



FISHWALL

Fire and Seismic performances of Hybrid fire WALLs in case of single-storey industrial and commercial steel buildings



SESSION: Experimental campaign – Results and exploitation of fire tests

- Sandwich panel fire wall associated with “fusible” links
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- CTICM

Objective & test specimen

➤ Objective

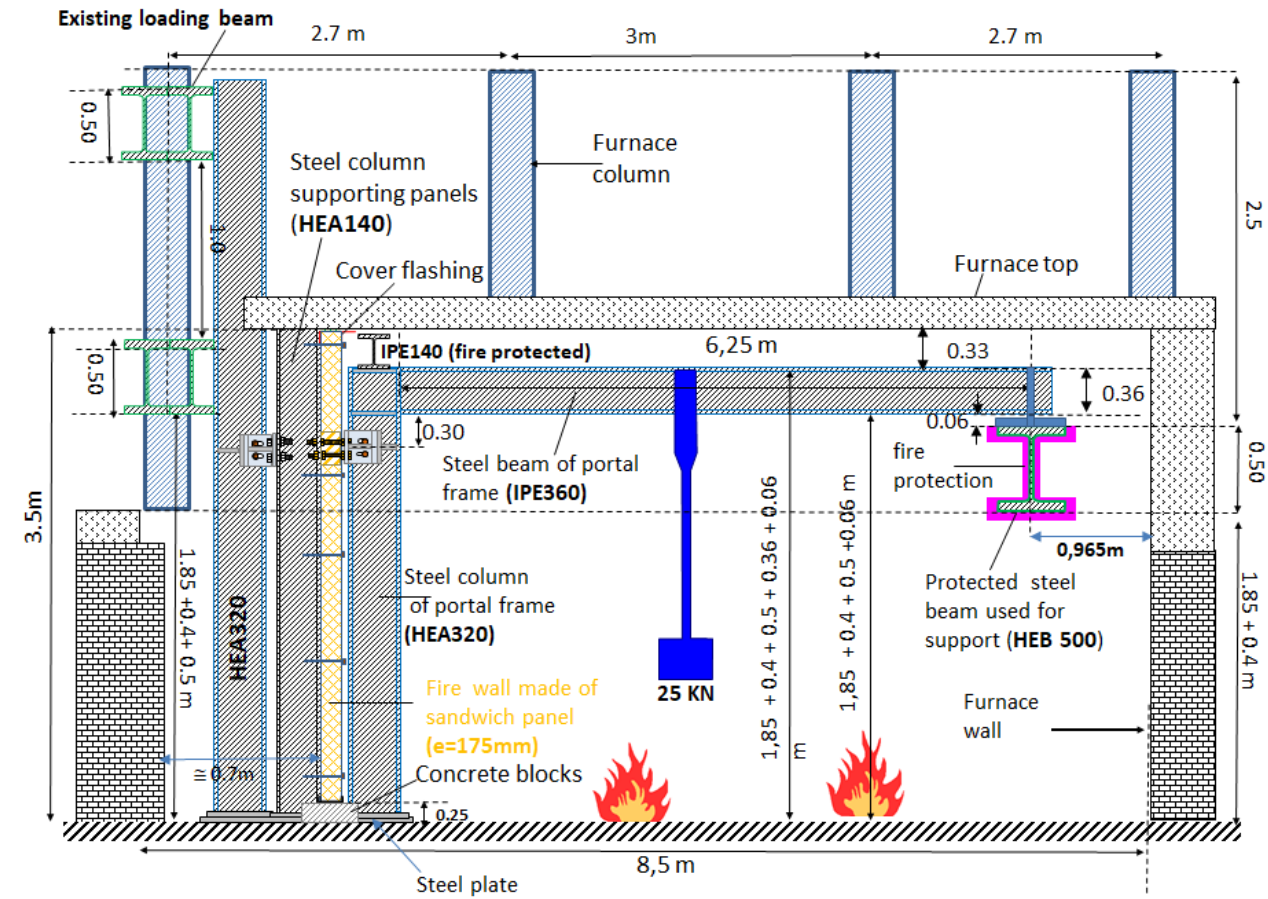
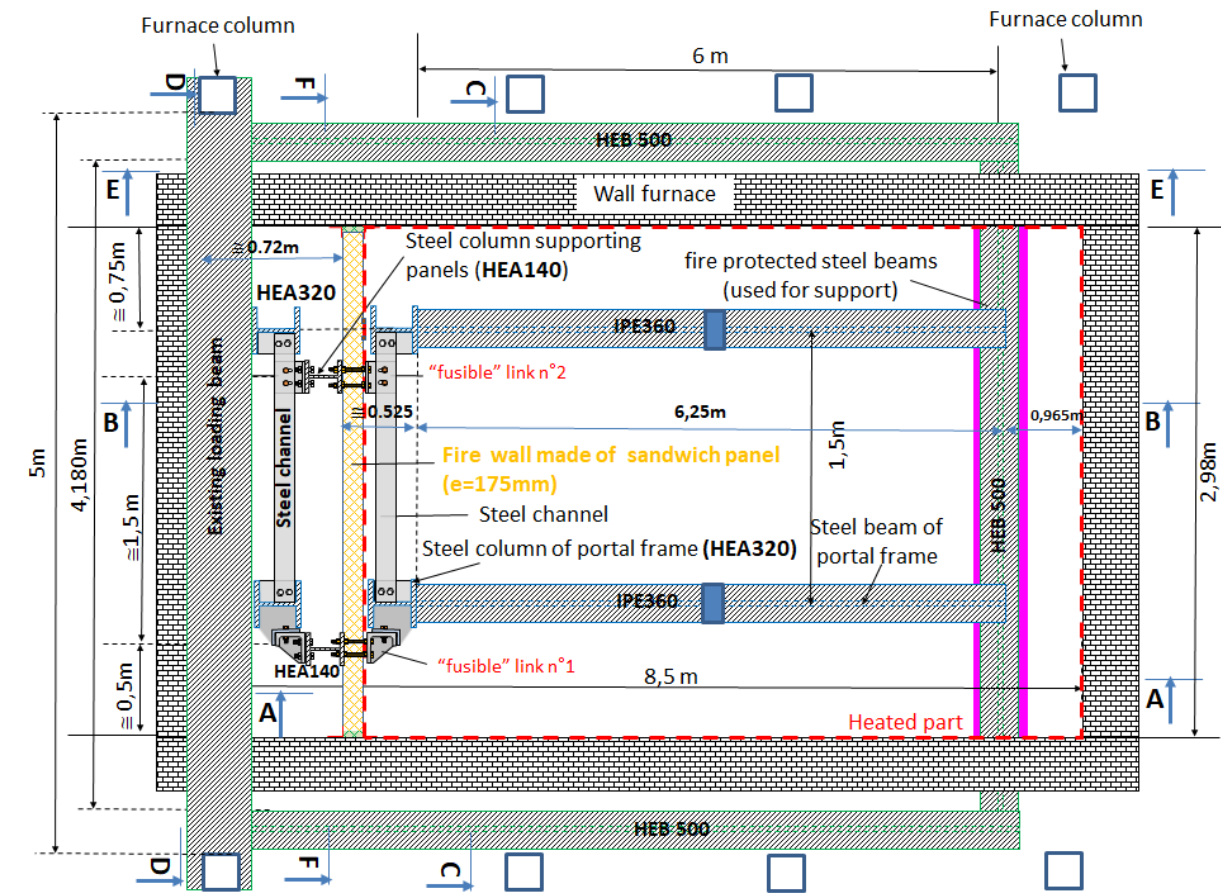
- ❖ Check the adequate fire behaviour of two different “fusible” system solutions based on common steel joints with aluminium bolts acting as the fusible component:
 - The fusible links must resist the compressive forces due to the thermal expansion of the steel structure exposed to fire
 - The fusible links on the fire-exposed side are the first to fail in the tensile phase due to the collapse of the steel structure

