
Fire Safety Ratings

Understanding Fire Ratings

The following are provided as general information on Fire Ratings in building construction as they pertain to GasPex and WaterPex installations.

IN ALL CASES please refer to the full transcript of our Fire Test reports to ensure that fire rated silicone and fire collars are suitable for use with our products to achieve the fire rating that is required for the nominated building specification.

Some Basic Information

1. A Fire Rated Duct is exactly that. It is generally a riser duct that has been constructed to achieve the fire rating required for that situation.
2. All other riser ducts have not been constructed to achieve a specific fire rating for the building and Fire Collars or Fire Rated silicone or similar will be required to be used for each service penetrating a wall or floor.
3. (Floor) Riser Ducts are typically required to have a 4 hour fire rating.
4. Walls are typically required to have a 2 hour fire rating.

Australian Standards (AS1530-4) for Fire Rating and the Building Code of Australia

AS1530-2005 is THE Australian Standard for Methods for fire tests on building materials, components and structures. The objective of the Standard is to provide building designers, manufacturers, test laboratories and regulatory authorities with a set of uniform requirements for heating conditions, test procedures, and criteria for the determination of fire resistance of an element of building construction. This Standard is referenced in the Building Code of Australia and Part 4 of this Australian Standard details the Fire-resistance testing of elements of Construction. This covers testing of fire resistance that relates to installation of pex systems in buildings including GasPex and WaterPex.

The Couta Group has comprehensive testing of its products with fire collars and fire rated silicones conducted in accordance with this Standard. This information is available on request.

The Essence & Implications of Fire Tests as per AS1530-4

AS1530-4 is primarily concerned as to what happens in a building should there be a fire. It particularly considers the following:

1. Will the Structural Integrity of the Building be compromised?
2. Will the fire collar, silicone or other similarly functioning element stay intact and close off the penetration through wall or floor in the event of fire? It must not crack or open so that it prevents transfer of flame, smoke or other through walls, floors and ceilings.
3. Will the fire collar, silicone or other similarly functioning element provide sufficient insulation against heat between each side of the wall, floor or ceiling?

A test assembly is prepared utilizing the materials intended to be used to construct the actual internal walls or floor of the building, the brand of piping intended to be installed and a range of fire resisting options for the wall penetrations such as fire collars, fire proof silicone and the like.

A furnace is set up on one side of the test wall and the fire resistance performance of wall and penetrations monitored. Throughout the course of the test, observations are made of the behavior of the assembly with particular emphasis on structural adequacy, integrity and insulation. All significant events are recorded and the time of their occurrence noted.

The test results are stated in terms of the time elapsed from the start of the test until failure occurs in each of the items of Structural integrity, and Integrity and insulation of the penetration.

The results are expressed as a Fire Resistance Level (FRL) and are shown in the form of xx/-/- for a structural beam or column or -/yy/zz for a non load bearing wall. The -/yy/zz format is that which is applicable to pex systems. In -/yy/zz, the "-" refers to the structural integrity, the "yy" refers to the integrity of the penetration and the "zz" refers to insulation effectiveness of the penetration.

Interpreting FRL's

If a wall or floor is required to have a 4 hour fire rating, the integrity and insulation of the penetration must not fail within 4 hours of testing as conducted in accordance with AS1530-4. Both integrity and insulation are equally important.

So for a 4 hour rating we would expect the test report to show a FRL of -/240/240 where 240 represents 240 minutes or 4 hours.

If a test report showed an FRL of -/90/120, this would indicate that the FRL of the integrity of the penetration (fire collar or silicone) is 90 minutes (one-and-a-half hours) and the FRL related to the insulation is 120 minutes (2 hours).

The FRL of the penetration is 90 minutes, which is the lower number in the above example.

The following pages show summary results of FRLs for a range of fire collars and sealants. In assessing whether any collar or sealant is compatible with GasPex or WaterPex products and the specific installation requirements, FULL reports should be requested and assessed. All reports are available on request.

Fire Safety Ratings

Likely Fire Resistance of Concrete, Plasterboard and Masonry Floors and Walls With SNAP Fire Collars

Refer to CSIRO Assessment number FC)-2719 available on the SNAP Fire Collar web site at

http://snapcollars.com.au/uploads/fsp1339_gas_floor_1.pdf

Based on the observed performance during full scale penetration testing it is the opinion of the division of CSIRO that the systems tabulated below comprising GasPex, WaterPex, HeatPex and ChillPex PEX-AL-PEX composite pipes would be capable of achieving the designated fire resistance levels if tested in accordance with AS1530.4:2005.

| Collar | Pipe sizes | | | | Frl | System | Element |
|------------|------------|----|----|----|-----------|-----------|---------------|
| SNAP32GAS | 16 | 20 | 25 | 32 | -/240/240 | Retro-fit | Concrete** |
| SNAP50GAS | 32 | 40 | 50 | | -/240/240 | Retro-fit | Concrete** |
| SNAP50HGAS | 32 | | | | -/240/240 | Cast-in | Concrete** |
| SNAP50HGAS | | 40 | 50 | | -/240/180 | Cast-in | Concrete** |
| SNAP63GAS | 63 | | | | -/240/240 | Retro-fit | Concrete** |
| SNAP32GAS | 16 | 20 | 25 | 32 | -/120/120 | Retro-fit | Plasterboard* |
| SNAP50GAS | 32 | 40 | 50 | | -/120/120 | Retro-fit | Plasterboard* |
| SNAP32GAS | 16 | 20 | 25 | 32 | -/180/120 | Retro-fit | Plasterboard* |
| SNAP50GAS | 32 | 40 | 50 | | -/180/120 | Retro-fit | Plasterboard* |
| SNAP32GAS | 16 | 20 | 25 | 32 | -/180/120 | Retro-fit | Masonry*** |
| SNAP50GAS | 32 | 40 | 50 | | -/180/120 | Retro-fit | Masonry*** |

