Door Security + Safety

DHI'S PUBLICATION FOR DOOR SECURITY + SAFETY PROFESSIONALS

OCTOBER 2018

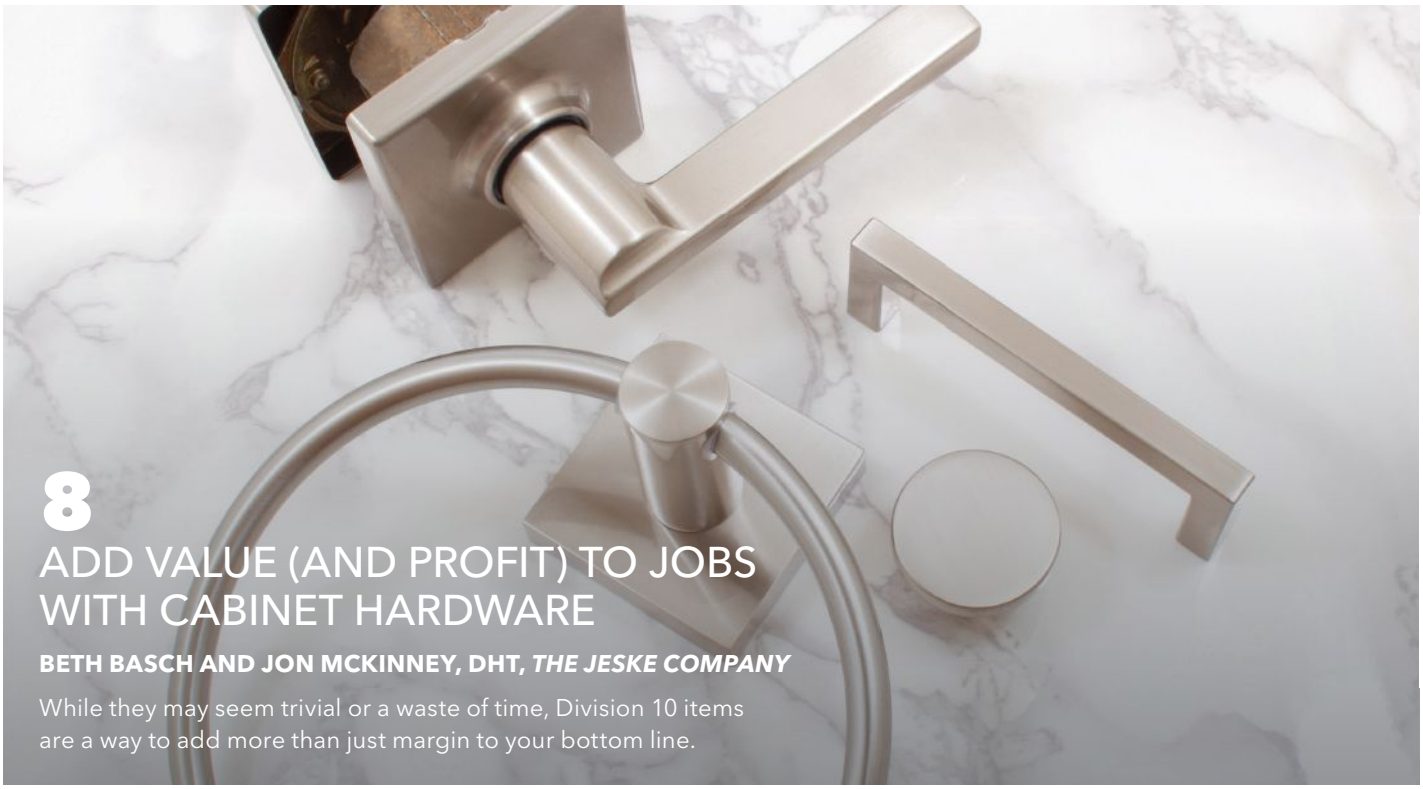
Historic Restoration and Renovation

ALSO INSIDE:

+ ADD VALUE AND PROFIT WITH CABINET HARDWARE
+ OPENING THE DOOR TO ENERGY EFFICIENCY
+ CASE STUDY: ELLIS ISLAND RESTORATION

