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BRE Global Test Report

Ad-hoc fire resistance test following the procedures and criteria of EN1363-1:2012 on two Wates fire cavity barriers (Blashford Profile) installed within a 200mm-deep cast concrete floor.

Prepared for:	**Wates Construction Ltd.**
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Summary

Two Blashford profile Wates Construction Ltd cavity barriers incorporated into the long edges of a 274mm x 1800mm x 300mm concrete slab with 12mm cement board backing and sandwiched between two 751mm x 1800mm x 200mm concrete slabs were submitted to an ad-hoc fire resistance test following the procedures and criteria of EN1363-1:2012[1], for a duration of 125 minutes on 30 May 2019.

The seals were labelled Seal A and Seal B and are marked in figures.

The sealing systems satisfied the criteria as follows:

Seal A	Mineral wool RWA-45 packed full depth and sealed on the exposed face with a bead of Firepro non-intumescent mastic (P12/391)	Integrity:	125min (no failure during test)
		Insulation:	125min (no failure during test)
Seal B	Siderise TW-PP-FS120 custom cut Fire stops sealed on the exposed face with a bead of Firepro non-intumescent mastic (P12/391)	Integrity:	125min (no failure during test)
		Insulation:	125min (no failure during test)

1 Objective

To determine at the request of Wates Construction Ltd, the performance of two Blashford Profile cavity barriers each with a different sealing system, when subjected to ad-hoc fire resistance test following the procedures and criteria of EN1363-1:2012[1].

2 Test construction

2.1 Construction

2.1.1 General

Two cast concrete slabs nominally 751mm x 1800mm x 200mm-thick and a third concrete slab nominally 274mm x 1800mm x 300mm-thick incorporating two fully formed 25mm deep Blashford profiles in the longitudinal edge

The test construction is shown in Figures and before test in Photographs.

2.1.2 Seal A (Mineral wool)

The seal was delivered to BRE for test, fully formed off site by the sponsor comprising of Mineral wool RWA-45 packed full depth and sealed on the exposed face with a bead of Firepro non-intumescent mastic (P12/391) with one layer of 12mm Cement board fixed to the outer face.

2.1.3 Seal B (Fire stops)

The seal was delivered to BRE for test, fully formed off site by the sponsor comprising of Siderise TW-PP-FS120 custom cut Fire stops sealed on the exposed face with a bead of Firepro non-intumescent mastic (P12/391) with one layer of 12mm Cement board fixed to the outer face.

2.1.4 Final construction

FirePro Fire resistant silicone sealant was gunned on the edge of one of the 751mm x 1800mm x 200mm-thick concrete slabs and placed in the test frame, the 274mm x 1800mm x 300mm-thick profiled slab was pressed against it. The remaining 751mm x 1800mm x 200mm-thick concrete slab had a layer of FirePro Fire resistant silicone sealant gunned on one edge and placed in the test frame against the other edge of the profiled slab.

A 180mm-wide strip of 180mm-thick Rockwool Rainscreen Duo slab were positioned on the outer edges of the cement boards and fixed with SFS-Intec Mids-s Insulation fastener with stainless steel plate washer (H92/777).

The test construction is shown in Figures and before test in Photographs.

3 Conditioning

A representative sample of Rockwool Rainscreen Duo was taken during construction, weighed and then oven-dried to determine the free moisture content by weight loss technique. The moisture content by dry weight is given below.

Table: Moisture content

	Oven drying temperature	Moisture content % by dry weight	Measured Density (kg/m^3)
Rockwool Rainscreen Duo 180mm-thick	105ºC	0.56	79.98

4 Test procedure

4.1 General

The test was conducted in accordance with EN1363-1:2012[1], on 30 May 2019 utilising a 1.5m x 1.5m furnace with the specimen located horizontally on the furnace and was witnessed on behalf of the sponsor by Wayne Gwilt and by Alan Curran and Simon Lay on behalf of OFR Consultants

The ambient temperature at the start of the test was 19°C

4.2 Furnace control

The furnace temperature was measured by means of four chromel / alumel plate thermometers, positioned symmetrically in the furnace with their measuring junctions nominally 100mm below the soffit of the concrete floor. The furnace was controlled so that the mean temperature followed the time/temperature heating curve specified in EN 1363-1: 2012[1].

The actual mean furnace temperature is plotted against time in the Graphs together with the specified curve for comparison.

A pressure sensing head was positioned similarly to the furnace thermocouples. The furnace was controlled to maintain a pressure of 20Pa ± 2Pa above that in the laboratory 100mm below the floor.

4.3 Temperature measurements on non-fire face

Twenty-one K-type thermocouples each covered with an insulating pad were fixed to the non-fireside face of the specimen to measure its temperature continuously during the test. Their locations are shown in Figures and Photographs.

5 Results

5.1 Observations

Observations made during the test are given in the table below.

Time mins:secs	Observation
0:00	Test started.
10:15	Concrete spalling and releasing water.
20:21	Exposed: concrete around seals falling away, bubbling texture to seals Unexposed: small puffs of smoke from middle of seal A
49:20	Exposed: more concrete around seals fallen away, seals still intact Unexposed: Small amounts of smoke from seal A edges.
68:21	Exposed: Cracks visible in cement board, seals rough and uneven texture.
94:20	Unexposed: Smoke issuing from middle of seals, Exposed: Rough texture to seals.
125:00	Test terminated by sponsors request.

The construction after test is shown in Photographs.

