

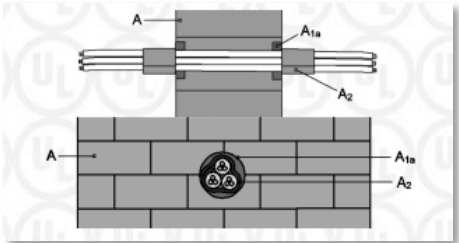


# THE LINK BETWEEN PASSIVE FIRESTOP APPROVALS, PRODUCT QUALITY, BUILDING SAFETY & SUSTAINABILITY

Dr Martin Stirling  
Codes & Approvals (Firestop) / WHS Manager  
May 2025



# THIS IS WHAT WE'LL BE LOOKING AT TODAY



eco-INSTITUT, Schanzestr. 6-20, D-51063 Köln  
 Hilti Entwicklungsgesellschaft mbH  
 Mr. Peter Schulze  
 Hiltistraße 6  
 86916 Kaufering

eco  
 eco-INSTITUT Germany GmbH  
 Laborprüfung  
 Laboratory testing

Dear Mr. Schulze,

based on the evaluation of Test Report No. S8020-A002-CS-1, dated 2023-02-28 the testing results of the product **Hilti Firestop Block CFS-01** manufactured by **Hilti Entwicklungsgesellschaft mbH** comply with the requirements of

- VOC product emissions acc. to California Department of Public Health (CDPH) Standard Method v1.2-2017 (California Specification 01350 (01/2017))

These criteria meet the requirements for low-emitting **Adhesives and Sealants** in credit EQ2 of the LEEDv4 Rating System and the LEEDv4.1 Rating System.

Acceptance Criteria and Results Demonstrating Compliance of Product Sample to Referenced Standard:

Exposure Scenario	Individual VOCs of Concern		Formaldehyde		TVOC
	Requirement	Requirement hold	Requirement	Requirement hold	
School Classroom	1/2 CREL	yes	≤ 9 µg/m³	yes	≤ 0.5 mg/m³
Private Office	1/2 CREL	yes	≤ 9 µg/m³	yes	≤ 0.5 mg/m³

Mass per surface area: not applicable

**PRODUCT CARBON IMPACT ANALYZER**

Start > Review your input > Refine output > Customize report

**WEBINAR**

↑ Total carbon impact (kg CO2e)	<b>A1-D: 1</b>	<b>A1-A3: 1</b>
Net Sales analyzed	n/a	Carbon intensity (kg CO2e / aud)
Items analyzed	1	Average item impact (kg CO2e)

**Performance requirements**

**Design decisions** requiring Deemed to Satisfy and or Performance solutions

**Quality (Performance & Consistency)**

**Building Occupant Sustainability**

**Environmental Sustainability**

**Building Safety**

**Building Sustainability**

# NATIONAL CONSTRUCTION CODE FIRESTOP PERFORMANCE REQUIREMENTS

# HOW TO CONFORM TO THE REQUIREMENTS OF THE NATIONAL CONSTRUCTION CODE (NCC)



## The National Construction Code is Australia’s primary set of technical design and construction provisions for buildings.

As a performance-based code, it sets the **minimum required** level for the safety, health, amenity, accessibility and sustainability of certain buildings. The Australian Building Codes Board, on behalf of the Australian Government and each State and Territory government, produces and maintains the National Construction Code.

### Performance based code, NCC sets outcomes This allows for innovation and flexibility.

DEEMED TO SATISFY SOLUTION

And / Or

PERFORMANCE SOLUTION

Assessment Methods are specified

# EXAMPLE: PROTECTION OF OPENINGS

## Section C Fire resistance



## C4 Protection of Openings

windows, doors, services and construction joints

## Performance Requirement

### C4D1 Deemed-to-Satisfy Provisions

Performance requirements C1P1 to C1P9 satisfied by complying with C2D2-15 / C3D2-15, C4D2-17

**C4D15 Openings for service installations**  
electrical, plumbing, mechanical ventilation, HVAC penetrating a building element

**Identical with a prototype** tested in accordance with AS 4072.1 and AS 1530.4

### Performance Solution

In accordance with A2G2(3) and A2G4(3)