CONTENTS

FEATURES



Cover photo courtesy of Leah Convery-Meyer, AHC, CSI, CDT

Door Security + Safety

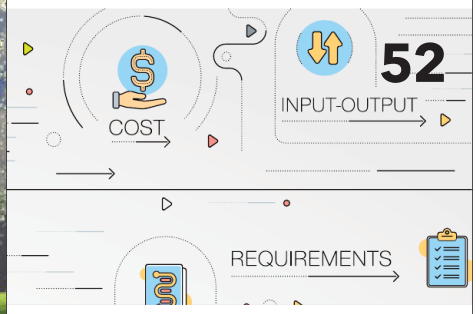
VOLUME 82
NUMBER 10

DHI'S PUBLICATION FOR DOOR SECURITY + SAFETY PROFESSIONALS

CASE STUDIES

BUSINESS MANAGEMENT

COLUMNS + DEPARTMENTS



Door Security + Safety
14150 Newbrook Drive
Suite 200
Chantilly, VA 20151-2232
703.222.2010
publications@dhi.org
www.dhi.org

Chief Executive Officer
Jerry Heppes Sr., CAE
jheppes@dhi.org
703.766.7010

Director of Operations
Sharon Newport
snewport@dhi.org
703.766.7009

Communications Manager/Managing Editor
Denise Gable
dgable@dhi.org
703.766.7018

Advertising Manager
Molly S. Long
mlong@dhi.org
703.766.7014

Design
tgdcom.com

Media & Editorial Board

David Beckham, AHC, FDAI
Cook & Boardman

Cheryl Cameron
Weinstein & Holtzman

Ben H. Dorsey III
LEED GA, *Special-Lite*

Glenn McNamara
ASSA ABLOY

Molly Mitchell
Allegion

Ginny Powell
Hager Companies

Jacob Wexler, FDAI
Legacy Manufacturing LLC

Amanda Wilson
Southeast Architectural Solutions

Door Security + Safety (ISSN 2577-0128 [online] ISSN 2576-4608 [print]) is published monthly by DHI, 14150 Newbrook Drive, Suite 200, Chantilly, VA 20151-2232; 703.222.2010; Fax: 703.222.2410. Periodicals postage paid at Fairfax, VA, and other additional mailing offices. **Postmaster:** Send address changes to *Door Security + Safety,* 14150 Newbrook Drive, Suite 200, Chantilly, VA 20151-2232. Email: publications@dhi.org; Website: www.dhi.org.

Editorial Policy: DHI is an international not-for-profit association of individuals and companies in the door and architectural hardware profession. Authors' opinions do not necessarily reflect the official views of the Door and Hardware Institute.

The magazine cannot guarantee the validity or accuracy of any data, claim or opinion appearing in any article or advertisement. However, the magazine is designed to provide accurate and authoritative information on the subject matter covered. The information is presented with the understanding that the publisher is not engaged in rendering legal or other expert professional services. If such assistance is required, the service of a competent professional should be sought.

Advertisements and product information do not constitute an endorsement, nor a DHI position concerning their suitability. The publisher reserves the right to reject any advertising. Advertisers and their agencies assume liability for all advertising content and assume responsibility for any claims that may arise from their advertisements. The publisher makes every effort to ensure suitable placement of advertising but assumes no responsibility in this regard.

Send subscriptions, advertising, business and editorial matter to *Door Security + Safety,* 14150 Newbrook Drive, Suite 200, Chantilly, VA 20151-2232. Letters to the editor are welcome and will be considered for publication in whole or in part in "Letters to the Editor." All editorial sent to the magazine will be treated as unconditionally assigned for publication and copyright purposes and is subject to the editor's unrestricted right to edit and comment editorially.

For current subscriptions, enclose an address label or facsimile from a recent copy when writing to DHI. For new subscription information, call DHI at 703.222.2010.

DHI Door Security + Safety Professionals

© Copyright 2018 Door and Hardware Institute. All rights reserved. Nothing may be reprinted without permission from the publisher.

