

## Test Results

### Fleet Service Medivan Testing

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Authority: Proforma Payment

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Test  
Date(s) 11th, 12th and 13th November 2014

#### Test Objective/Method/Specification No

The objective of this testing was to prove that the climate control and fridge systems fitted to this particular vehicle can perform at both ends of the temperature range of the British climate. The performance range testing was to prove how efficient and effective the systems were at returning to the desired temperatures (+6°C Fridge,  $\pm 3^{\circ}\text{C}$  and +21° Interior,  $\pm 3^{\circ}\text{C}$ ) after the doors had been opened for a period of time as shown in the results.

#### Specimen Description/Part No(s)/Delivery Dates

Medivan – A dual compartment climatic controlled pharmaceutical delivery vehicle.

#### Test Equipment

MIRA's Vehicle Climatic Chambers

Prepared By:



Rajan Mistry  
Engineer

Approved By:



Jeff Stevens  
Principal Engineer

Date: 20/11/2014

## Results

Three different ambient temperature conditions were used for this evaluation along with 7 stabilization periods used in total. The ambient temperatures used were -15°C, 0°C and +30°C.

Although more testing was carried out, at additional temperatures, only the three conditions identified above have been reported on, as agreed with Fleet Service.

Appendix 1: Notes taken during testing.

The results of each test, at each temperature, are shown in Graphs 1 to 14

The different stabilization test scenarios are as follows:

A – Side door open for 1 minute, fridge door open for 15 seconds

B – Both rear doors open for 1 minute, rear curtain open for 15 seconds

C – Both rear doors open for 1 minute, rear curtain open for 1 minute

D – Rear right hand door open for 1 minute, rear curtain open for 1 minute

E – Rear right hand door open for 1 minute, rear curtain open for 15 seconds

F – Side door open for 1 minute, then 3 times at 10 minutes apart, followed by 3 times at 5 minutes apart. Fridge door open for 15 seconds, then 3 times at 10 minutes apart, followed by 3 times at 5 minutes apart.

G – Side door open for 1 minute, then 3 times at 5 minutes apart. Fridge door open for 15 seconds, then 3 times at 5 minutes apart.

Side door open for 1 minute, then 1 time at 10 minutes. Fridge door open for 15 seconds, then 1 time at 10 minutes.

Side door open for 1 minute, then 2 times at 5 minutes apart. Fridge door opened for 15 seconds, then 2 times at 5 minutes apart.

The vehicle was fitted with 8 thermocouples:

TC1 – Bulkhead right front upper

TC2 – Fridge

TC3 – Offside centre

TC4 – Nearside centre

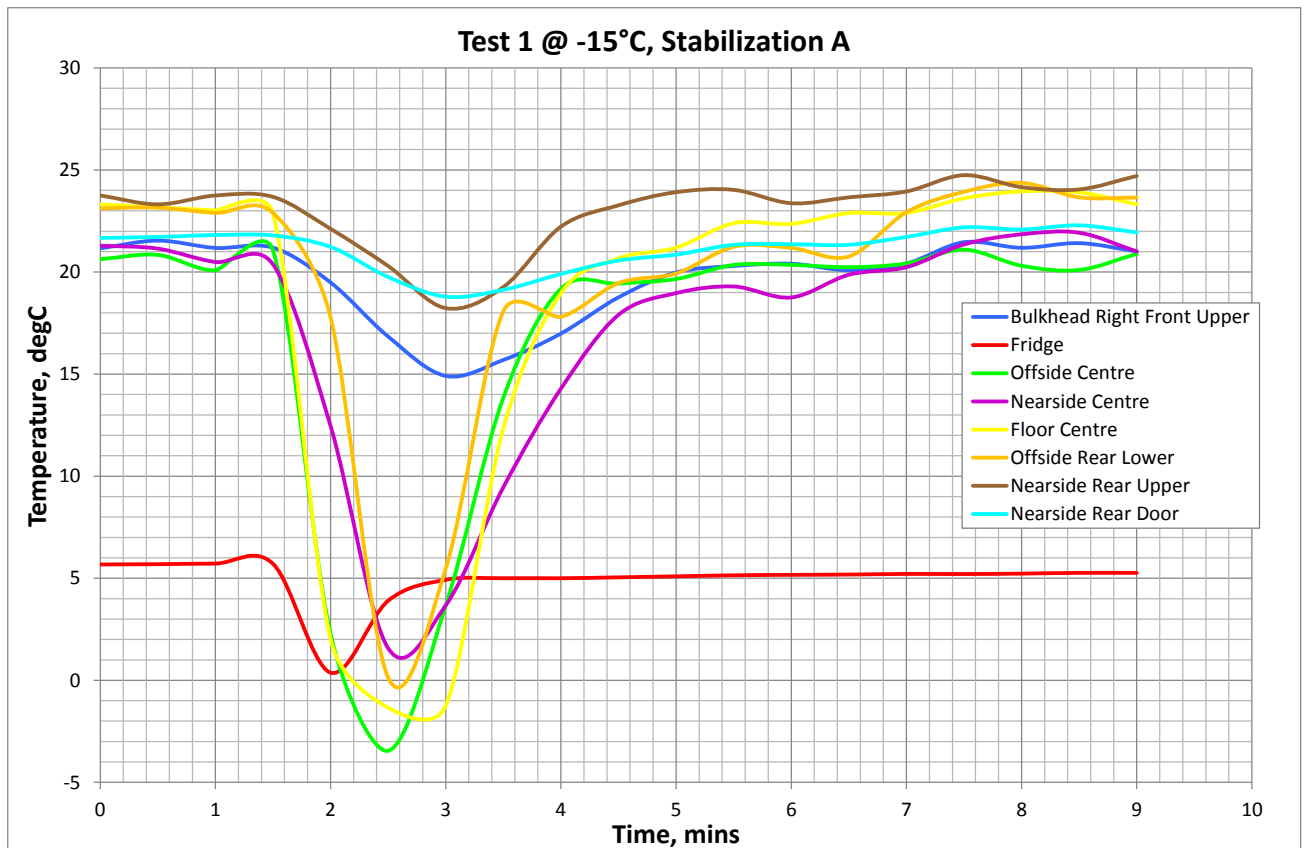
