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Ci/SfB		
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- ANTI-LIGATURE SUITABILITY** ●
- ABSORBS IMPACT & STRESS** ●
- NO DROPPING OF DOOR** ●
- MAINTENANCE FREE** ●

Technical Bulletin

CONTINUOUS GEARED HINGE



Specifically designed and
manufactured for the United Kingdom



Welcome to



Since 1952, when its first plant was opened in Emeryville, California, Pemko has supplied world markets with door and threshold sealing products. Today, a worldwide distribution network is serviced by 300 employees operating from five plants in the United States and Canada.

Pemko door and threshold seals have been available in the UK for the past 15 years. Their increasing popularity with a growing range of specifiers has prompted the company to actively develop its name and product range in this country.

PEMKO IN THE UK

Literature has been produced for the UK as a series of individual leaflets, each concentrating on the specific performance requirements of acoustics, energy conservation and weatherability, access and security.

UK Building Regulations, through their Approved Documents, demand performance requirements similar to the USA from doorsets, ironmongery and seals. Consequently, Pemko products, with their innovative and attractive design features, provide a range of door and threshold seals that meet or surpass the requirements and objectives of specifiers and end user customers.

WHY CHOOSE PEMKO PRODUCTS?

Subtle differences in the design of apparently similar and competitive products can make a considerable difference to performance, maintenance and durability. Take for example, the range of Pemko automatic door bottom seals; a patented design feature ensures that through the closing action of the door, the seal drops at the hinge side first, thus reducing drag along the threshold.

Additionally, our automatic door bottom seals incorporate our own uniquely designed low closing force springs; an essential plus factor when considering the issue of access, especially for the young or people with a mobility problem.



A third example of our innovative approach to product development can be seen in the range of Pemko continuous geared aluminium hinges. Unique and maintenance free gearing means minimum effort to open or close doors of up to 345 kg. These hinges are now independently tested and approved for fire resistance, in addition to security and standard doorsets.

This dedication to product innovation extends over the whole range of Pemko door and threshold seals; even perimeter door edge seals can now be fitted with adjustable seal elements.

In meeting our customers' requirements, design and development policy is influenced by the products' ease of fitting, competitive edge and longevity. They remain eminently suitable for meeting objectives of performance from specifiers and end users in the United Kingdom, whether the application is related to industrial, residential or commercial markets.

- As part of our commitment to excellence, Pemko operates under the
- quality procedures of ISO 9000, meeting or exceeding independent
- standards of conformity, with test evidence covering issues of air
- infiltration, sound, access, skid resistance, fire, smoke and general
- weatherability.

● AVAILABILITY OF PEMKO PRODUCTS

- In the UK, product distribution is provided by specialist door, hardware
- and seals companies who have been associated with Pemko from five to
- fifteen years. Our aim is to provide a choice of solutions to any problem,
- in a range of finishes at competitive prices.

Innovative design, leading technology

The unique and innovative PemkoHinge™ is of a continuous geared hinge design manufactured of extruded 6063-T6 tempered aluminum alloy and consists of three interlocking extrusions in a pinless assembly to form a hinge assembly that is intended to be fixed to the full height of a door and a frame. Each assembly consists of a frame blade, a door blade and a capping piece.

Flexibility in Design

- All aluminium components used for the PemkoHinge are clear or dark bronze anodised after milling and preparation to receive fixings, to provide for a hard and durable surface finish with excellent corrosion resistant properties. (Other finishes are available to special order).
- The design of the blades varies to suit a number of applications. Various frame blade designs can be assembled with a number of door blade designs held together using a common capping section to provide for an extensive range of standard and special designs for fully morticed, half morticed and surface mounted applications.
- The load bearing properties of the PemkoHinge are varied by the use of Delrin® - Teflon® bearings manufactured to a patented process to provide for Light Duty, Medium Duty and Heavy Duty options.
- All PemkoHinge designs allow for doors to open 180 degrees. However, for some locations wall or frame decoration might prevent use of this facility. Special extended throw options are available for both fully morticed and half morticed designs.

Specify Pemko continuous geared hinges with confidence

Durability	Door alignment-guaranteed	✓
	Low Maintenance	✓
	Ideal for doorsets exposed to all weather conditions.	✓
Compliant	Approved Document B (building regulations 1991, Appendix B:B5)	✓
	Independently tested and approved for use on FD30S and FD60S fire resisting doorsets to BS476 Part 20&22 including acting pairs of doors	✓
	Tested to 1,500,000 cycles, a threefold increase on the British Standard requirements.	✓
Security	Full height hinge prevents jemmy access to hanging stile operating gaps.	✓
Privacy	Enhanced privacy with the elimination of slight gap down hanging stiles.	✓
Safety	The full length capping piece reduces the risk of finger entrapment and anti ligature variant limit the risk of self harm.	✓
	Increase smoke sealing performance with the face fixed version of the hinge.	✓
Versatile	Ideal for physically disabled users as there is low operating force required, and the full length capping piece can be finished to contrast with door leaf and frame therefore acting as a navigation aid for users with slight disability.	✓
	Ideal for timber fire and non fire doorsets to steel doorsets, windows, furniture and lockers.	✓
	Variants of standard products are available for specialist applications.	✓

Tested and Proven

- The PemkoHinge has been successfully tested under positive pressure fire test conditions to satisfy a wide range of U.S. and UK fire performance requirements. The PemkoHinge also provides for security enhancement features and assists in the achievement of other performances where air permeability is a consideration (e.g. weather sealing). Other variants provide for 'finger safe' versions to prevent the entrapment of fingers in gaps between the closing stile of the door and the frame. The PemkoHinge has also been easily adapted to provide for an anti ligature performance for the protection of 'at risk' persons from self harm.

Peace of mind

- All PemkoHinge designs provide for a security performance by preventing access to the operating gaps between the door leaf and the frame. The security performance can be further improved by use of security pins that prevent the removal of the door leaf even in the unlikely event that the hinge capping unit is removed. A variant of the security pin is the Pemko FirePin that includes intumescent pockets that release intumescent material into gaps between the door leaf and the frame under fire conditions.
- Further options available for most fully morticed hinge designs can provide for further security enhancement include:

Magnetic Monitoring: The use of magnets and sensors that can be linked to a security control centre to indicate usage of a door location and to determine the status of the door. i.e. open or closed.

Current Transfer: Electrical modification providing for concealed current transfer using 4 wire, 8 wire or 12 wire units to transfer electrical power (4 amps at 48 volts) from a 'command' unit to electrical lock or strike units or monitoring units.

NOTE: The required handing for PemkoHinge units modified to receive magnetic monitoring or concealed current transfer wiring must be specified at the time of order.



Full Mortice Hinge

This hinge can only be used on new doorsets because it requires an 8mm gap at the hanging stile to accommodate both leaves, this is more satisfactorily achieved when the new door can be produced to fit the frame.

Half Surface Hinge

Designed mainly for upgrading existing doorsets. One hinge leaf is applied to the exposed surface of the door and the frame leaf is applied to the concealed surface of the frame jamb.



Full Surface Hinge

Designed mainly for upgrading existing doorsets and applied to the exposed surface of the door and frame.

Performance Applications

Stability and Durability:

The continuous hinge design of the PemkoHinge provides for the following stability and durability features:

- Multiple fixings that distribute load stresses in height.
- The virtual elimination of door sag.
- Door weights up to 272kgs.
- Cycling performance up to 2.5 million cycles.
- Hinge designs assist with the alignment of doors and frames reducing the risk of binding and consequent wear.

Vanity

The intermeshing gear with capping piece design of the PemkoHinge eliminates gaps that occur between the door leaf and the frame between hinges that occur when doors are hung on traditional hinges. This PemkoHinge sight proof feature provides for a privacy function that may be desirable for vanity or security purposes, even when used in the finger safe design without the use of a frame doorstop.

Security

The intermeshing gear with capping piece design of the PemkoHinge prevents access to gaps at the hinge knuckle face of the door. Various 'Safety' versions of the PemkoHinge can be used without a frame doorstop providing for sufficient space between the frame hinge blade and the door hinge blade to prevent the entrapment of fingers.

The slightly rounded 'soft-edge' profile of the hinge knuckle reduces the risk of injury in the event of impact with the hinge.

The PemkoHinge can be field modified by the use of the Pemko 'anti-ligature variant' that limits the risk of self harm when used for projects where such considerations might apply.

Disability

The PemkoHinge incorporates a number of features that are of assistance to the physically and visually disabled. The smooth low operating force feature of the PemkoHinge resulting from the self lubricating properties of Pemko's patented bearing system makes the PemkoHinge an ideal choice where use of the doors by physically impaired persons is anticipated.

The full height knuckle of the PemkoHinge can be finished to contrast with the door leaf and the frame to provide for a navigational reference for users of a building suffering from impaired sight disabilities.

Acoustics (Sound Attenuation)

The full height continuous intermeshing gear with capping piece design of the PemkoHinge restricts the flow of air, and therefore airborne sound at the hanging stiles of a door and contributes towards the sound attenuating performance of a doorset.

The use of face fixed versions of the PemkoHinge provides for 'clean' edges to the door leaf and to the frame reveal allowing for the use of continuous acoustic sealing systems that might otherwise be interrupted by the use of traditional hinges and other hardware.

Smoke Sealing

The full height continuous intermeshing gear with capping piece design of the PemkoHinge restricts the flow of air, and therefore airborne sound at the hanging stiles of a door and contributes towards the smoke sealing performance of a doorset.

Fire Performance

Various versions of the PemkoHinge have been successfully tested in the United States to meet the requirements of positive pressure testing by reference to UL10B, UL10C and UBC7-2, Part 1. Testing has also been carried out in the United Kingdom to the requirements of BS476 Pt.22.

Where identified as fire rated, the Pemko Hinge can provide for a performance up to 3 Hour (A-Label) Fire listing for all 4'-0" x 10'-0" and 8'-0" x 10'-0" door and frame assemblies

Fire listing certifications apply to all approved hollow metal and wood door assemblies in drywall or masonry wall constructions.

NOTE 1: Pemko 'FirePins' are required on 3-Hour (A-Label) assemblies.

NOTE 2: BS476 Pt.22 test data relates to the use of identified PemkoHinge types for FD30 (Half-Hour) and FD60 (One-Hour) applications when used with approved wood doors and frames.

Weather Sealing

The full height continuous intermeshing gear with capping piece design of the PemkoHinge restricts the flow of air at the hanging stiles of a door and contributes towards the weather sealing performance of a doorset.

The use of face fixed versions of the PemkoHinge provides for 'clean' edges to the door leaf and to the frame reveal allowing for the use of continuous sealing systems that might otherwise be interrupted by the use of traditional hinges and other hardware.

PEMKO Hinge

PemkoHinge™ - Method of Testing

- The current British Standard for classifying hinges is BS EN 1935. This test applies specifically to single axis hinges and is not applicable to geared hinges of the PemkoHinge™ design.

NOTE: The PemkoHinge™ cannot be CE marked on the basis of existing standards. We are currently active in the development of European tests for hinges of the PemkoHinge™ design.

- BS EN 1935 classifies hinges using an eight digit coding system for CE marking purposes. The test for a 'traditional' single axis hinge is carried out using one hinge only positioned at the top of the test rig with guide pivot used at the bottom of the test equipment.
- The maximum Grade of hinge envisaged by reference to BS EN 1935 is Grade 14 that relates to testing with a specimen weight of 160Kgs. Tested up to 200,000 cycles.
- The ANSI/BHMA A156.26 - 2000 tests described below are similar in many respects to the European tests.

ANSI/BHMA A156.26 - 2000 Grades hinges according to door weight and number of cycles. The door weights envisaged by the standard are 150lbs. (68kgs.), 300lbs. (135kgs.) and 600lbs. (270kgs.). The hinges are further graded on the basis of cycling performance thus:

Grade 1-150 = 2.5m. cycles using a 150lb. (72.6kgs.) specimen.

