

TECH Talk

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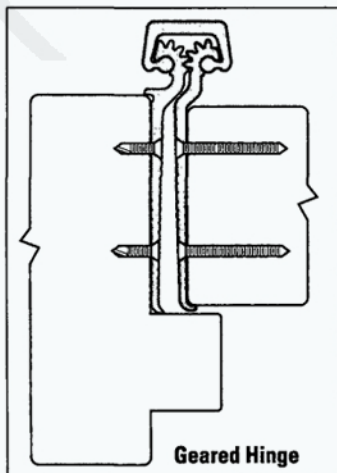
Continuous Hinges

More than 27 years of design, development, testing and actual application have brought the continuous hinge into everyday use. Continuous hinges are not intended to compete with conventional builders' hardware hinges, but to complement conventional hinges by carrying doors of greater weight and avoiding other adverse conditions.

The top hinge on a door hung on conventional builders' hardware hinges receives the most stress and carries most of the weight of the door. Even if the hinges used are of the proper size, weight and type for the opening, prolonged use and abuse can result in extensive wear of the hinge knuckles and door and frame reinforcement plates — eventually leading to a premature failure of the opening. This failure usually results in the door sagging in the opening which, in turn, leads to its inability to close and latch properly. Continuous hinges are designed to alleviate, if not eliminate, many of these types of problems by distributing the door weight and stresses over the full height of the door.

Abusive areas in schools, hospitals, manufacturing plants and other types of buildings benefit from the use of continuous hinges. Door and hardware weight are not as much of a concern, because continuous hinges have the capability to reliably carry heavy doors.

In retrofit construction, problems can be corrected that arise from: under-specified products; changes in building usage; increased frequency of use; or other detrimental building conditions. In most cases, the door and frame can be salvaged and only the hinges need to be replaced. This results in a substantial savings



to the building owner and provides many more years of service from a once damaged and potentially dangerous opening.

Continuous hinges have been used on such residential projects as HUD housing, military housing and all types of commercial projects ranging from airports, embassies, schools, hospitals, libraries, nursing homes, office buildings and so on.

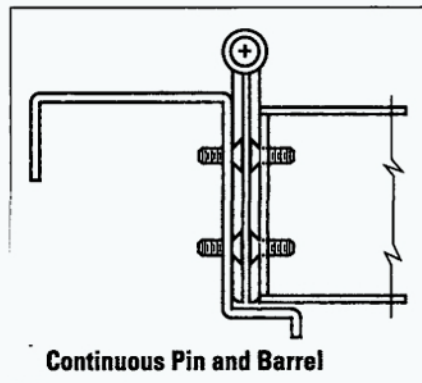
Construction

There are two types of continuous hinges available in the industry today: geared continuous hinges and continuous pin and barrel hinges.

Geared continuous hinges are manufactured from high-quality extruded aluminum alloys. Typical thickness of these aluminum alloys is approximately 1/8" (.125"). The alloys used in these hinges are substantially harder than similar alloys used for manufacturing thresholds and saddles, or aluminum doors and frames.

Generally there are four or five teeth on each of the extruded geared hinge leaves. The integrity of this style of hinge is based on the two center rotating points of the hinge leaves, in conjunction with the two pivot points on the cover channel. As the gears roll, they make contact with the pivot points and reduce any lateral wear. These gears interlock with one another; as the hinge pivot point rotates, the gear walks slightly as the door opens and closes.

Continuous pin and barrel hinges are manufactured from either aluminum alloys, as mentioned above, or



stainless steel and plain steel. Much like a standard hinge, this type of continuous hinge has a pin and barrel which extends along the full height of the door. Because this type of continuous hinge

uses a pin and barrel design, the pivot point is fixed.

Specially engineered polymer and nylon bearings, or stainless steel wafer bearings, are inserted into the leaves of the hinges and serve to cushion and support the door through its cycles. These bearings act much in the same manner as the disks in a person's back: They absorb the stress, impact and shock of door usage. The numbers of bearings per hinge can range from 16 to 20 in the standard weight hinges, and from 32 to 39 in the heavy weight or lead-lined weight versions. (Actual number of bearings vary from manufacturer to manufacturer.)