TC5 – Floor centre

TC6 – Offside rear lower

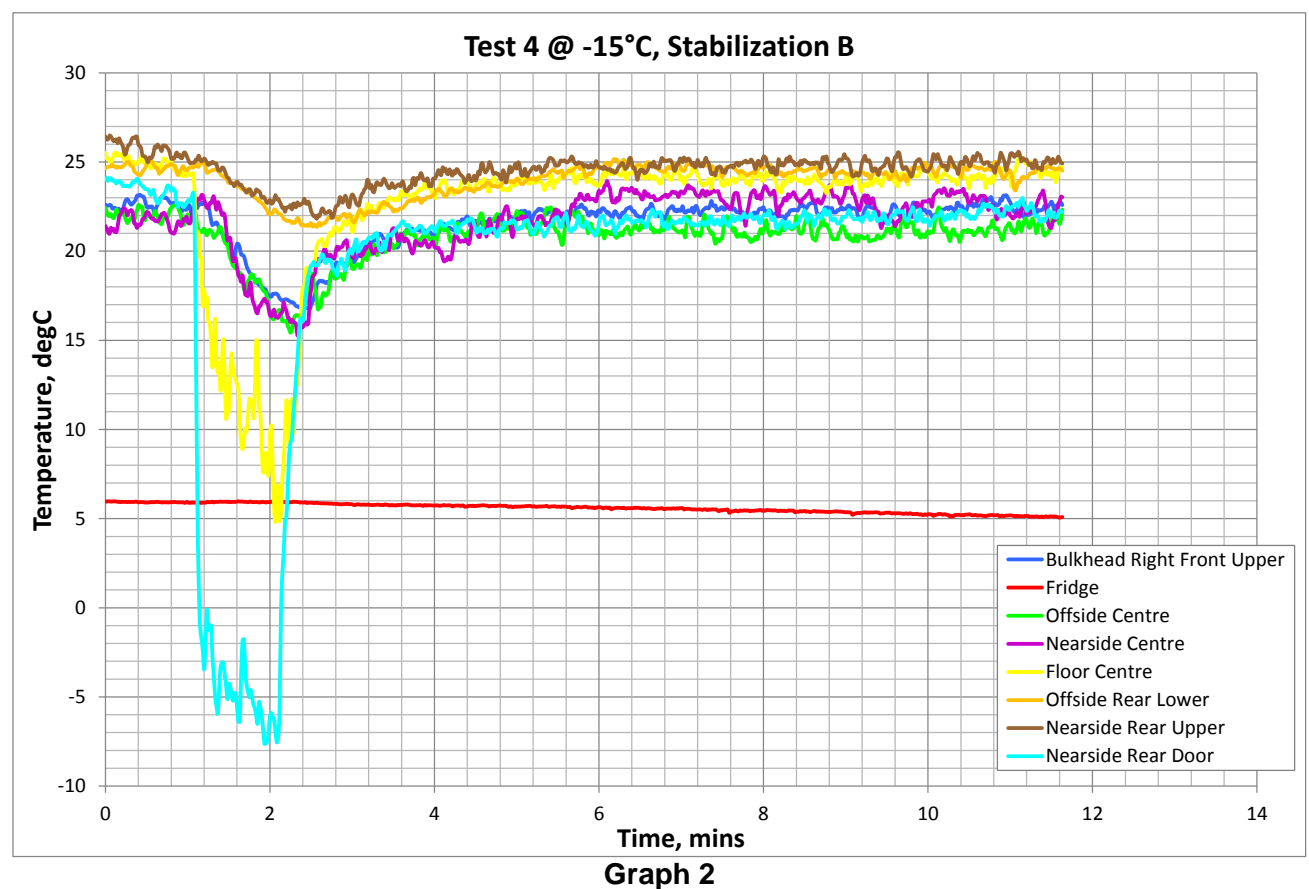
TC7 – Nearside rear upper

TC8 – Nearside rear door

