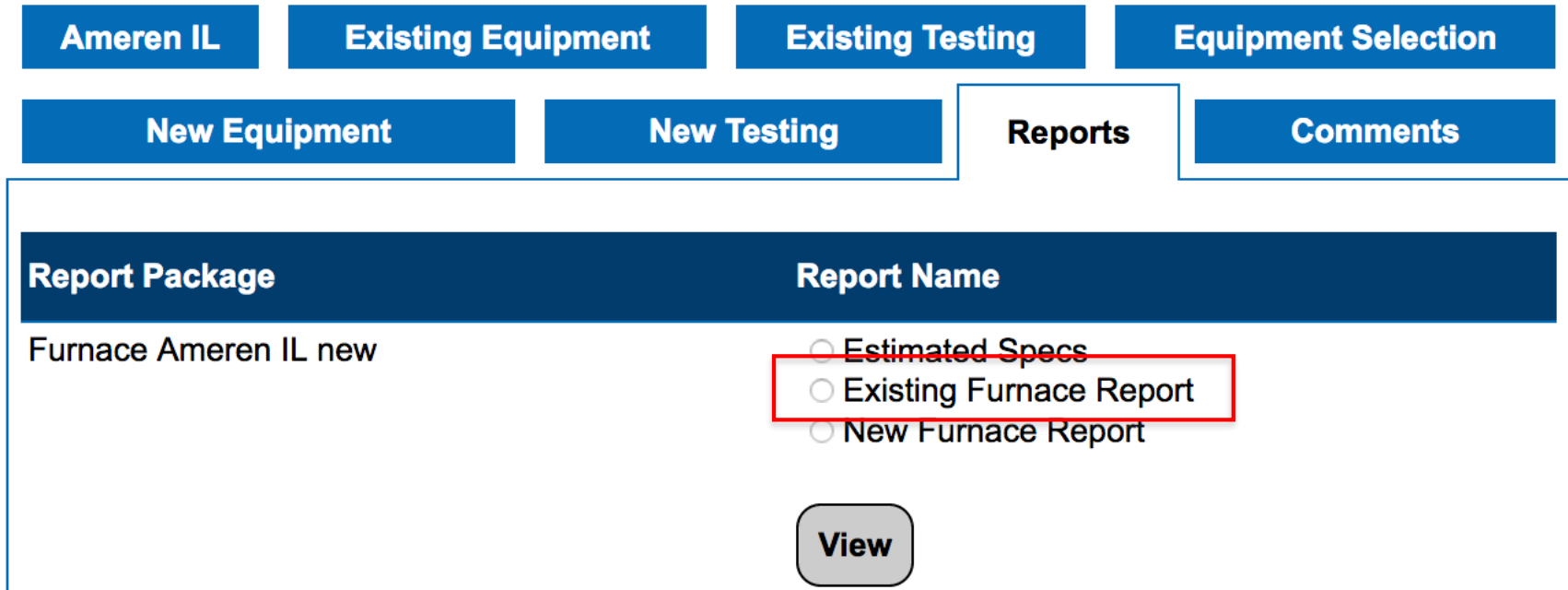
The first section is for the existing furnace

This is required for the Income Qualified Offering

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Ameren IL	Existing Equipment	Existing Testing	Equipment Selection
New Equipment	New Testing	Reports	Comments

Once each section is completed you can go to the reports tab and view the results
The Existing Furnace Report is for the first section



The screenshot displays a navigation menu with seven tabs: Ameren IL, Existing Equipment, Existing Testing, Equipment Selection, New Equipment, New Testing, Reports, and Comments. The Reports tab is selected and highlighted. Below the menu, a table lists report packages. The first package is 'Furnace Ameren IL new'. To its right, there are three radio button options: 'Estimated Specs', 'Existing Furnace Report', and 'New Furnace Report'. The 'Existing Furnace Report' option is highlighted with a red rectangular box. Below the radio buttons is a 'View' button.

Report Package	Report Name
Furnace Ameren IL new	<input type="radio"/> Estimated Specs <input type="radio"/> Existing Furnace Report <input type="radio"/> New Furnace Report

[View](#)

This report is the same as used for the Income Qualified Offering
“Testing Meets Requirements” should say “Pass”

To qualify the “Installed Efficiency” must be less than 80

Submit the test when you are satisfied with the results. Enter the tested efficiency
on the reservation application AFUE blank

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123 Main St
Anytown, IL 12345
515-710-9750

Tim Hanes
123 Main St
Anytown, IL 12345
515-710-9750
amil@wiswise.com

Job ID #: 191
Date: 6/4/2018
Technician: Tim Hanes
Tech ID: 10000

Account Holder: Tim Hanes
Elevation: 1000
Testing Meets Requirements: Pass
Total Errors: 0

