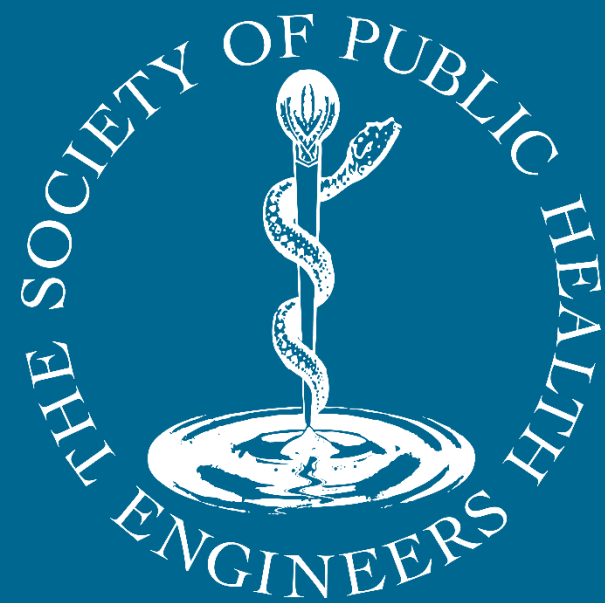
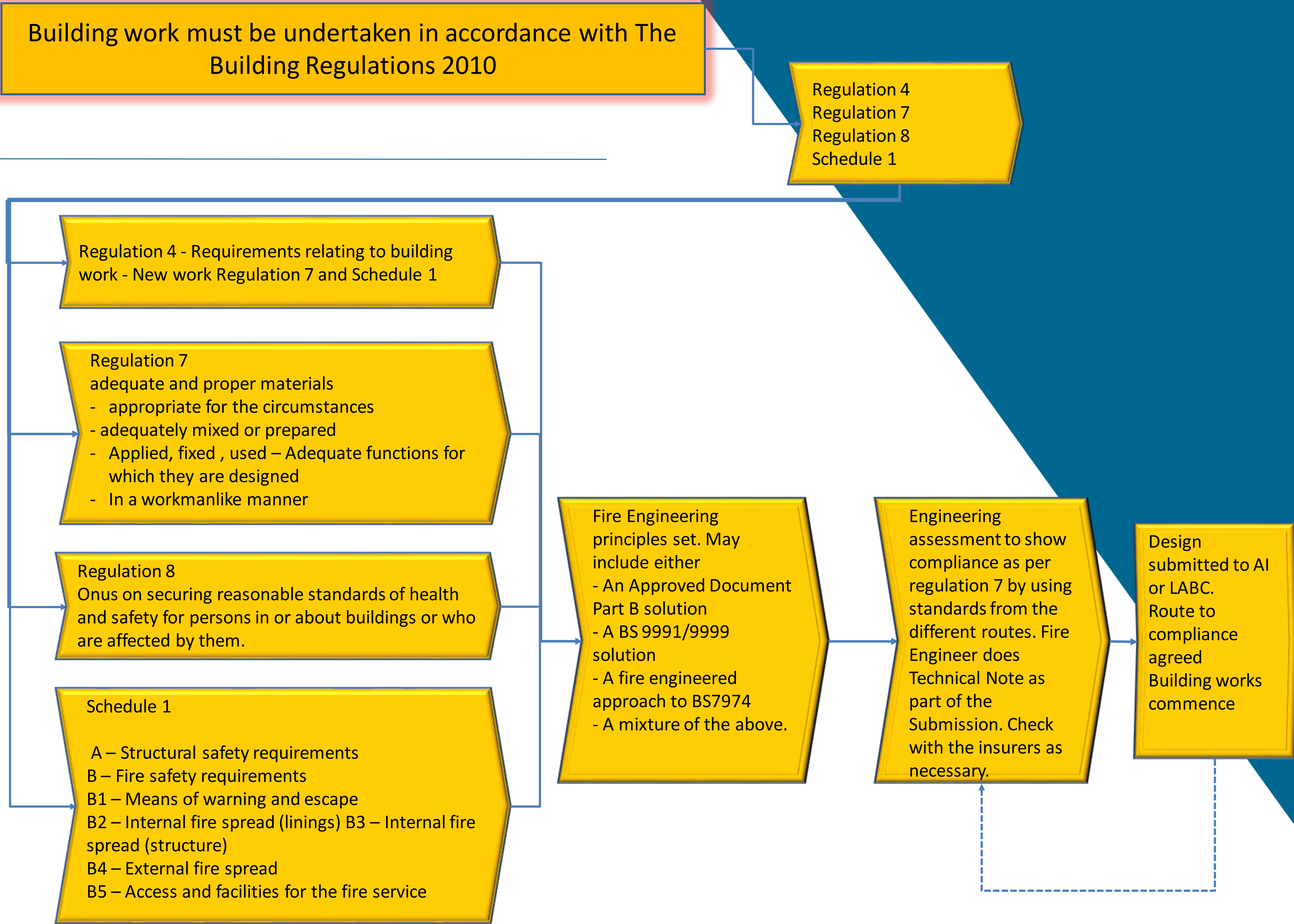


Practical application of compartmentation in building projects for fire and public health systems

Contractors Session 4

Paul McSoley | Mace Group
Nigel Green | Higgins Partnerships
Drew Mclean | London Diamond Drilling Construction





New Methods

Fire resistance tests for service installations

EN 1363-1: General requirements (tests)
EN 1366-1: Fire Ducts
EN 1366-2: Fire dampers
EN 1366-3: Penetration seals
EN 1366-4: Linear joint seals
EN 1366-5: Service ducts and shafts
EN 1366-6: Raised access floors and hollow floors
EN 1366-8: Smoke extraction ducts
EN 1366-9: Smoke extraction ducts single compartment
EN 1366-11: Fire Cable Systems and Components
EN 1366-10: Smoke control dampers
EN 1366-13: Chimneys
EN 1364-1: Fire resistance tests for nonloadbearing
Elements
EN 1364-2: Ceilings
EN 1364-4: Curtain walling

Old Methods

Fire Resistance Tests on Building Materials and Structures

BS 476-20 : Elements of Construction (General Principles)
BS 476-21 : Load bearing Elements of Construction
BS 476-22 : Non-Load bearing Elements of Construction
Tests are an 'Ad Hoc' Standard –Penetration Seals
BS 476-23 : Contribution of Components to the Fire Resistance of a Structure
BS 476-24 : Fire Resistance of Ventilation Ducts

Fire Stopping? This is a word that is generalised for sealing holes in walls and needs to be removed from the language. Its penetrations seals specific to the componentry.

- It is important to understand that CE marking is not a quality mark. It is a manufacturer's claim that the product has undergone testing to procedures set out in the EN product standard or ETAG.
- CE Marking indicates that the manufacturer has met the legal requirements under European Directives (CPR) and represent the manufacturer's claim that the test requirements of all relevant European Directives have been satisfied for the purpose to which the product is being used.

It does not mean its appropriate for use in the wrong application.

Wall Types, Standard Supporting Constructions

BS EN 1366-X gives advice on the supporting constructions. The references always lead back to what has been tested via the test methods in BS EN 1363-1.

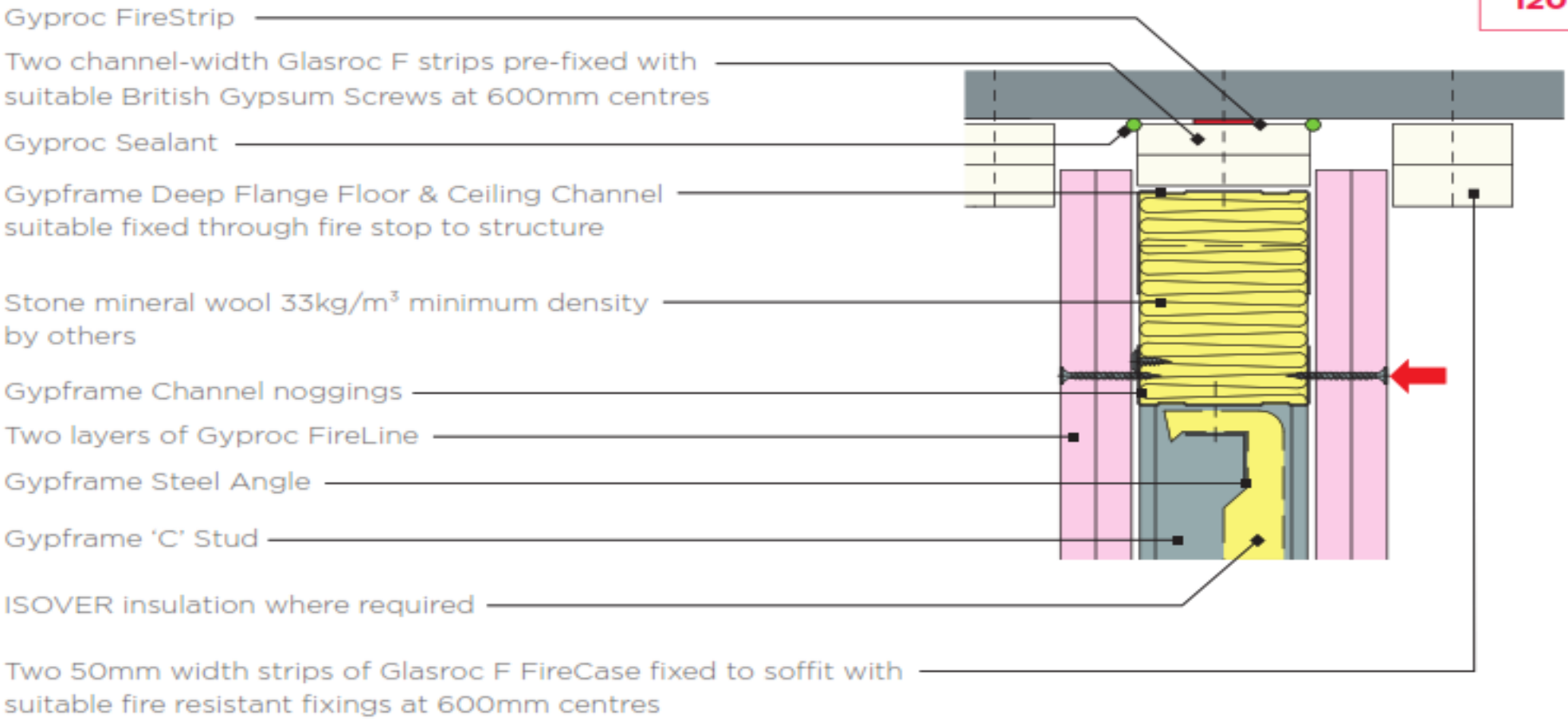
Where propriety systems are test in flexible walls they are grouped as below.

	Nominal Steel Stud Depth			EN 520 Board	EN 520 Board	1363 Other Tested Systems		
	1363 Group A	1363 Group B	1363 Group C	Layers per side	Thickness mm	Stud Thickness	Layers per side	Thickness mm
EI30	44 to 55mm	56 to 75mm	76 to 100mm	1 Layer	12.5mm	Check Manu	Check Manu	Check Manu
EI60	44 to 55mm	56 to 75mm	76 to 100mm	2 Layer	12.5mm	Check Manu	Check Manu	Check Manu
EI90	44 to 55mm	56 to 75mm	76 to 100mm	2 Layer	12.5mm	Check Manu	Check Manu	Check Manu
EI120	62 to 70mm	71 to 75mm	76 to 100mm	2 Layer	15mm	Check Manu	Check Manu	Check Manu

The trick with flexible constructions is selecting a wall type that is appropriate for the fire stopping methods or for the damper or ductwork installation methods etc. Most used 50mm stud and 2x 12.5mm EN520 to both sides.

15. Deflection head

25mm downward movement and 120mins fire resistance to BS EN 1364-1



Wall Types, Standard Supporting Constructions

BS EN 1366-X gives advice on the supporting constructions. The references always lead back to what has been tested via the test methods in BS EN 1363-1.

High density rigid construction

This kind of construction consists either of blockwork, masonry or homogenous concrete wall with an overall density $\geq 850 \text{ kg/m}_3$ and a thickness appropriate for the expected fire resistance period.

Low density rigid construction

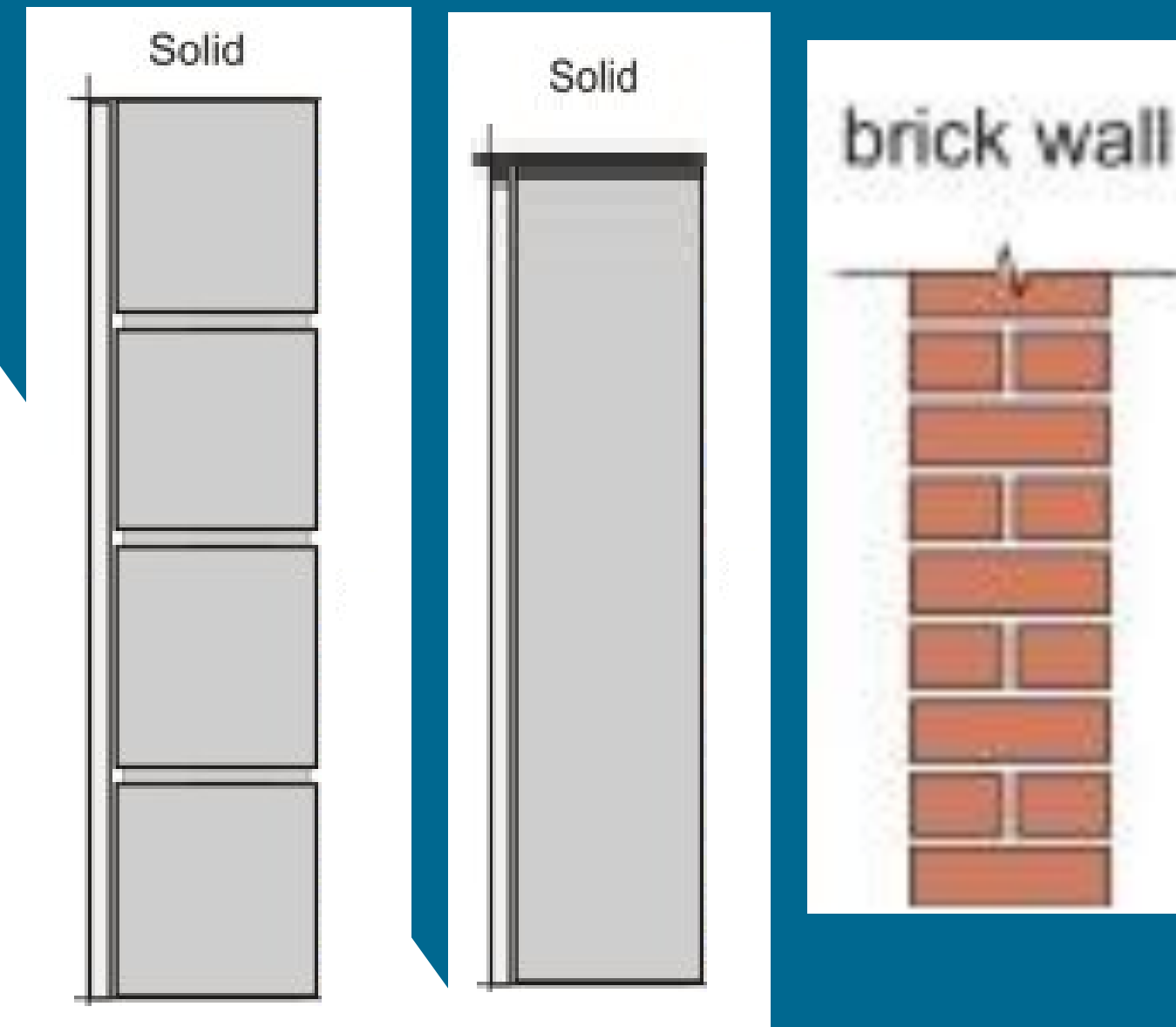
This kind of construction consists of an aerated concrete block wall with an overall density of $(650 \pm 200) \text{ kg/m}_3$ and a thickness appropriate for the expected fire resistance period.

Mortar

For blockwork (incorporating aerated concrete) or masonry wall supporting constructions given in above, the individual masonry units shall be bonded together with a mortar appropriate for the expected fire resistance period.

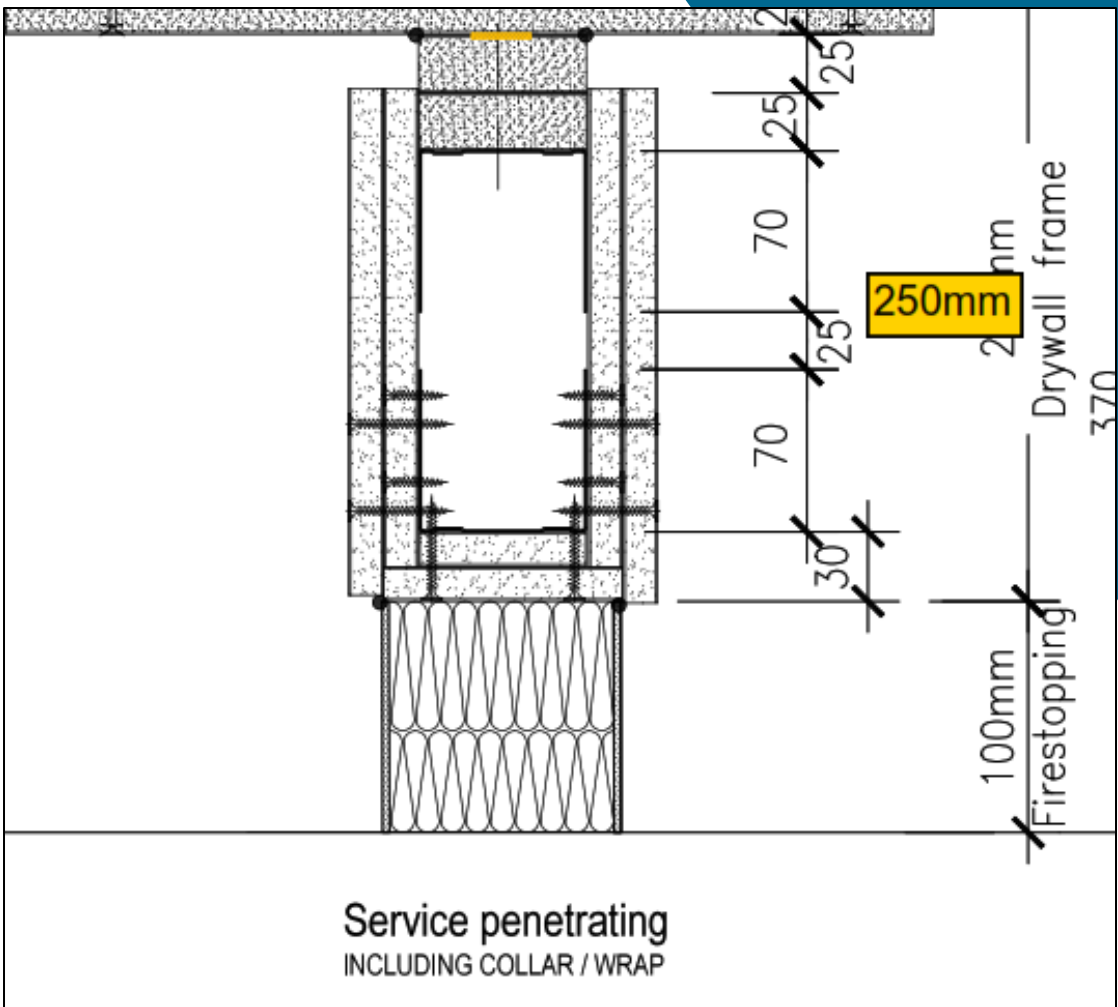
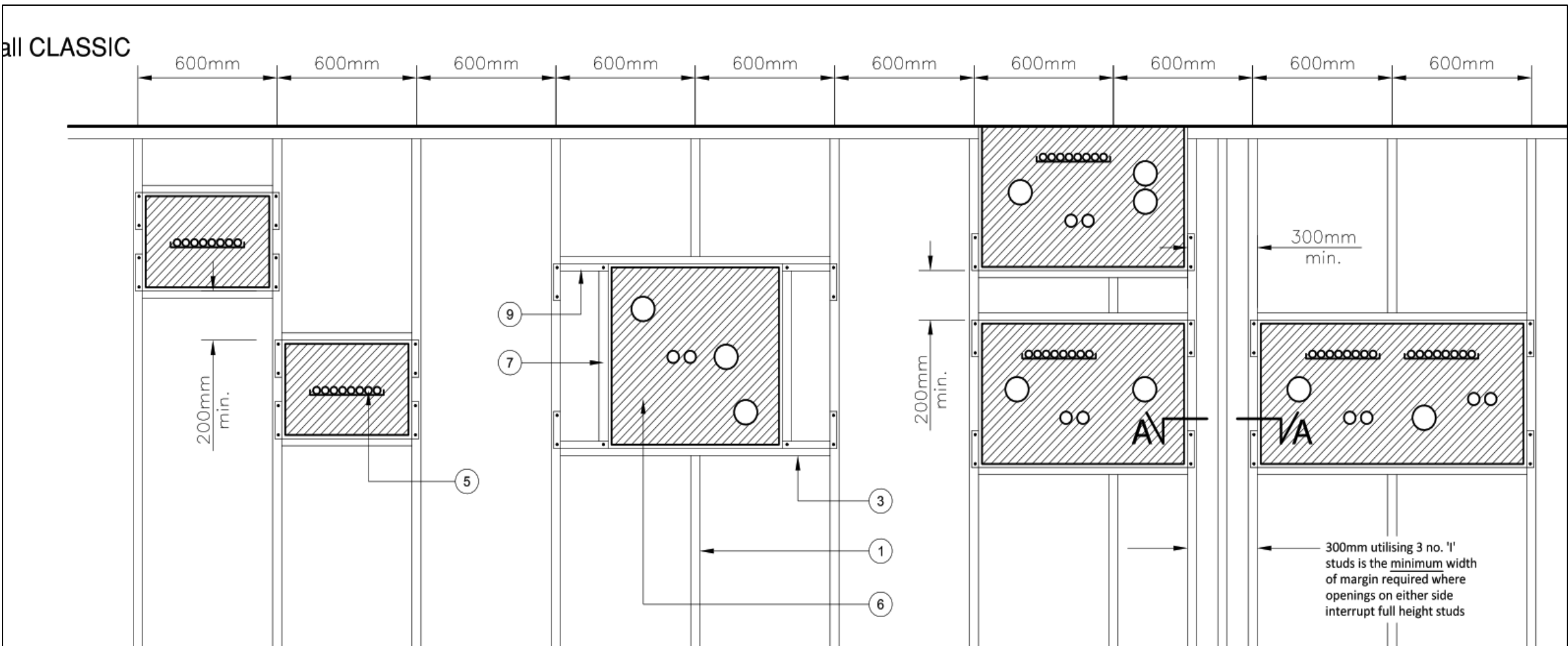
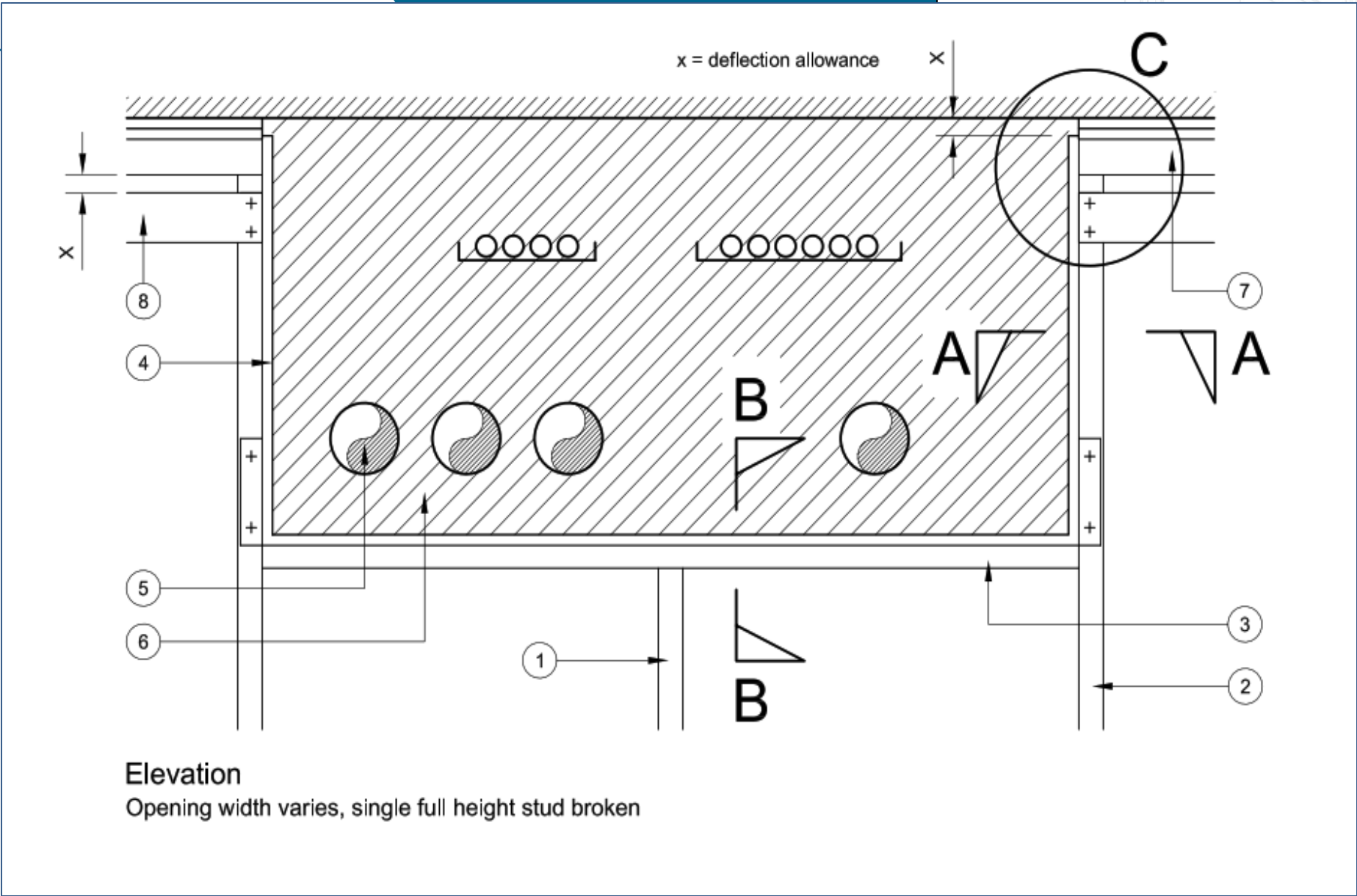
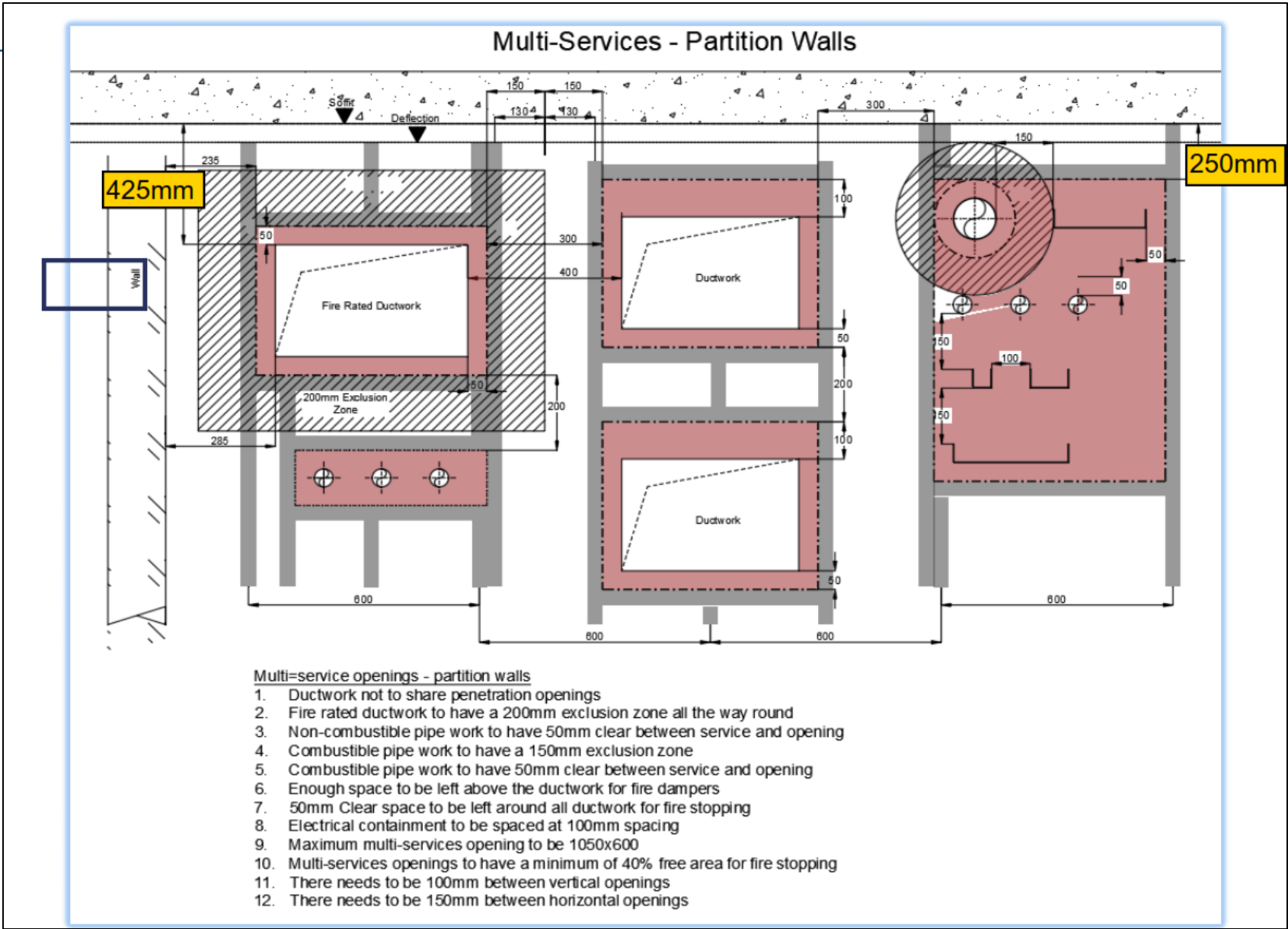
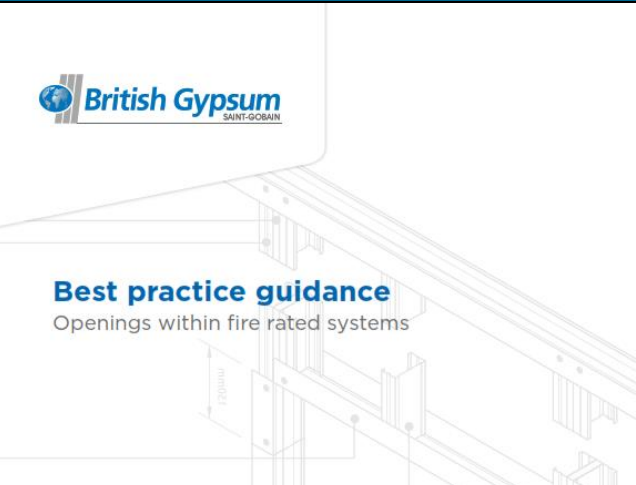
Non Standard Supporting Constructions

When the test specimen is intended to be used in a form of construction not covered by a standard supporting construction, it shall be tested within the supporting construction in which it is intended to be used.



