PLANNING & DEVELOPMENT SERVICES ADVISORY

Fire Stopping

COMPLIANCE WITH *THE UNIFORM BUILDING AND ACCESSIBILITY STANDARDS ACT*, REGULATIONS, THE NATIONAL BUILDING CODE OF CANADA 2015 (NBC) AND THE BUILDING BYLAW IS ADDRESSED IN THIS ADVISORY. WORDS IN ITALICS, OTHER THAN ACT TITLES, ARE DEFINED IN THE NBC.

Background

Much of the NBC is concerned with separating buildings into required *fire compartments* to minimize the negative impacts of fires to life and property. Therefore, there are many rules concerning the construction of *fire separations*. In general, *fire separations* are required to be:

1. Continuous,
2. Rated (as specified by various Code Articles), and
3. Protected with *closures,* shafts, fire stopping, etc. where there are openings or penetrations.

(See Articles 3.1.8.1 and Subsection 9.10.9 for more details)

Since *fire separations* are required to be continuous to stop the spread of fire and smoke, penetrations in *fire separations* must be dealt with properly. This advisory will focus specifically on the fire stopping requirements of Code.

FAQ

Question

What portions of NBC 2015 are concerned with fire stopping requirements?

Answer

Definition from NBC 2015, Division A

"Fire stop means a system consisting of a material, component and means of support used to fill gaps between *fire separations* or between *fire separations* and other assemblies, or used around items that wholly or partially penetrate a *fire separation."*

Part 9 Fire stopping Requirements

- Article 9.10.9.6 details general rules for fire stopping penetrations in *fire separations*.
- Article 9.10.9.7 details fire stopping of *combustible* drain, waste and vent (DWV) piping.
- Article 9.10.16.4 details fire stopping for penetrations in *fire blocks*
- Article 9.33.6.6. details fire stopping requirements for heating *supply ducts*.

Part 3 Fire Stopping Requirements

- Subsection 3.1.9 details the requirements for fire stopping of penetrations in *fire separations* and fire-rated assemblies
- Sentence 3.1.11.7.(6) details fire stopping requirements for penetrations in *fire blocks*

Question

What is a summary of the fire stopping requirements from Part 9 of NBC 2015?

Answer

Below is a summary of the Part 9 fire stopping requirements. Owners and designers are required to ensure designs conform to the requirements of NBC 2015, and so further information should be sought from the Code for specific designs.

Prior to the summary tables, it is also important to note the direction that fire ratings are determined, as the *fire* stop system must provide protection in this direction as well (see Article 9.10.3.3 for more information). Specifically:

- Horizontal *fire separations* (floors, ceilings/roofs) are rated from the underside.
- Interior vertical *fire separations* are rated from each side.
- Exterior vertical *fire separations* are rated from the inside of the building.

Article 9.10.9.6 (Penetration of Fire Separations)

The following table summarizes the fire stopping requirements of Article 9.10.9.6.[3]

Item	Comments	Tested to CAN/ULC-S115 Required?	Req'd Rating Type (F, FT)	Fire stop Rating to Meet	Req'd to be Tested with 50 Pa Pressure?	Code Ref.
General	**All** penetrations through a *fire separation* shall be tightly fit or fire stopped (including electrical wires, etc.). Penetrations are to be *noncombustible* (unless relaxed by Code or unless the rated *fire separation* was tested with that penetration).[1, 3]	See Table below for specific cases[1]	See Table below for specific cases[1]	See Table below for specific cases[1]	See Table below for specific cases[1]	9.10.9.6.(1)

