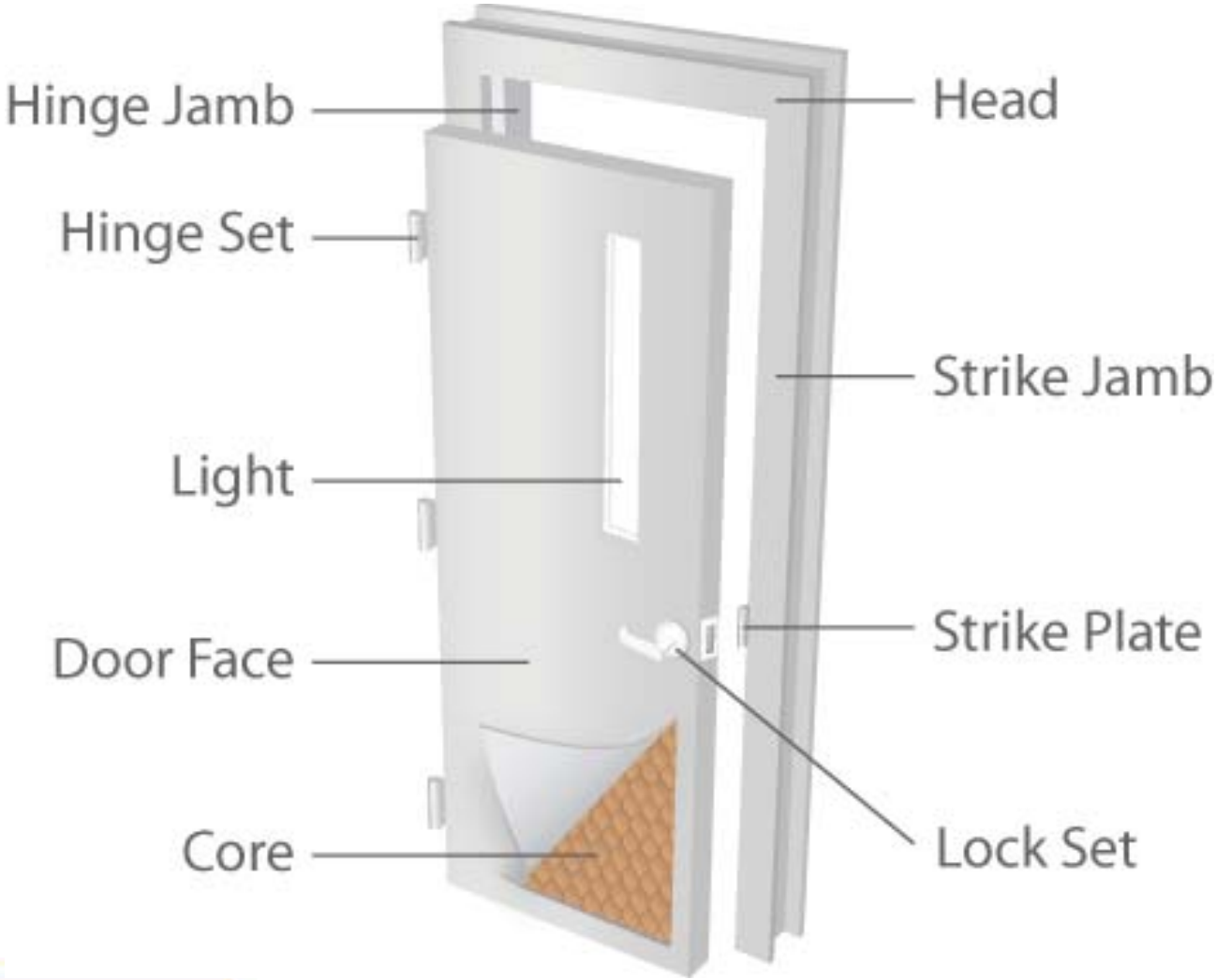
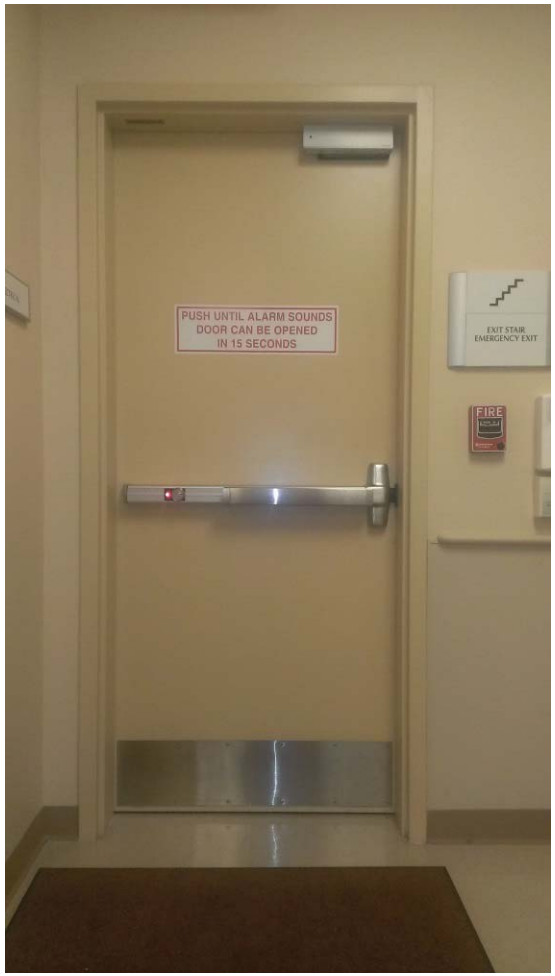
Anatomy of an Opening