➤ Test specimen

- ❖ A partition fire wall made of lightweight sandwich panels spanning horizontally between two steel columns connected to two fire-exposed semi-portal frames by means of two different “fusible” systems

Presentation of the test specimen

➤ Schematic views



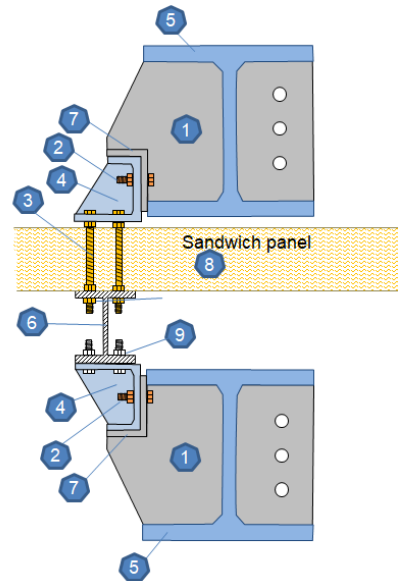
Presentation of the test specimen

➤ Assembling stage

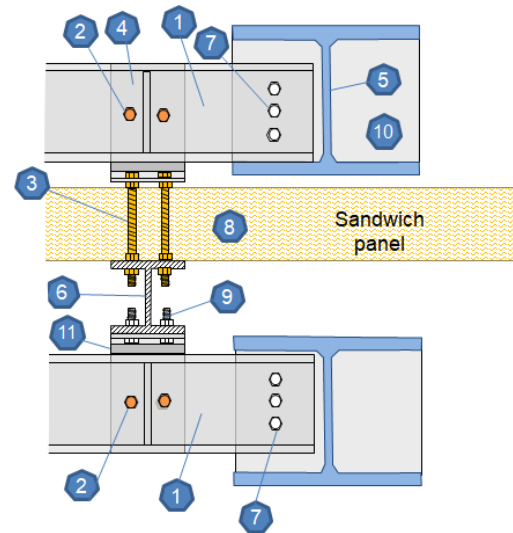


Presentation of the test specimen

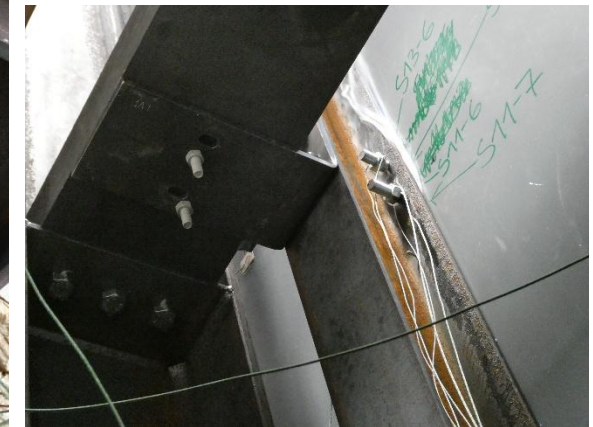
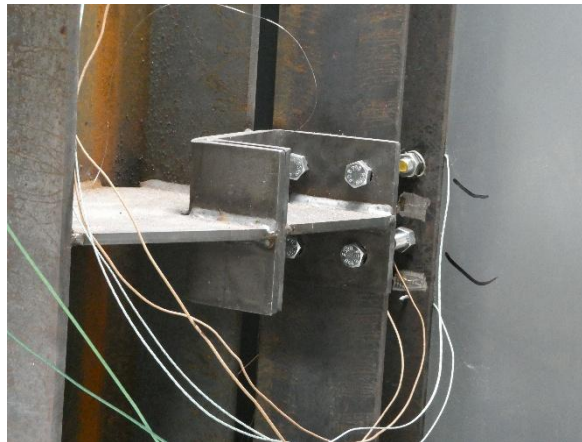
➤ “Fusible” link systems



- 1 Gusset steel plate (10 mm thick, S355)
- 2 M12 aluminium bolts
- 3 M16 class 8.8 steel rods
- 4 U-shaped steel profile (12 mm thick, S355) with stiffener
- 5 Steel column of portal frame HEA320 (S275)
- 6 HEA140 steel column (S275)
- 7 L-shaped folded profile (10mm thick, S355)
- 8 Sandwich panels (175 mm thick)
- 9 M16 class 8.8 bolts



- 1 UPN 240 steel profile (S275)
- 2 M12 aluminium bolts
- 3 M16 class 8.8 steel rods
- 4 L-shaped steel profile (10mm thick, S355)
- 5 Steel column of portal frame HEA320 (S275)
- 6 HEA140 steel column (S275)
- 7 M20 class 8.8 bolts
- 8 Sandwich panels (175 mm thick)
- 9 M16 class 8.8 bolts
- 10 Welded steel plate (10mm thick, S355)
- 11 Steel shim (20mm thick, S355)