Opening the Door to ENERGY EFFICIENCY

BY BEN H. DORSEY III, LEED GA


ISTOCK | IMAGINIMA

For many years, those of us in the building industry have been inundated with facts and figures regarding how much energy our buildings use. Likewise, for many years we've made attempts to make our buildings more energy efficient.

The quest for energy efficiency is not a standalone goal unto itself. It must be balanced with occupant comfort, for example, which has a direct bearing on productivity.

We also know that openings can be responsible for a good deal of energy loss. Along these lines, doors can be constructed for better energy efficiency and tested to verify such efficiency. For our discussion, we will focus on exterior entrance doors for non-residential applications.

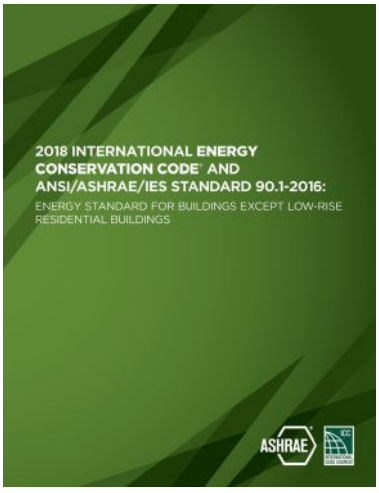
DEFINITIVE STANDARDS

We cannot address the subject of building energy usage without referencing ASHRAE 90.1. This standard is the product of the American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE). The formal title of the standard is *Energy Standard for Buildings Except Low-Rise Residential Buildings.*

ASHRAE 90.1 has become the basis of countless local building codes and is referenced in international codes such as the *International Building Code* (IBC) and the *International Energy Conservation Code* (IECC). Similarly, various product test standards reference provisions of ASHRAE 90.1.

This is true because 90.1 specifies the expected energy performance levels of building components and provides the criteria for determining compliance to these performance requirements. The same is true for the IECC. The IECC provides requirements for both residential and commercial buildings.

The IECC is a product of the International Code Council (ICC). However, ICC works closely with ASHRAE for development and implementation of the IECC. Also, both organizations collaborate with, and have their standards reviewed by, the U.S. Department of Energy (DOE).



These energy standards influence countless international and local building codes.

Keep in mind not all of these criteria are necessarily carried over into local building codes. In fact, newer editions of IECC (2018) and ASHRAE 90.1 (2016) included more stringent requirements for fenestration and opaque doors. Building codes often lag in implementing all such requirements.

THE DOOR CONNECTION

When it comes to doors, both IECC and ASHRAE 90.1 are virtually identical. The requirements of each standard for doors are based on the building geographic location according to standard-defined climate zones. For example, most of the portions of North America are covered in Climate Zones 1-8, with zones 5-8 representing the Northern U.S. and Canada.

In the standards, many entrance doors are defined as "opaque." Do not assume this means they are necessarily solid doors with no lites. In the language of the standards, "opaque" means all aspects of the building envelop except pure fenestration. However, doors that are more than 50 percent glass are considered fenestration in the energy standards.

These standards define the performance of doors and fenestration with four criteria:

- U-factor
- Solar Heat Gain Coefficient (SHGC)
- Visible Transmittance (VT)
- Air leakage

The middle two criteria apply primarily to fenestration and doors considered as fenestration. Door manufacturers in the non-residential market generally can't state values for SHGC and VT simply because many doors are field glazed. U-factor and air leakage are appropriate criteria for all entrance doors.

Keep in mind not all of these criteria are necessarily carried over into local building codes. In fact, newer editions of IECC (2018) and ASHRAE 90.1 (2016) included more stringent requirements for fenestration and opaque doors. Buildings codes often lag in implementing all such requirements.

However, to determine expected performance levels, we must examine the requirements of the standards for both opaque doors and fenestration.

U-FACTOR

U-factor is the accepted measure of thermal performance. It expresses the rate of heat loss or heat gain. To appreciate the importance of this criteria and its effect upon door energy efficiency, we need to consider the effects of climate, or hot summers and cold winters.