For Pex-b piping through Plasterboard Walls, refer to report FSP1634 - 32R available on the SNAP Fire Collar web site

* The Designated FRL is where the system is installed into a plasterboard lined framed wall system with an FRL of either -/120/120 or -/180/180 with the FRLs of the penetration system is altered to match that of the wall system

** The Designated FRL is where the system is installed into a concrete slab with an FRL of 240/240/240. For slab systems with lower FRLs the FRLs of the penetration system is lowered to match that of the slab

*** The Designated FRL is where the system is installed into a masonry or concrete wall with an FRL of either -/180/180 or 180/180/180. For masonry or concrete wall systems with lower FRLs the FRLs of the penetration system is lowered to match that of the slab.

Fire Safety Ratings

Likely Fire Resistance of 128mm Plasterboard Walls with Fire Pro M707 Sealant and Passive Fire GPFC Collars

The following shows the likely fire resistance performance of Passive Fire GPFC collars and Firepro M707 sealant protecting GasPex (pex/al/pex) pipe penetrations through a plasterboard wall tested in accordance with AS1530-4:2005 and assessed in accordance with AS4072.1:2005.

The test assembly comprised a section of plasterboard wall of nominally 128mm thickness comprised of 64mm Rondo steel studs faced on each side with 2 layers of 16mm thick fire rated plasterboard.

| Service | Criteria | Result |
|--|---------------------|------------------|
| 16mm GasPex with Passive Fire GPFC-16 retro fit collar | Structural Adequacy | Not applicable |
| | Integrity | 181 minutes |
| | Insulation | 155 minutes |
| | FRL | -/180/120 |
| 16mm GasPex with Fire Pro M707 sealant | Structural Adequacy | Not applicable |
| | Integrity | 181 minutes |
| | Insulation | 138 minutes |
| | FRL | -/180/120 |
| 20mm GasPex with Fire Pro M707 sealant | Structural Adequacy | Not applicable |
| | Integrity | 167 minutes |
| | Insulation | 115 minutes |
| | FRL | -/120/90 |
| 20mm GasPex with Passive Fire GPFC-16 retro fit collar | Structural Adequacy | Not applicable |
| | Integrity | 181 minutes |
| | Insulation | 153 minutes |
| | FRL | -/180/120 |
| 25mm GasPex with Passive Fire GPFC-16 retro fit collar | Structural Adequacy | Not applicable |
| | Integrity | 181 minutes |
| | Insulation | 115 minutes |
| | FRL | -/180/90 |
| 32mm GasPex with Passive Fire GPFC-16 retro fit collar | Structural Adequacy | Not applicable |
| | Integrity | 181 minutes |
| | Insulation | 111 minutes |
| | FRL | -/180/90 |

Fire Safety Ratings

Likely Fire Resistance of 150mm Concrete Slab with Fire Pro M707 Sealant and Passive Fire GPFC Collars

The following shows the likely fire resistance performance of Passive Fire GPFC collars and Firepro M707 sealant protecting GasPex (pex/al/pex) pipe penetrations through a 150mm concrete slab tested in accordance with AS1530-4:2005 and assessed in accordance with AS4072.1:2005.

| Service | Criteria | Result |
|--|---------------------|---------------------------|
| 16mm GasPex with Passive Fire GPFC-16 retro fit collar | Structural Adequacy | Not applicable |
| | Integrity | No Failure at 205 minutes |
| | Insulation | 149 minutes |
| | FRL | -/180/120 |
| 16mm GasPex with Fire Pro M707 sealant | Structural Adequacy | Not applicable |
| | Integrity | 181 minutes |
| | Insulation | 138 minutes |
| | FRL | -/180/120 |
| 20mm GasPex with Fire Pro M707 sealant | Structural Adequacy | Not applicable |
| | Integrity | 167 minutes |
| | Insulation | 115 minutes |
| | FRL | -/120/90 |
| 20mm GasPex with Passive Fire GPFC-16 retro fit collar | Structural Adequacy | Not applicable |
| | Integrity | 181 minutes |
| | Insulation | 153 minutes |
| | FRL | -/180/120 |
| 25mm GasPex with Passive Fire GPFC-16 retro fit collar | Structural Adequacy | Not applicable |
| | Integrity | 181 minutes |
| | Insulation | 115 minutes |
| | FRL | -/180/90 |
| 32mm GasPex with Passive Fire GPFC-16 retro fit collar | Structural Adequacy | Not applicable |
| | Integrity | 181 minutes |
| | Insulation | 111 minutes |
| | FRL | -/180/90 |

Fire Safety Ratings

Likely Fire Resistance of 150mm Concrete Slab with Fire Pro M707 Sealant and Passive Fire GPFC Collars

The following shows the likely fire resistance performance of Passive Fire GPFC collars and Firepro M707 sealant protecting GasPex (pex/al/pex) pipe penetrations through a 150mm concrete slab tested in accordance with AS1530-4:2005 and assessed in accordance with AS4072.1:2005.