Grade 2-150 = 1.5m. cycles using a 150lb. (72.6kgs.) specimen.

Grade 3-150 = 350k. cycles using a 150lb. (72.6kgs.) specimen.

Grade 1-300 = 1m. cycles using a 300lb. (136kgs.) specimen.

Grade 2-300 = 500k. cycles using a 300lb. (136kgs.) specimen.

Grade 3-300 = 150k. cycles using a 300lb. (136kgs.) specimen.

Grade 1-600 = 500k. cycles using a 600lb. (272kgs.) specimen.

Grade 2-600 = 250k. cycles using a 600lb. (272kgs.) specimen.

NOTE: For 150lb. doors the cycling rate is 10-20 cycles per minute. For 300lb. and 600lb. doors the cycling rate is up to 10 cycles per minute.

Before being subjected to the ANSI/BHMA A256.26 test, the specimen is subjected to an abuse test by reference to ASTM F476-84. For the abuse test, the hinge supports a specimen structure that is fitted with an impact pad located (for continuous hinges) at the mid height location. The specimen is impacted with a weight fixed to a pendulum device that strikes the 'target' position to apply the following forces (according to grading):

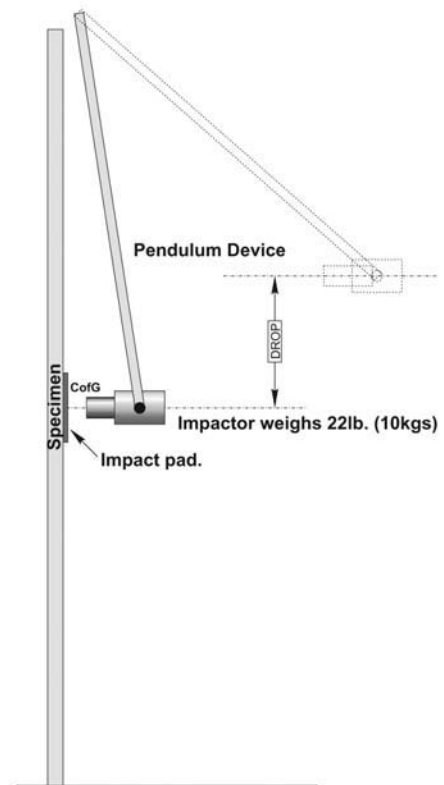
Grade 1 = As Grade 2 requirements plus 2 blows of 150lbf.ft. (203N.m) (203J)

Grade 2 = As Grade 3 requirements plus 2 blows of 120lbf.ft. (162N.m) (162J).

Grade 3 = 2 blows of 60lbf.ft (81N.m) (81J) plus 2 blows of 90lbf.ft. (122N.m) (122J).

Criteria: The hinge should not suffer from any damage to the hinge blades or hinge construction that would prevent operation of the specimen.

ASTM F 476 - 84 Hinge Abuse Test



PEMKO Hinge

PemkoHinge™ - Method of Testing

ANSI/BHMA A156.26 -2000

A specimen consisting of a door leaf or a skeleton structure with provision to receive weight at the centre of gravity position (to simulate a door) is hung onto a firmly fixed simulated jamb element using the specimen hinges.

The specimen door size is 36in. (914mm) wide x 84in. (2134mm) high x 13/4in. (44mm) thick.

NOTE: Some other test methods simply relate to door weight and do not consider the torque loading effects resulting from variations in door leaf width provided for by the use of this 'template' size of door sample. For a 150lb. (72.6kgs.) door, the force acting through the centre of gravity of the door would be 225lbf.ft. (305N.m). this information is useful when applying the test data to doors of a different width.

The weight of the door is felt through the centre of gravity of the door leaf (cog) at a distance from the pivot point of the hinge (d1). Thus, the moment of force felt on the top fixings of the hinge (where the door leaf is of a constant weight) will vary according to the door leaf width. Similarly, the moment of force will vary where the leaf dimensions remain the same but the weight is varied.

The specimen hinge is fixed to a secure jamb structure and to the template door leaf construction in accordance with the hinge manufacturers recommendations.

The template door leaf is pre loaded to the desired test weight for the required Grading, i.e. To create a template door weight of 150lbs. (72.6kgs.), 300lbs. (136kgs.) or 600lbs. (272kgs.)

The test assembly requires that the gaps between the top of the template door and the frame head (or measuring block) and at the closing stile of the template door and the closing jamb (or measuring block) are carefully set to 1/8 in. +/- 1/64 in. (3.2mm +/- 0.4mm). The gap under the template door should be sufficient to prevent grounding of the door structure during test.

NOTE: Measuring blocks are machined blocks that are carefully set so that accurate measurements may be taken from the face of the blocks to:

a/ Top of the frame fixing hinge blade.

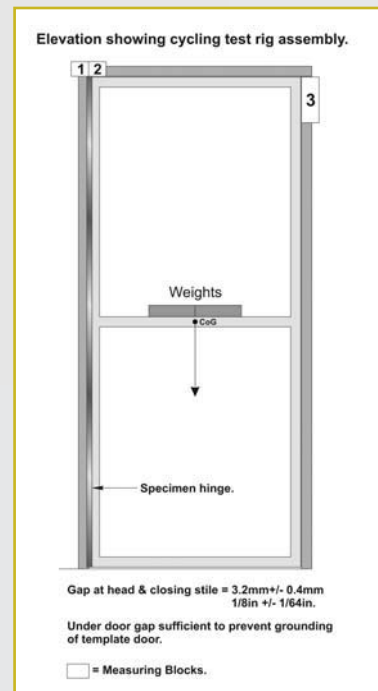
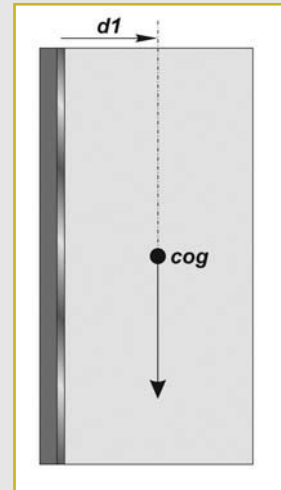
b/ Top of the door fixing hinge blade.

c/ Closing edge of the door and the closing jamb.

Before proceeding with a cycling test, a static overload test is carried out. The static overload test requires that an additional weight of 150lbs.(72.6kgs.) is added to the door at a point near to (or at) the centre of gravity position. The additional weights are removed after a period of 5 minutes and the lateral shift i.e. the distance moved as a consequence of overloading is measured at the measuring block 3 position. To provide for a satisfactory performance, the gap at this point should be not less than the original set gap less 0.062in. (1.6mm) for all grades.

NOTE: Actual measurements relating to the PemkoHinge™ for this test resulted in a shift of 0.015in. (0.4mm).

Following the static overload test, reference measurements are taken from measuring blocks 1 and 2 to the top of the frame hinge blade and the door hinge blade. The template door is then cycled between 0-90° for the number of cycles required for the particular grading.



PEMKO Hinge

PemkoHinge™ - Method of Testing

ANSI/BHMA A156.26 -2000

Following the cycling test to the number of cycles for the required grading, vertical wear measurements are taken relative to measurement blocks 1 & 2. A comparison of these measurements will result in a vertical wear measurement.

The maximum vertical wear permitted by the standard varies according to grading:

Grade 1 = 0.020in. (0.05mm)

Grade 2 = 0.030in. (0.76mm)

Grade 3 = 0.105in. (2.67mm)

NOTE: Following a Grade 2-150 test, the vertical wear measured for a PemkoHinge™ after 1.5m. cycles was 0.028in. (0.71mm).

The Overload test carried out before the cycling test is repeated with lateral wear measured relative to measurement block 3. The maximum lateral wear permitted for all grades is 0.062in. (1.6mm).

NOTE: Following a Grade 2-150 test, the lateral wear measured for a PemkoHinge™ after 1.5m. cycles under overload test conditions was 0.016in. (0.4mm).

PemkoHinge™ - Method of Testing

ANSI/BHMA A156.18 -2000

In addition to the Abuse test required by reference to ASTM F476-84 and the cycling and overload tests described above, ANSI/BHMA A156.26 also requires a Salt Spray Test to determine the corrosion resistance of materials and finishes. The requirements of the salt spray test are determined by reference to Clauses 3.1 and 3.2 of ANSI/BHMA A156.18 - 2000. The test procedure for salt spray testing is described by reference to ASTM B 117-95.

NOTE: When subjected to this test, samples of PemkoHinge™ achieved a Code 0 performance - No Attack after 1,000 hours.

PEMKO Hinge

To specify requirements for a PemkoHinge™ the following characteristics should be determined:

1/ Hinge Design: Determine the basic hinge design requirement from the following Data Sheets. e.g. Full Mortise, Half Mortise, Face Fixed etc. These basic designs are listed with a suffix number to indicate hinge blade dimensions.

2/ Grade: Determine the loading that is likely to be applied to the hinge by consideration of the door mass, door width and the influence of other hardware then select the grade i.e. LD (Light Duty), MD (Medium Duty) or HD (Heavy Duty) required for the particular project by reference to the appropriate hinge Data Sheet.

3/ Hinge Length: Select the required hinge length to suit the project requirements by reference to the particular hinge Data Sheet.

4/ Finish: Select the hinge finish required for the particular project. Finishing options include:

Clear Finished anodised aluminium.

Gold anodised aluminium.

Dark Bronze aluminium.

Satin Nickel aluminium.

5/ Accessories: Various security and performance enhancement accessories are available for use with the PemkoHinge™ these requirements should be specified as a suffix to the hinge codes shown in the Data Sheets. See: PemkoHinge™ Accessories.

Availability:

Some hinge designs, as indicated by the Union flag logo  are available from stocks held in the United Kingdom. For other hinge designs, the Pemko worldwide distribution service provides for an efficient method of delivery from stocks held in the United States.

The availability of a particular hinge design may vary according to the demand for the particular design at the time of the order.

Special Designs:

The extensive range of PemkoHinge™ designs will generally satisfy most project requirements. However, variations to 'standard' designs and the creation of 'special' designs may be considered relative to quantity requirements and related tooling costs.

Sales & Technical Support:

The PemkoHinge™ is supported by a world wide distribution network. Details of U.K. Distributors may be found by reference to the Pemko web site: www.pemko.com.

The Pemko Manufacturing Company UK Office also provide a technical support facility in the United Kingdom for users of all Pemko products including the PemkoHinge™. Technical support may be requested through any Pemko Distributor.

PEMKO Hinge

PemkoHinge™ Grading:

For use with door weights over 68Kgs. (150lbs.) hinges are graded in accordance with BHMA Standard ANSI/BHMAA156.26 -2000 for all Medium and Heavy Duty applications.

Cycling Performance: Cycling performance of the PemkoHinge™ are graded in accordance with ANSI/BHMA A156.26 -2000 as follows:

PemkoHinge™ Light Duty hinges = Not Graded.

PemkoHinge™ Medium Duty hinges = Grades 3-150 and 3-300.

PemkoHinge™ Heavy Duty hinges = Grades 2-150, 2-300, 1-300 and 1-600.

NOTE 1: The PemkoHinge™ is available to meet ANSI/BHMAA156.26 -2000 Grade 1-150 to special order.

NOTE 2: For an explanation of the ANSI/BHMA 156.26 performance requirements and test procedure See page x).

The weight bearing capabilities of the PemkoHinge™ varies according to the length of the hinge (height of the door) and the number of bearings used in the construction of the hinge.

NOTE: Weight bearing capabilities are based upon door leaf widths up to 36in. (914mm).