Wall Types, Standard Supporting Constructions

- Deflection is picked up by the walls and not the services.



Beam Types and Standard Supporting Constructions

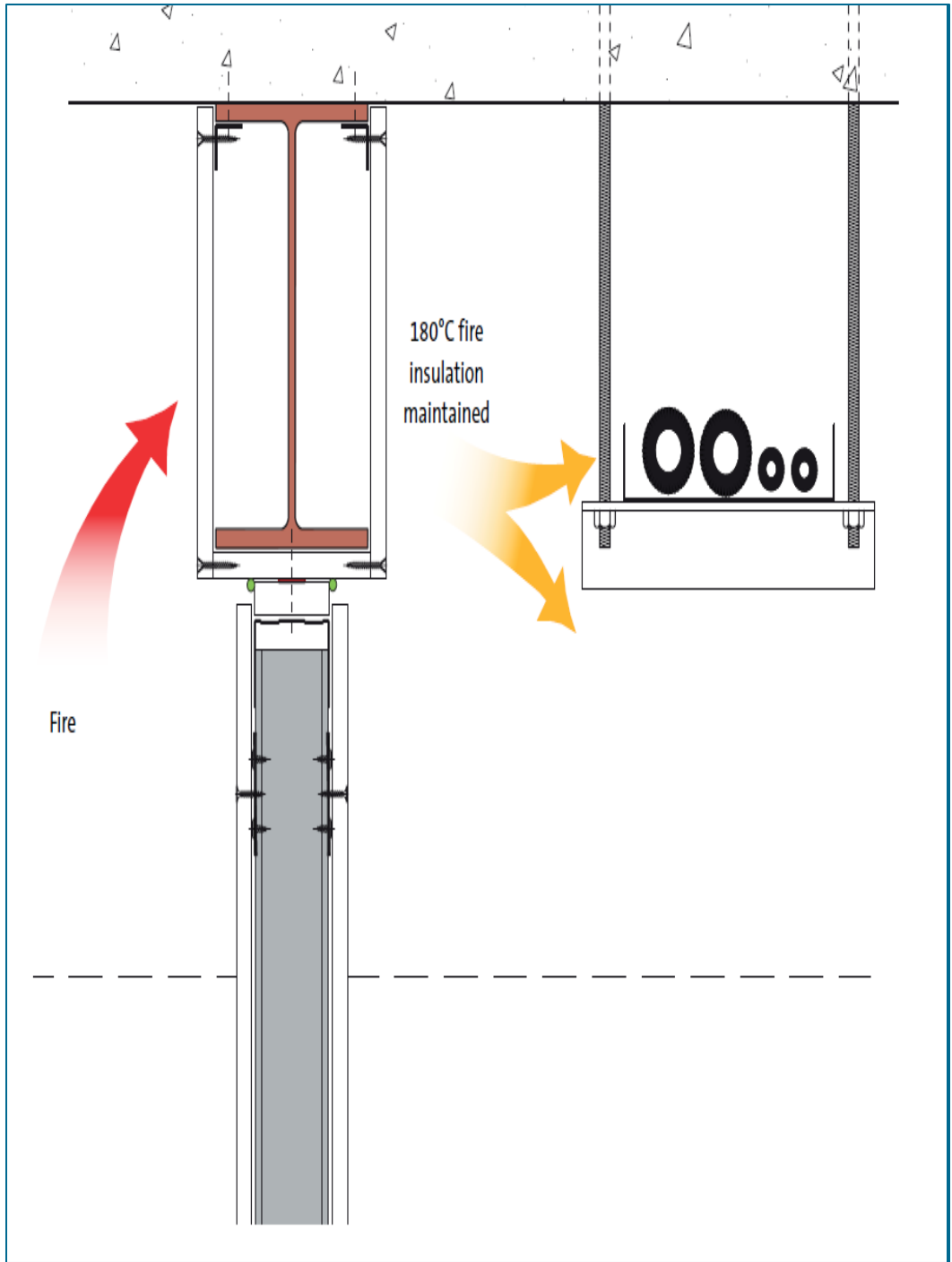


Table 1 — Standard floor constructions

Type of construction	Thickness mm	Density kg/m ³	Test duration t h
Normal concrete	110 ± 10	2 200 ± 200	t ≤ 1,5
	150 ± 10	2 200 ± 200	1,5 < t ≤ 3
	175 ± 10	2 200 ± 200	3 < t ≤ 4
Aerated concrete	125 ± 10	650 ± 200	t ≤ 2
	150 ± 10	650 ± 200	2 < t ≤ 4

7.3 Minimum separation

If more than one damper is tested at the same time the distance between the fire dampers shall not normally be less than 200 mm, as shown in Figures 11 and 12. However, if a specific installation requires fire dampers to be closer, then they shall be tested to the minimum separation used in practice.

A test result obtained for a fire damper installed within a structural opening is only applicable to fire dampers of the same type installed in the same orientation and position in relation to the supporting construction as that tested.

A test result obtained with the duct passing through a standard supporting construction is applicable to a supporting construction with a fire resistance equal to or greater than that of the standard supporting construction used for the test (thicker, denser, more layers of board, as appropriate).

Test results obtained with duct passing through flexible vertical supporting constructions may be applied to rigid supporting constructions of a thickness equal to or greater than that of the element used in the tests, provided that the classified fire resistance of the rigid supporting construction is greater than or equal to the one used for the test.

EN 13381-4 (non-reactive products) and EN 13381-8 (reactive products).

Services should not installed through steal beams at compartments lines. There is no test evident for any nor any test methods.

Beam Types and Standard Supporting Constructions



EN 13381-4 (non-reactive products) and EN 13381-8 (reactive products).

Fire resistance tests for service installations

Part 3: Penetration seals

BS EN 1366-3

Covers

- Metallic Pipes
- Plastic Pipes
- Metallic Tray work
- Metallic Ladders
- Conduits
- Trunking
- Busbar

There are different fields for busbar, trunking and conduits

Key Classifications

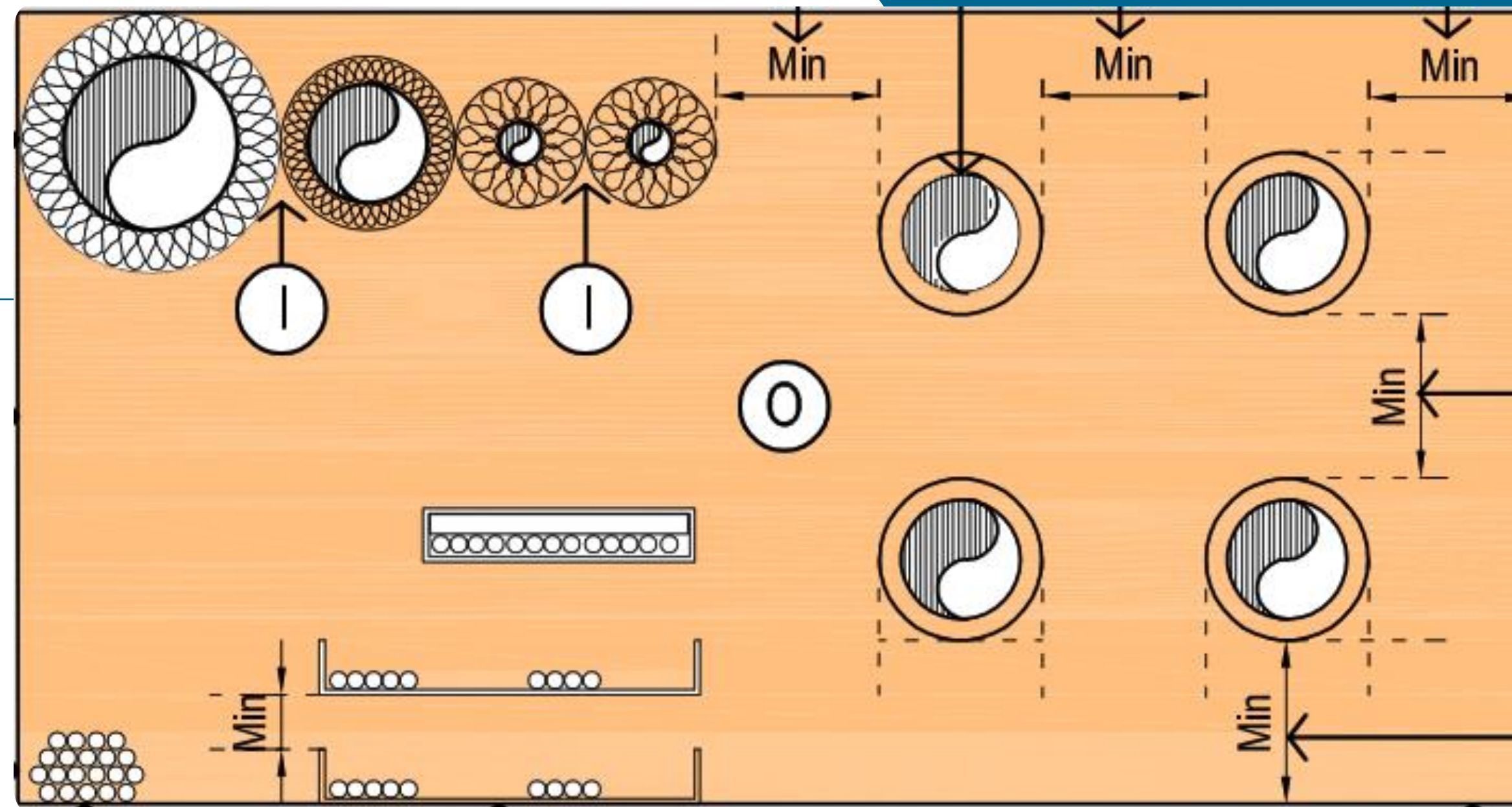
- (E) – Integrity ADD CS, CL, U/C ETC
- (I) – Insulation

Key Related Standards

- BS EN 1366-3:2021. Fire resistance tests for service installations. Penetration seals
- BS EN 1363-1:2020. Fire resistance tests. General requirements
- BS EN 1364-1:2015. Fire resistance tests for non-loadbearing elements. Walls
- BS EN 13501-1:2018. Fire classification of construction products and building elements. Classification using data from reaction to fire tests
- BS EN 15882-3:2009. Extended applications of results from fire resistance tests for service installations. Penetration seals



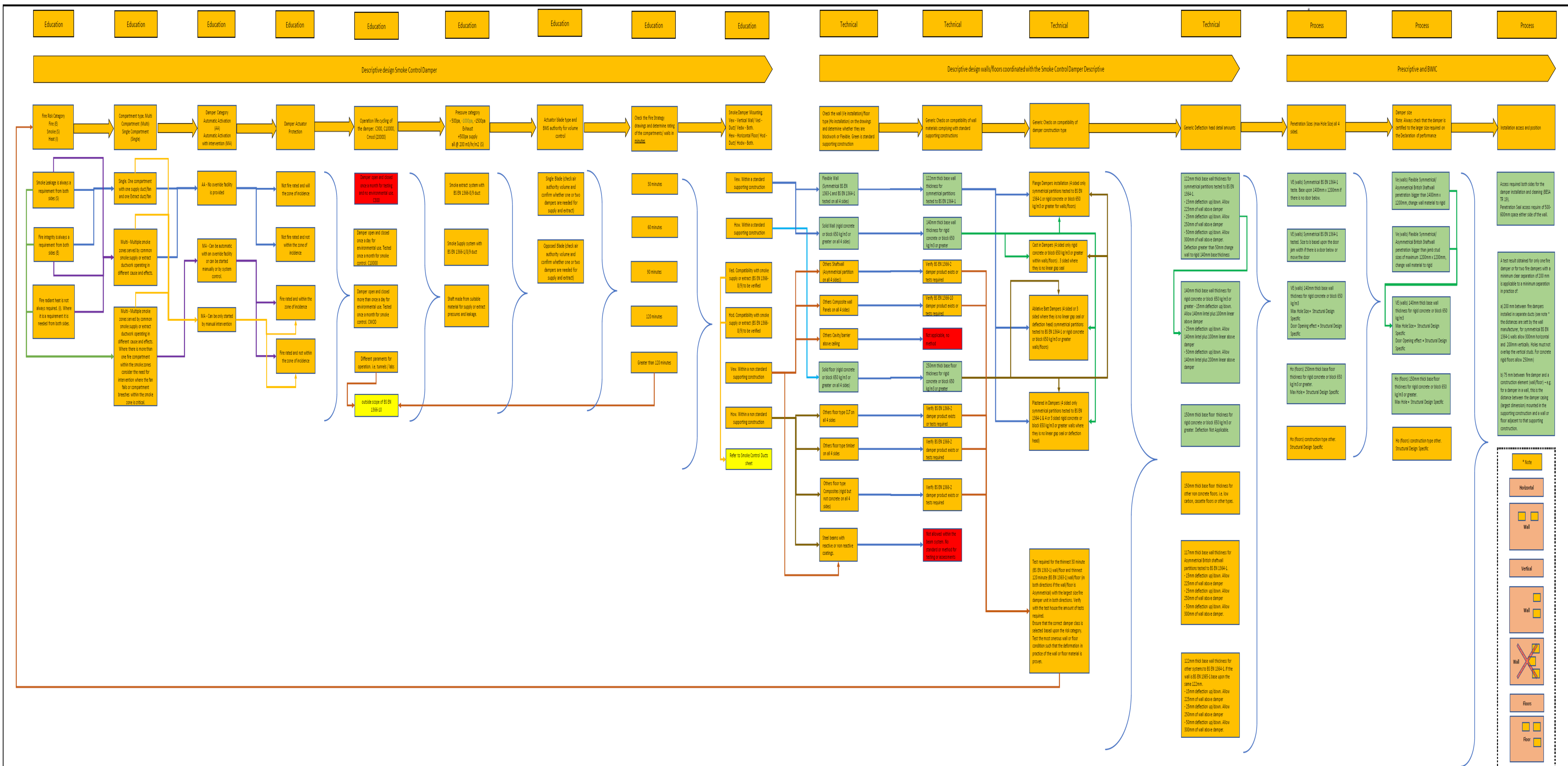
Fire Stopping? This is a word that is generalised for sealing holes in walls and needs to be removed from the language. Its penetrations seals specific to the componentry.



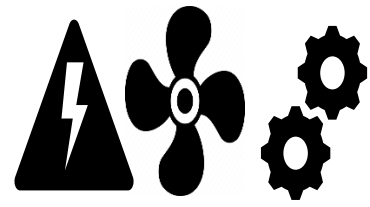
Fields of application issues.

- Distances between services vary dependent on whether they are combustible or not non combustible pipes
- The distance is different for different supplies of the penetration system supplier
- Supports have specific rules, nominally max 500mm from wall, but sponsor can test further.
- There are limitations on the maximum size of the aperture that can be tested dependent on the rating in E, I
- The maximum size is also limited with partitions to the size that the suppliers can support. Can be smaller than tested.
- Distance between adjacent aperture can is 200mm in the test. The partition suppliers will likely want more.
- Fire door partition apertures can normally not have the framing not going from the floor to ceiling.
- Dependent on the service type it is possible for a partition test to be applied to rigid walls
- Shaftwall is classed as Other Supporting Construction.
- The wall takes the deflection, not the services. No 3 sided holes with deflection details on walls. Some soft seals now available but do not assume this can work everywhere.
- Cannot change seal materials

The Process required for descriptive Smoke Control Dampers.



The Process required for descriptive Fire Rated Ductwork and Smoke Control.

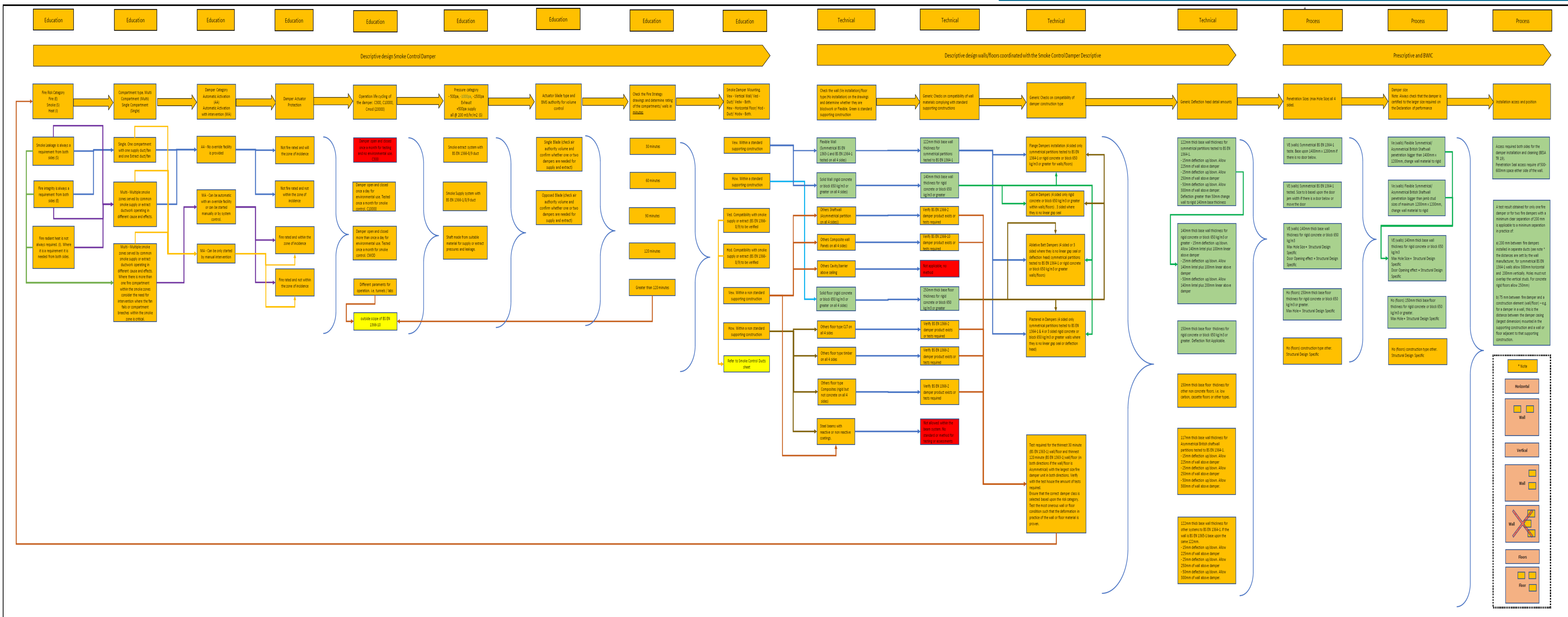
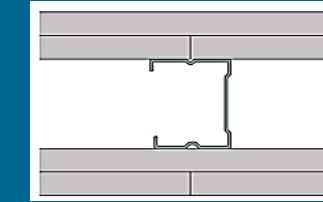
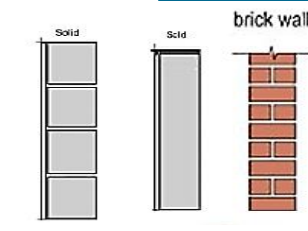
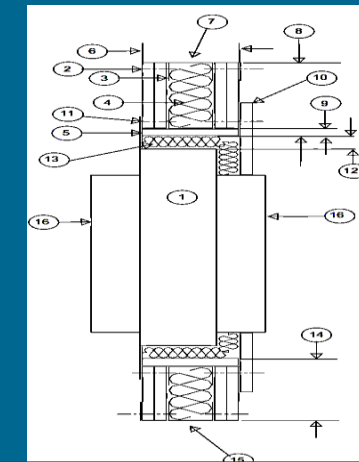


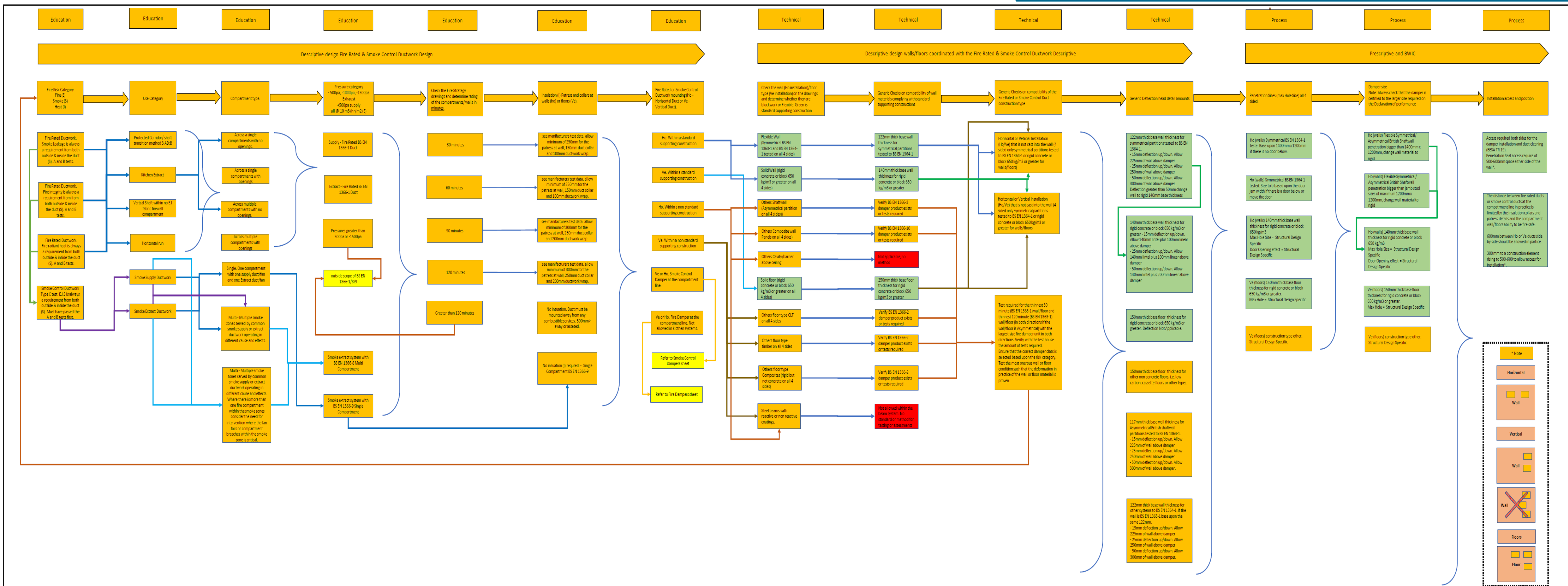
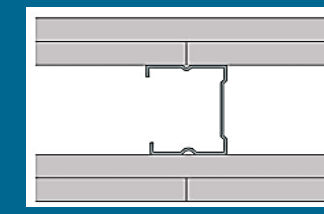
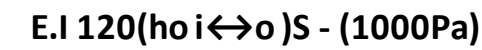
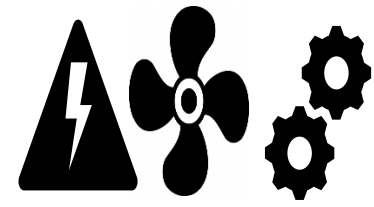
**System fire safety
operational type.
Static, Transient,
Dynamic.**

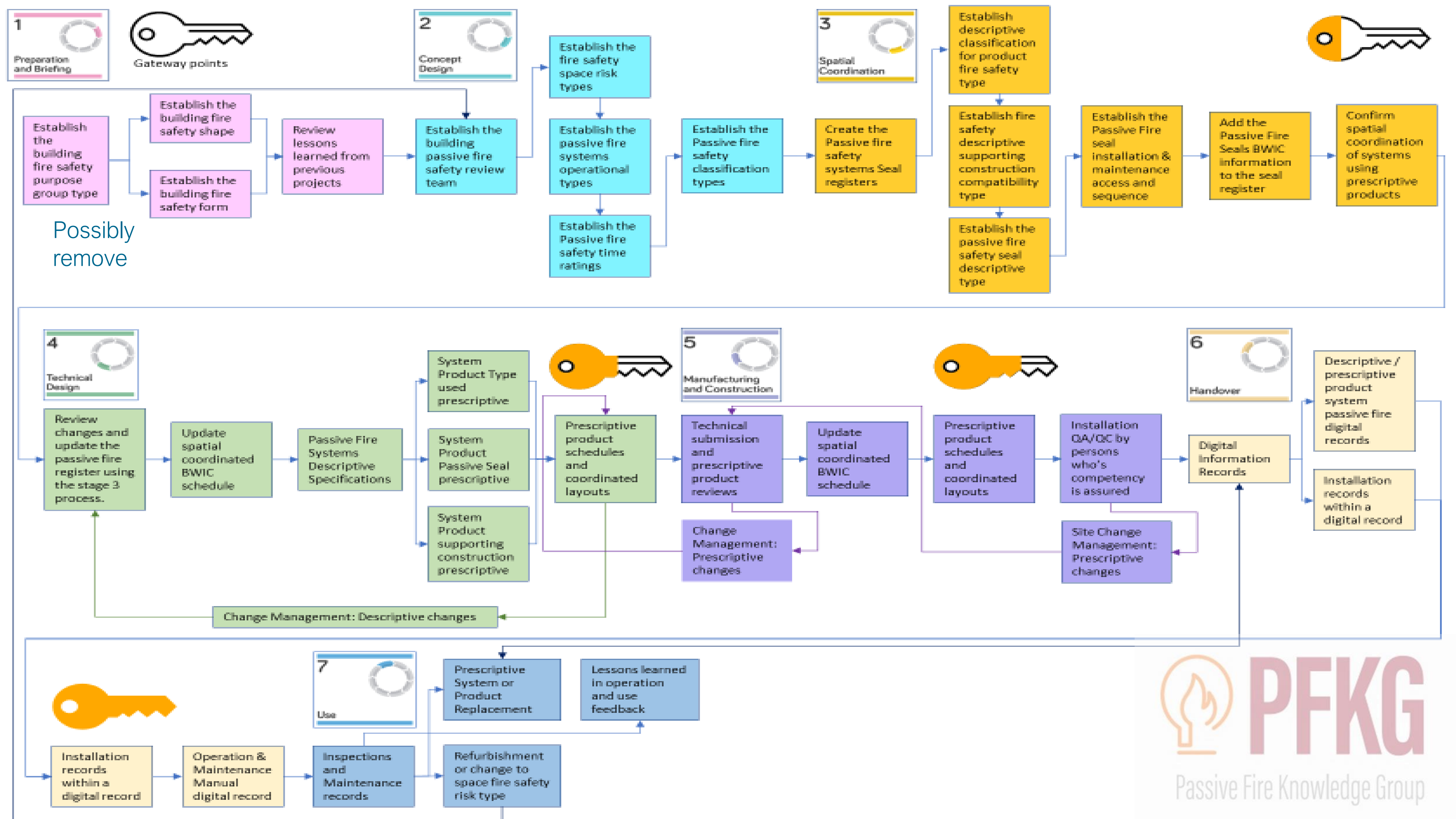
classification for product fire safety type

**Supporting construction compatibility type /P.F
safety seal type**

The installation/maintenance access types.