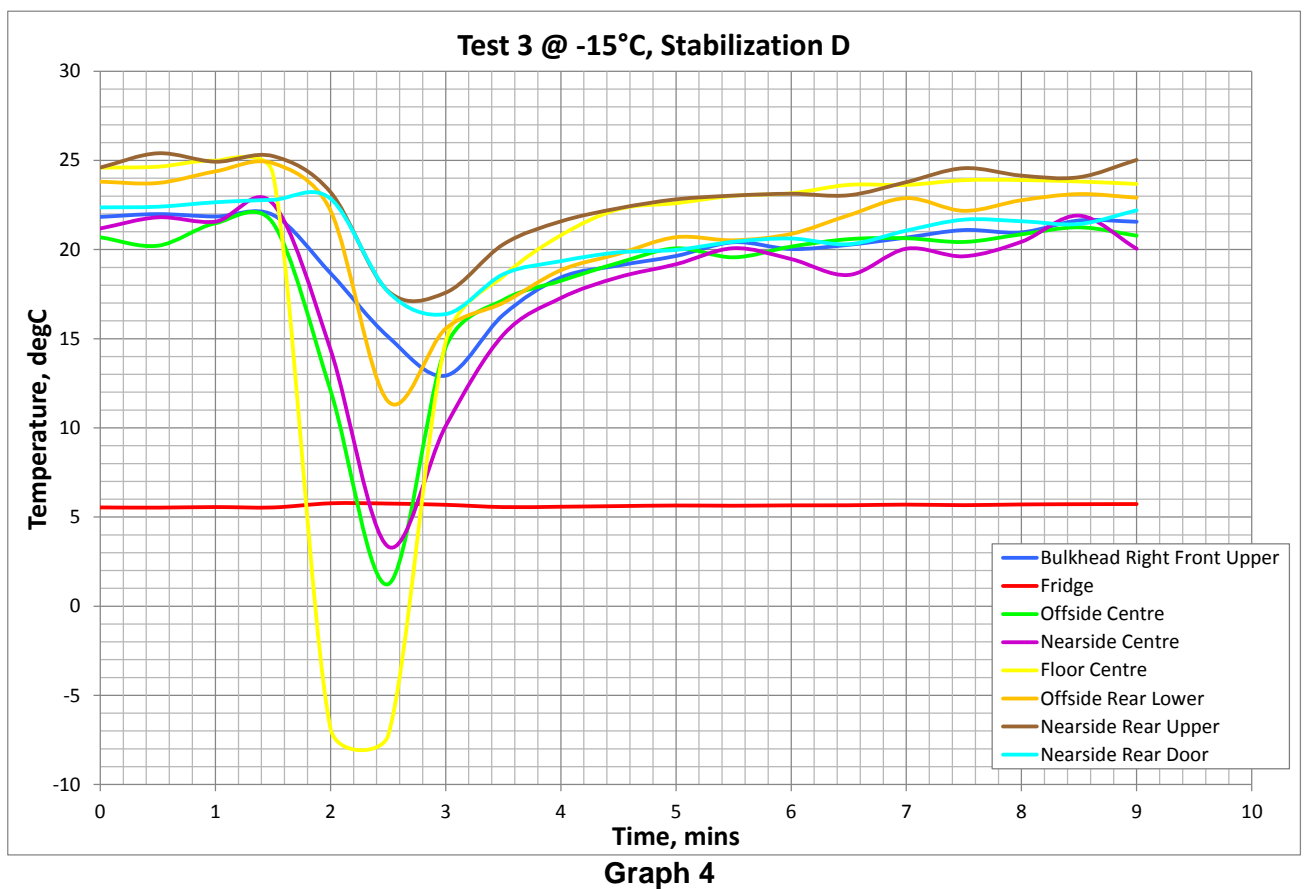
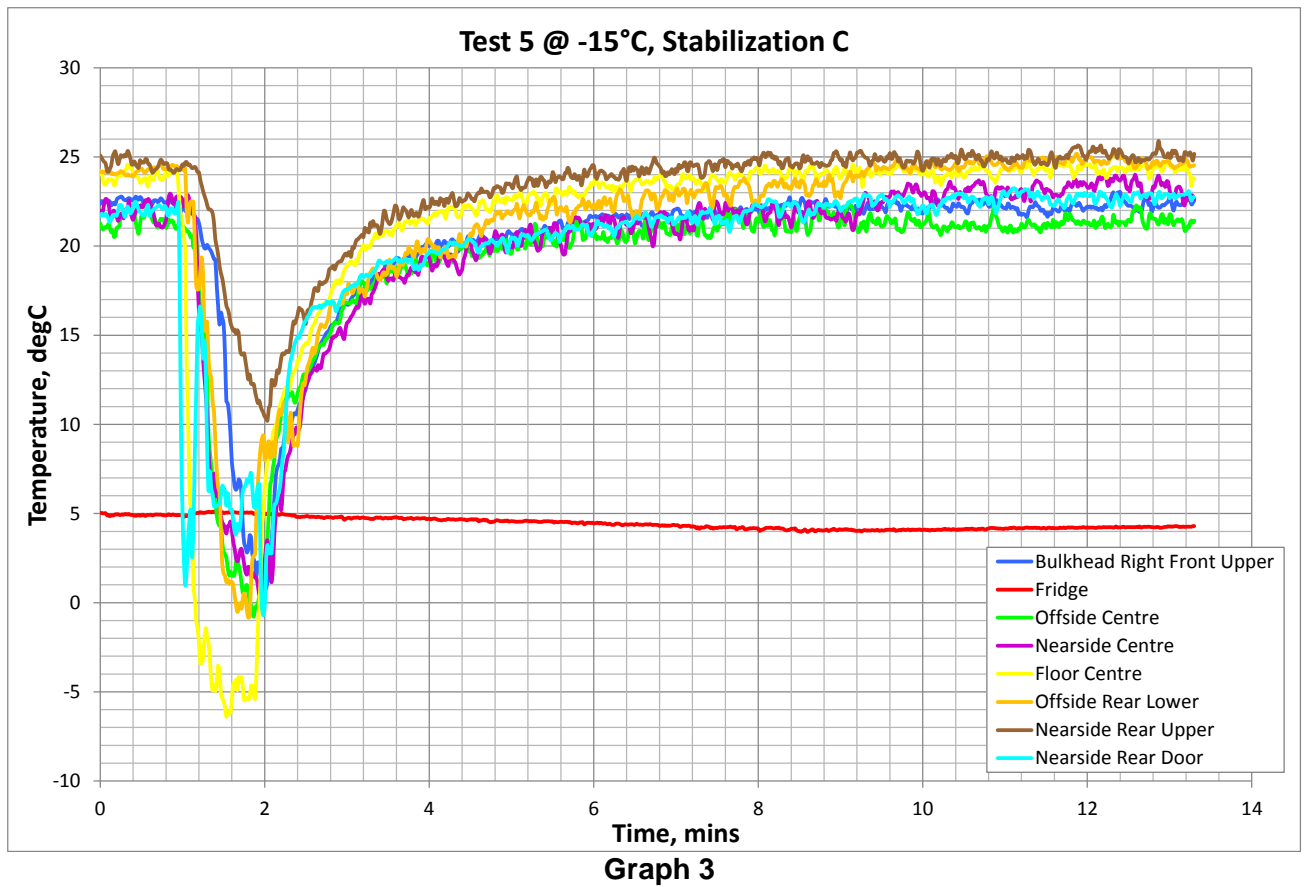
Each location is shown in Photos 3 to 10

