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FIRE RESISTANCE – A FIRE ENGINEER'S PERSPECTIVE

Fire and Security Consulting Services is frequently asked about how to achieve the correct fie resistive construction in a building. The questions invariably include the phrases "fire wall", "fire resistance", "fire rating" and "FRL" and so on. This paper has been prepared to assist building practitioners, Certifiers, QFRS BAOs and Fire Engineers in the understanding and application of the terms referenced above.

In particular I feel it necessary to differentiate between the terms ***fire wall*** and ***FRL***.

FSCS has written a paper (included in this series of papers) outlining the history of building codes in Queensland, Going much further back in time it is thought that the first recorded building codes were enacted by King Hammurabi, the famous law-making Babylonian ruler who reigned from approximately 1955 to 1913 **B.C.** Probably best remembered is the *Code of Hammurabi,* a statute primarily based on retaliation. The following decree was from the code.

*In the case of collapse of a defective building, the **architect** is to be put to death if the owner is killed by accident; and the **architect's son** if the son of the owner loses his life.*

Later, after the great fire of Rome in AD64, Rome was rebuilt according to Nero's orders with broad thoroughfares, buildings of restricted height, and open spaces. He established building codes that required new houses to be built with stone and with **fire walls** (direct quote).

1 - Introduction

In Australia the term *fire wall*, although used generically throughout the building industry, was not formally used until the introduction of the Building Code of Australia (BCA) in 1990. Similarly, the term fire compartment was not used and instead the term *maximum floor area* was used.

Before then, the building regulations including the Queensland Building Act (1975) use the terms "fire resistance rating" and "fire rating" to describe the "*fire-resistance grading period determined according to the Standard Fire Test, being AS1530.4*".

Similar to the BCA, The Building Act 1975 provided for compartmentation of the building into maximum floor areas dependant on the number of storeys contained and type of construction. However, unlike the BCA, required fire resistance ratings also considered fire zones (classification of the area where the building was to be constructed) and provided for increased floor areas where automatic fire sprinkler systems were installed.

Whilst not directly relevant to this paper, the information provided above should be useful when assessing compliance of existing building constructed prior to 1990.

2 - Using the BCA

This section serves to guide the reader through the process which ends up in the application of "fire" related construction terms. Many building practitioners fail to understand that the BCA is a document that needs to be read in order and they should not think that they can start half way through and achieve a compliant design.

Specification A2.3 in Part A of the BCA provides information on DtS (Deemed to Satisfy) FRLs of various elements such as insulated and uninsulated beams, columns and walls. This is useful background information but is inadequate to complete a compliant structural design of a building.

Part B addresses the structural requirements of a building to withstand passive and dynamic loading in it use. Building codes no longer provide prescriptive designs with tables of beam, column, wall dimensions required to support specified loads. . Part B generally references various Australian Standards whereby a building designer (structural) can develop a "performance" based structural design for the building which, ignoring fire issues, addresses static and dynamic loads. Note that Australian Standards such as AS3600 – Concrete Structures and AS4100 – Steel Structures, each have sections addressing design for fire resistance and the designer must determine from Part C of the BCA what fire resistance levels (FRL) are required before completing the structural design.

Part C is where a building design really begins. The development of the structure in a "*where* and *what is required*" sense is in Part C whereas the referenced Australian Standards provide for the "*how to do it*" sense.

From Table C1.1, the "type of construction" can be determined by the rise in storeys and the Class of the building. In addition to the "Guide to the BCA", the FSCS paper "Building Occupancy Risk and Hazard Profiles" provides background information as to the risk analysis of various Classes of building.

Moving on, Table C2.2 provides information as to the required "type of construction" relating to maximum sizes of "fire compartments" and building Classification. It can be seen that in this Table, Class 2, 3 and 4 occupancies are not referenced, this is because in the development of the BCA it was concluded that these Classifications were substantially compartmented into dwellings of modest area. However the other Classifications are separated into two size limitations. FSCS has yet to understand how the "guide to the BCA" cites this as "an indicator of the building's fire load".

One of the most common misconceptions is that Type A construction means the most fire resistive, Type C the least fire resistive and Type B "*somewhere in between*". Whilst there is some truth in this, the type of construction required is based on a number of issues including the distance to "fire source features", generally being the side and rear boundaries of a lot.