Fire Code Requirements



- Must meet the requirements of the International Building and International Fire Code, as well as NFPA 80
- Ratings range from 20 minutes to 3 hours, depending on the wall
- Temperature rise doors retard the transmission of heat through the door. They are typically used in stairwells so people can safely pass the floors with fire.

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Fire Rated Doors

- If the wall is fire rated, the frame and door must be fire rated as well
- Steel is the only door material that offers a three hour fire rating (with the exception of highly specialized and expensive doors of alternate materials)

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Americans with Disabilities Act (ADA)

Covers **accessibility**:

- Getting **to** the building
- Getting **into** the building
- Moving **around in** the building
- **Using** the building elements

Americans with Disabilities Act (ADA)

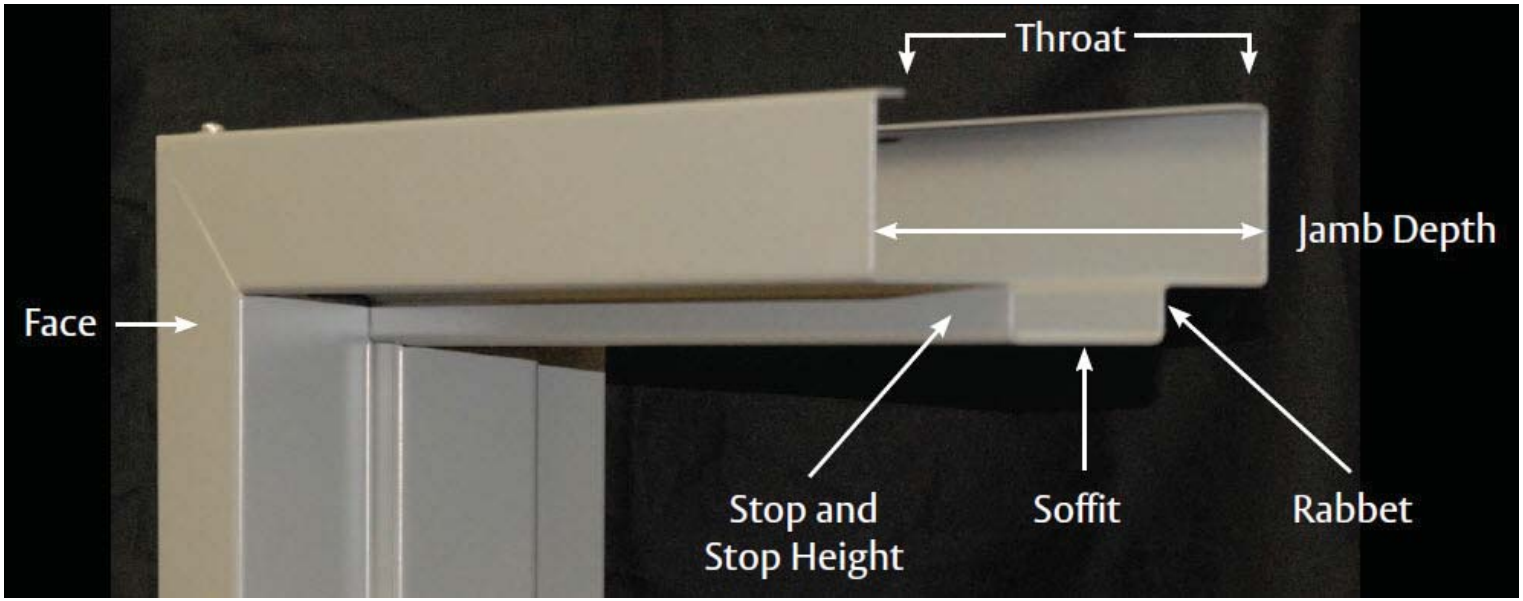
- Minimum Height
- Opening Force
- Closing Speed
- Hardware
- Glasslight location