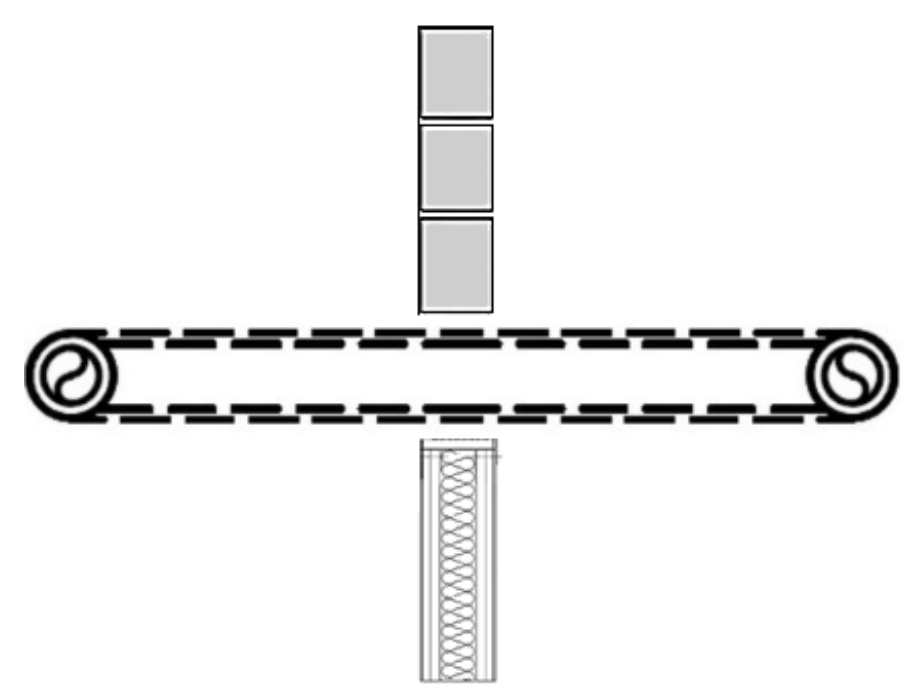
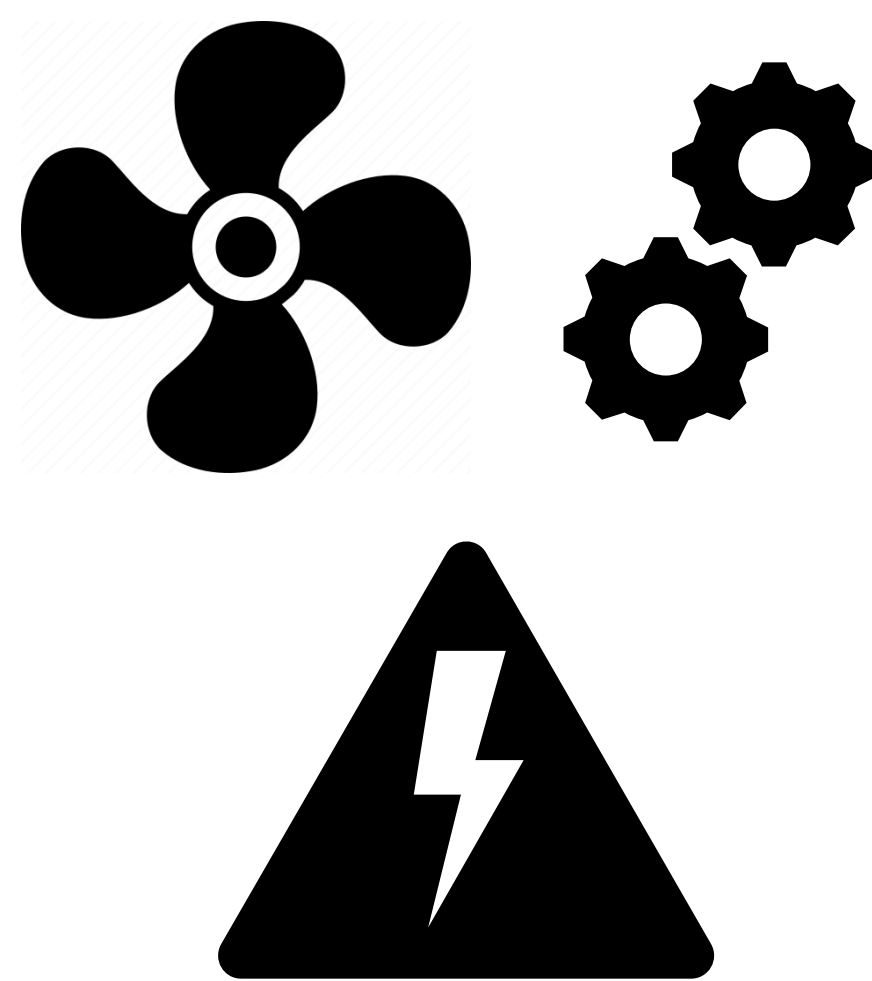
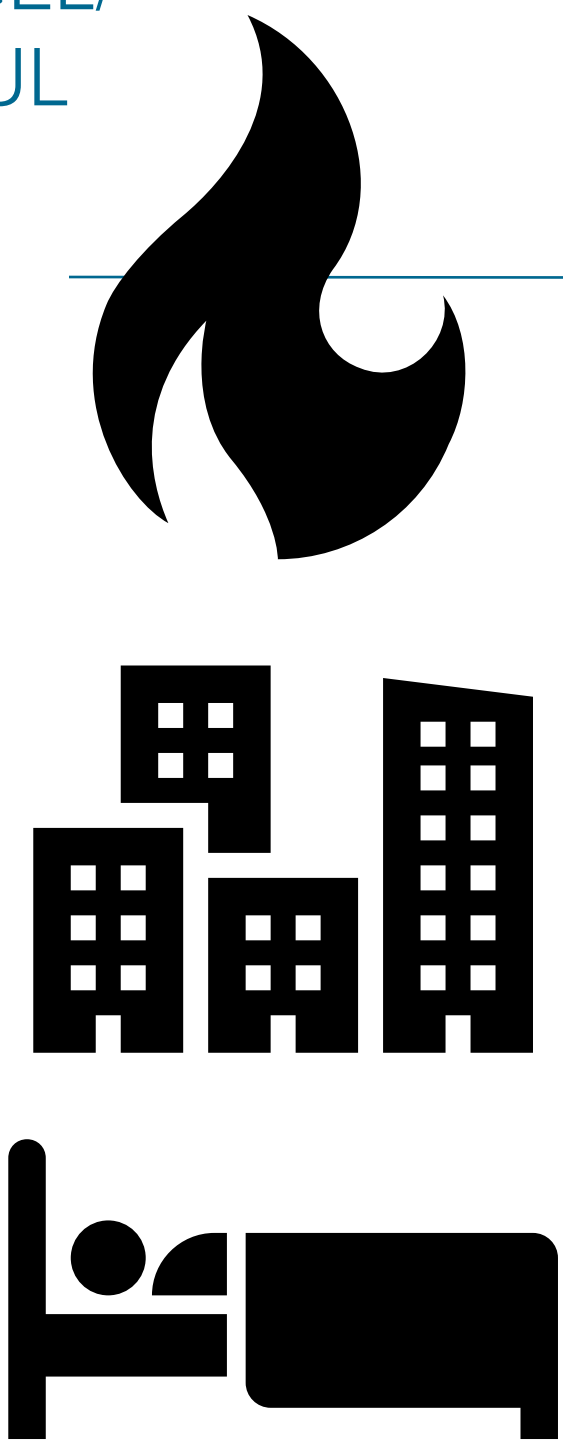




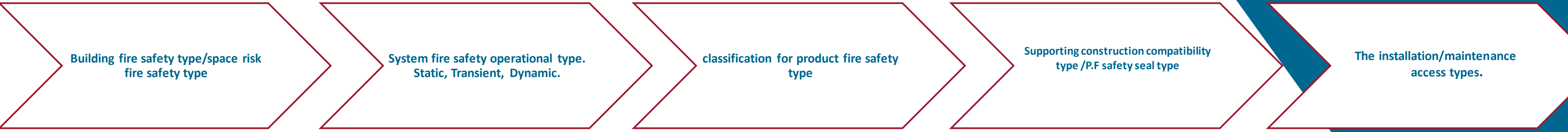
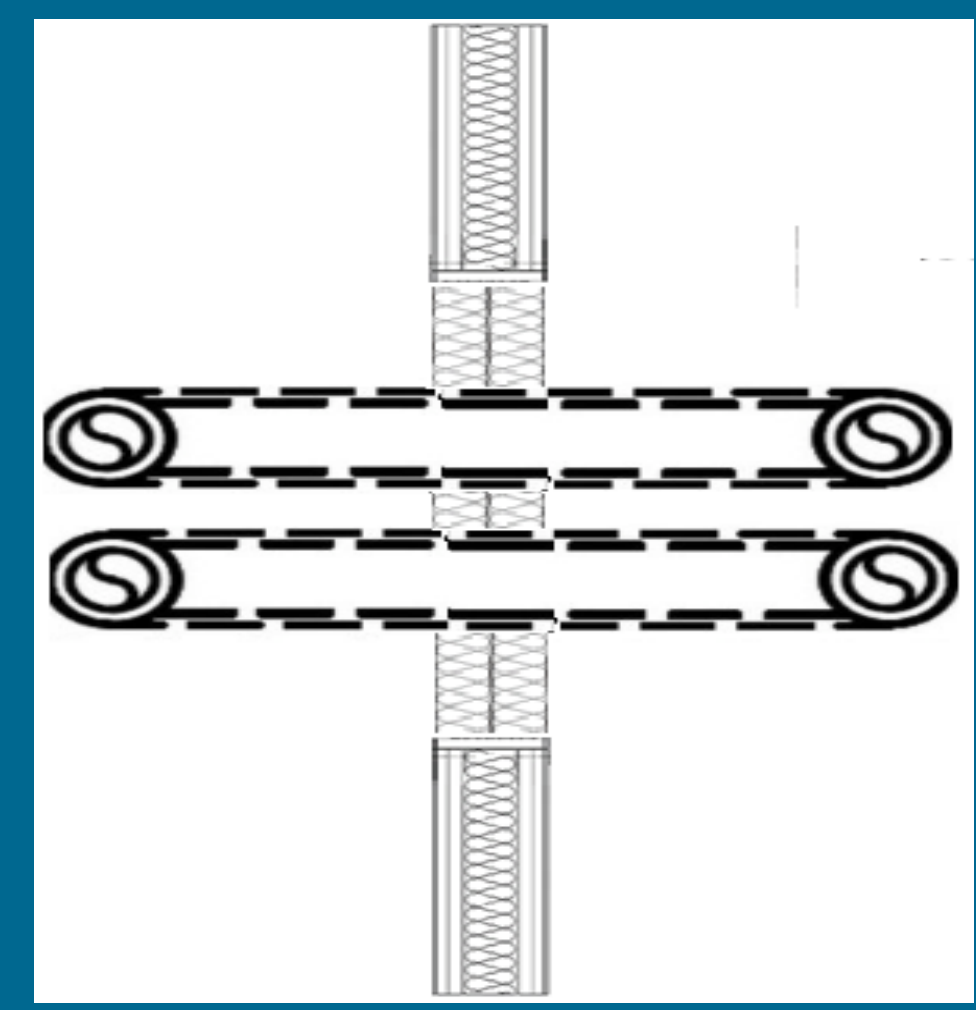
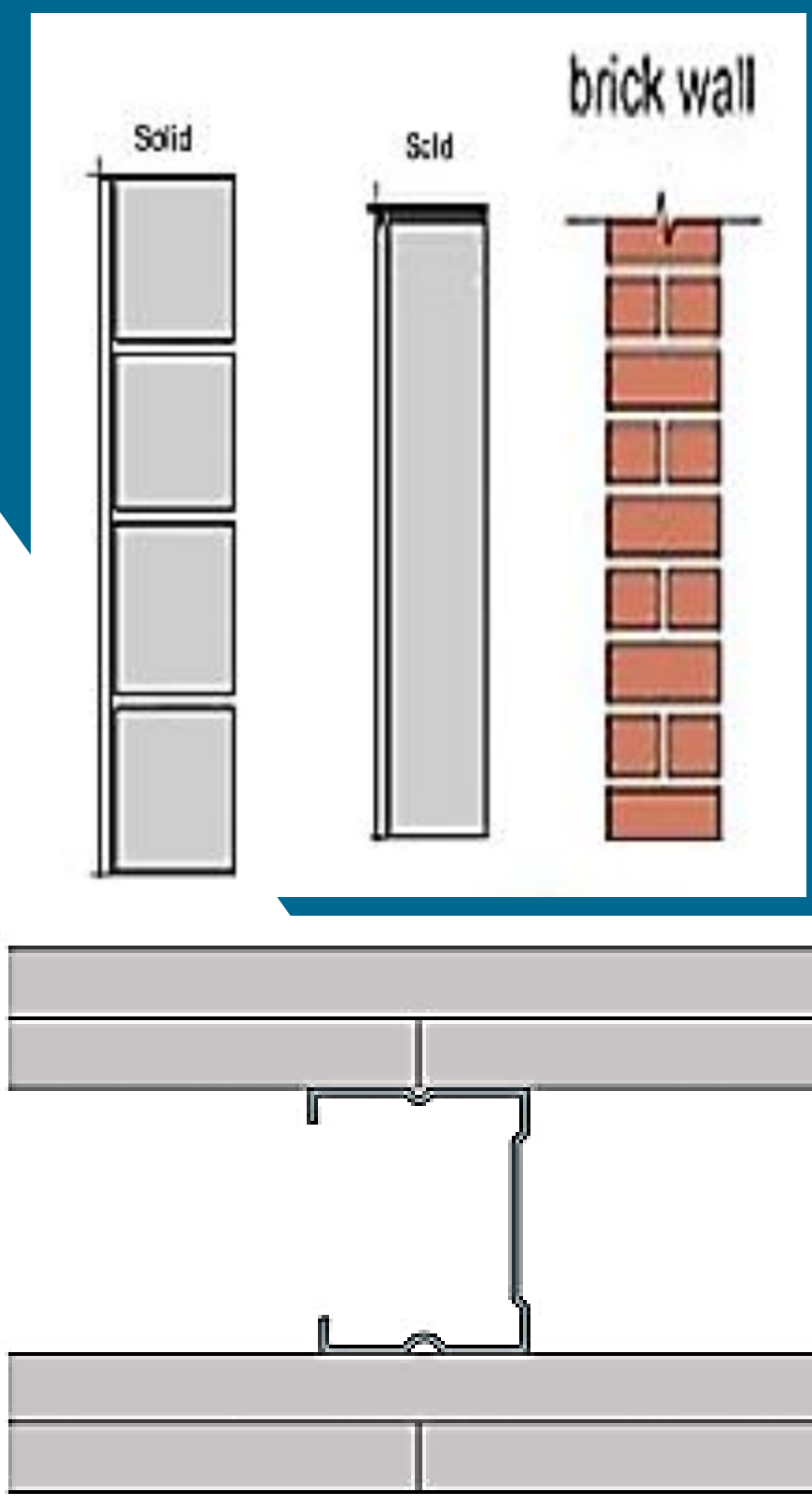


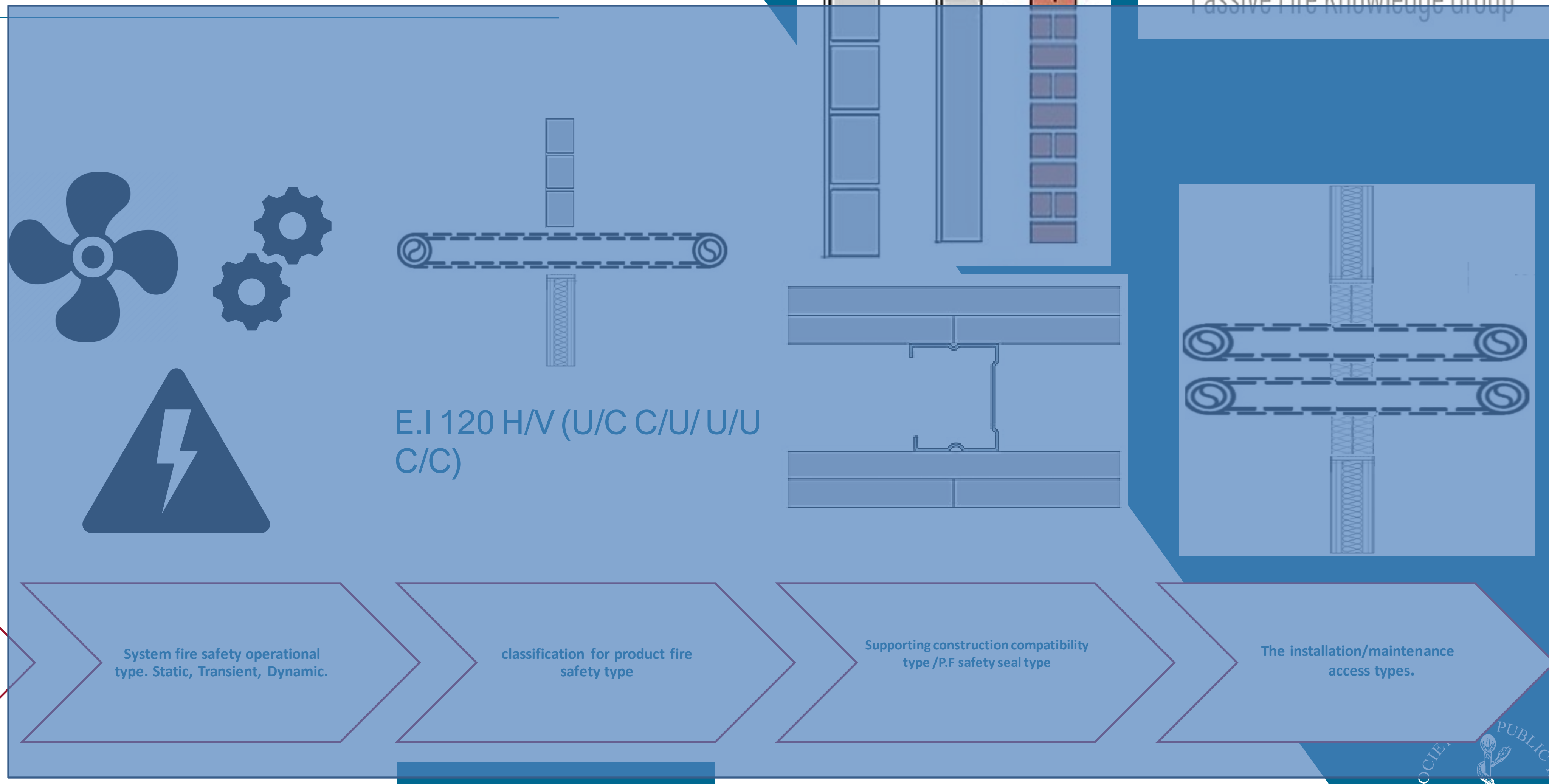
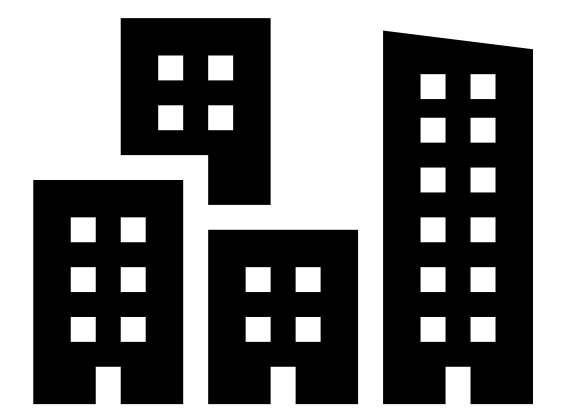
The Process required for descriptive

DREW/
NIGEL/
PAUL



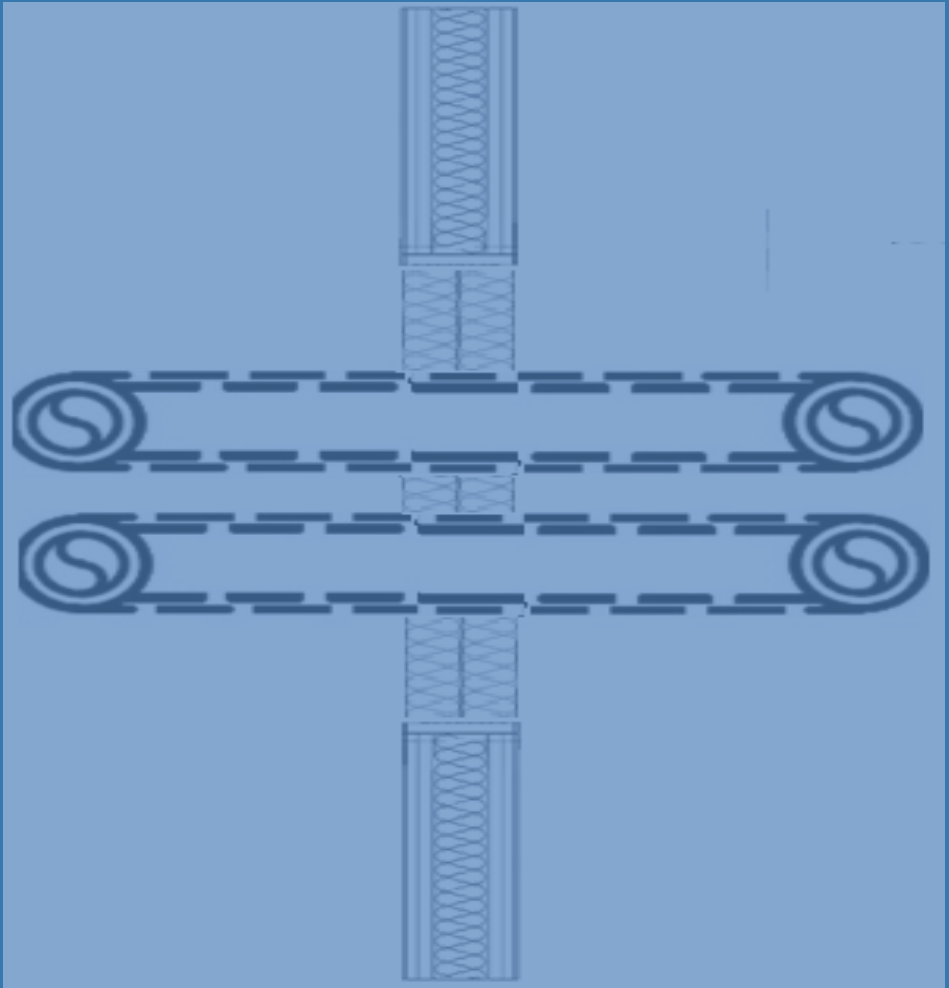
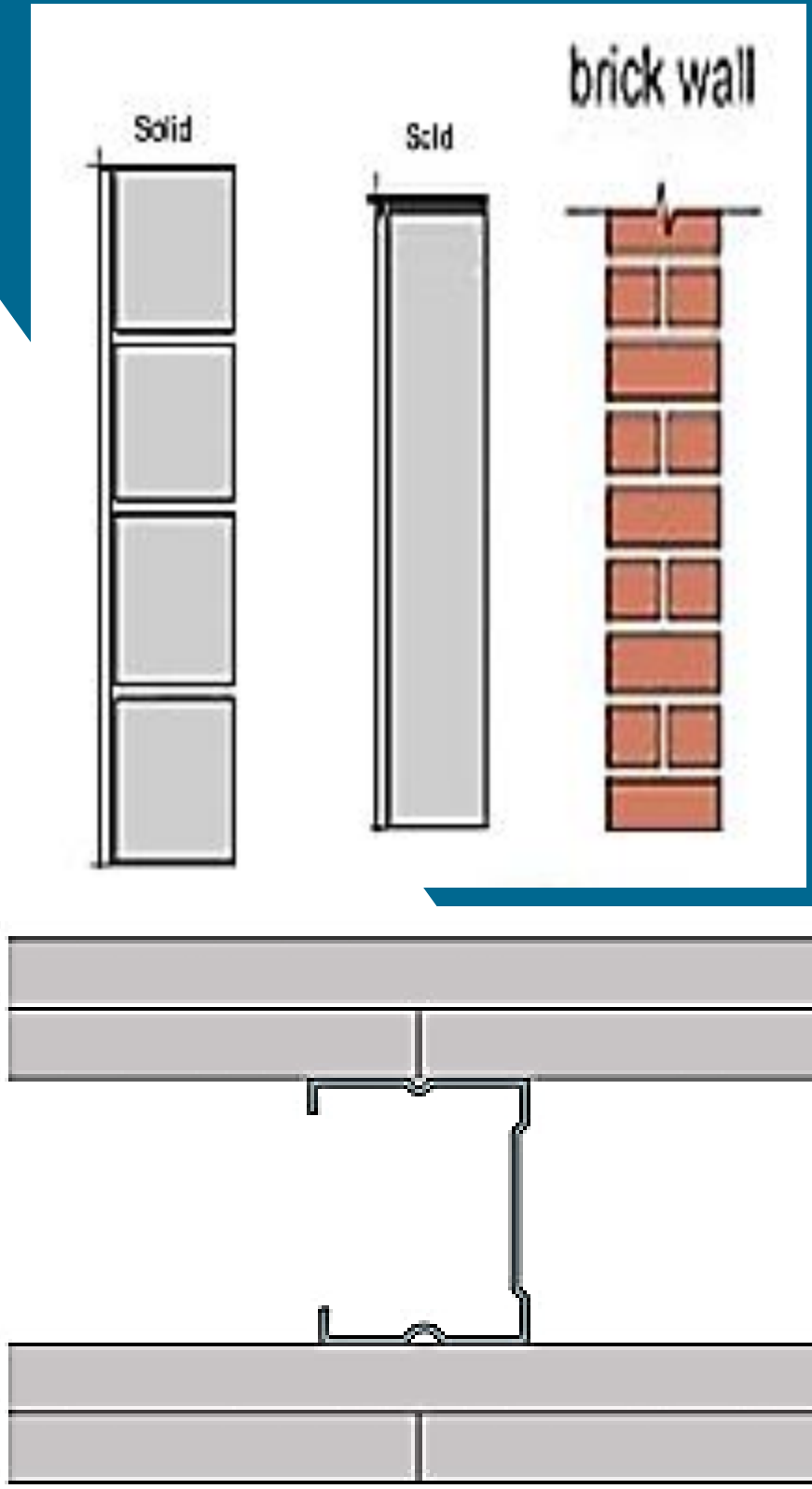
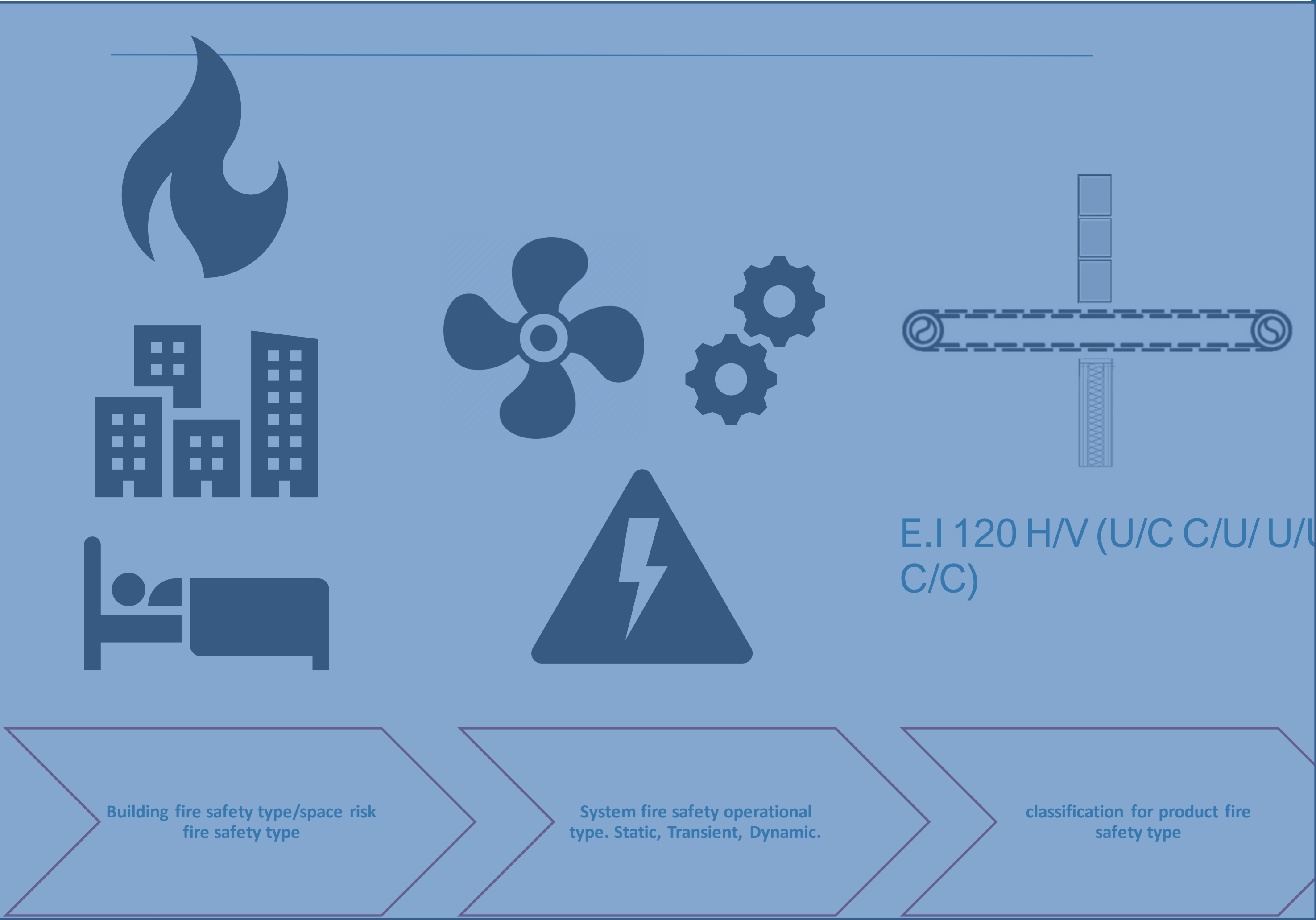
E.I 120 H/V (U/C C/U/ U/U
C/C) (CS,CI,LS,LI)