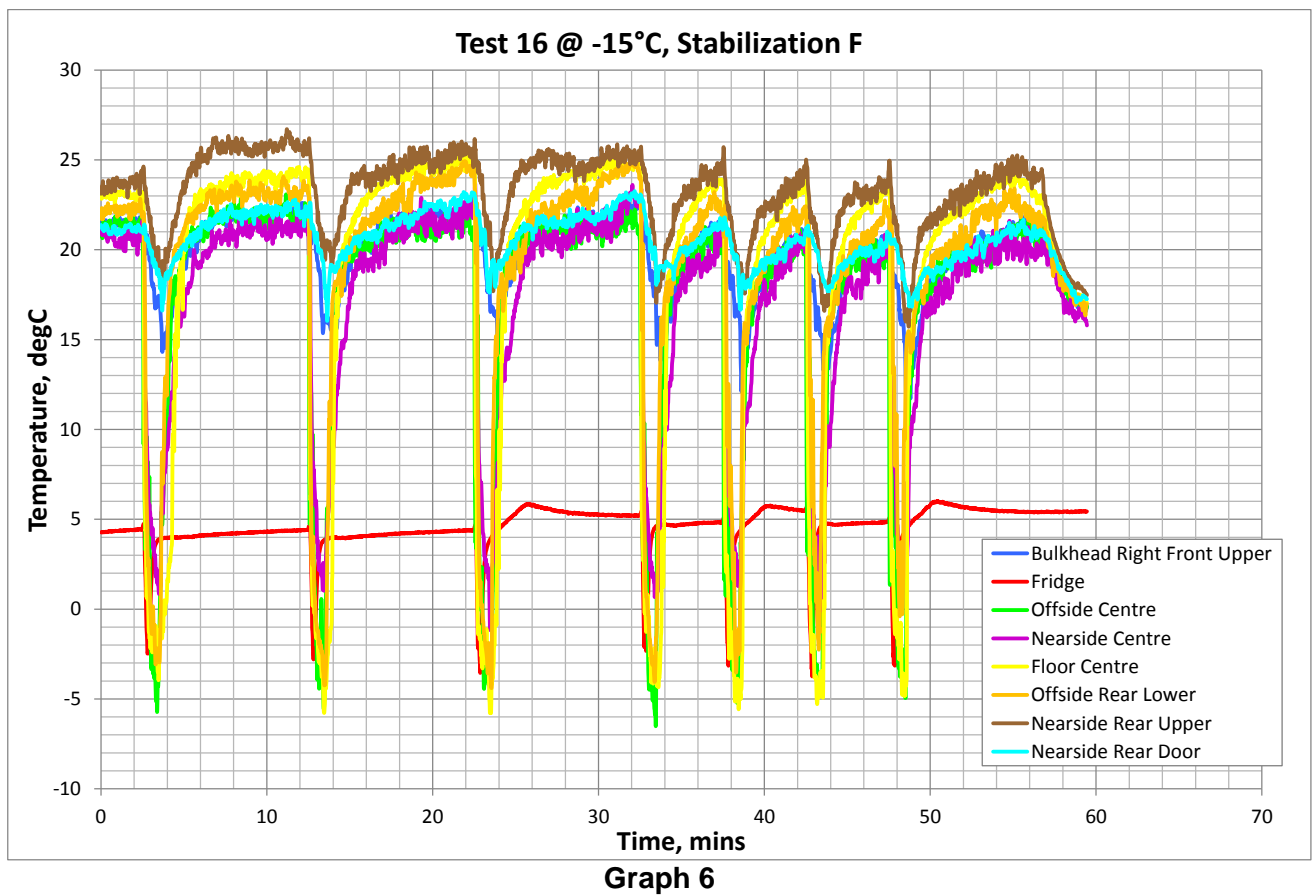
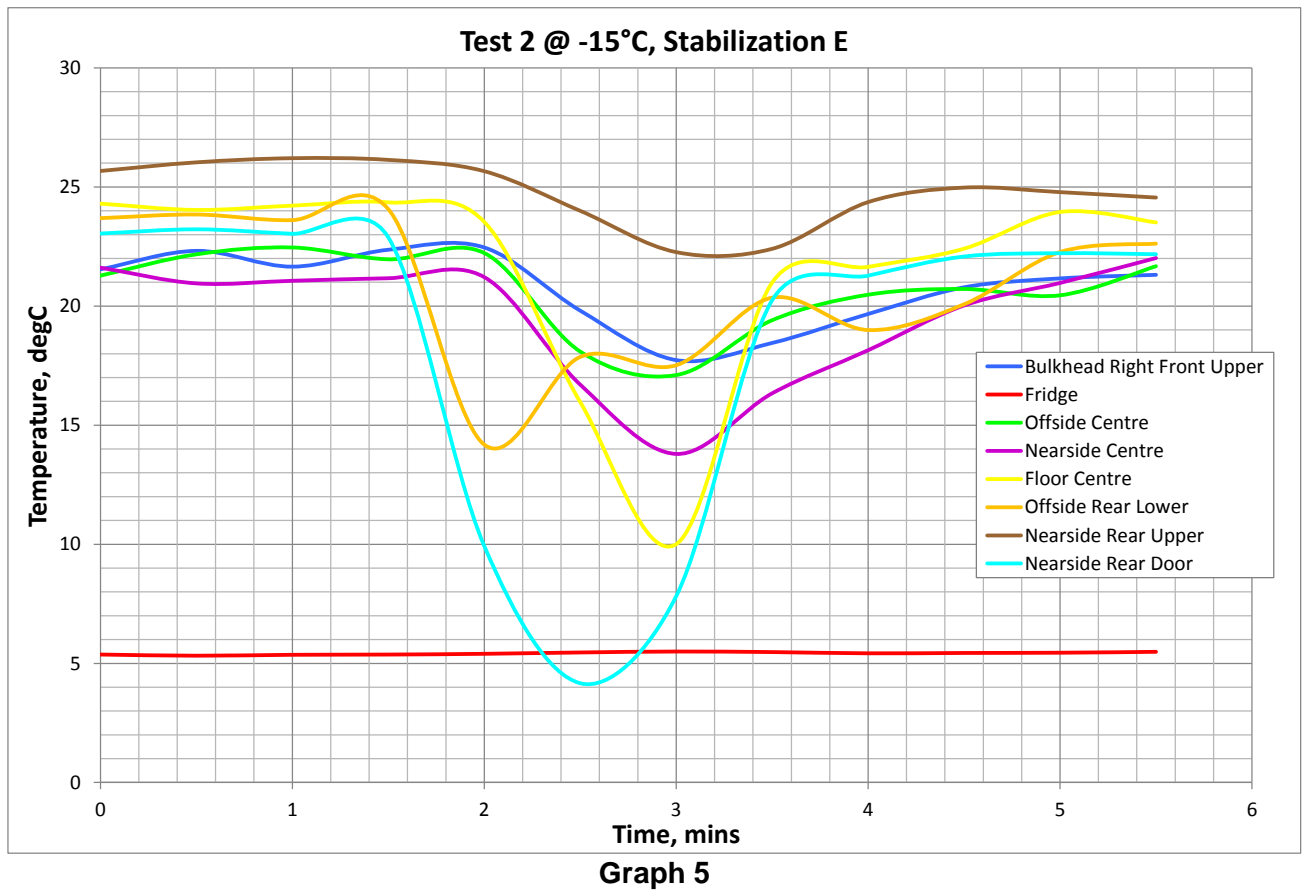