➤ **Temperature rises**

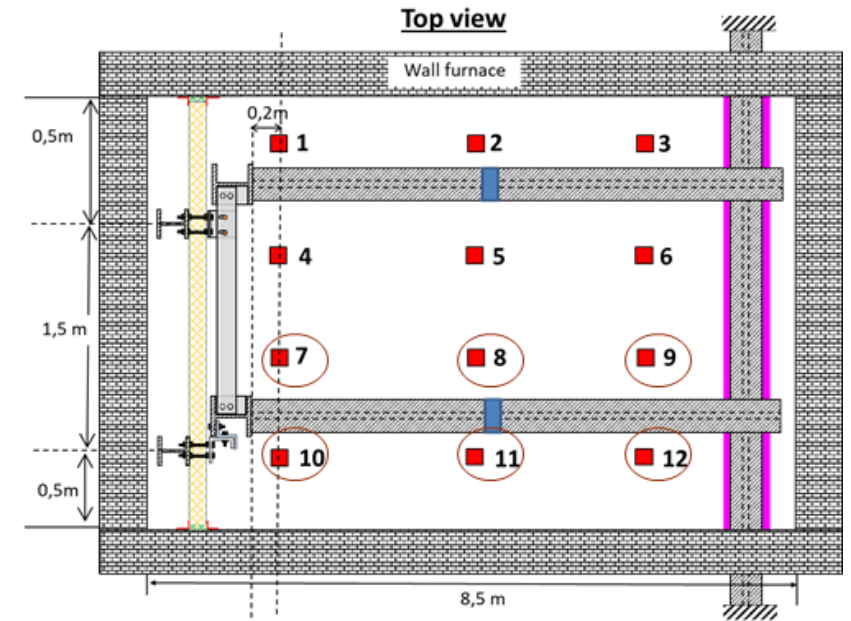
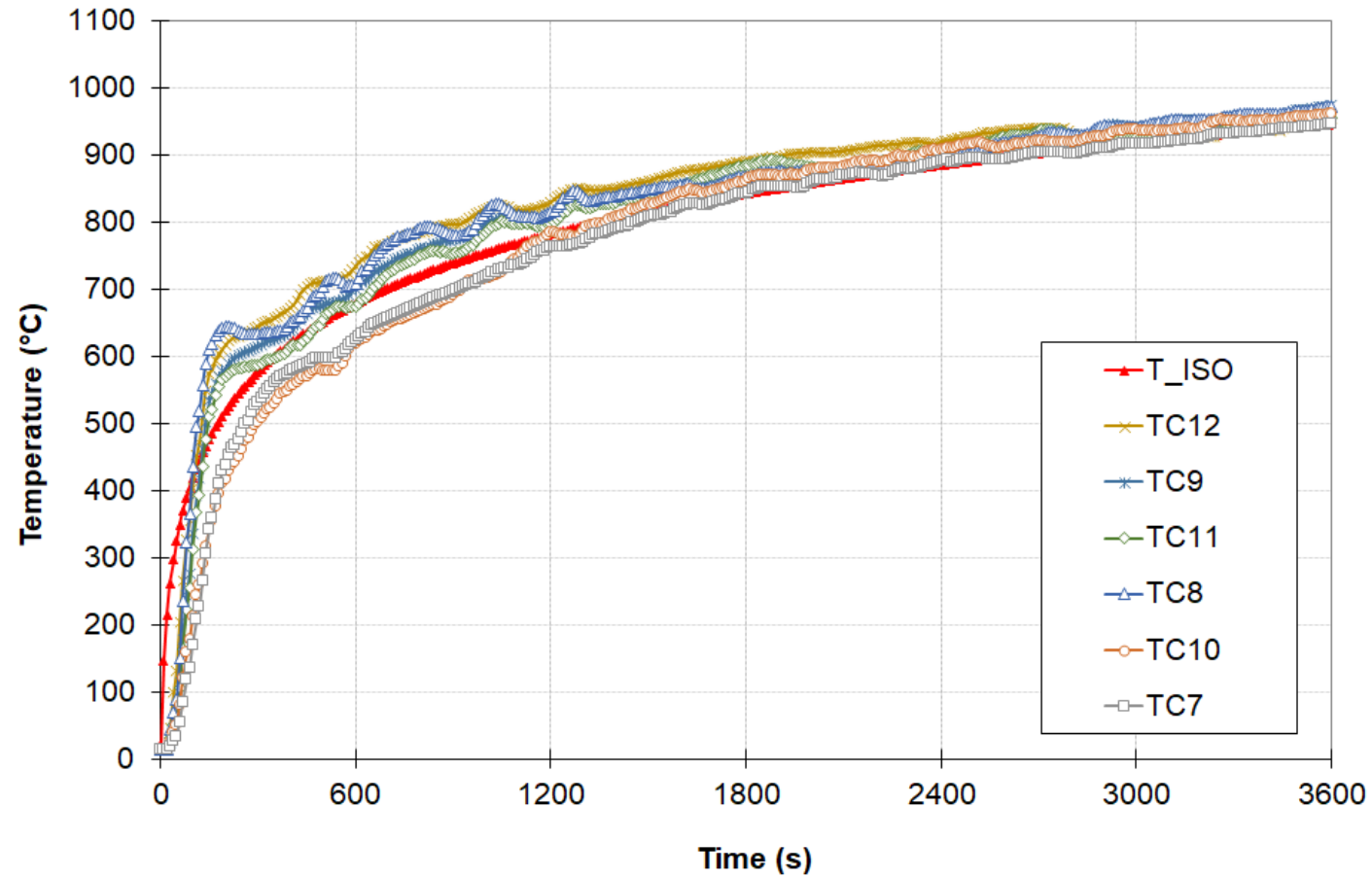
- ## Specimen deformations

