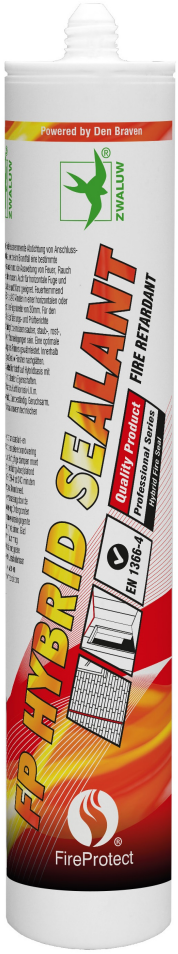
PEUTZ

Laboratory for Fire Safety

Summary of a fire resistance test:

FP Hybrid Sealant connecting stone to wood and stone to steel



On behalf of Den Braven, three tests were performed for determination of the fire resistance of several linear joint seals with FP Hybrid Sealant in walls connecting stone to wood and stone to steel. The tests are performed in accordance with the European standard EN 1366-4:2006+A1:2010 using the standard heating curve.

This summary provides an outline of the product performance and the conclusions of the test. For a complete description of the examined linear joint seals, please refer to the reports mentioned in the footnote.

Based on the test performed in accordance with EN 1366-4:2006+A1:2010 and the extended application in accordance with EN 15882-4:2012, the system was classified in accordance with EN 13501-2:2007+A1:2009 and EN 13501-2:2016.

Taking in into account the possible classification times mentioned in the standard, a linear joint seal made out of FP Hybrid Sealant, is classified according to the following combinations of performance parameters and classes.

Fire resistance classification (vertical linear joint seal in a stone wall)		
Applied at both faces, connecting stone to wood	**Applied at both faces, connecting stone to steel**	
Wall thickness ≥ 100 mm	**Wall thickness ≥ 100 mm**	**Wall thickness ≥ 150 mm**
EI 120 – V – X – F – W 5 to 20 E 120 – V – X – F – W 5 to 20	EI 30 – V – X – F – W 5 to 20 EI 45 – V – X – F – W 20 E 120 – V – X – F – W 5 to 20	EI 60 – V – X – F – W 5 to 20 E 120 – V – X – F – W 5 to 20

This summary consists out of 5 pages. The classification reports and expert judgement that form the basis for this summary are available for inspection at the client and are registered YB 1692-1E-RA-002, dated September 2016, C 1736-1E-RA-001 dated September 19, 2016 and 18565C dated September 28, 2017.	**Reference** HL/HL//YP 1692-6E-RA-001 20 February 2018	**Page** 1/5	**Initials**

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Fire resistance classification (horizontal linear joint seal in a stone wall)		
Applied at both faces, connecting stone to wood	**Applied at both faces, connecting stone to steel**	
Wall thickness ≥ 100 mm	**Wall thickness ≥ 100 mm**	**Wall thickness ≥ 150 mm**
EI 120 – T – X – F – W 5 to 20	EI 45 – T – X – F – W 5 to 20	EI 90 – T – X – F – W 5 to 20
E 120 – T – X – F – W 5 to 20	EI 60 – T – X – F – W 20	EI 120 – T – X – F – W 20
E 240 – T – X – F – W 20	E 120 – T – X – F – W 5 to 20	E 120 – T – X – F – W 5 to 20

Fire resistance classification (vertical and horizontal linear joint seal in a stone wall)	
Fully filled, vertically orientated, connecting stone to steel	**Fully filled, horizontally orientated, connection stone to steel**
Wall thickness ≥ 100 mm	**Wall thickness ≥ 100 mm**
EI 45 – V – X – F – W 20	EI 90 – T – X – F – W 20
E 120 – V – X – F – W 20	E 120 – T – X – F – W 20

E = Criterion integrity, I = Criterion insulation, V = Vertical application in a vertical wall, T =Horizontal application in a vertical wall
X = No movement applied, F = Splice applied in the field, W = Permitted width range in millimetres

The following conditions apply:

- the classifications are valid for linear joint seals in a wall with an orientation as mentioned (vertical or horizontal);
- the linear joint seals may connect to any type of wall of aerated concrete (class G4/600 or heavier), concrete, block work, limestone or masonry. At the other side, the linear joint seals may connect to:
  - any type of wooden construction with a density of 500±50 kg/m^3 or higher where the wooden construction is placed over the full thickness of the wall or at least 100 mm, or;
  - any type of steel construction with a melting point above 1000 ºC and the steel construction is placed over the full thickness of the wall or as mentioned;
- the surfaces of the material on which the FP Hybrid Sealant is applied are thoroughly cleaned and treated with primer when needed;
- except for the fully filled linear joint seals, the use of suitable PE / PU backing material is mandatory;
- except for the fully filled linear joint seals, the required depth of the FP Hybrid Sealant depends on the width of the linear joint seal. The minimum depth of the FP Hybrid Sealant in relation to the width of the linear joint seal is shown in Graph 1. The required depth of the sealant may also be increased with respect to the Graph (the line is the minimum and recommended seal depth);
- the allowed movement capability in practice is maximized to 7.5 %;
- the classifications are valid in both directions.