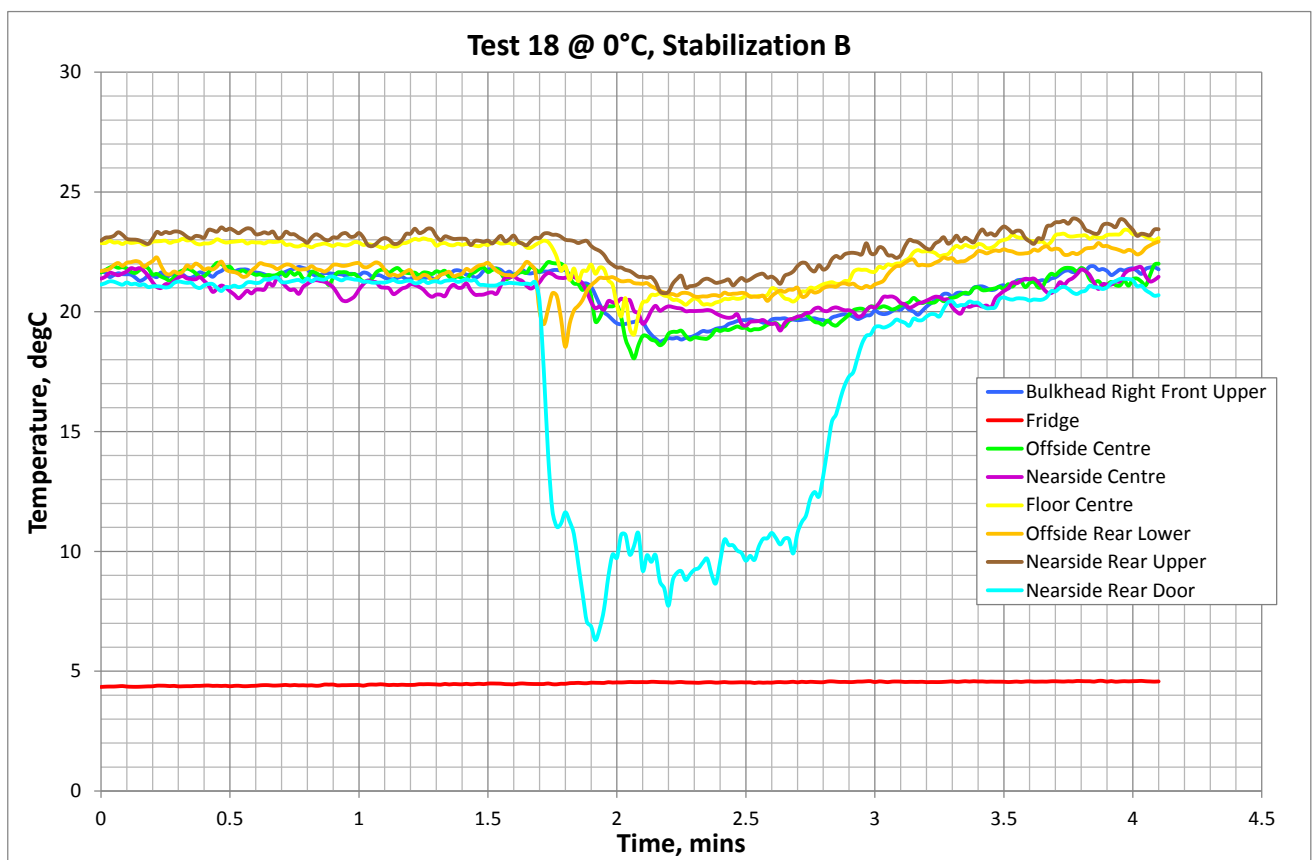
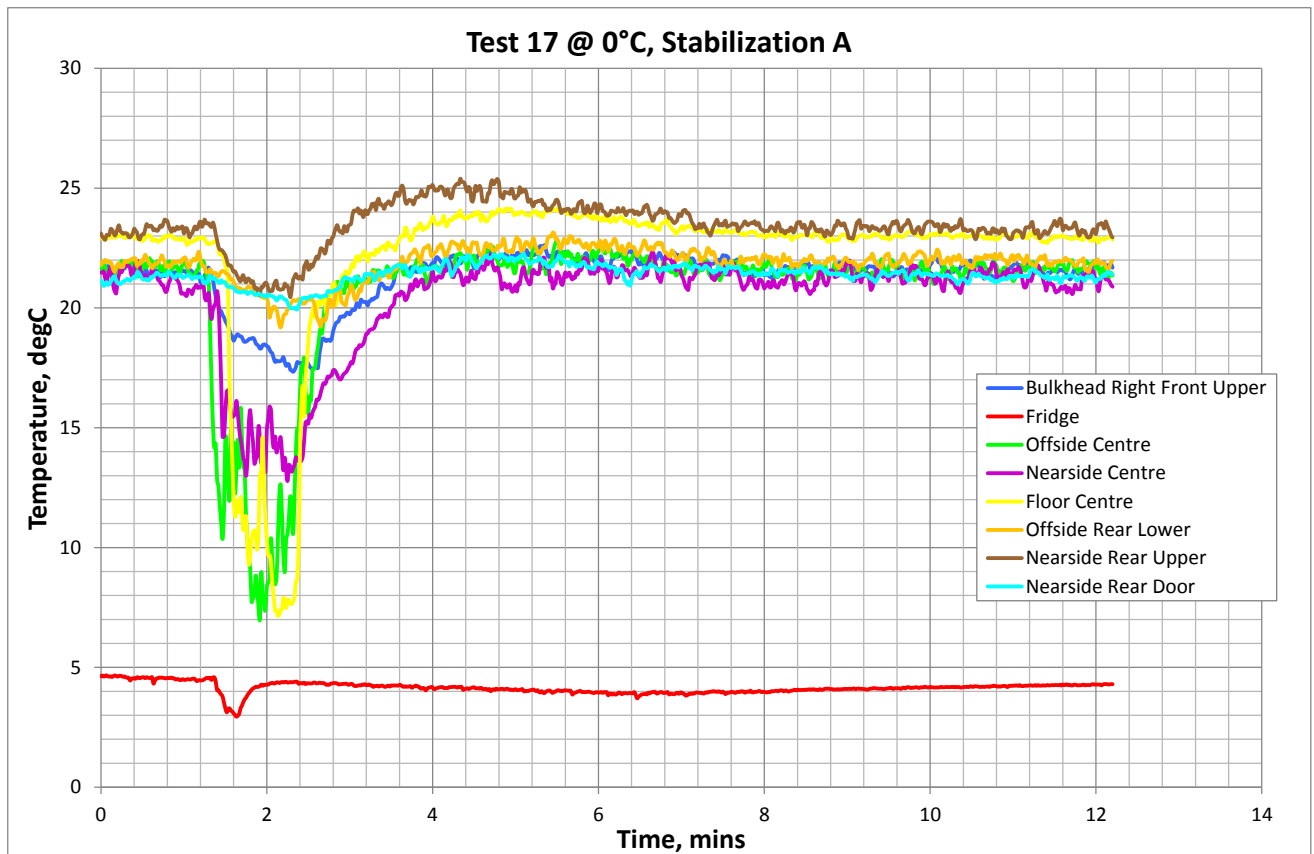
Graph 1