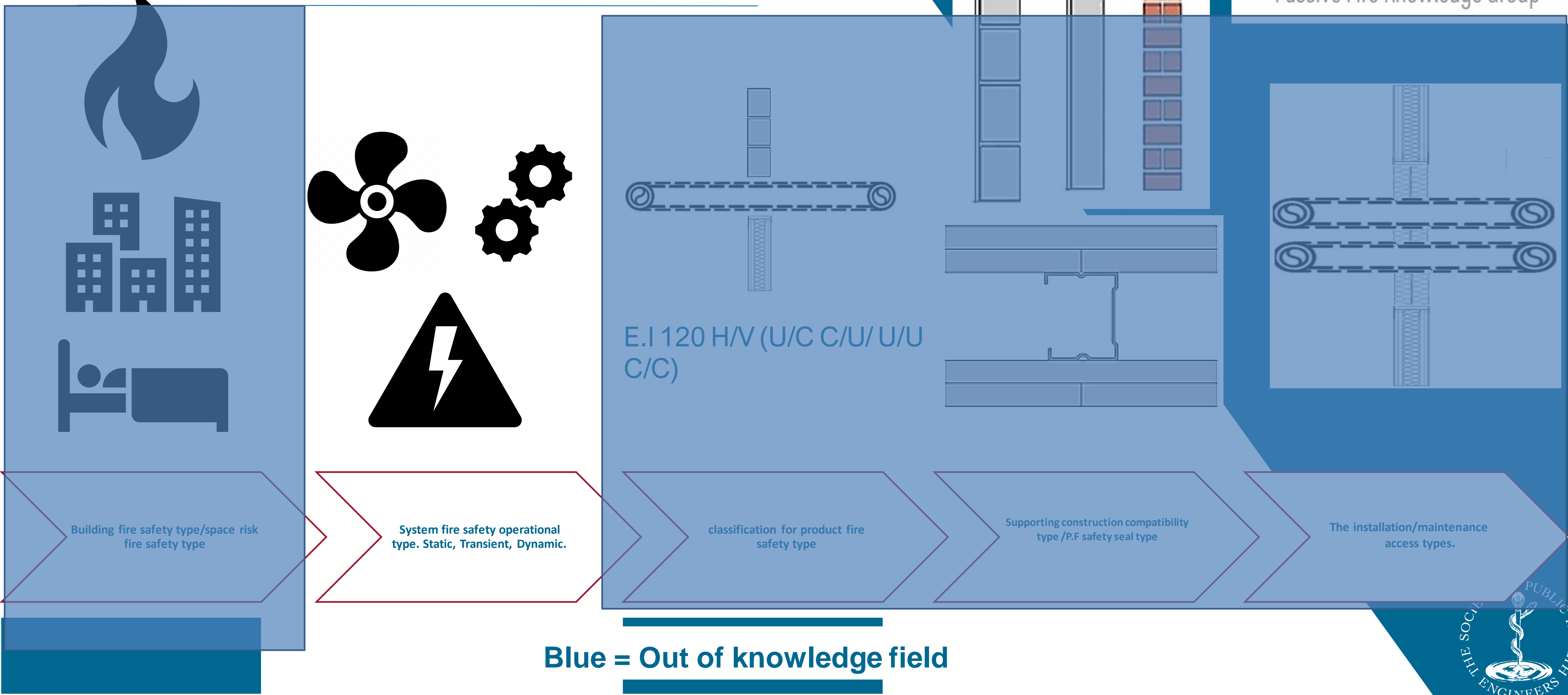
Blue = Out of knowledge field

Architect



Blue = Out of knowledge field

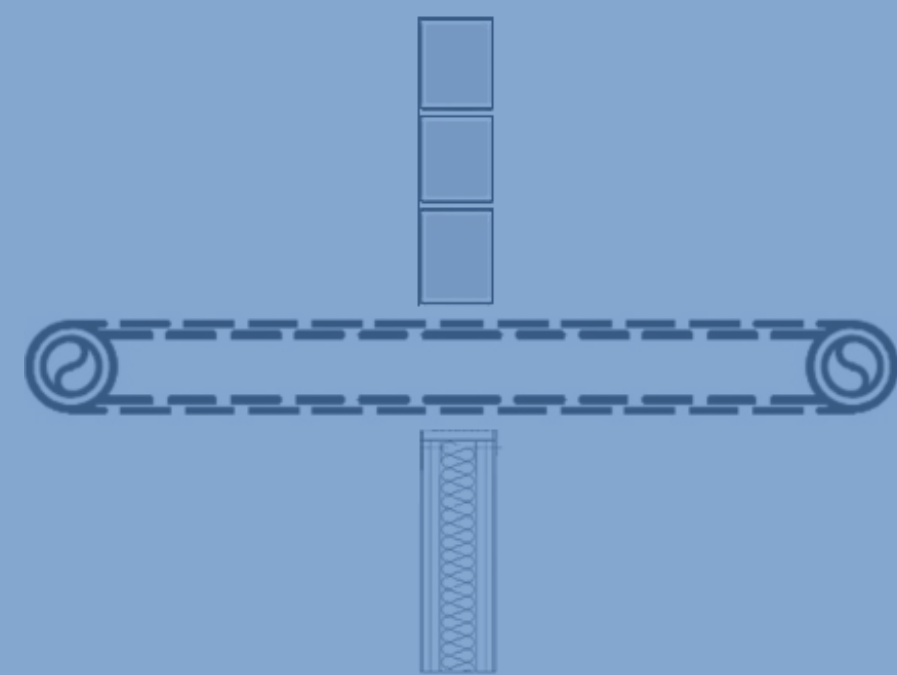
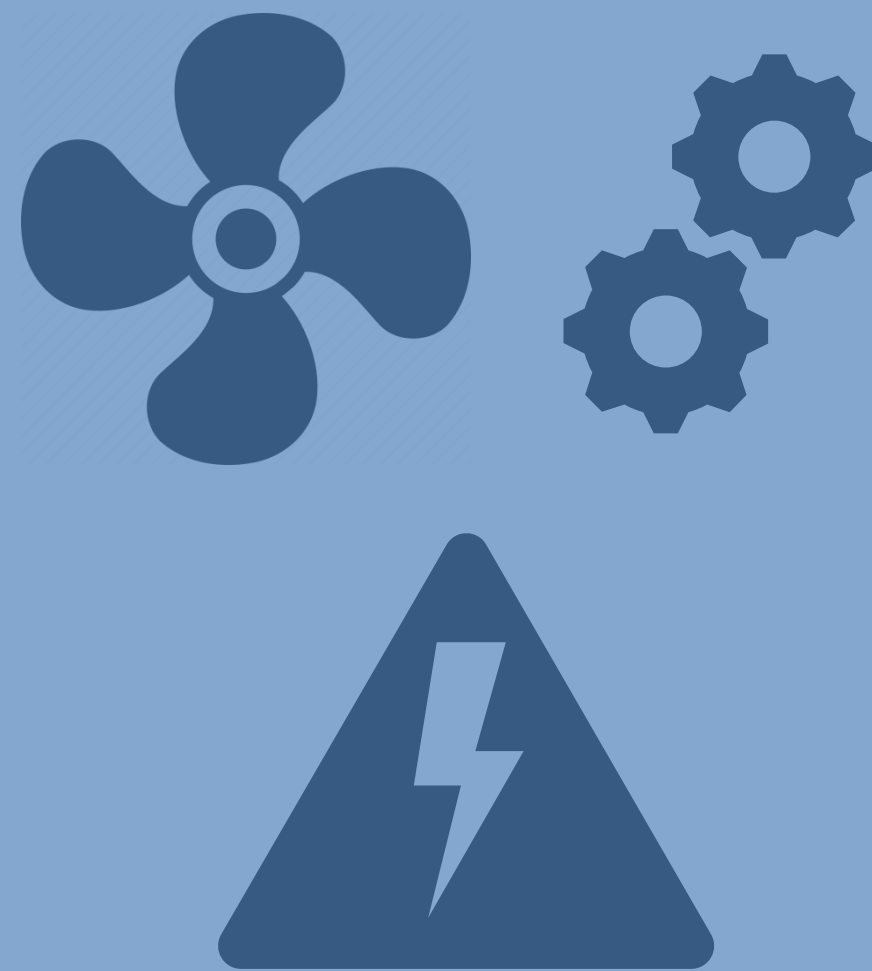
Building Services Consultant



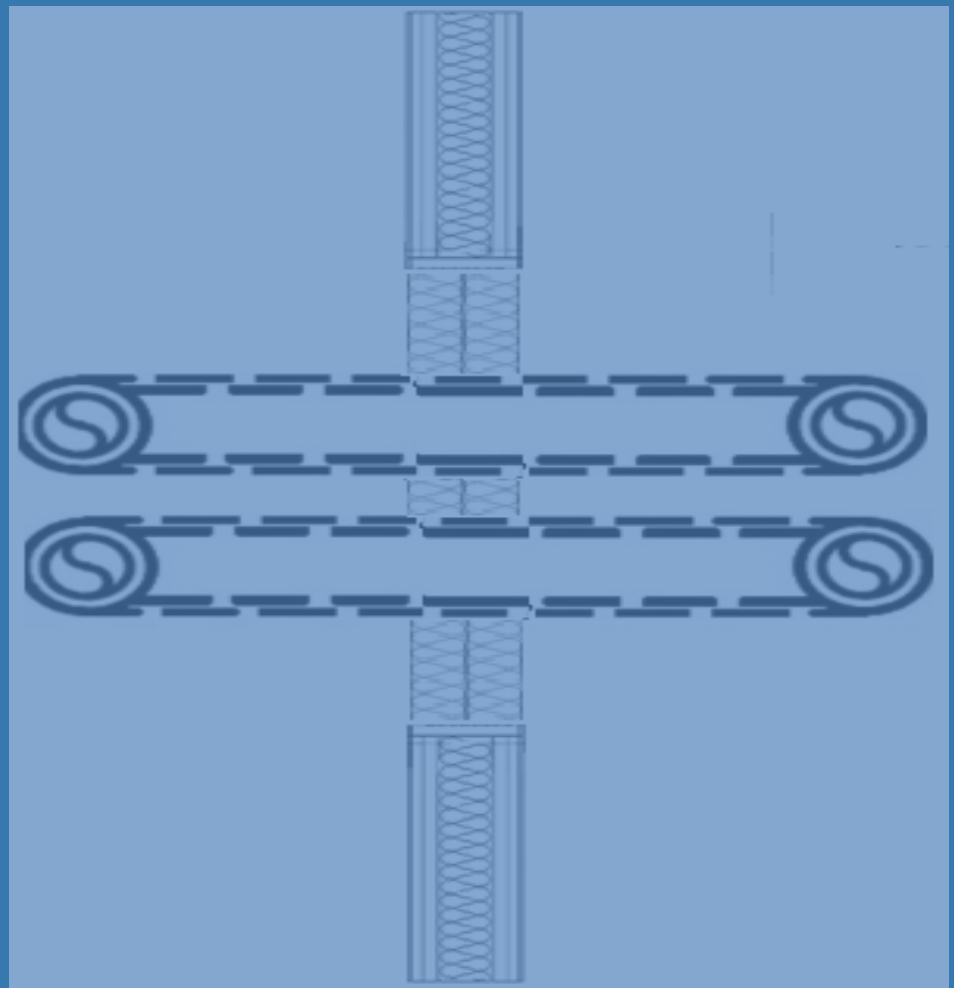
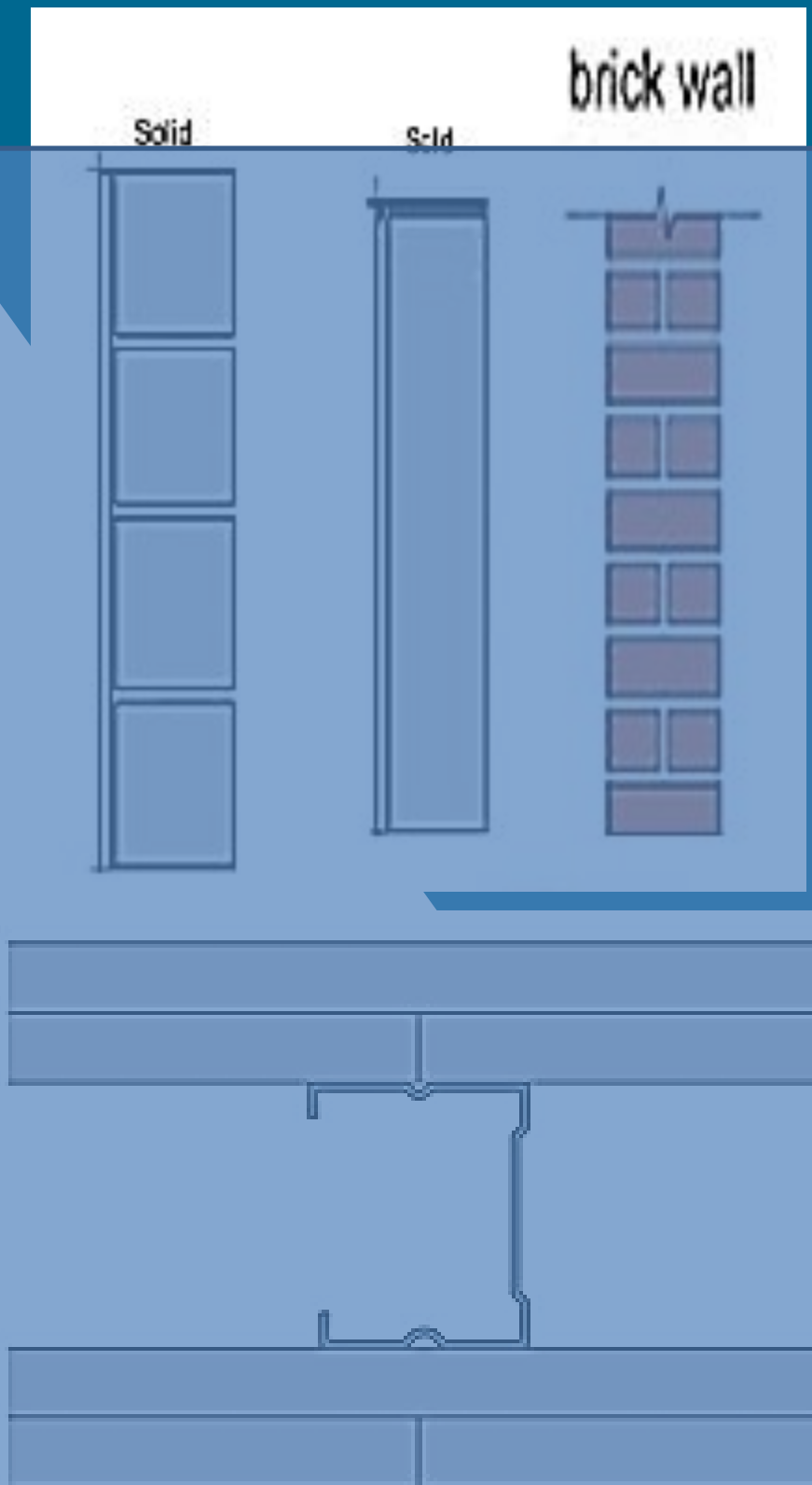
Principle Contractor



Passive Fire Knowledge Group



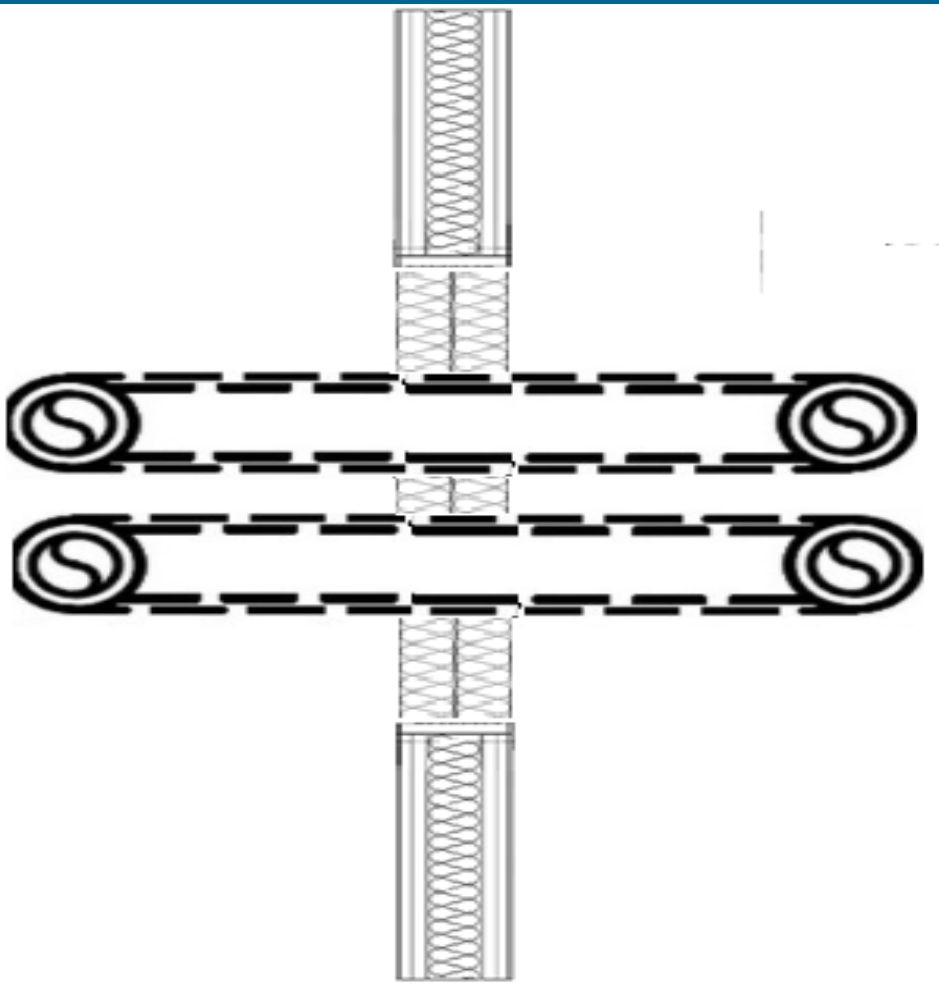
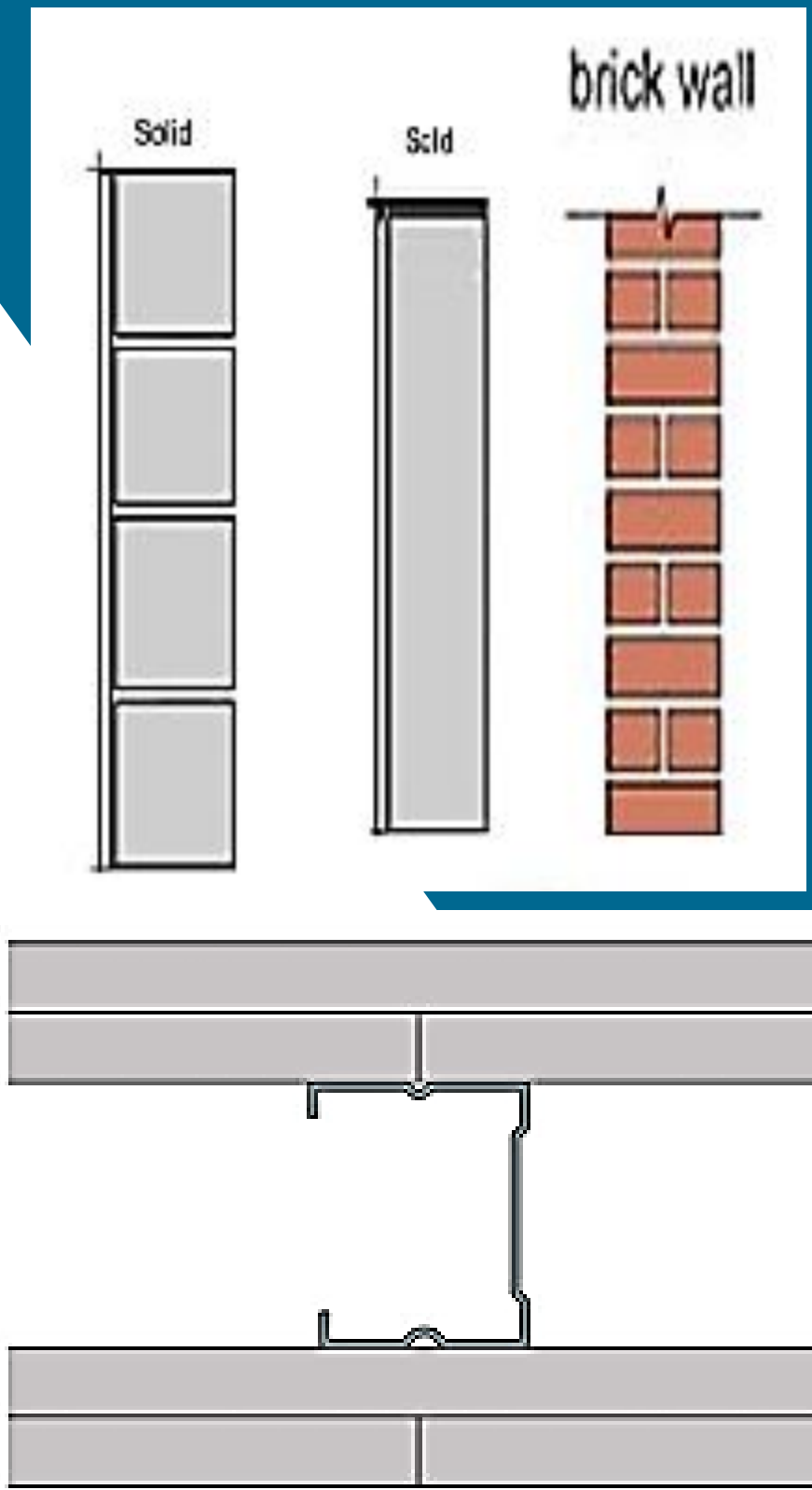
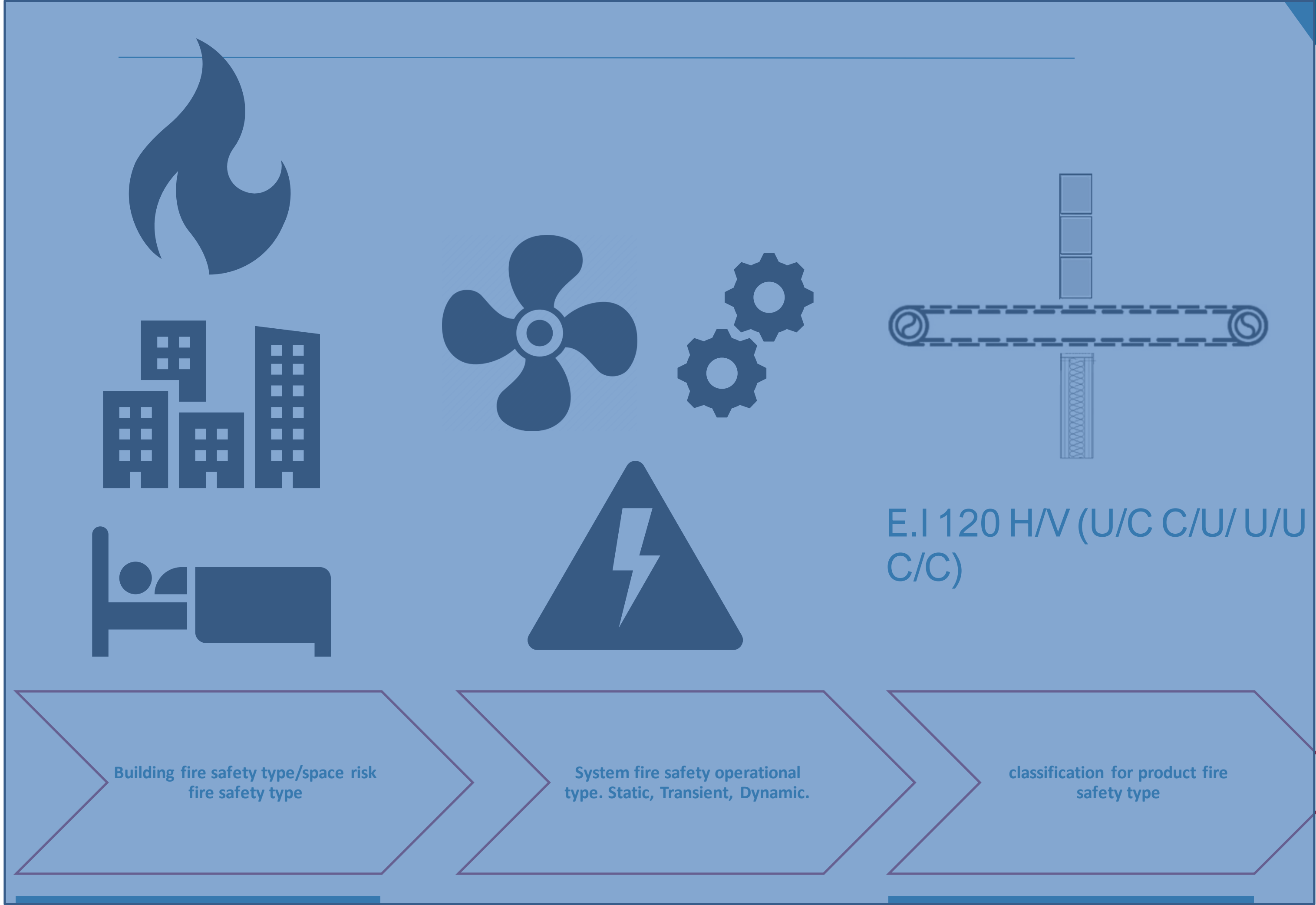
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Blue = Out of knowledge field

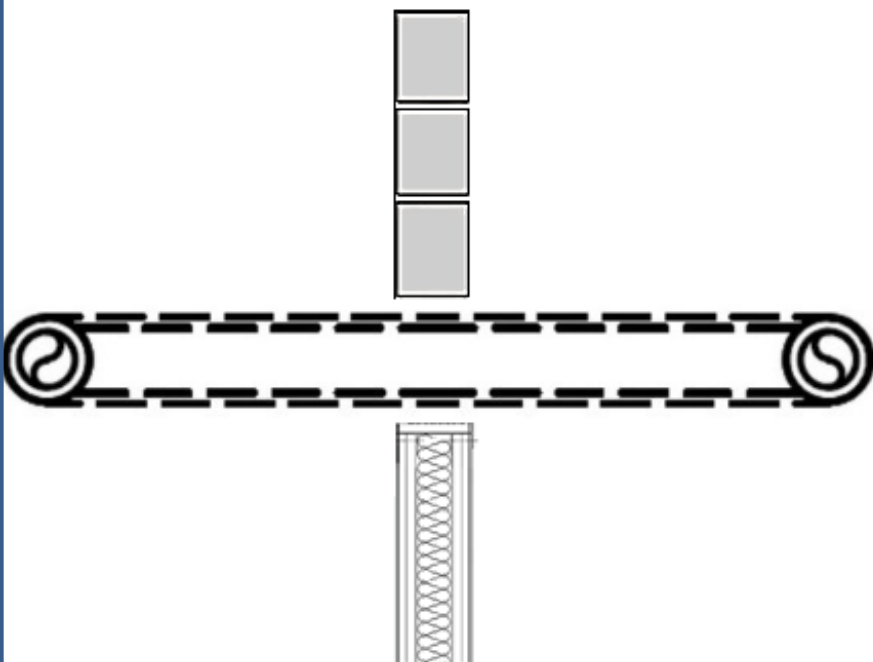


Specialist Trade

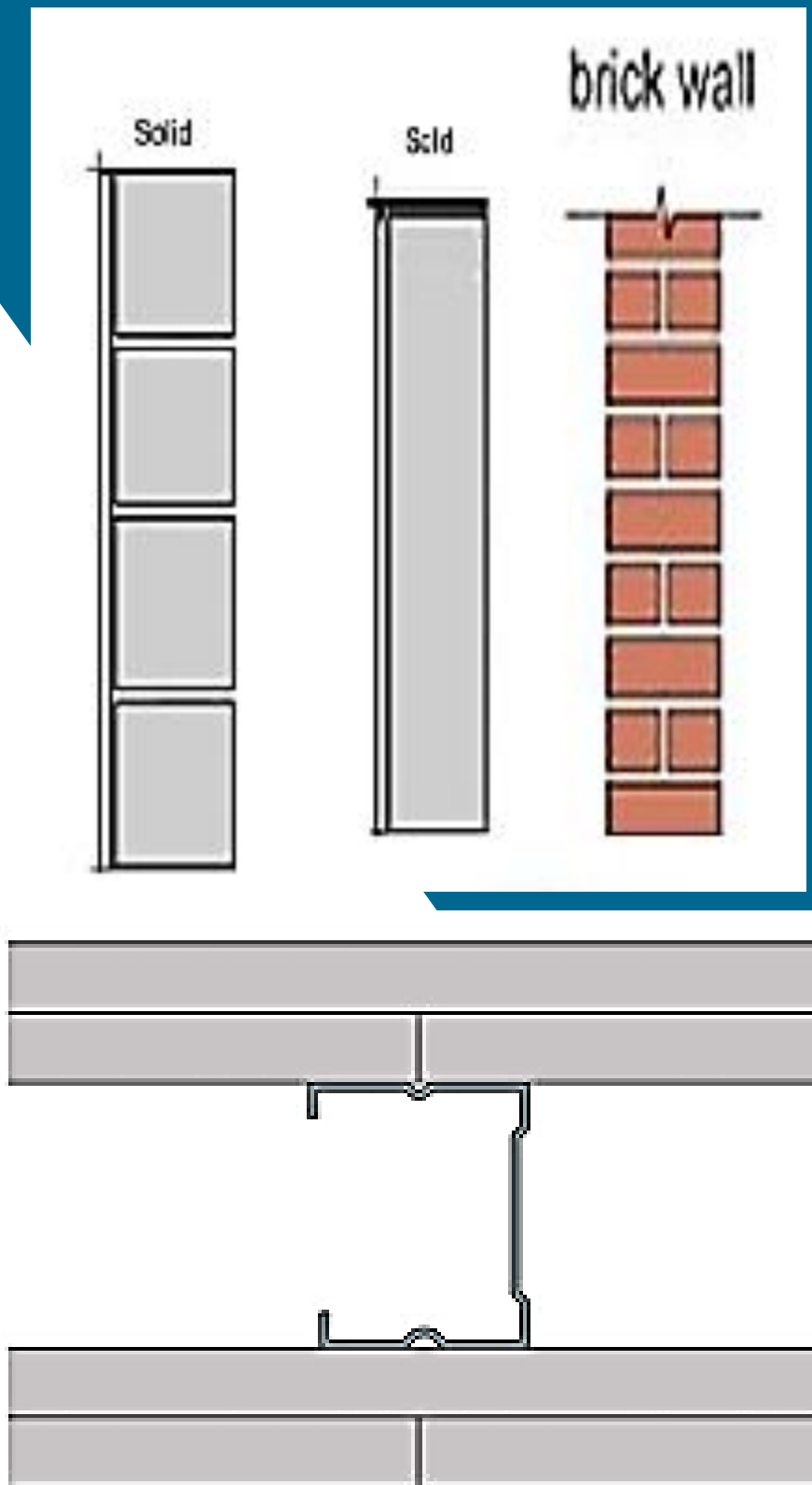


Blue = Out of knowledge field

Product Supplier



E.I 120 H/V (U/C C/U/ U/U C/C)



classification for product fire safety type



Supporting construction compatibility type /P.F safety seal type

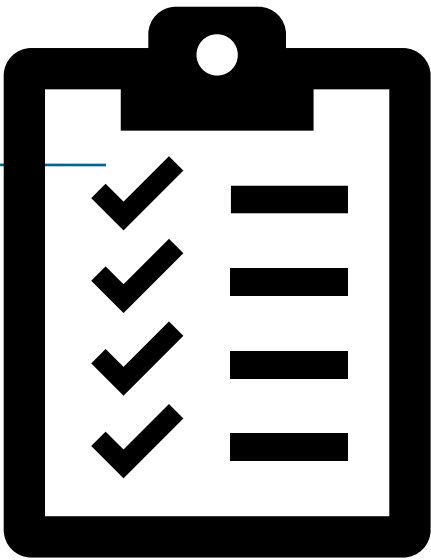
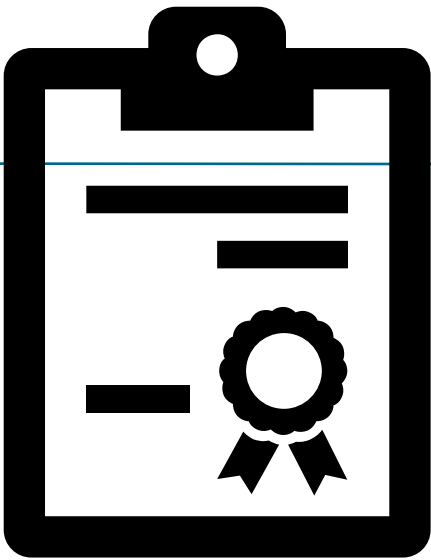


The installation/maintenance access types.