# AS1530.4 & AS4072.1 AND WHY WE NEED BOTH

AS 1530.4:2014



**Methods for fire tests on building materials, components and structures**

**Part 4: Fire-resistance tests for elements of construction**

**AS 1530.4**

How to configure a fire test  
Which variations to the tested prototype are allowed

AS 4072.1—2005

Australian Standard™

**Components for the protection of openings in fire-resistant separating elements**

**Part 1: Service penetrations and control joints**

**AS 4072.1**

How to write an assessment  
Which variations to the tested prototype are allowed  
Additional engineering requirements for installation e.g. movement in control joints

# WHO CAN DO THE FIRE TESTS AND WHO CAN WRITE ASSESSMENTS BASED ON THE TEST RESULTS

## Section C Fire resistance







Performance requirement (DTS and / or Performance solution) is the FRL achieved by a prototype in a standard fire test, in accordance with **AS 1530.4 + AS 4072.1** in an **Accredited Testing Laboratory**

### Accredited Testing Laboratory

One of the following:

- (a) An organisation accredited by the National Association of Testing Authorities Australia (NATA) to undertake the relevant tests.
- (b) An organisation outside Australia accredited to undertake the relevant tests by an authority recognised by NATA through a mutual recognition agreement.
- (c) An organisation recognised as being an Accredited Testing Laboratory under legislation at the time the test was undertaken.

### Examples of authorities recognized as Accredited Testing Laboratories

NATA  UKAS  IAS  IANZ  are signatories to a mutual recognition agreement (ILAC / MRA) as part of the WTO's Agreement on Technical Barriers to Trade. **ABCB confirms this in its 'Evidence of suitability handbook'.**

### UL Solutions use test data from these authorities to write certificates

UL is a global safety science leader. They are over 130 years old. UL helps companies demonstrate safety, enhance sustainability, strengthen security, deliver quality, manage risk and achieve compliance.



# IF THE PERFORMANCE ROUTE IS TAKEN, IT MUST BE IN ACCORDANCE WITH A2G2(3) AND A2G4(3)

## Section C Fire resistance

### C4 Protection of Openings

windows, doors, services and construction joints

### Performance Requirement

#### C4D1 Deemed-to-Satisfy Provisions

Performance requirements C1P1 to C1P9 satisfied by complying with C2D2-15 / C3D2-15, C4D2-17

**C4D15 Openings for service installations**  
electrical, plumbing, mechanical ventilation, HVAC penetrating a building element

**Identical with a prototype** tested in accordance with AS 4072.1 and AS 1530.4

#### Performance Solution

In accordance with A2G2(3) and A2G4(3)

- A report from an Accredited Testing Laboratory.
- A Certificate of Conformity or a Certificate of Accreditation.
- A certificate from a professional engineer or appropriately qualified person.
- A current certificate issued by a product certification body that has been accredited by the Joint Accreditation System of Australia and New Zealand (JAS-ANZ).
- Any other form of documentary evidence that adequately demonstrates suitability such as a Product Technical Statement.



# HOW QUALITY IS RELATED TO CONFORMANCE

# THE NCC INFERS THE REQUIREMENT FOR QUALITY, BY THE 'IDENTICAL PROTOTYPE' STATEMENT



## Section C Fire resistance

**C4D15 (2)(a)(i)** requires that “The service, building element and any protection method at the penetration are **identical with a prototype assembly** of the service, building element and protection method which has been tested in accordance with **AS 4072.1** and **AS 1530.4**”

