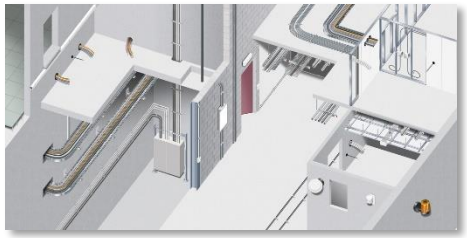
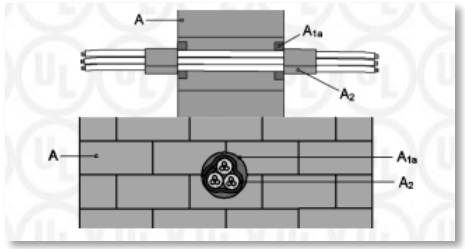
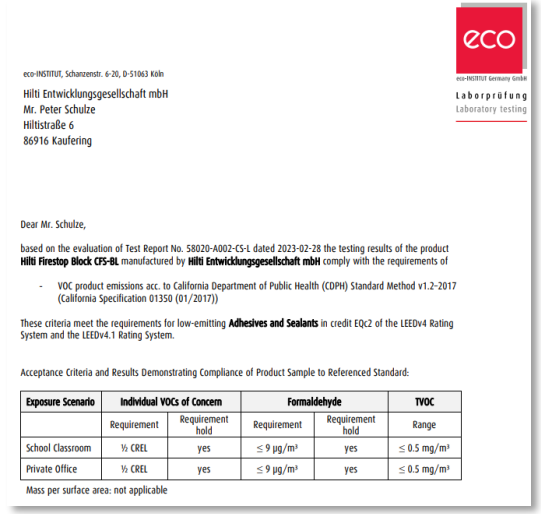
THE LINK BETWEEN PASSIVE FIRESTOP APPROVALS, PRODUCT QUALITY, BUILDING SAFETY & SUSTAINABILITY

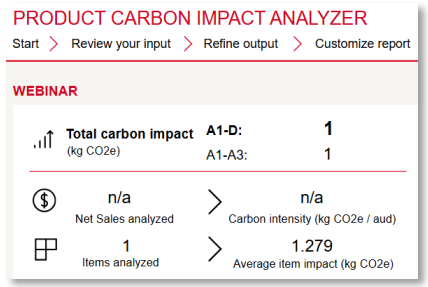
Dr Martin Stirling
Codes & Approvals (Firestop) / WHS Manager
May 2025

THIS IS WHAT WE‘LL BE LOOKING AT TODAY









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

Australian STANDARD

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

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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