- Minimum Door Width
- Minimum Maneuvering Clearances
- Threshold

Types of Frames

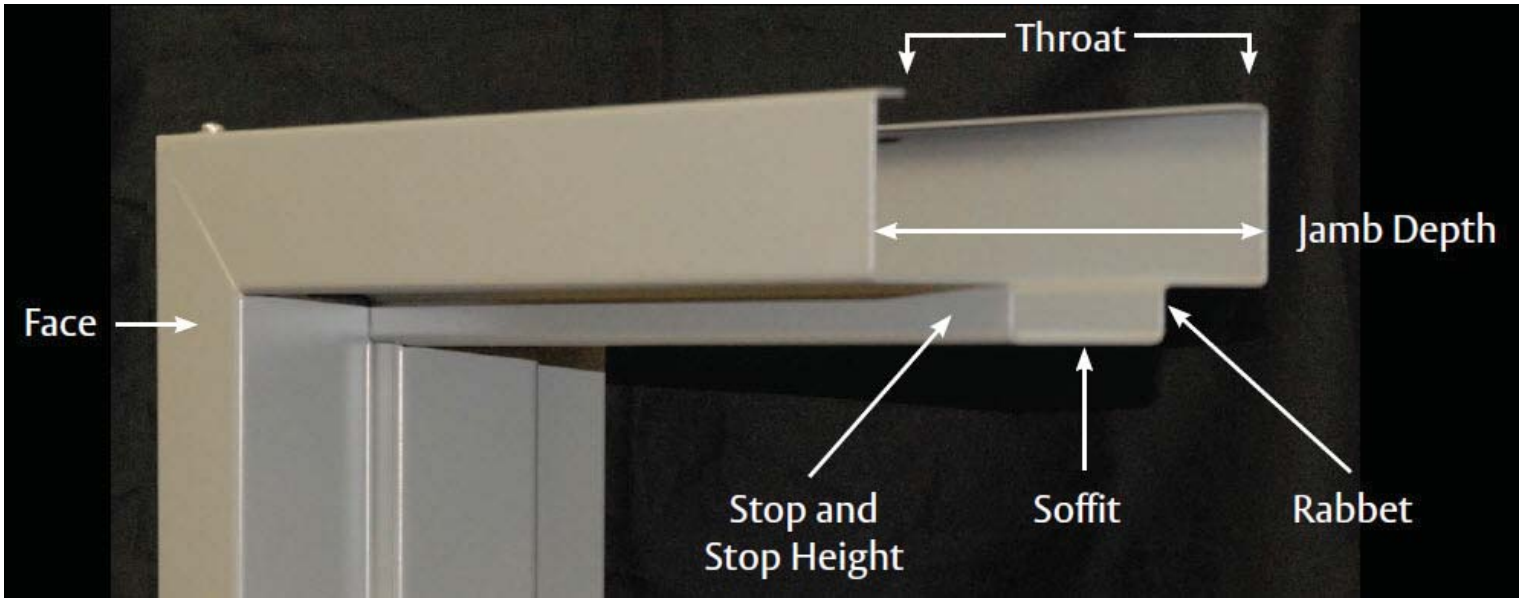
- Two most common types of profiles are masonry and drywall
- **Knockdown** frames come in pieces. The frame is then assembled and installed into an opening.
- **Welded** frames are in one piece, and are set in place. The masonry is then built around it.