# A PERFORMANCE TEST ALONE CAN'T PROVE 'IDENTICAL'

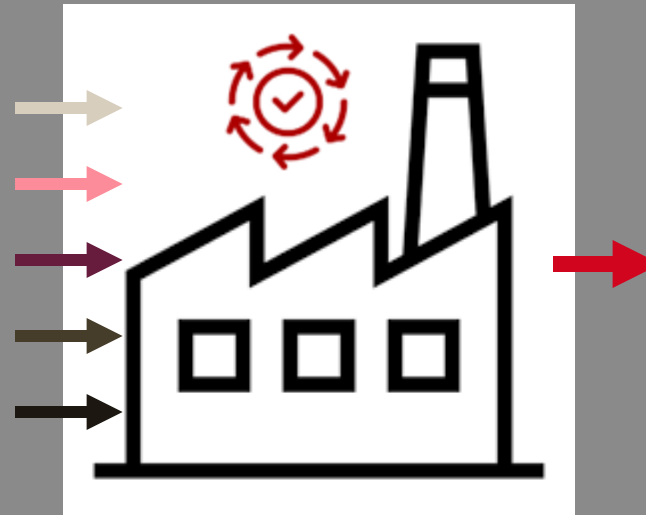
## MEASURE PERFORMANCE

Assess FRL in an Accredited Testing Laboratory



## CHECK CONSISTENCY

Ingredients must remain consistent and production process must remain consistent to produce a final, consistent product; year-in, year-out



A Fire-stopped Penetration identical to a prototype assembly requires ...