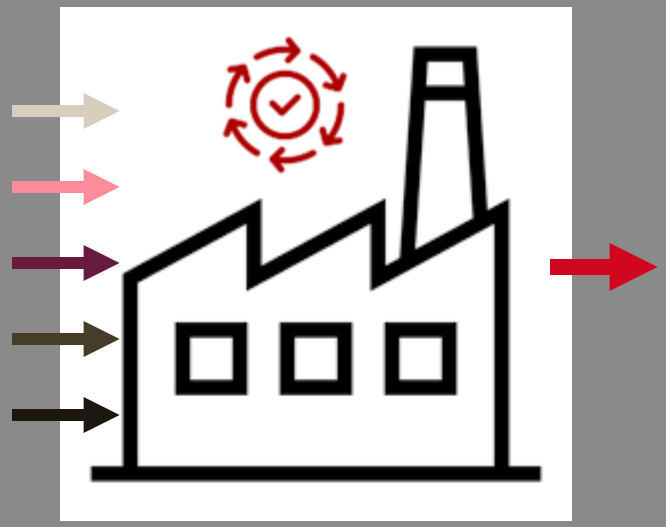
Section C Fire resistance

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

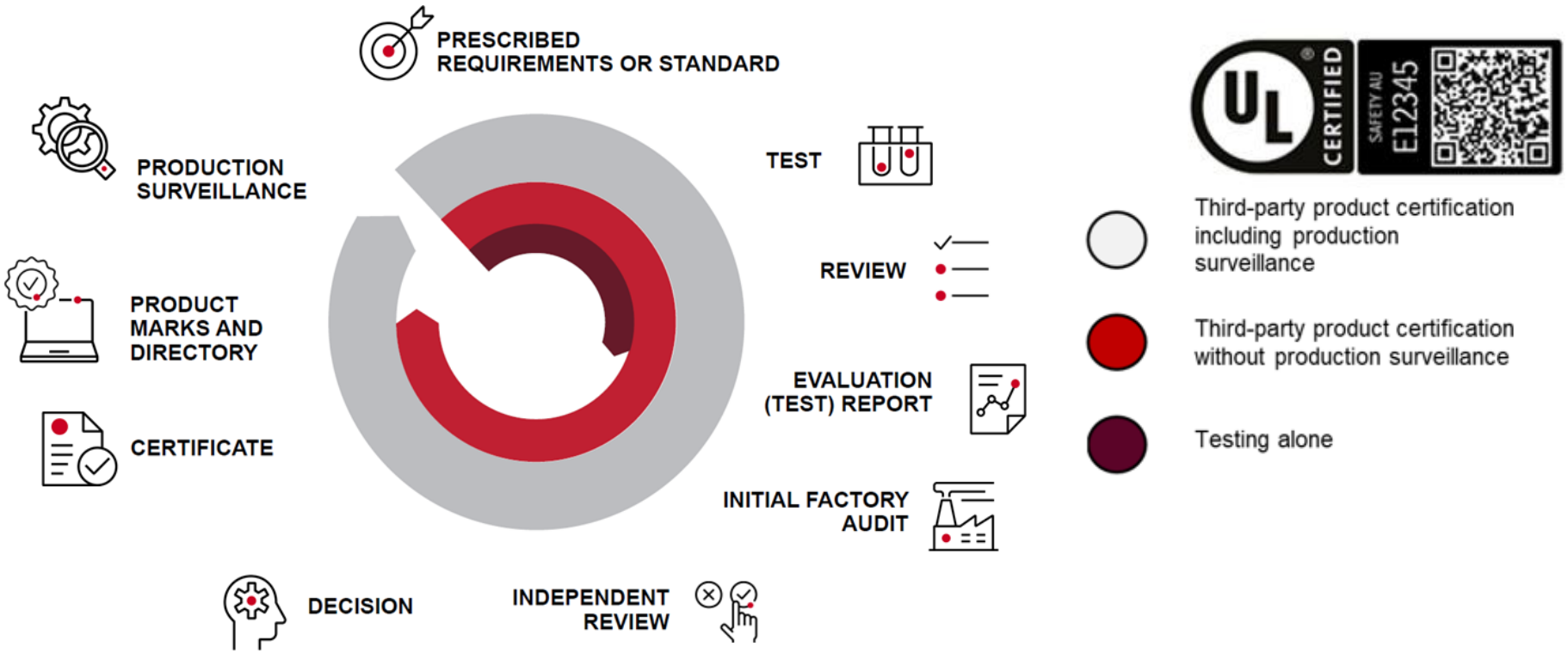
+

Product quality

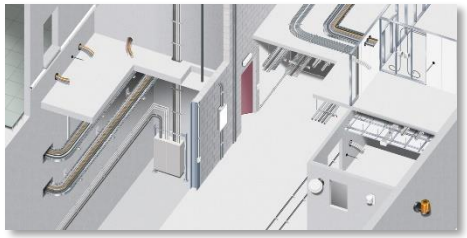
HOW YOU CAN CONFIRM ‘IDENTICAL’

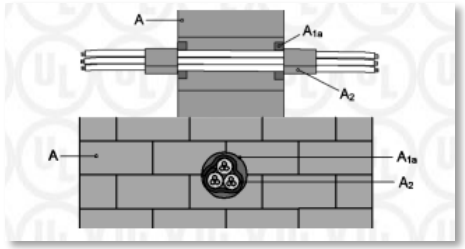
Section C Fire resistance

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

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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

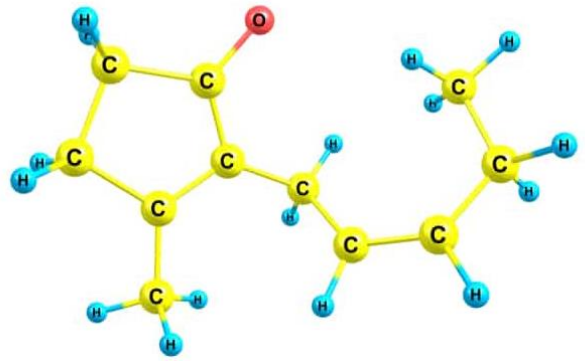
A Volatile Organic Compound is a chemical that easily evaporates into a vapor. VOC's are found in many products and settings, including paints, fuels, and building materials.