The size of the fire compartment drives the type of construction required. Note that Part C2.3 allows fire compartments to be larger than cited in Table C2.2 provided certain additional fire safety features are provided. These include one or more of the following - open space around the building, sprinklers and Fire Brigade access. However if this concession cannot be accommodated by the lot, building design or budget, the designer has the option to chose a higher type of construction than specified in Table C1.1. An example of this is provided in section 3 in this Paper.

After determining the required type of construction, the building designer then moved on in Specification C1.1 Table 3, 4 or 5 and selects the FRLs for the various building elements.

Part C3 addresses the required methods of protecting openings in walls etc that require an FRL. These openings may be internal between fire compartments or other areas or external to openings in adjacent fire compartments or at the boundary. See Section 4 of this Paper addressing the FRL of fire doors.

Part C3.15 and Specification C3.15 addresses the protection of penetrations for service installations. This is a particularly controversial issue with claims and counter claims by various manufacturers regarding the validity of tested systems. The only advice that I can give is to require full (not summary) copies of test reports where limitations and / or conditions (if any) would be provided.

Many penetrations for services are "built in" to the structure behind ceilings and duct covers etc. Whilst it may be inconvenient and costly to inspect all penetrations before they are built in, FSCS in its submissions for Form 16 Certification requires the builder or Project Manager to digitally photograph each penetration from both sides, give it a number and identify the penetration on both the architectural and services drawings. These documents together with certified copied of test certificates and the installer Form 16 are then part of the building approval. I urge all Certifiers, QFRS BAOs and Fire Engineers to adopt this approach. These records then allow for confidence in certifying the building and future maintenance compliance.

One further issue on this subject, FSCS has seen many installations which do not comply with Specification C3.15 part 6 which provides limits for chase depths and locations for electrical services. Figure 2.1 below is at a resort building in Queensland where the single brick (90mm) non loadbearing wall was chased both side to a depth of 25mm with chases opposite. Additionally wall boxes for electrical outlets were back to back leaving no brick left in between. This installation reduced the wall FRL from -/60/60 to zero!

Figure 2.1 – Wall Chases

3 - Worked Example

As discussed in Section 2, selection of the type of building construction is driven by BCA Tables C2.1 and C2.2. Using these, the following is an example of this process. This example will be continued later when "fire compartments" and "fire walls" are discussed.

The Client requires a 4,000m^2 by 8m high single storey storage building to be constructed on a lot which will give 3m clearance to the side and rear boundaries.

Figure 3.1 below shows the required design.

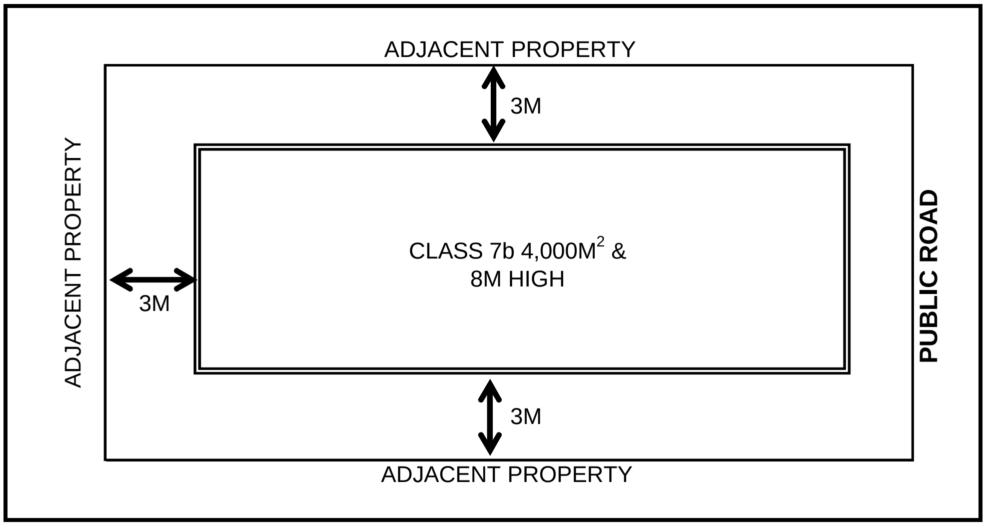


Figure 3.1 - Required Building Design

Considering the building dimensions, it will have to be of Type A construction with external; walls having FRLs as specified in Table 3 of Specification C1.1. Figure 3.2 below shows the arrangement and this will be a DtS design.