Installation quality

+

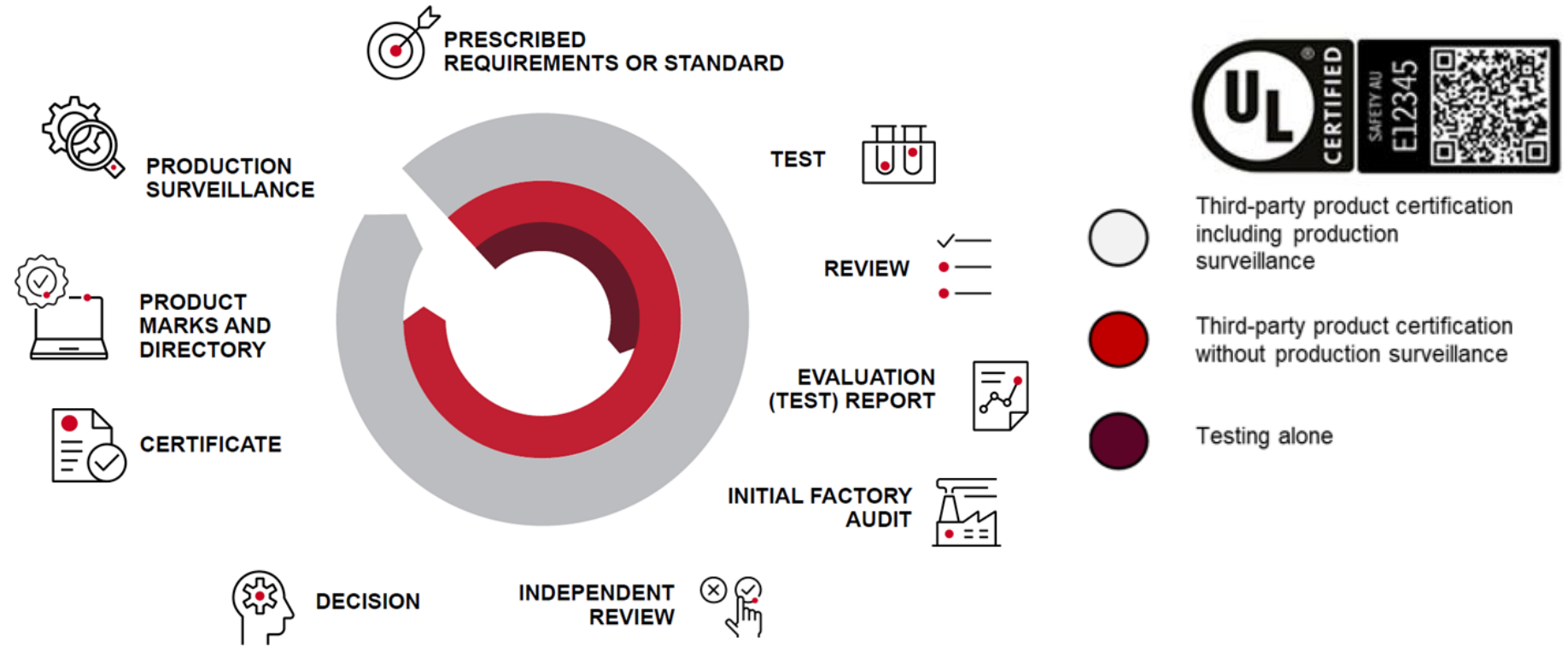
Product quality

# HOW YOU CAN CONFIRM 'IDENTICAL'

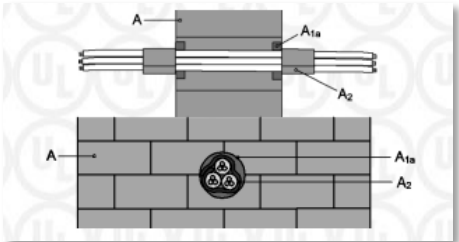
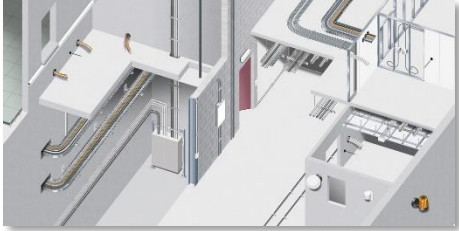
## Section C Fire resistance



To confirm 'identical with a prototype assembly' you need the full **circle of assessment** and **on-going surveillance**



# THIS DELIVERS A SAFE BUILDING THAT CONFORMS TO CODE AND ALSO ENSURE IT WILL PERFORM



**Performance requirements**



**Design decisions** requiring Deemed to Satisfy and or Performance solutions



**Quality** (Performance & Consistency)



**Building Safety**

# SUSTAINABILITY (1) – TAKING CARE OF SOCIETY

# AIR QUALITY FOR BUILDING OCCUPANTS

Volatile Organic Compounds (VOC's) can potentially impact indoor air quality and impact health

## Definition

### VOC

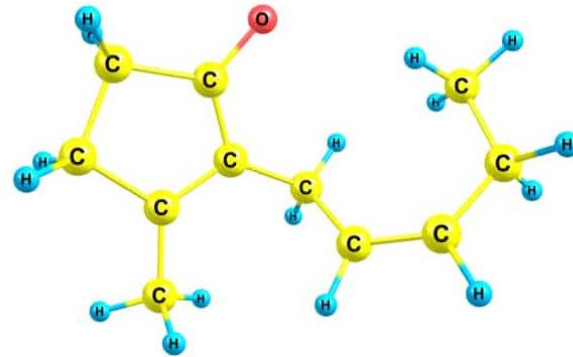
A Volatile Organic Compound is a chemical that easily evaporates into a vapor. VOC's are found in many products and settings, including paints, fuels, and **building materials**.

### Examples

Benzene / Formaldehyde / Acetone / Toluene / Vinyl chloride / Chloroform / Trichloroethylene

### Health effects

Exposure to high levels of VOC's can damage the liver, kidney, or central nervous system. Some VOC's are linked to cancer. They may also worsen symptoms for people with asthma and COPD.