Pemko Grading	Hinge Length	Number of Bearings	Door Weight
Light Duty (Residential Hinges)	2006mm (79in.)	7No.	38kgs. (70lbs.)
	2108mm (83in.)		
Medium Duty (Standard - 0) Hinges	2108mm (83in.)	14No.	127kgs. (280lbs.)
	2159mm (85in.)	16No.	145kgs. (320lbs.)
	2413mm (95in.)		182kgs. (400lbs.)
Heavy Duty (HD) Hinges	3048mm (120in.)	20No.	182kgs. (400lbs.)
	2108mm (83in.)	27No.	245kgs. (540lbs.)
	2159mm (85in.)	31No.	281kgs. (620lbs.)
2413mm (95in.)	345kgs. (780lbs.)		
	3048mm (120in.)	39No.	345kgs. (780lbs.)

Fire Door Application

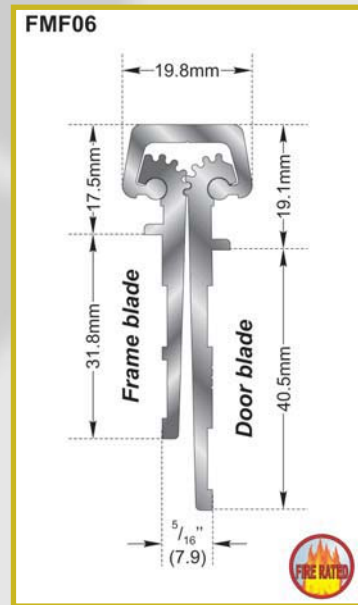
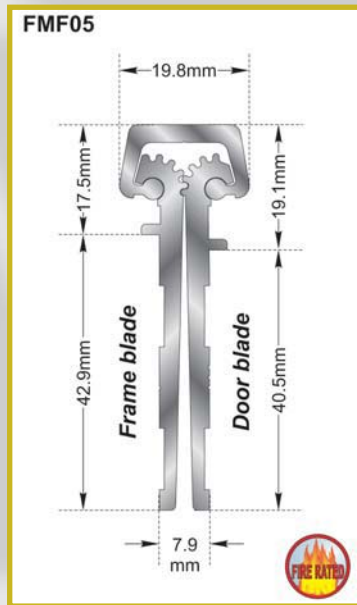
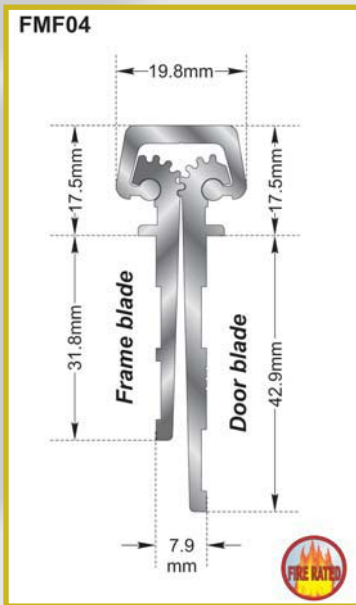
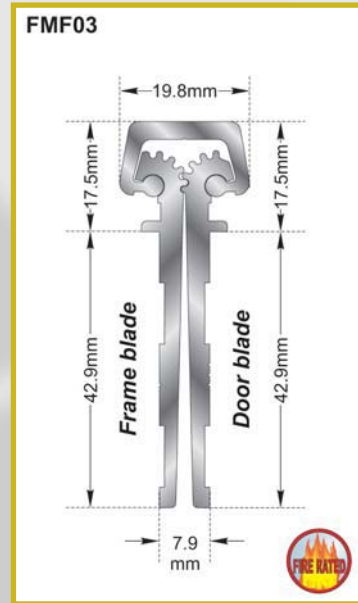
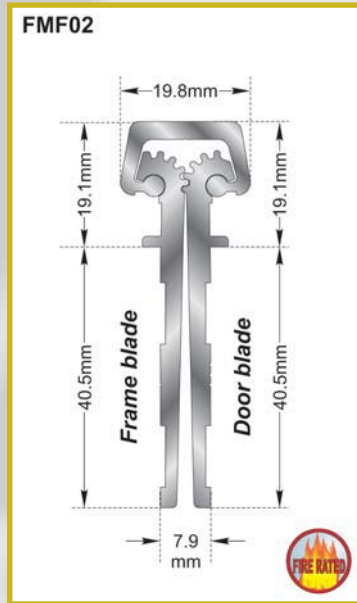
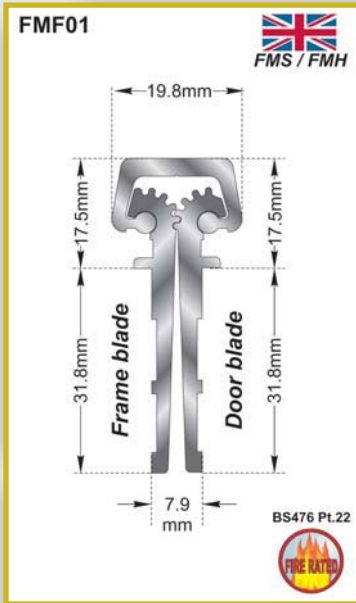


= Positive Pressure Fire Tested to meet US Standards UL10B, UL10C, UBC7-2 Part 1
BS476 Pt.22 = Tested in the United Kingdom to BS476 Pt.22 - See Warrington Test Report No. WFRC 139560 valid until 1st. July 2009.

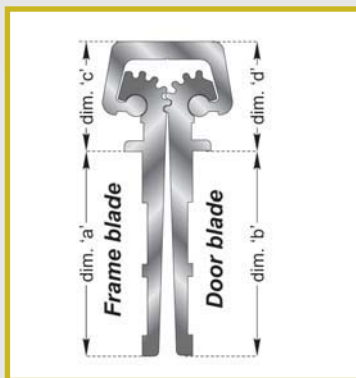
Finishes

- SN** Satin nickel aluminum
- C** Clear anodised aluminum
- D** Dark bronze aluminum
- G** Gold anodised aluminum

Full-Mortise – Flanged



NOTE: See intumescent sealing details for use with wood fire rated doorsets.

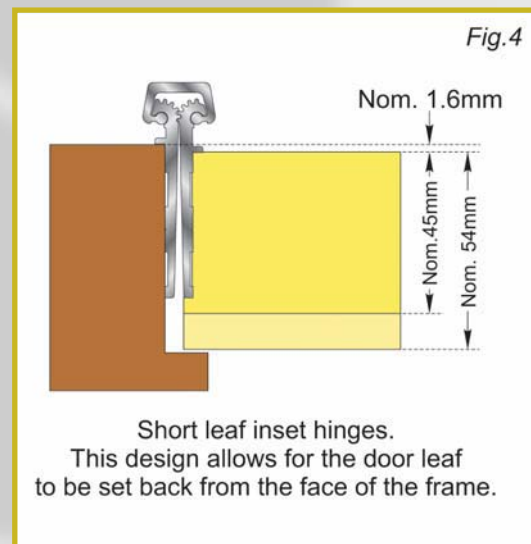
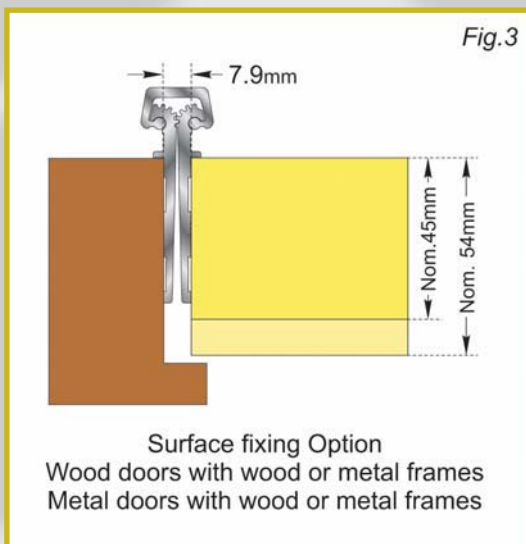
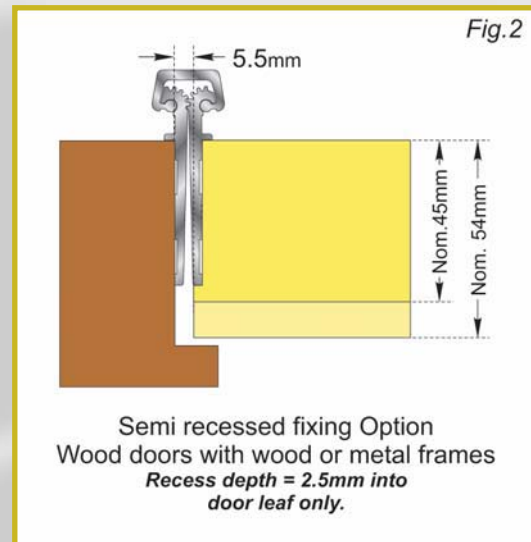
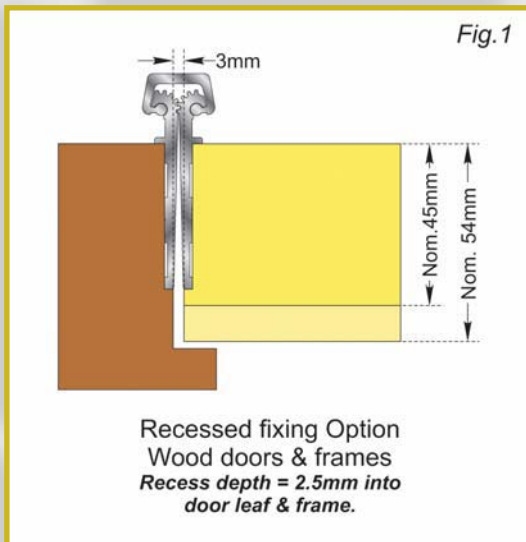


Type Ref:	Dimensions (mm)				Grade			Hinge Length (mm)					Finishes			
	'a'	'b'	'c'	'd'	LD	MD	HD	2006	2108	2159	2413	3048	SN	C	D	G
FMF01 FMS / FMH	31.8	31.8	17.5	17.5	☒	☑	☑	☒	☑	☒	☒	☒	☒	☑	☒	☒
FMF02	40.5	40.5	19.1	19.1	☒	☑	☑	☒	☑	☑	☑	☑	☒	☑	☑	☒
FMF03	42.9	42.9	17.5	17.5	☒	☑	☑	☒	☑	☑	☑	☑	☒	☑	☑	☒
FMF04	31.8	42.9	17.5	17.5	☒	☑	☑	☒	☑	☑	☑	☑	☒	☑	☑	☒
FMF05	42.9	40.5	17.5	19.8	☒	☑	☑	☒	☑	☑	☑	☑	☒	☑	☑	☒
FMF06	31.8	40.5	17.5	19.8	☒	☑	☑	☒	☑	☑	☑	☑	☒	☑	☑	☒

Refer to page 8 for code references

PEMKO Hinge

PemkoHinge™ - Method of Testing

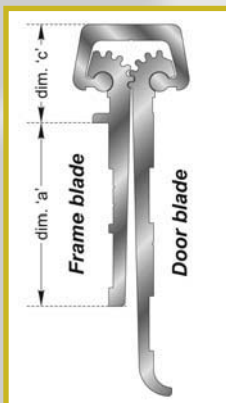
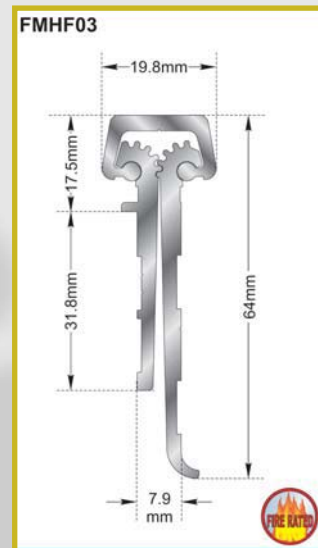
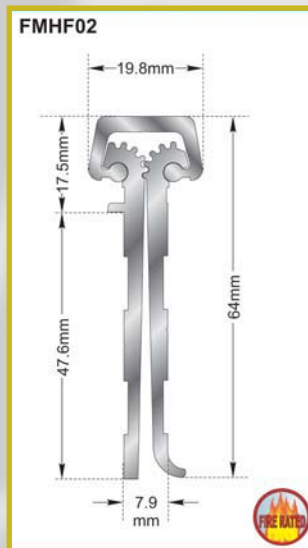
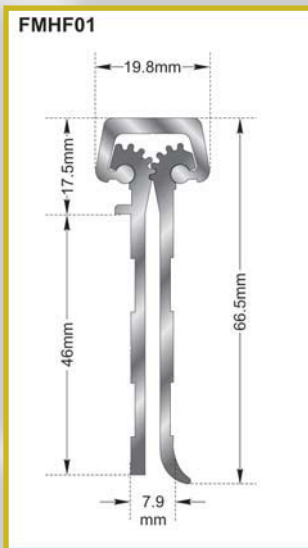


NOTES:

- 1 Full mortise flange type hinges may be recessed, semi recessed or surface mounted as illustrated in Figs. 1 - 3 above. When used in any of these applications, the face of the door leaf is positioned to be flush with the face of the frame nosing.
- 2 Where required, (e.g. when using bolted assembly hollow metal frames) short leaf inset hinges (Type FMF06) with off set flanges may be used.
- 3 The flange detail used with some PemkoHinge designs assists with the accurate location of the hinge and provides for enhanced security and weather sealing performances.
- 4 Intumescent sealing must be used when fitting the PemkoHinge™ to wood fire rated doorsets -See Wood Fire Door applications.
- 5 Light duty hinges are intended mainly for residential building use but may also be used for low usage doorsets. e.g. duct doors.