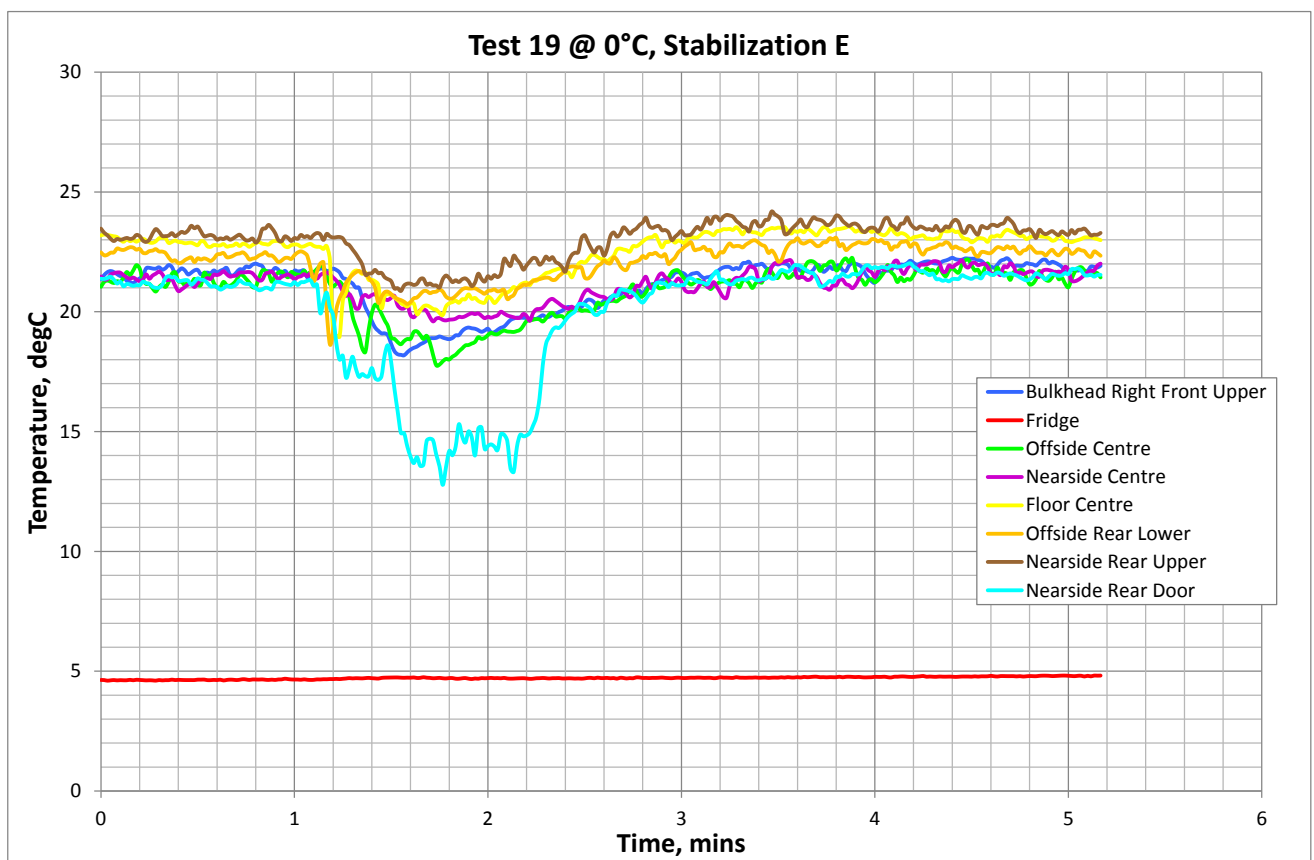
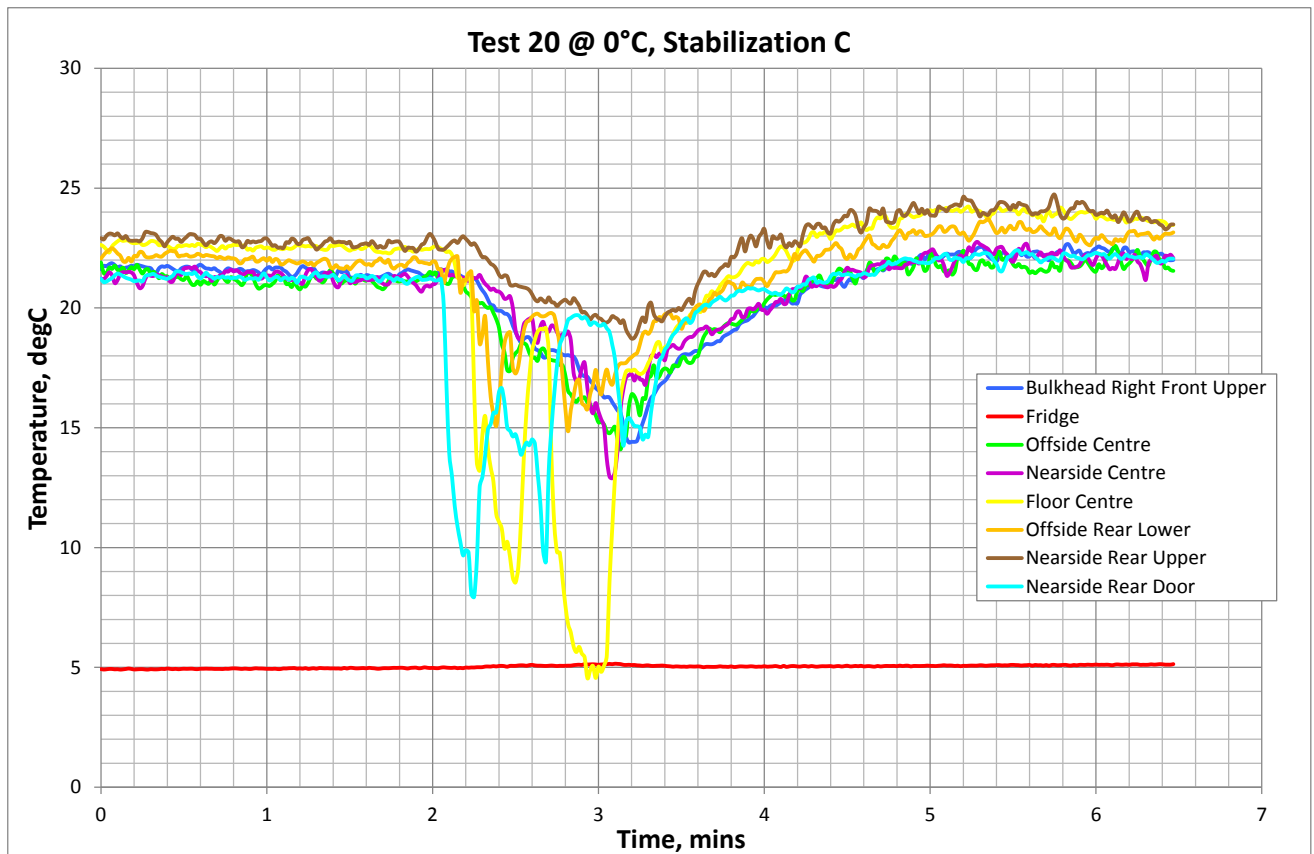


