Raising Standards
Advancing Safety

Biosafe Hardware
Best Practice Guide

dhf Best Practice Guide: Biosafe Hardware

dhf Best Practice Guides

This publication is one in a series of guides addressing the major issues that should be considered when specifying, ordering or using the products it describes. It aims to provide the reader with a concise document which includes a summary of relevant sections from the relevant European product standards. The reader will then be in a position to seek further specialist advice where necessary and recognise GENUINE conformity to the relevant standards.

Introduction

The doors in our buildings are the one thing we ALL touch every day - a physical barrier there to secure and keep us safe. However, now touching that door poses a potential risk.

Building managers and owners need to balance the needs of security and safety in terms of fire and smoke along with minimising the transference of infection through 'touch', e.g. Coronavirus, SARS and MERS.

The aim of this document is to guide the reader towards the best solutions for making the doors in their buildings as biosafe as practicable.

Often, there will be multiple potential options for achieving this and these need to be balanced against budget, practicality, door type and frequency of use.

In order to simplify this selection process, we have produced a flow chart of questions which should guide the reader to the relevant sections of this document.

The guide has been written so as to 'break down' the solutions from the utopian solution of a door which automatically opens and closes itself, through to a door for which 'touch' is unavoidable and, in each case, highlights a range of solutions to consider.

Legal duties of persons in charge of workplaces

Health & Safety

The Workplace (Health, Safety & Welfare) Regulations 1992 and the Workplace (Health, Safety & Welfare) Regulations (Northern Ireland) 1993 impose duties on persons in charge of workplaces. Regulation 9 requires premises and their fixtures and fittings to be kept clean, regulation 18 requires that doors and gates must be safe, including necessary safety devices, and regulation 5 requires that safety-critical systems must be subject to a suitable system of maintenance.

Duty holders must ensure that premises, including doors and hardware, are sufficiently clean to avoid transmission of infectious diseases. They must, of course, also make sure that any changes, such as the introduction of automation, are carried out by competent persons and do not prejudice the safety of those using the door.

Fire Safety

Fire safety legislation imposes duties on persons in charge of workplaces, including in relation to doors on escape routes and fire-resisting doors:

- Regulatory Reform (Fire Safety) Order 2005 - England and Wales
- Fire (Scotland) Act 2005 and Fire Safety (Scotland) Regulations 2006 - Scotland
- Fire & Rescue Services (NI) Order 2006 and Fire Safety Regulations (NI) 2010 - Northern Ireland

Duty holders must be aware of the requirements for escape in case of fire, and of the need for fire-resisting doors to provide fire compartmentation. Changes to automation and door locking arrangements could impede escape if not properly considered. For example, what happens if the power fails? Will the door remain locked and possibly trap people attempting to escape?

Alterations to fire-resisting doors must not risk the integrity or self-closing ability of such doors. Fitting new hardware which has not been tested with the door could cause the door to burn through if exposed to fire, for example. Similarly, a fire door which fails to close in the event of a fire could enable the spread of smoke and fire through the building.