Firewall Penetration	Fire stopping requirements are more strict due to importance of *firewalls*.	Yes	FT	FRR of the ***fire separation***	No[4]	9.10.9.6.(2) & 9.10.9.7
Combustible Water Piping[2]	Part 9 points to the requirements in Sentence 3.1.9.5.(4).[2]	Yes	F[5]	FRR of the ***fire separation***	Yes	9.10.9.6.(9) & 3.1.9.5.(4)
Combustible sprinkler piping	Permitted to penetrate a *fire separation* when both sides are sprinklered, **but** must still *fire stop*.	No[1, 5]	N/A[5]	N/A[5]	No	9.10.9.6.(10)
Sprinkler Penetration	The sprinklers themselves are permitted to penetrate a membrane or *fire separation* without needing to be fire stopped when the space around the sprinkler is covered by a metal escutcheon plate as per NFPA 13.	N/A	N/A	N/A	N/A	9.10.9.6.(11)
Combustible Piping for Central Vacuums[2]	The same rules apply as for *combustible* DWV piping discussed in Article 9.10.9.7.[2]	Yes	F[5]	FRR of the ***fire separation***	Yes	9.10.9.6.(12)
Fire Dampers	Must meet NFPA 80 and are not subject to fire stopping requirements (unless the damper is specifically designed with a *fire stop*. If designed with a *fire stop*, refer to the listed design for more information).	N/A	N/A	N/A	N/A	9.10.9.6.(13)
Electrical Wires, Cables, & *Noncom-bustible* Raceways[3]	**All** penetrations through a *fire separation* shall be tightly fit or fire stopped to maintain the integrity of the *fire separation* (Sentences 9.10.9.2.(1) & 9.10.9.6.(1)).	No[1,5]	N/A[1,5]	N/A[1,5]	No	9.10.9.6.(1)
Outlet Boxes[3]	Article 9.10.5.1 permits outlet boxes to pierce a wall or ceiling membrane as long as it	N/A	N/A	N/A	N/A	9.10.5.1

	is tightly fit. If on both side of a wall, they shall be offset to maintain the integrity of the *fire separation.*[3] See also Sentence 9.10.5.1.(4) about the construction requirements in Appendix D for rated ceiling membranes that are being penetrated.					
Fire Blocks	Where a penetration occurs through a fire block, generic fire stopping shall be provided to maintain the integrity of the fire block.	No Similar to Note 1	N/A	N/A	N/A	9.10.16.4

Notes to the Table:

1. A *fire stop* standard **is not** provided by Sentence 9.10.9.6.(1). Appendix A-9.10.9.6.(1) explains that this a relaxation compared to the Part 3 requirements, as Code assumes that "generic *fire stop* materials such as mineral wool, gypsum plaster or Portland cement mortar" can satisfy the Part 9 *fire stop* requirements. However, the fire stopping standard (CAN/ULC-S115) **is** required to be met for certain penetrations (firewalls, combustible piping penetrations as noted elsewhere in the Table, etc.). In all cases the requirement remains that the *fire separation* must be a "continuous barrier against the spread of fire and retard the passage of smoke." (Sentence 9.10.9.2.(1)).
2. Combustible piping is never permitted in a shaft (*vertical service space),* as per Sentences 3.1.9.5.(4), 9.10.9.7.(2), and 9.10.9.7.(5)
3. A number of requirements are provided in Article 9.10.9.6 about which penetrations are permitted to be *combustible*, and which penetrations are permitted without the need to test the rated assembly with that penetration included in the testing. However, these requirements are not being examined in detail, as this advisory about fire stopping.
4. Unless the penetration is *combustible* DWV piping, *combustible* water distribution piping, or *combustible* piping for central vacuum, which would then require the testing to include 50 Pa of pressure on the fire-exposed side (see Sentences 9.10.9.6.(9) & (12), and Article 9.10.9.7)
5. Unless penetrating a *firewall*, which would then require the more strict *firewall* requirements to apply.

Article 9.10.9.7 Summary (Combustible DWV Piping)

The following table summarizes the fire stopping requirements of Article 9.10.9.7.