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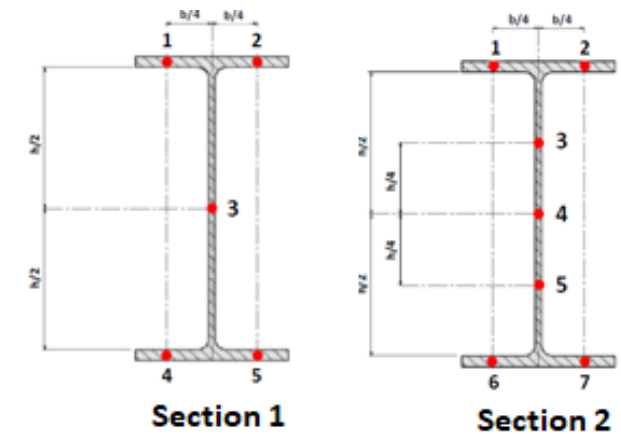
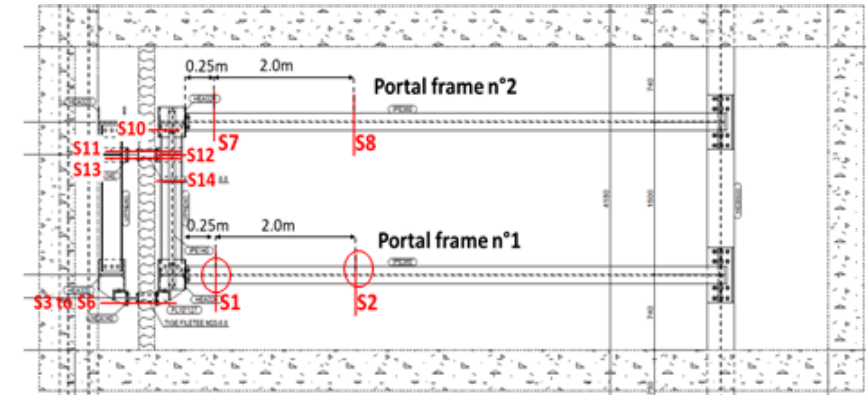
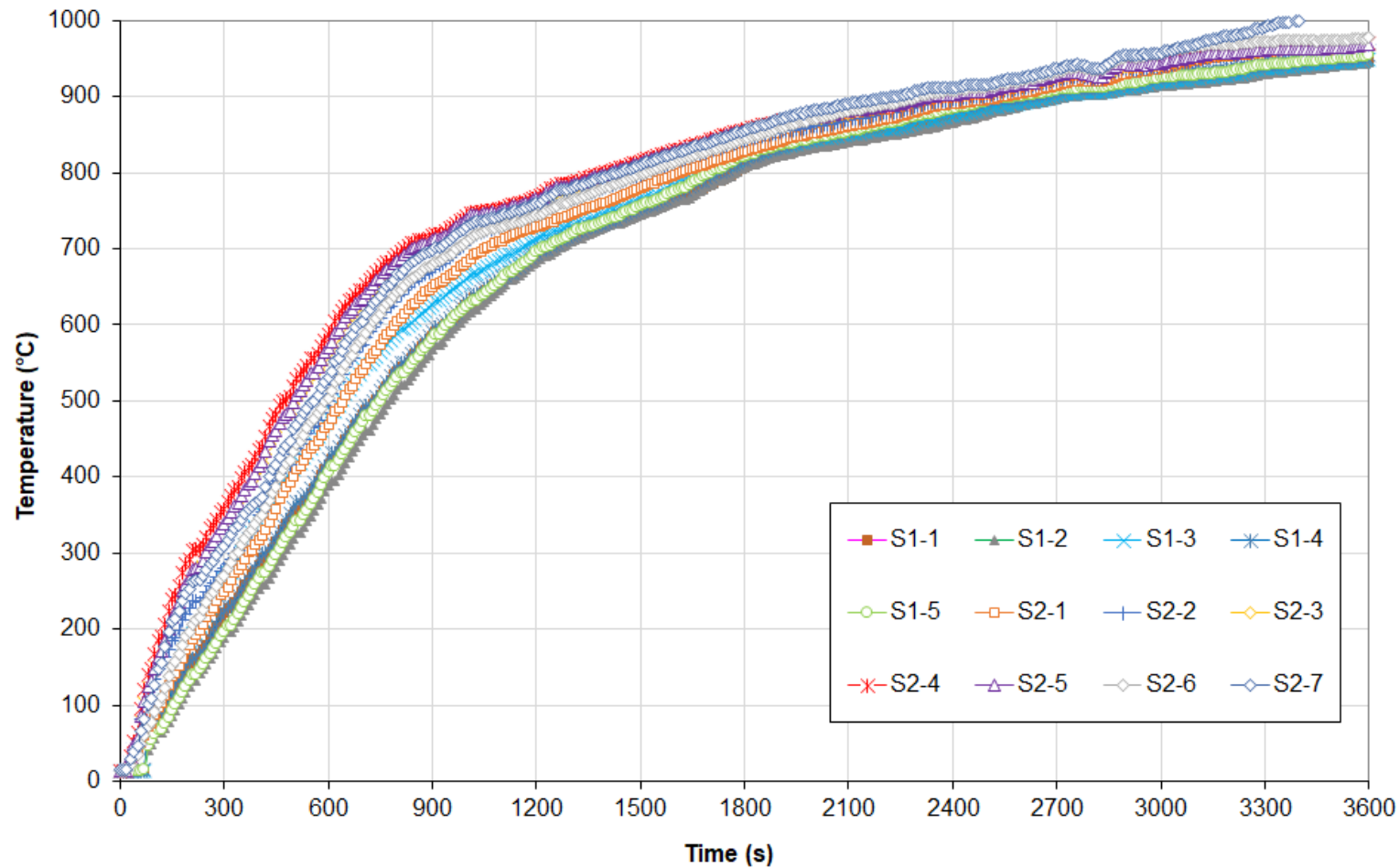
Test results

