

Hilti firestop collar CFS-C, CFS-C P Seismic performance test sheet



Product description / application

Hilti firestop collar used for firestop seals of plastic pipe penetrations in walls and floors.

Tested application: plastic pipe penetration

For specific application details the national approvals and the European Technical Approval must be observed. All results are based upon the test constellation and its respective parameters described in the Hilti seismic firestop test reports and the application details set out in the Hilti installation instructions.

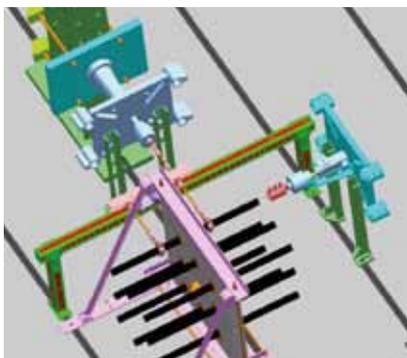


Test setup / description

Simulated seismic firestop tests conducted in the Hilti research laboratory, accredited by the DAP (German Accreditation System for Testing) regarding the standard DIN EN ISO / IEC 17025. The quasi-static cyclic loads according to the FEMA 461* protocol were applied directly on one single penetrant, whereas the wall was fixed. Tests were carried out in x-direction (load in same direction as the penetrant), in y-direction (load rectangular to the penetrant) and in zz-direction (rotation with the center in the wall layer) where applicable. The gap between penetrants and walls was also varied. Air/gastightness was measured during tests with a pressure testing device to come to measurable conclusions about damages of the penetration seal in a seismic event. After the seismic test an additional orientating firestop test was conducted to evaluate smoketightness and fire integrity of the relevant firestop system.

* Federal Emergency Management Agency:

Code for interim testing protocol for determining the seismic performance characteristics of structural and non-structural components



Test apparatus seismic testing



Firestop collar test details



Fire test after seismic impacts

Test results

Test configuration: plastic pipe penetration to represent the key application. Firestop collar tested in typical opening size. Backfilling (smoke seal) with reference to different sealant materials. Installation in drywall.

	x-direction	y-direction	zz-direction
Result:			
1. Displacement amplitude			
2. Movement force			
3. Pressure			
Movement	+/- 20 mm	+/- 30 mm	+/- 10°
Resistance to movement	Low (<1kN)	Medium (<5kN)	Medium (<4kN)
Initial pressure	5000 Pa	6000 Pa	5000 Pa
Pressure drop*	Low-to-medium	Low-to-high	Medium-to-high Pronounced plateau
Airtight during test*	Yes/Partly	Yes/No	Yes/No
Firestop functionality	Passed	Passed	Passed

* Performance data influenced by smoke seal system.

Summary and interpretation of results

- The Hilti firestop collar performed very well. No cracks or deformations were observed during movement of the pipes.
- The collar was still fixed to the wall and fully intact.
- High intumescent performance of the collar ensured fire integrity of the penetration.
- The sealant, functioning as a smoke seal in the annular gap, is the critical component. The usage of an equivalent smoke seal product (such as Hilti firestop acrylic sealant CP606/CFS-S ACR) is recommended.

Influence of seismic actions on mechanical performance, smoke and fire ratings

Hilti firestop drop-in device - seismic			
Damage	Smoke	Fire	Overall performance*
■■■	■ - ■■■ Performance data influenced by smoke seal system.	■■■	■■■

Rating criteria	Damage	Smoke	Fire ratings
■■■	Excellent mechanical performance under seismic conditions	Excellent smoketightness	Excellent fire performance
■■	Good mechanical performance under seismic conditions	Good smoketightness	Good fire tightness
■	Poor mechanical performance under seismic conditions	Poor smoketightness	Poor fire tightness
□	Very poor mechanical performance under seismic conditions	Very poor smoketightness	Very poor fire tightness

* for an entire evaluation of post-earthquake risks an additional consideration of inherent product properties and installation reliability factors are necessary and therefore might lead to a degradation or upgrading.

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