Blue = Out of knowledge field

Outputs

NIGEL/
DREW/
PAUL



Known installation records
prescriptive digital
information

Quality parameters &
workmanship standards

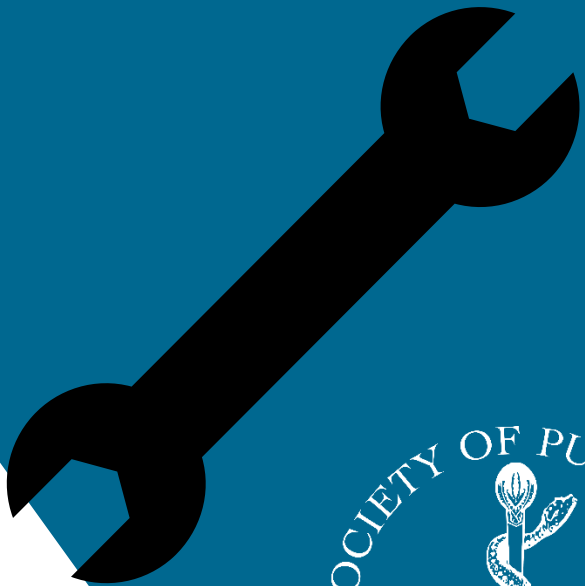
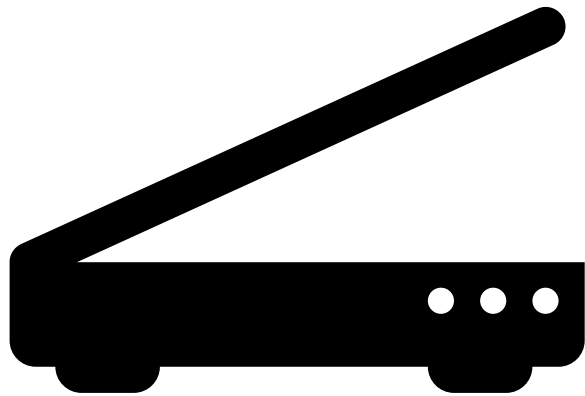
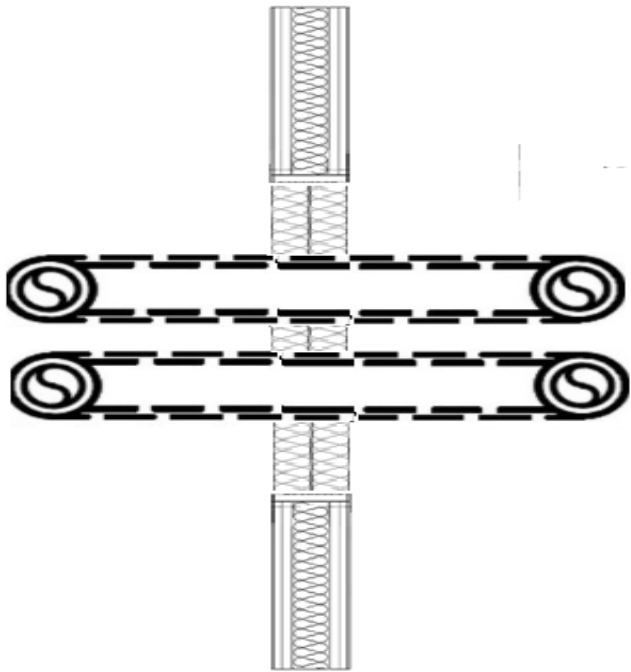
Benchmarking

Installation acceptance

Digital Records

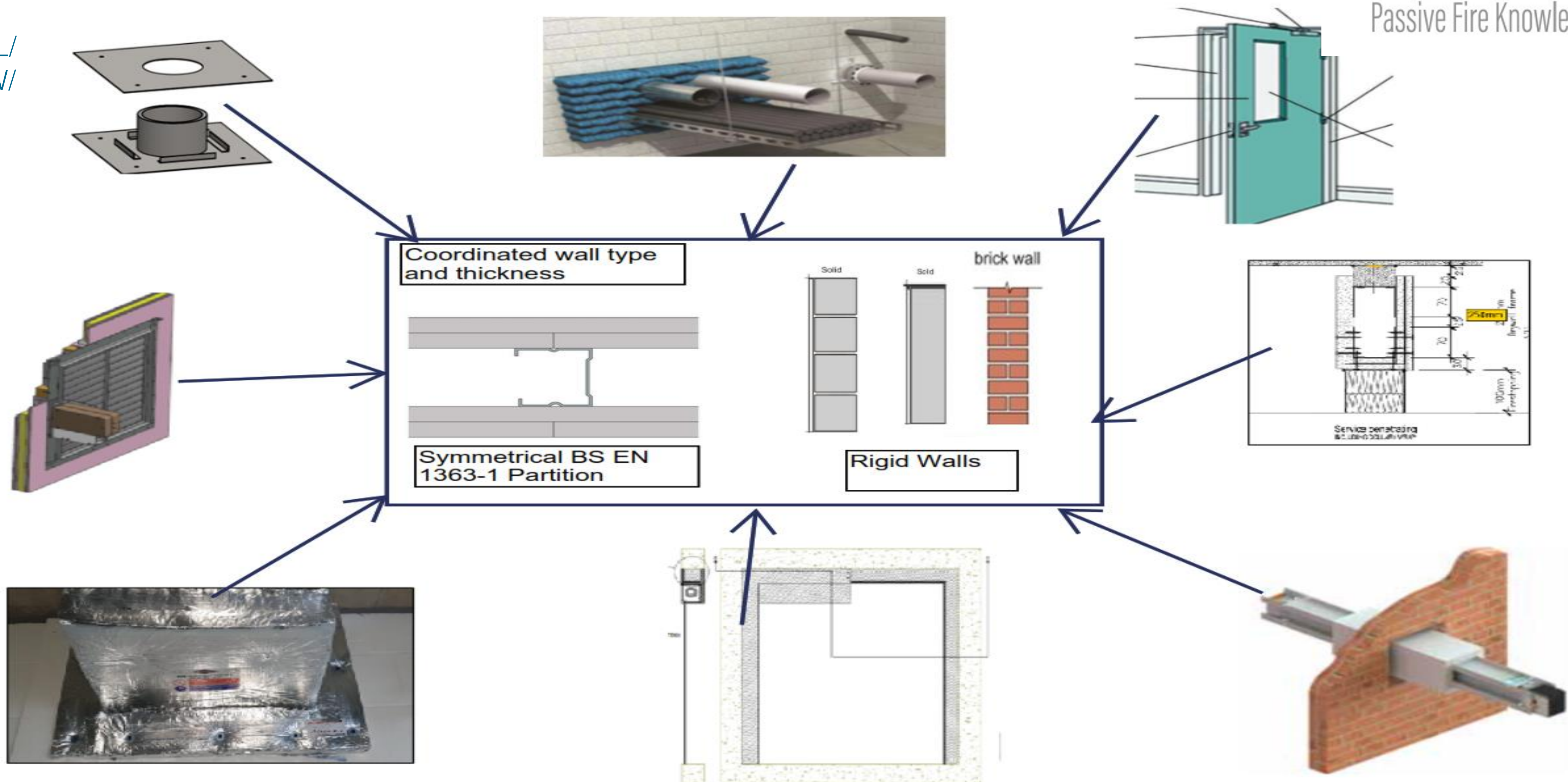
Information for future
change management

operating & maintenance
instructions.

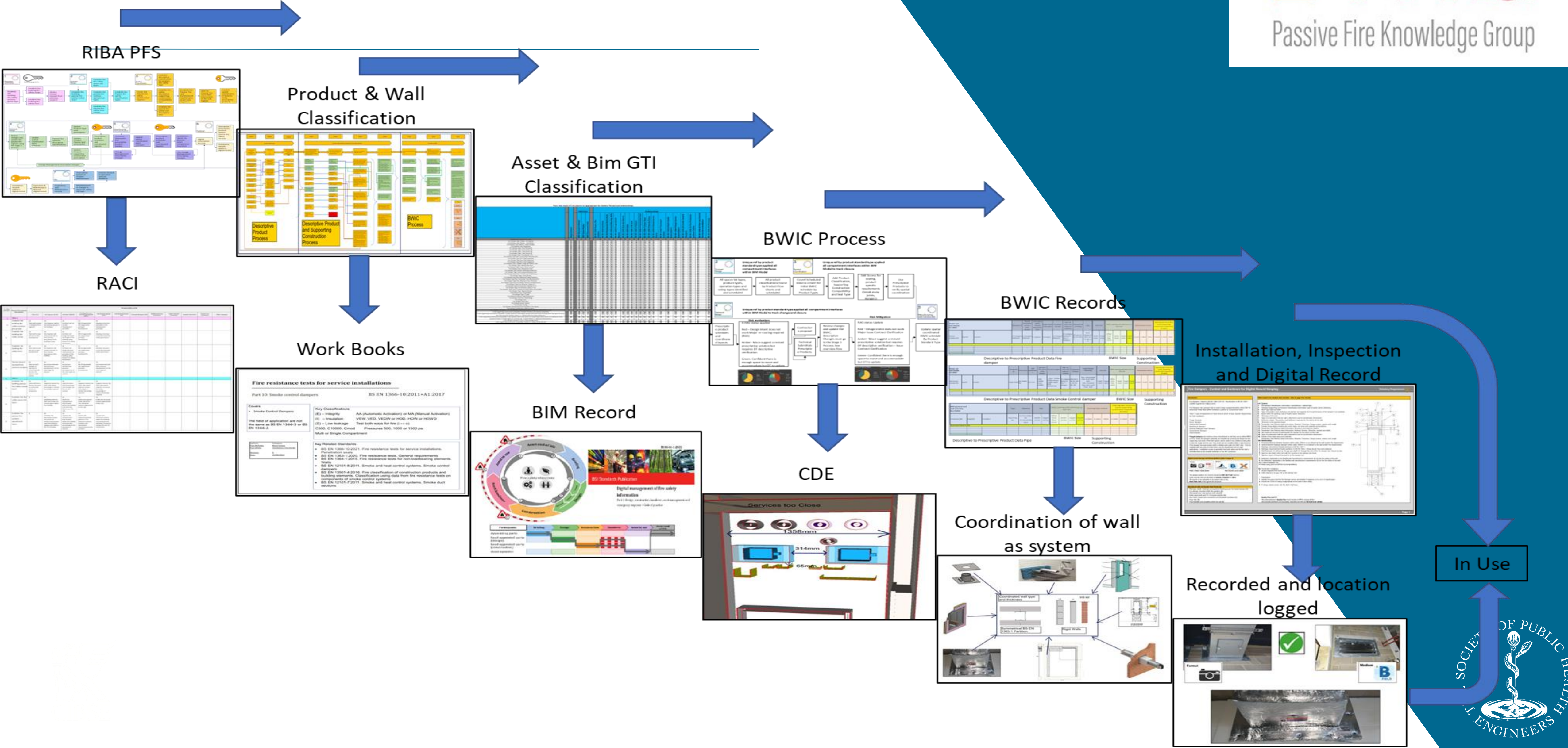


Key Topics – Design Review – BIM

NIGEL/
DREW/
PAUL



Key Topics – Design Review – BIM

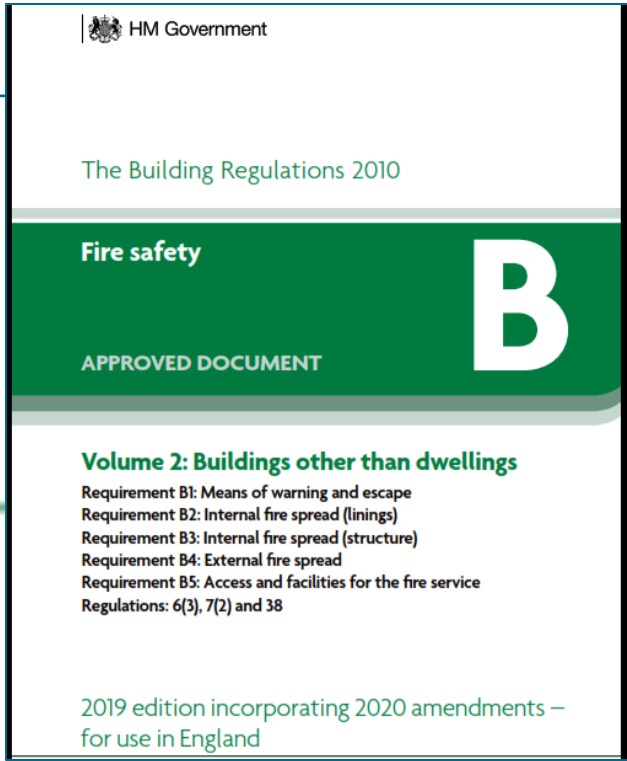


The Process required for descriptive pipework s

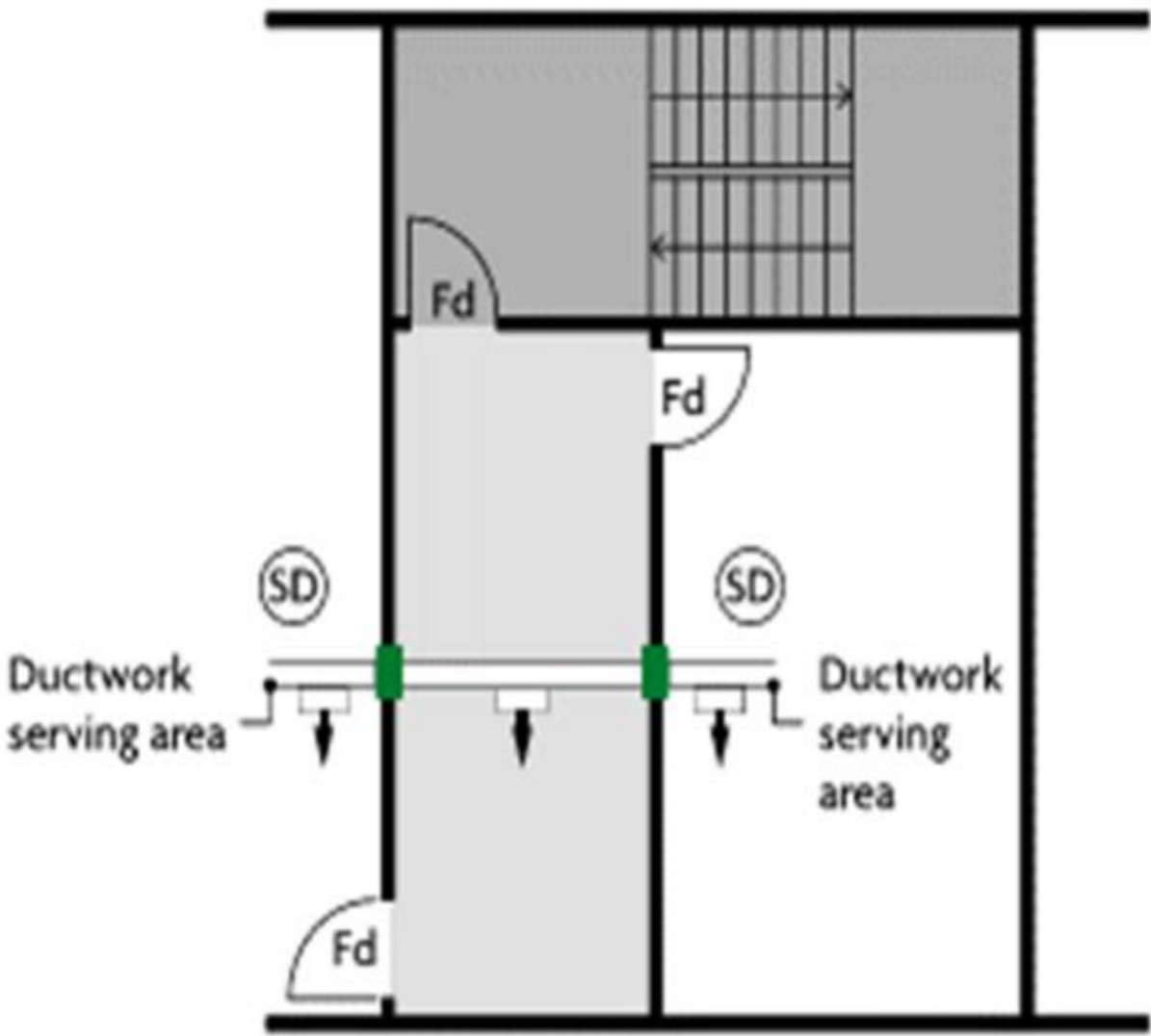
NIGEL/
DREW/
PAUL

Example:

Refuge in protected corridor with
pipe work transition



See para 10.15



- ES leakage rated fire and smoke damper conforming to BS EN 13501-3/BS EN 1366-2
- Protected stairway
- Protected lobby
- SD Smoke detection system in accordance with BS 5839-1 to activate ES damper
- Fd Fire doorset

NOTE: Ventilation ducts which serve other parts of the building should not supply or extract air directly to or from a protected escape route.

Diagram 10.3 Ductwork passing through protected escape routes – method 4

Fire resistance tests for service installations

Part 3: Penetration seals

BS EN 1366-

3

Key Classifications

- (E) – Integrity
- (I) – Insulation

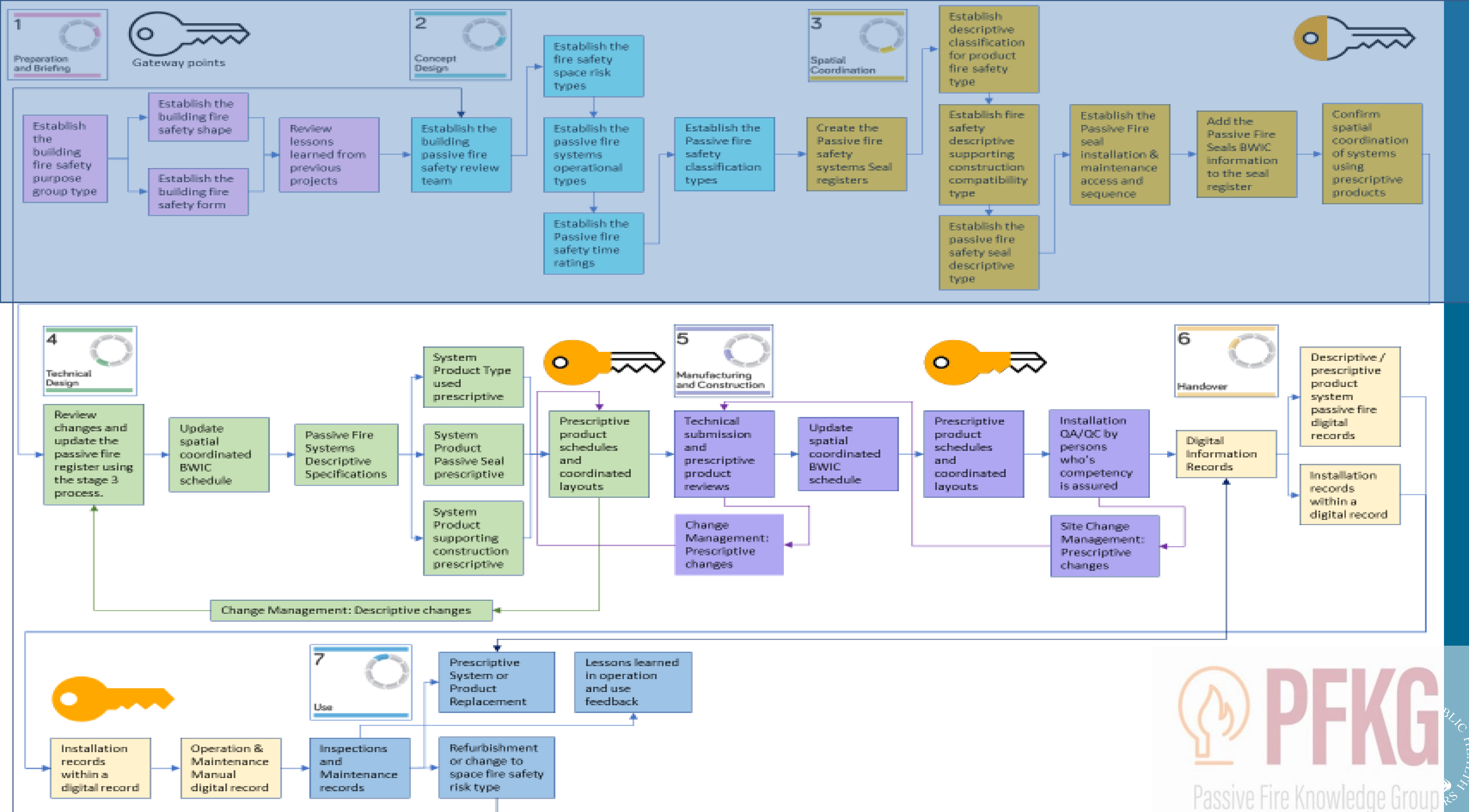
Key Related Standards

- BS EN 1366-3:2021. Fire resistance tests for service installations. Penetration seals
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- BS EN 1364-1:2015. Fire resistance tests for non-loadbearing elements. Walls
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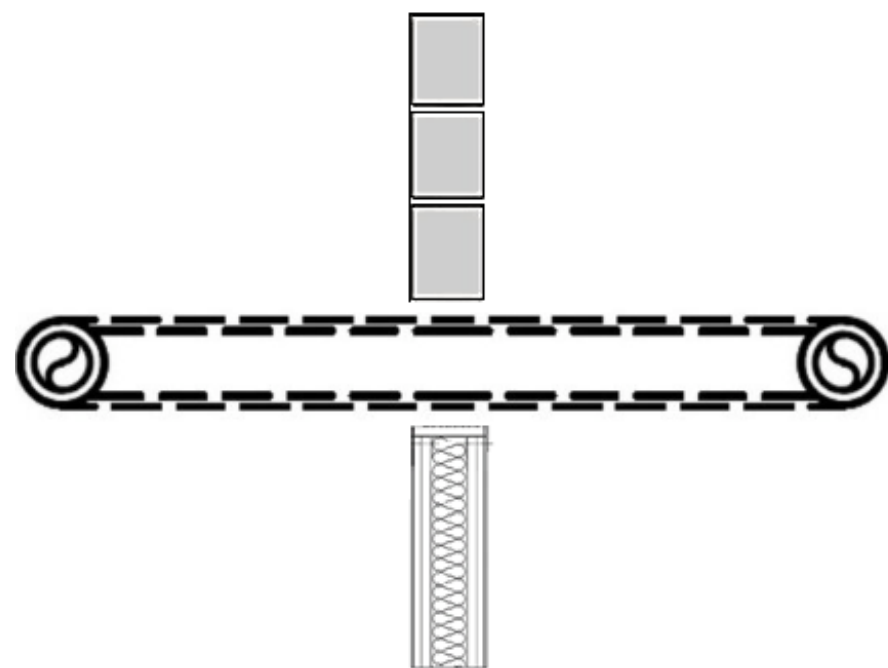
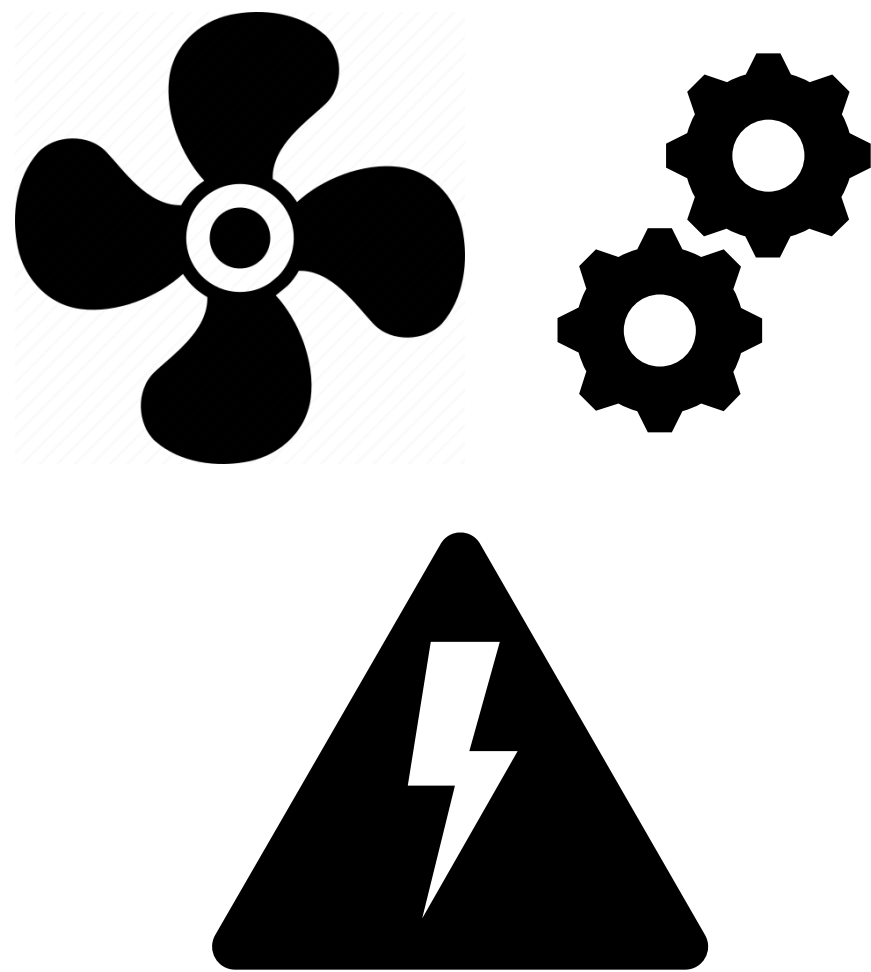
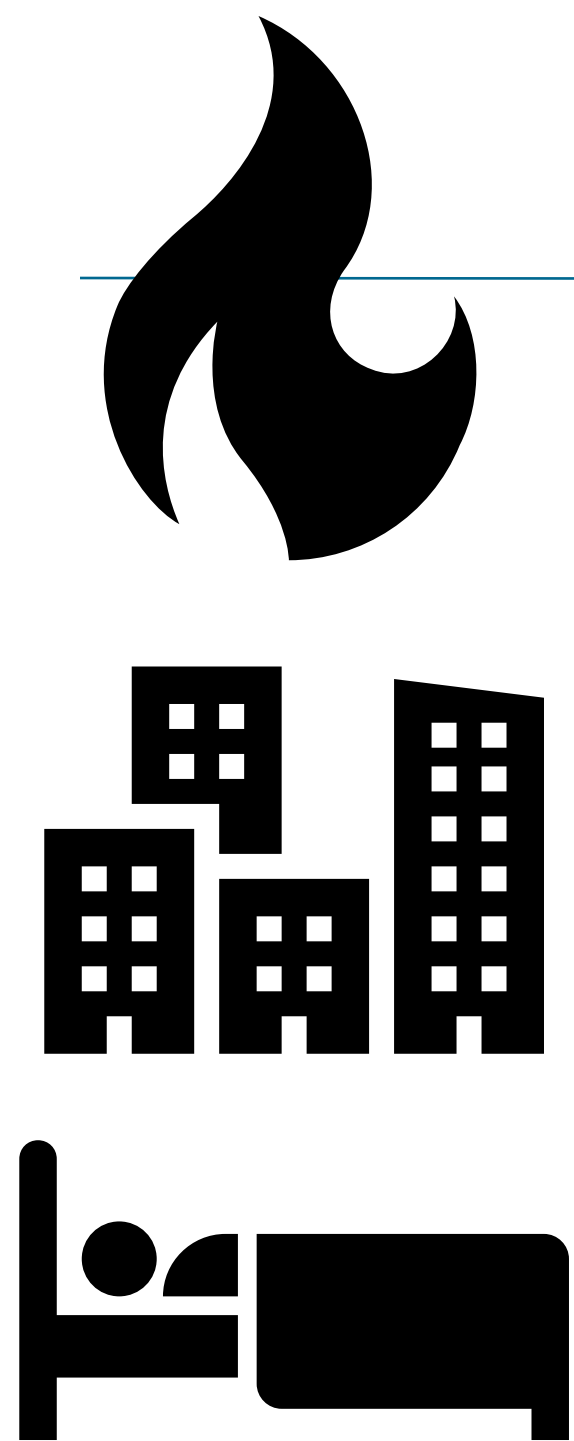
Covers

