

DOORS THAT MAKE A STATEMENT

Jack Shinder

President, Ambico Limited

Published in *Door & Hardware Magazine*, September 2002

Let's agree on a few things when it comes to "specialty steel doors and door frames":

- Specify specialty steel doors and frames only when they suit the project
- Outline a reasonable budget for their use.
- Understand that lengthy lead times are common but that certain products are in stock
- Consult an industry expert when developing a project specification

Knowing this, are you ready to read on? Perhaps now you have the appetite for this crème de la crème of the steel door and frame business. Working in this field of the openings industry requires curiosity, honesty, a love of technical detail and a desire to work closely with small, quality-driven manufacturing businesses that have personality! Success in this corner of the industry demands that you research the web sites of manufacturers, scour the technical information provided by trade associations and curl up with bulletins and test standards issued by the leading standards organizations in the country.

Do you think that you can you work in this environment?

What are the benefits to you? Well ? strangely enough, the primary pleasure will be the joy that you experience in becoming an expert in a field of knowledge where few others dare to tread! Consequently, you will have an opportunity to be a technical resource in an industry that will be of particular value to you, to your firm, as well as to the industry at large. A result of this will be that you will gain the confidence to specify, to sell, and to enlighten others about the extraordinary benefits of these products to the construction industry.

We refer to products that can stop a speeding bullet, contain explosions with a single door and, keep the sound of the rabble from penetrating your private paradise.

In the following article, I will attempt to simplify the specialty steel door and frame industry. As a first step in doing this, two broad areas are described:

Engineered Door and Frame Products
Decorative Door and Frame Products
These product types are outlined in Tables One and Two found within the article.

TABLE ONE

SPECIALTY DOOR	SPECIALTY DOOR Performance Level	STANDARD DOOR Performance Level	TEST STANDARD
-----------------------	--	---	----------------------

Engineered			
Acoustic	STC 33-55	STC 18-30	ASTM E90-90
Bullet Resistant	UL Level I-VIII	N.A.	UL 752
Explosion Resistant	40 PSF to 50 PSI	5-15 PSF	ASTM E330
Stainless Steel 304 - Alloy	Corrosive resistant in most environments. Due to high tensile strength it is also resistant to abuse.	Subject to rusting in corrosive areas	UL10B UL10C
Stainless Steel 316 - alloy	In addition to above, it is highly corrosive resistant to chlorine.	Not recommended for use in pools, or waste water treatment plants.	UL10B UL10C

Engineered Specialty Steel Door & Frame Products

Steel doors attain levels of performance that have been established by third party, independent agencies, such as UL or ASTM. These facilities test and certify that steel door and frame products have met stringent test standards.

Acoustic Doors

These doors are utilized to diminish the flow of sound through a door opening. As shown in Table One a standard steel or wood door will have a noticeable effect on sound transmission loss. Will its performance be adequate? The answer is dependent on a number of variables. Let's say that noise of 60 decibels (db) is being created in an office environment. In an adjacent boardroom an ambient noise level of 35db is required. A quick look at Table One will indicate that our dealer will be able to use stock steel doors and hardware and meet the customer's needs (plus save someone a whack of money!). However, let's say that this same boardroom is not adjacent to an ordinary office but is in fact beside a noisy hollow metal shop! The noise created in the shop is 85 db. In order to create the identical ambient level of noise in the boardroom, ie. 35db, an acoustic door with an STC 50 rating will be required. Voila! One acoustic door should be specified (& budgeted!). This is one simple example of how this particular specialty door product should be specified. By the way, the decibel levels referred to are indicative of actual noise levels experienced in ordinary building projects. (Only the names of projects have been changed to protect ?)

Bullet Resistant Doors

Now let's take a door whose performance criteria can be very easily understood. A bullet is fired at a door and frame unit. The bullet does not penetrate the door. The door passes the test. This all appears to be quite simple. In fact, only the pass/fail aspect of this test is simple. The test standard for bullet resistant materials (including doors,

windows, walls) is known as UL 752. This is not to be confused with a fire test. There are eight levels of bullet resistance and they are based on a number of specific criteria.

- velocity of the bullet as it leaves the gun
- muzzle
- the weight of the bullet
- the material composition of the bullet

As well, the actual pattern and number of shots to be fired on the door panel is variable. What is sufficient to determine the door's overall performance? All of the following test patterns are acceptable.

- a single shot anywhere on the door panel
- three shots in a triangular pattern at the center of the door
- twelve shots at various weak points on the door panel

And what about the performance of the door hardware? UL752 does not demand that an entire door unit including the latch and hinges be tested. Where does this leave the casual consumer of bullet resistant doors? One can say with certainty that the use of a standard door in these circumstances would be completely ineffective. However, how should one best define the threat level anticipated by the end user and what precise test criteria should be applied to the door/frame/hardware unit? UL 752 provides only a guide. It is reasonable to suggest that the performance criteria of the product exceed the UL 752 guideline. Clearly, the superior product has been tested by multiple shots fired at all of the weak points of the unit - a unit which incorporates door hardware that complements the bullet resistant rating of the door. Now that's a door to stand behind!