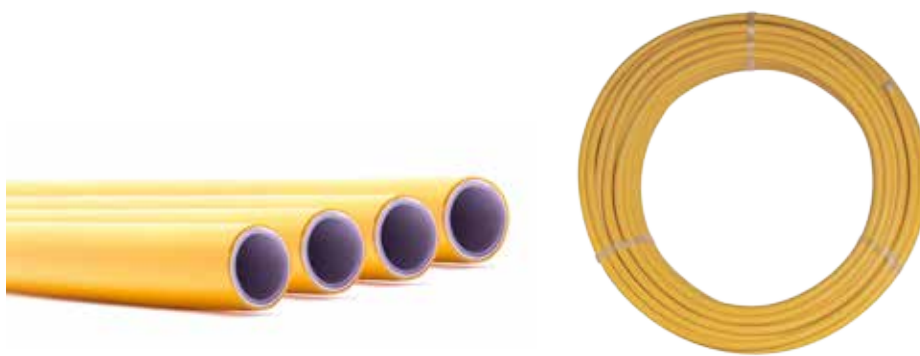
| Service | Criteria | Result |
|--|---------------------|---------------------------|
| 16mm GasPex with Passive Fire GPFC-16 retro fit collar | Structural Adequacy | Not applicable |
| | Integrity | No Failure at 205 minutes |
| | Insulation | 149 minutes |
| | FRL | -/180/120 |
| 16mm GasPex with Fire Pro M707 sealant | Structural Adequacy | Not applicable |
| | Integrity | No Failure at 205 minutes |
| | Insulation | 163 minutes |
| | FRL | -/180/120 |
| 20mm GasPex with Fire Pro M707 sealant | Structural Adequacy | Not applicable |
| | Integrity | No Failure at 205 minutes |
| | Insulation | 133 minutes |
| | FRL | -/180/120 |
| 20mm GasPex with Passive Fire GPFC-20 retro fit collar | Structural Adequacy | Not applicable |
| | Integrity | No Failure at 205 minutes |
| | Insulation | 132 minutes |
| | FRL | -/180/120 |
| 25mm GasPex with Passive Fire GPFC-25 retro fit collar | Structural Adequacy | Not applicable |
| | Integrity | No Failure at 205 minutes |
| | Insulation | 107 minutes |
| | FRL | -/180/90 |
| 32mm GasPex with Passive Fire GPFC-32 retro fit collar | Structural Adequacy | Not applicable |
| | Integrity | No Failure at 205 minutes |
| | Insulation | 117 minutes |
| | FRL | -/180/190 |
| 40mm GasPex with Passive Fire GPFC-40 retro fit collar | Structural Adequacy | Not applicable |
| | Integrity | No Failure at 205 minutes |
| | Insulation | 119 minutes |
| | FRL | -/180/90 |
| 50mm GasPex with Passive Fire GPFC-50 retro fit collar | Structural Adequacy | Not applicable |
| | Integrity | No Failure at 205 minutes |
| | Insulation | 119 minutes |
| | FRL | -/180/90 |
| 63mm GasPex with Passive Fire GPFC-63 retro fit collar | Structural Adequacy | Not applicable |
| | Integrity | 201 minutes |
| | Insulation | 34 minutes |
| | FRL | -/180/30 |

Fire Safety Ratings

Promat FRLS

The following pages relate to the Approval for Promat fire collars (PROMASEAL CFC products) with GasPex and WaterPex branded pipes.

GAS – (PEX-AL-PEX_



Gas (Pex-Al-Pex) piping

| | Floor / Slab | | Fire Rated Plasterboard (128mm Thick) | | Fire Rated Plasterboard (96mm Thick) | |
|------|-------------------------------|-----------|---------------------------------------|-----------|--------------------------------------|---------|
| PIPE | RETRO-FIT COLLAR | FRL | RETRO-FIT COLLAR | FRL | RETRO-FIT COLLAR | FRL |
| 16mm | PROMASEAL CFC 32 ¹ | -/180/90 | PROMASEAL CFC 32 ² | -/180/90 | PROMASEAL CFC 32 ⁶ | -/60/60 |
| 20mm | PROMASEAL CFC 32 ¹ | -/180/180 | PROMASEAL CFC 32 ² | -/180/120 | PROMASEAL CFC 32 ⁶ | -/60/60 |
| 25mm | PROMASEAL CFC 32 ³ | -/180/90 | | | | |
| 32mm | PROMASEAL CFC 32 ⁴ | -/180/90 | PROMASEAL CFC 32 ⁵ | -/180/120 | | |

Results based on tested pipes with wall thickness within +/- 0.5mm of manufacturers published nominal thickness.