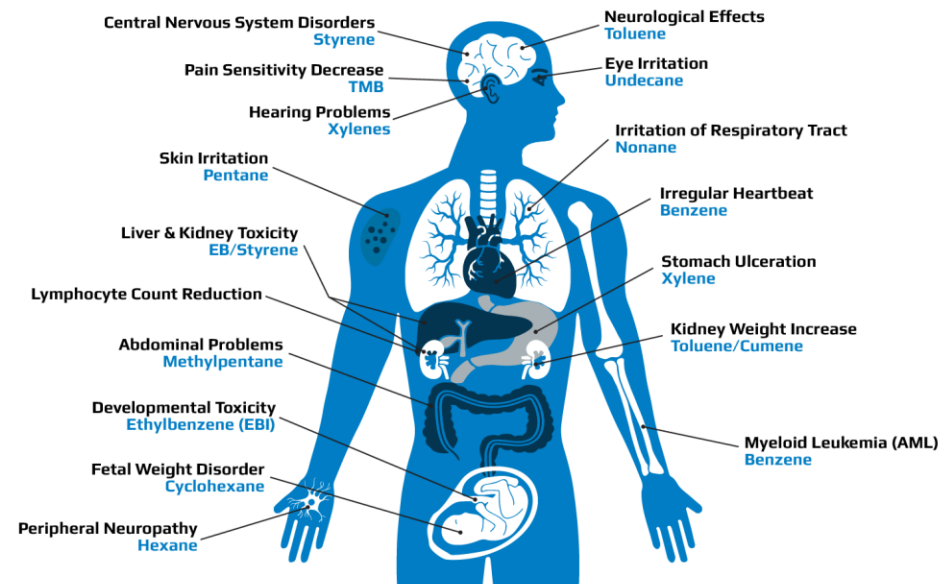
## Which materials emit them

### Building materials

- Paint, paint strippers
- Varnishes and finishes
- **Caulks and sealants**
- Adhesives
- Flooring, carpet, pressed wood products

### Home & personal care products:

- Cleaners and disinfectants
- Furniture
- Pesticides
- Air fresheners
- Cosmetics and deodorants
- Fuel oil, gasoline



# MEASUREMENT OF VOC'S AND WHAT'S ACCEPTABLE

The WES for VOC's in Australia is 150 ppm (or 445 mg/m<sup>3</sup>) and you also need it for Green Star status

## Measurement



### Can be expressed in several ways

Parts per million (ppm)  
Parts per billion (ppb)  
Milligrams per cubic meter (mg/m<sup>3</sup>)  
Micrograms per cubic meter (µg/m<sup>3</sup>)  
Grams per liter (g/L)  
Normally refer to TVOC (T = Total)

### Compliance

- Compliance demonstrated through VOC or Formaldehyde data sheets.
- Must NATA or another ISO/IEC 17025 accredited laboratory.
- Material Safety Data Sheets (MSDS) can also be used.

## Safe levels in office buildings

 Organization	 TVOC Guidelines
<b>World Health Organization (WHO)</b>	< 0.05 ppm or 0.25 mg/m <sup>3</sup>
<b>RESET</b>	< 0.25 ppm or 500 µg/m <sup>3</sup>
<b>LEED</b> <small>Green Star buildings have volatile organic compound (VOC) limits</small>	< 0.25 ppm, or 500 µg/m <sup>3</sup> <small>Green Star buildings VOC limits stipulate 250g/L for fire retardant sealants, same as LEED</small>
<b>OSHA</b>	Formaldehyde < 0.75 ppm

# THE VOC'S OF TYPICAL FIRESTOP PRODUCTS

... and what the compliance documentation looks like

**CFS-F FX Flexible firestop foam**



VOC g/L **26 g/L** ✓

Green Star limit 250 g/L



**CP 611A sealant**



VOC g/L **56 g/L** ✓

Green Star limit 250 g/L



**CP 606 sealant**



VOC g/L **49.5 g/L** ✓

Green Star limit 250 g/L



**CP 679A cable coating**



VOC g/L **0 g/L** ✓

Green Star limit 250 g/L



**CFS-SP SIL sealant**



VOC g/L **72.8 g/L** ✓

Green Star limit 250 g/L



**CFS-CT board coating**

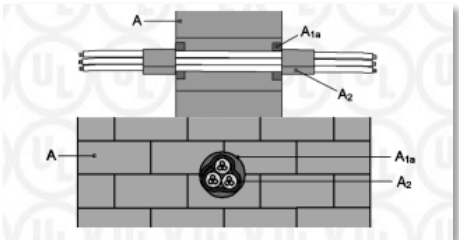
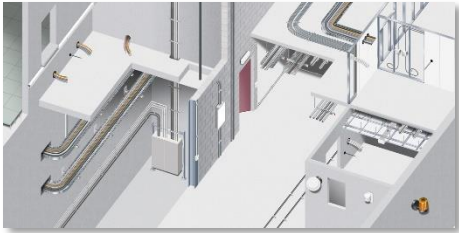


