



PERFORMANCE REPORT

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Traffic Doors...

FASTER

MEANS

GREENER



Impact of High Speed Door Operation on Saving Energy

The large doors used on doorways accessed by traffic both inside and outside a building can make a big difference in terms of the operation's energy budget and sustainability mission.

In this report find out about...

- R-Value vs infiltration and what they mean to saving energy
- Revealing research on the impact of door opening time on energy loss
- Changes to building codes regarding doors
- Other benefits of high speed doors

Collectively, buildings across the United States use 36 percent of the nation's energy and generate 30 percent of greenhouse gas (GHG) emissions, according to the U.S. Environmental Protection Agency.

For doorways with high traffic volumes, faster door operation trumps R-value when it comes to preventing energy loss and maintaining a productive environment. High-speed doors also add airflow control, lower maintenance costs, and efficient material-handling benefits.

As traffic moves in and out of an industrial or commercial building, numerous areas throughout the facility must deal with temperature differentials both on the inside and on the outside. Though most of these structures feature vast, open spaces, doors can also lead to and from docks, the warehouse, laboratories, and packaging areas.

Conditioned air is important for productivity and maintaining a specified interior climate needed to achieve desired product quality in operations where manufacturing and processing take place. The kind of large doorways found in these facilities also handle traffic in places such as automobile

dealerships, warehouses, parking garages, maintenance facilities for large equipment, and mass-transit bus-barns.

Nevertheless, industrial and commercial facilities are among the biggest users of energy, and facility/plant managers are becoming keenly aware of their consumption. At its national convention in 2011, the Material Handling Institute of America (MHIA) released the study of its members, **"Sustainability in Warehousing, Distribution & Manufacturing."**

The findings indicated 48 percent of companies had a sustainability initiative underway and 88 percent of respondents said sustainability would be of even greater importance in the ensuing 14 to 18 months.

More manufacturing and processing plants are seeking certification under the Leadership in Energy and Environmental Design (LEED) program, putting to rest the classic image of carbon-laden smoke-belching factories. In 2012, a number of major manufacturers formed the LEED Manufacturing User Group to share resources, expertise, and best practices. As of the close of last year, there were 738 LEED-certified manufacturing facilities worldwide, representing 18.1 million m² (195 million sf); another 31.9 million m² (343 million sf) are in the pipeline.

Energy use vs energy savings

Cost-cutting is always a management mission in any operation, and industrial and commercial buildings have plenty of potential when it comes to both financial and energy savings. These improvements to the bottom line exist because buildings, particularly older structures, are a major consumer of heating and cooling energy, and retrofitting or changing elements of the facility can help reduce consumption.



Collectively, buildings across the United States use 36 percent of the nation's energy and generate 30 percent of greenhouse gas (GHG) emissions, according to the **U.S. Environmental Protection Agency** (EPA). Although much of this consumption is necessary, with extreme temperatures more common with each passing year, energy demand will increase. When it comes to buildings, wasted energy means lost profits and loss of control over the interior environment. Smart building owners and managers focus on sealing up every crack in the building envelope.

Doors can constitute a major problem. Each door represents a hole in the building envelope that provides an escape route for energy every time traffic goes in and out of a room or the building. In some cases, doors comprise half of the total wall surface. So no matter how tightly a building seals its doorways, air infiltration will still happen.

Doorways have a big impact on the energy budget. Depending on the process, temperature differentials between rooms can be considerable, with positive/negative pressures pushing out conditioned air when a door opens.

Industrial and commercial facility owners have long recognized the role doors play in the battle against energy loss by installing heavy panel sliding doors inside the building, and sectional garage-style doors on exterior walls. Both conventional styles are heavily insulated for high R-value, but tend to be slow-moving, impeding traffic that must almost always beat the clock.