Furnace Specs

Furnace Manufacturer: Amana
Furnace Model: am8010048
Blower Tons: 4

Rated Input: 100000
Rated Output: 80000

Installed Performance

Installed Input: 100000
Potential Output: 80000

Installed Btu/h: 68160
Installed Efficiency: 68.2

The next section is Equipment Selection

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Ameren IL

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The Estimated Specs Report is for the second section

This is not required by Ameren and a webinar regarding this section is available for viewing
If you would like one-on-one training please contact Steve Gwinn or Tim Hanes

Ameren IL	Existing Equipment	Existing Testing	Equipment Selection
New Equipment	New Testing	Reports	Comments
Report Package	Report Name		
Furnace Ameren IL new	<input type="radio"/> Estimated Specs		
	<input type="radio"/> Existing Furnace Report		
	<input type="radio"/> New Furnace Report		
	View		

- Replacing heating and cooling equipment can be more challenging than a new installation
- Making sure that the new equipment will operate correctly with an existing system before installation is critical
- An often overlooked but vital part of equipment performance is having the correct airflow
- Without the correct airflow the equipment will not be able to perform up to it's rated efficiency
- This can cause comfort problems, premature failure and increased operating costs

- ***Even the best technician cannot make heating & cooling equipment work correctly if the airflow is not correct***
- The airflow requirements of the new equipment are probably different than the airflow needed by the old equipment
- This is especially true with condensing furnaces
- They can require 50% - 100% more airflow than the induced or natural draft furnace that is being replaced

- By using static pressure and airflow measurements from the existing system, along with manufacturer specs of the new equipment, filter and any additional ductwork will enable us to predict if the new equipment is capable of moving the correct amount of air
- This can be done prior to installing the new equipment! It's like knowing the lottery numbers before they are drawn

- ***We can stop gambling and hoping that everything will work after the new equipment is installed***
- This process will also identify problems with the existing system before the sale is finalized.
- We do not own existing problems and they can be addressed with the customer prior to the sale
- Fixing problems can be part of the sale, instead of getting blamed for them after the installation

Estimated Specs Report Heating Equipment Section

Target CFM: This is the CFM needed in heating mode. It is based upon the **Furnace Output** and the **Furnace Target Temp Rise**

Gas Meter Target: This is the target seconds per revolution when clocking the gas meter. Three options are given depending upon which dial you are clocking. This is based upon the **Furnace Input**

Heating Equipment

Equipment Type: Furnace
Target CFM: 1396

Size: 76800
Gas Meter Target: 23 Half Foot, 45 1 Foot, 90 2 Feet

Cooling Equipment Section

Target CFM: This is the CFM needed in cooling mode. It is based upon the **Condenser Tons** and the **CFM per Ton Target**.

Cooling Equipment

Equipment Type: Air Conditioner
Target CFM: 1200

Size: 3

Estimated Specs Report



Duct Temperature Loss Section (not used to qualify for duct sealing incentive)

Return Duct Temp Loss: Degrees of loss between the **Return Dry Bulb Equipment** and the **Return Grille Dry Bulb Average**.

Return Duct % Loss: Percent return duct loss compared to equipment delta t.

Supply Duct Temp Loss: Degrees of loss between the **Supply Dry Bulb Equipment** and the **Supply Register Dry Bulb Average**.

Supply Duct % Loss: Percent supply duct loss compared to equipment delta t.

Duct Temperature Loss

Return Duct Temp Loss: 6
Return Duct % Loss: 11%

Supply Duct Temp Loss: 11
Supply Duct % Loss: 20%

Filter Section

Size: This is the minimum recommended filter size. It is based upon the **New Filter Rated Pressure Drop**, **New Filter Rated Velocity**, **New Filter Dimension 1** and the maximum **Target CFM**.

Filter

Rated Pressure Drop: .11
Square Inches Target: 670

Rated Velocity: 300
Size: 25" x 27"

Filter size is based upon the maximum airflow that is required by the HVAC system. If the recommended size is not available use the next larger size. If a filter with less square inches than the target is used, the filter pressure drop will increase.