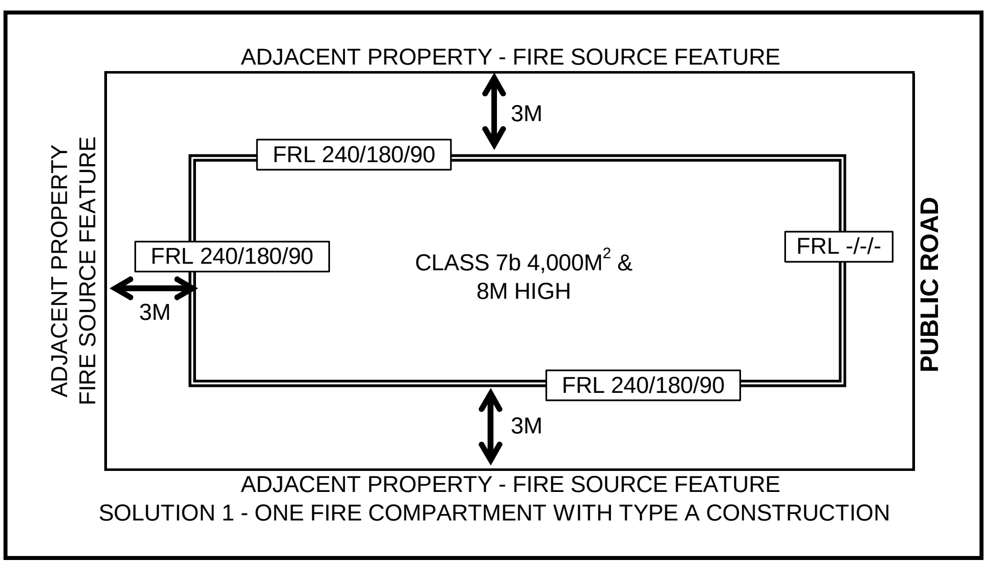


Figure 3.2 – Single Fire Compartment

However the Client was not prepared to bear the high costs of concrete external walls and asked the design team to formulate a new design.

Figure 3.3 below shows the revised design where the building was divided by a fire wall into two fire compartments with a FRL 90/90/90 *fire wall*.

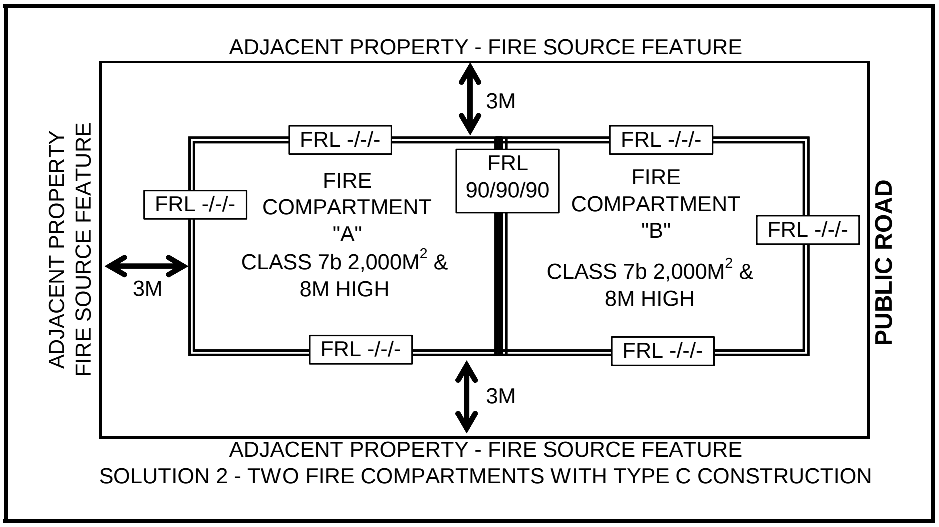


Figure 3.3 – Two Fire Compartments

The issue now is how to construct this fire wall to meet the BCA requirements. Section 7 addresses potential solutions with additional background information in Sections 4, 5 and 6.

4 – Fire Resistance Level (FRL)

The BCA defines Fire-resistance level (FRL) as *the* ***grading periods in minutes determined in accordance with Specification A2.3, for the following criteria-***

(a) ***structural adequacy; and***

(b) ***integrity; and***

(c) ***insulation,***

and expressed in that order.

