

Hilti firestop sleeve CFS-SL

Seismic performance test sheet



Product description / application

Hilti firestop sleeve is a pre-engineered device used for firestop seals in small openings, offering 2" and 4" dimensions diameter for high traffic cable penetrations with an easy repenetration of cables.

Tested application: cable bundle

For specific application details the national approvals or 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.

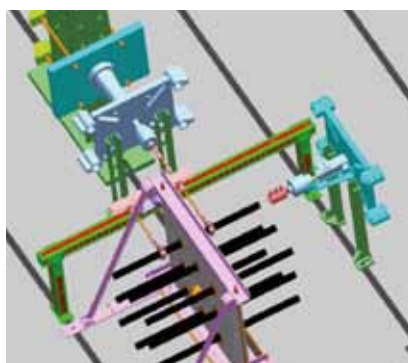


Test setup / description

Simulated seismic firestop tests conducted in the Hilti research laboratory, accredited by DAP (German Accreditation System for Testing) regarding the standard DIN EN ISO / IEC 17025. The quasi-static cyclic loads according to 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 sleeve test details



Fire test after seismic impacts

Test results

Test configuration: cable penetration to represent the key application. Firestop sleeve tested in typical opening size. Installation in a drywall.

	x-direction	y-direction	zz-direction
Result:			
1. Displacement amplitude			Not tested as rotation in flexible material is comparable to x- and y-direction
2. Movement force			
3. Pressure			
Movement	+/- 20 mm	+/- 32 mm	
Resistance to movement	Low (<1kN)	Low (<1kN)	
Initial pressure	1500 Pa	2500 Pa	
Pressure drop	No	No	
Airtight during test	Yes	Yes	
Firestop functionality	Passed	Passed	

Summary and interpretation of results

- The Hilti CFS-SL firestop sleeve performed very well. No cracks or deformations were observed during movement of the penetrating cables.
- The high stability of the firestop sleeve at the outside and the flexible membrane in the inside of the device allowed a maximum of movement of the cables.
- No deformation of penetrating items
- The air- and gastightness was fully maintained during the whole test.
- In the subsequent orientation fire test the firestop sleeve successfully kept smoketightness and ensured the fire integrity of the penetration.

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

Hilti firestop sleeve - seismic			
Damage	Smoke	Fire	Overall performance*
■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■

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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