5.2 Temperatures recorded on non-fireside (unexposed) face

The maximum temperatures recorded on the individual fire seals were:

- Seal A = 99.5°C (recorded by thermocouple t/c5 after 74 minutes)
- Seal B = 82°C (recorded by thermocouple t/c14 after 123 minutes)

The temperatures recorded by each thermocouple are plotted against time in Graphs.

6 Performance criteria

The criteria for failure under integrity and insulation adopted from the standard[1] are given below.

6.1 Integrity

Failure is deemed to occur:

a) When collapse or sustained flaming for not less than 10s on the unexposed face occurs;

b) When cracks, gaps or fissures allow flames or hot gases to cause flaming or glowing of a cotton fibre pad, when applied for a maximum of 30s;

c) When a 6mm-diameter gap gauge can penetrate through a gap into the furnace and be moved in the gap for a distance of at least 150mm;

d) When a 25mm-diameter gap gauge can penetrate through a gap into the furnace

6.2 Insulation

Failure is deemed to occur:

a) When the mean unexposed face temperature increases by more than 140°C above its initial value;

b) When the temperature recorded at any position (including the roving thermocouple) on the unexposed face is in excess of 180°C above the initial mean unexposed face temperature;

c) When integrity failure occurs.

7 References

1. Fire resistance tests. Part 1: General requirements. EN 1363-1: 2012. British Standards Institution, London, 2012.
2. Fire resistance tests: Alternative and additional procedures. EN 1363-2: 1999. British Standards Institution, London, 1999.

8 Figures

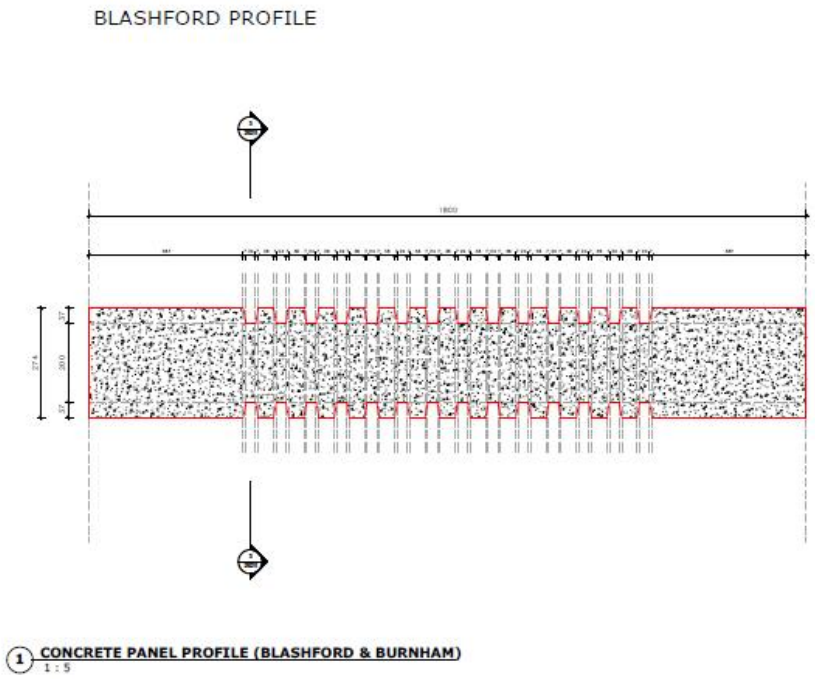


Figure 1: Test construction details – as supplied by the sponsor.