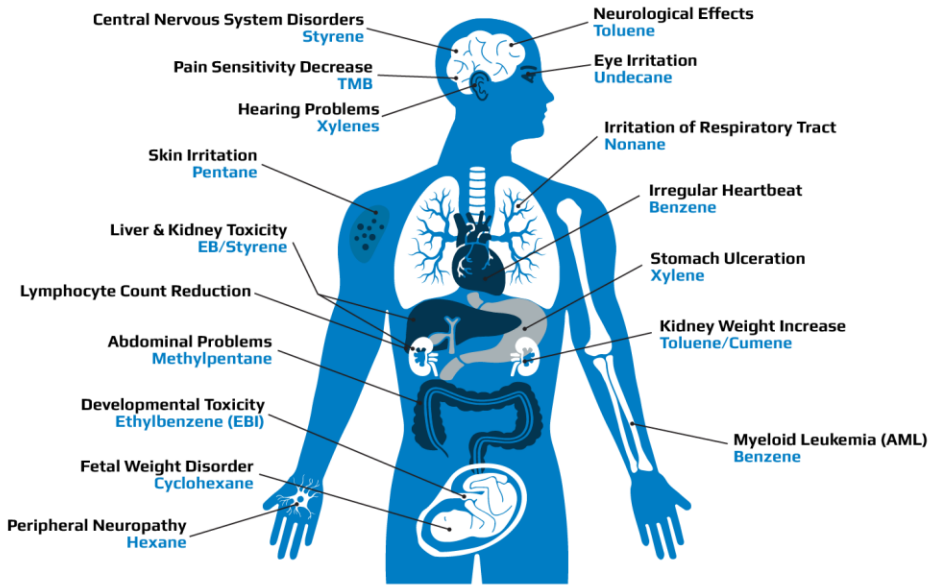
Examples

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/m³) 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/m3)
Micrograms per cubic meter (µg/m3)
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
World Health Organization (WHO)	< 0.05 ppm or 0.25 mg/m³
RESET	< 0.25 ppm or 500 µg/m³
LEED	< 0.25 ppm, or 500 µg/m³
OSHA	Formaldehyde < 0.75 ppm

Green Star buildings have volatile organic compound (VOC) limits

Green Star buildings VOC limits stipulate 250g/L for fire retardant sealants, same as LEED

THE VOC‘S OF TYPICAL FIRESTOP PRODUCTS

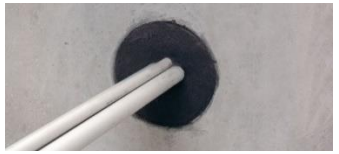
… and what the compliance documentation looks like

