

Duct Leakage Test Procedure Pdf

Building and Engineering Services Association

Residential Forced-air System Cabinet Leakage and Blower Performance ,2011

HVAC Air Duct Leakage Test Manual ,1985

HVAC Air Duct Leakage Test Manual Sheet Metal and Air Conditioning Contractors' National Association (U.S.),1985

HVAC Air Duct Leakage Test Manual 2nd Ed Smacna,2012-01-02

Duct Leakage Testing John Diem,Erik Rasmussen,Randy F. Petit, Sr.,2015-05-01 To comply with the International Energy Code, most states now require duct testing for both new construction and retrofit. Duct leakage testing provides an in-depth understanding of duct leakage testing procedures, methods of expressing results, and terminology. Building Science is the study of a building's interaction between the structure and its components. A structure's occupants, mechanical systems, and the surrounding outdoor environment all play a role in the performance of a building. Duct Leakage Testing covers: * Duct leakage testing methods or total leakage. * Leakage to the outside using a duct pressurization tester. * Modified blower door subtraction methods.

Guide for Protection and Repair of Concrete Structures FIB - International Federation for Structural

Concrete,2022-03-01 The idea of preparing a technical document for the repairs and interventions upon concrete structures goes back to the former fib COM5: Structural Service Life Aspects, being the goal of the then TG5.9. After a long period of reduced activity, and taking into account the reorganization of fib commissions that meanwhile took place, on June 2017 a different approach was proposed to push forward the task of TG8.1 (formerly TG5.9). The (new) goal of TG 8.1 was to deliver a 'how-to-do' guide, gathering together protection, repair, and strengthening techniques for concrete structures. Chapters are intended to provide both guidelines and case-studies, serving as support to the application of fib MC2020 pre-normative specifications. Each chapter was written by an editorial team comprising desirably at least a researcher, a designer and a contractor. Templates have been prepared in order to harmonize the contents and the presentation of the different methods. Following the writing process, chapters were reviewed by experts and, after amendments by the authors, they underwent a second review process by COM8 and TG3.4 members, as well as by different practitioners. For each protection, repair and strengthening method addressed in this guide, readers have a description of when to adopt it, which materials and systems are required, which techniques are available, and what kind of equipment is needed. It then presents a summary of

stakeholders' roles and qualifications, design guidelines referring to most relevant codes and references, the intervention procedure, quality control measures and monitoring and maintenance activities. Due to the extent of the guide, it was decided to publish it as bulletin 102, addressing protection and repair methods, and bulletin 103, addressing strengthening methods. We would like to thank the authors, reviewers and members of COM8 and TG3.4 for their work in developing this fib Bulletin, which we hope will be useful for professionals working in the field of existing concrete structures, especially those concerned with life-cycle management and conservation activities. As noted above, this Bulletin is also intended to act as a background and supporting document to the next edition of the fib Model Code for Concrete Structures, which is currently under development under the auspices of TG10.1 with the working title of fib Model Code 2020.

Duct and Envelope Testing Erik Rasmussen, Randy F. Petit, Sr., John Diem, 2015-01-01 To comply with the International Energy Code, most states now require duct testing for both new construction and retrofit. Duct and Envelope Testing provides an in-depth understanding of envelope and duct leakage testing procedures, methods of expressing results, and terminology. This five-section manual provides an understanding of the terminology and building science affecting energy efficiency. The tools and testing procedures used to evaluate a building's envelope and duct systems are covered in detail. The manual provides the methods for expressing and recording envelope or duct leakage test results and explains what the numbers mean to the home owner and local code officials. The manual contains a worksheet for each section.

Development of a New Duct Leakage Test, 2001 Duct leakage is a key factor in determining energy losses from forced air heating and cooling systems. Several studies (Francisco and Palmiter 1997 and 1999, Andrews et al. 1998, and Siegel et al. 2001) have shown that the duct system efficiency cannot be reliably determined without good estimates of duct leakage. Specifically, for energy calculations, it is the duct leakage air flow to outside at operating conditions that is required. Existing test methods either precisely measure the size of leaks (but not the flow through them at operating conditions), or measure these flows with insufficient accuracy. The DeltaQ duct leakage test method was developed to provide improved estimates of duct leakage during system operation. In this study we developed the analytical calculation methods and the test procedures used in the DeltaQ test. As part of the development process, we have estimated uncertainties in the test method (both analytically and based on field data) and designed automated test procedures to increase accuracy and reduce the contributions of operator errors in performing field tests. In addition, the test has been evaluated in over 100 houses by several research teams to show that it can be used in a wide range of houses and to aid in finding limits or problems in field applications. The test procedure is currently being considered by ASTM as an update of an existing duct leakage standard.

Alternative Procedure to Home Energy Rating System Rater Nonresidential Duct Leakage Test Verification Joe Loyer, 2017

A Practical Guide to Ductwork Leakage Testing Heating and Ventilating Contractors' Association, 2000

Journal of the Royal Aeronautical Society ,2006

Duct Leakage Repeatability Testing ,2014 The purpose of this report is to evaluate the repeatability of the three most significant measurement techniques for duct leakage using data from the literature and recently obtained field data. We will also briefly discuss the first two factors. The main question to be answered by this study is to determine if differences in the repeatability of these tests methods is sufficient to indicate that any of these methods is so poor that it should be excluded from consideration as an allowed procedure in codes and standards. The three duct leak measurement methods assessed in this report are the two duct pressurization methods that are commonly used by many practitioners and the DeltaQ technique. These are methods B, C and A, respectively of the ASTM E1554 standard. Although it would be useful to evaluate other duct leak test methods, this study focused on those test methods that are commonly used and are required in various test standards, such as BPI (2010), RESNET (2014), ASHRAE 62.2 (2013), California Title 24 (CEC 2012), DOE Weatherization and many other energy efficiency programs.