- Metallic Pipes
- Plastic Pipes
- Metallic Tray work
- Metallic Ladders
- Conduits
- Trunking
- Busbar

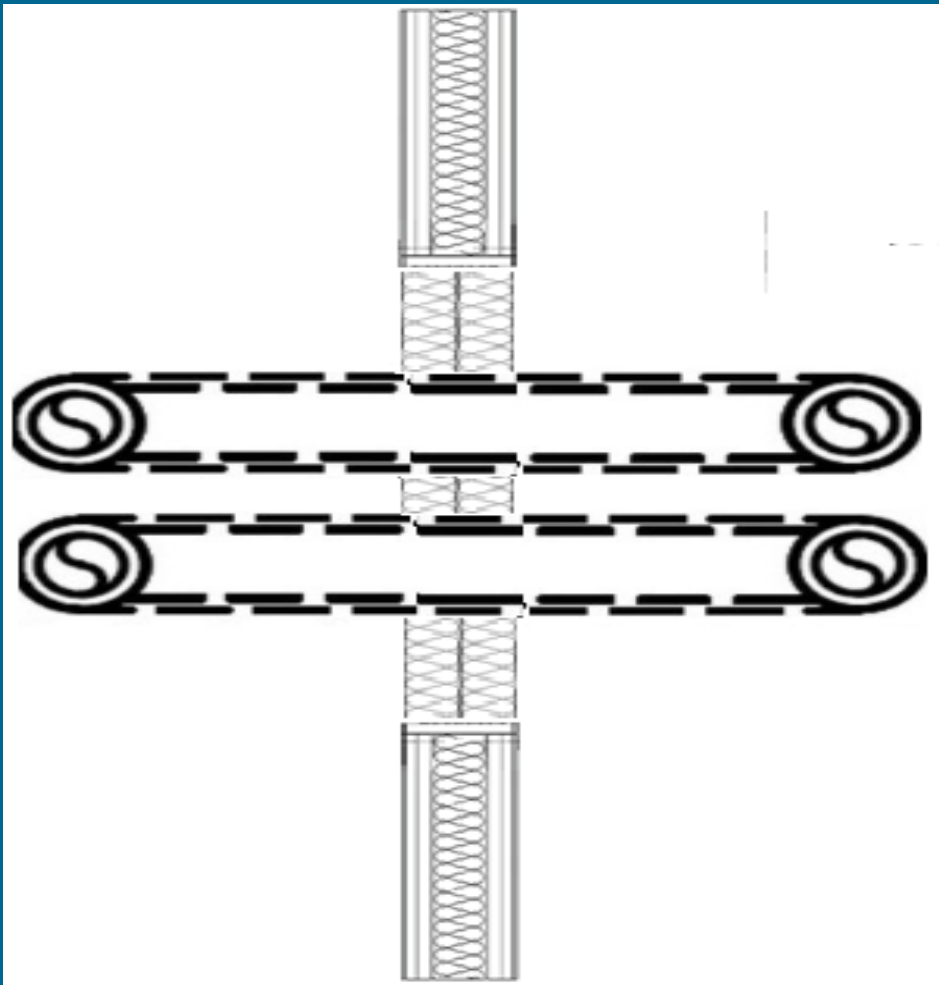
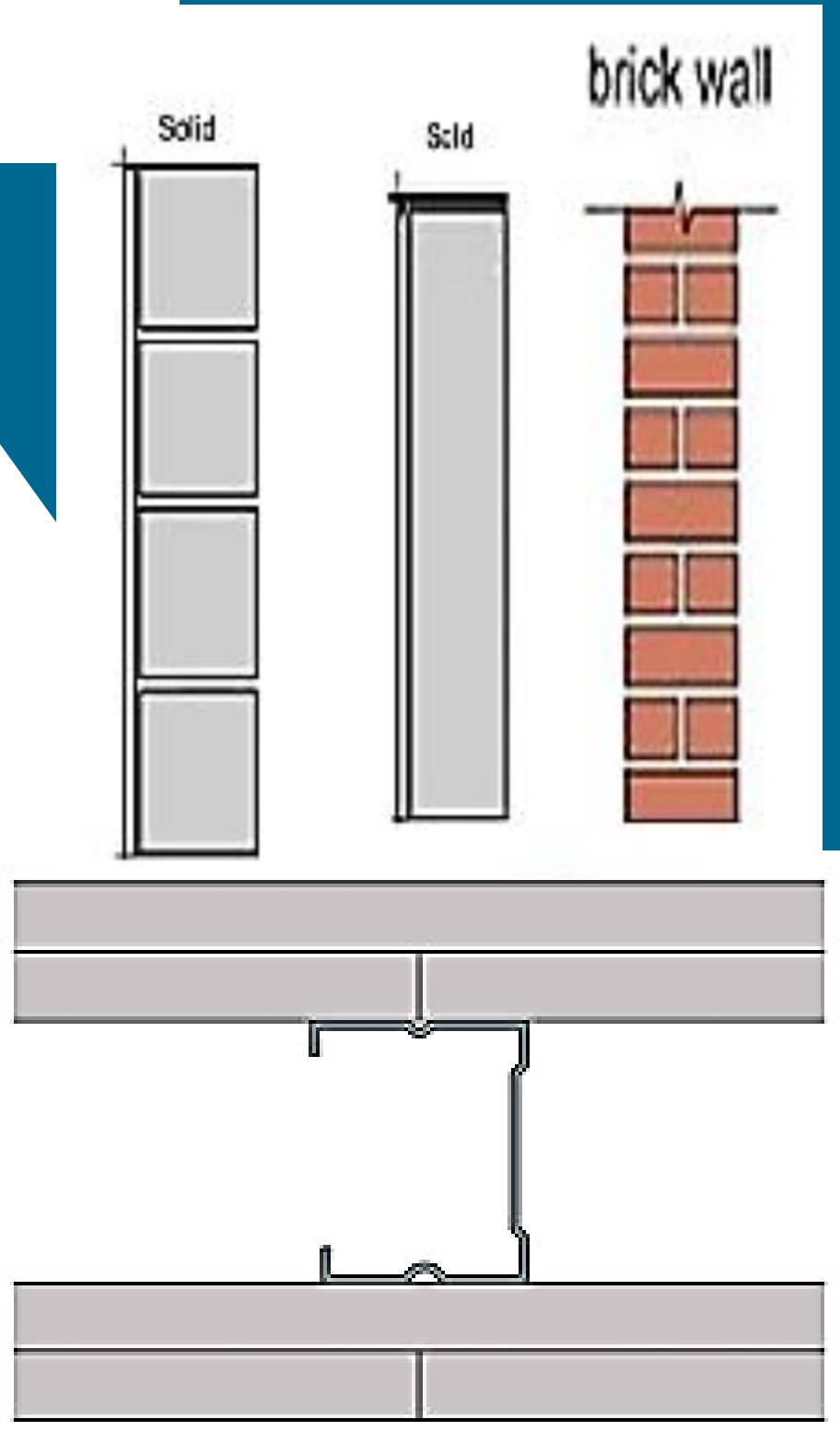
There are different fields for busbar, trunking and conduits



The Process required for descriptive pipework seals



E.I 120 H/V (U/C C/U/ U/U
C/C) (CS, CI, LS, LI)



Building fire safety type/space risk
fire safety type

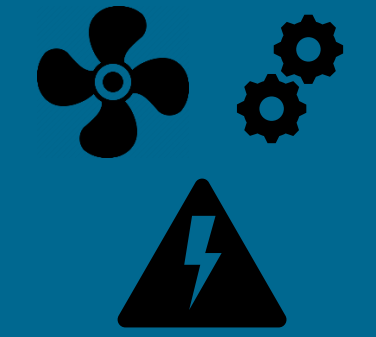
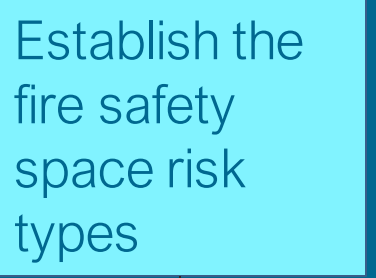
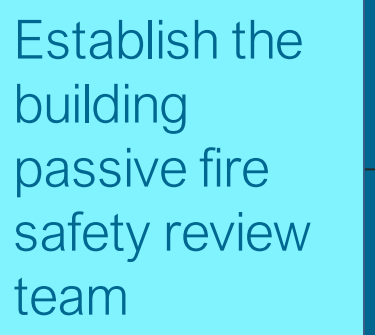
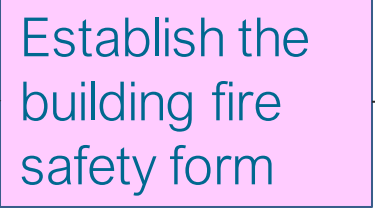
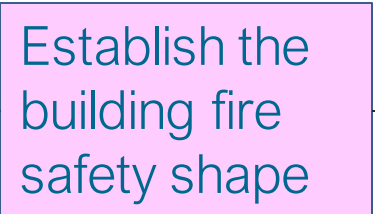
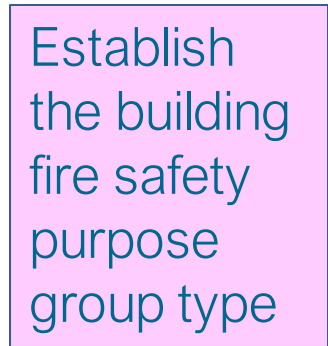
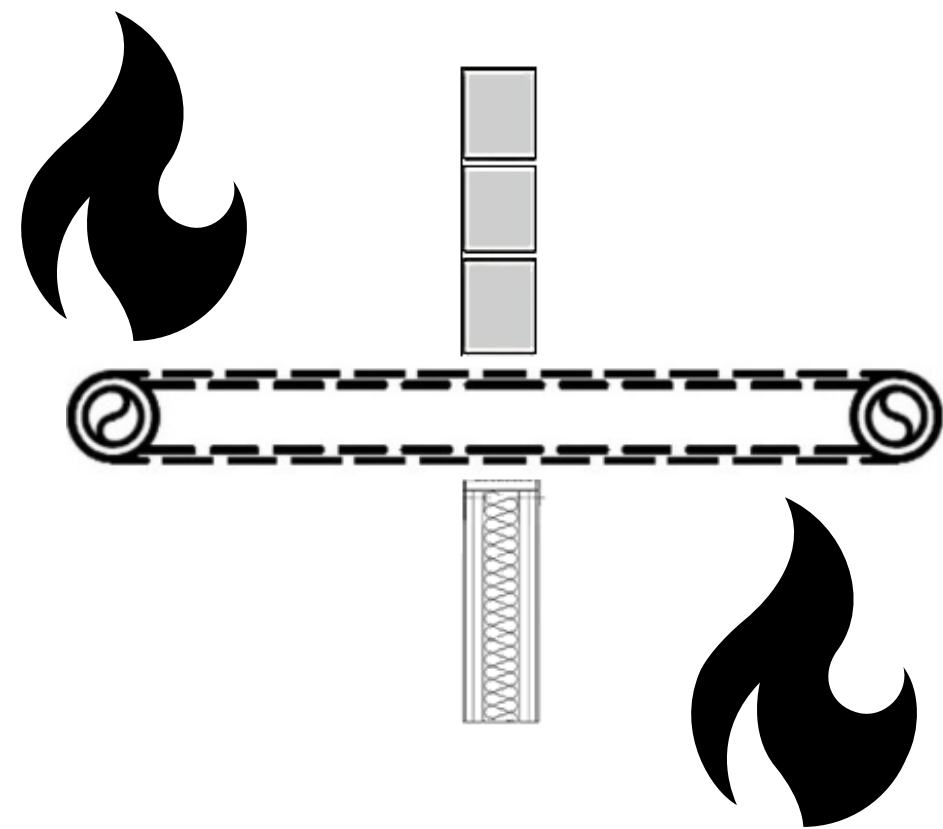
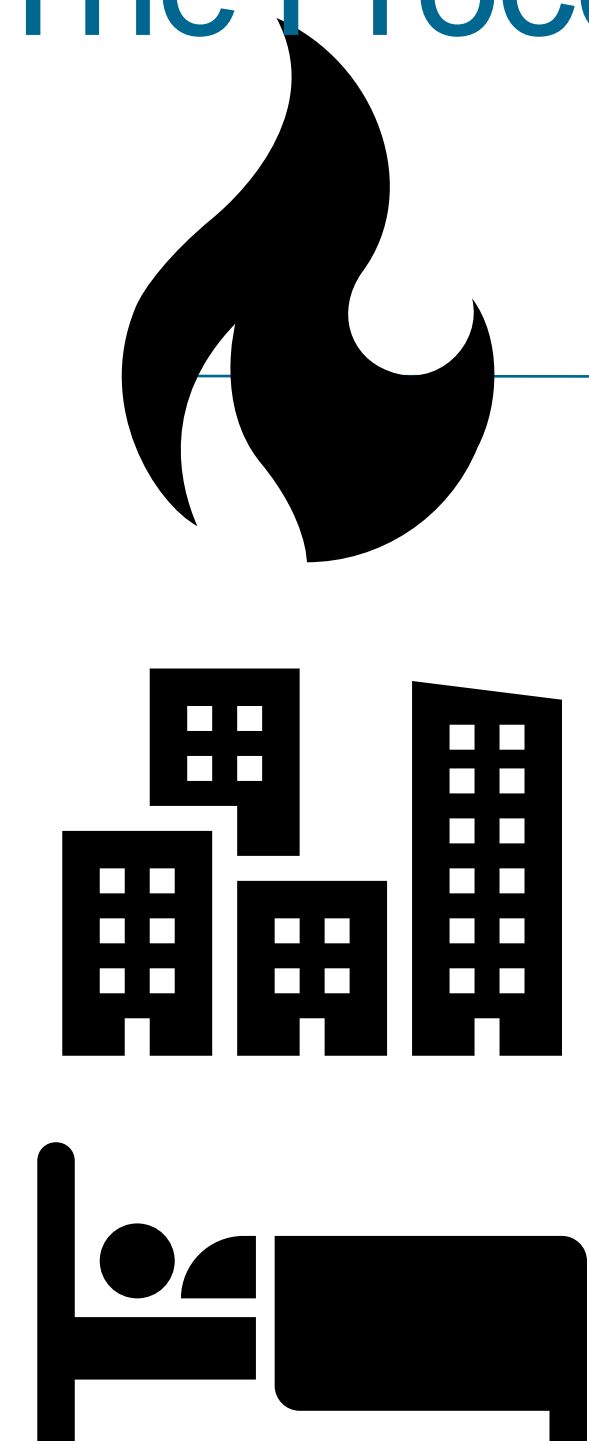
System fire safety operational type.
Static, Transient, Dynamic.

classification for product fire safety
type

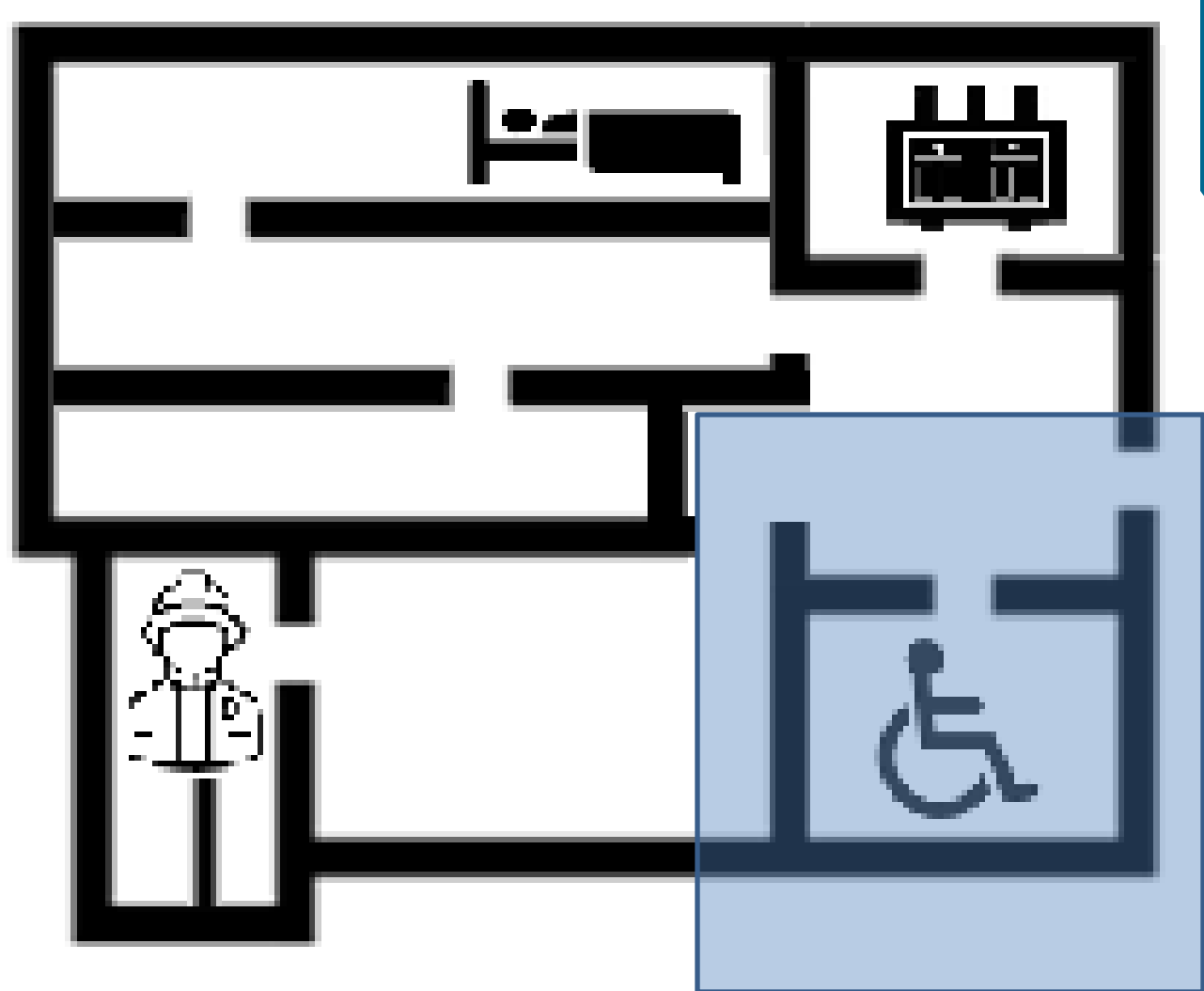
Supporting construction compatibility
type /P.F safety seal type

The installation/maintenance
access types.

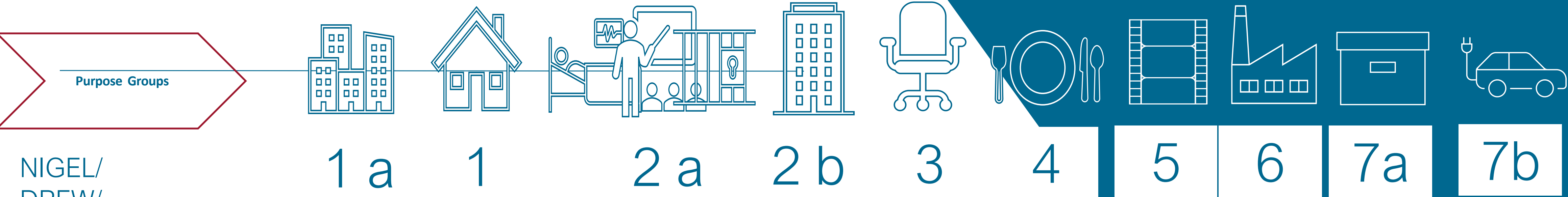
The Process required for descriptive pipew



Example:
Refuge in protected corridor with
pipe work transition

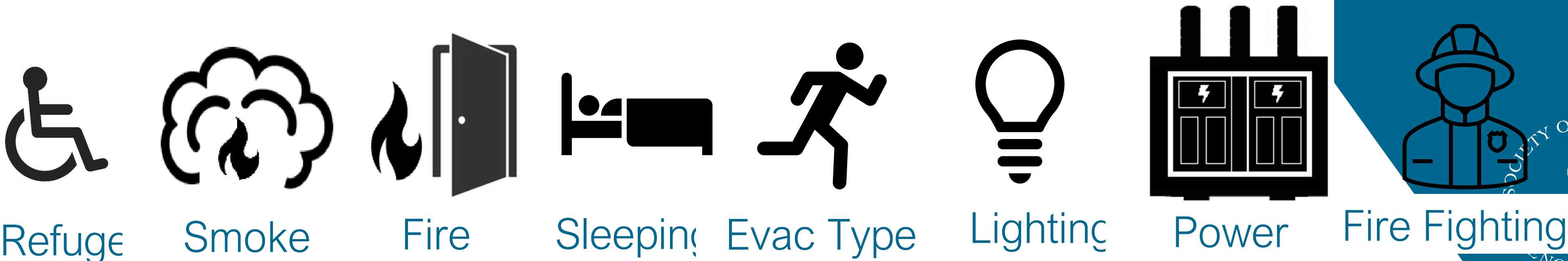
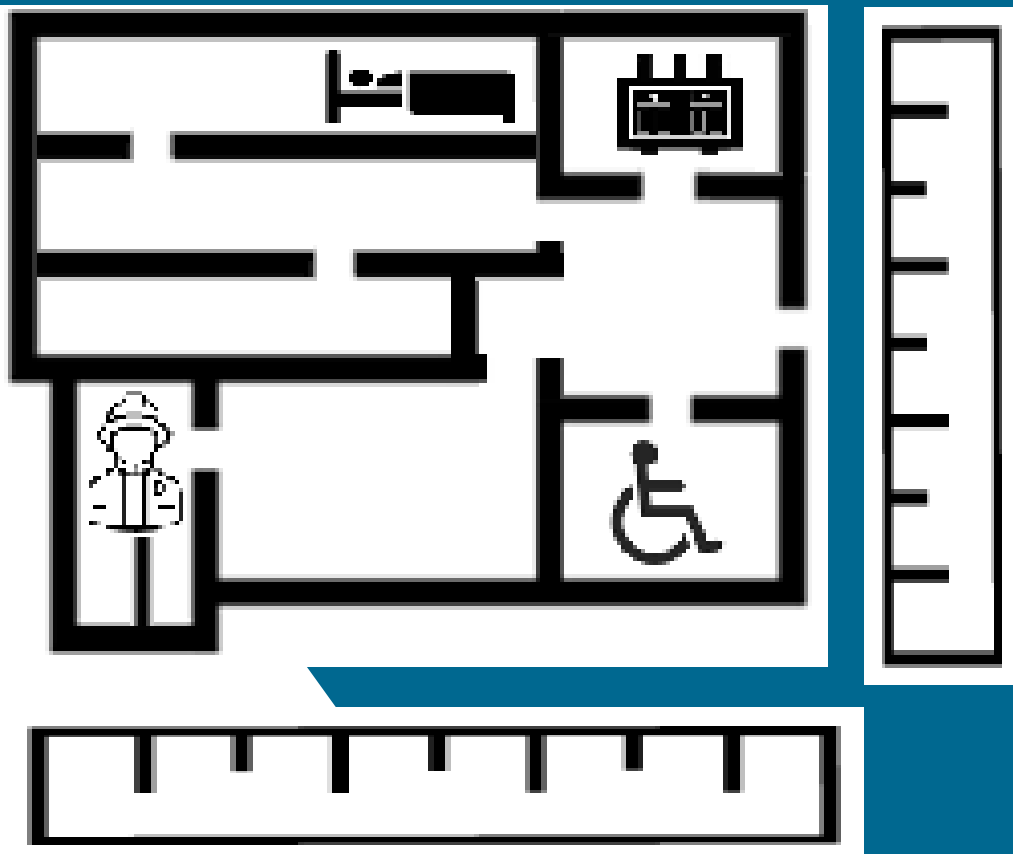


Building fire safety type/space risk fire safe

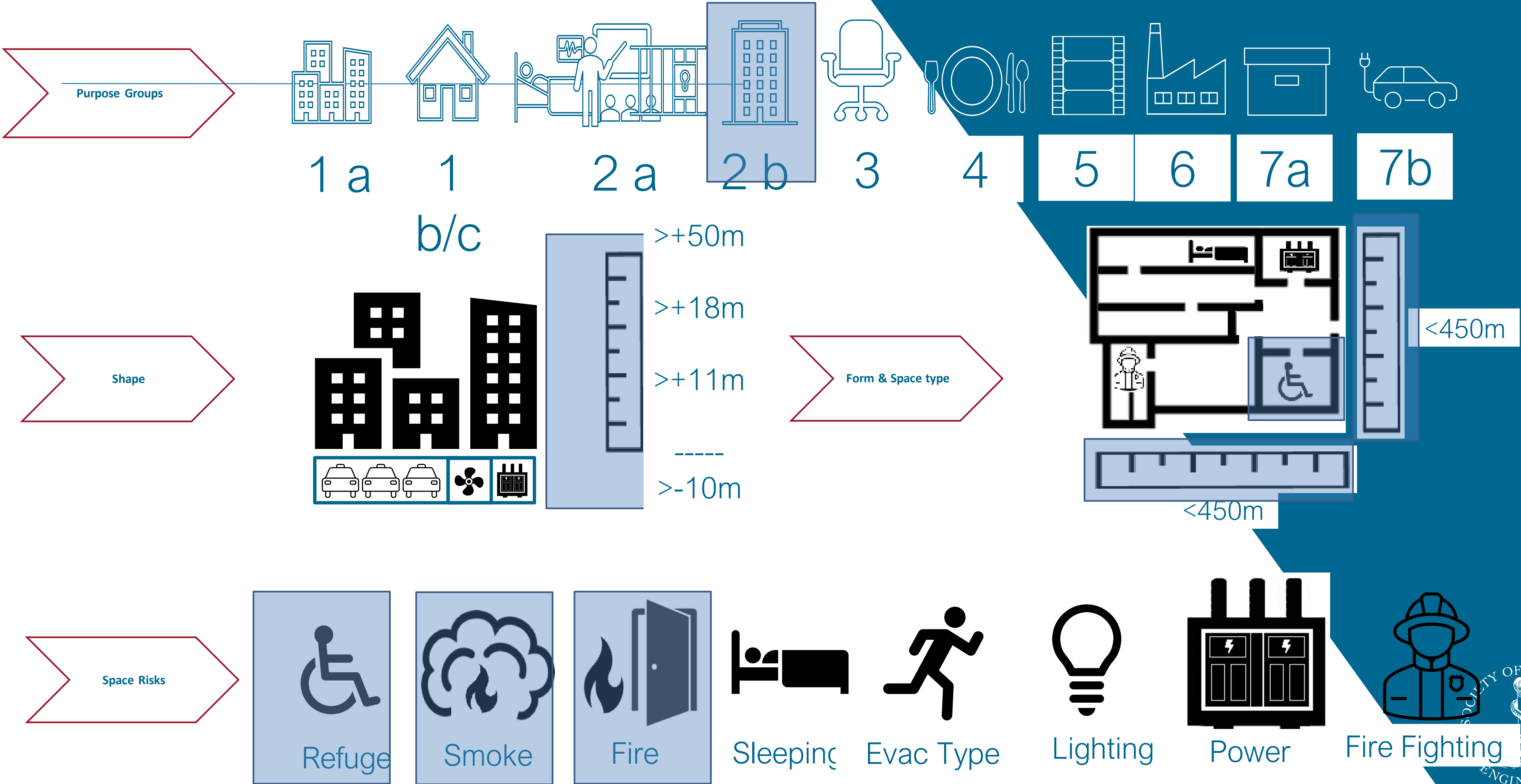


NIGEL/
DREW/
PAUL

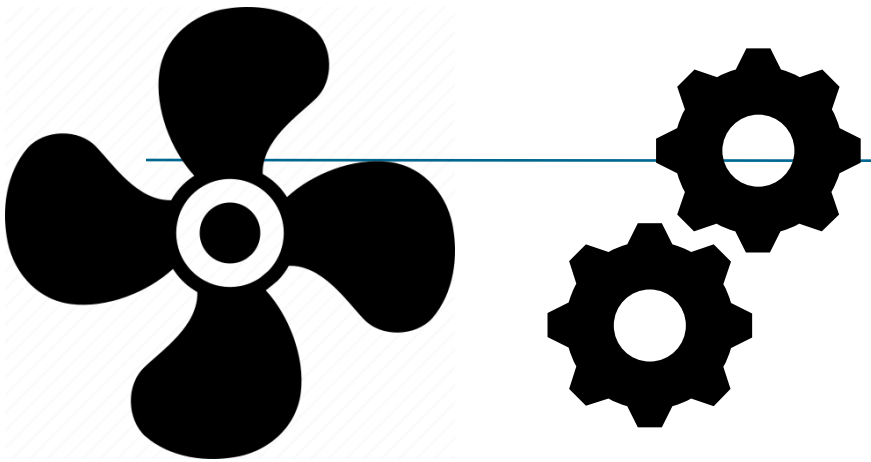
b/c



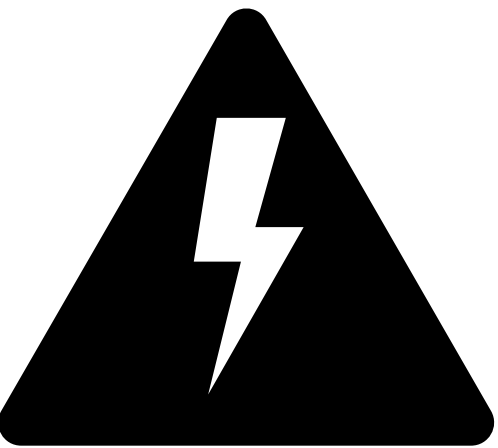
Building fire safety type/space risk fire safe



The Process required for descriptive pipework s



System fire
safety
operational type.
Static, Transient,
Dynamic.