Frame Profile Nomenclature



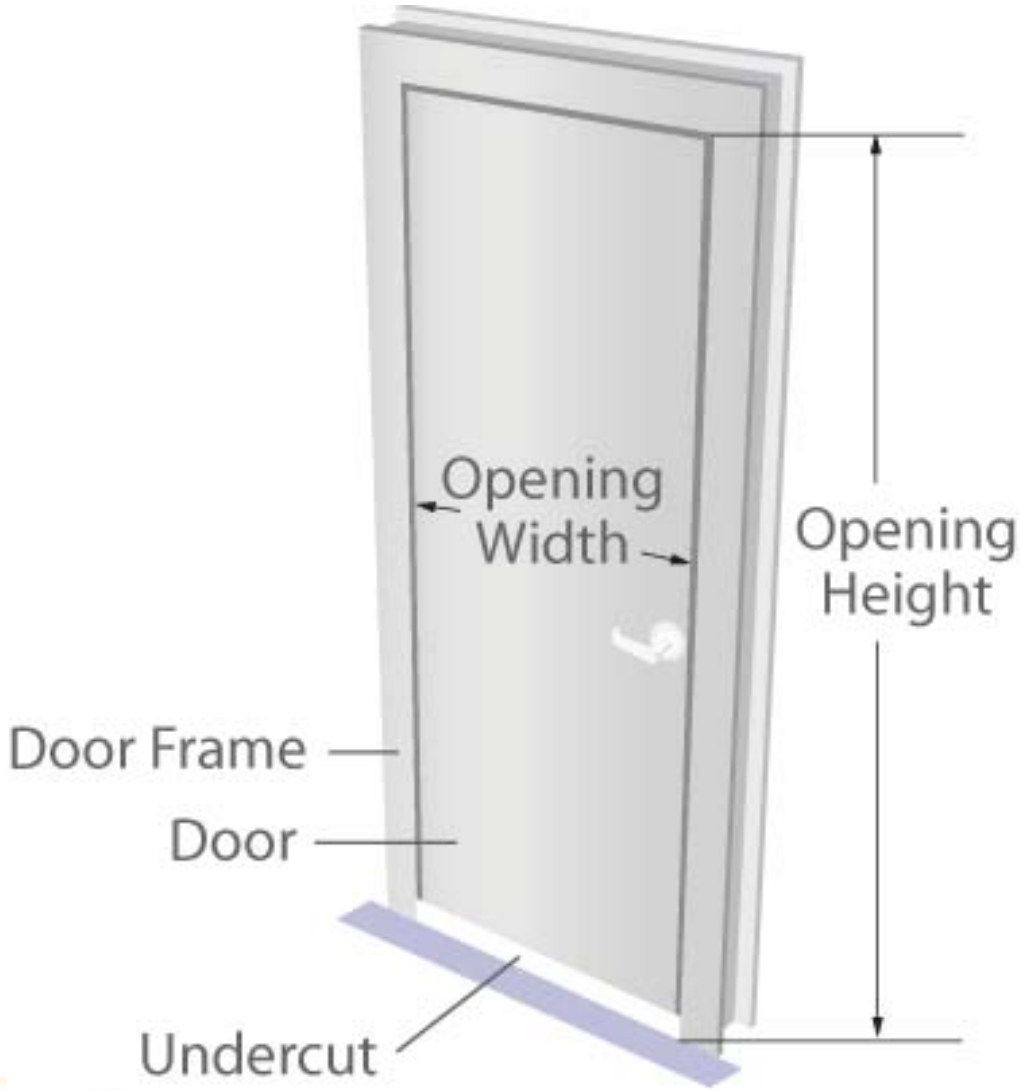
- **Face** – exposed part of the frame
- **Throat** – opening between the backbends of the frame
- **Jamb depth** – overall width of frame profile—face to face dimension

Frame Profile Nomenclature



- **Stop** – part of frame against which door closes
- **Rabbet** – the area on either side of the soffit, available in a single or double rabbet design
- **Soffit** – the area between the rabbets

The Frame Opening



Frame Opening Nomenclature

- **Nominal opening** – the distance measured between the frame. The **net opening** is the measurement of the door slab.

- **Undercut** – clearance between the bottom of the frame and the door.

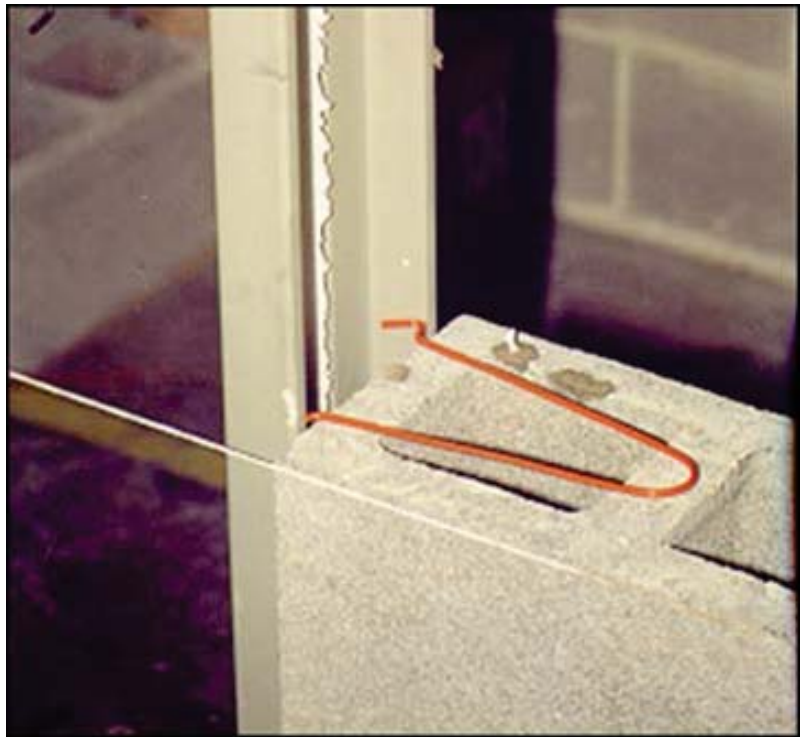
- **Door width** and **door height** – measurements of the width and height inside of the frame, less the clearance