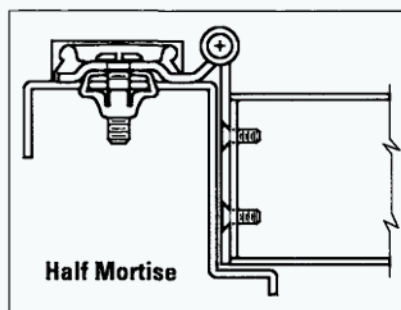
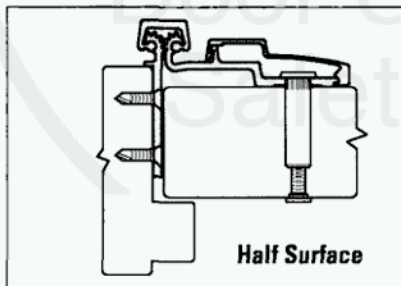
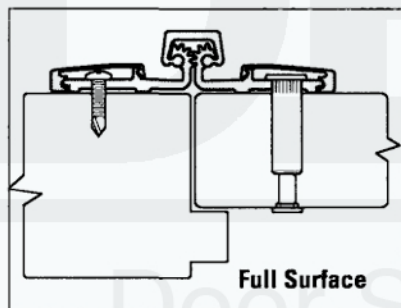
When the leaves of a continuous hinge are applied to a door and frame, they act as a reinforcement to both. The door, hinge and frame, become an integral unit, which adds stability and strength to the entire opening. This added strength helps to deter warping of the door due to the rigidity of the hinge on the door leaf.

Models

Concealed/Full Mortise - This type of continuous hinge is attached to the door rabbet of the frame and to the hinge stile of the door. It is referred to as full mortise because both leaves of the hinge are mounted between the hinge stile of the door and the door rabbet of the frame, similar to a conventional full mortise hinge. In this case though, the leaves of the hinge are surface applied rather than recessed into the door or frame.

When the supplier orders the doors and frames for openings with this type of hinge, either the frame may have to be ordered over-sized in width, or the door may have to be ordered under-sized in width, to accommodate the thickness of the hinge leaves. Verify the actual clearance dimensions required for proper installation with each manufacturer.

When using concealed leaf continuous hinges on renovation projects, where the tested and approved for use on



existing frames are to remain, the existing doors will have to be trimmed in width (if practical), or new doors will have to be ordered to fit.

Full Surface - This type of hinge is attached to the face of the frame and to the face of the door. This hinge can be used for renovation or new construction projects.

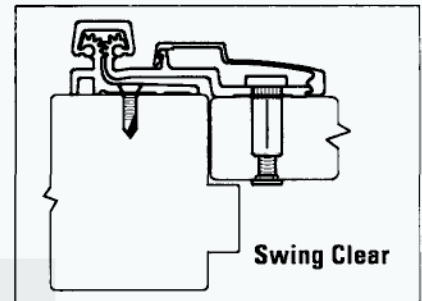
Half Surface - This type of hinge is attached to the door rabbet of the frame and to the face of the door. This hinge can be used for renovation or new construction projects.

Half Mortise - This type of hinge is attached to the face of the frame and the edge of the hinge stile of the door. This hinge can be used for renovation or new construction projects.

Swing Clear

Some models of continuous hinges are available with an offset knuckle which gives the hinge the capability to swing the door

out of the opening to a sufficient point where they are considered to be swing-clear. For example, a door opened to 95° would project into the opening approximately 1/8" and a similar door opened to 100° would completely clear the opening.



Dutch Door Hinge

Continuous hinges can be ordered for dutch-door openings. In this case, the frame leaf remains continuous and the door leaf is cut into two separate pieces. Be sure to advise your manufacturer of the actual door height for the upper and lower door leaves, the clearance between the two leaves, the handing of the opening, as well as the door and frame material.

Lead-Lined Openings

Certain models of continuous hinges are specifically designed to be used on lead-lined doors and frames. These hinges typically have staggered hole patterns for the fasteners on the door leaf. This staggered pattern allows the fasteners to be installed without penetrating the lead shielding in the center of the door. Verify the thickness of the lead, its placement in the door and the overall door weight before specifying, or supplying, continuous hinges for these types of openings.

Continuous Hinges for Labeled Openings

Specific models of continuous hinges have been fire-rated openings. These hinges are available in both aluminum and stainless steel materials.

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Approved products vary from manufacturer to manufacturer, and may only be available for specific door, frame and wall conditions (see table page 3). Refer to the various manufacturers' catalogs and other documentation for products meeting your specific requirements.