Item	Comments	Tested to CAN/ULC-S115 Required?	Req'd Rating Type	Fire stop Rating to Meet	Req'd to be Tested with 50 Pa Pressure?	Code Ref.
General	*Combustible* DWV piping is generally **not** permitted in any part of a system that penetrates a rated *fire separation* or a membrane that contributes to the rating. However, relaxations are provided, as described below.	See Table below for specific cases	See Table below for specific cases	See Table below for specific cases	See Table below for specific cases	9.10.9.7.(1) & 9.10.9.7.(2)
Combustible DWV Allowed if Fire Stopped Correctly[1]	*Combustible* DWV is permitted to be used to penetrate a rated *fire separation* or membrane, if the following items in the Table are met.[1]	Yes	F[2]	FRR of the ***fire separation***	Yes	9.10.9.7.(2) & 9.10.9.7.(3)
Toilets over Concrete Floors	*Combustible* DWV piping is permitted to penetrate a horizontal *fire separation* or rated membrane, as long it leads directly from a *noncombustible* water closet, and the floor it is penetrating is made of concrete.	No[3]	N/A[3]	N/A[3]	N/A[3]	9.10.9.7.(4)
Combustible DWV on One Side of a Vertical *Fire Separation*[1]	Allowed, as long as it is not located within a vertical shaft.	N/A[4]	N/A[4]	N/A[4]	N/A[4]	9.10.9.7.(5)
Buildings with only Two *Dwelling Units*	*Combustible* DWV piping is permitted on one side of a horizontal *fire separation*.	N/A[4]	N/A[4]	N/A[4]	N/A[4]	9.10.9.7.(6)

Notes to the Table:

1. Combustible DWV piping is never permitted in a shaft (*vertical service space),* as per Sentences 9.10.9.7.(2) and (5).
2. Unless penetrating a *firewall*, which would then require the more strict *firewall* requirements to apply.

3. However, the penetration should still be fire stopped (see Sentences 9.10.9.6.(1) and 9.10.9.2.(1)). No fire stopping testing standard is referenced for this application in Part 9, so the general requirements of Sentence 9.10.9.6.(1) would apply.
4. See other portions of Table for information about when combustible DWV penetrates a *fire separation.* This portion is only talking about it being permitted on one side of a *fire separation.*

Article 9.33.6.6.
Heating *supply ducts* in walls or floors are to be fire stopped on both ends where there is a space between the construction materials and the duct. The *fire stop* is to be *noncombustible* material.

Note that Article 9.10.13.13 has more strict requirements, as *fire dampers* must be used when a duct penetrates a rated *fire separation* (except where relaxed by Article 9.10.13.13). Where fire dampers are permitted to be waived, the *fire separation* must still provide a continuous barrier to fire and smoke, and so Article 9.33.6.6 provides guidance on achieving this fire stopping, specific to heating *supply ducts*.

See also Sentence 9.10.5.1.(4) for construction requirements given in Appendix D for when a membrane in a rated ceiling is penetrated by a duct leading to the ceiling space.

Question
What is a summary of the fire stopping requirements from Part 3 of NBC 2015?

Answer
Below is a summary of the Part 3 fire stopping requirements. Owners and designers are required to ensure designs conform to the requirements of NBC 2015, and so further information should be sought from the Code for specific designs.

Prior to the summary table, it is also important to note the direction that fire ratings are determined, as the *fire* stop system must provide protection in this direction as well (see Article 3.1.7.3 for more details). This is summarized below:

- Horizontal *fire separations* (floors, ceilings/roofs) are rated from the underside.
- Interior vertical *fire separations* are rated from each side.
- Exterior vertical *fire separations* are rated from the inside of the building.