Grouting Frames

- Never grout frames in drywall
- Grouting will not make a properly anchored frame any sturdier, although it can improve sound deadening
- Thin pumpable slurry is often used, and its excess water causes rust. Grout should always be hand troweled, never pumped.

Anchoring

- Anchors are used to affix the frame to the wall. The type of anchor depends on the wall.



- Wire anchors are installed in masonry frames as the wall is built. Contact the frame manufacturer for instructions.

- Altering anchoring methods may negate the fire rating of the opening

Elevations

- Endless frame possibilities
- Side lights are physically connected to the side of the door
- Transoms are an overhead light or panel

- Many frames have more than one type of elevation. This school entrance has transoms and side lights.

Performance Levels of Doors

- ANSI/SDI A250.8 assigns door performance levels from 1-4. The gauge changes with each level.
- Architects should stipulate the doors' level in their specs
- Level one doors are **standard duty** and are designed for applications with minimal wear and tear, such as an interior office door
- Level four doors are **maximum duty** and are for abusive environments, or where security is imperative

Specify ANSI/SDI A250.8

- The heavier duty the door, the more it costs and weighs
- Architects should specify the level according to the use of the door

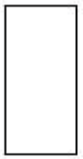
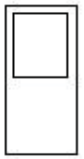
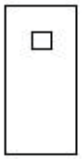
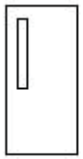
Level	Duty
1	Standard Duty
2	Heavy Duty
3	Extra Heavy Duty
4	Maximum Duty

- When architects specify **A250.8**, their doors and frames will actually meet the requirements of more than 20 other standards

Selecting the Right Doors and Frames

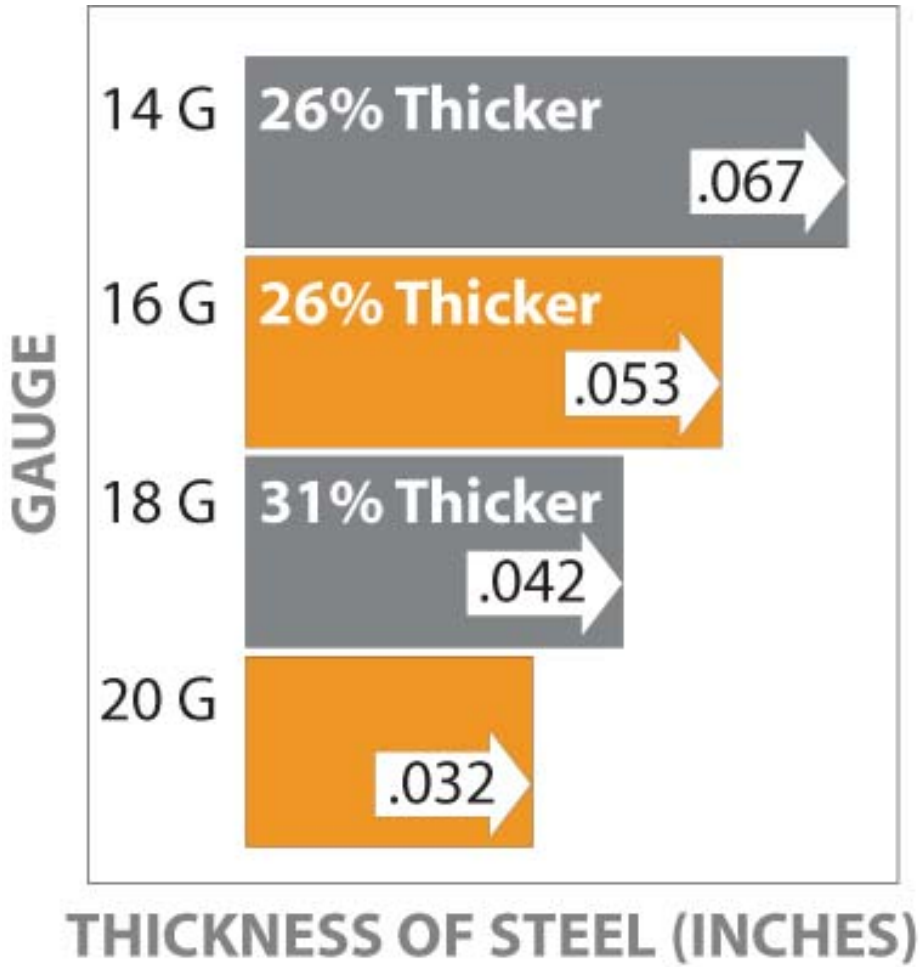
- **SDI 108** is one of SDI's most referenced standards
- Table 2 in the standard suggests specific **door levels** and **designs** for various building types such as offices, industrial buildings, schools, hotels, and more