Reference test numbers

¹ WFRA 41195_SAS.1

² WFRA 21138

³ WFRA 2159700B.1

⁴ BWA 2253500

⁵ BWA 2253502

⁶ FSRG A-14-947

Fire Safety Ratings

Collars for Wall Penetrations

WATERPEX



WaterPex piping

| | Fire Rated Plasterboard (128mm Thick) | | Hebel (75mm) | | Speed Panel (77mm) | | Fire Rated Plasterboard (48mm Thick) | | Fire Rated Plasterboard (96mm Thick) | |
|------|---------------------------------------|-----------|-------------------------------------|-----------|-------------------------------------|-----------|---------------------------------------|---------|--------------------------------------|---------|
| PIPE | CAST-IN COLLAR | FRL | RET-RO-FIT COLLAR | FRL | RET-RO-FIT COLLAR | FRL | | | | |
| 16mm | PROMASEAL CFC 32 ³ | -/180/180 | | | | | | | PROMASEAL CFC 32 ¹² | -/60/60 |
| 20mm | PROMASEAL CFC 32 ⁴ | -/180/180 | PROMASEAL CFC 32 ^{1&6} | -/180/120 | PROMASEAL CFC 32 ^{2&7} | -/120/30 | PROMASEAL CFC 32 ^{2 & 7} | -/90/90 | PROMASEAL CFC 32 ¹² | -/60/60 |
| 25mm | PROMASEAL CFC 32 ¹¹ | -/180/180 | PROMASEAL CFC 32 ^{1&6} | -/180/90 | PROMASEAL CFC 32 ^{2&7} | -/120/120 | | | | |
| 32mm | PROMASEAL CFC 32 ⁵ | -/180/120 | | | | | | | | |

Reference Notes / Test Numbers

¹ Based on two CFC32 screwed together and inserted into wall (centralised). If on each face FRL is -/120/90.

² A layer of 25mm PROMATECT -100 is attached to each face of wall before applying collar. applying collar

³ WFRA41195

⁴ WFRA 2257300.1

⁵ FSRG A-13-852

⁶ FSRG A-13-816

⁷ FSRG A-12-777

⁸ FSRG A-13-848

⁹ FSRG A-13-823

¹⁰ Based on a single CFC32 centralised in the wall

¹¹ WFRA21138-01.1

¹² FSRG A-14-947

Fire Safety Ratings Collars for Slab Penetrations

WATERPEX



WaterPex piping

| | Floor / Slab | | | |
|------|---------------------------------|-----------|-------------------------------|-----------|
| PIPE | CAST-IN COLLAR | FRL | RETRO-FIT COLLAR | FRL |
| 16mm | PROMASEAL CFC 32 ¹ | -/240/120 | PROMASEAL CFC 32 ² | -/180/90 |
| | PROMASEAL Green 40 ¹ | | | |
| 20mm | PROMASEAL CFC 32 ¹ | -/240/180 | PROMASEAL CFC 32 ³ | -/180/120 |
| | PROMASEAL Green 40 ¹ | | | |
| 25mm | PROMASEAL CFC 32 ¹ | -/240/180 | | |
| | PROMASEAL Green 40 ¹ | -/120/120 | | |
| 32mm | PROMASEAL CFC 32 ¹ | -/240/120 | PROMASEAL CFC 32 ³ | -/240/120 |
| | PROMASEAL Green 40 ¹ | -/180/180 | | |

Test Numbers

¹ FSRG A-11-737

² BWA2253500.1

³ WFRA 2257301.1

Fire Safety Ratings

HILTI Fire Test Report

20190911-FAS180493 RIR1.2

2hr 75mm Hebel Wall FRL -/120/120 &
Rigid Walls FRL -/120/120 & FRL 120/120/120
Various water and gas PE-X pipes protected with Hilti Intumescent Sealant CP611a (1/4)

The bare wall can be 75mm Hebel wall with dry density of 510 kg/m³ or rigid wall which must have a minimum thickness of 75mm and comprise of concrete, aerated concrete, solid or hollow masonry with a minimum density of 510 kg/m. Backing rod is recommended to position the service at the centre of the hole and to control the sealant depth of 25 mm each side. Alternatively, CP 611a sealant can be installed without backing rod at full depth of the wall. The service can be installed off centre with a minimum edge distance $S1 = 5\text{mm}$ as specified in Table A.

Figure 4.1a

Side view- Water and gas PE-X pipe with PEF backing rod.

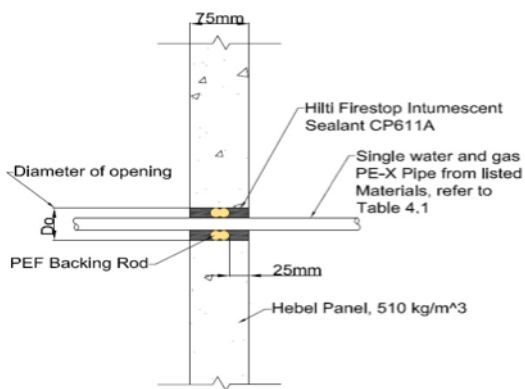


Figure 4.1b

Side view- water and gas PE-X pipe with 60mm sealant depth.