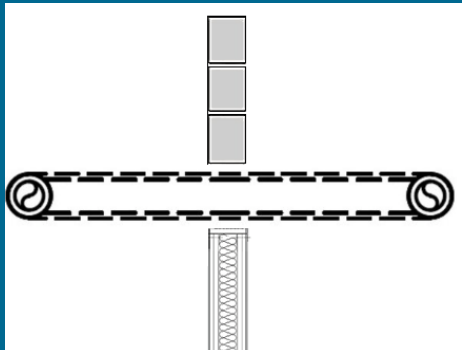


Building fire safety
type/space risk
fire safety type

Establish the
passive fire
systems
operational
types

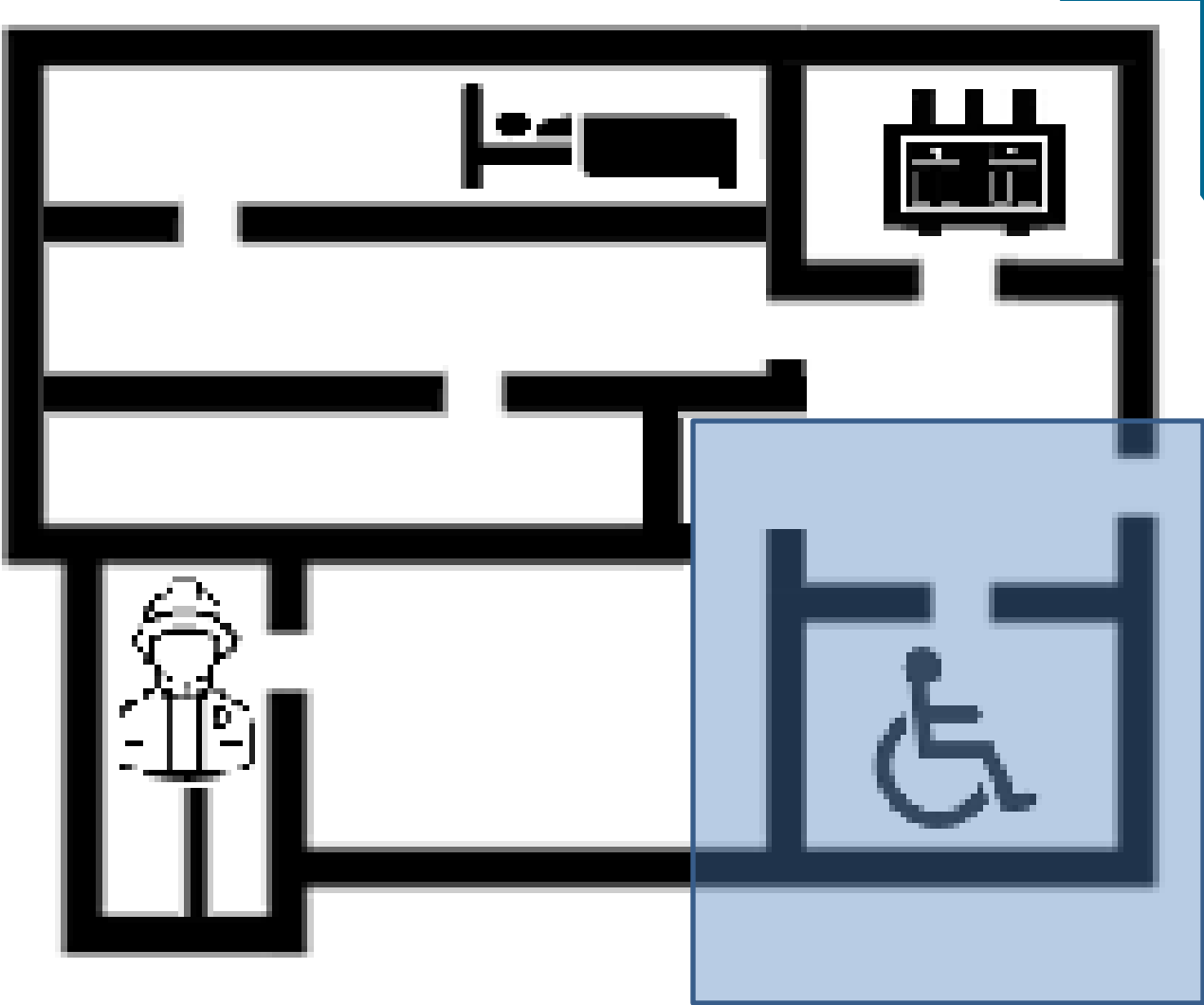
Establish the
Passive fire
safety time
ratings

classification for
product fire
safety type









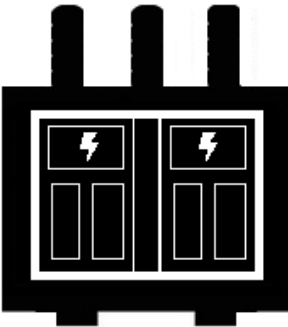





E.I 120 U/C C/U/U/U C/C

Example:
Refuge in protected corridor with
pipe work transition



Building fire safety type/space risk fire safe

Space Type		Risk	Time	Capped/ Un Capped	Material	Fluid Temp oC	Required	Sustained/ interrupted	Plane	Movement mm
	Protected Corridor or Lobby		30-240 minutes	C/C, U/C, C/U, C/C	Non Combustible/ Combustible	-x to +x	Y/N	CS, CI, LS, LI	H/V	-XX to +XX
	Sleeping, Clinical		30-240 minutes							
	Phased Evacuation		30-240 minutes							
	Simultaneous Evacuation		30-240 minutes							
	Power Critical supplies		30-240 minutes							
	Fire Fighting		30-240 minutes							



Smoke (S)



Fire (E)



Insulation (I)

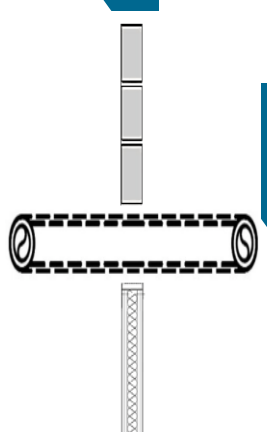


Radiance (W)

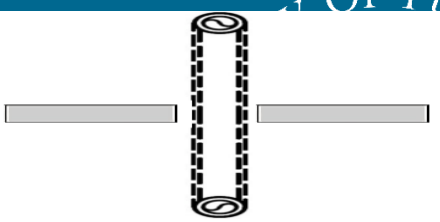
Combustible (melting points lower than 1153oC)
– Plastics (Upvc, ABS, HDPE

Non Combustible (melting points higher than 1153oC)
– Steels, Copper, Stainless steels.

Insulation for thermal or acoustics

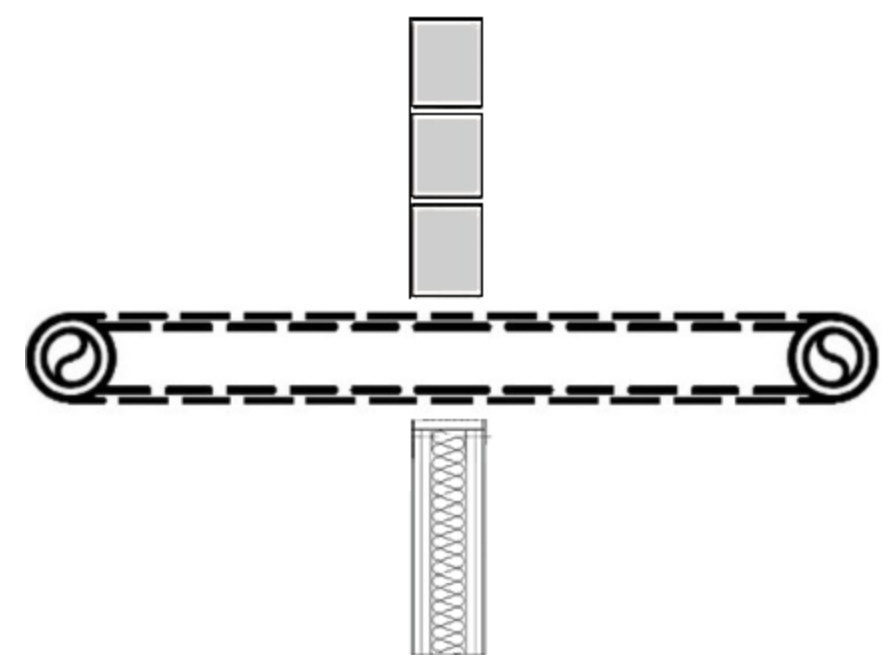


H – Horizontal

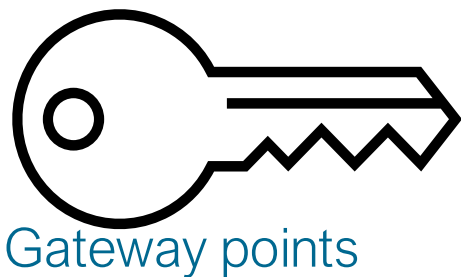


V - Vertical

The Process required for descriptive pipework



E.I 120 V/H (U/C C/U/
U/U C/C) (CS, CI, LS, LI)

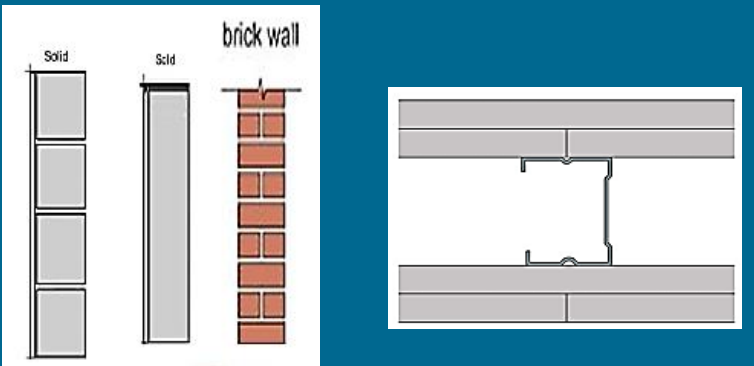


Establish the
Passive fire
safety
classification
types

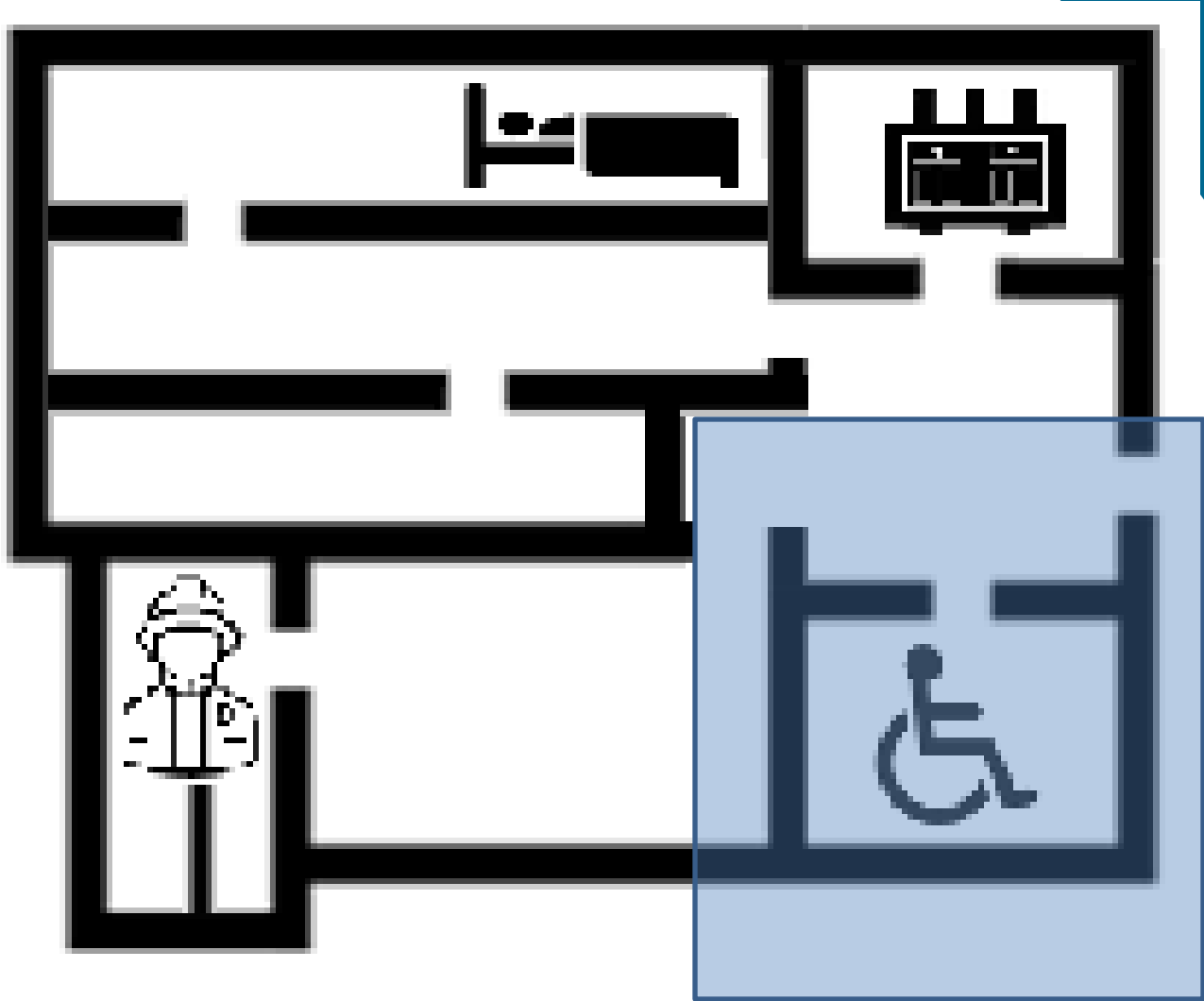
Create the
Passive fire
safety
systems Seal
registers







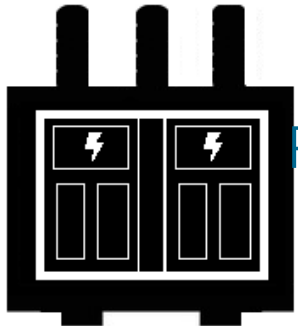

Establish
descriptive
classification
for product
fire safety type





Example:
Refuge in protected corridor with
pipe work transition





Building fire safety type/space risk fire safety type

Space Type		Risk	Time	C/C U/C C/U C/C	Materi al	OD Size	Wall Size	Fluid Temp oC	Pipe Insulant	Insulant Seal	Plane	Movem ent mm	Supports from wall	Seal type
	Protected Corridor or Lobby	E.I	30-240 minutes	C/C	steel	100mm	6.2mm	RWP 0-40	CS	Sleeve	H	-25mm +4mm	≤500m	Sleeve
	Sleeping, Clinical		30-240 minutes											
	Phased Evacuation		30-240 minutes											
	Simultaneous Evacuation		30-240 minutes											
	Power Critical supplies		30-240 minutes											
	Fire Fighting		30-240 minutes											

 Smoke
(S)

 Fire (E)

 Insulation
(I)

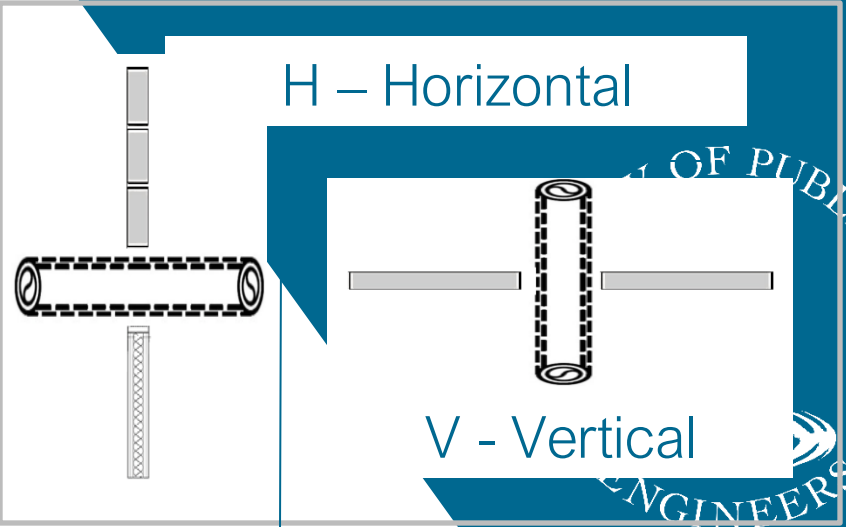
 Radiance
(W)

Combustible
(melting points
lower than
1153oC)
– Plastics (Upvc,
ABS, HDPE

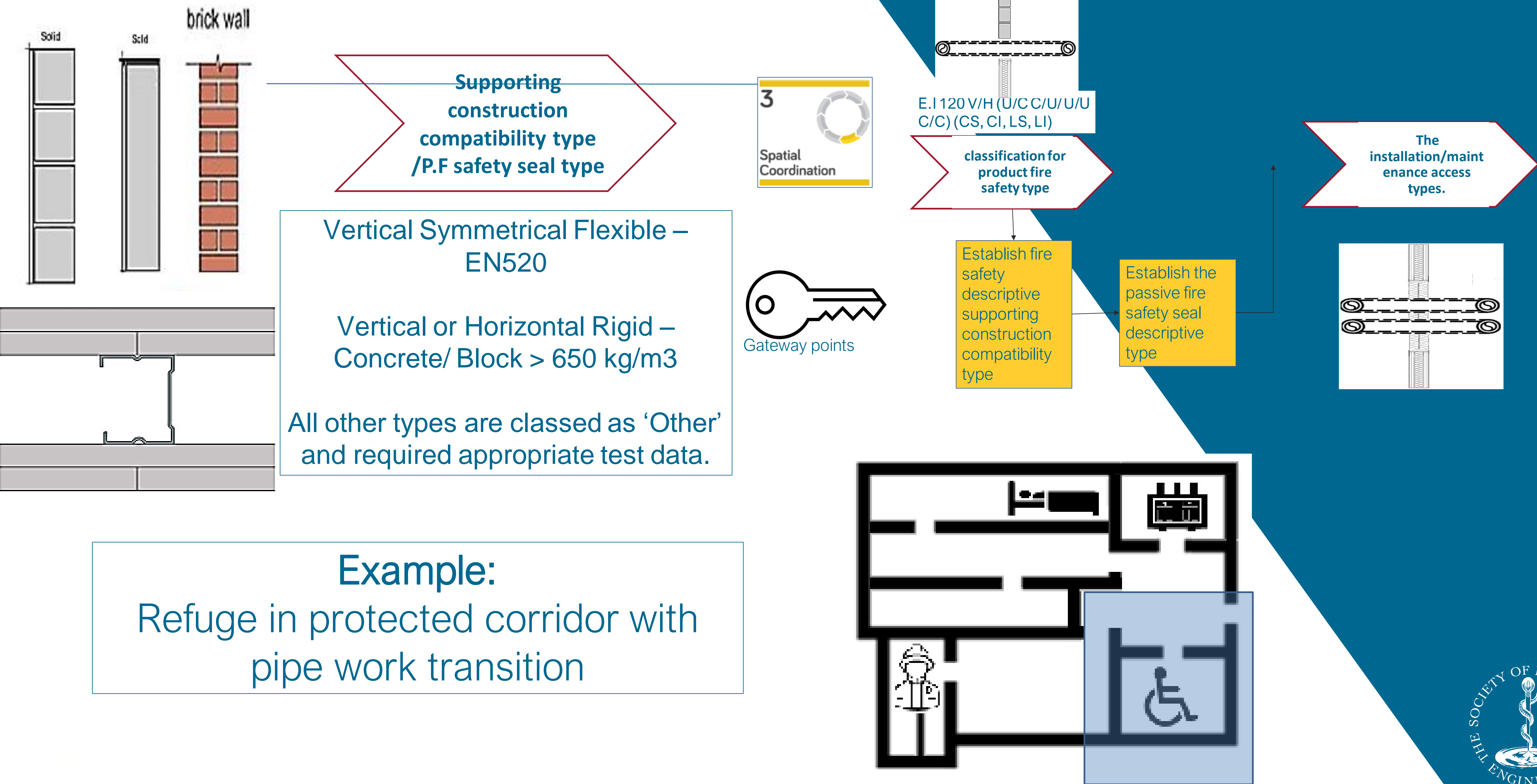
Non Combustible
(melting points
higher than
1153oC)
– Steels, Copper,
Stainless steels.

Pipe Seal Types
Crush Collars
Pipe Wraps
Intu Mastics
Sleeves
Mortar

Insulation Seals
Crush Collars
Pipe Wraps
Intu Mastics
Sleeves
Mortar



The Process required for descriptive pipew



Building fire safety type/space risk fire safety type Classification

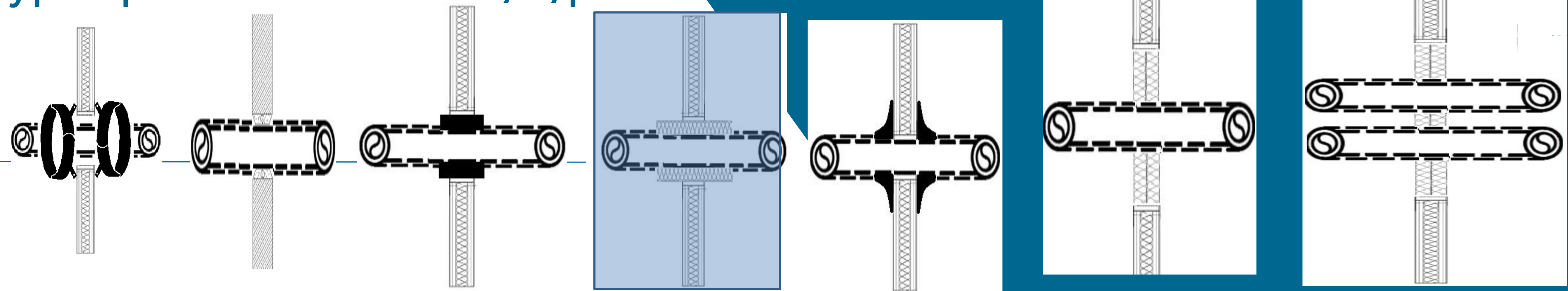
E.I 120 (H)(C/C)(CS)



Protected
Corridor or
Lobby

Arrangement

Seal Type

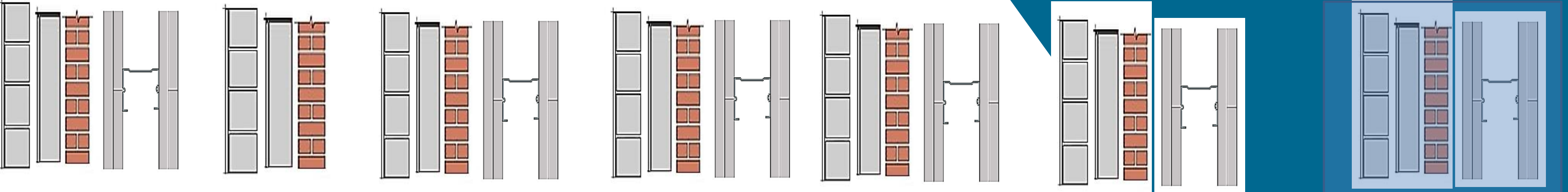


Crush Collar/ Mortar Wraps **Sleeve** Intu Mastic Batt/Mastic + Sleeve/wrap/Collar Multi Hole + Sleeve/wrap/Collar

Vertical Symmetrical Flexible – EN520

Vertical or Horizontal Rigid – Concrete/ Block > 650 kg/m3

Wall System Type



All other types of wall or floor are classed as “Other” and require supporting test and classification data.

Wall Thickness is specific to test arrangement

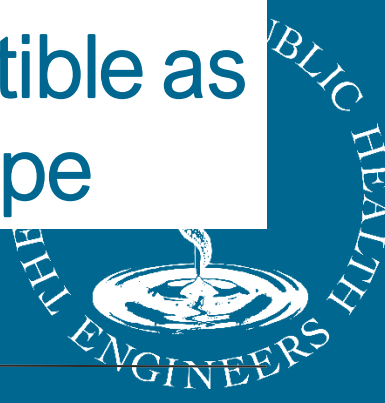
Wall Thickness

Check with the damper manufactures DOP and compare with other wall system products DOP to ascertain the thickness for all system components (I.E. Doors, FR Ducts, Flues, Glass Screens, Pipework, Busbar, FR Cable Containment Systems)

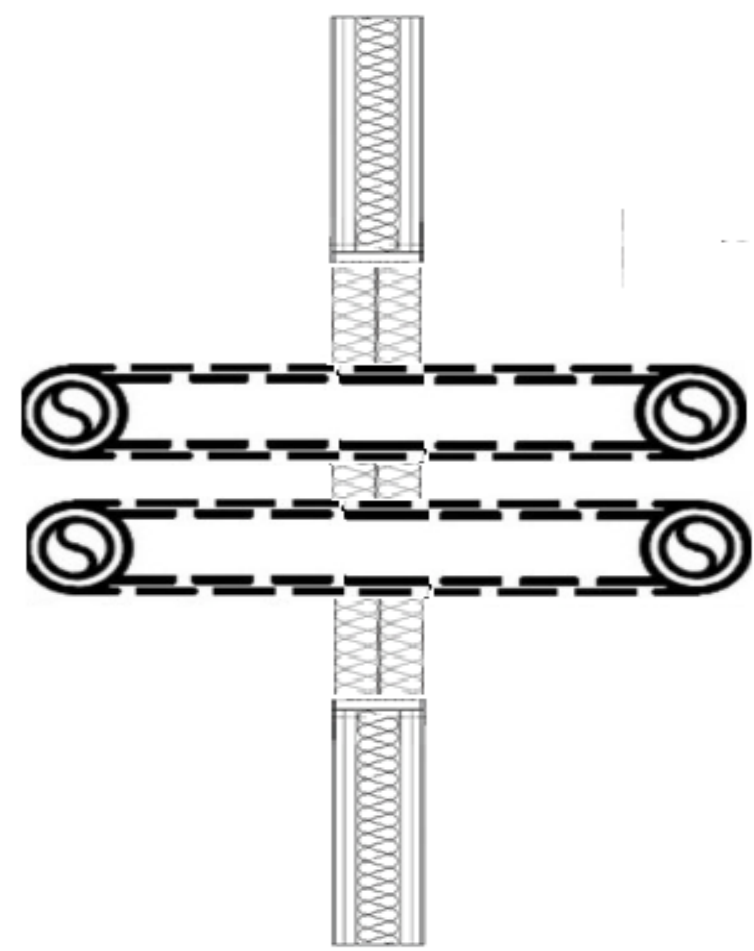
Combustible / Non Combustible

Material Type

Combustible Non-Combustible Non-Combustible (insulation only) & Combustible Non-Combustible Non-Combustible (insulation only) & Combustible Non-Combustible & Combustible as seal type Non-Combustible & Combustible as seal type



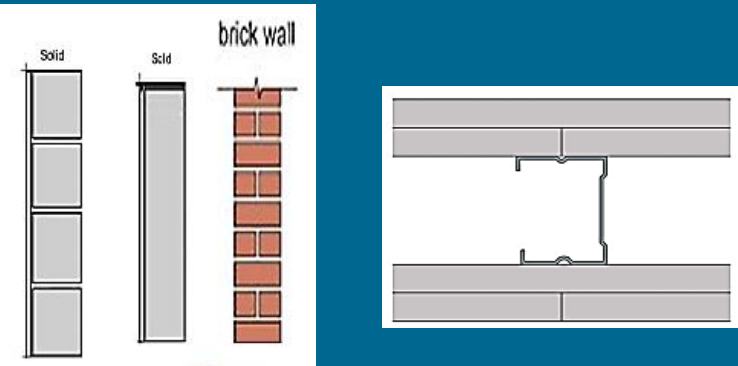
The Process required for descriptive pipework seals



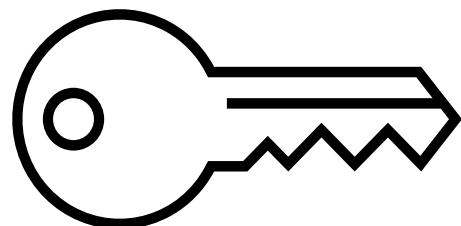
The installation/maintenance access types.