VOC g/L **close to 0 g/L** ✓

Green Star limit 250 g/L



# WE CAN ACHIEVE A SAFE BUILDING THAT CONFORMS TO CODE, AND ENSURES OCCUPANT HEALTH



eco INSTITUT, Scharzenstr. 6-20, D-51063 Köln  
 Hilti Entwicklungsgesellschaft mbH  
 Mr. Peter Schulze  
 Hiltistraße 6  
 86916 Kaufering

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 Laborprüfung  
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Mass per surface area: not applicable

Performance requirements

✓

Design decisions requiring Deemed to Satisfy and or Performance solutions

✓

Quality (Performance & Consistency)

✓

Building Occupant Sustainability

✓

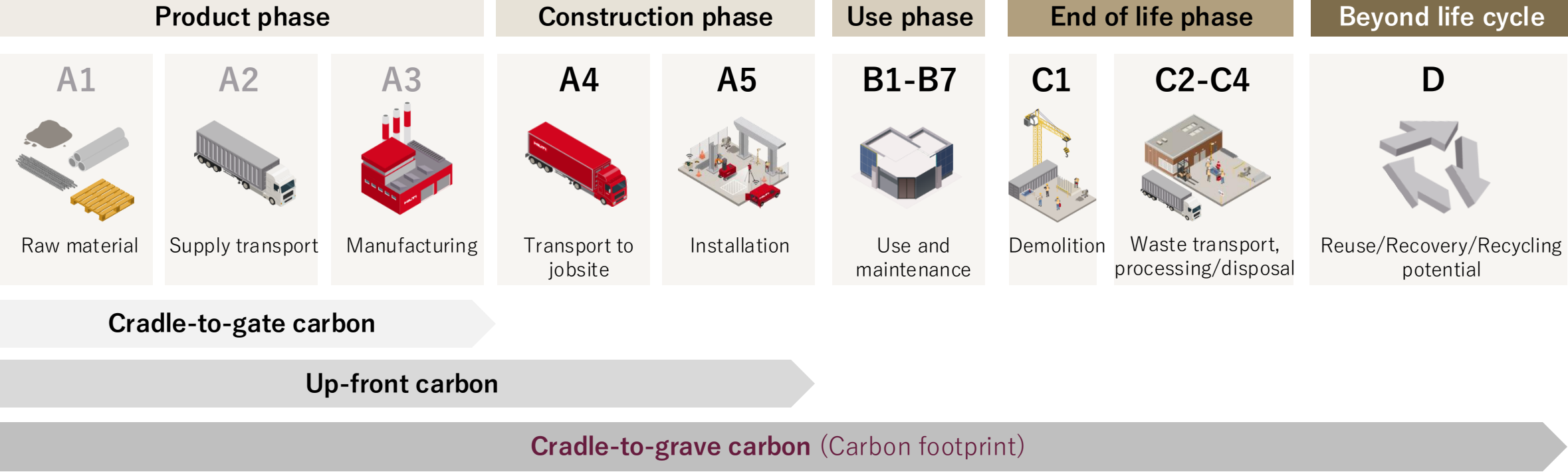
Building Safety

Building Sustainability

# SUSTAINABILITY (2) – TAKING CARE OF THE ENVIRONMENT

# HOW CARBON FOOTPRINT OF A PRODUCT IS MEASURED

‘Cradle-to-grave’ carbon is often interchangeable terminology with ‘carbon-footprint’