Estimated Specs Report

Heating Pressure Drops Section



Return Duct Total PD: This is the estimated return duct pressure drop at the heating **Target CFM**. It is based upon the **Return Duct Existing Pressure, Return Duct Existing CFM at Pressure, New Return Duct Rated Pressure Drop and New Return Duct CFM at Rated Pressure Drop.**

Supply Duct Total PD: This is the estimated supply duct pressure drop at the heating **Target CFM**. It is based upon the **Supply Duct Existing Pressure, Supply Duct Existing CFM at Pressure, New Supply Duct Rated Pressure Drop and New Supply Duct CFM at Rated Pressure Drop.**

Filter PD: This is the estimated filter pressure drop at the heating **Target CFM**. It is based upon the **New Filter Rated Pressure Drop, New Filter Rated Velocity and Filter Size.**

Evaporator Coil PD: This is the estimated coil pressure drop at the heating **Target CFM**. It is based upon the **Evaporator Rated Pressure Drop, and Evaporator Coil CFM at Rated Pressure Drop.**

Estimated Total ESP: This is total of all of the heating pressured drops at the heating **Target CFM**. It is based upon the **Evaporator Rated Pressure Drop, and Evaporator Coil CFM at Rated Pressure Drop.**

Heating Pressure Drops

Return Duct Existing PD: .06
Return Duct New PD: .04
Return Duct Total PD: .1

Supply Duct Existing PD: .21
Supply Duct New PD: 0
Supply Duct Total PD: .21

Filter PD: .11

Evaporator Coil PD: .43

Estimated Total ESP: .85

Target CFM: 1396

Use the OEM fan table and the Estimated Total ESP to verify that the Target CFM can be achieved. This will also provide you with the estimated fan speed setting.

Estimated Specs Report

Cooling Pressure Drops Section



Return Duct Total PD: This is the estimated return duct pressure drop at the cooling **Target CFM**. It is based upon the **Return Duct Existing Pressure, Return Duct Existing CFM at Pressure, New Return Duct Rated Pressure Drop and New Return Duct CFM at Rated Pressure Drop.**

Supply Duct Total PD: This is the estimated supply duct pressure drop at the cooling **Target CFM**. It is based upon the **Supply Duct Existing Pressure, Supply Duct Existing CFM at Pressure, New Supply Duct Rated Pressure Drop and New Supply Duct CFM at Rated Pressure Drop.**

Filter PD: This is the estimated filter pressure drop at the cooling **Target CFM**. It is based upon the **New Filter Rated Pressure Drop, New Filter Rated Velocity and Filter Size.**

Evaporator Coil PD: This is the estimated coil pressure drop at the cooling **Target CFM**. It is based upon the **Evaporator Rated Pressure Drop, and Evaporator Coil CFM at Rated Pressure Drop.**

Estimated Total ESP: This is total of all of the cooling pressured drops at the cooling **Target CFM**. It is based upon the **Evaporator Rated Pressure Drop, and Evaporator Coil CFM at Rated Pressure Drop.**

Cooling Pressure Drops

Return Duct Existing PD: .04
Return Duct New PD: .03
Return Duct Total PD: .07

Supply Duct Existing PD: .16
Supply Duct New PD: 0
Supply Duct Total PD: .16

Filter PD: .08

Evaporator Coil PD: .32

Estimated Total ESP: .63

Target CFM: 1200

Use the OEM fan table and the Estimated Total ESP to verify that the Target CFM can be achieved. This will also provide you with the estimated fan speed setting.

Estimated Specs Report

Trouble Shooting Section

Trouble Shooting

If the Estimated Total ESP is higher than listed on the OEM Fan Table or the Target CFM cannot be achieved, than you should make changes to lower the pressure drops or choose equipment that has a blower that can operate at the Estimated Total ESP and deliver the Target CFM.

If the Estimated Total ESP is higher than listed on the OEM Fan Table or the Target CFM cannot be achieved, than you should make changes to lower the pressure drops or choose equipment that has a blower that can operate at the Estimated Total ESP and deliver the Target CFM.

If the Return or Supply Duct Total PD is higher than 0.15 consider measures that will reduce the pressure drop; increase size, change fittings, change register/grilles, ...

If Evaporator Coil PD is higher than 0.25 consider using a coil that is less restrictive. Another option is increasing the size of the coil if the OEM offers that option. Make sure that the evaporator and condenser are a matched pair.

If duct temp loss is above 10% consider insulating the duct even if it is in conditioned space. Hotter or colder air at the registers will increase comfort, save energy, and increase customer satisfaction.