Note:

A dash means that there is no requirement for that criterion. For example, 90/-/- means there is no requirement for an FRL for integrity and insulation, and -/-/- means there is no requirement for an FRL.

BCA Guide

The Guide to the BCA provides the following advice:-

Fire-resistance level (FRL)

Used only in the Deemed-to-Satisfy Provisions, the FRL of a building element is determined by conducting the Standard Fire Test on a prototype in accordance with AS 1530.4.

Example

If the BCA requires a building element to have an FRL of 120/60/30, this means that the element must maintain, when tested in accordance with AS 1530.4:

- structural adequacy for a period of 120 minutes;
- integrity for a period of 60 minutes; and
- insulation for a period of 30 minutes.

Commentary

The FRL of an element of construction may be DtS as specified in Specification A2.3 in Part A of the BCA and discussed in the Section 1 of this Paper, or determined by test by a Registered Testing Authority such as CSIRO. The element to be tested is constructed in either a vertical or horizontal furnace (see Figure 4.1) and subjected to the AS1530.4 test regime. Note that the test results will provide the achieved FRL but the building designer must be satisfied that the first number in the FRL, namely the **structural adequacy** MUST be adequate to satisfy the structural loading requirements as calculated in Part B of the BCA. This is not always provides for the Certifier to assess.

Figure 4.1 below shows a vertical test furnace with a masonry wall and lintel under an applied load. Note that the openings below the lintel have been in filled with material that allows the furnace to maintain the temperature but not provide any support for the lintel.

Figure 4.1 – Vertical Test Furnace

Other Parts of the BCA qualify the requirements for FRLs and IN particular:-

1. The BCA advises in Specification C1.1 Part 5.1 (b) that an *external wall* that is *required* by Table 5 to have an FRL need only be tested from the outside to satisfy the requirement; and
2. The BCA advises in that where a building element is required to have an FRL and that element depends upon direct lateral or vertical support from another part to maintain its FRL, Specification C1.1 Part 2.2 applies and requires certain features such as an FRL for that supporting part.

Looking at Figure 3.3 where the bounding construction has an FRL of -/-/- and the *fire wall* between the two compartments has an FRL of 90/90/90, then it is obvious that this wall has to be free standing or supported by the boundary walls. Consequently the bounding walls will have to have an FRL of 90/90/090 or be a free standing fire wall.

This issue will be further addressed in Section 5 in this paper.

Doors

With respect to further explanation of FRL and in particular doors, John Rakic from the "Alliance for Fire and Smoke Containment (PFPA has published an excellent "Technical Guidance Note 003" providing an insight into fire ratings.

I encourage readers to download this paper from:-

http://www.pfpa.com.au/docs/Tech%20Guidance%20notes/PFPA%20-%20TECHNICAL%20GUIDANCE%20NOTE%20-%2003%20-%20Understanding%20fire%20ratings%20-%20V1.pdf

One issue that I have to address frequently is that the BCA in Parts C3.5 and C3.11 is that fire doors need only have a structural adequacy of "-" and an insulation value of "30", e.g. FRL -/60/30 for an apartment door in a Class 3 building.

The "**-**"for structural adequacy is explained by the fact that a door cannot be a loadbearing element. However designers and Certifiers should be aware that an opening in a wall required to have an FRL requires that opening to be designed so as not to compromise the structural adequacy of the wall. This is usually by the provision of lintels (see Figure 4.1) but is often missed, especially when door openings are cut into walls after construction!

The "30" for insulation is explained in two ways, firstly the design of a fire door precludes the possibility of achieving the AS1530.4 temperature limitations after 30 minutes because hardware such as locks, closers, hinges and internal strengthening plates will heat up. (I was involved in the design of fire doors in the late 1960s when the first timber veneer fire doors in the world were designed and produced in Australia).

The other basis for this "concession" was that the insulation level temperature limits are in place so that materials on the non fire side of the wall will not ignite. Obviously doors (should!) would not have combustible materials adjacent to them. This hypothesis is still valid except where safety has gone horribly wrong as shown in Figure 4.2 below. [1] EXIT sign, [2] door bolted, [3] storage.

Figure 4.2 – Exit (fire) door at University of [redacted]

Figures 4.3 and 4.4 below are a unique view of the CSIRO small vertical furnace carrying out a "pilot examination" of a door leaf section where, in a hotel environment, the Architect instructed the door installer to install the locksets at a low level on the door leaf. On inspection I picked this up and required a test to demonstrate that with the lockset installed outside the reinforcing plate that the door still maintained its FRL.