Subsection 3.1.9 Summary (Penetrations in Fire Separations and Fire-Rated Assemblies)

The following table summarizes the fire stopping requirements of Article 9.10.9.7.[7]

Item	Comments	Tested to CAN/ULC-S115 Required?	Req'd Rating Type	Fire stop Rating to Meet	Req'd to be Tested with 50 Pa Pressure?	Code Ref.
General	**All** penetrations through a rated *fire separation* or membrane shall: • Have fire stopping tested to CAN/ULC-S115 (including electrical wires, etc.)., or • Be cast in place[1] Penetrations of *fire separations* or of rated membranes shall generally be *noncombustible* (unless relaxed by Code or unless the rated *fire separation* was tested with that penetration)[7]	Yes (unless cast in place)[1,2,3,4,5]	F[2,3,4]	FPR required for ***closures*** in the *fire sep'n*[2,3,4]	No[5]	3.1.9.1.(1) & 3.1.9.2
Firewall	Fire stopping requirements are more strict due to importance of *firewalls*.	Yes[6]	FT	FRR of the ***fire separation***	No[5]	3.1.9.1.(2)
Horizontal *fire separation* above a *storage garage* that is considered as a separate *building* (by Article 3.2.1.2)	The fire stopping requirements for this horizontal *fire separation* are more strict due to the importance of this *fire separation* keeping the *storage garage* separate from the rest of the *building* as if it were a separate *building*.	Yes[6]	FT	FRR of the ***fire separation***	No[5]	3.1.9.1.(2)
Fire separation where the ceiling is providing the required rating to	The fire stopping requirements for these *fire separations* are more strict, as the ceiling is being used to form the *fire compartment*, rather	Yes[6]	FT	FRR of the ***fire separation***	No[5]	3.1.9.1.(3)

complete the *fire compartment* (by Sentence 3.6.4.2.(2))	than providing an equivalent rated *fire separation* in any concealed spaces above (see also Article 3.1.8.3).					
Sprinkler Penetration	The sprinklers themselves are permitted to penetrate a membrane or *fire separation* without needing to be fire stopped when the space around the sprinkler is covered by a metal escutcheon plate as per NFPA 13.	N/A	N/A	N/A	N/A	3.1.9.1.(4)
Fire Damper	Must meet NFPA 80 and are not subject to fire stopping requirements (unless the damper is specifically designed with a *fire stop*. If designed with a *fire stop*, refer to the listed design for more information).	N/A	N/A	N/A	N/A	3.1.9.1.(5)
Electrical Wires, Cables, Raceways[7]	**All** penetrations through a rated *fire separation* or membrane shall: • Have fire stopping tested to CAN/ULC-S115 (including electrical wires, etc.)., or • Be cast in place[1]	Yes (unless cast in place)[1,2,3,4]	F[2,3,4]	FPR required for ***closures*** in the *fire sep'n*[2,3,4]	No	3.1.9.1.(1)
Outlet Boxes[7]	Outlet boxes are permitted to pierce a membrane of a rated assembly as long as: • it is fire stopped, or • If all the conditions of Sentences 3.1.9.4.(2) & (3) are met[8]	Yes[8]	FT[8]	FRR of the ***fire separat'n***[8]	No	3.1.9.4
Fire Blocks	Penetrations through fire blocks must be sealed to maintain the integrity of the fire block. Generic fire stop	No	N/A	N/A	N/A	3.1.11.7.(6)

	material is permitted by A-3.1.11.7.(6)					
Combustible Piping Penetrations[7]						
Combustible sprinkler piping[7]	Permitted to penetrate a *fire separation* when both sides are sprinklered, **but** must still *fire stop*.	Yes (unless cast in place)[1,2,3,4]	F[2,3,4]	FPR required for ***closures*** in the *fire sep'n*[2,3,4]	No	3.1.9.5.(1) & 3.1.9.1.(1)
Combustible Water Piping[7,9]	Permitted to penetrate a *fire separation* when more strict fire stopping requirements are met.	Yes[6]	F[2,3,4]	FRR of the ***fire separation***	Yes	3.1.9.5.(2)
Combustible DWV Allowed if Fire Stopped Correctly[7,9]	Permitted to penetrate a rated *fire separation* or membrane when more strict fire stopping requirements are met.	Yes[6]	F[2,3,4]	FRR of the ***fire separation***	Yes	3.1.9.5.(4)
Combustible DWV on One Side of a Vertical *Fire Sep'n*[7,9]	Allowed, as long as it is not located within a vertical shaft.	N/A[10]	N/A[10]	N/A[10]	N/A[10]	3.1.9.5.(5)
Combustible Piping for Central Vacuums[7,9]	The same rules apply as for *combustible* DWV piping discussed in Sentence 3.1.9.5.(4)	Yes[6]	F[2.3.4]	FRR of the ***fire separation***	Yes	3.1.9.5.(6)