Typically, door and frame manufacturers attach their physical labels on the hinge stiles of the doors and the door rabbet of the frames. In most applications, one or both of these labels may be covered when the continuous hinge is installed. This problem can be avoided by specifically telling the door and frame manufacturer to place the frame label on the door rabbet of head of the frame, and the door label on the top rail of the door.

Listed & Labeled Continuous Hinges are Available for	
Label	Door, Frame & Wall Condition
20 Minute	WD/HMD x HMF in Drywall or Masonry
30 Minute	WD/HMD x HMF in Drywall or Masonry
45 Minute*	WD/HMD x HMF in Drywall or Masonry
90 Minute*	WD/HMD x HMF in Drywall or Masonry
3 Hour*	HMD x HMF in Masonry Wall
*Some models may require a series of studs be used to secure the hinge to the door and/or frame during a fire. Verify that the door and frame manufacturer is approved for the application of this type of hinge.	

Renovation projects present another problem. In cases where the existing fire-rated door and frame (or frame only in some instances) are to be reused, the existing physical label will be covered by the installation of the continuous hinge. In this situation, the hardware installer will have to request permission from the local authority having jurisdiction (AHJ) to move the existing labels to the above-mentioned locations. Moving these labels must only be done in the presence of the AHJ, by a licensed and authorized door and frame supplier.

Be sure to properly and adequately document the moving of any fire labels. Documentation should include: the request to move the labels; the AHJ's written approval; proof of authorization for the door and frame supplier to perform the work; and proof that all work was accomplished in the presence of the AHJ.

Installation

Continuous hinges are normally sized one 1" than the nominal door height to accommodate the undercut at the bottom of the door and are installed flush with the top of the door. These hinges can be sized in the field. However, the installer must be careful not to cut through a bearing or fastener hole. Manufacturers recommend any field cutting be done at the bottom of the hinge.

Fasteners

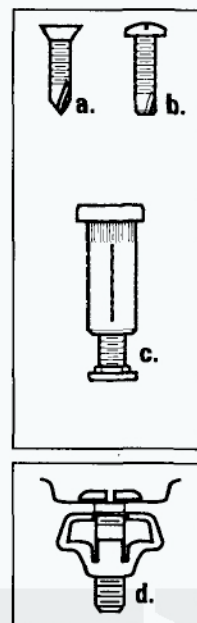
Fastener material is normally either hardened steel,

which is then plated, or stainless steel (grade 410).

Standard fasteners vary widely from one manufacturer to another. Common types of fasteners include: self-drilling/tapping screws; self-tapping; through-bolts and sex nuts; machine screws and jack-nuts; and wood screws.

Self-drilling and self-tapping screws can be used to attach continuous hinges to both the door and frame. Self-drilling screws (see a in following drawing) have a drill point on the tip of the screw which drills and taps the thread as it is installed. Self-threading screws (b) require the installer to drill a pilot hole prior to insertion of the screw. Self-threading screws are normally used in grout or mortar filled frames.

Through-bolts and sex nuts (c) are used to attach the hinge leaf to the face of the door. This type of



fastener consists of a machine screw, which reaches through the center of the door thickness, from one side of the door, and a threaded sex nut which reaches into the center of the door thickness from the other side of the door. Normally these fasteners are furnished for 1-3/4" thick doors — advise the manufacturer if other lengths are required.

Machine screws and jack-nuts (d) are used to attach continuous hinges to either the face of the door or frame. This type of fastener requires the installer to drill a hole into the face of the door or frame (provided the frame is not filled with mortar or grout). A special tool is then used to insert the jack-nut into the door or frame which then receives the machine screw.

Thread-to-the-head wood screws are available when certain models of continuous hinges are used with wood doors.

For security applications, variations of these fasteners are available with Torx™ or Spanner™ heads.

Finishes

Stainless steel hinges are available in either BHMA 630 (US32D), satin stainless steel or BHMA 629 (US32), bright stainless steel finishes.

Aluminum continuous hinges are available in many anodized finishes. The most common of these finishes are BHMA 628 (US28), Satin Anodized Aluminum and BHMA313 (similar to US10B Dark Bronze), Duranodic. Various custom anodized finishes are available through most manufacturers; consult with them before committing a custom finish to an architectural specification.