The temperature differential from interior to exterior can be dramatic, and the entrance door is the separator between these extremes shown in figure below.

Here, the door experiences heat gain in summer and heat loss in winter. A lower value for U-factor is better and indicates a low level of heat loss or heat gain. That translates into better thermal performance and better energy efficiency.

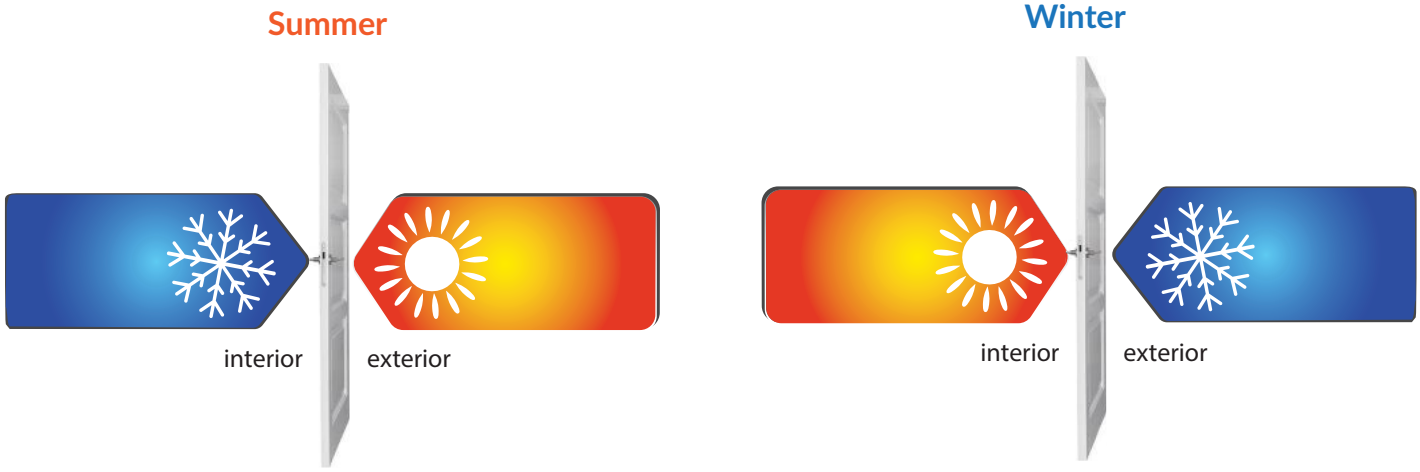


ILLUSTRATION COURTESY OF SPECIAL-LITE

In the energy standards, many factors play into the U-factor requirements, such as climate zones. However, the required U-factor for opaque doors can be generalized as between 0.370 and 0.700. Doors classified as fenestration have numerous caveats including the type of framing used. No generalized number is possible.

SOLAR HEAT GAIN COEFFICIENT

The Solar Heat Gain Coefficient (SHGC) is the ratio of the solar heat gain entering the space through the fenestration area to the incident solar radiation. Solar heat gain includes directly transmitted solar heat and absorbed solar radiation, which is then re-radiated, conducted, or convected into the space. SHGC is expressed as a number between zero and one.

For doors classified as fenestration, expected SHGC levels generally fall between 0.20 and 0.45.