Expected fire resistance *FP Hybrid Sealant connecting to a steel EI 60-construction*

An additional expert judgement is made for FP Hybrid Sealant connecting stone to a steel EI 60-construction. The outcome is given in below.

Fire resistance connecting to a EI 60-construction according to EN 13501-2 (vertical linear joint seal, connecting stone to steel)
Applied at both faces and fully filled, wall thickness ≥ 100 mm
60[1] minutes on the criteria integrity (E) and insulation (I)

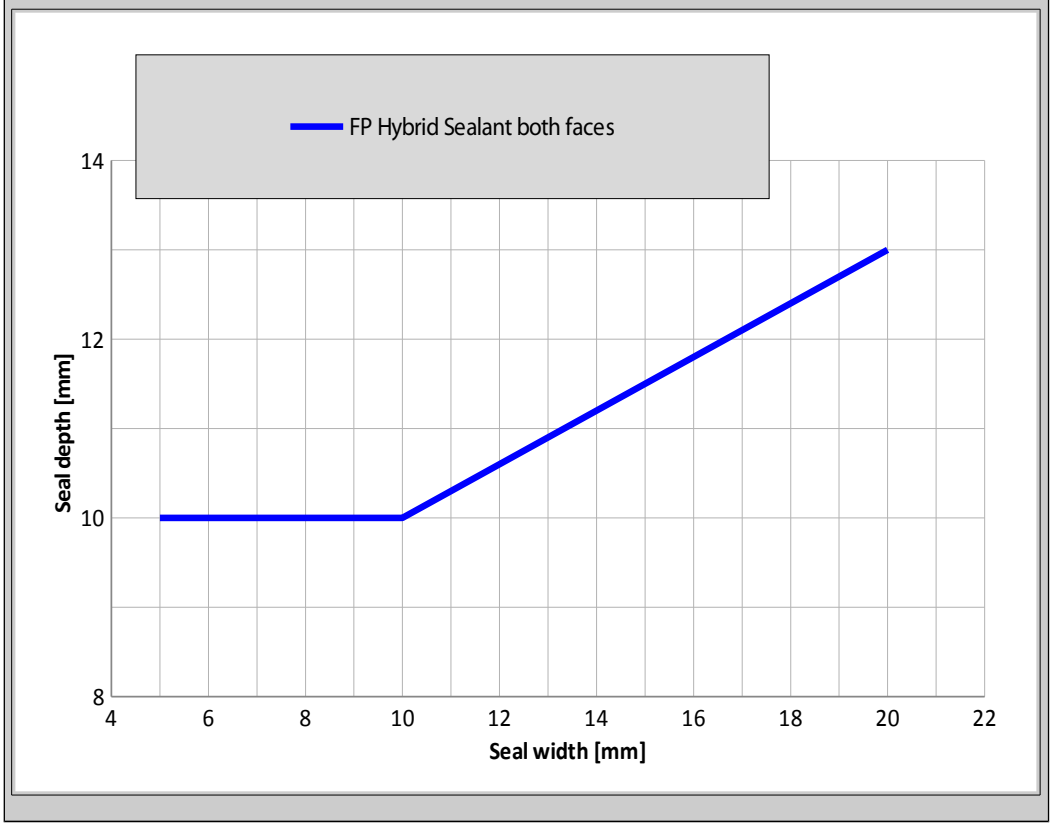
Fire resistance connecting to a EI 60-construction according to EN 13501-2 (horizontal linear joint seal, connecting stone to steel)
Applied at both faces, wall thickness ≥ 100 mm
60[1] minutes on the criteria integrity (E) and insulation (I)

The following conditions apply:

- the expected fire resistance is valid for linear joint seals in a wall with a orientation as mentioned (horizontal or vertical);
- the linear joint seals may connect to any type of wall of aerated concrete (class G4/600 or heavier), concrete, block work, limestone or masonry with a thickness of 100 mm or more;
- at the other side, the linear joint seals may connect to any type of steel construction with a fire resistance of 60 minutes for the criteria E and I or more in accordance with EN 13501-2 (EI 60 or higher). The steel construction is placed over the full thickness of the wall of 100 mm or more;
- the surfaces of the material on which the FP Hybrid Sealant is applied are thoroughly cleaned and treated with primer when needed;
- except for the fully filled linear joint seals, the use of suitable PE / PU backing material is mandatory;
- the width of the linear joint seals is between 5 mm and 20 mm;
- except for the fully filled linear joint seals, the required depth of the FP Hybrid Sealant depends on the width of the linear joint seal. The minimum depth of the FP Hybrid Sealant in relation to the width of the linear joint seal is shown in Graph 1 on the next page. The required depth of the sealant may also be increased with respect to the Graph (the line is the minimum and recommended seal depth);
- the allowed movement capability in practice is maximized to 7.5 %;
- the expected fire resistance is valid in both directions.