Figure 4.3- Pilot Furnace

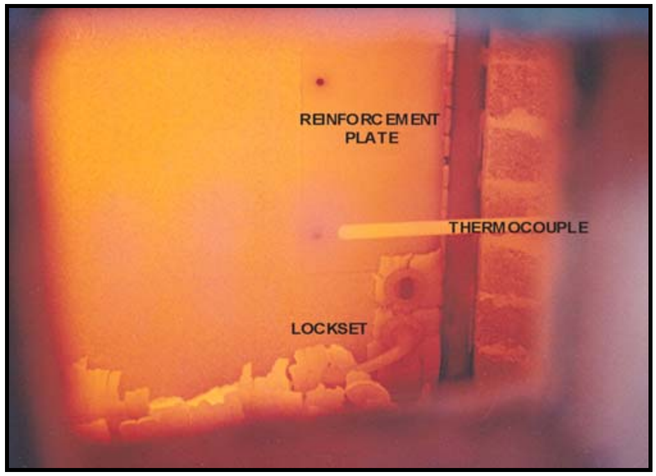


Figure 4.4 – View Inside Furnace

Lightweight Construction

Many internal walls now use fire rated plasterboard such as CSR Gyprock®, Boral ® and Plasmaster® and the various tested designs are detailed in their publications, the "Red Book" being from CSR.

It is vitally important to note that these designs are NOT generic and the installation design details for say 16mm Gyprock cannot be used for 16mm Plasmaster, ever though they may achieve the same FRL.

In a similar situation to masonry systems, the loadbearing capacity of lightweight walls may be limited and the designer should be satisfied that the imposed load for his project can be satisfied by the tested system.

One issue that is a real worry is that lightweight construction has limited capacity to counter axial loads regardless of whether steel or timber studs are used. The steel studs supplied by Rondo have limited vertical and axial loadbearing capacity and Rondo publish loadbearing tables for walls with varying stud sixes and spacing. FSCS has in the past issued owners and occupiers this as part of it MIU (Management in Use Fire Safety Plan)

Figure 4.5 below shows a rather crude test programme for determining maximum loads for lightweight construction. It MUST be noted that this test and all data published is for non fire situations. In a fire scenario, it is highly likely that the studs will be weakened and fail under axial load.

Figure 4.5 - Axial Load Test

The increased use of flat panel TV units has also meant that these are increasingly being mounted on walls. Some large LCD (not LED) displays weigh in excess of 70kg and can pose a real problem, especially when the wall is between units and the installer has made openings in the fire rated plasterboard to conceal power and antenna cables!

5 - FIRE COMPARTMENTS

The BCA defines a Fire compartment as-

(a) ***the total space of a building; or***

(b) ***when referred to in-***

(i) ***the Objective, Functional Statement or Performance Requirements – any part of a building separated from the remainder by barriers to fire such as walls and/or floors having an appropriate resistance to the spread of fire with any openings adequately protected; or***

(ii) ***the Deemed-to-Satisfy Provisions – any part of a building separated from the remainder by walls and/or floors each having an FRL not less than that required for a fire wall for that type of construction and where all openings in the separating construction are protected in accordance with the Deemed-to-Satisfy Provisions of the relevant Part.***

BCA Guide

The Guide to the BCA provides the following advice:-

> **Fire compartment**
>
> A fire compartment contains walls, floors and the like creating a compartment (or "box") of any shape used to limit the spread of fire to another compartment or part of a building.
>
> **Example**
>
> If any floor has an opening for an open stairway or escalator, a fire could spread through the opening—that floor would not form the boundary of a fire compartment.
>
> If there are no distinct fire barriers erected, then the whole building forms a fire compartment.
>
> If an Alternative Solution is used, the building elements used to form a fire compartment must have appropriate fire separation from the remainder of the building as determined by fire engineering principles. Note that FRLs are only used in the Deemed-to-Satisfy Provisions.
>
> If the Deemed-to-Satisfy Provisions of Part **C3** are used, the building element used to form a fire compartment must have the fire-resistance level (FRL) of a fire wall required by **Specification C1.1**.
>
> Sole-occupancy units are not generally regarded as fire compartments except for **E1.4** for fire hose reels.