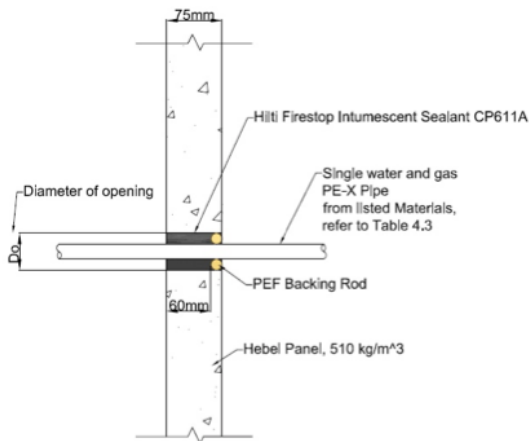


Figure 4.1c

Side view- water and gas PE-X pipe with 75mm sealant depth

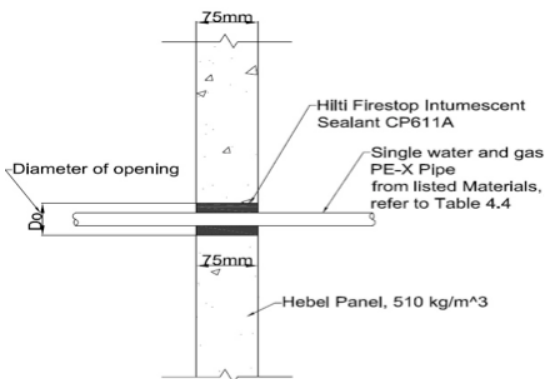
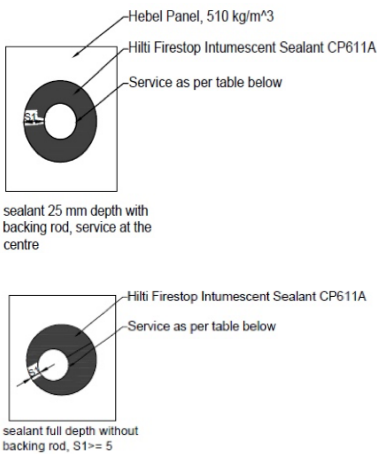


Figure 4.1d

Front view- water and gas PE-X



Fire Safety Ratings

HILTI Fire Test Report

20190911-FAS180493 RIR1.2

Table 4.1 Assessment table of PE-X water and gas pipes configuration as per figure 4.1

| Service | Pipe diameter (mm) | Pipe Wall Thickness range (mm) | Minimum Diameter of the opening D _o (mm) | Minimum Diameter of the opening D _o (mm) | Depth of the sealant t _s | Backing Option | FRL |
|----------------|--------------------|--------------------------------|---|---|-------------------------------------|---|-----------|
| PE-Xa | 16 | 1.2 - 2.4 | 27 | 38 | 25/60/75 | With PEF Backing rod or sealant at full depth | -/120/120 |
| | 20 | 2.3 - 3.4 | 32 | 38 | 25/60/75 | | -/120/120 |
| | 25 | 2.8 - 3.9 | 35 | 50 | 25/60/75 | | -/120/120 |
| PE-Xb | 16 | 1.2 - 2.4 | 27 | 38 | 25/60/75 | | -/120/120 |
| | 20 | 1.9 - 2.4 | 32 | 38 | 25/60/75 | | -/120/120 |
| | 25 | 2.3 - 3.9 | 35 | 50 | 25/60/75 | | -/120/120 |
| PE-X/AL/PE | 16 | 2.0 - 2.6 | 27 | 38 | 25/60/75 | | -/120/120 |
| | 20 | 2.3 - 2.9 | 32 | 38 | 25/60/75 | | -/120/120 |
| | 25 | 3.5 - 3.7 | 35 | 50 | 25/60/75 | | -/120/90 |
| PE-Xb/AL/PE-Xb | 16 | 2.0 - 2.6 | 27 | 38 | 25/60/75 | | -/120/120 |
| | 20 | 2.0 - 2.9 | 32 | 38 | 25/60/75 | | -/120/120 |
| | 25 | 2.4 - 3.7 | 35 | 50 | 25/60/75 | | -/120/90 |
| PE/AL/PE | 16 | 2.0 - 2.6 | 27 | 38 | 25/60/75 | | -/120/120 |
| | 20 | 2.3 - 2.9 | 32 | 38 | 25/60/75 | | -/120/120 |
| | 25 | 3.5 - 3.7 | 35 | 50 | 25/60/75 | | -/120/120 |

2hr 75mm Hebel Wall FRL -/120/120 &

Rigid Walls FRL -/120/120 & FRL 120/120/120

Various water and gas PE-X pipes protected with Hilti Intumescent Sealant CP611a and PEF backing rod (2/4)

The bare wall can be 75mm Hebel wall with dry density of 510 kg/m³ or rigid wall which must have a minimum thickness of 75mm and comprise of concrete, aerated concrete, solid or hollow masonry with a minimum density of 510 kg/m³. Backing rod is recommended to position the service at the centre of the hole and to control the sealant depth of 25 mm each side. Alternatively, CP 611a sealant can be installed without backing rod at full depth of the wall. The service can be installed off centre with a minimum edge distance S1 = 5mm as specified in Table A.

Figure 4.2a

Side view- Water and gas PE-X pipe

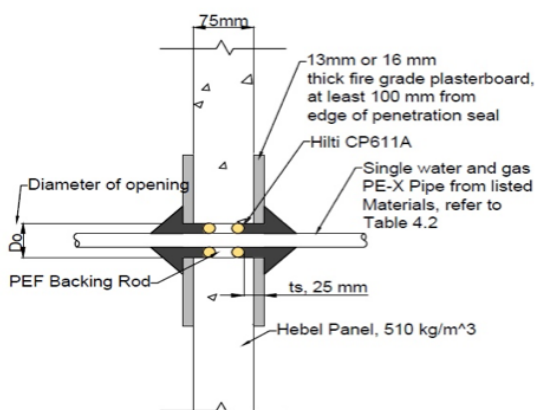
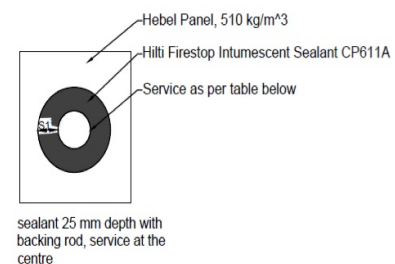


Figure 4.2b

Front View-Water and gas with PEF backing rod.