Reducing Uncertainty for the DeltaQ Duct Leakage Test ,2004 The thermal distribution system couples the HVAC components to the building envelope, and shares many properties of the buildings envelope including moisture, conduction and most especially air leakage performance. Duct leakage has a strong influence on air flow rates through building envelopes (usually resulting in much greater flows than those due to natural infiltration) because unbalanced duct air flows and leaks result in building pressurization and depressurization. As a tool to estimate this effect, the DeltaQ duct leakage test has been developed over the past several years as an improvement to existing duct pressurization tests. It focuses on measuring the air leakage flows to outside at operating conditions that are required for envelope infiltration impacts and energy loss calculations for duct systems. The DeltaQ test builds on the standard envelope tightness blower door measurement techniques by repeating the tests with the system air handler off and on. The DeltaQ test requires several assumptions to be made about duct leakage and its interaction with the duct system and building envelope in order to convert the blower door results into duct leakage at system operating conditions. This study examined improvements to the DeltaQ test that account for some of these assumptions using a duct system and building envelope in a test laboratory. The laboratory measurements used a purpose-built test chamber coupled to a duct system typical of forced air systems in US homes. Special duct leaks with controlled air-flow were designed and installed into an airtight duct system. This test apparatus allowed the systematic variation of the duct and envelope leakage and accurate measurement of the duct leakage flows for comparison to DeltaQ test results. This paper will discuss the laboratory test apparatus design, construction and operation, the various analysis techniques applied to the calculation procedure and present estimates of uncertainty in measured duct leakage.

The Delta Q Method of Testing the Air Leakage of Ducts ,2002 The DeltaQ test has been developed in order to

provide better estimates of forced air system air leakage for use in energy efficiency calculations and for compliance testing of duct systems. The DeltaQ test combines a model of the house and duct system with the results of house pressurization tests with the air handler on and off to determine the duct leakage air flows to outside conditioned space at operating conditions. The key advantage of the DeltaQ test over other methods is that it determines the air leakage flows directly, rather than requiring interpretation of indirect measurements. The results from over 200 field and laboratory tests are presented. The laboratory tests have shown that the DeltaQ repeatability uncertainties are typically 1% or less of system fan flow and that the accuracy of the test is between 1.3% and 2.5% of fan flow (or 13 cfm to 25 cfm (6 to 12 l/s) for this system).

Commerce Business Daily, 1999

Duct and Envelope Tightness ESCO PRESS, 2012-09-21

DW143 Guide to Good Practice Building and Engineering Services Association, 2013

LABORATORY EVALUATION OF THE DELTA Q TEST FOR DUCT LEAKAGE. , 2003 Using a residential-size duct system in a controlled laboratory setting, the repeatability and accuracy of the Delta Q test for air leakage in residential duct systems have been measured. More than 100 Delta Q tests were performed. These were compared with results using fan pressurization and also with results of a procedure (Delta Q Plus) that uses leakage hole-size information to select the leakage pressures to be used in the Delta Q algorithm. The average error in supply or return leakage for the fan-pressurization test was 6.4% of system fan flow. For the Delta Q test it was 3.4% of fan flow, while for Delta Q Plus it was 1.9% of fan flow.

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FIELD EVALUATION OF IMPROVED METHODS FOR MEASURING THE AIR LEAKAGE OF DUCT SYSTEMS UNDER NORMAL OPERATING CONDITIONS IN 51 HOMES. Paul W. Francisco, Larry Palmiter, Erin Kruse, Bob Davis, 2003 Duct leakage in forced-air distribution systems has been recognized for years as a major source of energy losses in residential buildings. Unfortunately, the distribution of leakage across homes is far from uniform, and measuring duct leakage under normal operating conditions has proven to be difficult. Recently, two new methods for estimating duct leakage at normal operating conditions have been devised. These are called the nulling test and the Delta-Q test. Small exploratory studies have been done to evaluate these tests, but previously no large-scale study on a broad variety of homes has been performed to determine the accuracy of these new methods in the field against an independent benchmark of leakage. This sort of study is important because it is difficult in a laboratory setting to replicate the range of leakage types found in real homes. This report presents the results of a study on 51 homes to evaluate these new methods relative to an independent

benchmark and a method that is currently used. An evaluation of the benchmark procedure found that it worked very well for supply-side leakage measurements, but not as well on the return side. The nulling test was found to perform well, as long as wind effects were minimal. Unfortunately, the time and difficulty of setup can be prohibitive, and it is likely that this method will not be practical for general use by contractors except in homes with no return ducts. The Delta-Q test was found to have a bias resulting in overprediction of the leakage, which qualitatively confirms the results of previous laboratory, simulation, and small-scale field studies. On average the bias was only a few percent of the air handler flow, but in about 20% of the homes the bias was large. A primary flaw with the Delta-Q test is the assumption that the pressure between the ducts and the house remain constant during the test, as this assumption does not hold true. Various modifications to the Delta-Q method were evaluated as possible improvements. Only one of these modifications provided improved results. This modification requires measuring the duct pressure relative to the house at either every pressure station within the Delta-Q test or at the extremes of the house pressure range involved in the Delta-Q test. If the pressures are only measured at the extremes, then calculated pressures at the other pressure stations are obtained via interpolation. Using these pressures reduced the bias in the Delta-Q test by about one-third.

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