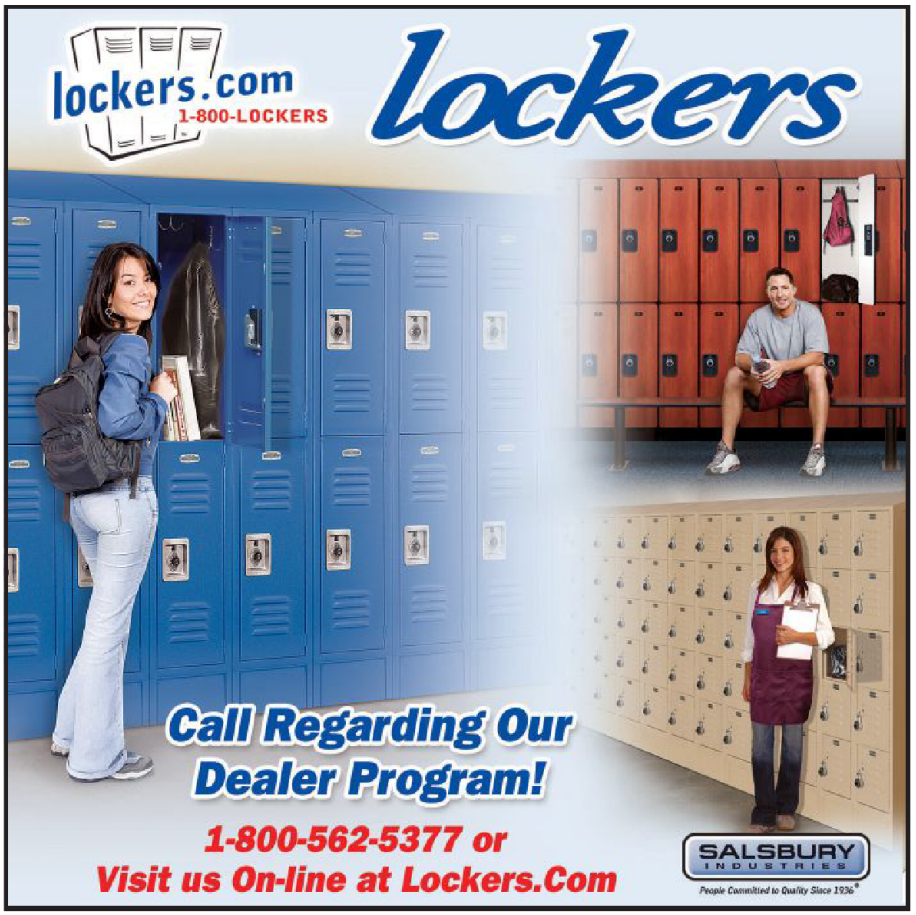
VISIBLE TRANSMITTANCE (VT)

Visible Transmittance is an optical property that indicates the amount of light in the visible portion of the spectrum that passes through a glazing material. A higher VT means there is more daylight in a space. With careful design and consideration of U-factor and SHGC, proper VT levels can offset artificial lighting, and its related costs, as well as offset heating and cooling loads.

AIR LEAKAGE

Air leakage is sometimes called infiltration, which is the unintentional or accidental introduction of outside air into a building, typically through cracks in the building envelope and through use of doors for passage. When the entrance door is shut, however, air leakage becomes a factor in its energy performance.

ASHRAE 90.1 calls for an air leakage performance for swinging entrance doors, not to exceed 1.0 cfm/ft2, tested at a pressure of at least 1.57 psf. As you might suspect, it is the framing of the door, weatherstripping, door



Frost accumulates on the interior of these doors during Winter in the upper Midwest, indicating heat loss and unsatisfactory U-factor.

ARE DOORS LABELED FOR ENERGY EFFICIENCY?

The latest version of the ASHRAE 90.1 standard calls for door and fenestration labeling in these words: "All manufactured and site-built fenestration and door products shall be labeled, or a signed and dated certificate shall be provided, by the manufacturer, listing the U-factor, SHGC, VT, and air leakage rate." (Doors with 25 percent glazing or less are not required to list SHGC or VT.)

So why do we not see such labels on doors?

First, because not all aspects of IECC or ASHRAE 90.1 are necessarily implemented into building codes affecting your projects. So, while the energy performance requirements may be part of the local code, the labeling requirement may not.

Second, it has to do with business realities. In the residential market, doors are mass produced in specific sizes and configurations. Such become easier to test and label. Labeling requirements are also more stringent in the residential market. However, in the made-to-order market of commercial and institutional doors, many doors are custom sized, have custom-sized lite kits, and are field glazed. Here, no such commonality exists and only representative products are tested.

Even without labels, however, manufacturers should be testing their products to standards mentioned in this article and should be able to provide test results when asked.

bottoms, etc. that have more to do with air leakage than the door itself.