Table 2 – Suggested door levels and applications

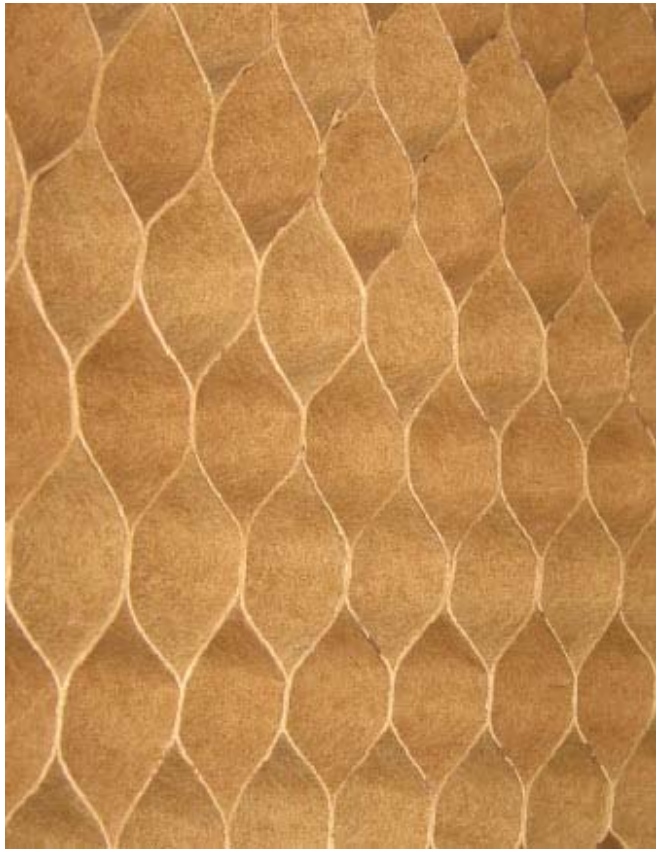
Building Types	Standard Steel Door Levels				Door Design Nomenclature					
	Level 1 Standard Duty 1-⅜" 1-¾"	Level 2 Heavy Duty 1-¾" only	Level 3 Extra Heavy Duty 1-¾" only	Level 4 Maximum Duty 1-¾" only	 F	 G	 V	 FG	 N	 L
Hotel – Motel										
Unit Entrance	•	•			•					
Bathroom	•				•					
Closet	•				•					•
Stairwell		•	•				•		•	

Door Gauges

- The lower the gauge, the thicker the door face
- Steel door gauges range from 14 - 20
- SDI provides minimum suggested gauges
- Avoid over- and under-specifying



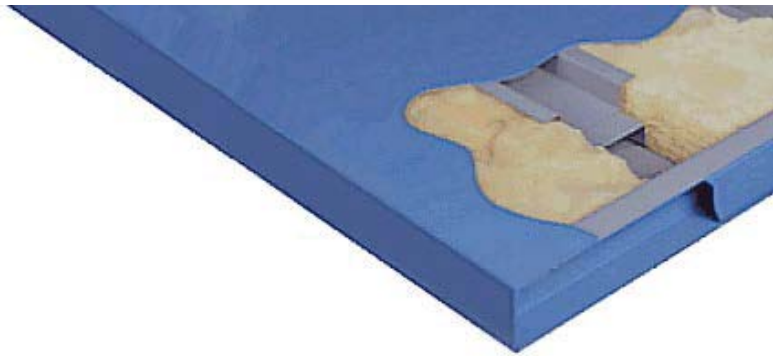
Door Cores



- Stipulate to the performance of the door, not the core material
- **Honeycomb** – moderate sound reduction, minimal insulation
- **Polystyrene** – moderate insulation, minimal sound reduction

More Door Cores

- **Polyurethane** – high insulation, minimal sound reduction
- **Mineral** – used for temperature rise doors, which reduce the heating of the “cool” side of the door
- **Steel Stiffened with Fiberglass Insulation** – withstands abuse and high usage; good sound resistance



When are Steel Doors Galvannealed?