Fire Safety Ratings

HILTI Fire Test Report

20190911-FAS180493 RIR1.2

Table 4.2

| Service | Pipe diameter (mm) | Pipe Wall Thickness range (mm) | Minimum Diameter of the opening D _o (mm) | Minimum Diameter of the opening D _i (mm) | Depth of the sealant t _s | Backing Option | FRL |
|----------------|--------------------|--------------------------------|---|---|-------------------------------------|---|-----------|
| PE-X/AL/PE | 25 | 3.5 - 3.7 | 35 | 50 | 25 | With PEF Backing rod or sealant at full depth | -/120/120 |
| PE-Xb/AL/PE-Xb | 25 | 2.4 - 3.7 | 35 | 50 | 25 | | -/120/120 |

2hr 75mm Hebel Wall FRL -/120/120 & Rigid Walls FRL -/120/120 & FRL 120/120/120

Various water and gas PE-X pipes protected with Hilti Intumescent Sealant CP611a and Hilti Retrofit Fire Collar CFS-C P 50/1.5" (3/4)

The bare wall can be 75mm Hebel wall with dry density of 510 kg/m³ or rigid wall which must have a minimum thickness of 75mm and comprise of concrete, aerated concrete, solid or hollow masonry with a minimum density of 510 kg/m³.

Figure 4.3a

Side view-water and gas and gas PE-X pipe Hilti Retrofit Fire Collar CFS-C P 50/1.5"

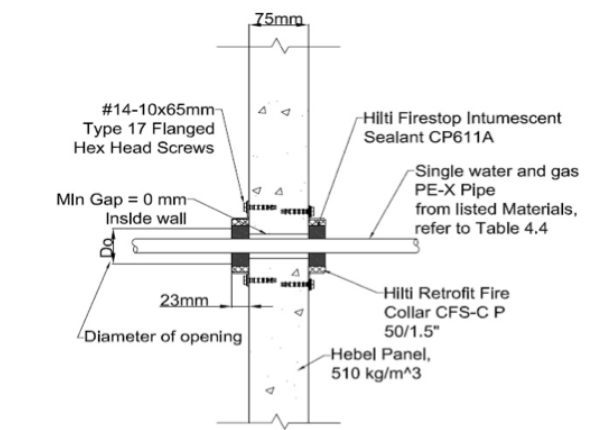
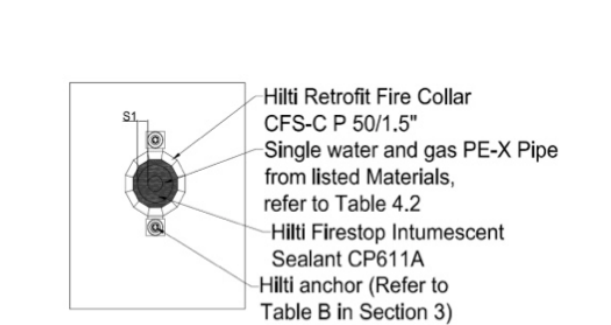


Figure 4.3b

Front view- water PE-X pipe with Hilti Retrofit Fire Collar CFS-C P 50/1.5"



Fire Safety Ratings

HILTI Fire Test Report 20190911-FAS180493 RIR1.2

Table 4.3 Assessment table of PE-X water and gas pipes configuration as per figure 4.3

| Service | Pipe diameter (mm) | Pipe Wall Thickness range (mm) | Minimum Diameter of the opening D _o (mm) | Minimum Diameter of the opening D _o (mm) | Depth of the sealant t _s | Additional Protection | FRL |
|----------------|--------------------|--------------------------------|---|---|-------------------------------------|--|-----------|
| PE-Xa | 16 | 1.2 - 2.4 | 16 | 25 | 23 | CFS-C P 50/1.5 ϕ + Hilti Intumescent Sealant filled inside of collar (only to full depth CP611A | -/120/120 |
| | 20 | 2.3 - 3.4 | 20 | 32 | 23 | | -/120/120 |
| | 25 | 2.8 - 3.9 | 25 | 38 | 23 | | -/120/120 |
| PE-Xb | 16 | 1.2 - 2.4 | 16 | 25 | 23 | | -/120/120 |
| | 20 | 1.9 - 2.4 | 20 | 32 | 23 | | -/120/120 |
| | 25 | 2.3 - 3.9 | 25 | 38 | 23 | | -/120/120 |
| PE-X/AL/PE | 16 | 2.0 - 2.6 | 16 | 25 | 23 | | -/120/120 |
| | 20 | 2.3 - 2.9 | 20 | 32 | 23 | | -/120/120 |
| | 25 | 3.5 - 3.7 | 25 | 38 | 23 | | -/120/90 |
| PE-Xb/AL/PE-Xb | 16 | 2.0 - 2.6 | 16 | 25 | 23 | | -/120/120 |
| | 20 | 2.0 - 2.9 | 20 | 32 | 23 | | -/120/120 |
| | 25 | 2.4 - 3.7 | 25 | 38 | 23 | | -/120/90 |
| PE/AL/PE | 16 | 2.0 - 2.6 | 16 | 25 | 23 | | -/120/120 |
| | 20 | 2.3 - 2.9 | 20 | 32 | 23 | | -/120/120 |
| | 25 | 3.5 - 3.7 | 25 | 38 | 23 | | -/120/120 |

2hr 75mm Hebel Wall FRL -/120/120 & Rigid Walls FRL -/120/120 & FRL 120/120/120

Various water and gas PE-X pipes protected with Hilti Intumescent Sealant CP611a and Hilti Retrofit Fire Collar CFS-C P 50/1.5" (4/4)

The bare wall can be 75mm Hebel wall with dry density of 510kg/m³ or rigid wall which must have a minimum thickness of 75mm and comprise of concrete, aerated concrete, solid or Hollow masonry with a minimum density of 510 kg/m

Figure 4.4a

Side view- Water and gas PE-X pipe with PEF backing rod.

