

Hilti firestop intumescent sealant CFS-IS

Seismic performance test sheet



Product description / application

Hilti CFS-IS firestop intumescent sealant is used for permanent firestop seals in small-to-medium-sized cable and pipe penetration openings.

Tested application: pipe and cable penetrations, small annular space, large annular space, pipe with and without insulation.

For specific application details national approvals must be observed. All results are based on 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.

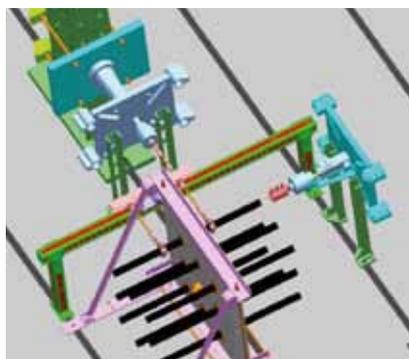


Test setup / description

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



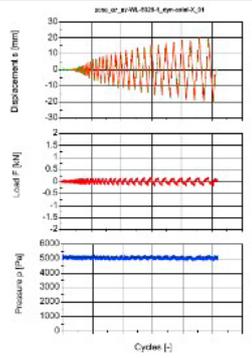
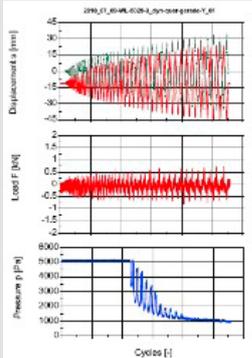
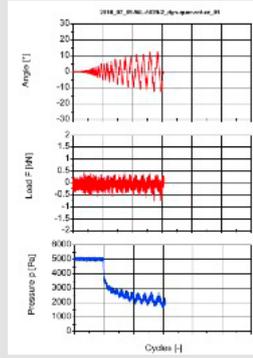
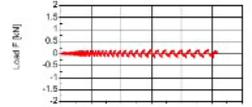
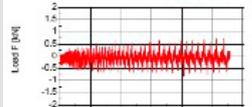
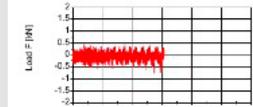
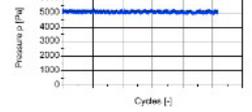
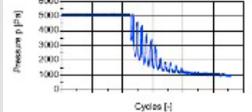
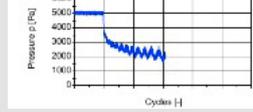
Intumescent firestop sealant
test details



Fire test after seismic impacts

Test results

Test configuration: pipe penetrations to simulate extreme impact forces and key seismic influencing factors. Firestop intumescent sealant tested in different test setups. With pipe, insulated pipe and different annular spaces in typical opening sizes. Installation in drywall.

	x-direction	y-direction	zz-direction
Result:			
1. Displacement amplitude			
2. Movement force			
3. Pressure			
Movement	+/- 20 mm	+/- 16-32 mm	+/- 10°
Resistance to movement	Low (<1kN)	Low-<1kN) to-high in small annular space	Low (<1kN)
Initial pressure	5000-6000 Pa	5000-6000 Pa	5000-6000 Pa
Pressure drop	No to medium, pronounced plateau	Medium-to-high, pronounced plateau	Medium, pronounced plateau
Airtight during test	Yes / partly	Partly	Partly
Firestop functionality	Passed	Passed	Passed

Summary and interpretation of results

- The Hilti Firestop Intumescent Sealant performed well and very well when movement of the penetrant in x-direction was applied. Cracks and deformations were observed during movement and in the case of high movement force in y-and zz-directions.
- The Firestop Intumescent Sealant shows a favorable visco-plastic deformation behavior. Larger annular gaps significantly improve the performance.
- In the subsequent fire test the high performance intumescence of the product successfully kept smoke tightness and ensured the fire integrity of the penetration.

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

Hilti intumescent firestop sealant - 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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Hilti Corporation | 9494 Schaan | Liechtenstein | P +423-234 2111 | F +423-234 2965 | www.hilti.com