Commentary

One of the issues that FSCS has with the BCA is that apart from Specification C1.1 Part 2.2 (previously referenced) which addresses support for another part is deficient in its requirements.

As an example, BCA C2.7c and Figure C2.7c from The Guide to the BCA reproduced in Figure 5.1 below indicates that two offset fire compartments can be made by the installation of the two fire walls depicted. This means that the second floor slab and the First and Ground floor right side external walls must have the same FRL as the fire wall. I have seen designers and Certifiers rely on this figure as a compliant design without the appropriate FRLs as discussed!

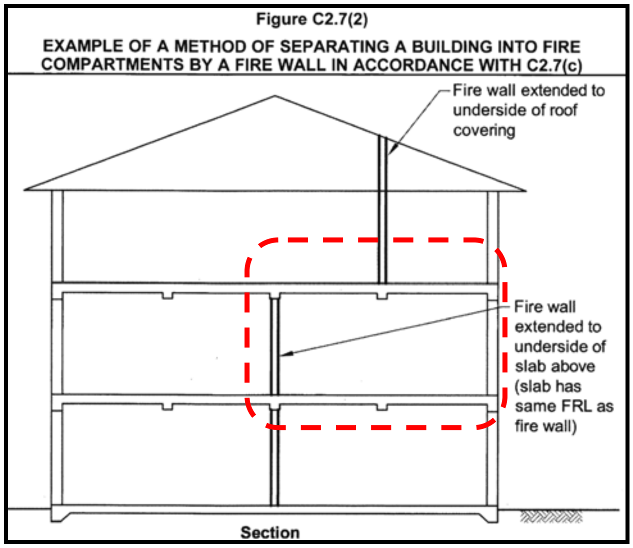


Figure 5.1 – Offset Fire Compartments

6 - FIRE WALLS

The BCA defines a fire wall as

a wall with an appropriate resistance to the spread of fire that divides a storey or building into fire compartments*.*

BCA Guide

The Guide to the BCA provides the following advice:-

> **Fire wall**
>
> Fire walls separate fire compartments. To avoid the spread of fire to another part of the building, a fire wall must extend from the fire-rated floor of a storey to the underside of the fire-rated floor above, or to a non-combustible roof covering.
>
> A "fire-resisting" wall is not necessarily a "fire wall". A fire wall can sometimes be an external wall. See **C2.7** and **Figure C2.7(3)** of this Guide.

Reading the BCA definitions of a fire wall and a fire compartment, we have a circular argument that can be reduced to:-

A fire wall surrounds a fire compartment, and, a fire compartment is surrounded by a fire wall! Not a particularly helpful situation.

Consequently is necessary to come up with another more realistic definition of a fire wall which can properly constructed. As a Fire Engineer, I am in the fortunate position that in the event of the building having an Alternative Solution, I can invoke BCA A0.10 and address any DtS or Performance Requirements that may influence the outcome of the Alternative Solution.

I suggest the Certifier and QFRS also take this approach to DtS buildings.

Examination of Specification C1.1 Tables 2, 3 and 4 for the FRLs of construction elements in various types of Buildings, Table 5.1 below shows the required FRLs of fire walls.

	TYPE A CONSTRUCTION	TYPE B CONSTRUCTION	TYPE C CONSTRUCTION
Classes 2, 3 & 4	90/90/90	90/90/90	90/90/90
Classes 5, 7a & 9	120/120/120	120/120/120	90/90/90
Class 6	180/180/180	180/180/180	90/90/90
Classes 7b & 8	240/240/240	240/240/240	90/90/90

Table 51 – Required FRLs of Fire Walls

If we look at the FSCS Paper “Building Classification” and Tables C2.1 and C2.2 in the BCA, it can be seen that for Types A and B construction, the different FRLs are consistent with the increased hazards in the different classes, the fire in storeys and the fire compartment areas.

Type C construction is unique in requiring lower FRLs in that the fire compartment s are smaller.

Further examination of Tables 3, 4 and 5 in Specification C1.1 shows that the only other construction elements requiring the same FRLs as fire walls are loadbearing floors in Type A construction and loadbearing stair and lift shafts in all types of construction. When one examines the functions of these elements, it is obvious that they substantially form part of the fire compartments in a building.

Consequently the principal difference is that a fire wall, having maximum FRL elements of structural adequacy, integrity and insulation form the principal building separation for:-

1. Occupant safety during evacuation, and
2. Fire Fighter safety during rescue and fire fighting intervention, and
3. Protection of property.