The next section is New Furnace

Customer: wis, test (wis, test) ([View More](#)) ([View / Edit Customer Info](#))
ID / Job / Job Type: 3087 / contractor test / 2019 Furn Prequalify & New Furnace

Ameren IL

Existing Equipment

Existing Testing

Equipment Selection

New Equipment

New Testing

Reports

Comments

The New Furnace Report is for the third section

Ameren IL	Existing Equipment	Existing Testing	Equipment Selection
New Equipment	New Testing	Reports	Comments
Report Package	Report Name		
Furnace Ameren IL new	<input type="radio"/> Estimated Specs		
	<input type="radio"/> Existing Furnace Report		
	<input type="radio"/> New Furnace Report		
View			

WIS
5030 Hwy 3
Dickinson, TX 77539
5157109750
timothymhanes@gmail.com

test wis
111 elm st
Anytown, IL 12345



Job ID #: 3087
Date: 4/22/2019
Technician: TMH
Tech ID: NA

Account Holder: john doe
Elevation: 900
Testing Meets Requirements: NA
Total Errors: 0

Furnace Specs

Furnace Manufacturer: ICP COMMERCIAL
Furnace Model: A*VC80804C*B*
Blower Tons: 4

Rated Input: 90000
Rated Output: 73000

Installed Performance

Installed Input: 81818
Potential Output: 66363

Installed Btu/h: 57600
Installed Efficiency: 70

Gas Meter

Gas Meter Type: Standard Residential
Seconds per Revolution: 22

Gas Meter Dial: Half Foot

Static Pressures

Filter Pressure Entering: .1
Filter Pressure Exiting: .2
Filter Pressure Drop: .1

Coil Pressure Entering: .3
Coil Pressure Exiting: .12
Coil Pressure Drop: .18

Return Duct Pressure Drop: .1
Supply Duct Pressure Drop: .12
Total Duct Pressure Drop: .22

Equipment Pressure Entering: .2
Equipment Pressure Exiting: .3
Total External Static Pressure: .5

Equipment Airflow

Blower Speed: Medium
Equipment CFM: 1200

Equipment CFM Method: OEM Blower Tables

Temperatures

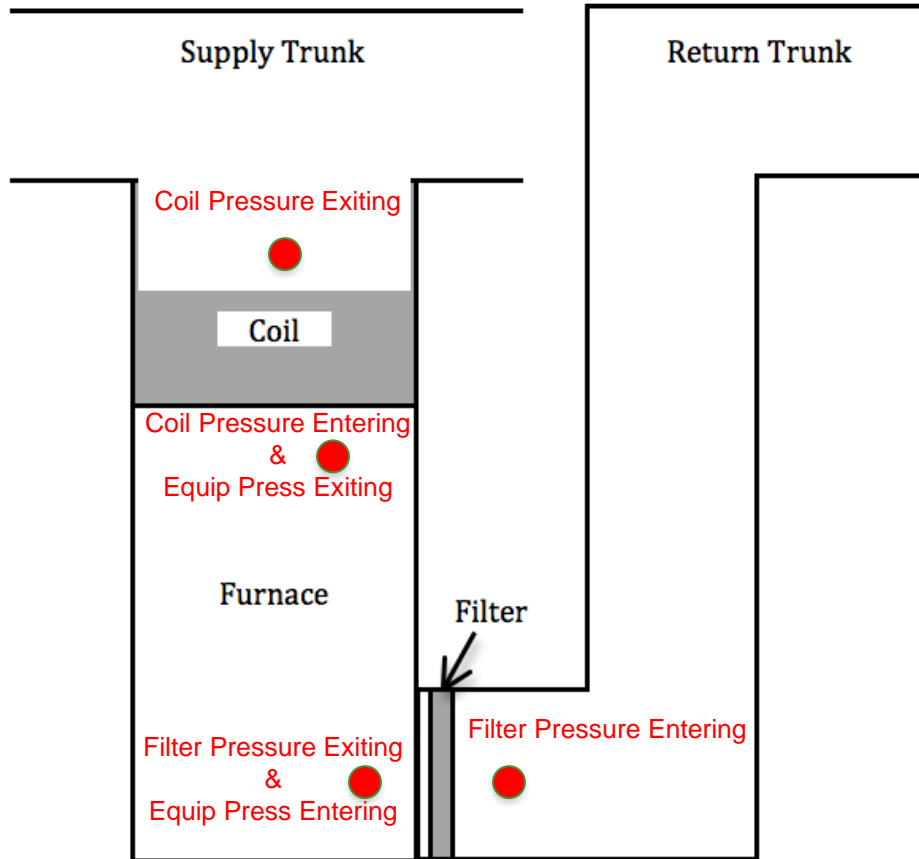
Equipment Dry Bulb Entering: 70
Equipment Dry Bulb Exiting: 120

Outdoor Dry Bulb: 55
Equipment Temperature Rise: 50

This report is basically the same as the existing furnace report. It uses the data from the new furnace and “Testing Meets Requirements” does not apply.

Compare the Installed Efficiency to the Rated AFUE.