- All doors are prime painted with a rust inhibiting primer. Factory finish paints are offered by some manufacturers.

- Interior doors are made of cold rolled steel. **Galvanneal** doors are specified for exterior, humid and/or wet environments. It improves paint adhesion and protects from corrosion.

- SDI does not recommend **galvanize** doors due to poor paint adhesion

Levels of Galvanneal Coating

- **Specify the weight** of galvanneal coating
- There are two levels: **A40** and **A60**. A40 is the minimum recommended weight. A60 offers better corrosion protection.
- It is not recommended to go higher than A60; it reduces paint adhesion

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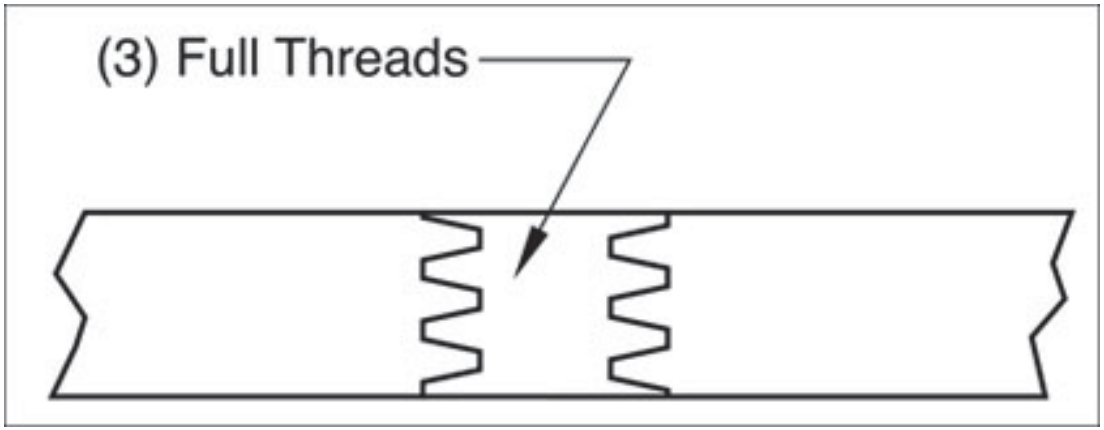
SDI 129 - Hinge and Strike Locations

- Hinge and strike locations vary by manufacturer
- Doors and frames are usually purchased from the same manufacturer to ensure coordination of hardware locations, rather than assuming responsibility for the coordination.
- **SDI 129** provides the opening height, strike location, and hinge spacing for each manufacturer's products
- The standard also provides measurements for doors manufactured by companies no longer in business. This simplifies the process of finding replacements.

Hardware Reinforcement

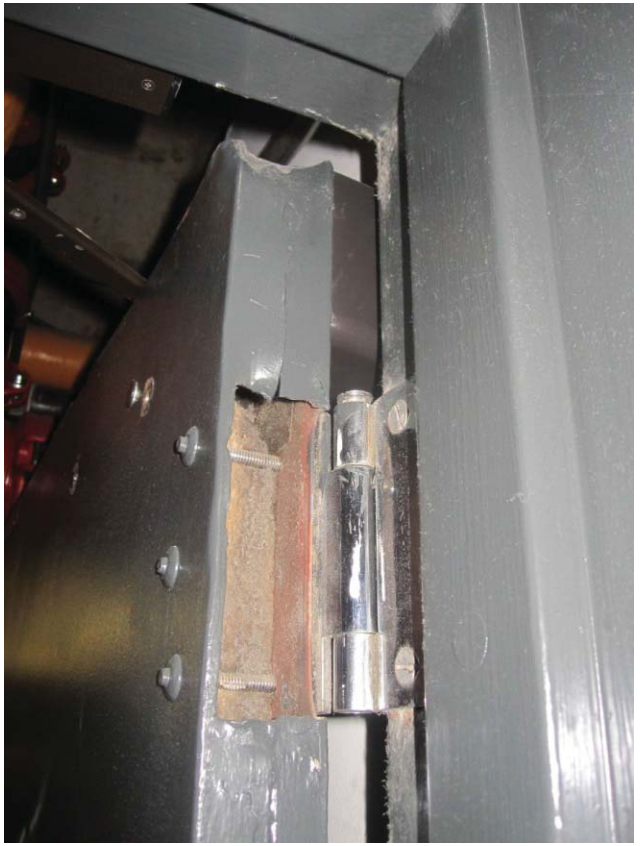
- The correct hardware must be specified to ensure the door and frame are properly reinforced. Screws must have **three threads** within the door to effectively secure the hardware.