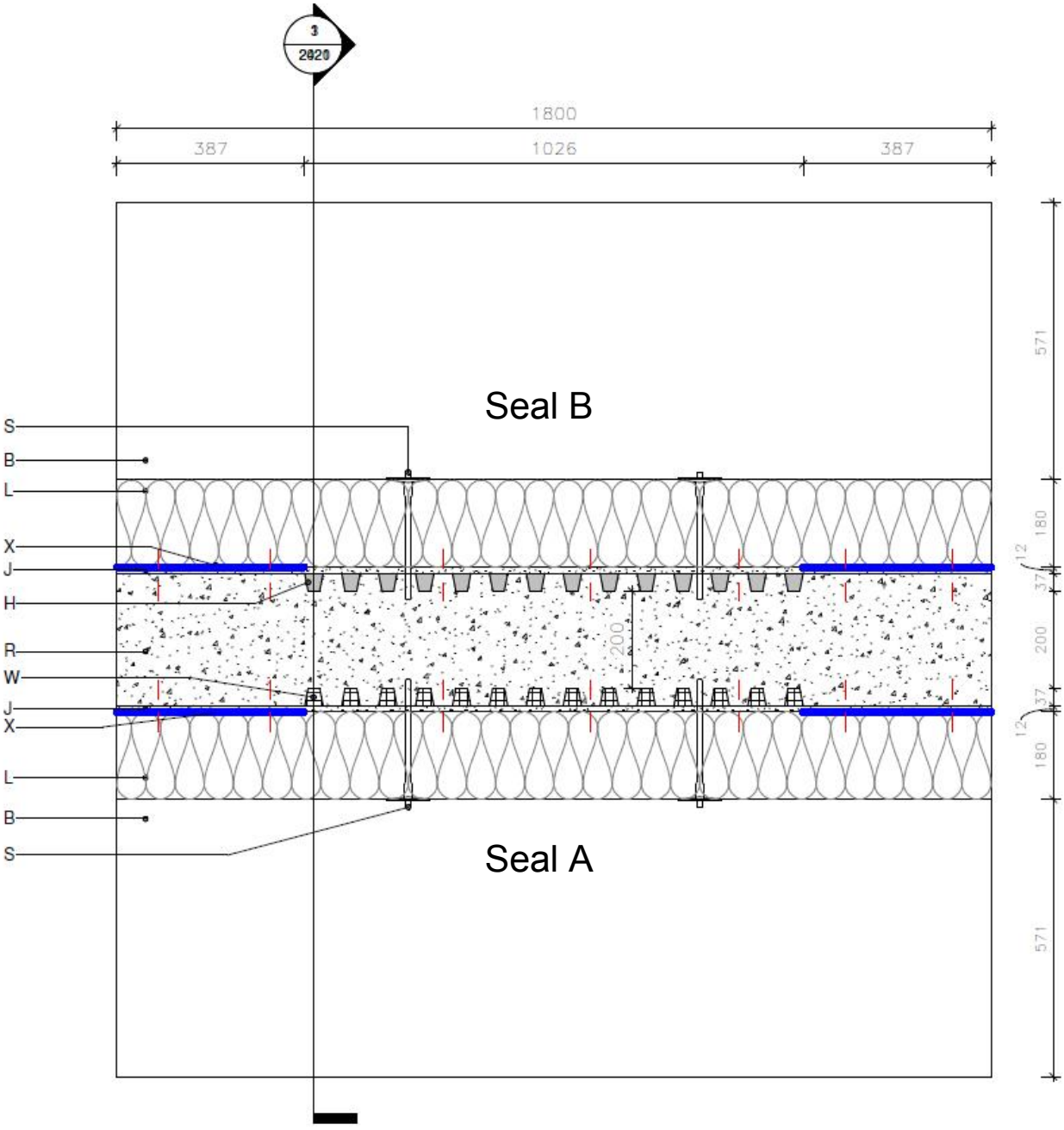


Figure 2: Test construction details

(Enlarged extract from Figure 1).

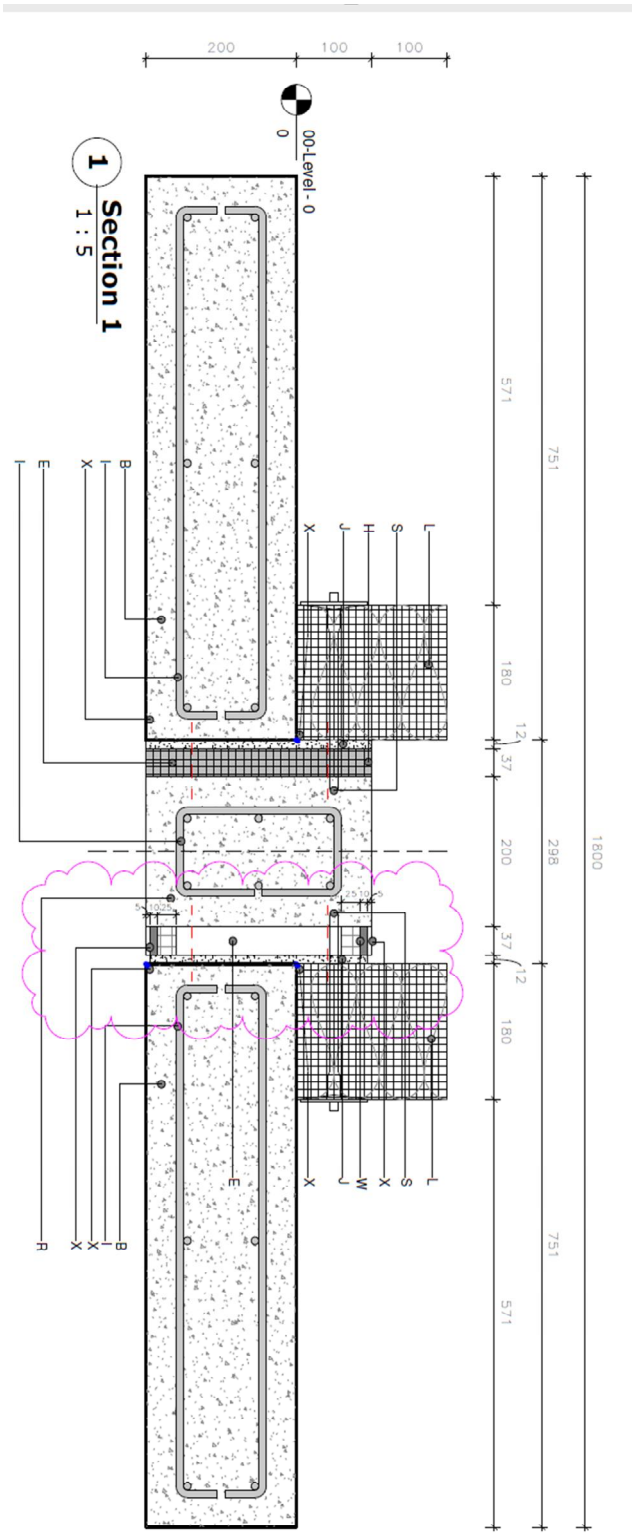


Figure 3: Test construction details.