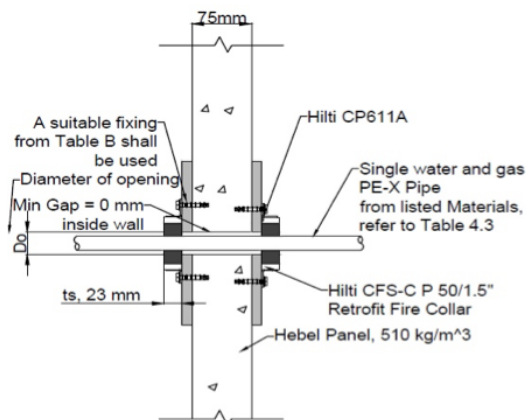


Figure 4.4b

Front View-Water and gas PE-X pipe with PEF backing rod.

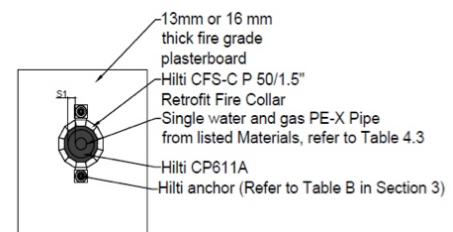
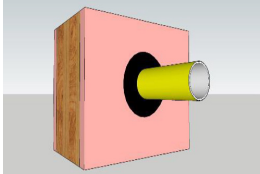
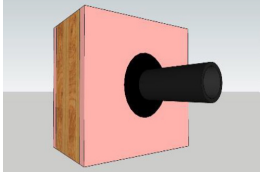
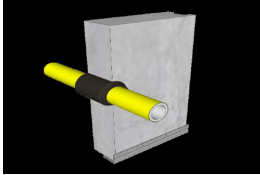
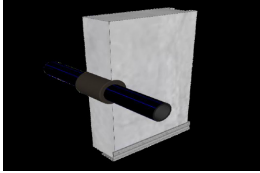


Table 4.2 Assessment table of PE-X water and gas pipes configuration as per figure 4.2

| Service | Pipe diameter (mm) | Pipe Wall Thickness range (mm) | Minimum Diameter of the opening D _o (mm) | Minimum Diameter of the opening D _o (mm) | Depth of the sealant t _s | Backing Option | FRL |
|----------------|--------------------|--------------------------------|---|---|-------------------------------------|---|-----------|
| PE-X/AL/PE | 25 | 3.5 - 3.7 | 35 | 50 | 25 | With PEF Backing rod or sealant at full depth | -/120/120 |
| PE-Xb/AL/PE-Xb | 25 | 2.4 - 3.7 | 35 | 50 | 25 | | -/120/120 |

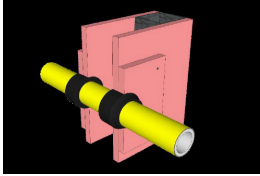
TBA Firefly Report

Report No. RIR 23671-09

| | Service Description | Penetration Seal Description | Support Construction | FRL |
|-------|--|---|---|-----------|
| V19 A | Up to Ø43mm PEX pipe | Protected with TBA Firefly Intumastic HP in the annular gap (Min 10mm Max 40mm) and sealed to the full depth of the substrate | Min. 100mm thick Concrete/masonry or Hebel wall which has been otherwise tested or assessed as a wall to achieve an FRL of -/120/120 | -/120/120 |
| V19 B | | Protected with TBA Firefly Intumastic HP in the annular gap (Min 10mm Max 30mm) and sealed to minimum depth of 26mm and finished with a 40mm fillet on both sides | Min.116mm thick steel framed wall clad with 1 or more layers of fire grade plasterboard with total thickness of at least 26mm each side, which has been otherwise tested or assessed as a wall to achieve an FRL of -/120/120 | -/120/120 |
| V20 A | Up to Ø43mm OD PEX AL pipe | Protected with TBA Firefly Intumastic HP in the annular gap (Min 10mm Max 30mm) and sealed to minimum depth of 26mm and finished with a 40mm fillet on both side | Min.116mm thick steel framed wall clad with 1 or more layers of fire grade plasterboard with total thickness of at least 26mm each side, which has been otherwise tested or assessed as a wall to achieve an FRL of -/120/120 Or | -/120/120 |
| V20 B | | Protected with TBA Firefly Intumastic HP in the annular gap (Min 10mm Max 40mm) and sealed to the full depth of the substrate | Min. 100mm thick Concrete/masonry or Hebel wall which has been otherwise tested or assessed as a wall to achieve an FRL of -/120/120 | -/120/120 |
| V42 | Up to 40mm OD PEX-AL Gas Pipe  | 75mm Core Hole. The annular gap around the service filled to the full depth of the substrate using Intumastic HP | Xlam 105mm CLT with 1 layer of 16mm FR Plasterboard to either side | -/90/90 |
| V43 | Up to 40mm OD PEX Pipe  | 75mm Core Hole. The annular gap around the service filled to the full depth of the substrate using Intumastic HP | Xlam 105mm CLT with 1 layer of 16mm FR Plasterboard | -/90/90 |
| V52 | Up to 25.9mm OD PEX-AL Gas Pipe  | 50mm Core Hole. The annular gap around the service filled to the full depth of the substrate using Intumastic HP * an additional 10mm fillet of Intumastic HP to both sides | Hebel Powerpanel 1m Single Mesh 75mm thick 60 minute panel | -/60/60 |
| V53 | Up to 40mm OD PEX Pipe  | 60mm Core Hole. The annular gap around the service filled to the full depth of the substrate using Intumastic HP | Hebel Powerpanel 1m Single Mesh 75mm thick 60 minute panel | -/60/60 |