➤ Temperature rises in furnace



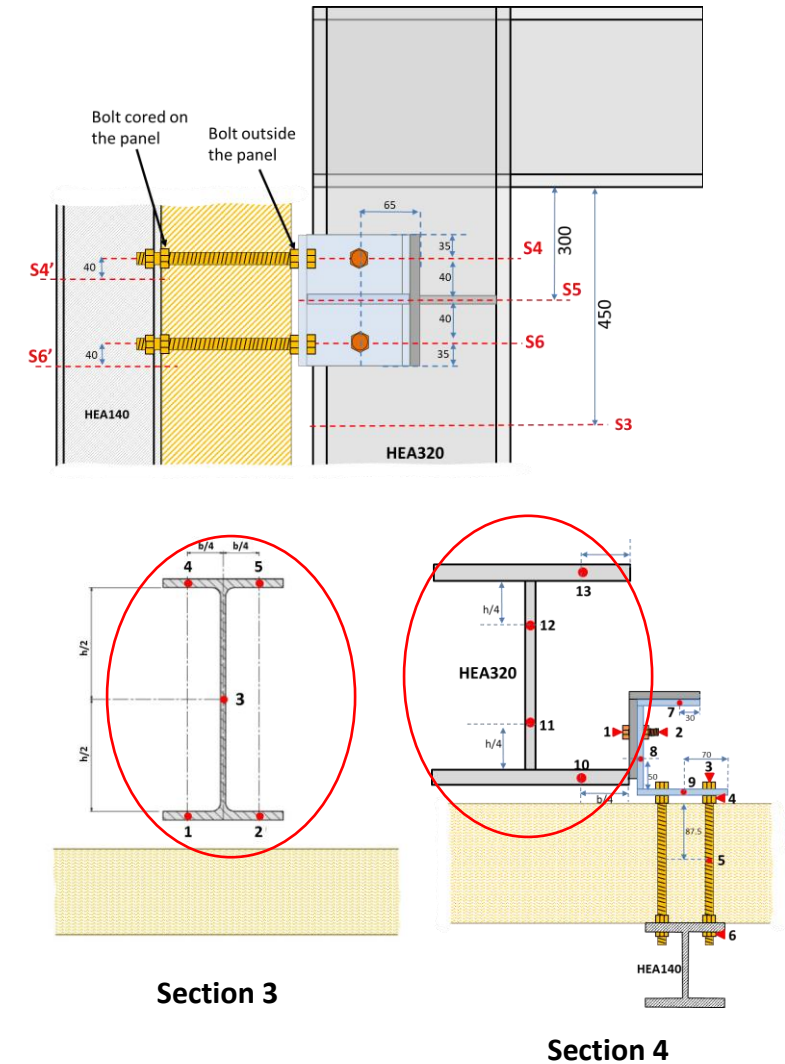
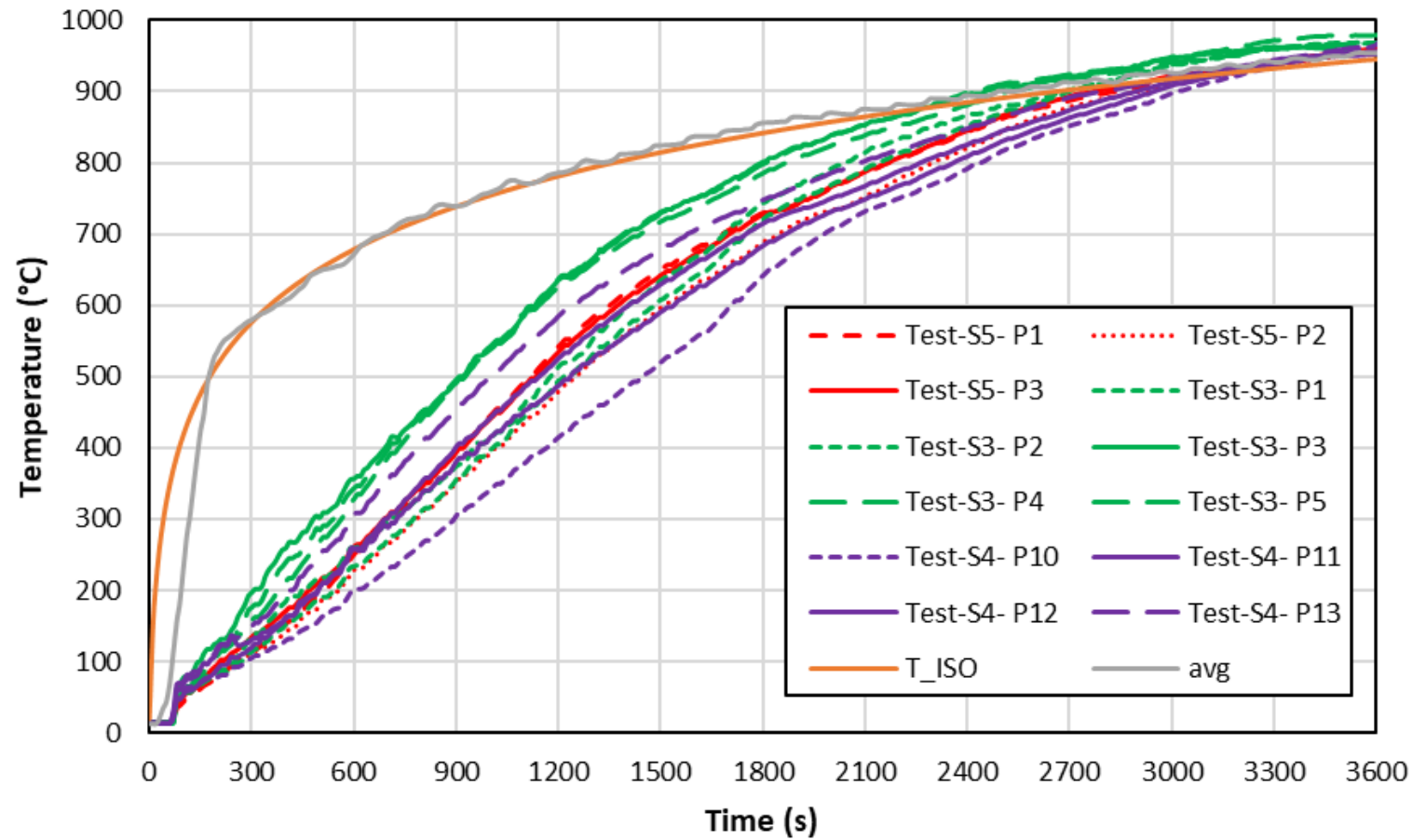
Test results