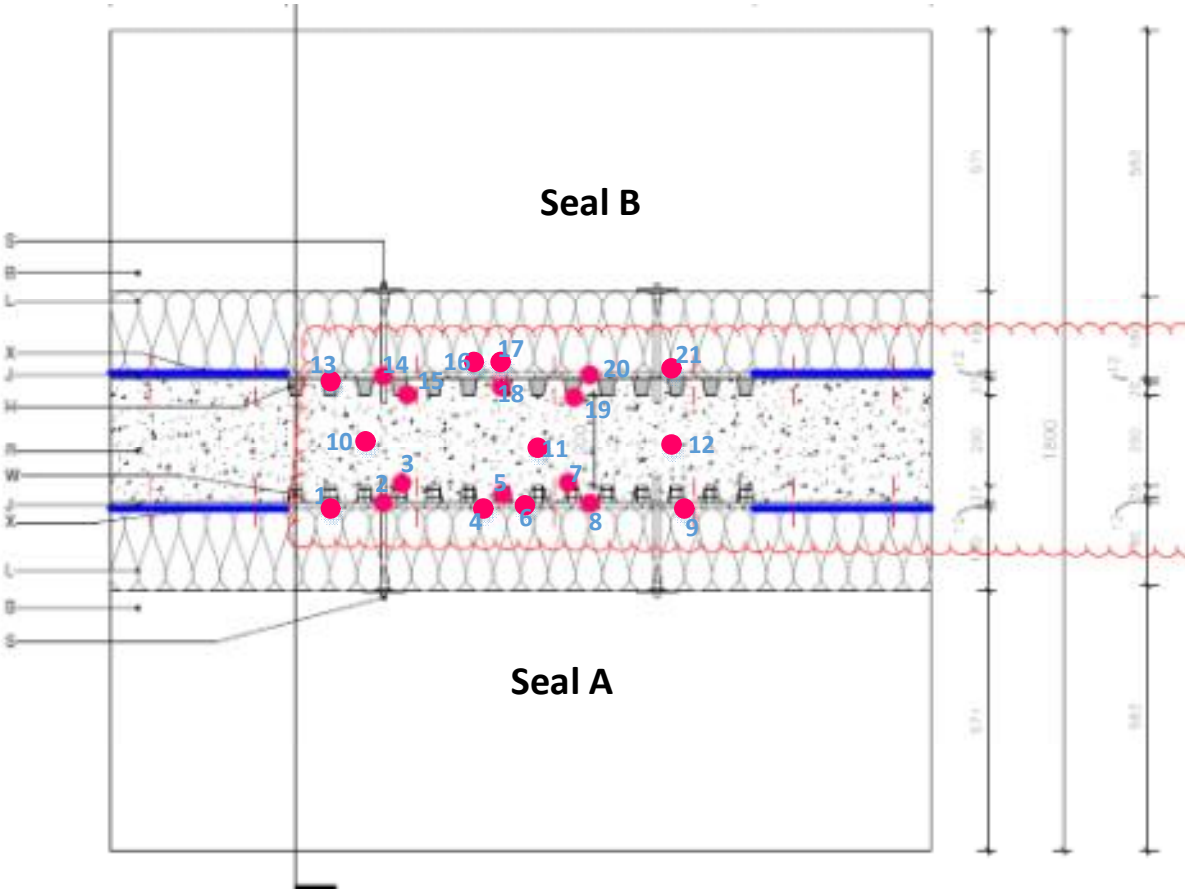
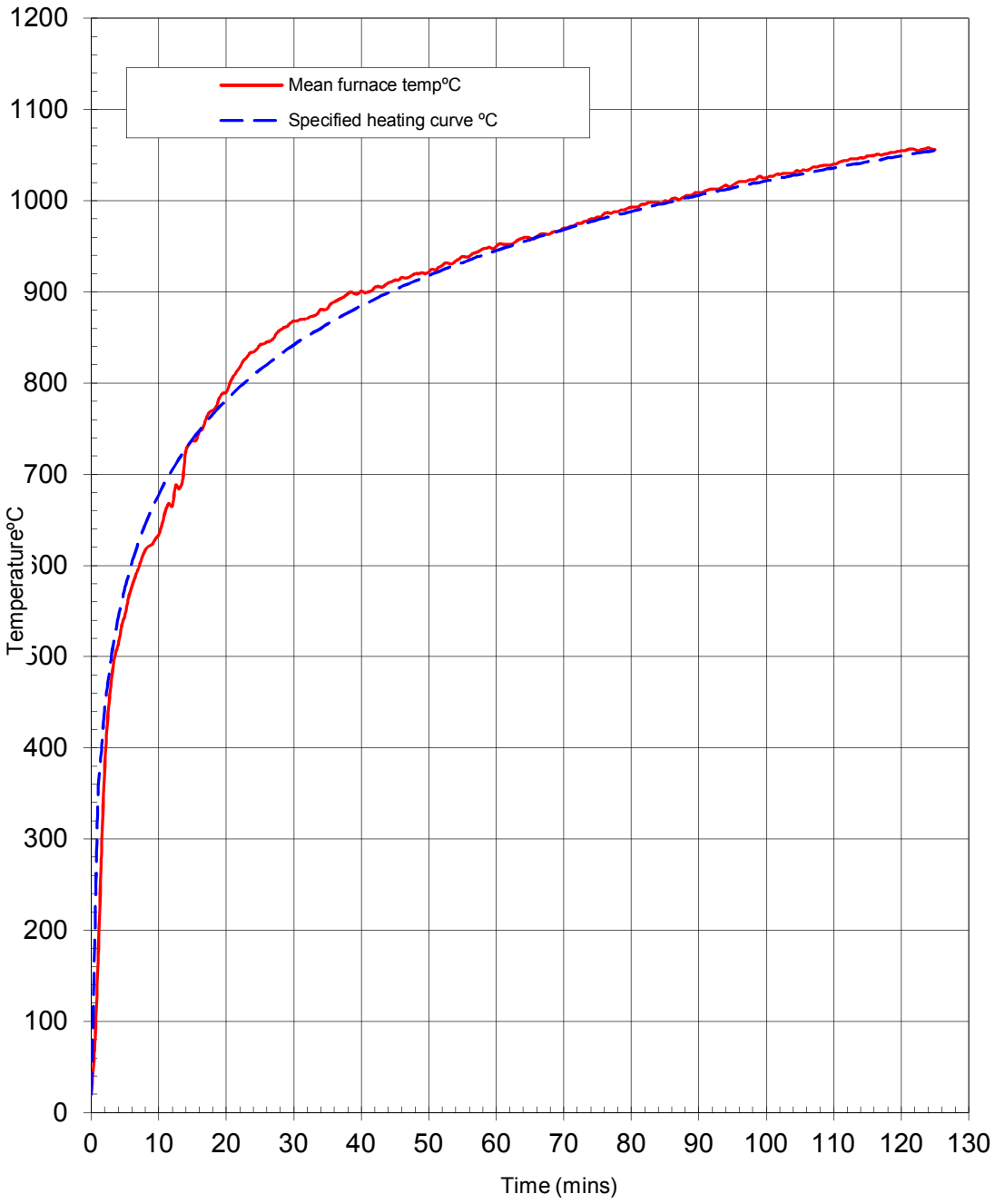