3

Spatial Coordination



Supporting construction compatibility type /P.F safety seal type



Gateway points

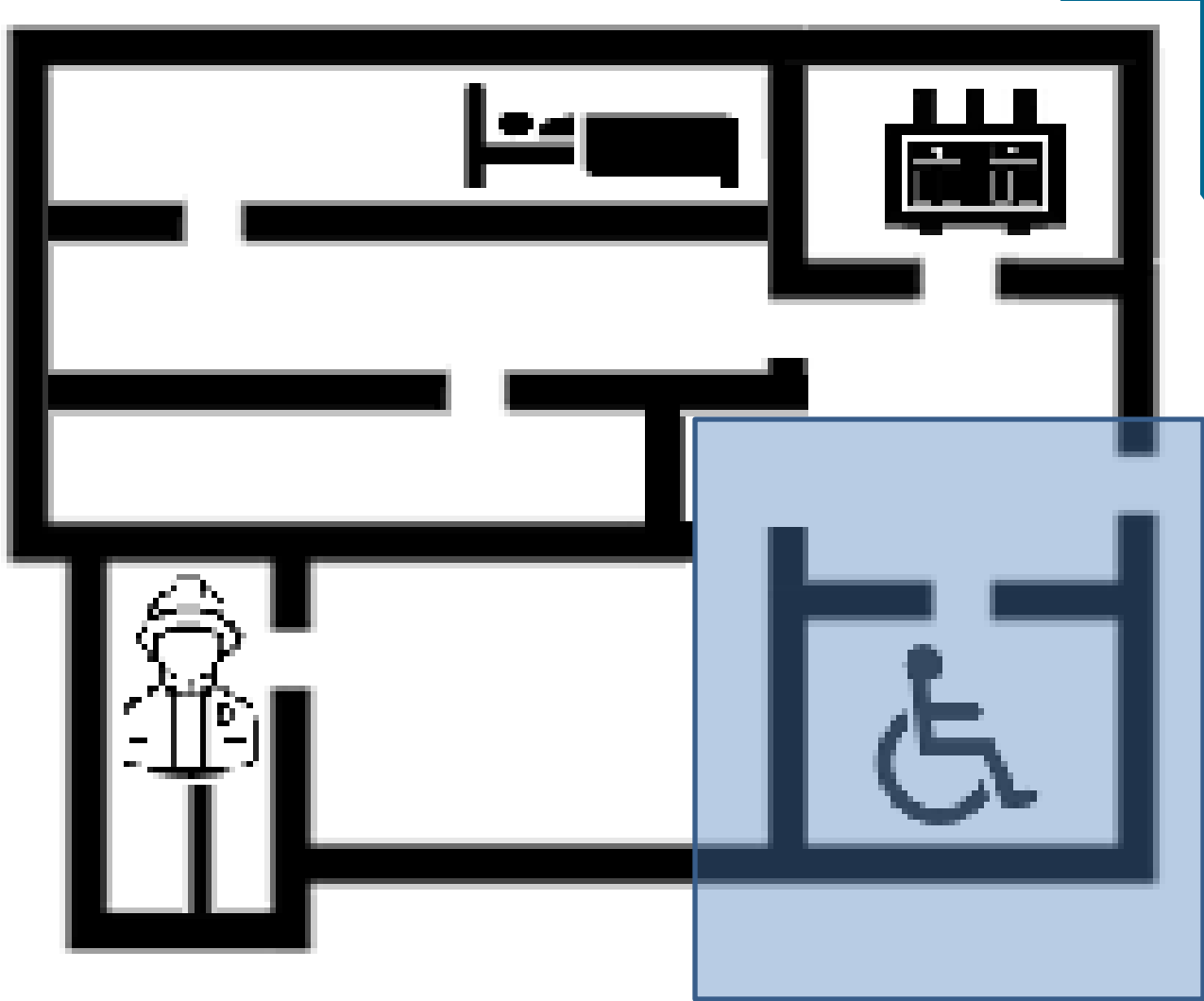
Establish the Passive Fire seal installation & maintenance access and sequence

Add the Passive Fire Seals BWIC information to the seal register


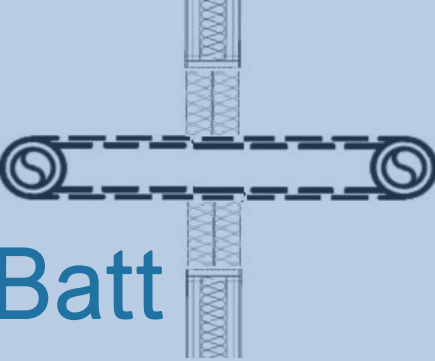

Confirm spatial coordination of systems using prescriptive products



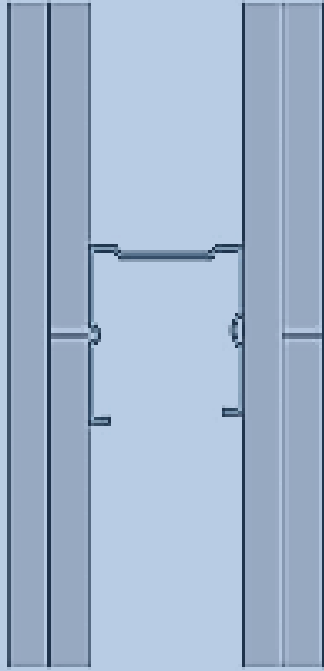
Example:
Refuge in protected corridor with pipe work transition



Building fire safety type/space risk fire safety type

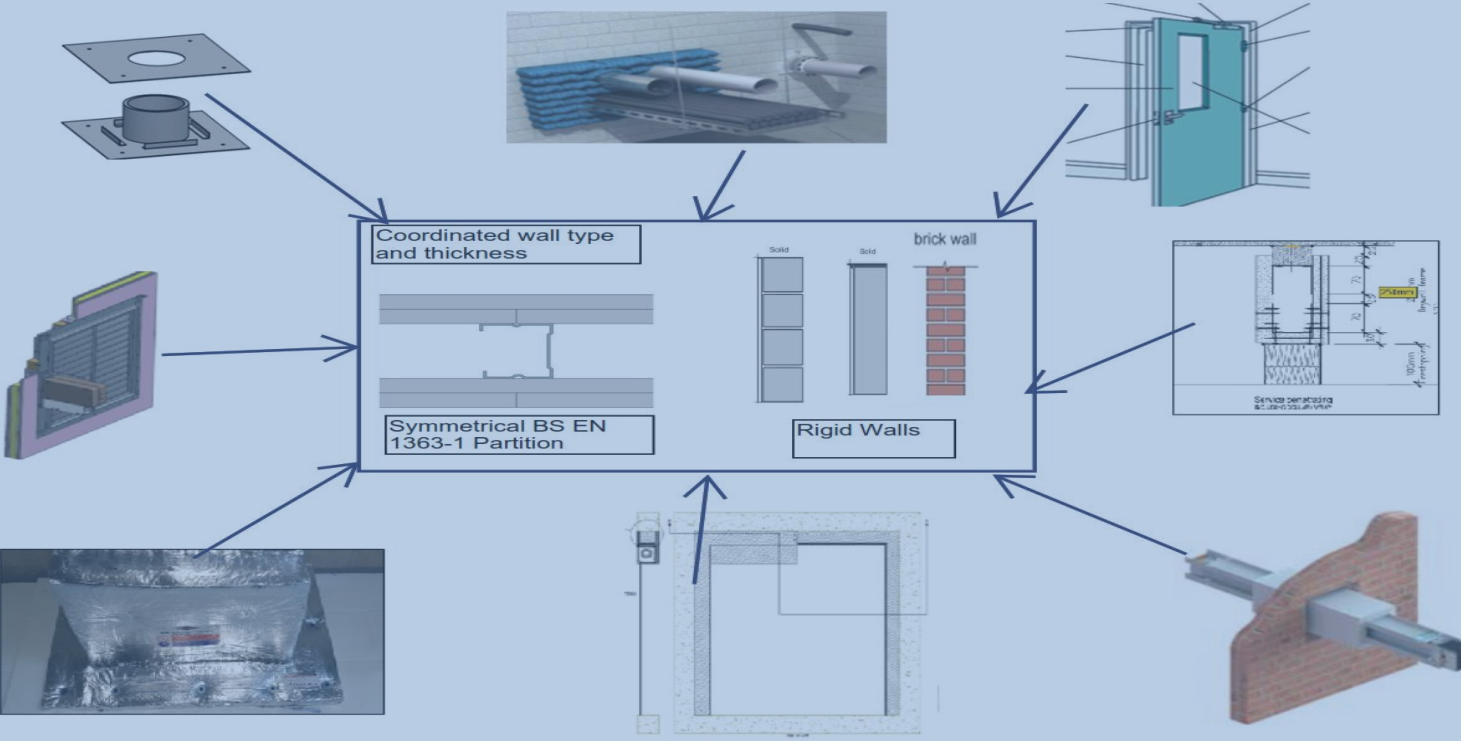
Classification	Material	Size OD	Fluid Temp oC	Wall Position
E.I 120 (V)(C/C) (CS)	Non-Combustible	100mm	0oC	H - Horizontal
 Protected Corridor or Lobby	Insulation Yes	Arrangement  Batt	Seal Type  Sleeve	Supports Straight pipe length and support ≤500mm

Wall Type



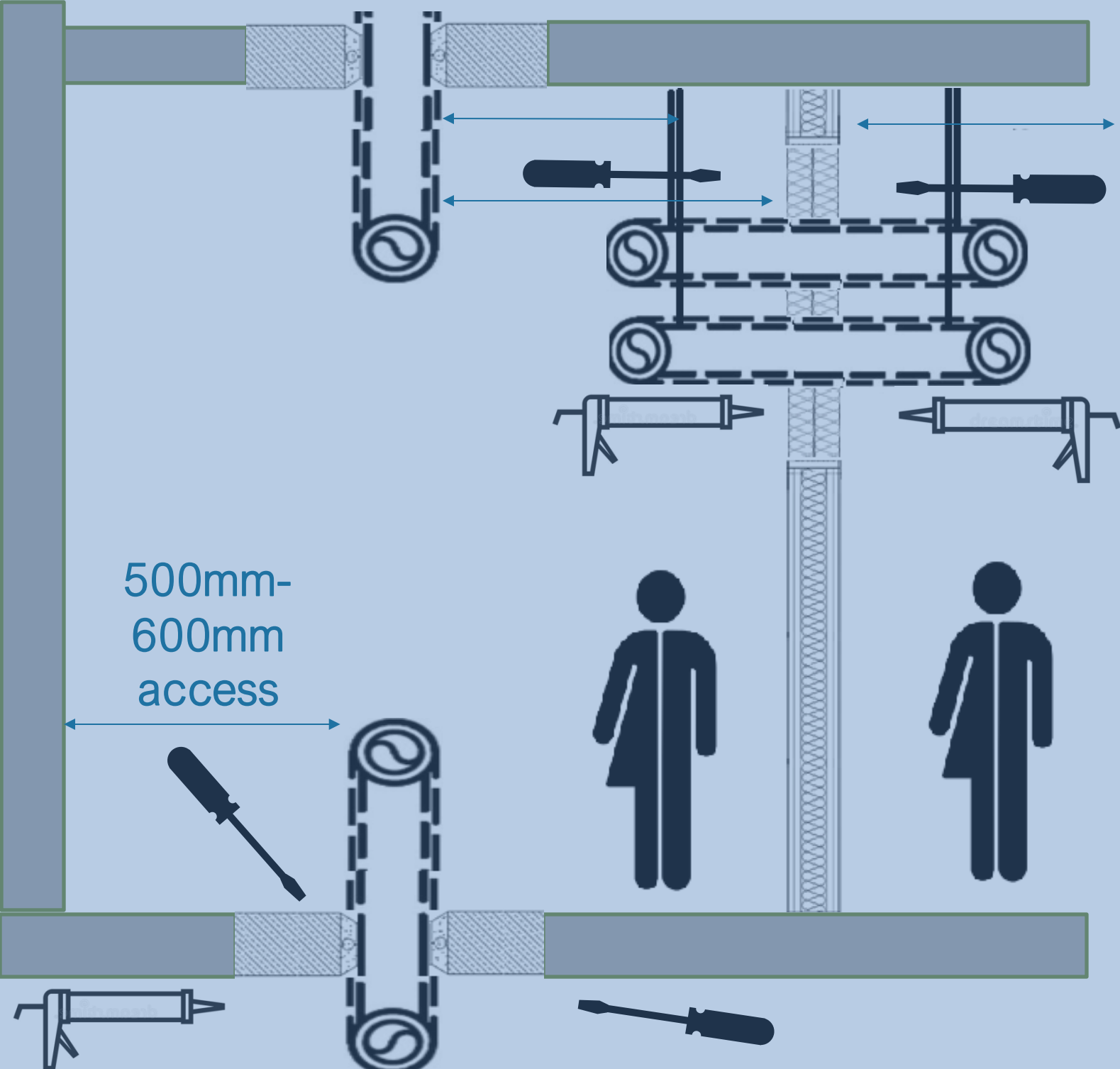
Symmetrical
Flexible – EN520

Wall System Thickness



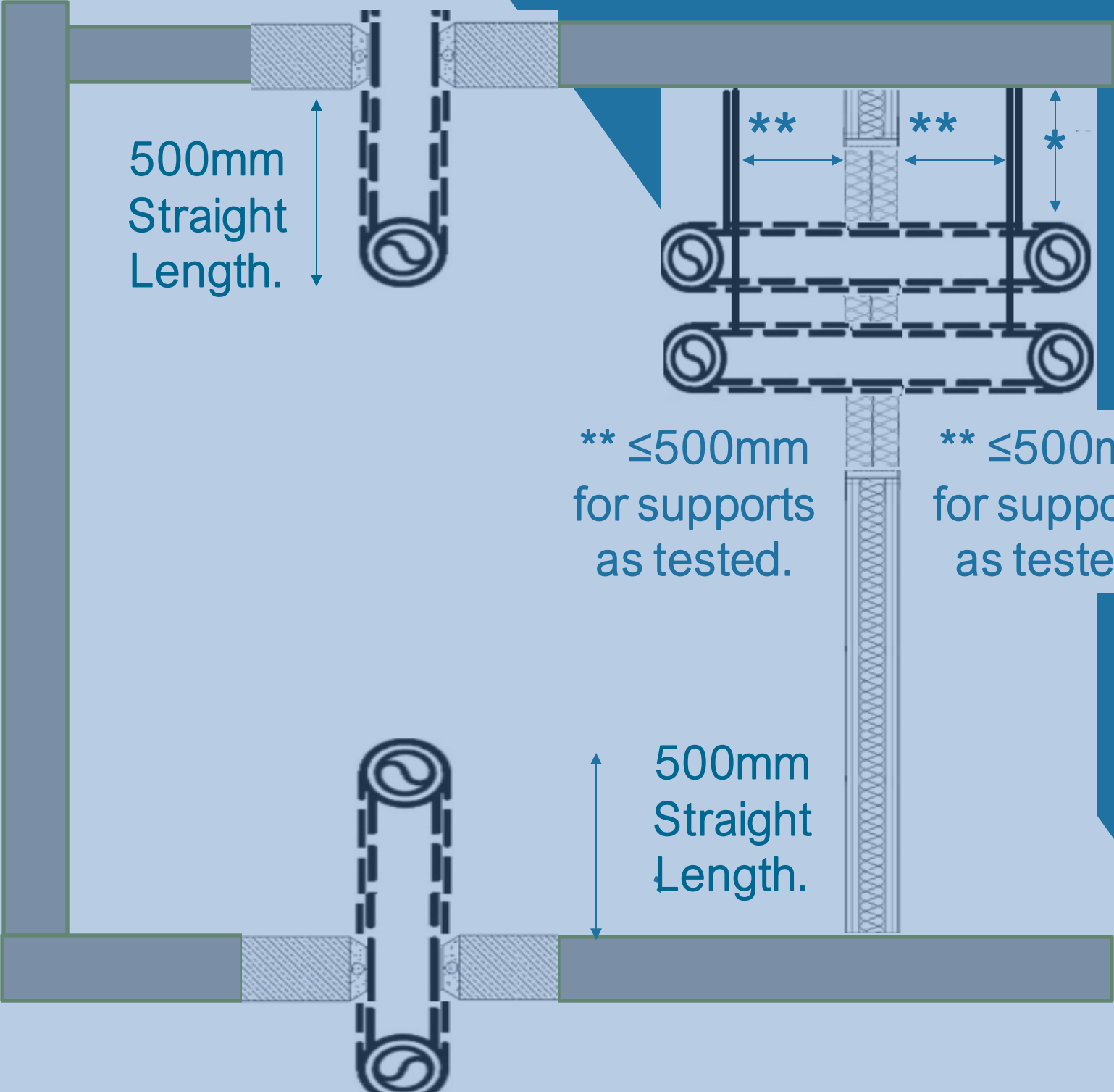
Installation Requirements

Notes: Anchors to selected BS B539. Where sleeves or mastics touch the pipe surface, ensure that there is no corrosion risk. i.e. CPCV or Stainless Steel (mineral wool)



500mm-600mm access

500mm-600mm access



500mm Straight Length.

** ≤500mm for supports as tested.


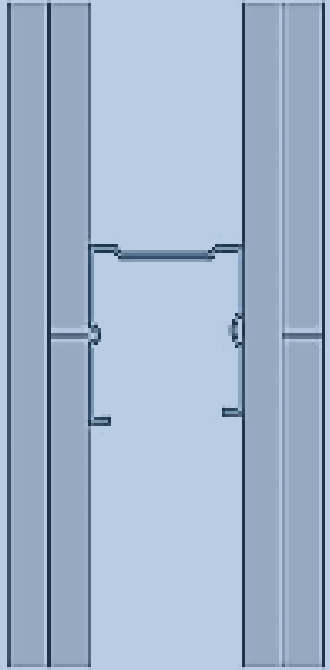
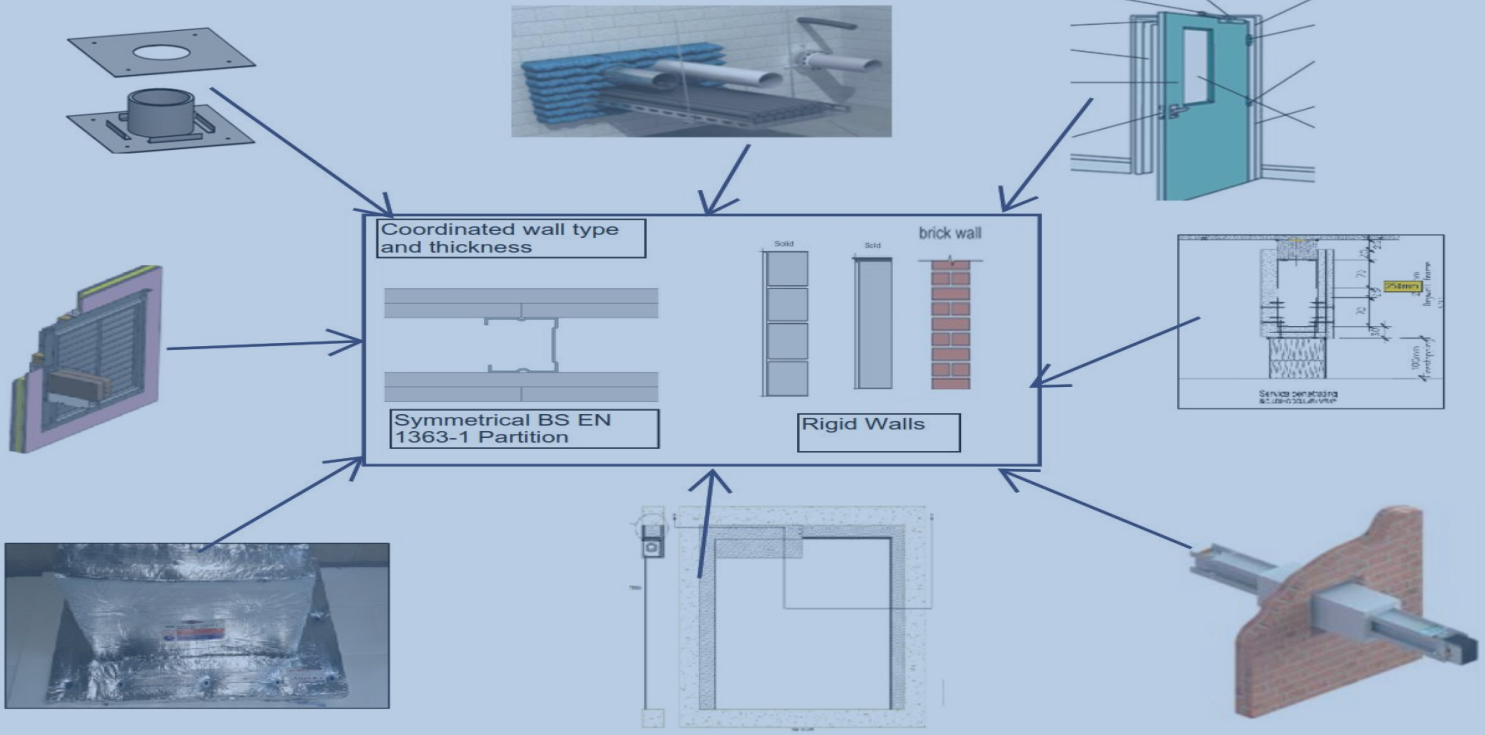
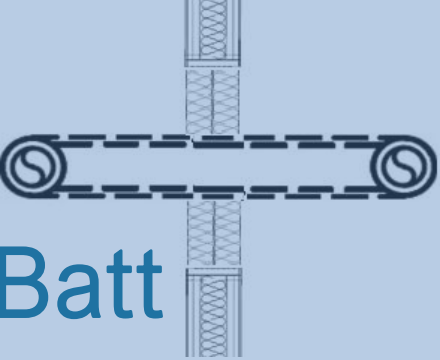

** ≤500mm for supports as tested.

500mm Straight Length.

* Distance from slab 90-110mm min or distance as required by the fire wall for its tested requirements.

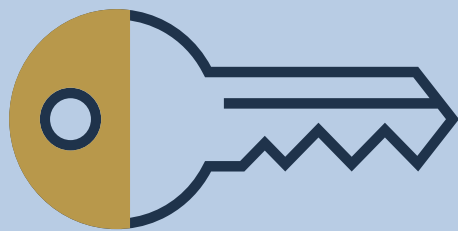
Movement, as determined by review, can not always be accommodated by the seal material and shall be added to the yearly inspections schedule

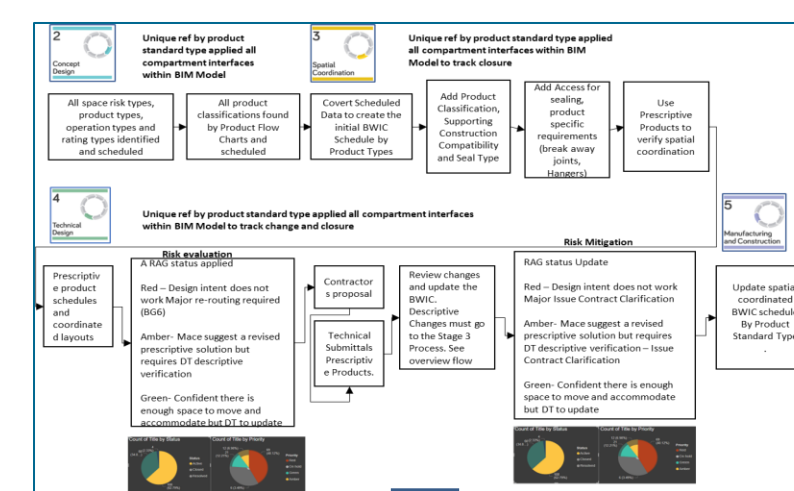
Building fire safety type/space risk fire safety type

Classification	Material	Size OD	Fluid Temp oC	Wall Position	Wall Type	Wall System Thickness
<div>E.I 120 (V)(C/C) (CS)</div> <div></div> <div>Protected Corridor or Lobby</div>	Non-Combustible	100mm	0oC	H - Horizontal	 Symmetrical Flexible – EN520	 122mm (example determination)
	Insulation Yes	Arrangement  Batt	Seal Type  Sleeve	Supports Straight pipe length and support ≤500mm		

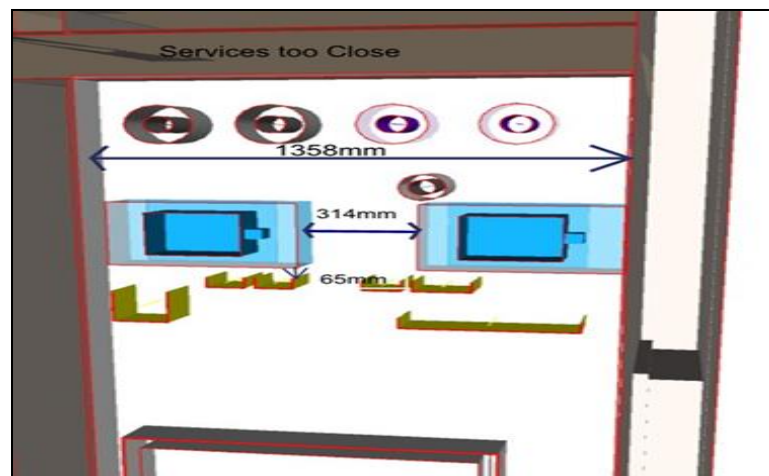
Classification

E | I | 120 | H | C/C | CS





CDE



BWIC Records

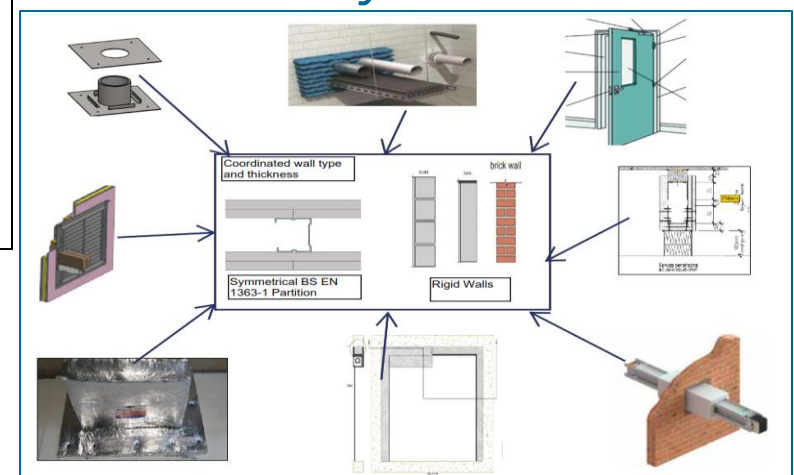
Descriptive to Prescriptive Product Data Fire damper									
Product	Manufacturer	Model	Rating	Access	Seal	Supporting Construction	Notes	Location	Status
Fire Damper	Fire Damper Co.	FD-100	FD-100	FD-100	FD-100	FD-100	FD-100	FD-100	FD-100

Descriptive to Prescriptive Product Data Smoke Control damper									
Product	Manufacturer	Model	Rating	Access	Seal	Supporting Construction	Notes	Location	Status
Smoke Control Damper	Smoke Control Co.	SCD-100	SCD-100	SCD-100	SCD-100	SCD-100	SCD-100	SCD-100	SCD-100

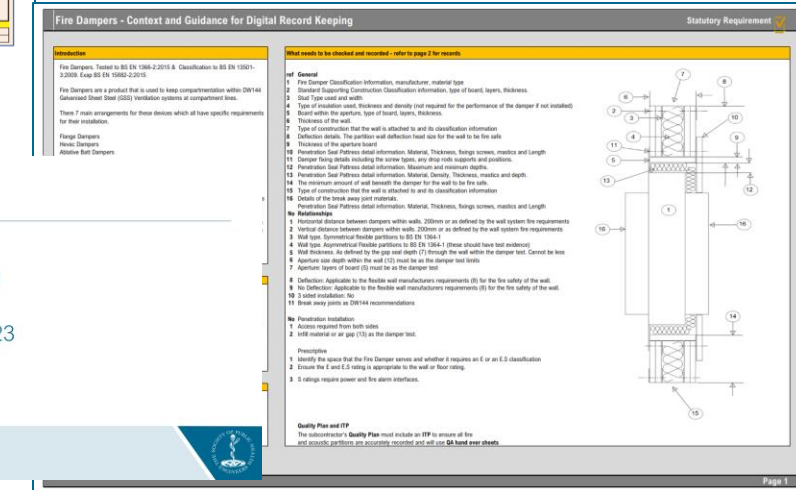
Descriptive to Prescriptive Product Data Fire									
Product	Manufacturer	Model	Rating	Access	Seal	Supporting Construction	Notes	Location	Status
Fire	Fire	Fire	Fire	Fire	Fire	Fire	Fire	Fire	Fire

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#sophe2023

Coordination of wall as system



Installation, Inspection and Digital Record



Recorded and location logged



In Use

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