The major factors that effect the installed efficiency are installed input, equipment cfm and equipment temperature rise.



Static Pressure Review

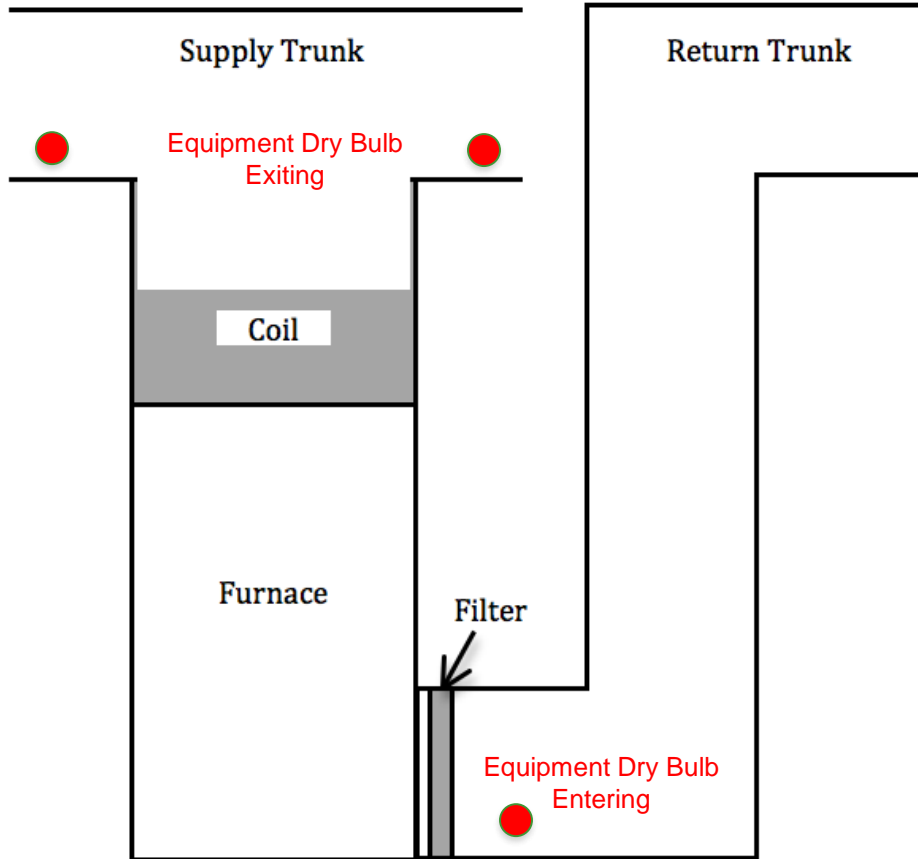
A common mistake is measuring the static pressures at the incorrect location.

Using the OEM blower table is the preferred cfm method.

To use them add the equipment entering pressure and the equipment exiting pressure together to get the total external static pressure. Then plot the airflow with the fan speed and the TESP.

Equipment entering pressure 0.24", Equipment exiting pressure 0.39", TESP 0.63", Fan speed Med
That makes the equipment cfm 1,305

Model—Heating Speed as Shipped	Motor Speed	Tons AC at 0.5" ESP	External Static Pressure (Inches Water Column)															
			0.1		0.2		0.3		0.4		0.5		0.6		0.7		0.8	
			CFM	Rise	CFM	Rise	CFM	Rise	CFM	Rise	CFM	Rise	CFM	Rise	CFM	Rise	CFM	Rise
WFM180453AXC (Medium)	High	3.0	1,739	19	1,656	20	1,601	21	1,551	21	1,513	22	1,460	22.83	1,413	23.59	1,353	24.64
	Med	2.5	1,422	23	1,399	24	1,378	24	1,350	25	1,305	26	1,275	26.14	1,220	27.32	1,178	28.30
	Med-Lo	2.0	1,207	28	1,213	27	1,197	28	1,169	29	1,158	29	1,131	29.47	1,103	30.22	1,068	31.21
	Low	1.5	991	34	980	34	958	35	950	35	937	36	924	36.08	910	36.63	874	38.14



Equipment Temps Review

Make sure that you don't measure supply temps in direct sight of the furnace.

For Software or Technical Support Contact:

Tim Hanes

515-710-9750

amil@wiswise.com

For Income Qualified Offering program question/approval Contact:

Steve Gwinn

309-230-0959

Steve.M.Gwinn@leidos.com

*****Existing Furnace Testing and Equipment Selection webinars are available for viewing along with additional one-on-one training by contacting Steve or Tim for information*****

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AmerenIllinoisSavings.com