PEMKO Hinge

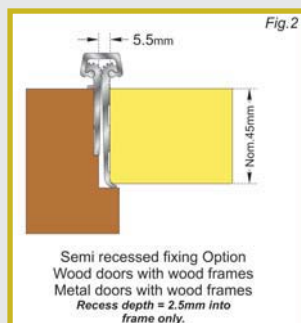
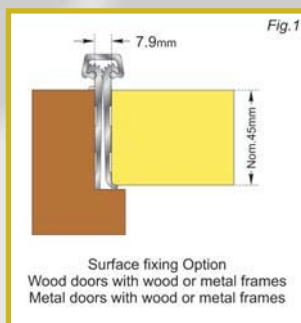
Full-Mortise – Half Flanged



Type Ref:	Dimensions (mm)				Grade			Hinge Length (mm)					Finishes			
	'a'	'b'	'c'	'd'	LD	MD	HD	2006	2108	2159	2413	3048	SN	C	D	G
FMHF01	46	See detail	17.5	See detail	✓	✗	✗	✗	✓	✗	✓	✗	✗	✓	✓	✗
FMHF02	47.6	See detail	17.5	See detail	✗	✓	✓	✗	✓	✓	✓	✓	✓	✓	✓	✗
FMHF03	31.8	See detail	17.5	See detail	✗	✓	✓	✗	✓	✓	✓	✓	✗	✓	✓	✗

Refer to page 8 for code references

NOTE: Hinges of this design are intended for use primarily with metal doors (windows) but may be used with non fire rated wood doors where the door fitting hinge blade replaces the hanging stile lipping.

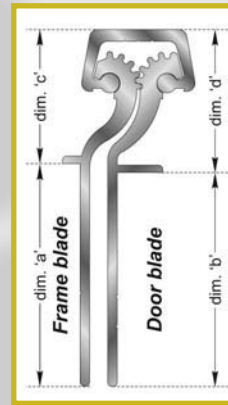
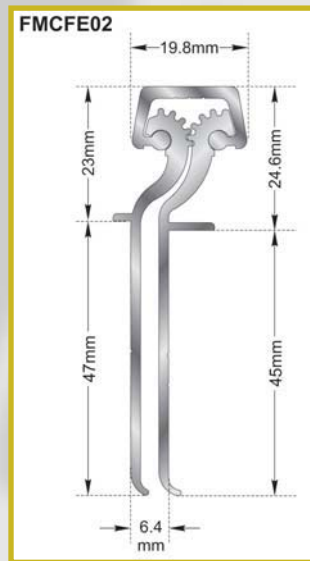
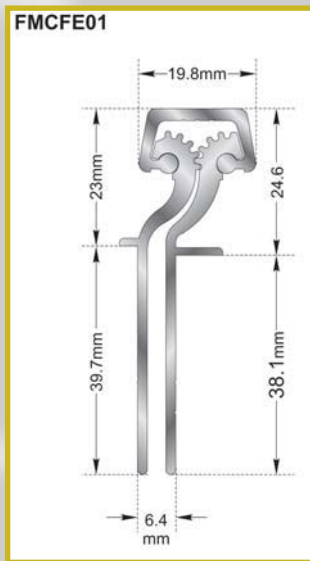


NOTES:

- 1 Full mortise half flange hinges may be semi recessed or surface mounted as illustrated in Figs. 1 & 2 above. When used in any of these applications, the face of the door leaf is positioned to be flush with the face of the frame nosing.
- 2 The frame hinge blade may be surface mounted or recessed with the door hinge blade providing for a wrap round feature. This hinge type is designed primarily for use with metal doors (and windows) but may also be used with wood doors, frames and windows.
- 3 Intended for use with door leaves of Nom.45mm thickness.
- 4 The FMHF01 Light duty versions of this hinge design are intended for use with light weight aluminium doors, frames or windows.

PEMKO Hinge

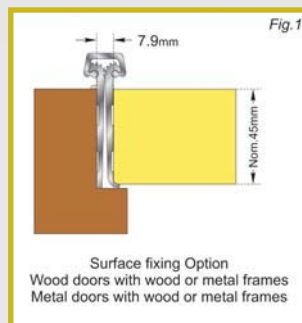
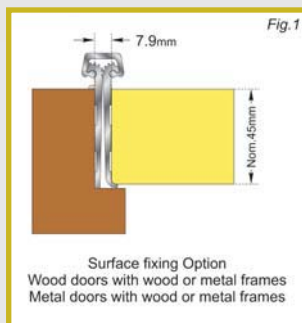
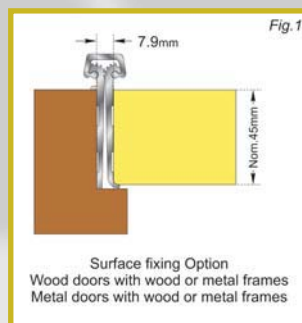
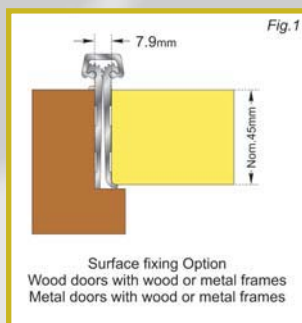
Full-Mortise – Cranked – Flanged – Extended Throw



Type Ref:	Dimensions (mm)				Grade			Hinge Length (mm)				Finishes				
	'a'	'b'	'c'	'd'	LD	MD	HD	2006	2108	2159	2413	3048	SN	C	D	G
FMCFE01	39.7	38.1	23	24.6	✓	✗	✗	✓	✓	✗	✗	✗	✗	✓	✓	✓
FMCFE02	46.8	45.2	23	24.6	✓	✗	✗	✓	✓	✗	✗	✗	✗	✓	✓	✗*

* = Supplied with Bright Dip Gold Cap

Refer to page 8 for code references

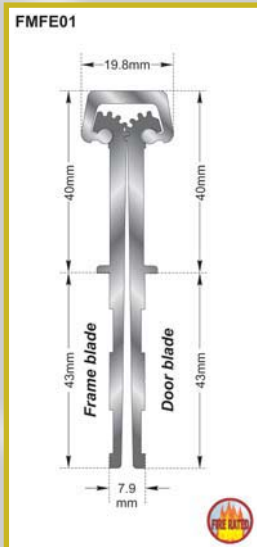


NOTES:

- 1 Full mortise cranked, flanged, extended throw hinges are of a light duty design intended for use with wood or metal doors, frames or windows.
- 2 The cranked and extended throw design provides for doors to be operated within the door leaf width and permits the use of decorative architrave or other design features while maintaining full 180° swing characteristics.
- 3 FMCFE hinges are intended for use with door leaves / windows up to Nom. 13/4in. (45mm) thickness.
- 4 The FMCFE02 (Fig. 4) hinge is designed for use with metal doors and frames and may be used without the use of door stops to the hanging stiles.

PEMKO Hinge

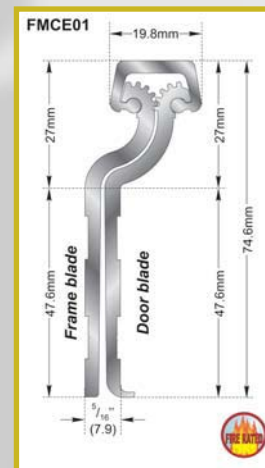
Full-Mortise – Flanged & Cranked – Extended Throw



Type Ref:	Dimensions (mm)				Grade			Hinge Length (mm)					Finishes			
	'a'	'b'	'c'	'd'	LD	MD	HD	2006	2108	2159	2413	3048	SN	C	D	G
FMFE01	43	43	40	40	☒	☒	☑	☒	☑	☒	☑	☒	☒	☑	☑	☒

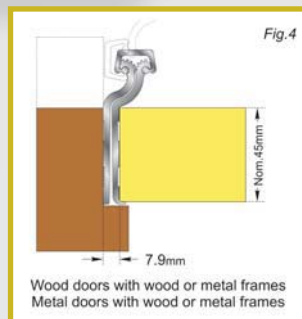
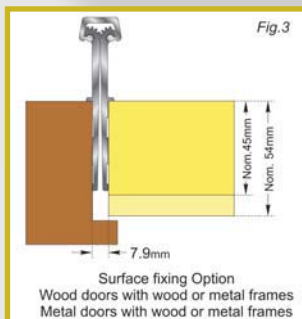
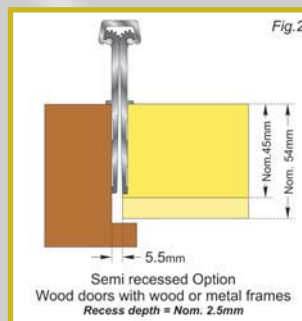
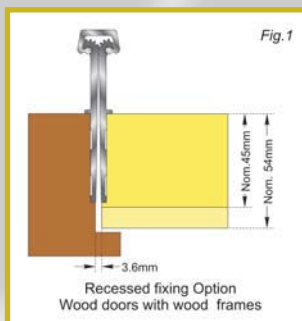
Refer to page 8 for code references

NOTE: See intumescent sealing details for use with wood fire rated doorsets.



Type Ref:	Dimensions (mm)				Grade			Hinge Length (mm)					Finishes			
	'a'	'b'	'c'	'd'	LD	MD	HD	2006	2108	2159	2413	3048	SN	C	D	G
FMFE01	43	43	40	40	☒	☒	☑	☒	☑	☒	☑	☒	☒	☑	☑	☒

Refer to page 8 for code references



NOTES:

1 Full mortise flanged or cranked, extended throw hinges are designed for heavy duty and medium duty applications to provide for 1800 opening when using decorative architrave or other door frame trim that might otherwise cause a restriction to the opening of the door.

