

## Laboratory for Fire Safety

### Summary of a fire resistance test:

### *Bostik FP 403 Fireseal Hybrid connecting stone to wood and stone to steel*

On behalf of Bostik, three tests were performed for determination of the fire resistance of several linear joint seals with Bostik FP 403 Fireseal Hybrid (further called FP 403 Fireseal Hybrid or Bostik FP 403) 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 403 Fireseal Hybrid is classified according to the following combinations of performance parameters and classes.

Fire resistance classification (vertical linear joint seals in a stone wall)		
<b>Bostik FP 403 applied at both faces, connecting stone to wood</b>  <b>Wall thickness ≥ 100 mm</b> EI 120 – V – X – F – W 5 to 20 E 120 – V – X – F – W 5 to 20	<b>Bostik FP 403 applied at both faces, connecting stone to steel</b>	
	<b>Wall thickness ≥ 100 mm</b> 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	<b>Wall thickness ≥ 150 mm</b> EI 60 – V – X – F – W 5 to 20 E 120 – V – X – F – W 5 to 20

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Fire resistance classification (horizontal linear joint seals in a stone wall)		
Bostik FP 403 applied at both faces, connecting stone to wood	Bostik FP 403 applied at both faces, connecting stone to steel	
<b>Wall thickness ≥ 100 mm</b>	<b>Wall thickness ≥ 100 mm</b>	<b>Wall thickness ≥ 150 mm</b>
EI 120 – T – X – F – W 5 to 20 E 120 – T – X – F – W 5 to 20 E 240 – T – X – F – W 20	EI 45 – T – X – F – W 5 to 20 EI 60 – T – X – F – W 20 E 120 – T – X – F – W 5 to 20	EI 90 – T – X – F – W 5 to 20 EI 120 – T – X – F – W 20 E 120 – T – X – F – W 5 to 20

Fire resistance classification (vertical and horizontal linear joint seals in a stone wall)	
Fully filled with Bostik FP 403, vertically orientated, connecting stone to steel	Fully filled with Bostik FP 403, horizontally orientated, connection stone to steel
<b>Wall thickness ≥ 100 mm</b>	<b>Wall thickness ≥ 100 mm</b>
EI 45 – V – X – F – W 20 E 120 – V – X – F – W 20	EI 90 – T – 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 (see Graph 1 for seal depth)

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  $500 \pm 50 \text{ kg/m}^3$  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  $1000^\circ\text{C}$  and the steel construction is placed over the full thickness of the wall or as mentioned;
- the surfaces of the material on which FP 403 Fireseal Hybrid 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 FP 403 Fireseal Hybrid depends on the width of the linear joint seal. The minimum depth of FP 403 Fireseal Hybrid 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.

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**Expected fire resistance *Bostik FP 403 connecting to a steel EI 60-construction***

An additional expert judgement is made for FP 403 Fireseal Hybrid connecting stone to a steel EI 60-construction. The outcome is given in below.

<b>Fire resistance connecting to a EI 60-construction according to EN 13501-2 (vertical linear joint seals, connecting stone to steel)</b>
<b>Bostik FP 403 applied at both faces and fully filled, wall thickness <math>\geq 100</math> mm</b>
60 <sup>1</sup> minutes on the criteria integrity (E) and insulation (I)

Width of the linear joint seals is between 5 mm and 20 mm


<b>Fire resistance connecting to a EI 60-construction according to EN 13501-2 (horizontal linear joint seals, connecting stone to steel )</b>
<b>Bostik FP 403 applied at both faces, wall thickness <math>\geq 100</math> mm</b>
60 <sup>1</sup> minutes on the criteria integrity (E) and insulation (I)

Width of the linear joint seals is between 5 mm and 20 mm (see Graph 1 for seal depth)

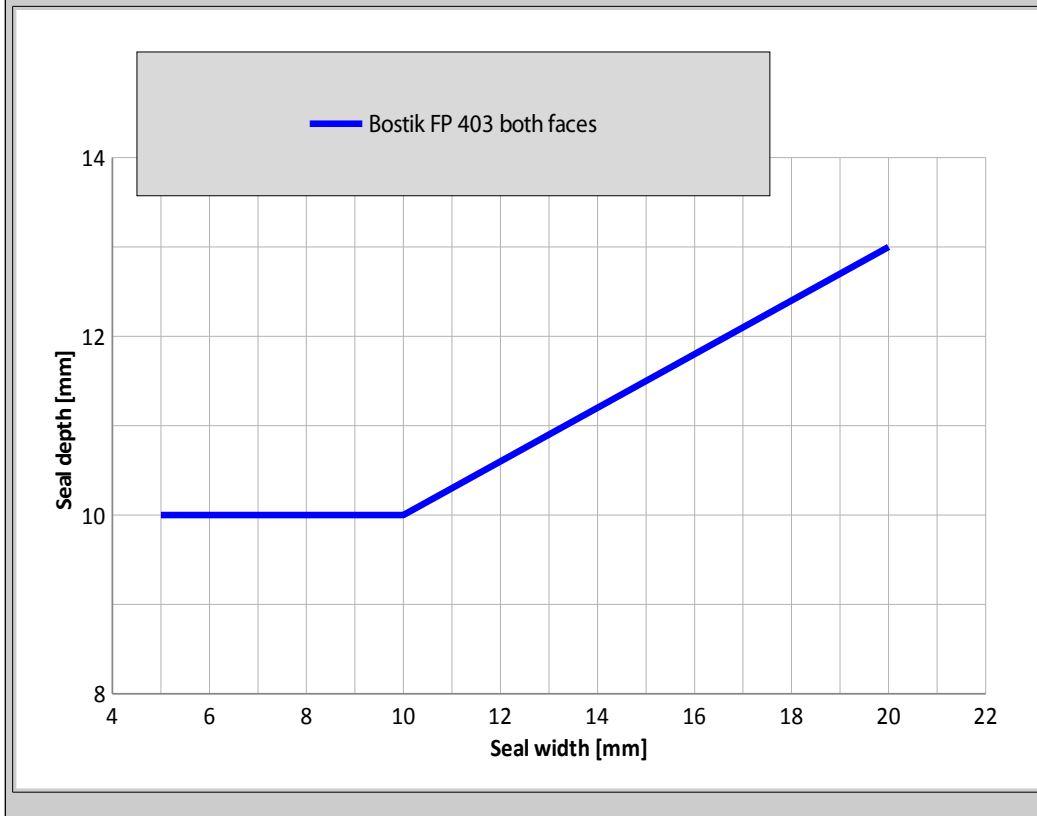
The following conditions apply:

- the expected fire resistance is valid for linear joint seals in a wall with an 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 FP 403 Fireseal Hybrid 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 FP 403 Fireseal Hybrid depends on the width of the linear joint seal. The minimum depth of FP 403 Fireseal Hybrid 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

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



**Classification of the fire resistance *Bostik FP 403 in combination with Bostik FP 404 (PU foam)***

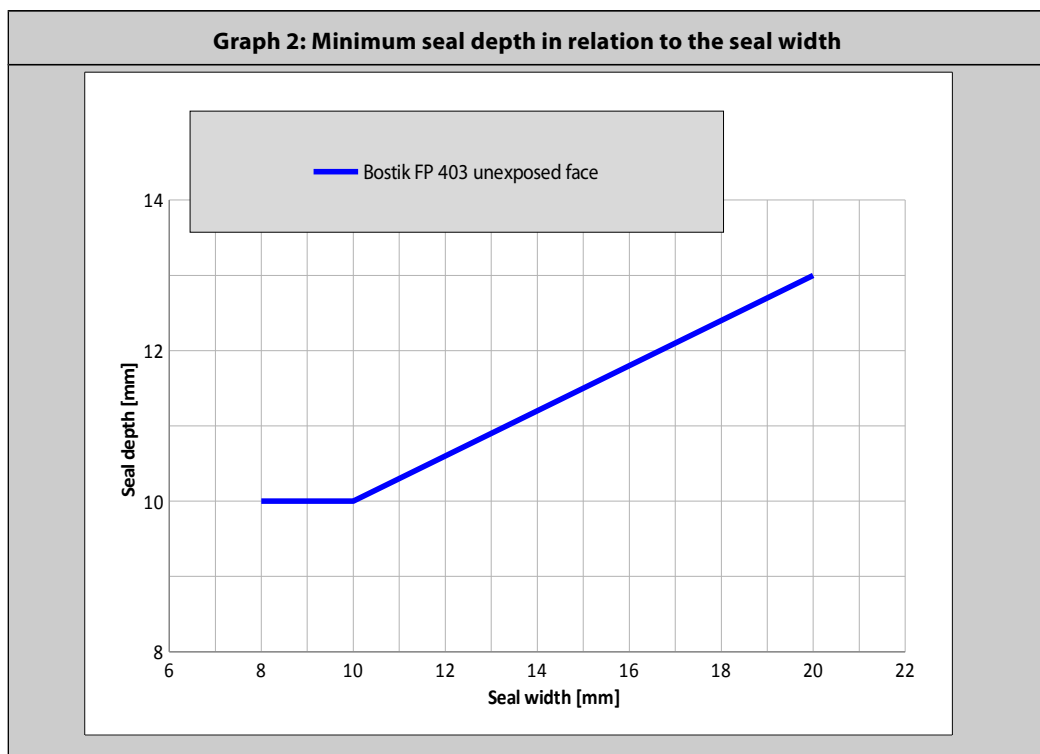
<b>Fire resistance classification (Bostik FP 403 in combination with Bostik FP 404)</b>	
<b>Bostik FP 403 applied at the unexposed face, Bostik FP 404 applied at the exposed face, vertically orientated connecting stone to wood</b>  <b>Wall thickness ≥ 100 mm</b>  EI 120 – V – X – F – W 8 to 20  E 120 – V – X – F – W 8 to 20	<b>Bostik FP 403 applied at the unexposed face, Bostik FP 404 applied at the exposed face, horizontally orientated connecting stone to wood</b>  <b>Wall thickness ≥ 100 mm</b>  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 (see Graph 2 for seal depth)

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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  $500 \pm 50 \text{ kg/m}^3$  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 FP 403 Fireseal Hybrid and Bostik FP 404 Fire Retardant PU (Gun)Foam is applied are thoroughly cleaned and treated with primer and moistened with water when needed;
- the required depth of FP 403 Fireseal Hybrid depends on the width of the linear joint seal. The minimum depth of FP 403 Fireseal Hybrid 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 Bostik FP 404 Fire Retardant PU (Gun)Foam;
- the allowed movement capability in practice is maximized to 7.5 %;
- the classifications are valid for FP 403 Fireseal Hybrid applied at the unexposed face.



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