Note also that fire walls and other elements “having the same FRL as a fire wall” are required in certain buildings with certain types of construction to separate compartments with different occupancy classifications whether they be in the same storey or different storeys.

Other walls and ceiling / floor assemblies with reduced FRLs provide for: –

1. Separation of sole occupancy units, such as Class 2 units, and
2. Separation of equipment such as lift motor rooms and the like specified in BCA Part C2.12, and
3. Separation of electricity substations, and
4. Separation of sprinklered and non sprinklered areas, and
5. Protection of cables supplying essential services, and
6. Protection of above grade hydrant piping in non sprinklered buildings etc.

In conclusion we can now differentiate between a fire wall and a wall with an FRL based on what and *where* criteria set out in the BCA.

7 - Construction of Walls with an FRL Fire Walls and

Walls with an FRL

As discussed earlier, the BCA in Specification C1.1 Part 2.2 requires any element with an FRL that requires support from another part, that other part is required to have an FRL.

Whilst a building designer can usually achieve this, in the opinion of FSCS, this requirement is a nonsense because this BCA requirement is rarely examined on the design drawings and is impossible to police and certify.

As an example, if we have a Class 2 Type B construction apartment building with loadbearing walls between sole occupancy units requiring an FRL of 60/60/60, these walls are normally constructed between the floor slabs.

Note that Type B construction does not require the floor slab to have an FRL and the external walls do not require an FRL if greater than 18m from the boundary. How then do the inter unit walls achieve the required support? This is but one of many examples that FSCS can identify.

Fire Walls

Whilst fire walls are required in both single and multi storey buildings of all types of construction, it is only in single or two storey buildings using steel framed construction that the integrity of fire walls seems to be a problem.

As an example, FSCS was recently consulted by the owner of a single storey portal framed building of 1,800m^2 in area and 10,000m^3 in volume. He wanted to divide the building into two portions so that he could let out both parts to separate tenants.

The Certifier required him to build a 90/90/90 fire wall. Now remember, this building is less that the maximum floor area and volume in BCA Table C2.2 and under the BCA the separating wall need not have been a fire wall. The owner had a builder construct the wall and then asked the Certifier how to how to infill the openings at the side. The Certifier advised him that the openings at the top and side had to be infilled with a "fire protective" material and referred him to FSCS for advice. See Figure 7.1 below. Never mind fire wall, it is not even a wall with an FRL!

Figure 7.1 – Is This a Fire Wall?

In the end the Certifier accepted my advice that the wall was not required but the result was that the owner spent several thousand dollars unnecessarily.

This is the issue with fire walls that FSCS sees on a weekly basis with requests for advice in the construction of fire walls.

The construction of fire walls and the appropriate footing and support design should be left to a qualified structural engineer but the following is a guide to the issues that need to be addressed and what a Fire Engineer, Certifier or inspecting QFRS Officer would expect to see.

Returning to the BCA definition of a fire wall which FSCS considered lacking in detail, FSCS has researched other building codes for guidance.

FSCS considers that Section 706 0f the International Building Code (2012 edition) provides a more useful definition as below:-

706.2 Structural stability.
<u>Fire walls shall have sufficient structural stability under fire conditions to allow collapse of construction on either side without collapse of the wall for the duration of time indicated by the required fire-resistance rating</u> or shall be constructed as double fire walls in accordance with NFPA 221.

FSCS considers that the underlines section of the IBC definition is the intent of the performance of a fire wall required under the BCA.

Now that we have addressed the *what* and *where* of fire walls, it is now critical that the how is addressed and FSCS continues this paper using its adoption f the IBC definition.

As discussed earlier, the normal dynamic and static loads must be considered in the design, and the additional dynamic loads from steel distortion, as discussed below must also be addressed.

As unprotected steel trusses, girders or beams approach and exceed temperatures of 600°C, the material will initially expand, then lose its strength, which allows the structure to twist and sag under the imposed and self-loads. Large horizontal forces develop at the ends of the structure where restraints, such as walls occur, as the steel first expands and then pulls away from the wall as the steel fails. Design considerations must be taken into account to prevent any damage as these lateral forces act on the wall in order to maintain the structural integrity of the wall.

Note that fire walls in portal frame buildings will require different approaches considering the orientation of the wall, which is either parallel or perpendicular to the frame.