# CARBON FOOTPRINT OF PASSIVE FIRE-STOPPED PRODUCTS

**CFS-F FX Flexible firestop foam**



Total CO2 (kg) generated in lifecycle, per unit  
**8.5**

**CP 606 sealant**



Total CO2 (kg) generated in lifecycle, per unit  
**1.2**

**CFS-SP SIL sealant**



Total CO2 (kg) generated in lifecycle, per unit  
**295**

**CFS-PL Firestop plug**



Total CO2 (kg) generated in lifecycle, per unit  
**3.2**

**CFS-BL Firestop block**



Total CO2 (kg) generated in lifecycle, per unit  
**1.3**

**CFS-SL Firestop sleeve**



Total CO2 (kg) generated in lifecycle, per unit  
**12.4**

**CP 680 Cast-in device**



Total CO2 (kg) generated in lifecycle, per unit  
**1.8**

**CFS-B Firestop bandage**



Total CO2 (kg) generated in lifecycle, per unit  
**7.0**

**CFS-C Collar**



Total CO2 (kg) generated in lifecycle, per unit  
**0.6**

**CP 674V Cavity barrier**



Total CO2 (kg) generated in lifecycle, per unit  
**60.4**

**CFS-TTS Top track**



Total CO2 (kg) generated in lifecycle, per unit  
**4.2**

**CFS-P Putty**

**PRODUCT CARBON IMPACT ANALYZER**

Start > Review your input > Refine output > Customize report > Visualizations

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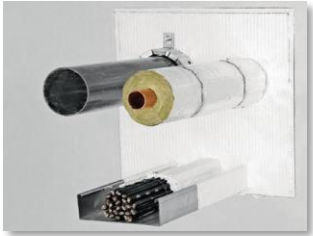
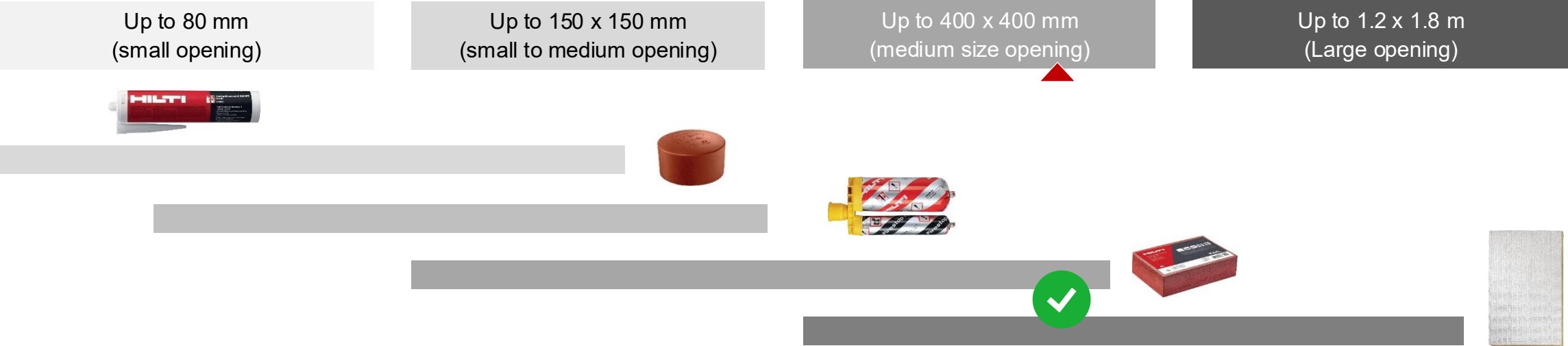
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# WORKED EXAMPLE OF THE LINKAGE

# LET'S ASSUME A SERVICES PENETRATION THAT IS 400 X 400 MM IN SIZE THROUGH A FLEXIBLE WALL

We can shortlist solutions by their dimension and approval coverage



# ONCE WE ESTABLISH SIZE, THEN WE MAY ALSO NEED TO ESTABLISH OTHER DESIGN CONSIDERATIONS



Ease of Re-penetration



Smoke and Gas Tightness



Acoustic Insulation



Water Tightness



Thermal Insulation



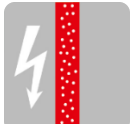
Seismic Resistance



Rodent Resistance



Mold and Mildew Resistance



Electrical Resistance



Chemical Resistance

# CARBON FOOTPRINT OF THE FINAL INSTALLED SYSTEM

Penetration size has an impact on overall footprint, proportional to cross-sectional area

100mm total thickness drywall on 50 mm steel studs with 2 x 13mm plasterboard layers on each side. -/120/120 required.