Blast Resistant Doors

When an explosion is anticipated it is usually thought to occur in an industrial locale where materials capable of causing explosion are a threat to life safety. Such conditions exist commonly in specific industries such as petrochemical processing, munitions storage or manufacturing, and in many buildings where significant paint storage areas are in use. Of course the door must act together with building products in the area under concern. Our concern though is the door frame and door hardware which must be tested as a single entity. The unit must survive the explosive pressure loaded onto it, so that when the explosive incident is complete, the door unit will not have been forced open. Naturally this is a far more difficult task to achieve when the door is out-swinging.

One might think that it would be wise to design a blast resistant area only with doors that are in-swinging. The nature of an explosion is such that the air pressure explodes out from the blast source and then immediately implodes. This takes place in a fraction of a second. Practically speaking it means for example, that an air pressure load of 5 pounds per square inch (PSI) forces itself on the door panel (on a door 3'0 x 7'0" this amounts to a total load on the door panel of 12,620 pounds). The "rebound" pressure should be equal to the initial pressure of the explosion.

Insist on a test report from an independent and reputable source that indicates that the unit has met the explosion requirements with a 50% safety factor in both in the in-swinging and out-swinging directions.

With increasing frequency, today's secure buildings are designed mindful of terrorist attacks. Consequently the blast resistant standards are being revised to take account of dynamic pressure loading that approximates live conditions. Leading-edge firms are at the forefront of life safety tests that respond to this new reality in the market place.

Decorative Specialty Steel Door Products

As noted at the outset of this article, a second type of specialty door product exists that is defined by criteria similar to the engineered specialty door products. These products are best defined by their decorative characteristics and to a lesser extent by their performance characteristics. They do qualify though as "specialty steel doors" in that they offer not only the benefits of a standard door with respect to functionality, but they achieve various additional milestones.

TABLE TWO

SPECIALTY DOOR Decorative	FINISHES	TYPICAL USE	TEST STANDARD
Brass Clad	#4 Satin #8 Bright	Historic Restoration Hotel Entrances	Finish standards are those defined by the "Specialty Steel Industry of the United States" All material, doors and door frames, can be fire rated to UL10B and UL10C
Stainless Steel	#4 Satin #8 mirror colored textured	Surgical Areas Office Lobbies Casinos Mass transit Stations	All material, doors and door frames can be fire rated to UL10B and UL10C

Let's examine Products identified in Table Two

Brass Clad Doors

The sole purpose of this door and door frame is to project a striking appearance conducive to the overall design of the building project. These doors are widely used in public areas of hotels, upscale apartments and condominiums, and class "A" office buildings. Naturally, the appearance of these products is significantly different than that of painted steel door products.

Due to the soft tensile characteristics of this metal the brass door face must be clad to a rigid core - whether it be steel or wood. As well, it is useful to know that various brass alloys exist and are widely available in sheet form suitable for door and door frame fabrication. Brass sheet is polished to a "satin" finish known as a #4 finish (US4) or a #8 "bright" finish (US3). Recently these products have become available as fire doors able to withstand up to date positive pressure fire tests.

Stainless Steel

By far, the most common of specialty door products in this category is stainless steel. It combines engineered properties with an obvious decorative quality. Consequently it falls into both Tables One and Two. Its level of performance is measured primarily in relation to its corrosion-resistant characteristics. As well, it is preferred for its striking appearance. There are a number of features of stainless steel which are worth examining.

1. Corrosion Resistance

Stainless steel is defined as an alloy of chromium and steel. There are two broad alloys of stainless steel defined as Series 400 and Series 300. The latter series has a significant amount of nickel present (between 8% -12%) and includes the alloy that is widely used in the door and door hardware industry- namely #304 alloy.

This alloy is used because of its corrosion-resistant characteristics as well as its formability and fine welding characteristics. This being said, this alloy is not resistant to all environmental challenges. In particular #304 alloy is not resistant to chlorine. This widely used chemical is present in public swimming pools, in factories associated with pulp and paper production, as well as in water purification and waste water treatment facilities and will attack most stainless steel alloys causing them to discolor. The #316 alloy will inhibit this "rusting" activity and will maintain the structural and chemical characteristics of the substrate. This is a clear example of an instance where one must carefully specify the performance expected of a specialty steel door/frame product.

2. Decorative Characteristic

When one thinks of stainless steel one naturally thinks of its attractive appearance. The most common finishes are the #4 Satin finish (US32D) and the #8 Mirror finish (US32). However, although these comprise 95% of the finishes currently specified they represent only a small portion of the finishes and patterns available on the market! The choice of available finishes is noted in Table Two. A wide variety of finishes are available to suit the aesthetic needs of end users, designers, and architects - particularly when a decorative statement is demanded. This makes the product highly appealing! Adding to the marketability of the product is the fact that certain manufacturers stock these materials and can provide them with fire labels up to three hours.

CONCLUSION

I have touched on the specialty steel door products that are now common in the North American marketplace. Indeed these products are in demand worldwide.

A need exists for qualified and forward-thinking professionals in the chain of supply to educate those who specify and purchase these specialty steel door products. In many cases, the end users and architects are unaware of the characteristics of these products and consequently overlook them in the development of project designs and specifications.

Yes -these products are expensive. However, when one is able to determine that a specialty steel door product best meets a need on a building project, then the opportunity exists to add true value for the owners and users of that building. If the net result is also to add to the knowledge of those in the architectural community then this too adds value to their services. Of course, the knowledgeable distributor is able to add both knowledge and economic value to the informed use of specialty steel door products. When this wisdom is supported by intelligent, service oriented, factory personnel the opportunities can be significant and the effect upon the construction market place can be widespread.