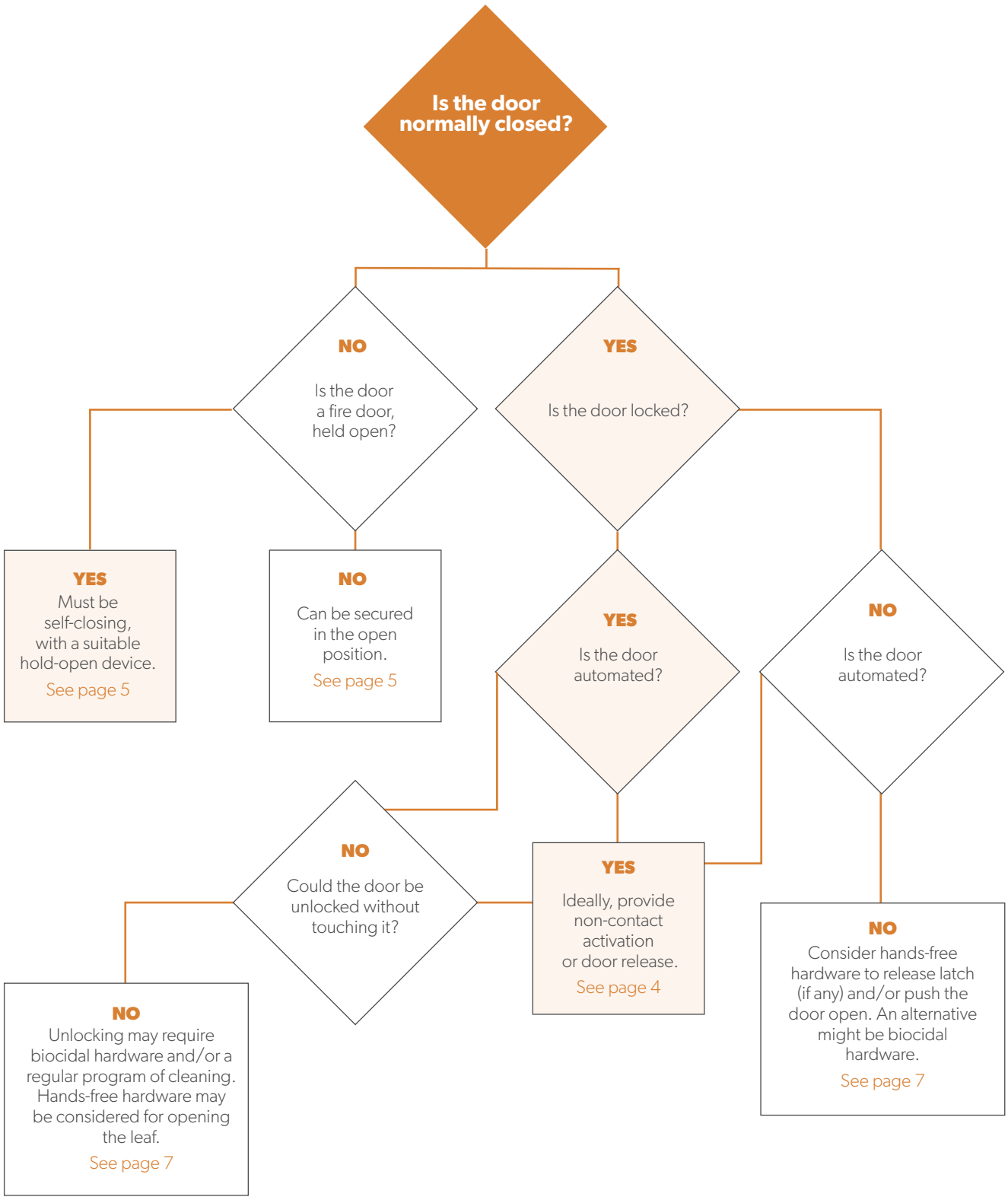
N.B. The legislation in England and Wales covers the common parts of blocks of flats.

Access for the Disabled

The Equality Act 2010 requires that reasonable adjustments are made to ensure that disabled people have access to buildings and their facilities. BS 8300 Design of buildings and their approaches to meet the needs of disabled people is a useful guide.

Door flow chart

How to select the best solution to improve door hygiene



1. Powered Pedestrian Doors

The most effective way to minimise the risk of infectious transmission when accessing doors is to remove the need to touch them entirely.

A. Door Automation

The types of door under consideration will be either sliding, swing or revolving doors. Sliding doors will mostly (but not exclusively) be found on main entrance doors, whereas swing doors can be found in all locations.

Powered pedestrian doors, can be fully automatic i.e. open on approach or manual activation, where an intended action is needed for the doors to operate.

Full automation will consist of activation via sensors or access control, with safety sensors to prevent impact with pedestrians, and doors will require full compliance with the safety requirements of BS EN 16005.

Low energy operation will only apply to swing doors and does not require a full safety system as vulnerable traffic is not likely to be in the area of the door. In many cases, swing door operators may be installed as low energy or fully automated systems, dependent on site, or individual door requirements with the addition or omission of safety sensors as appropriate, and a simple change to the wiring.