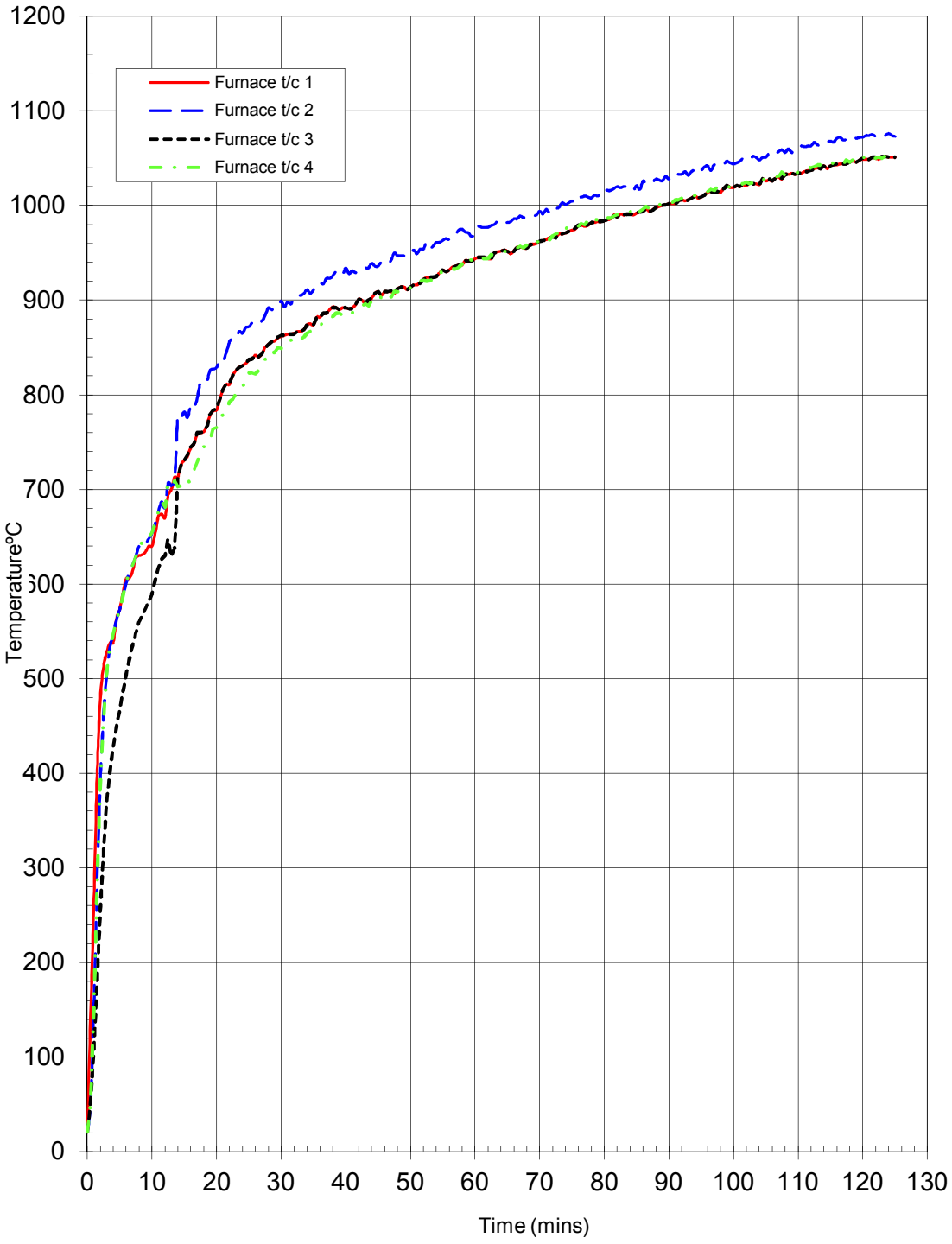
Figure 4: Sketch drawing showing nominal thermocouple locations.

