

Alternatives to Duct Pressurization Testing for Determining Duct System Efficiency

Duct pressurization tests are the most common tests performed on duct systems. They are similar to pressure testing of building envelopes in that the test measures airflows at specified pressure differences. To perform a pressurization test all the registers in a system must be covered and a measured amount of air is blown into the ducts using a duct pressurization device, essentially a small blower door. The measurement of the duct pressure, or the amount of “pressurization”, indicate how leaky the ducts are. Historically, duct pressurization testing has been the only testing method recognized by the Program, and is considered the most accurate and preferred testing method.

However, duct pressurization testing can be time-intensive, and impractical in some cases. As a result of the difficulties in testing, duct sealing and duct insulation improvements are not always quantified or reported to the program, which has resulted in a lost opportunity for the program to report energy savings. The Program is striving to maximize savings, especially the kWh savings that can be achieved through quantifying duct sealing and insulation benefits related to cooling systems.

To address the difficulties in performing duct pressurization testing, the following methods for quantifying duct leakage and duct improvement will be recognized in the Program:

1. A method complying with the ASTM standard for measuring duct leakage (ASTM E1554-94 (1994)), which includes:
 - a. duct pressurization; and
 - b. blower door subtraction
2. *Delta Q* method as developed by Lawrence Berkeley National Laboratory described in document ([LBNL 47308](#))
3. Use of the [Distribution Efficiency Look-up Table](#) as published on Page 7 of the Building Performance Institute (BPI) Technical Standards for the Heating Professional (Revision: 11/20/07 mda).

Information related to the ASTM standard methods and the *Delta Q* method may be found online and by consulting the user manuals of the various duct diagnostic equipment.

Of all the methods, the Distribution Efficiency Look-up Table method is considered to be least complex, and requires no specialized testing equipment. Furthermore, once determined by using the look-up table, the distribution efficiency can be input directly into the program modeling software, readily quantifying the benefit of duct sealing or insulation improvements and the related savings. Program contractors are encouraged to use the Look-up table method whenever duct system improvements are being performed, and other testing methods are considered impractical.

For more information on any of the duct system testing methods, please contact your Account Manager.

Example:

Using the Distribution Efficiency Look-up Table in the BPI Heating Professional standards, a house with 50% or more of the ducts inside the building envelope, some observable leaks, and the ducts are uninsulated would have an estimated distribution efficiency of 78%.

Distribution Efficiency	90% or more inside envelope	50% or more inside envelope	less than 50% inside envelope	Connections sealed w/mastic	No observable leaks	Some observable leaks	Significant leaks	Catastrophic leaks	Ducts outside envelope R-8 or greater	Ducts outside envelope R-4 - R-7	Ducts outside envelope < R-4
	90%		XXX		XXX					XXX	
89%		XXX		XXX						XXX	
88%		XXX		XXX							XXX
84%		XXX			XXX				XXX		
83%		XXX			XXX					XXX	
82%		XXX			XXX						XXX
80%		XXX				XXX			XXX		
78%		XXX				XXX				XXX	

Once the connections are sealed with mastic, the new distribution efficiency would be 88%.

Distribution Efficiency	90% or more inside envelope	50% or more inside envelope	less than 50% inside envelope	Connections sealed w/mastic	No observable leaks	Some observable leaks	Significant leaks	Catastrophic leaks	Ducts outside envelope R-8 or greater	Ducts outside envelope R-4 - R-7	Ducts outside envelope < R-4
	90%		XXX		XXX					XXX	
89%		XXX		XXX						XXX	
88%		XXX		XXX							XXX
84%		XXX			XXX				XXX		
83%		XXX			XXX					XXX	
82%		XXX			XXX						XXX

In TREAT, the duct sealing improvement could then be modeled as 78% existing estimated total distribution efficiency, being increased to 88% proposed estimated total distribution efficiency. The duct test leakage would be left at the default (50 CFM25) since the duct leakage to outside was not actually tested.

Estimated Total Distribution Efficiency, %	88	78
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