Main entrance doors

Options

1. Full automation - all door types. The door will require activation and safety sensors, resulting in very little chance of contact with the door at all. Doors which require restricted access control would require activation via non-contact access control device, e.g. proximity card/fob (see section B Controlling the Door Operation on page 4), linked to a powered door operator which will open the door when triggered and then close it again once accessed.
   It should be noted that these automatic operators must be fitted by a competent engineer in accordance with BS EN 16005 .

For further information visit www.adsa.org.uk
The Automatic Door Suppliers' Association.

Internal doors

For doors such as passage doors used in corridors or individual rooms, there are two main options:

1. Standard powered pedestrian doors - all door types. Door will require activation and safety sensors as per main entrances.
2. Low energy operation – swing doors mainly. This means not protected by safety sensors. Any non-touch activation type can be used, with the exception of automatic activation, as the speed of door travel would cause traffic to hesitate. In busy areas or where vulnerable people are present, safety sensors will be required.

B. Controlling the Door Operation

NOTE: Finger readers and hand readers are not recommended, as contact will be made with the reader

Clearly, manually operated powered pedestrian door operators as described on page 3 will need a form of 'trigger' to stimulate them into action. This trigger needs to be a device which does not require 'touch'. Push or touch to open buttons are NOT recommended and KEYPADS should be avoided for locked doors. Figures 1 - 3 illustrate what to avoid.

Figure 1 - Press to exit button

Figure 2 - Push button keypad

Figure 3 - Disabled door operator

Fully automated - unlocked

For an unlocked fully automatic door, no contact should be required. The door will release when approached via door activation sensors (figure 4) from the outside and inside. These doors tend to be common entrance doors on commercial premises open to the general public, shopping centres and disabled entrance doors, etc and controlled by an automatic door operator (figure 5).

Figure 4 - Door Sensor fitted at the top of the door

Figure 5 - Door operator

Fully automated - locked

In the situation where you have a fully automated door which is locked for security reasons, releasing the door from the non-secure side (if there is one) could be via no touch to exit buttons (figure 6), or from the locked side by card/fob proximity readers (figure 7) or Bluetooth exit buttons (figure 8) which would be personal to the user. Other non-touch solutions include Iris Recognition Readers and Facial Recognition Readers as illustrated in figures 9 & 10.

Figure 6 - No touch exit button

Figure 7 - Proximity Reader

Figure 8 - Bluetooth operated exit switch

Figure 9 - Iris Recognition Reader

Figure 10 - Facial Recognition Reader

NOTE: Power operated pedestrian door equipment such as sliding, swing and revolving doorsets, either unlocked or locked, must conform to BS EN 16005 and be fitted by a fully qualified engineer. The devices used to trigger and control them must be fully matched and also installed, set up and maintained professionally.

Controlling final exit doors (Double or single)

Electronically secured

Figure 11 - Electrically operated touch bar device used with electro-magnetic Locks

Electronically secured final exit doors to BS EN 13637 are the preferable solution. These will automatically release upon fire alarm activation, as well as being able to release electronically with little or no contact with the release device, if using a no-touch exit switch or Bluetooth technology. Pressure may still need to be applied to the device on the door in the case of an emergency. It is therefore critical the surface mounted hardware is part of a regular cleaning regime.

Products in this sector would include an actuator bar used with electro-magnetic locks or electric locks, electric latch retraction touch bars, electric releases or access control handset.

Mechanically secured

In the case of an existing final exit door that is mechanically locked via either a panic bar, push pad or touch bar (figure 12), fire and evacuation safety should always take precedence and therefore it is advisable that these doors are not tampered with to ensure they function correctly when needed. The benefit of fitting a panic device to BS EN 1125 is that the device is fitted across the door and therefore the body can be pushed against it to open the device without touching the device with the hand.

Using a mortice night latch and actuator unit (figure 13) will assist in reducing contact on the outside, as this will provide key access only which is personal to the user via a single euro cylinder.

Anti-microbial coatings to the mechanical panic hardware could be applied, or a regular cleaning regime should be adhered to. Please see section on 'Solutions' on page 9.

For new installations, it is advisable to make use of an electronically secured panic system to BS EN 13637.