Note: TCS 1,4,6,9,13,16,17,21 were located on the rockwool.

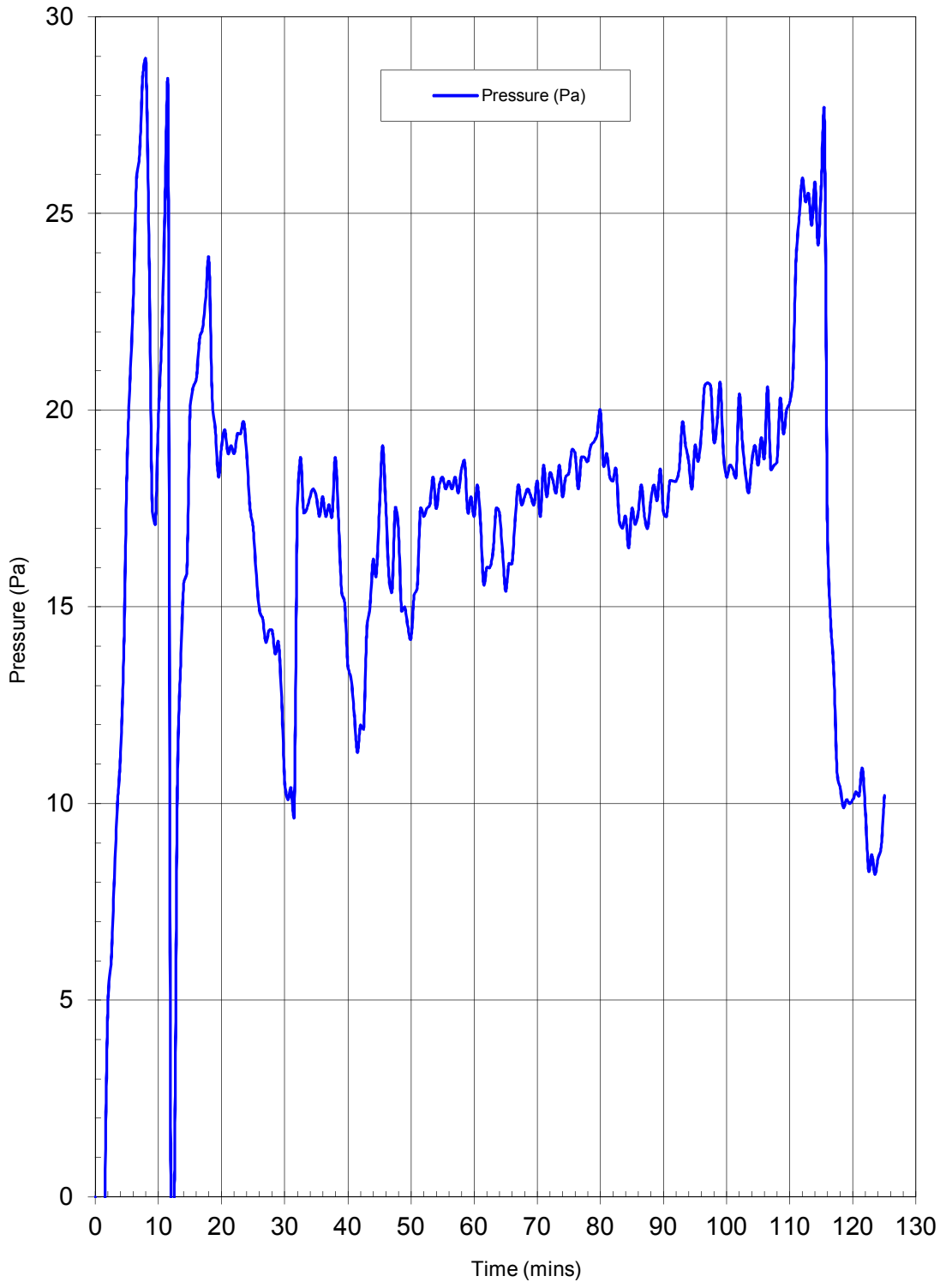
9 Graphs



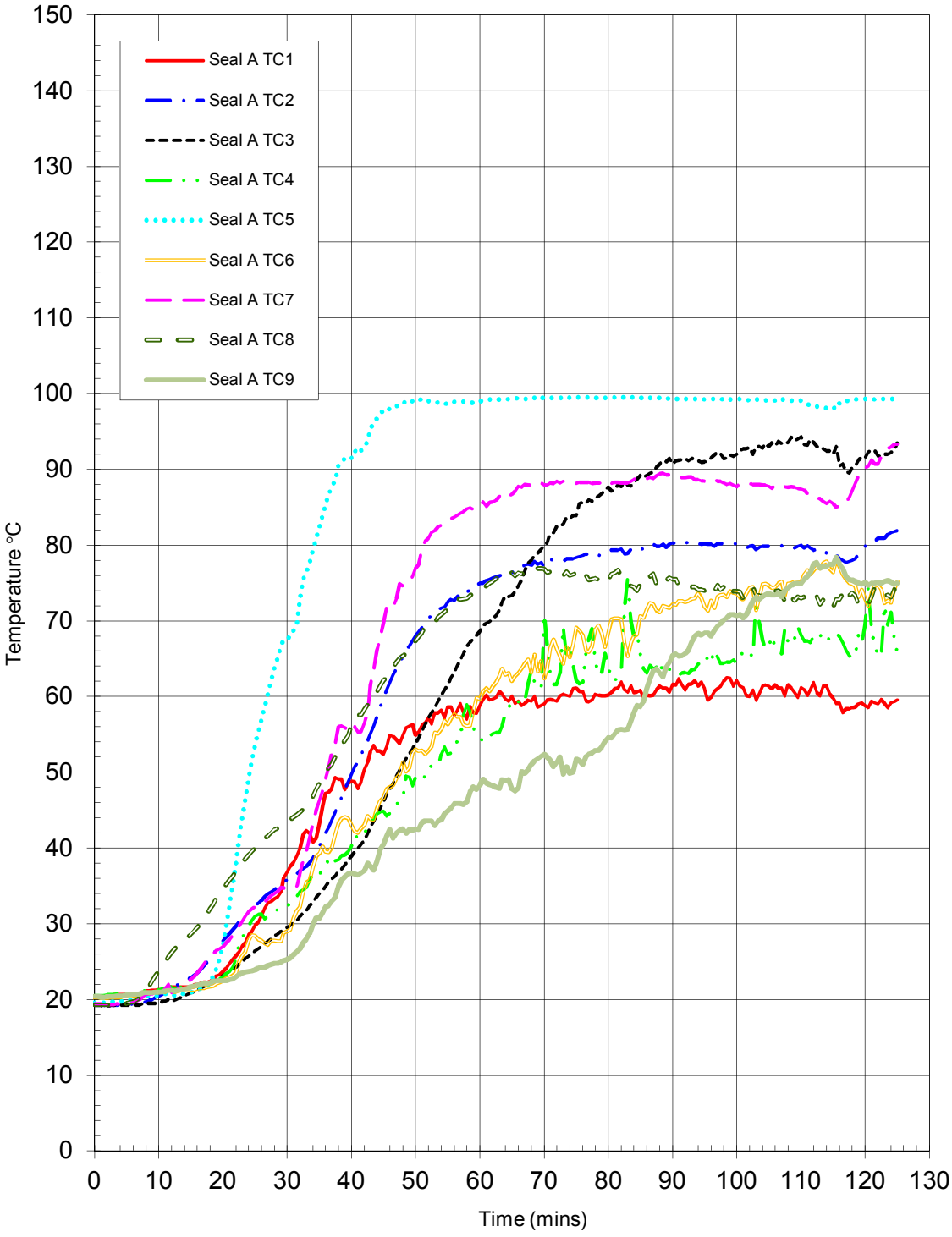