Notes to the Table:

1. Appendix A-3.1.9.1.(1)(b) explains that "cast in place" means there are no gaps, and implies that the penetration is typically through a concrete *fire separation* that has been cast around the penetration.
2. Unless penetrating a *firewall*, which would then require the more strict *firewall* requirements of Sentence 3.1.9.1.(2) to apply. See *firewall* portion of table.
3. Unless penetrating a horizontal *fire separation* above a *storage garage* where the *storage garage* is considered a separate *building* (by Article 3.2.1.2), which would then require the more strict requirements of Sentence 3.1.9.1.(2) to apply. See that portion of the table.
4. Unless penetrating a *fire separation* where the ceiling is providing the required rating to complete the *fire compartment* (by Sentence 3.6.4.2.(2)), which would then require the more strict requirements of Sentence 3.1.9.1.(3) to apply. See that portion of the table.
5. Unless the penetration is *combustible* water distribute piping, *combustible* DWV piping, or *combustible* central vacuum piping. See those portions of the table.
6. "Cast in place" not a permitted fire stopping method.
7. A number of requirements are provided in Subsection 3.1.9 about which penetrations are permitted to be *combustible*, and which penetrations are permitted without the need to test the rated assembly with that penetration included in the testing. However,

these requirements are not being examined in detail, as this advisory about fire stopping.

8. Fire stopping can be exempted if **all** requirements of Sentences 3.1.9.4.(2) & (3) are met:
    a. Outlet boxes must be *noncombustible*,
    b. Each box must be small (not more than 0.016 m2 in area),
    c. In any 9.3 m^2 portion, the aggregate area of boxes cannot exceed 0.065 m^2,
    d. The space between membrane is box is not more than 3 mm, and
    e. If on both side of a rated vertical *fire separation*, boxes shall be offset by 600 mm horizontally or fire blocked between.
9. Combustible piping is never permitted in a shaft (*vertical service space),* as per Sentence 3.1.9.5.(4)
10. See other portions of Table for information about when *combustible* DWV penetrates a *fire separation.* This portion is only talking about it being permitted on one side of a *fire separation.*

Finally, it is important to note that even though Subsection 3.1.9 may provide relaxations for *combustible* penetrations, other portions of Code provide rules regarding the *flame-spread rating* or smoke developed classifications for those penetrating items. For example:

- Wires, Cables, Non-metallic raceways in *Combustible* Construction: detailed in Articles 3.1.4.3. and 3.1.4.4
- Wire, Cables, Non-metallic raceways in *Noncombustible* Construction: detailed in Articles 3.1.5.21, 3.1.5.22 & 3.1.5.23
- Combustible Piping in *Noncombustible* Construction: detailed in Article 3.1.5.19 & 3.2.5.13.
- Combustibles in plenums: detailed in Article 3.6.4.3.
- Etc.

Question

What is the requirement for ULC system sheets and where can they be obtained?

Answer

ULC system sheets are obtained from the *fire stop* manufacturer, and are often available from an online catalogue on the supplier's website or from the local representative.