Open and shut case for controlling energy loss

Just standing guard at the doorway may not be enough when traffic demands a door that

Food Processing Plant



MINOR'S — Cleveland, OH
The high-speed doors for this leading processor of soups and bases for the foodservice industry relies on Rytec Clean Roll® high speed rollup doors for speed and for ensuring food safety.

Operating at 50 inches per second, the doors prevent the loss of cold air from chilled rooms into warmer areas. This speed and the doors' electronic controls enable their totally automated vehicles to glide from room to room, while reducing the flow of contaminants within this ultra-pure operation.

opens and closes often. A recent report, "High Speed Doors and Thermal Performance," commissioned by the **Door and Access Systems Manufacturers Association's (DASMA's)** High-Performance Door Division, explains that today's industrial and commercial buildings can have high door speed, while saving energy at the same time.

These findings have changed the way the industry looks at doors and door certification. After nearly two years of research featuring third-party lab testing, DASMA developed a method to demonstrate the efficiency of high-speed doors in building envelope energy calculations. The model for performance testing and evaluation was a prototypical, high-speed fabric door.

Fifty-five cycles make the difference

The DASMA research revealed a new perspective in evaluating door energy efficiency and took into consideration common U-factor, air leakage, and motor horsepower values in a comparison of high-speed doors to conventionally operating insulated doors. The study showed high-speed doors become more efficient when cycled 55 or more times per day. The data for the ‘crossover’ point is illustrated in Figure 1.

FIGURE 2 Annual Energy Consumption in Chicago for a 8' x 8' Door (Facility Heated Only)

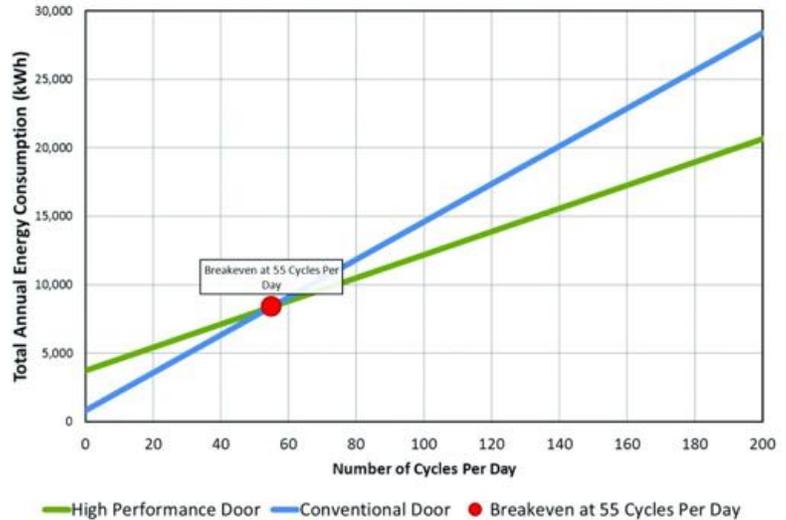


Figure 1 ANNUALIZED ENERGY CONSUMPTION ANALYSIS

DOOR TYPE		HIGH SPEED	CONVENTIONAL
Door Size	ft x ft	8 x 8	8 x 8
Opening Speed	in./sec	32	8
Hold Open Time	sec	10	10
Closing Speed	in./sec	24	8
Cycles/Day	average	55	55
Air Leakage	cfm/sf	1.3	0.4
U-Factor		1.20	0.25
Assumed Door Operator Horsepower	h.p.	2	0.5
Energy Consumption - Air Exchange	kWh	6109	9954
Energy Consumption - Air Leakage	kWh	416	126
Energy Consumption - Conduction	kWh	4443	916
Energy Consumption - Door Operator	kWh	58	50
Total Energy Consumption	kWh	11026	11046

speed doors are typically specified for applications requiring 75 to 100 daily cycles. Thus, the doors studied demonstrate superior overall energy efficiency when meeting the demand for high-cycle operation in a building.