1 Fire resistance based on expert judgement and assessed on equivalence, not an official classification according EN 13501-2:2007+A1:2009

Graph 1: Minimum seal depth in relation to the seal width



Classification of the fire resistance *FP Hybrid Sealant in combination with FP PU Foam*

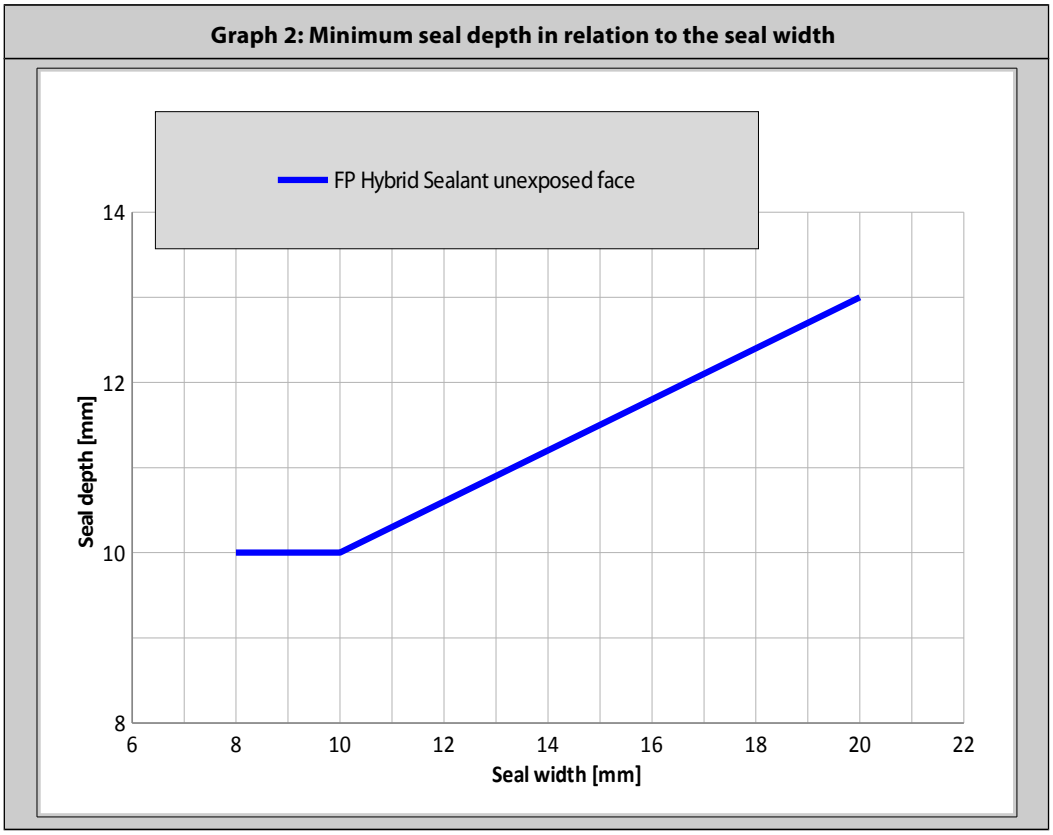
Fire resistance classification (FP Hybrid in combination with FP PU Foam)	
FP Hybrid applied at the unexposed face, FP PU foam applied at the exposed face, vertically orientated connecting stone to wood	**FP Hybrid applied at the unexposed face, FP PU foam applied at the exposed face, horizontally orientated connecting stone to wood**
Wall thickness ≥ 100 mm EI 120 – V – X – F – W 8 to 20 E 120 – V – X – F – W 8 to 20	**Wall thickness ≥ 100 mm** EI 120 – T – X – F – W 8 to 20 E 120 – T – X – F – W 8 to 20

E = Criterion integrity, I = Criterion insulation, V = Vertical application in a vertical wall, T =Horizontal application in a vertical wall
X = No movement applied, F = Splice applied in the field, W = Permitted width range in millimetres

The following conditions apply:

- the classifications are valid for linear joint seals in a wall with an orientation as mentioned (vertical or horizontal);
- the linear joint seals may connect to any type of wall of aerated concrete (class G4/600 or heavier), concrete, block work, limestone or masonry. At the other side, the linear joint seals may connect to any type of wooden construction with a density of 500±50 kg/m^3 or more and the wooden construction is placed over the full thickness of the wall or at least 100 mm;
- the surfaces of the material on which the FP Hybrid Sealant and PF PU Foam is applied are thoroughly cleaned and treated with primer and moistened with water when needed;
- the required depth of the FP Hybrid Sealant depends on the width of the linear joint seal. The minimum depth of the FP Hybrid Sealant in relation to the width of the linear joint seal is shown in Graph 2 below. The required depth of the sealant may also be increased with respect to the Graph (the line is the minimum and recommended seal depth). The rest of the slot is fully filled with FP PU Foam;
- the allowed movement capability in practice is maximized to 7.5 %;
- the classifications are valid for the FP Hybrid Sealant applied at the unexposed face.

Graph 2: Minimum seal depth in relation to the seal width



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