Figure 12 - Panic bar

Figure 13 - Mortice actuator with Mortice Night Latch

2. Doors which can be HELD OPEN

Door Hold Open Devices

CONSIDER: Does a door need to be closed **at all** except in the case of an emergency?

After an automatic door which opens whenever you approach it, or in the case of a 'locked' one, present the correct credentials, the next best way of ensuring a biosafe door is to have it held open whenever practical as this means that, again, there is no need to touch it.

but remember...

- A fire door won't work if it is propped open with wedges or furniture - this is illegal.
- Stopping a fire door from closing can put your insurance at risk - and land you in court if a fire takes hold.
- Any fire door that is kept open without a device to release it in the event of a fire alarm activating could lead to legal action under the Regulatory Reform (Fire Safety) Order 2005 and Health & Safety at Work Act 1974.
- In this instance, products can be provided to safely hold open a door whilst meeting all fire & safety regulations.

Mechanically operated door closing devices fitted on fire-resisting doors can pose significant obstacles to the young, elderly, infirm or disabled. This self-closing function can also be an inconvenience in high traffic areas and cause difficulties where large numbers of users have to pass through the doors, touching them each time.

To overcome these problems, electrically powered hold open devices can be used to hold a self-closing fire-resisting door in the open position. These devices are linked either into a building fire/smoke alarm system or controlled from locally positioned smoke detectors.

These products fall into three main groups:

1) Auto-releasing audibly controlled door hold open devices

These devices have a built-in microphone which will constantly monitor for sounds over a certain volume and duration, such as a fire alarm.

Once activated by sound, they will 'release'.

Figure 14 - Audible hold open device

These devices DO NOT close the door so MUST be used in conjunction with a door closer or floor spring which is fully certified to BS EN 1154 in all relevant fitting applications and has suitable fire rating within BS EN 1634.

These devices will be electrically controlled, meaning they must be certified to BS EN 1155. They must also be EMC tested and have sound test evidence. They should also have fire test evidence relevant to the size and type of fire door they are fitted to.

These devices should have the ability to be manually released, normally by tripping a foot pedal.

These are the cheapest and simplest devices to fit and so are very popular in many applications. They are particularly suitable for retro-fitting on to existing doors.

Most of these devices are foot operated to set, reducing transference of infection by touch even further.

2) Auto-releasing electronically controlled door hold open devices

Typically, these are referred to as **magnetic hold open** devices and are normally fitted to the wall or floor to 'hold open' a door.

Figure 15 - Electronically controlled hold open device

They are best fitted at the top of the door so that they are in a similar 'plane' to the door closer and avoid any tendency to 'twist' the door against its hinges.

While power is applied, these devices hold the door open to permit free passage.

When triggered, they release, allowing the door to close.

These devices DO NOT close the door so MUST be used in conjunction with a door closer which is fully certified to BS EN 1154 in all relevant fitting applications and has suitable fire rating within BS EN 1634.

The hold-open device may be linked to a fire alarm system, timing device or switch to 'release' and allows the mechanical door closer to automatically shut the door in case of emergency, helping to prevent the spread of smoke/fire through the building.

These devices can be 24v or 12V powered and must comply with BS EN 1155 and be CE marked.

3) Electromagnetic hold-open door closers

These are often the best units to fit for corridor and other doors as they combine both the 'hold open' and 'closing' functionality in one unit.

Because everything is in one unit, it allows for greater flexibility and control of the door operation, such as:

- Free swing
- Hold open
- Standard door closing

These devices combine a mechanical door closer functionality with electronic control. This means that electrical power controls and overrides the natural mechanical operation of the door closer.

Once electrical power is removed, the door closer reverts to a purely mechanical functionality and closes the door.

This electrical control can be designed to accommodate fire control by building it into the fire alarm system, whereby electric control is removed by alarm activation. Electrical control can also be deactivated by switch or time clock.

These closers must be CE marked to BS EN 1154 and BS EN 1155 and fire rated to BS EN 1634 in all relevant applications.

In addition, as they are acting as the door closing device itself, they must be specified to match the size, type and weight of the door.

Figure 16 - Electromagnetic hold open device

Important notes

All three types of door hold open device must 'FAIL SAFE', meaning that, should electrical power (whether mains or battery) fail or be removed, the device should immediately disengage and allow whatever form of mechanical door control is in place to operate and close the door.