Graph 1: Mean Furnace Temperature with the specified furnace curve for comparison



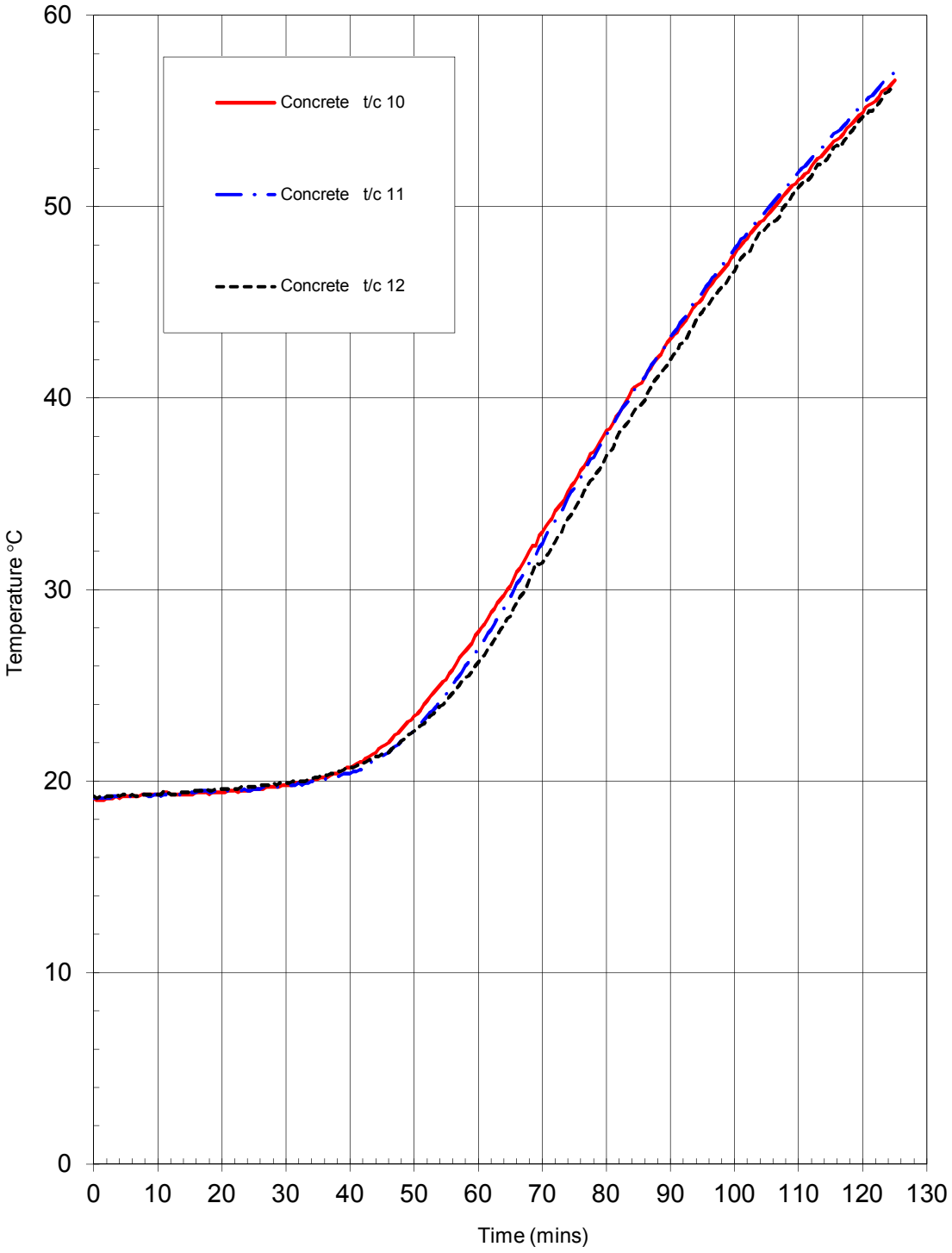
Graph 2: Individual furnace thermocouple temperatures.