Dynamic doors

This new approach views doors as ‘dynamic’ parts of a building. High-speed doors, in addition to providing rapid access, also contribute to the thermal efficiency of a building through dynamic thermal performance characteristics when the door is not closed. These characteristics include:

- opening speed;
- closing speed;
- cycles per day; and
- time the door is not fully closed.

For purposes of the test, a 10-second hold-open time — typical for a high-speed door — was factored into the equation. It should be noted, conventional doors typically do not use an automatic closing device to regulate door opening time, and operation is based on user door activation.

While 55 cycles is the minimum (as shown for an example application in Figure 2), high-

The bottom line is, no matter how well insulated and tightly sealed a door may be, neither matters if the door is rarely closed because of frequent use. Rapid closing speed means a reduction in air infiltration for doors used often.

3PL Cold Storage Facility

It is not enough to look at doors from just a static thermal performance approach. Even though they cycle infrequently, these doors may be needlessly left open. Existing American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE) and *International Energy Conservation Code (IECC)* standards assume these doors are open only an insignificant amount of time, but real-world experience shows otherwise.

High-speed doors are excellent at controlling air exchange — the air flowing through an opening when a door is not fully closed. In fact, when taking thermal transmittance (*i.e.* U-factor), air leakage, and door power usage into consideration, air exchange can be the most significant part of the total energy loss for a door, depending on the application.

U-factor, along with air leakage when the door is closed, is not enough to evaluate high-speed doors for energy performance. The updated ASHRAE and *IECC* standards put the new high-speed door maximum air leakage requirement at 23.8 m³/h/m² (1.3 cfm/sf). It should also be noted this specification is higher than the maximum sectional garage door requirement of 7.1 m³/h/m² (0.4 cfm/sf). High-speed doors must be flexible at the jambs to allow for both speed and movement during operation.

Conversely, built for speed and not for bulk, high-speed doors cannot meet previously prescriptive U-factor requirements, which pertain to the rate at which a door conducts non-solar heat flow. A U-factor of 1.2 is typical for a high-speed door, versus a conventional, slow-moving sectional type door that might have a U-factor of .25.



Preferred Refrigeration Services — Elizabeth, NJ The reason why they are one of the leading third party logistics (3PL) services in the country is no accident, thanks to their relentless innovation. This is evidenced by their “Generation III” warehouse design, which includes freezer storage areas having higher ceilings for better use of the building footprint.

The Ryttec Turbo-Seal® Insulated high speed roll up doors in their 140,000 sq ft freezer storage area enable the Elizabeth facility to significantly reduce their refrigerated system load while moving product quickly to the dock.

The doors work in coordination with the facility’s WMS, insuring that the doorway is open the second a pallet arrives. Opening at a peak speed of 182 inches per second, the doors minimize energy loss out of the -15 degree freezer onto the warmer dock.

For those times when the doors are rarely closed, the insulated panel reduces heat transfer. To stop air infiltration dead in its tracks, the Turbo-Seal Insulated Quad Seals™ in the door’s side columns provide double seals on the front and back of the panel. Double brush seals combined with the idler barrel seal the top of the door. The vinyl loop creates a tight seal along the bottom of the door.

Earlier versions of the codes required a lower U-factor than 1.2, and did not include the building trade off provision they include now. Without these changes, high-speed doors would not be able to meet the lower U-factor requirements. Now, however the codes recognize high-speed doors contribution to energy saving by keeping the opening closed as much as possible.

Beginning with the upcoming 2015 edition of standards, *IECC* recognizes the contribution of high-speed doors to energy conservation. Since many state and municipal governments require code compliance, the addition of high-speed doors offers a different approach to achieving significant energy savings and efficiency while providing additional flexibility to builders and building management.

Besides providing high-speed door definition for compliance, the code incorporates the maximum air leakage requirement, which is only one aspect of the big energy picture involving high-speed doors. Code users are likely aware of the conventional wisdom surrounding the importance of door assembly air leakage as well as U-factor. Together, these parameters are critical considerations when evaluating insulated doors, including those that are conventionally automated.