Manually operated mechanical hold open devices (i.e. mechanisms which must be released manually) SHOULD NOT BE USED ON FIRE DOORS UNDER ANY CIRCUMSTANCES.

Low voltage (24/12 V dc) electrically powered hold open devices and their accessories should be:

• CE marked to BS EN 1155 - Building Hardware – Electrically powered hold open devices for swing doors

• preferably provided with additional product certification by an approved third-party certification body.

Note 1: BS 5839:3 Specification for automatic release mechanisms for certain fire protection equipment, covers products which run off mains voltage (240 V ac). Some point magnets are supplied to work off mains voltage.

Note 2: Electrically powered hold open devices should be installed in line with the recommendations of BS 7273-4:2007 Code of practice for the operation of fire protection measures. Actuation of release mechanisms for doors.

3. Doors which have to be TOUCHED

If it is not possible to make a door operate fully automatically without the need for touch, or have the door 'held open' due to practical issues, meaning that manual intervention is required to open or close the door, then, there are still a variety of ways in which you can reduce the likely spread of biocides.

A. Hands Free Hardware

Introduction

A standard door handle is one of the most commonly used items around a building. However, simply operating a door handle by grasping with your hand could result in transmitting germs/bacteria/virus or infection from one person's hand to another.

This guidance section is relevant to pedestrian doors that require manually operated hardware to be controlled by the user, and will cover potential solutions that allow a door to be operated without the need to grasp the door handle/hardware. The objective is to offer recommendations and considerations for the specification of these products. The specific types of door will include fire-resisting and enhanced security doorsets, doorsets on escape routes and those doorsets meeting the requirements of BS 8300:2009+A1:2010, Design of buildings and their approaches to meet the needs of all people.

This could include hands-free hardware items such as lever handles/ pull handles that are shaped to allow operation with the forearm; other solutions could be connected to allow operation by the foot.

Product examples

a) Foot operated hardware

Figures 17, 18 & 19 - illustrate a selection of foot operated door hardware

Figure 17

Figure 18

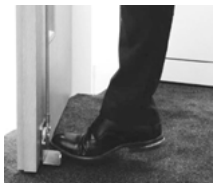


Figure 19

These may be used as a replacement for a hand operated pull handle or connected to a lever handle where the foot is used to operate a low level lever.

Considerations

- A user would have to stand on one foot to operate the door. Consideration must be given to the location of the door, e.g. doors opening onto a stairwell could pose a risk to a user who is stood at the top of a stairway on one foot whilst another user approaches the door from the opposite side.
- Trip hazards or potential injury - certain shapes of foot pulls are designed to give additional grip to the user but from another perspective could easily cause injury.
- Restricted clear opening - ensure that the operator does not affect a clear opening that could create difficulty with trolleys/wheelchair users - escape routes should also be considered.
- Installation of such items should not compromise any existing evidence of fire resistance - **care must be taken to ensure fire integrity is maintained.**

b) Forearm operated hardware

Figures 20, 21 & 22 - illustrate a selection of forearm operated door hardware

Figure 20

Figure 21

Figure 22

These are hardware items that prevent the hand being required to operate a pull handle or lever handle and adaptations allow the use of the forearm. Suitable for pull handle and lever handle styles.

Considerations

- A user may need to stand closer to the door to be able to operate the door. Consideration should be given to product design, installation and usage to allow arms to fall away from the product preventing the risk of entanglement should the door be opened from the opposite side by another user.
- Add on items for use on existing hardware should not compromise existing performance standards - operational testing:
  BS EN 1906: 2012 Building Hardware. Lever handles and knob furniture
  BS 8424:2004 Building hardware. Pull handles. Requirements and test methods
- Installation of such items should not compromise any existing evidence of fire resistance - **care must be taken to ensure fire integrity is maintained.**

In all examples, vision panels are recommended on relevant doors

Safety in use

Where products are to be considered for use, the application of the product must be reviewed in situ. A suitable risk assessment should be made by the specifier for both the mobility and capabilities of potential users against the motion/action required to operate the hardware along with the surrounding environment of the door.