These sheets are required to show that the *fire stop* has been tested to CAN/ULC-S115, as required. The sheets also details the ratings achieved and the type of construction used to achieve the tested results. During plan review, reviewers generally do not require fire stopping ULC system sheets to be submitted. However, the Mechanical Inspectors and Building Inspectors will require the ULC system sheets to be provided on site. The inspectors will compare the ULC system sheets to what is observed in the field to confirm that appropriate fire stopping has been installed. If the ULC system sheets are not

available, this will be noted as a deficiency and will require re-inspection, which could delay construction progress. Therefore, the contractor performing the fire stopping shall ensure that all ULC system sheets are available on site and that they are following the appropriate design for each penetration.

Sheets indicating "engineering judgements" are not acceptable, as Code requires *fire stops* to be tested to CAN/ULC-S115.

Question

Are penetrations, such as plastic laundry boxes (recessed box for laundry water connections and discharge hose connection) permitted in rated *fire separations* and what would the *fire stop* requirements be for the laundry box?

Answer

Generally, this type of penetration would not be permitted. This is because a *fire separation* is required to be:

1. Continuous,
2. Rated (as specified by various Code Articles), and
3. Protected with *closures,* shafts, fire stopping, etc. where there are openings or penetrations.

(See Articles 3.1.8.1 and Subsection 9.10.9 for more details)

Due to the importance of *fire separations,* Code is very specific about what types of penetrations are permitted, and the protection that must be provided to those penetrations.

An evaluation of a plastic laundry box is provided below:

1. The laundry box does not provide the required rating for the wall. Therefore, the laundry box is an area where fire can easily spread between *fire compartments*. The continuity of the rated *fire separation* has been destroyed by the laundry box penetration, and therefore this fails to meet the requirements of Code (unless a relaxation is provided in Code. Continue to next point).
2. In general, penetrations of *fire separations* are required to be *noncombustible*, unless relaxed by Code (or unless the penetration has been part of the fire testing of that assembly). Since the plastic laundry box is *combustible*, this contributes to its failure to meet Code (unless a relaxation is provided in Code. Continue to next point).
3. Note that NBC does allow for *combustible* outlet boxes if certain conditions are met.
    a. To be permitted for **Part 9**, Code states that:
        i. *Combustible* outlet boxes shall be not more than 160 cm^2 (9.10.9.6.(8)), and,

ii. The service outlet box shall be tightly fit to the membrane (see Article 9.10.5.1 for more details on this). Note that a rated *fire stop* is not required for Part 9.

b. To be permitted for **Part 3**, Code states that:
   i. *Combustible* outlet boxes shall be not more than 160 cm^2 (3.1.9.3.(5), and,
   ii. They shall be *fire stopped* to CAN/ULC-S115 to achieve an FT rating equivalent to the *fire-resistance rating* of the *fire separation*, OR they shall meet all the requirements of Sentences 3.1.9.4.(2) & (3)

The laundry box would exceed the 160 cm^2 (24.8 in^2) and would therefore fail to meet the requirements in both Part 9 and Part 3. However, if *noncombustible* laundry boxes were used for Part 9, they could meet Code if they were tightly fit (and if on both sides of an interior vertical *fire separation*, they would need to be offset). For Part 3, a *noncombustible* laundry box would have to be *fire stopped* to CAN/ULC-S115 and achieve an FT rating equal to the rating of the *fire separation* to be considered acceptable (since the size would disqualify it from meeting Sentences 3.1.9.4.(2) & (3)). The ULC system sheets for this *fire stop* would be required to be provided on site to the inspectors.

While this advisory is mainly about fire stopping, this example intends to show that care must be taken to determine which penetrations are allowed by Code, and the resulting fire stopping requirements for the penetration. It is important to re-state that Code requires that *fire separations* provide a continuous barrier to the spread of smoke and fire for the protection of life and property.

For more information on Building Permits, Building Safety or Zoning Information contact us at:
Phone: 306-777-7000
Website: Regina.ca