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

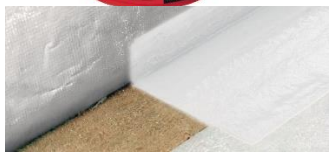
Green Star limit
250 g/L

CP 679A cable coating

VOC g/L
0 g/L

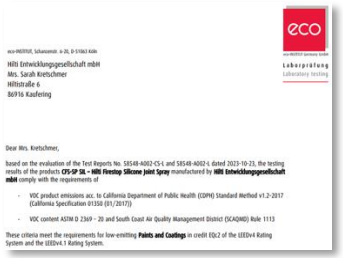
Green Star limit
250 g/L

CFS-SP SIL sealant



VOC g/L
72.8 g/L

Green Star limit
250 g/L

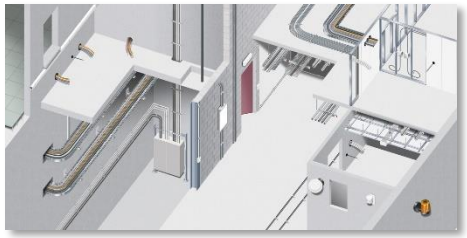


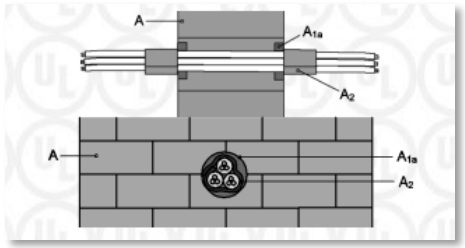
CFS- CT board coating

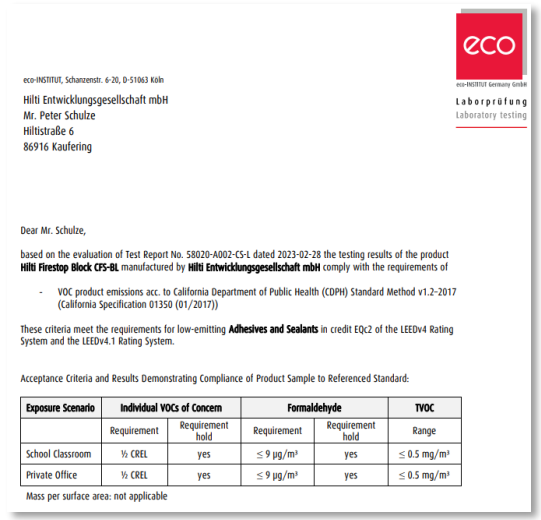
VOC g/L
close to 0 g/L

Green Star limit
250 g/L

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







eco-INSTITUT, Schanzenstr. 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. 58020-A002-CS-L 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 EQc2 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	½ CREL	yes	≤ 9 µg/m³	yes	≤ 0.5 mg/m³
Private Office	½ CREL	yes	≤ 9 µg/m³	yes	≤ 0.5 mg/m³

Mass per surface area: not applicable

Performance requirements

Design decisions requiring Deemed to Satisfy and or Performance solutions

Quality (Performance & Consistency)

Building Occupant Sustainability

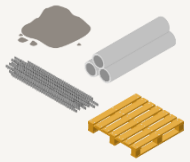
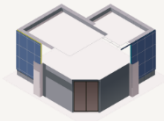
Building Safety

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’

Product phase			Construction phase		Use phase	End of life phase		Beyond life cycle
A1	A2	A3	A4	A5	B1-B7	C1	C2-C4	D
								
Raw material	Supply transport	Manufacturing	Transport to jobsite	Installation	Use and maintenance	Demolition	Waste transport, processing/disposal	Reuse/Recovery/Recycling potential