Based on the research, the group proposed changes to *IECC*, ASHRAE 90.1, and ASHRAE 189.1, *Standard for the Design of High-performance, Green Buildings*. These changes include the following wording:

“A high-speed door is a non-swinging door used primarily to facilitate vehicular access of material transportation and having an automatic closing device, with an opening rate of at least 32 inches per second [812.80 mm/s] and a closing rate of at least 24 inches per second [609.60 mm/s].”

There are LEED categories that can apply to high-speed doors. For example, in the Energy and Atmosphere (EA) category, this door style can contribute to Credit 2, *Minimum Energy Performance*,

and for the Indoor Environmental Quality (EQ), credits can be earned for Credit 1, *Minimum Indoor Air Quality Performance*. The findings of the DASMA study will make professionals involved with LEED projects aware of the contribution rapid operating doors in these and other categories.

Now, when a high-speed door is specified for a building, the door should comply with the new performance standard set for high-speed doors. With this in mind, the manufacturer should be able to supply the opening and closing speeds, as well as U-factor and air leakage performance values, and should be able to make a more accurate assessment of doorway need based on actual or projected usage.

Other benefits

This new recognition adds to the other benefits recognized for high-speed doors. Most users and potential users are already aware of the lower maintenance required by high-speed doors. High speed itself means material-handling vehicles rarely catch up with the moving panel to hit it. If they do, many of these doors have a quick reset feature to put the panel back in its track and the door back into operation.



Auto Dealership

Along with these new criteria, high-speed doors can also pay off in other ways. For example, when a slow, solid panel door is hit it can be misaligned or, even worse, the door can be taken out of action and the doorway left exposed. Because a vehicle is unable to make contact with a rapidly-moving high-speed door, the doorway is always protected against energy loss. It is important to remember when a door is disabled and the panels are damaged, energy loss will be considerable.

Unlike heavily insulated doors, the lightweight panels and roll-up design put less strain on operating parts and require lower horsepower (HP) drives. As a result, downtime and maintenance costs on high-speed doors are minimal.

Door manufacturers should also supply the annualized energy performance of the door compared to a conventionally operating insulated door to assure the owner the result is a top energy-performing product. Having building codes up to speed with the high-speed doors leads to design professionals and building owners thinking differently about how doors can contribute to sealing up the building envelope.

Conclusion

A building is more than a box, and certainly is not designed to contain all the energy generated inside the facility. Each building is a hub of activity facilitated by doors that get out of the way when traffic barrels through.



Delaney Honda, Indiana, PA The service department used to be the run-down, smelly and dirty place most dealership folks didn't

give a second thought to, feeling it was supposed to look this way. Now thanks to the Rytec Spiral® high speed roll-up doors on this and other dealerships, all parts of the building can have curb appeal that matches the style of the cars sold inside.

Operating at a rapid speed of 60 inches per second, Delaney's four doors minimize conditioned air loss from the service department. For additional energy savings, each rigid slat has a vision panel to let in sunlight.

The doors also quickly let customers' cars in and out of the building, saving them time. In addition, the doors' rigid slat design helps keep the building secure.



Careful analysis of each doorway by a door supplier will determine what style of door to ensure the doorway provides the proper balance of protection and access, and at the same time enables use of every BTU generated by a building's HVAC System.



RYTEC **HIGH PERFORMANCE DOORS**

With 100,000 doors operating worldwide, Rytec quality is proven day in day out, cycle after cycle.

The simple fact is Rytec builds a higher-performance door and provides the greatest value to customers. We deliver superior customer support and technical assistance through national offices and a network of local dealers throughout

North America. Our pioneering history and innovative, patented technologies make the higher performance of Rytec doors possible. The bottom line, Rytec doors will pay for themselves day in, day out, cycle after cycle.



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