RELEVANT TEST STANDARDS

For performance requirements stated within the energy standards, relevant test standards are referenced. As the name implies, a test standard sets forth the testing method to show compliance with the energy standard or a building code. Manufacturers submit their products to third-party agencies that use these test standards.

For instance, for the air leakage performance mentioned above, ASHRAE 90.1 specifies that one of the following test standards be used to verify this performance: AAMA/WDMA/CSA 101/I.S.2/A440, NFRC 400, or ASTM E283.

The relevant test standards to measure opaque door U-factor are ASTM C1363, NFRC 100, or ANSI/DASMA 105. For fenestration and doors classified as such, NFRC 100 is the go-to test standard for thermal performance.

SHGC and VT for fenestration and doors classified as such are determined in accordance with NFRC 200.

THE EFFECTS OF DOOR CONSTRUCTION

According to *Building Design + Construction*[1] (www.bdcnetwork.com), about 75 percent of building professionals they surveyed prioritized energy and thermal efficiency as the most critical functional feature of entry and door systems. ("Durability or reliability" ranked a close second, followed by weather protection and aesthetics.)

By considering U-factor, SHGC, VT, and Air Leakage for a particular door (or at least the U-factor) we can form a comprehensive view of its energy efficiency.

ILLUSTRATION COURTESY OF SPECIAL-LITE

Door construction plays a significant role in meeting the required energy performance ratings. Likewise, the material used for, and the construction of, the entire entrance system, including framing, sidelites, transoms, vestibules, and access systems, has a greater effect on energy efficiency.

Rather than tackle all of the entrance system components, let's consider door material and construction and its effects on energy performance. The good news is that all door construction types are capable of good energy performance.

Steel, aluminum, fiberglas, and FRP (fiber reinforced polymer) skins are often used with various core types. These core types provide the insulating value that can lead to better thermal performance at the entrance:

- **Honeycomb**—This core material is often paper-based but may also be constructed of polypropylene. It is most applicable to interior doors or exterior doors that do not require thermal performance.
- **Polystyrene**—This foam material is used as an economical means of achieving some level of insulating value.
- **Polyurethane or Urethane**—The material may be a solid core or poured-in-place. It offers good insulating value leading to better (lower) U-factors.

The skin material and its color have a bearing on such factors as heat gain and subsequent thermal performance. Darker colors, as you might suspect, tend to gather more solar radiation, leading to higher U-factors and poorer energy efficiency. FRP and fiberglass skins are less susceptible to heat gain versus metal skins.

Once more, however, it is the total construction of the entrance system that brings all of the elements of energy efficiency together. Further, some of the elements, such as air leakage, only become meaningful as we examine the entire system.

Given that commercial customers are seeking energy and thermal performance as their top priority in entrance systems, we would be wise to pay attention to such matters in our product selections. +

REFERENCES

[1]https://www.bdcnetwork.com/emerging-trends-windows-doors-and-storefronts-aia-course

BEN H. DORSEY III, LEED GA, is Manager of Marketing and Communications for Special-Lite. He can be reached at Ben_Dorsey@special-lite.com.

DECORATIVE DOORS & FRAMES FOR RESTORATION PROJECTS

AMBICO™
SPECIALIZED DOORS · FRAMES · WINDOWS

www.ambico.com

MISSING FIRE DOOR LABELS?

WE RE-LABEL
FIRE DOORS USING OUR ANALYSIS
& EVALUATION FIELD LABELING PROGRAM

Steel Door Frames—90 min.
Steel Doors—90 min.
Wood Frames—20 minutes
Wood Core Doors—20 min.
Mineral Core Doors—45, 60 or 90 min.

We label the door & frame, and comment on the hardware.

GUARDIAN

GUARDIAN FIRE TESTING LABORATORIES, INC.
716.835.6880 | Fax: 716.835.5682 | gftli@earthlink.net
www.firetesting.com

GUARDIAN IS ACCREDITED BY ANAB TO: ISO 17025 AS A TEST LAB; AS A CERTIFICATION BODY TO ISO 17020 INSPECTIONS & TO ISO 17065, PRODUCT CERTIFICATION