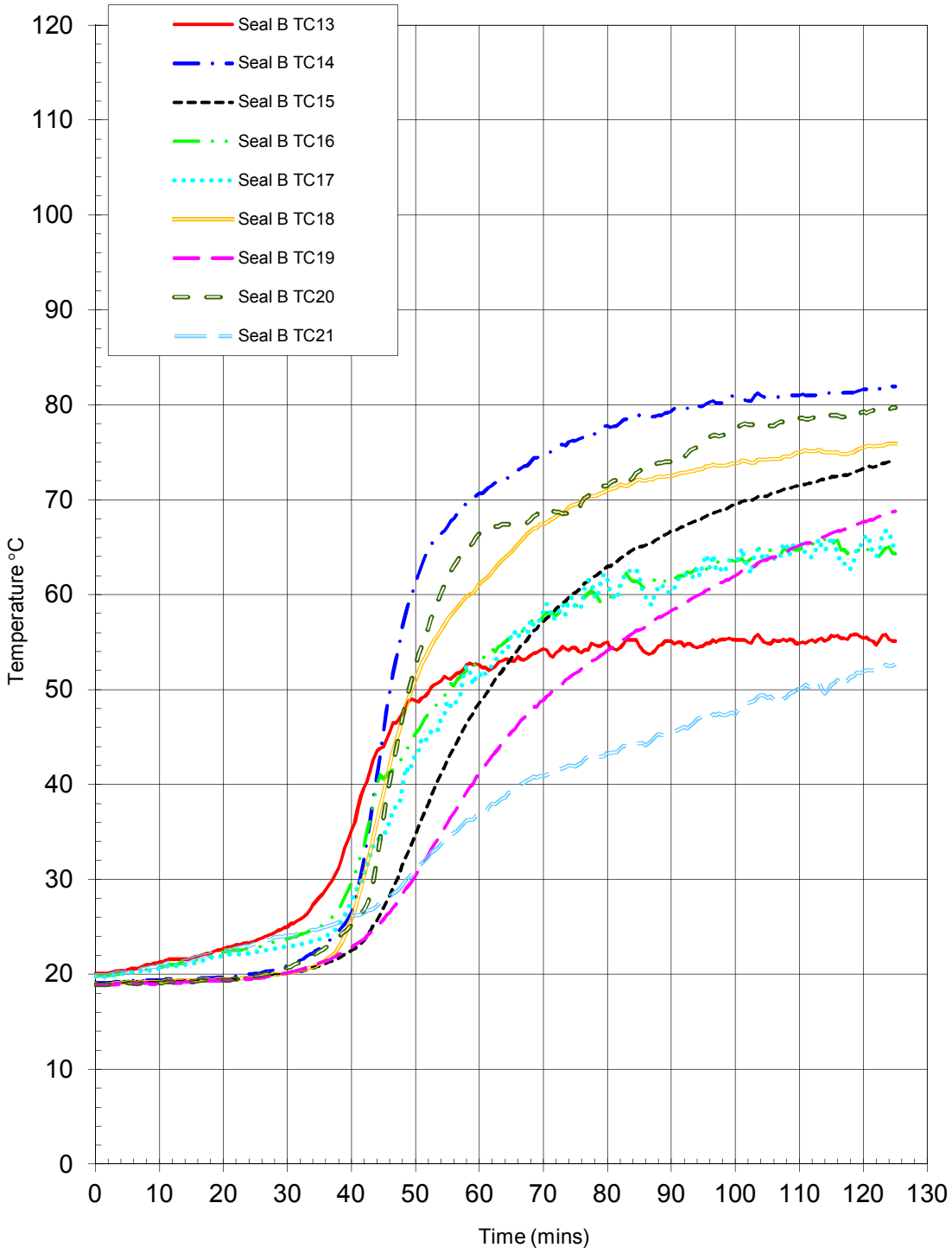
Graph 3: Furnace pressure



Graph 4: Temperature recorded by thermocouples 1 to 9 on Seal A.



Graph 5: Temperature recorded by thermocouples 10 to 12 on the concrete.



Graph 6: Temperature recorded by thermocouples 13 to 21 on Seal B.

10 Photographs

Photograph 1: Installation of specimen into test frame.

Photograph 2: Installation of test specimen into test frame.

Photograph 3: Test specimen.

Photograph 4: Exposed face (fireside) face before test.

Photograph 5: Unexposed face (non-fireside) face after 60minutes from the start of the test.

Photograph 6: Exposed face (fireside) face after test.

Report Ends