Epoxy painted finishes are a popular alternative to

anodized finishes. This type of finish allows the architect to match the hinge colors with other design elements. The hinge manufacturer will require a sample paint chip from the original paint manufacturer before proceeding with the finishing of the hinges. In most cases, the hinge manufacturer will submit samples of the custom finishes for architectural approval. Once approved, the hinges will be finished and shipped. Epoxy painted finishes are available from various paint manufacturers, such as Kynar and Duranar. Expect longer than normal lead times and additional costs for hinges with this type of finish.

It's important to note that most continuous hinge manufacturers will work with the hardware specifier on these custom finishes, prior to a project going out for bid. Due to the extended lead time required for the submittal period, it is much more difficult to match samples once a project is awarded and under a completion schedule.

Aluminum continuous hinges may also be field painted. However, field painting must be accomplished with a high degree of professionalism, the paint grade must be of excellent quality, and care should be taken not to get paint in the gears of the continuous geared hinges.

Electrical Modifications

Various models of continuous hinges can be modified to provide power transfer from the frame to the door, or monitoring of the door position. It is possible to modify a hinge to provide both the power transfer and monitoring functions. These functions are available in either exposed or concealed versions.

Monitoring

Monitoring of the door position is accomplished by the means of an integrated switch. This switch is usually a single-pole-double-throw switch (SPDT) and can be wired in the field to provide either normally-open or normally-closed contacts. These switches are usually adjustable for degree of opening on the lock side of the door. Normally, the manufacturers send these hinges to the field pre-adjusted to the appropriate settings.

On the exposed version, the monitoring switch is exposed to view on the frame leaf when the door is in the open position. As the hinge closes, the switch is depressed, changing the status of the switch.

The concealed electric monitoring hinge uses a switch that is mounted on the back of the frame leaf, and has a magnet mounted on the back of the door leaf. Once installed, the switch is not visible on the exposed surface of the hinge. This switch is also adjustable, but the door leaf must be removed in order to adjust the switch.

Power Transfer

On the exposed version, the contacts which transfer the electrical current are exposed to view when the door is in the open position. When the hinge is closed, the contacts are engaged and allow the current to pass through the hinge. As the hinge opens, the contacts separate, stopping the flow of electricity.

Concealed electric power transfer hinges typically use anywhere from two to ten (possibly more in some cases) continuous wires that carry current from the frame to the door. Once the hinge is installed on the door and frame, the wires are not visible on the exposed face of the hinge.

Other Modifications

In some cases, the hardware specification may require a separate power transfer unit be used (in lieu of the above-mentioned through-wire or exposed contact versions) to satisfy the electrical requirements of the opening. Continuous hinges can be ordered with cutouts to accept these products. Care must be taken to properly coordinate the actual location of these cutouts between the door, frame and hinge manufacturers.

Installation Aids

Most manufacturers supply various tools and accessory materials which assist in the installation of this product. Such items include:

template book, installation videos, installation instruction sheets, shim materials, drill bits, special cover channels, transfer punches, center punches, marking jigs, cover moldings, screw and thru-bolt pack.

Selection Guide

There are specific points that need to be addressed before the proper hinge can be determined:

Door Weight - Be sure to include the weights of all other hardware items for a true door weight.

Frequency of Use - Use charts in the manufacturers' catalogs to estimate the opening usage.

Model - Does the application require a concealed/mortise, model, full surface, half surface hinge or half mortise model.

Hinge Weight-Does the application require a standard weight or heavy weight hinge?

Door Height - Most continuous hinges are furnished 1" less than the nominal door height. Verify the undercut of the specific door on which the hinge will be installed.

Hardware - In some cases, other types of hardware (e.g., overhead concealed closers, or overhead concealed stops and/or holders) will require special templating and installation in order to function properly. Swing clear models will also affect the installation of other types of hardware such as door closers and overhead stops and/or holders.

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Labeling Requirements - If the hinge is to be used on a fire-rated opening, consult the manufacturer's catalog for fire ratings that are applicable for their products.

Fasteners - Does the application require self-drilling, self-threading, sex-bolts or security screws?

Finish -Satin Aluminum, Stainless Steel, Anodized Dark Bronze or Black, or other custom finish.

Conclusion

Continuous hinges provide an alternative means of satisfying many common door, frame and hardware situations. They are capable of supporting heavy doors and doors in high-traffic or high-abuse areas, and require little maintenance over the life of their installation.



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