1

400 x 400 mm 5% wastage  
25 blocks, 0.4m of putty, 229ml sealant  
**33 CO2e kg**

2

Optimized ... 350 x 400 mm 6% wastage  
22 blocks, 0.4m of putty, 229ml sealant  
**29 CO2e kg**

Optimization yields 12% less CO2e; 12% less material cost and maybe similar installation time



5000 x 100 x 3 mm



310 ml



200 x 130 x 50 mm

Max size 1000 x 1000mm, thickness 200mm (block and build)

Gaps fill with CP611A 20mm deep intumescent sealant required non-tray and full depth for tray. 2 x

Putty bandage on top services on tray over-lapped 20mm. 2 x putty bandage on cables

Tray can rest on the bottom / side. Must be 50mm away from other >16mm D services. >16mm

services must be 500mm apart. Insulation 1200mm (85kg/m<sup>3</sup>) on Cu pipes

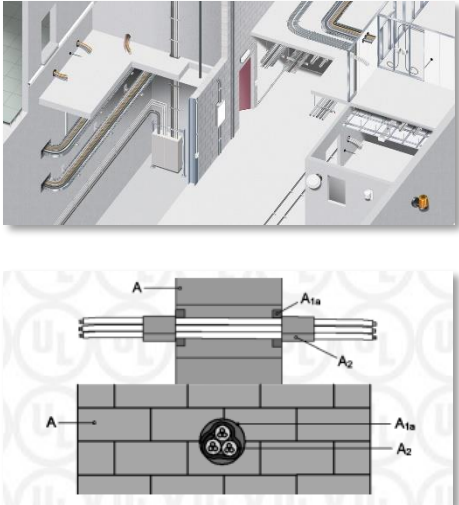
12.5mm Box or 100mm Bead or Build-up to 200mm required. 100mm insulation required in cavity around penetration

Services supported 250mm from both sides of wall



Additional design attributes

# WE CAN ACHIEVE AN OUTCOME OF A SAFE BUILDING THAT CONFORMS TO CODE, ENSURES OCCUPANT HEALTH AND MINIMIZES ENVIRONMENTAL IMPACT



eco-INSTITUTE, Schanzstraße 4-20, D-51063 Köln  
 Hilti Entwicklungsgesellschaft mbH  
 Mr. Peter Schulte  
 Hiltistraße 6  
 86916 Kaufering

Dear Mr. Schulte,

based on the evaluation of Test Report No. 58020-A002-CS-1 dated 2023-02-28 the testing results of the product **Hilti Firestop Block CFS-BL** manufactured by **Hilti Entwicklungsgesellschaft mbH** comply with the requirements of

- VOC product emissions acc. to California Department of Public Health (CDPH) Standard Method v1.2-2017 (California Specification 01350 (01/2017))

These criteria meet the requirements for low-emitting **Adhesives and Sealants** in credit EQ2 of the LEEDv4 Rating System and the LEEDv4.1 Rating System.

Acceptance Criteria and Results Demonstrating Compliance of Product Sample to Referenced Standard:

Exposure Scenario	Individual VOCs of Concern		Formaldehyde		TVOC
	Requirement	Requirement hold	Requirement	Requirement hold	Range
School Classroom	1/2 CREL	yes	≤ 9 µg/m³	yes	≤ 0.5 mg/m³
Private Office	1/2 CREL	yes	≤ 9 µg/m³	yes	≤ 0.5 mg/m³

Mass per surface area: not applicable

**PRODUCT CARBON IMPACT ANALYZER**  
 Start > Review your input > Refine output > Customize report

**WEBINAR**

↑ Total carbon impact (kg CO2e)	<b>A1-D: 1</b>	<b>A1-A3: 1</b>
⌘ Net Sales analyzed	n/a	n/a
📦 Items analyzed	1	1.279
		Average item impact (kg CO2e)

**Performance requirements**



**Design decisions** requiring Deemed to Satisfy and or Performance solutions



**Quality (Performance & Consistency)**



**Building Occupant Sustainability**



**Environmental Sustainability**



**Building Safety**

**Building Sustainability**

# THANKYOU !



## Contact

Dr Martin Stirling

Hilti (Aust) Pty Ltd  
1G Homebush Bay Drive  
Rhodes NSW

**Tel: 0437-891-695**

**[Martin.Stirling@hilti.com](mailto:Martin.Stirling@hilti.com)**

[www.hilti.com.au](http://www.hilti.com.au)