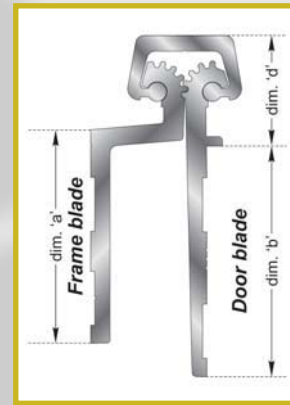
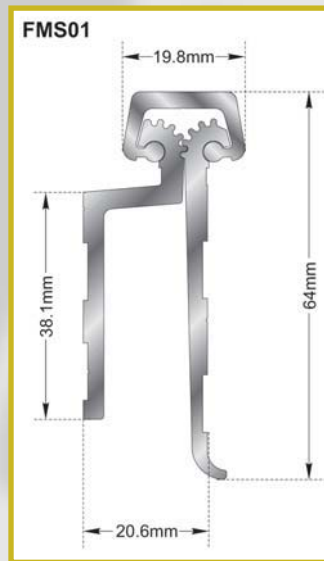
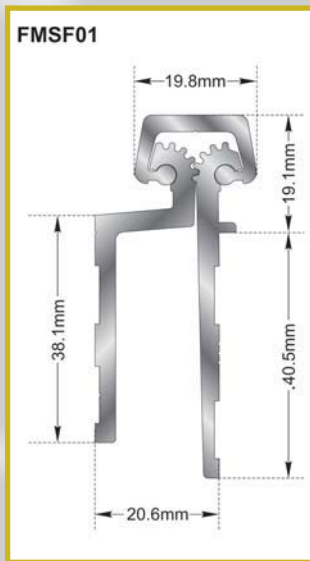
2 The FMFE01 hinge design may be used in the same manner as described for Full Mortise Flange Types.

3 The FMCE 01 hinge design is cranked and intended for use with door leaves up to Nom. 13/4in. (45mm) thickness. The design of the hinge ensures that doors operate within the door width allowing for a wide range of frame designs and trim.

WARNING: The pivot point for an extended throw hinge can give rise to operational problems, particularly if used with thick or narrow door leaves. To ensure correct operation extensive profiling of closing or meeting stiles may be required -See 'Growth Formula'

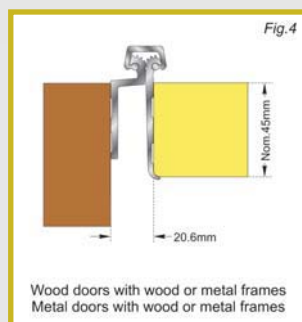
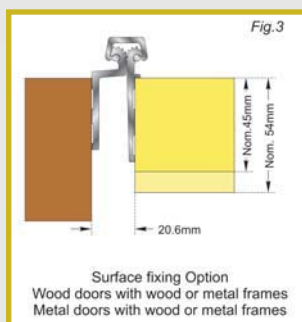
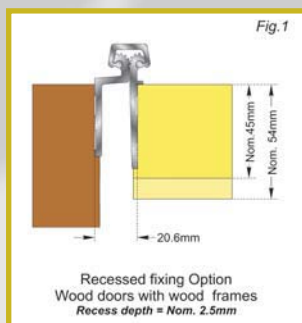
PEMKO Hinge

Full-Mortise – Safety – Flanged



Type Ref:	Dimensions (mm)				Grade			Hinge Length (mm)					Finishes			
	'a'	'b'	'c'	'd'	LD	MD	HD	2006	2108	2159	2413	3048	SN	C	D	G
FMSF01	38.1	40.5	See detail	19.1	☒	☑	☑	☒	☑	☑	☑	☑	☒	☑	☑	☒
FMS02	38.1	See detail	See detail	See detail	☒	☑	☑	☒	☑	☑	☑	☑	☒	☑	☑	☒

Refer to page 8 for code references

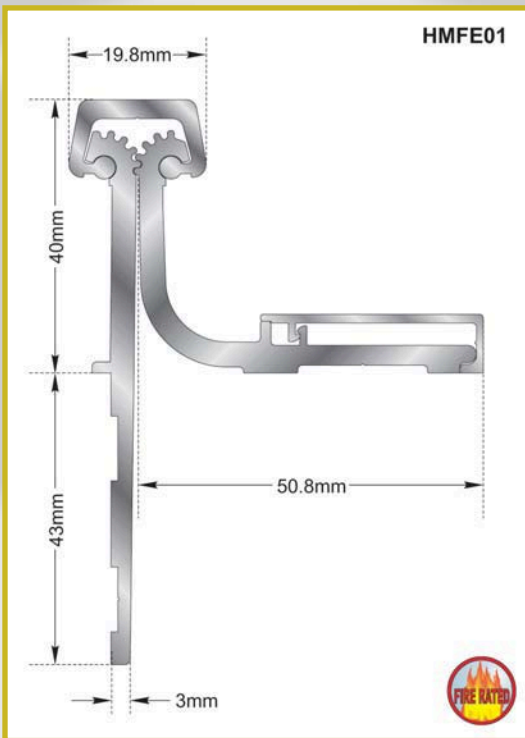
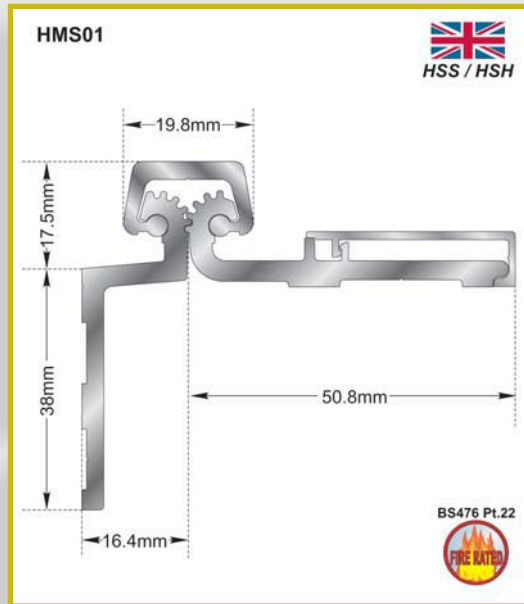
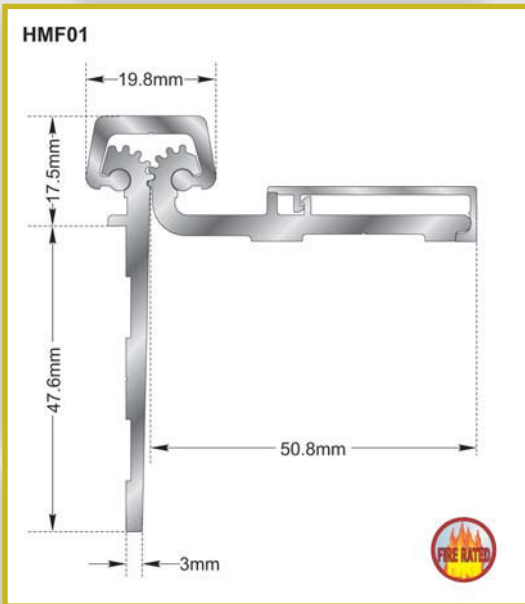


NOTES:

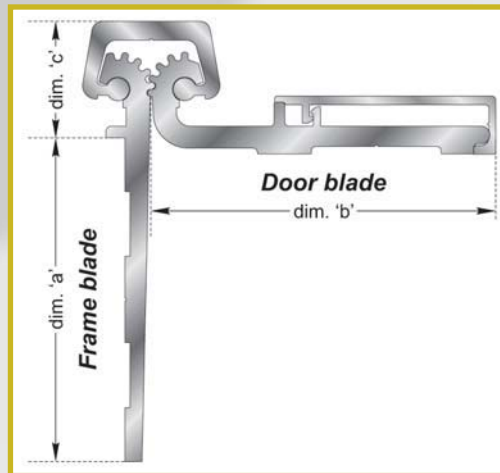
- 1 Full mortise safety and safety flanged hinges are designed for heavy duty and medium duty applications to provide for 180 opening of the door.
- 2 The safety hinges provide for a large clearance, sufficient to avoid the entrapment of fingers. These hinges should be used without a doorstop to the hanging edges. Swing through of the doors is prevented by the use of doorstop to the closing stiles and / or at the head of the door.


PEMKO Hinge

Half-Mortise



Half-Mortise – Flanged
 Half-Mortise – Safety
 Half-Mortise – Flanged
 Half-Mortise – Extended Throw

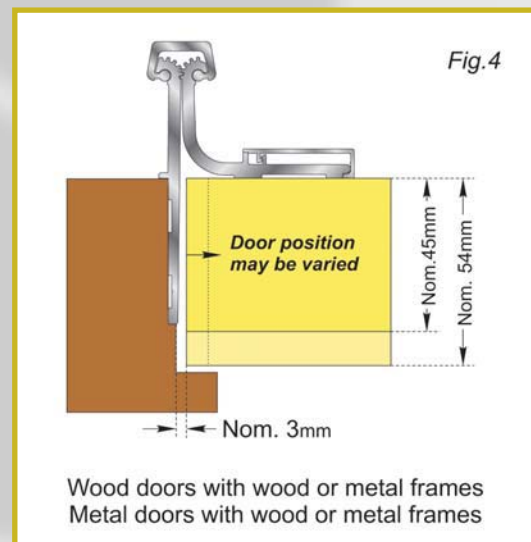
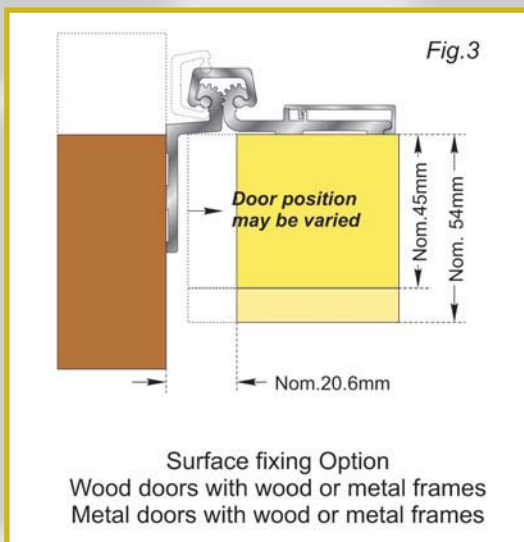
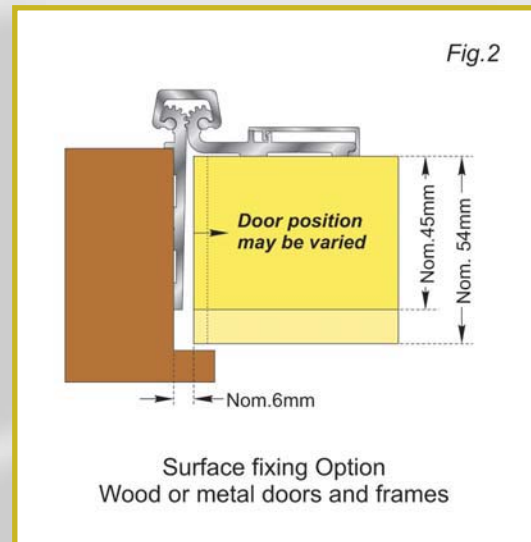
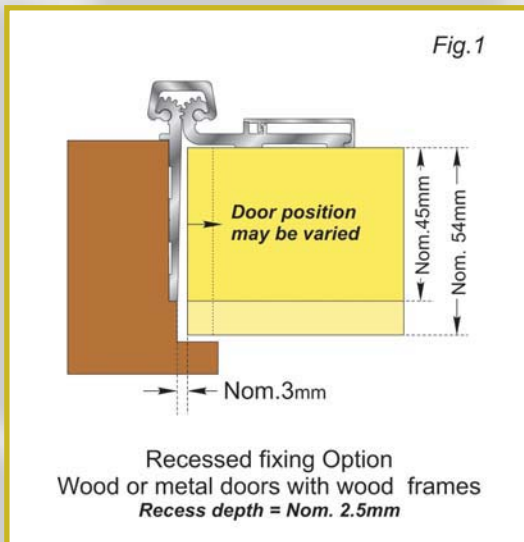