Durability

Retrofit devices should also be assessed for their use with existing products.

The durability of that product and any operating torque differences should be reviewed to ensure item performance is not compromised. Also, any items used, for example an overhead door closer, should have opening forces reviewed for suitability in operation.

Instructions for use

Clear operating instructions should be added to the door as many users will be unfamiliar with how the hardware is to be operated.

Operating signs with graphics should be used with any product that offers an alternative method of operation:

Figure 23 - Types of signage used

Figure 24 - Types of signage used

B. Biocidal Hardware Products

Introduction

Hardware articles, essential for the operation of doors and windows through physical human interaction, are recognised to be potential sources of contamination and transfer of harmful biological organisms, including bacteria and viruses.

If a door cannot be automatically opened, held open when possible (but close automatically in emergencies) or be fitted with hardware which does not require the use of hands, then, as a final part of a layered defence against the transmission of infectious organisms, hardware with biocidal properties can be used to reduce the risk of harm to human health.

In accordance with the guidance listed within 'Applicable Standards', the stated properties, including range of effectiveness and action time, should be taken into account when developing a range of complimentary strategies to mitigate the risk of contamination from biological organisms.

Typical hardware items include, but are not limited to, lever, bar and rose handles, push plates, key turns & keys, panic & emergency hardware and digital locks.

Figure 25

Figure 26

Figure 27

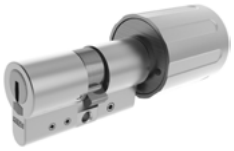


Figure 28

Figure 29

Figure 30

Applicable standards

Guidance on applicable test methods used to examine the antimicrobial activity of non-porous substances can be found in Table VIII of the Biocidal Products Regulation, produced by the European Chemicals Agency.

Additionally, when selecting hardware with biocidal properties, it is important to ensure that the hardware is suitable for, and does not compromise, the critical performance features of the doorset or window, including resistance to fire, accessibility, means of escape, durability and security.

In addition to the biocidal properties of the hardware, its stated performance in accordance with the relevant product standard should be assessed to ensure compatibility with the performance requirements of the doorset, including:

BS EN 12209 Building Hardware. Mechanically operated locks and locking plates

BS EN 1906 Building Hardware. Lever handles and knob furniture

BS EN 1303 Building Hardware. Cylinders for locks

BS EN 1125 Building Hardware. Panic exit devices operated by a horizontal bar, for use on escape routes

BS EN 179 Building Hardware. Emergency exit devices operated by a lever or push pad, for use on escape routes

4. Solutions

Suitable for lever and pull handles, knobs, push plates etc.

A) Materials

Possible options include hardware either made from materials which possess biocidal properties, such as copper, or are coated with a suitable agent.

Figure 31 - Copper lever handle

B) Tapes/shields

Other options include applying specialist copper tape or 'wraps' to handles; these can be used as a very quick solution and avoid the need to change existing hardware. These are not suitable for very high traffic doors.

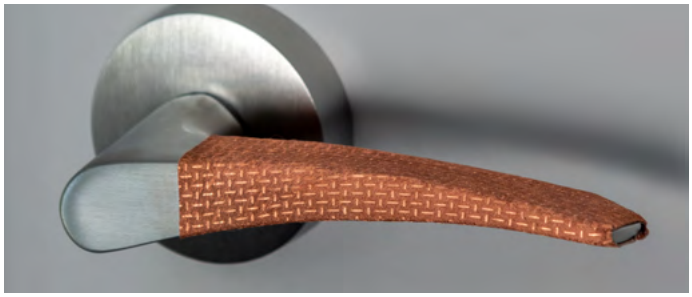


Figure 32 - Handle with copper wrap

Critical recommendations:

- The target organisms against which the hardware article is effective, should be clearly stated to ensure that the specifier can make an informed decision based on the specific contamination risk being targeted.
- The time for the biocidal properties to become effective should be clearly stated by the manufacturer and taken into consideration by the specifier, when developing risk mitigation strategies. The frequency of use of the door or window should be assessed when determining supplementary hygiene protocols such as cleaning regimes, to work in conjunction with the time for the biocidal properties to take effect.
- Claims of biocidal performance should be based upon verifiable efficacy evidence, which the manufacturer should make available upon request.
- The durability and effective biocidal life expectancy of the hardware article should be clearly stated and considered when specifying appropriate products (for example, peroxide and acid-based cleaning materials are known to degrade some biocidal agents).
- Comprehensive maintenance, cleaning and care instructions including identification of common cleaning materials known to reduce or destroy the biocidal properties, should be provided.
- The identification of the active biocidal substances should be stated in accordance with the Biocidal Products Regulation.