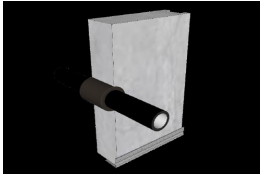
TBA Firefly Report

Report No. RIR 23671-09

| | Service Description | Penetration Seal Description | Support Construction | FRL |
|------|--|--|---|-----------|
| V64 | Up to 40mm OD PEX Pipe  | 60mm Core Hole. The annular gap around the service filled to the full depth of the substrate using Intumastic HP | Hebel Powerpanel 1m Single Mesh T&G 75mm thick 90 minute panel | -/90/90 |
| V76 | Up to 40mm OD PEX Pipe  | 60mm Core Hole. The annular gap around the service filled to the full depth of the substrate using Intumastic HP * an additional 10mm fillet of Intumastic HP to both sides | Hebel Powerpanel 2m Caged 75mm thick 2HR panel | -/120/120 |
| V89 | Up to 25.9mm OD PEX-AL Gas Pipe  | 50mm Core Hole. The annular gap around the service filled to the full depth of the substrate using Intumastic HP * an additional 10mm fillet of Intumastic HP to both sides | Pronto Panel 60mm thick 1HR Panel | -/60/60 |
| V90 | Up to 40mm OD PEX Pipe  | 60mm Core Hole. The annular gap around the service filled to the full depth of the substrate using Intumastic HP | 1 layer of 13mm FR Plasterboard to either side of a 64mm Steel Stud. 1HR FR System. | -/60/60 |
| V107 | Up to 40mm OD PEX-AL Gas Pipe  | 60mm Core Hole. Locally thickened with a 150mm x 150mm layer of 13mm FR Plasterboard fixed using 4 x 32mm long drywall screws The annular gap around the service filled to the full depth of the plasterboard using Intumastic HP. No backing rod required | 1 layer of 13mm FR Plasterboard to either side of a 64mm Steel Stud. 1HR FR System. | -/60/60 |
| V108 | Up to 40mm OD PEX Pipe  | 60mm Core Hole. Locally thickened with a 150mm x 150mm layer of 13mm FR Plasterboard fixed using 4 x 32mm long drywall screws The annular gap around the service filled to the full depth of the plasterboard using Intumastic HP. No backing rod required | Minimum 75mm thick Concrete or Masonry block work wall that is capable of minimum -/120/120 FRL | -/120/120 |

TBA Firefly Report

Report No. RIR 23671-09

| | Service Description | Penetration Seal Description | Support Construction | FRL |
|------|---|---|--|-----------|
| V120 | Up to 40mm OD PEX Pipe  | 60mm Core Hole. The annular gap around the service filled to the full depth of the substrate using Intumastic HP * an additional 10mm fillet of Intumastic HP to both sides | Min. 100mm thick Concrete/masonry or Hebel floor which has been otherwise tested or assessed as a floor to achieve an FRL of 120/120/120 | -/120/120 |
| H12 | Ø43mm PEX pipe | Protected with TBA Firefly Intumastic HP in the annular gap (MIN 10mm Max 40mm)and sealed to the full depth of the substrate | Min. 100mm thick Concrete/masonry or Hebel floor which has been otherwise tested or assessed as a floor to achieve an FRL of 120/120/120 | -/120/120 |
| H13 | Ø43mm PEX AL pipe | Protected with TBA Firefly Intumastic HP in the annular gap (MIN 10mm Max 40mm)and sealed to the full depth of the substrate | Min. 100mm thick Concrete/masonry or Hebel floor which has been otherwise tested or assessed as a floor to achieve an FRL of 120/120/120 | -/120/120 |
| H14 | Up to Ø43mm OD PEX AL pipe | Protected with TBA Firefly Intumastic HP in the annular gap (MIN 10mm Max 40mm)and sealed to the full depth of the substrate | Min. 100mm thick Concrete/masonry or Hebel floor which has been otherwise tested or assessed as a floor to achieve an FRL of 120/120/120 | -/120/120 |
| H27 | Up to Ø43mm PEX Pipe | Protected with TBA Firefly Intumastic HP in the annular gap (MIN 10mm Max 40mm)and sealed to the full depth of the substrate | Min. 100mm thick Concrete/masonry or Hebel floor which has been otherwise tested or assessed as a floor to achieve an FRL of 120/120/120 | -/120/120 |