To limit the fire spread to an adjoining compartment from the fire compartment, a solution that requires the building to be subdivided into independent compartments can be achieved by implementing one of the following construction details:

1. Two independent fire walls (such as prefabricated panels, etc.) each fixed to an independent structural frame (see Figure 7.2 (a)). In this case, when one structure and its fire wall collapse during a fire, the fire cannot spread to the adjoining structure, which remains stable and fire protected by the second fire wall
2. A single fire wall inserted between both structures. This fire wall can be a self-stabilized wall and fully independent. The fire wall can be also fixed at its top to both structures by means of "fusible" ties (see Figure 7.2 (b)) [**See Note 1**]which, in case of fire near the wall, releases the connection to the 'hot' structure (usually when a temperature from 100 to 200°C is reached in bolts) without causing any damage to the wall (it remains attached to the steel structure located on the 'cold' side) and the stability of the neighboring cold structure.

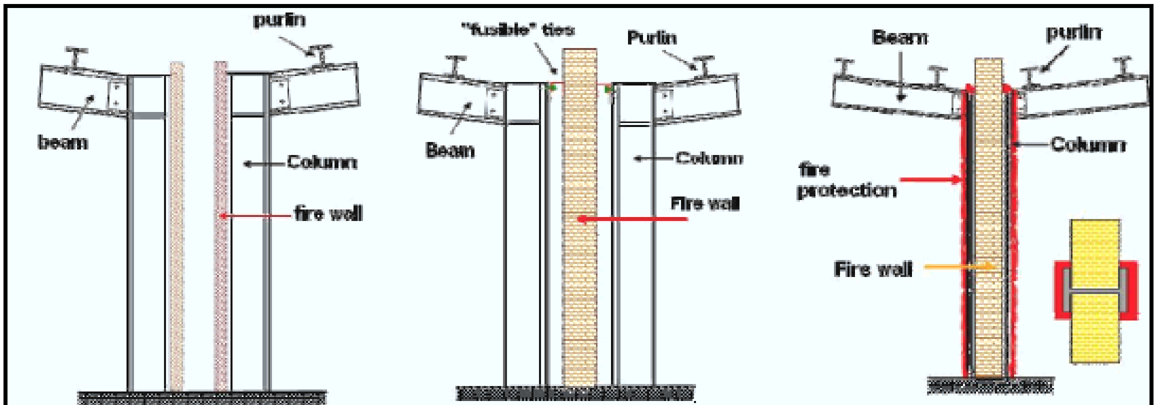
Note 1 – Do not confuse these ties with "fire ties) which absorb portal frame expansion without pushing a concrete tilt slab outwards. – See Figure 7.3

Self-stabilized walls are commonly used in practice. However during a fire, this solution can be dangerous for people (occupants and firemen) because they collapse away from the fire as a consequence of thermal bowing effect. So, they should be used only if their behaviour has been evaluated by advanced calculation model taking into account second order effects. Moreover, where spacing from the self-stable wall to the adjoining steel structure is not sufficient, it is important to make sure that the fire wall can bear the force which may be induced by the movements of the building due to the thermal elongation of the roof structure (beams and purlins) due to the increase of temperature in the cell with the fire.

As an alternative to the previous solutions, it is possible to insert the fire wall into the steel structure of the single-storey building as illustrated in Figure 7.2(c). Such wall can be either perpendicular to the steel frame or parallel to the steel frame. Several solutions can be then considered: fire wall inserted into a line of columns, fire wall attached to columns or fire wall moved from a line of columns. For these solutions, adequate measures must be implemented to avoid the collapse of the wall as a result of significant lateral displacements of the steel structure.

These measures concern:

1. The attachment of fire walls to the steel structure
2. The fire protection of the steel structure near fire walls,
3. The roof system above fire walls
4. The bracing system.



a) Doubling of the structure as well as fire walls

b) Doubling of structure with fire wall fixed by "fusible" ties

c) Example of fire wall inserted into the steel structure

Figure 7.2 Attachment Details

Figure 7.3 – Fire Ties

I trust that this paper provides appropriate advice regarding fire resistive construction and fire walls.

As indicated earlier, as a Fire Engineer, I am in the fortunate position that in the event of the building having an Alternative Solution, I can invoke BCA A0.10 and address any DtS or Performance Requirements that may influence the outcome of the Alternative Solution.

I suggest the Certifier and QFRS also take this approach to DtS buildings.

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