Cleaning door hardware

Regardless of what methods you employ to ensure your doors are as safe as possible, maintaining a cohesive and regular cleaning regime can dramatically reduce the risk of transmission.

Recommended cleaning

Generally common multi-purpose cleaners and household disinfectants and alcohol-based cleaning solutions (no more than isopropanol 70% alcohol) are acceptable to use on architectural hardware products.

- Use hard surface cleaners that are also suitable for use on light switches, remote controls, or a computer mouse and keyboard.
- The best option is to use pre-moistened wipes or microfiber pads. Apply cleaning solution to the pad, then rub down the surface being cleaned.
- Target high touch surfaces that are in frequent contact with hands.
- For effective cleaning, the treated surface should appear visibly wet then allowed to air dry.
- HOWEVER ALWAYS check with the hardware manufacturer PRIOR to using cleaning agents to ensure they are suitable and do not introduce any other potential problems.
- REMEMBER! Cleaning is only effective if built into a frequent and regular regime and this should consider frequency of use.

Figure 33 - Regular cleaning of hardware

NOT recommended

- Do NOT use bleach solutions in high concentrations in order to prevent reaction with the metal and subsequent corrosion.
- Avoid high alkaline cleaners including sodium carbonate, sodium hydroxide and ammonia, as these can damage metals and plastics.
- Do NOT use cleaners typically used on bathroom fixtures and industrial solvents, as these may damage the protective finish.
- Do NOT use abrasive products to apply the cleaner such as scouring pads or steel wool.
- Avoid spraying the cleaning solution directly onto the product.

Further reading

Conformity marking

The following construction products are required to carry either the CE or UKCA marking when placed on the market in Great Britain. In Northern Ireland, the UKCA mark is not recognised and the CE mark remains the only recognised conformity mark (note that the CE mark may be accompanied by the UKNI mark in certain circumstances; UKNI is never valid on its own).

Compliance with the applicable harmonised (or designated) standard is mandatory for CE or UKCA marking.

Product	Intended use	Applicable harmonised standard(s)
External fire/ smoke-resisting doorsets	Separating exterior climate from the interior of a building	BS EN 16034:2014 plus BS EN 14351-1:2006+A2:2016
External doorset	Not fire or smoke-resisting	BS EN 14351-1:2006+A2:2016
Emergency exit devices	On an escape route door	BS EN 179:2008
Panic exit devices	On an escape route door	BS EN 1125:2008
Controlled door closing devices	On a fire-resisting door	BS EN 1154:1996+A1:2002+AC:2006
Hold-open devices	On a fire-resisting door	BS EN 1155:1997+A1:2002+AC:2006
Door co-ordinators	On a fire-resisting door	BS EN 1158:1997+A1:2002+AC:2006
Single-axis hinges	On a fire-resisting door	BS EN 1935:2002+AC:2003
Mechanically operated single point locks & latches	On a fire-resisting door	BS EN 12209:2003+AC:2005
Electromechanical locks & strikes	On a fire-resisting door	BS EN 14846:2008

Other relevant British standards

BS 8214:2016 Timber-based fire door assemblies. Code of practice

Other specifications and codes of practice

Code of Practice: Hardware for Fire and Escape Doors. Issue 4, 2012.
Free download from: www.firecode.org.uk

dhf TS 010:2016 + A1:2019 Electromagnetic Locking Devices Performance Requirements and Test Methods.
Free download from: www.dhfonline.org.uk

dhf TS 621:2018 Thief Resistant Electronic Door Locking Devices.
Free download from: www.dhfonline.org.uk

British and European standards are available from https://shop.bsigroup.com

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