➤ Temperature rises in steel portal frames

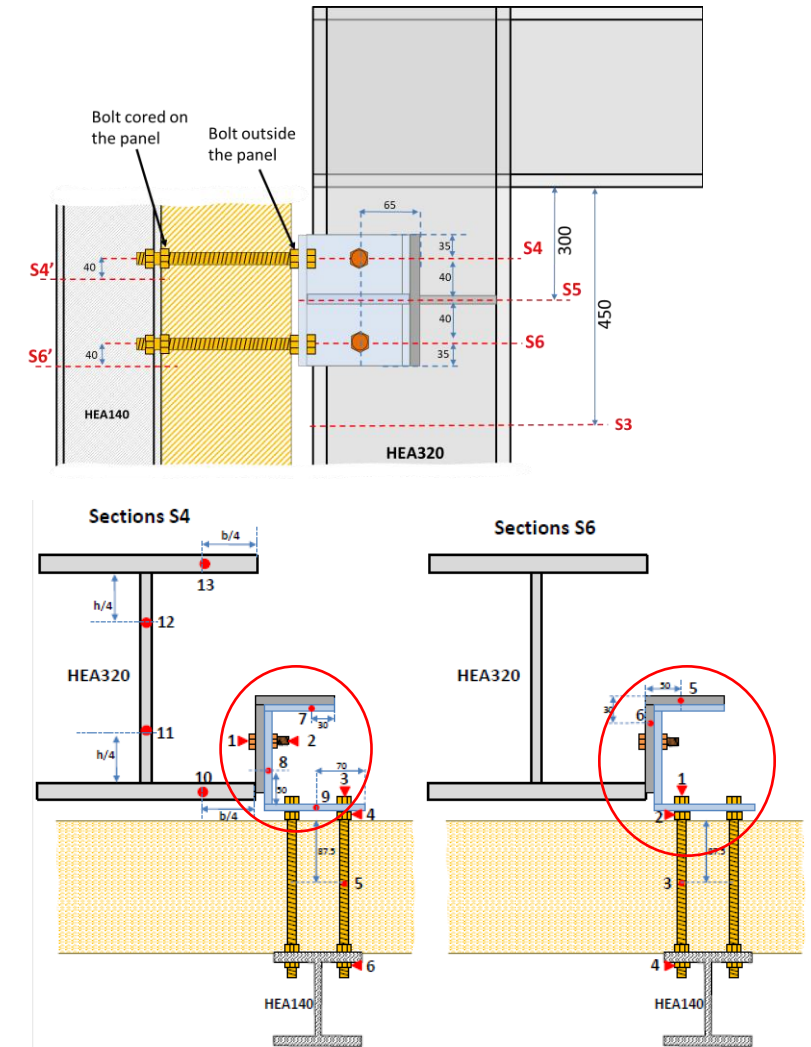


Test results

➤ Temperature rises in steel columns

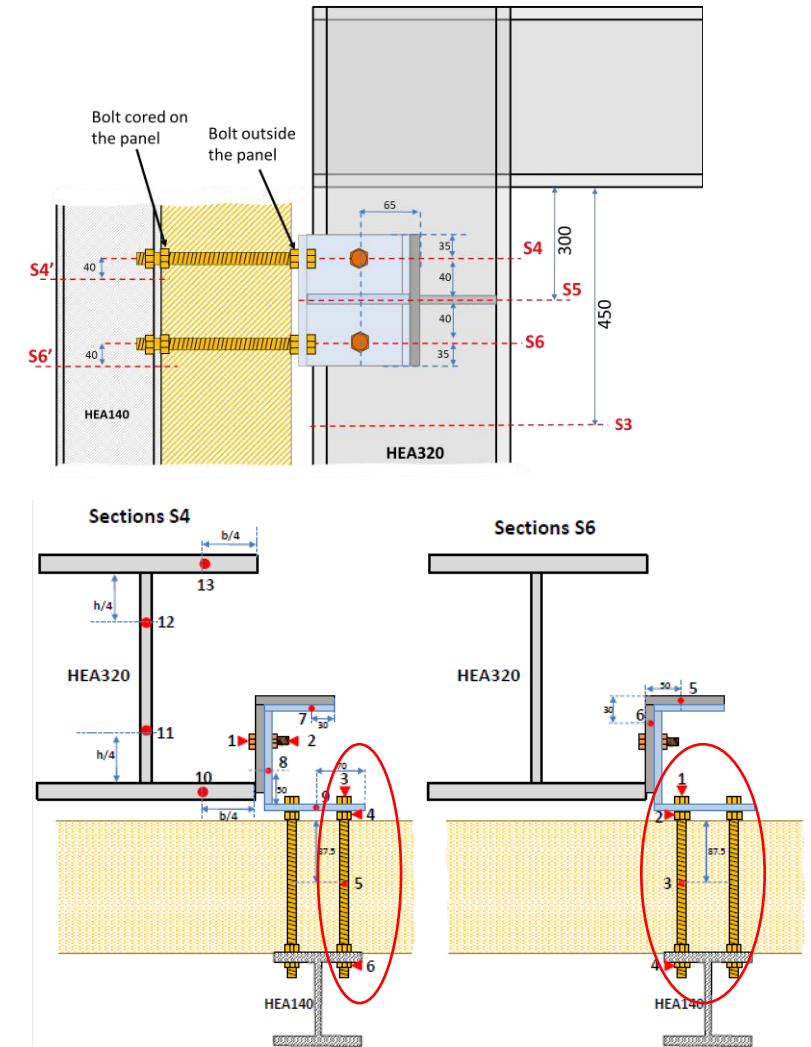
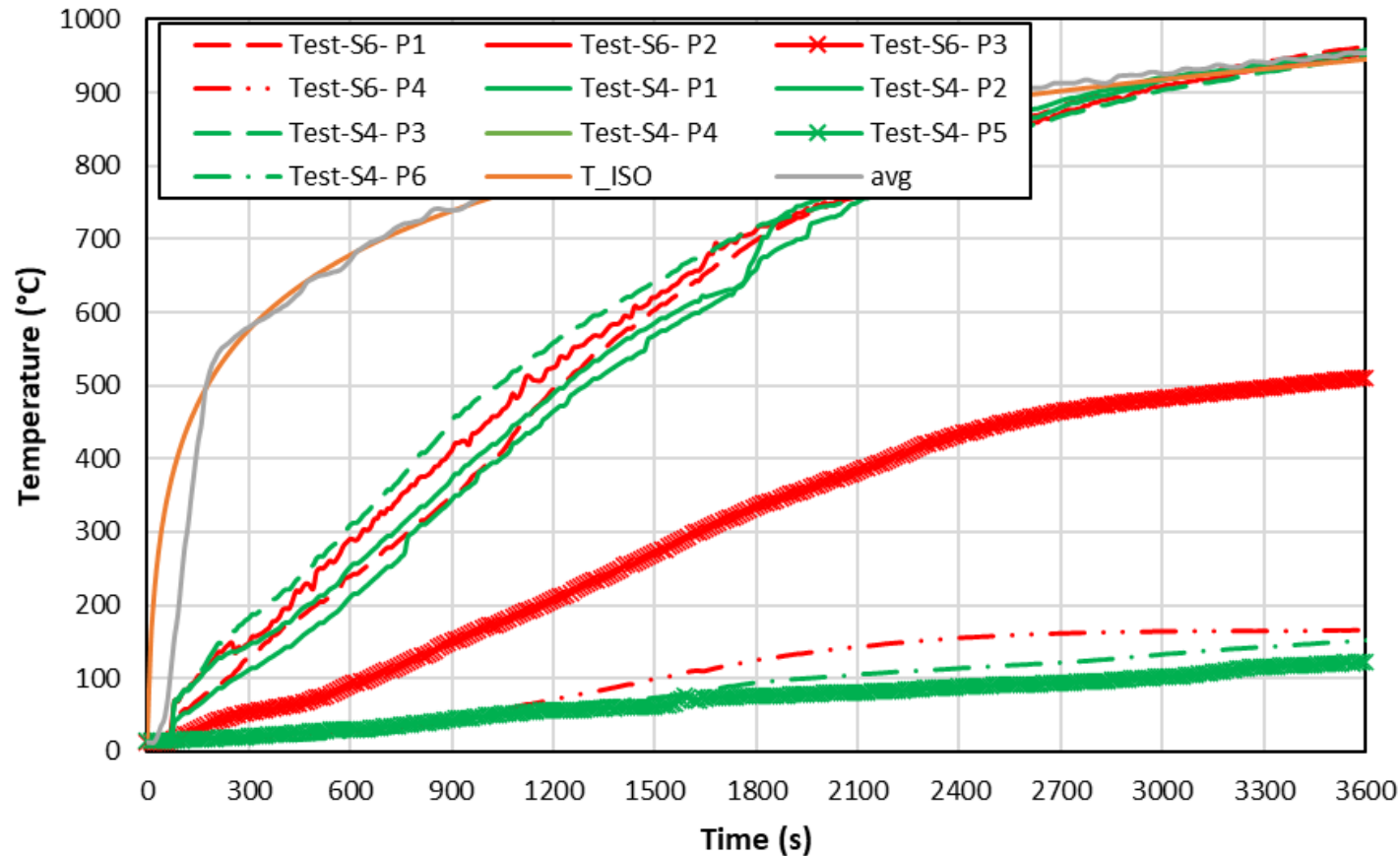


➤ **Temperature rises in fusible links – Steel profile**



Test results

➤ Temperature rises in fusible links – Steel rods



Test results

➤ Specimen during the test



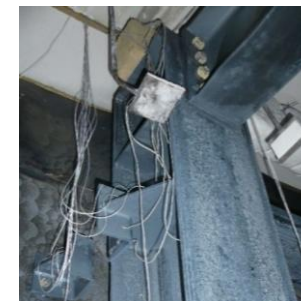
Test results

➤ Specimen after the test



Conclusion

- The test result confirmed the appropriate fire behaviour of tested fusible system solutions which allowed the wall to be disconnected from the steel portal frames exposed to fire without endangering the separating function of the wall, which remained fixed to the steel structure on the other side of the wall and therefore not exposed to fire.
- There was also integrity loss of the wall due to sustained flaming in the half of the wall's height, on one vertical edge. However, this would not have happened if steel flashings placed on the edges of the wall could have been fixed to the furnace walls, as usually happens in standard fire test on walls.



Thank you for your attention!

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