Type Ref:	Dimensions (mm)				Grade			Hinge Length (mm)					Finishes			
	'a'	'b'	'c'	'd'	LD	MD	HD	2006	2108	2159	2413	3048	SN	C	D	G
HMF01	47.6	50.8	17.5	See detail	☒	☑	☑	☒	☑	☑	☑	☑	☒	☑	☑	☒
 HMS01 HSS/HSH	38.1	50.8	17.5	See detail	☒	☑	☑	☒	☑	☒	☒	☒	☒	☑	☒	☒
HMFE01	43	50.8	40	See detail	☒	☑	☑	☒	☑	☑	☑	☑	☒	☑	☑	☒

Refer to page 8 for code references

PEMKO Hinge

Half-Mortise



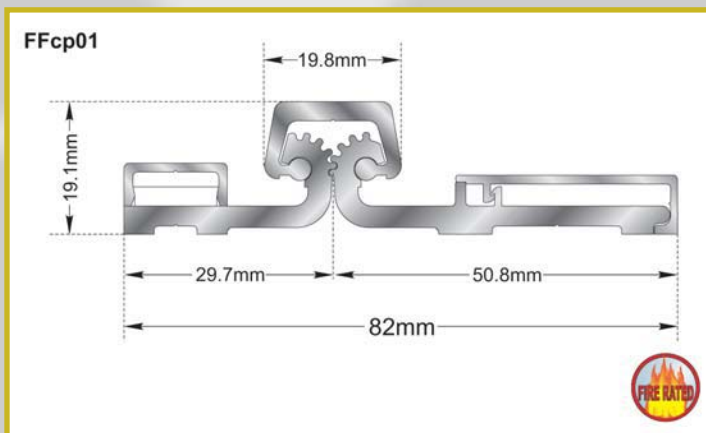
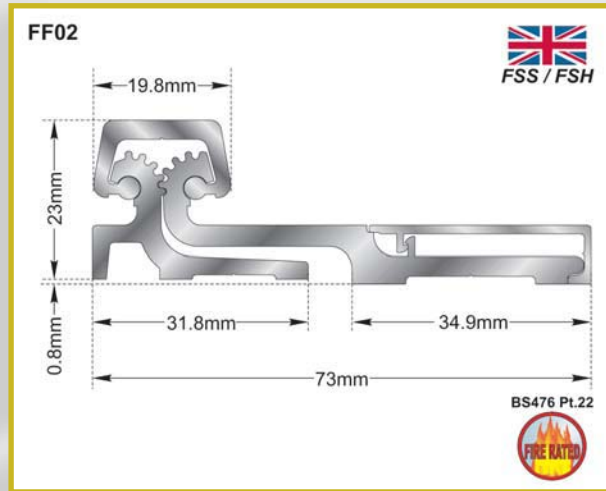
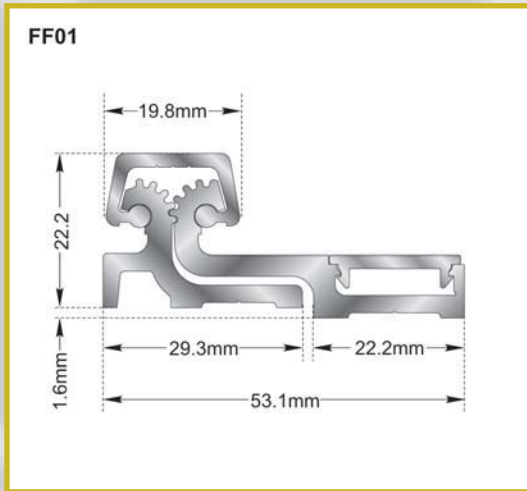
NOTES:

- 1 Half mortise hinges provide for traditional fixing to wood or metal frames with face fixing through the door leaf. The design allows for extensive lateral adjustment of the door leaf to provide for optimum setting of operating tolerances.
- 2 The half mortise design is recommended for use with some mineral core door leaf constructions that provide for limited edge screw fixings. The design will also allow for unbroken sealing systems that are to the door leaf edges.
- 3 Half mortise hinges are available as a safety hinge when used without a doorstop to the hanging jamb. The same design of hinge can be used with a frame incorporating a door stop with the door leaf repositioned to suit. This allows for the door leaf to be set back within the frame partition thickness.
- 4 A further half mortise design option provides for an extended throw facility.

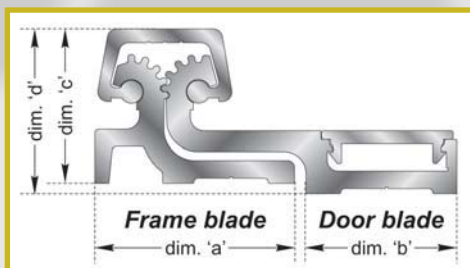
WARNING: The pivot point for an extended throw hinge can give rise to operational problems, particularly if used with thick or narrow door leaves. To ensure correct operation extensive profiling of closing or meeting stiles may be required - See 'Growth Formula'

PEMKO Hinge

Face Fixed



Face Fixed O1
Face Fixed O2
Face Fixed Centre Pivot



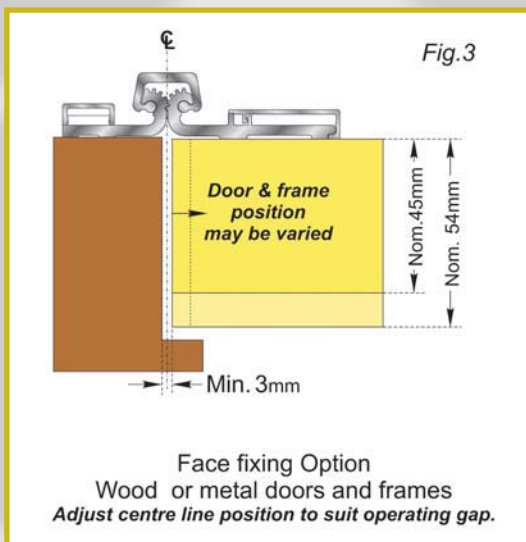
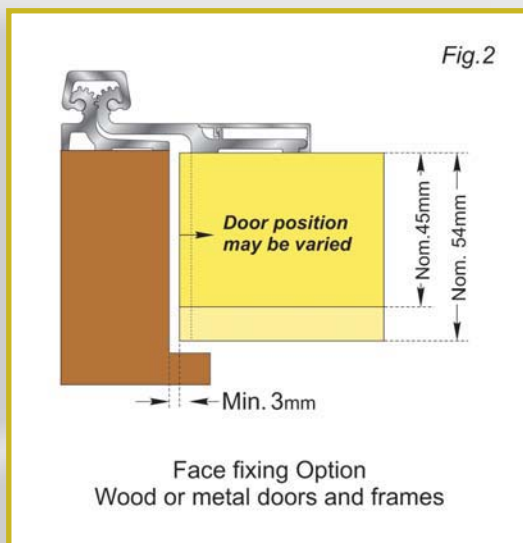
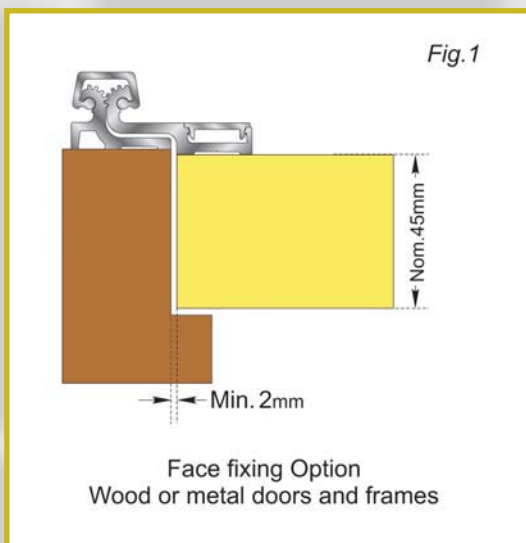
Type Ref:	Dimensions (mm)				Grade			Hinge Length (mm)					Finishes			
	'a'	'b'	'c'	'd'	LD	MD	HD	2006	2108	2159	2413	3048	SN	C	D	G
FF01	29.3	22.2	22.2	23.8	☒	☑	☒	☒	☑	☑	☑	☑	☒	☑	☑	☒
FF02 FSS/FSH	31.8	34.9	23	23.8	☒	☑	☑	☒	☑	☒	☒	☒	☒	☑	☒	☒
FFcp01	29.7	50.8	19.1	See detail	☒	☑	☑	☒	☑	☑	☑	☑	☒	☑	☑	☒



Refer to page 8 for code references

PEMKO Hinge

Face Fixed



NOTES:

- 1 Face fixed hinges are fitted to the face of the door leaf and the frame allowing for the lateral adjustment of doors.
- 2 These hinge designs allow for unbroken sealing systems to the door leaf edges and / or the frame reveal.

PEMKO Hinge

Accessories – Fire/Security Pins

FirePins™

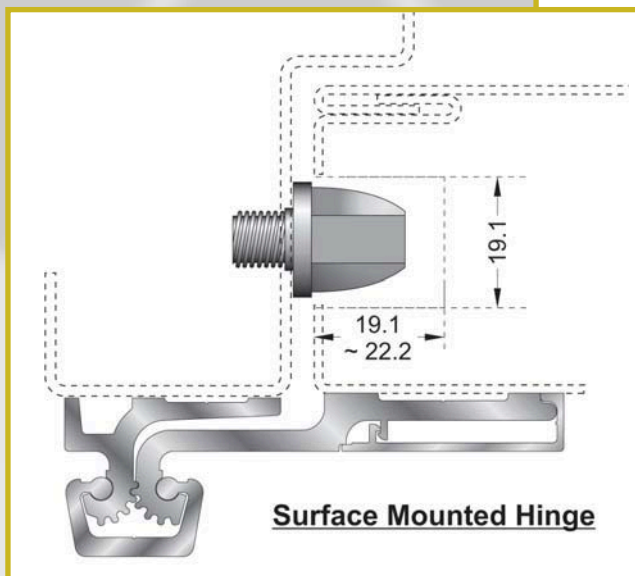
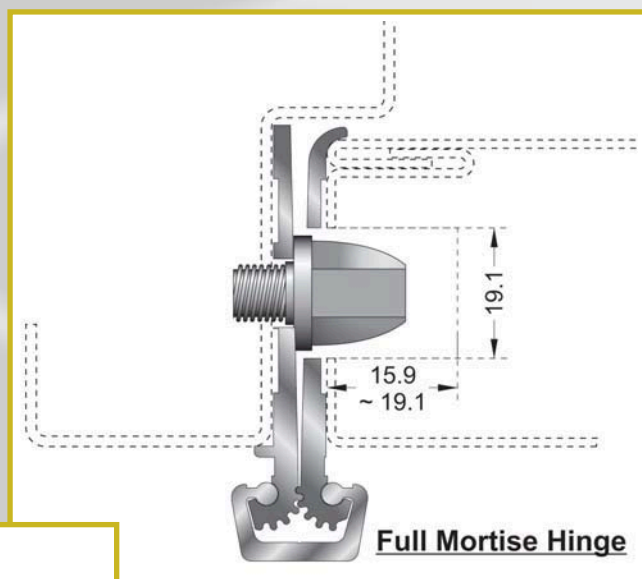
Combined security and fire pins are recommended for use with fire rated doorsets and may be an essential requirement for use with 3hr. fire rated assemblies to satisfy UL Fire Ratings for use with steel doorsets.

Firepins™ can be used with any of the PemkoHinge™ designs. Intumescent material is encased in each FirePin™ with this material bleeding out when under attack by fire to reduce charring and improve sealing at vulnerable door edges.

Use of the FirePin™ will also enhance security performances by preventing the removal of the door leaf even in the unlikely event that the hinge capping is completely removed by excessive force or milling.



PemkoHinge™ types approved for fire door applications are identified by use of the 'FIRE RATED' symbol.



Fire pins should be located as follows:

Top pin: (All hinge lengths) 76.2mm (3in.) from the top of the door leaf.

Bottom pin: (All hinge lengths) 76.2mm (3in.) from the bottom of the door leaf.