- An 18 gauge door is only thick enough for two threads. Therefore the door is **reinforced** per ANSI/SDI A250.6.

Let ANSI/SDI A250.6 Be Your Guide

- Improper reinforcement shortens the lifespan of the product
- The hardware must also meet the fire rating requirements of the opening
- **ANSI SDI/A250.6** has tables with hardware measurements. It should be referenced by specifiers and installers.



Physical Performance of Steel Doors

- Steel is very strong. In its unaltered state, it can withstand more natural and man-made abuse than other materials.
- Properly installed and maintained hollow metal doors often last 30 years or longer
- When repairs are necessary, they typically occur in the field at relatively low cost
- Steel doors have a low **total cost of ownership**

Specialty Steel Doors

- SDI member manufacturers make a variety of commonly used and specialty doors.

- Acoustic
- Blast and Pressure Resistant
- Bullet Resistant
- Fire Rated
- Windstorm Resistant

Acoustic

- Acoustic doors prevent a specific amount of sound from passing through a door.

- Measured in Sound Transmission Class (STC) ratings. Steel doors are available up to STC 54, and in some cases, higher.

STC 50 - STC 54	Very loud sounds are faintly heard
STC 40 - STC 49	Loud speech is barely audible
STC 35 - STC 39	Loud speech is audible but words hard to distinguish
STC 30 - STC 34	Loud speech can be distinguished; normal speech barely heard or inaudible

Blast and Pressure Resistant

- Blast and pressure resistant doors protect people and property from explosions and shrapnel
- Amount of protection offered is measured in PSI
- SDI members manufacture doors that meet or exceed the performance requirements of the Departments of Defense, State, and Homeland Security

Bullet Resistant (BR)

- Used in government buildings, cashier stands, high crime areas and any structure where increased safety is desired
- Manufactured in accordance with UL 752 levels 1-8
- Many BR doors are also fire rated

LEVEL	BULLET	CALIBER	SHOTS
1		9mm (124g) FMJ	3
2		.357 Magnum (158g) SP	3
3		.44 Magnum (244g) SP	3
4		.30 Caliber Rifle (180g) SP	1
5		7.62mm Rifle (150g) FMJ	1
6		9mm Multi (124g) FMJ	5
7		5.56mm Rifle (55g)	5
8		7.62 Multi Rifle (150g) FMJ	5
8 (AP)		30-06 Rifle (166g) AP	5

Fire Tests

- Fire tests must be performed by an independent, internationally recognized laboratory

- The temperature increases as the test progresses, to simulate the conditions of a real fire. The furnace reaches **1,550°F** at 30 minutes, and **1,925°F** at 3 hours.

- The **temperature and pressure** of the door is continuously monitored

Hurricane and Tornado Resistant

- Hurricane and tornado doors are designed to withstand high wind speeds and impact debris
- They are gaining popularity due to their ability to save lives and protect property
- Available in single and double doors
- Steel is the only door material to pass FEMA 361

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Wide Variety of Steel Doors

- Stainless steel doors can give a modern appearance to a building
- Stainless steel with a seamless edge has excellent anti-microbial properties and washes easily
- A marine grade 316 coating makes it corrosion and water resistant

Custom Doors and Frames

- Architects often request custom products to create a unique opening or satisfy a specialized requirement
- Use your imagination. SDI members offer a wide variety of custom steel doors and frames.
- Many custom openings meet building code requirements for fire protection

Finishes

- Steel doors have a wide variety of finishes available
- They can have a wood grain pattern embossed into the steel with a clear top coat for protection
- Stained doors can carry a three hour fire rating, just like other steel doors

Embossed Doors

- Architects often specify embossed doors when a decorative opening is desired
- They can range from a single panel (*see image*) up to eight or more panels
- SDI manufacturers can show you a variety of designs

Steel is Infinitely Recyclable

- Steel is the most recycled material in North America
- Most materials degrade in the recycling process. Such products can be recycled once or twice, but ultimately must be discarded.
- Because of the inherent durability of steel, it can be recycled endlessly into new steel products. This closed-loop life cycle provides many environmental and economic advantages.

LEED Credits

SDI members' products qualify for one point of the following LEED credits:

- **Credit 4.1 & Credit 4.2** (1 point each) – relates to usage of recycled materials

- **Credit 5.1 & Credit 5.2** (1 point each) – relates to using materials that are manufactured within the region

In Conclusion

Steel doors' and frames' strength, customization, and recyclability make it an economically and environmentally smart choice for construction projects