Cradle-to-gate carbon

Up-front carbon

Cradle-to-grave carbon (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

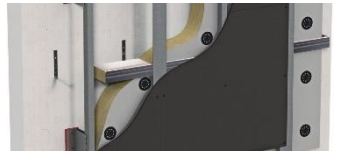
CFS-B Firestop bandage

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

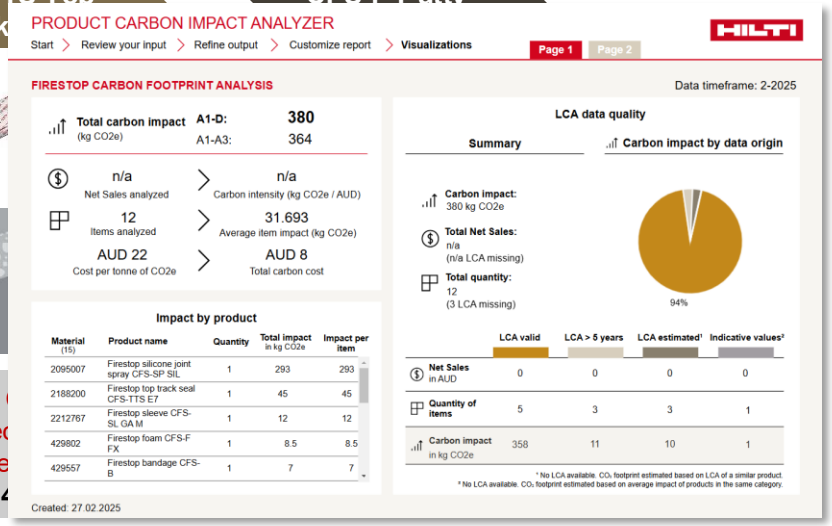


Total CO2 (kg) generated in lifecycle, per unit
60.4

CFS-TTS Top track

Total CO2 (kg) generated in lifecycle, per unit
4

CFS-P Putty

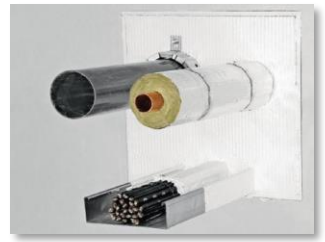


WORKED EXAMPLE OF THE LINKAGE

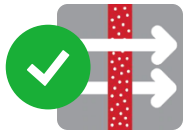
LET'S ASSUME A SERVICES PENETRATION THAT IS 400 X 400 MM IN SIZE THROUGH A FLEXIBLE WALL

We can shortlist solutions by their dimension and approval coverage

Up to 80 mm (small opening)	Up to 150 x 150 mm (small to medium opening)	Up to 400 x 400 mm (medium size opening)	Up to 1.2 x 1.8 m (Large opening)



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



Ease of Re-penetration

Smoke and Gas Tightness

Acoustic Insulation

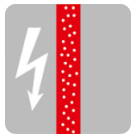
Water Tightness

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.

5000 x 100 x 3 mm **310 ml** **200 x 130 x 50 mm**

Additional design attributes

1

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

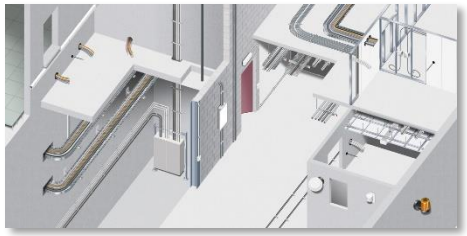
2

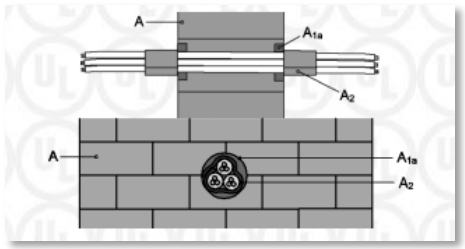
Optimized … 350 x 400 mm 6% wastage
22 blocks, 0.4m of putty, 229ml sealant
29 CO2e kg

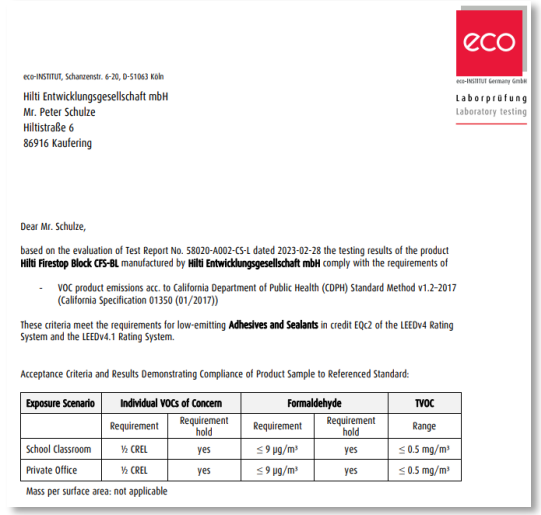
Optimization yields 12% less CO2e; 12% less material cost
and maybe similar installation time

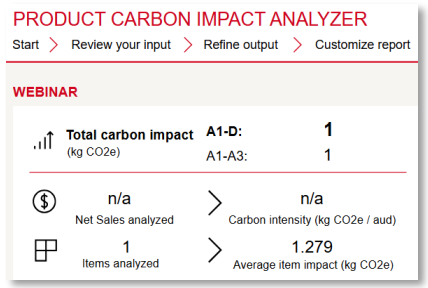
Max size 1000 x 1000mm, thickness 200mm (block and build)
Gaps fill with CP611A 20mm deep intumescent sealant required non-tray and full depth for tray. 2 x Putty bandage on top services on tray over-lapped 20mm. 2 x putty bandage on cables
Tray can rest on the bottom / side. Must be 50mm away from other >16mm D services. >16mm services must be 500mm apart. Insulation 1200mm (85kg/m^3) 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

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









Performance requirements

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Quality (Performance & Consistency)

Building Occupant Sustainability

Environmental Sustainability

Building Safety

Building Sustainability

THANKYOU !

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