Intermediate pins: (Hinge heights 2007-2413mm (79-95in.)) 2No. positioned equidistant between the top and bottom pins.

(Hinge Heights 2414-3048 (96-120in.)) 3No. positioned equidistant between the top and bottom pins.

PEMKO Hinge

Face Fixed

Magnetic Monitors

Magnetic monitoring provides for additional security in public buildings by sensing the door position, i.e. open or closed, and relaying this to a security control centre.

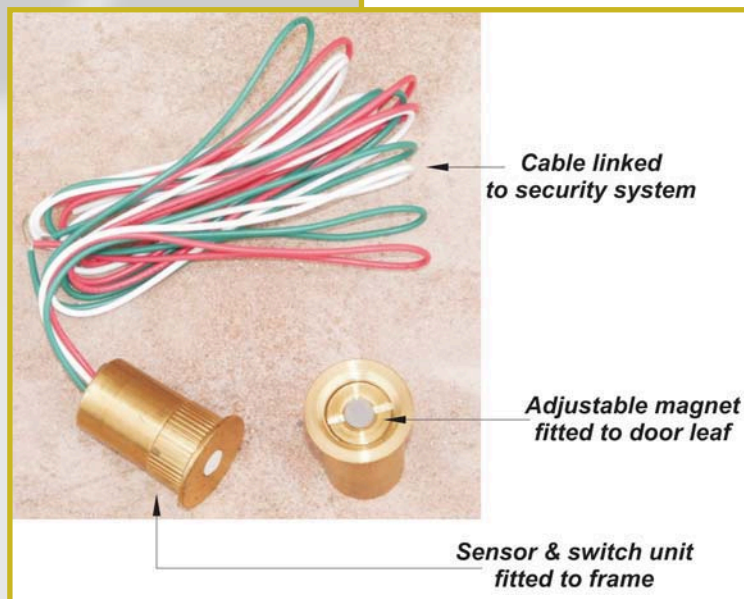
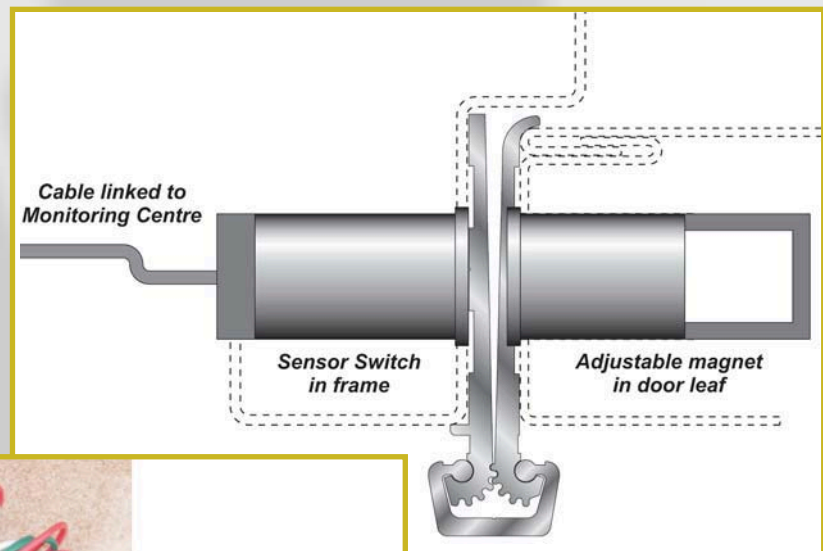
Pemko magnetic monitors are adjustable to provide for the optimum level of sensitivity for the particular location.

Magnetic monitors are available as concealed or exposed units. The concealed units are better suited for use in locations where tampering with the sensor is a risk whereas the exposed units provide for easier access for servicing and adjustment.

Concealed magnetic sensors are also available using the 'Service Module' option where part of the hinge is removed and replaced with a 'Magnetic Sensing Module' incorporated into a short length of hinge that is otherwise of the same design as the primary hinge. This provides for the added security advantage of the concealed magnetic sensor with access for adjustment or servicing without the need to remove the full height hinge.

Magnetic Monitoring may be specified for use with the following PemkoHinge™ types:

FMF01 FMF02 FMF03 FMF04 FMF05 FMF06 FMHF02 FMHF03 FMFE01 FMCE01



NOTE: Magnetic monitoring may be specified in addition to Current Transfer.

PEMKO Hinge

Accessories – Current Transfer

Magnetic Monitors

Electrically modified PemkoHinge™ types are available for power transfer, current transfer and monitoring applications. Each conductor laminated cable will carry 4 amps at 48 volts.

The electrically modified PemkoHinge™ has been extensively tested for durability. Using a specially designed flat cables (patent pending) the electrically modified hinges have successfully completed 1,250,000 cycles without failure.

For added security concealed current transfer hinges can be specified using a 'CC' suffix to the hinge specification code.

Concealed current transfer is available in 4 wire, 8 wire or 12 wire options using the following suffix codes:

4 Wire = (CC4)

8 Wire = (CC8)

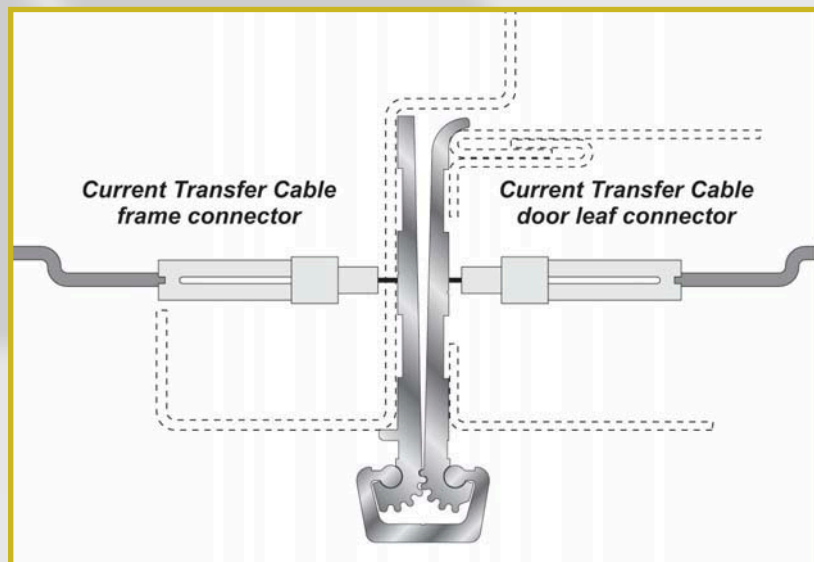
12 Wire = (CC12)

WARNING: A 4 amp in-line fuse must be used between the hinge thru-wire and the power supply.

Current transfer can also be provided by use of a 'Service Module' option where part of the hinge is removed and replaced with a 'Current Transfer Module' incorporated into a short length of hinge that is otherwise of the same design as the primary hinge. This provides access for fitting, adjustment or servicing without the need to remove the full height hinge. Installation and servicing can be carried out by electricians without the attendance of other trades.

Current Transfer may be specified for use with the following PemkoHinge™ types:

FMF01 FMF02 FMF03 FMF04 FMF05 FMF06 FMHF02 FMHF03 FMFE01 FMCE01



PEMKO Hinge

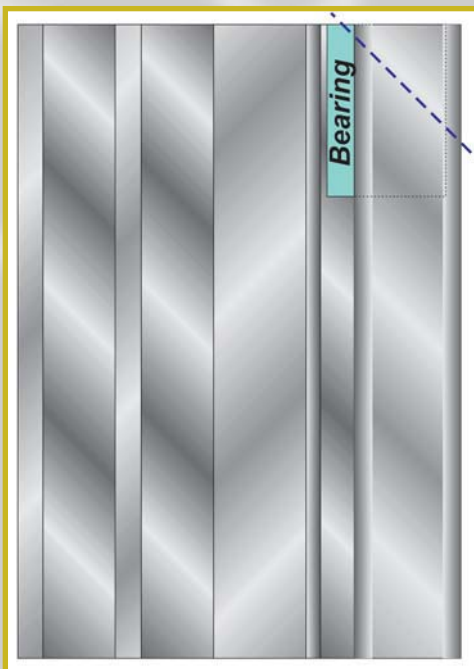
Accessories – Anti-Ligature Fitting

Anti Ligature Fittings:

PemkoHinge™ designs benefit from a number of design features that improve safety in use and they are particularly useful as a hanging device for use in institutions where self harm is a risk.

The full door height design and the use of a hinge capping piece that avoids the use of sharp edges results in a reduced risk of injury even where there is accidental impact with the hinge. Safety in use can be further enhanced by the use of the anti-ligature capping piece. This simple but effective device can be fitted on site and limits opportunities for the use of the hinge as an anchor point for ropes or wires that might otherwise be exploited by those wishing to cause themselves harm.

Generally the anti-ligature fitting will be used with PemkoHinge™ full mortise design hinges.



- 1 Reduce the hinge height from the top of the hinge aligning with the top bearing.
- 2 Cut through the top bearing and capping piece at an angle of 45° as illustrated.



3 Remove the top bearing and replace this with the aluminum anti-ligature fitting.

4 Reduce the hinge height from the bottom of the hinge to suit the door height.

NOTE: For anti-ligature applications it might be necessary to drill additional fixing holes to suit the bottom fixing position recommended above.

PEMKO Hinge

Hinge Mass Loading

Hinge Loading Considerations:

By reference to ANSI/BHMA A156.26 - 2000 the width of the door leaf specimen door used for testing is 36in. (914mm).

The mass of the door acts through the centre of gravity of the door leaf but the forces felt on the hinge fixings will be a moment of force that will be felt as a force acting on the top fixings in a manner that tries to pull the hinge away from the frame. The moment of force acts in the opposite direction at the bottom of the hinge.

The height of the door leaf will have a minimal influence on the moment of force. For door leaves up to 914mm wide (but otherwise within the tested weight limits) this is generally not a problem. However, the loading on the hinges should be recalculated for door leaves in excess of 914mm. wide.

For a 914mm wide door weighting 136Kgs. the moment of force acting on the top hinge fixings will be approx. 610Nm.

If the door leaf width is increased to (say) 1,200mm but with the door leaf mass remaining at 136Kgs. The loading on the top hinge fixing will increase to approx. 800Nm.

Conversely, the loading on the top hinge fixings will be reduced for narrower doors (otherwise of the same weight). For (say) a 700mm wide door with the door leaf mass remaining at 136Kgs. the loading on the top hinge fixing will reduce to approx. 467Nm.

Calculations of this nature can also be used in other ways. By reversing the calculations it can be determined that a Heavy Duty PemkoHinge™ Grade 1-300 (136Kgs.) could be used for a door leaf with a mass of (say) 180Kgs. where the door leaf width is restricted to 690mm in width. In this case the moment of force acting on the top hinge fixings would be approximately the same as the tested 610Nm. loading.

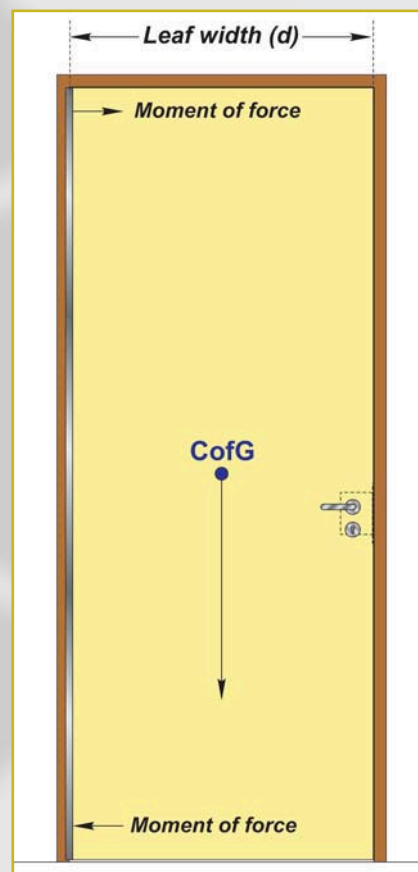
NOTE: It is essential that the correct type of fastener should be used for fixing the PemkoHinge™ to the door leaf and the frame. The choice of fastener will vary according to the nature of the material into which the fastener is to be fixed. Generally, for wood products, pilot holes should be drilled to suit the fastener and care should be taken to avoid over tightening of these fixings.

Hardware Considerations:

Some hardware items, particularly powered closers, can add to the loading on hinges. As a general guide the door leaf mass should be recalculated as follows where door closers are used:

Normal powered closer – Add 20% to the actual door weight to determine the effective door weight.

Powered closers with backcheck facility – Add 75% to the actual door weight to determine the effective door weight.



PEMKO Hinge

Door Growth During Swing Calculation

The PemkoHinge™ can be used with door leaves that are square edged or beveled at the hanging stiles without the necessity for further adjustment.

A door leaf, when it is operated, pivots around the pivot center of the hanging device. This can lead to operating problems requiring the profiling of the closing stile edge of the door according to:

- 1/ Door width.
- 2/ Door thickness.
- 3/ Position of the pivot center relative to the door face.

NOTE: As the PemkoHinge™ is of a variable axis design calculations relating to door operation can be calculated using a nominal pivot center position.

The extent of the profiling required at the closing stile can be calculated by use of the following formula:

$$\text{Growth} = \left[\sqrt{(a+b)^2 + (c+d)^2} \right] - a + b$$

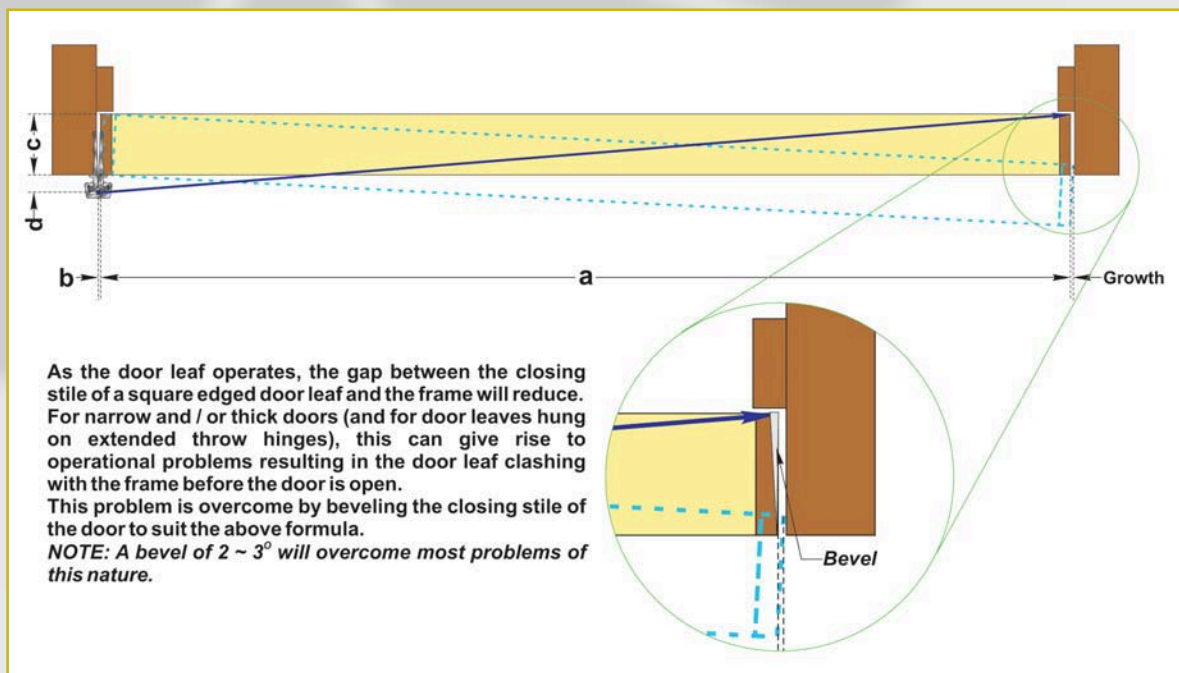
Where:

a = Door leaf width.

b = Dimension from the hanging edge of the door to the pivot center of the hanging device.

c = Door leaf thickness.

d = Dimension from the face of the door to the pivot center of the hanging device.



PEMKO Hinge

UK Fire Test Data

Fire Rated Doorsets:

Various designs of the PemkoHinge™ have been extensively tested in the United States by Underwriters Laboratories Inc. to the requirements of UL10B, UL10C and UBC7.2 (positive pressure testing) for performances up to 3 hours ('A' Label Listing).

NOTE: For 3 hr. fire rated steel doors with steel frames the doors should be fitted with Pemko Fire Pins.

Test data includes testing of the PemkoHinge™ with steel doors used with steel frames and for wood doors used with wood and steel frames.

PemkoHinge™ types that have successfully demonstrated required performances to meet UL requirements are identified with the 'Fire Door' symbol in this brochure for guidance.

PemkoHinge™ and Building Regulations - Approved Document 'B' (2000).

To satisfy United Kingdom Building Regulations doorsets must be tested or assessed to the required fire performance relative to BS476 Pt. 22 or BS EN 1634-1.

PemkoHinge™ types identified in this document as UK stock items have been tested with wood doors and frames to the requirements of BS476 Pt. 22 by reference to the following base tests:

Warrington Fire Research:

WARRES No. 102678 5th. June 1998 WARRES No. 104531 22nd. October 1998 WARRES No. 106217 11th. February 1999 WARRES No. 110251 6th. October 1999

Dixon International Group Ltd:

DFR 0009131 13th. September 2000 DFR 0103121 12th. March 2001

The scope for use of PemkoHinge™ types tested by reference to the above is defined by reference to Warrington Fire Research Assessment - Report No. WFRC 139560 3rd. June 2004.

This assessment report being valid until 1st July 2009.

The PemkoHinge™ types approved for use with wood doors and frames in the United Kingdom are identified in this brochure by reference to 'BS476 Pt.22' included with the 'Fire Rated' logo.

The PemkoHinge™ types tested in the United Kingdom and suitable for FD30 & FD60 (BS476 Pt.22)

applications are as follows:

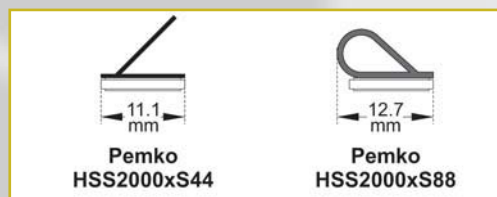
FMF01 (FMS / FMH) - Full Mortise -MD or HD

HMS01 (HSS / HSH) - Half Surface -MD or HD

FF02 (FSS / FSH) - Full Surface -MD or HD BS476 Pt.22

Fire performance testing included tests where the hinge blades were surface mounted to the edge of the door leaf and to the face of the frame i.e. allowing for operating gaps of up to 7.9mm that are subsequently filled with the hinge blades.

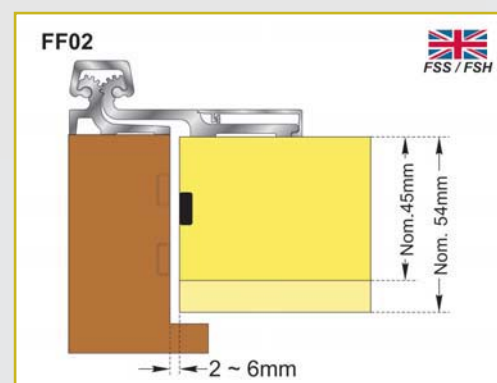
Generally, the intumescent sealing system determined by test for the particular doorset design should be maintained. The Pemko HSS2000xS44 or S88 intumescent / smoke seal should be added to the sealing system as illustrated below.



The following details illustrate tolerances and intumescent sealing requirements for wood fire rated doorsets using tested PemkoHinge™ types:

Hinge Type FF02 (FSS / FSH) - Surface Mounted - MD (Medium Duty) or HD (Heavy Duty).

Operating gaps at the Hanging stiles should be set between 2 - 6mm.



Intumescent seals in the door leaf and / or frame should be of the type approved for the particular doorset design.

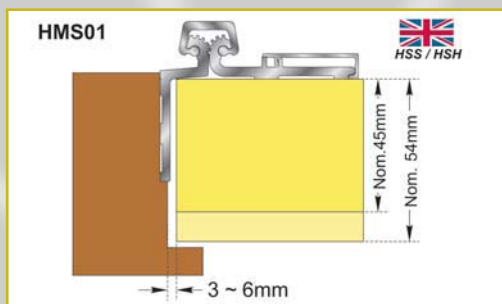
PEMKO Hinge

UK Fire Test Data

Fire Rated Doorsets contd:

Hinge Type HMS01 (*HSS / HSH*) - Half Surface Mounted - MD (Medium Duty) or HD (Heavy Duty).

The hinge blade may be recessed or surface mounted to the frame providing for nominal operating gaps of 3 - 6mm.



Intumescent seals at the Head, Closing stiles and meeting stiles should be as defined by reference to the fire test / assessment data relating to the particular doorset design.

FD30S = At the hanging stiles use an intumescent seal in the door leaf (or frame) of the type approved for the particular doorset design. Add Pemko HSS2000xS44 or S88 combined intumescent / smoke seals.

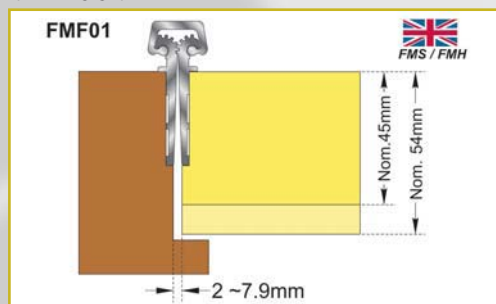


FD60S = At the hanging stiles use an intumescent seal in the door leaf (or frame) of the type approved for the particular doorset design. Add Pemko HSS2000xS44 or S88 combined intumescent / smoke seal.



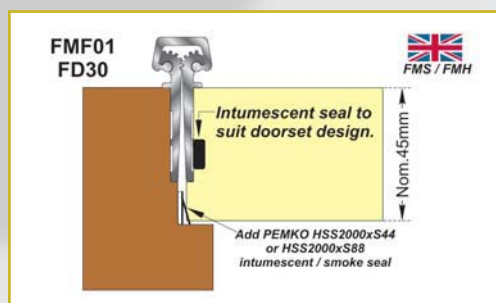
Hinge Type FMF01 (*FMS / FMH*) - Fully Mortised - MD (Medium Duty) or HD (Heavy Duty).

The hinge blades may be recessed or surface mounted to the door edge and / or frame providing for a nominal operating gap of 2 - 7.9mm.

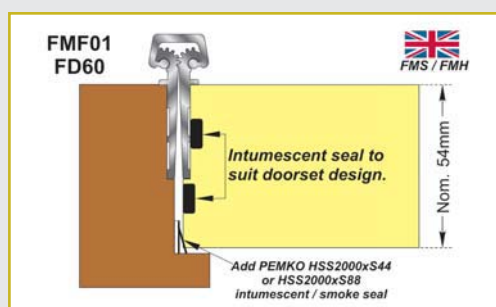


Intumescent seals at the Head Closing stiles and Meeting stiles should be as defined by reference to the fire test / assessment data relating to the particular doorset design.

FD30S = At the hanging stiles use an intumescent seal in the door leaf (or frame) of the type approved for the particular doorset design. Add Pemko HSS2000xS44 or S88 combined intumescent / smoke seals.



FD60S = At the hanging stiles use an intumescent seal in the door leaf (or frame) of the type approved for the particular doorset design. Add Pemko HSS2000xS44 or S88 combined intumescent / smoke seal.





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