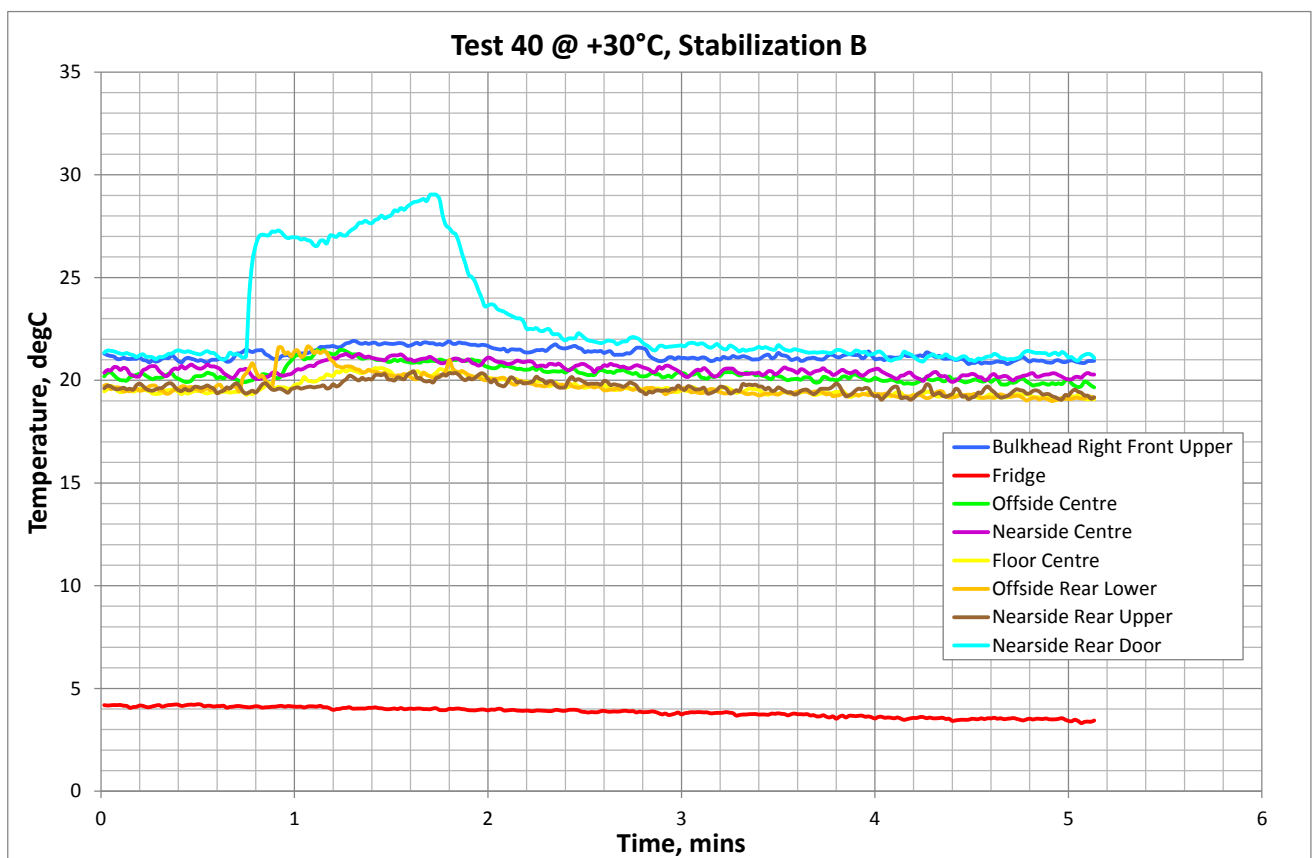
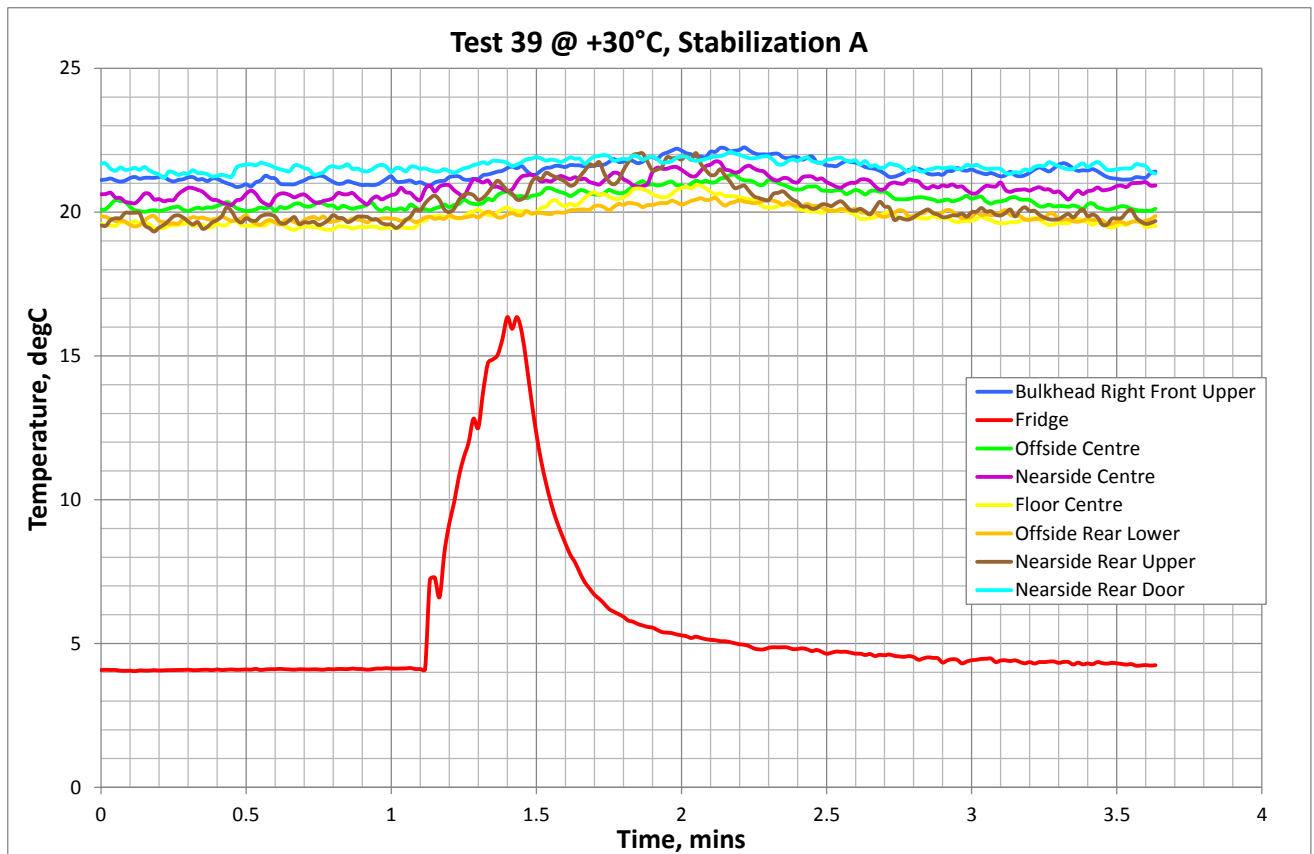
Graph 2



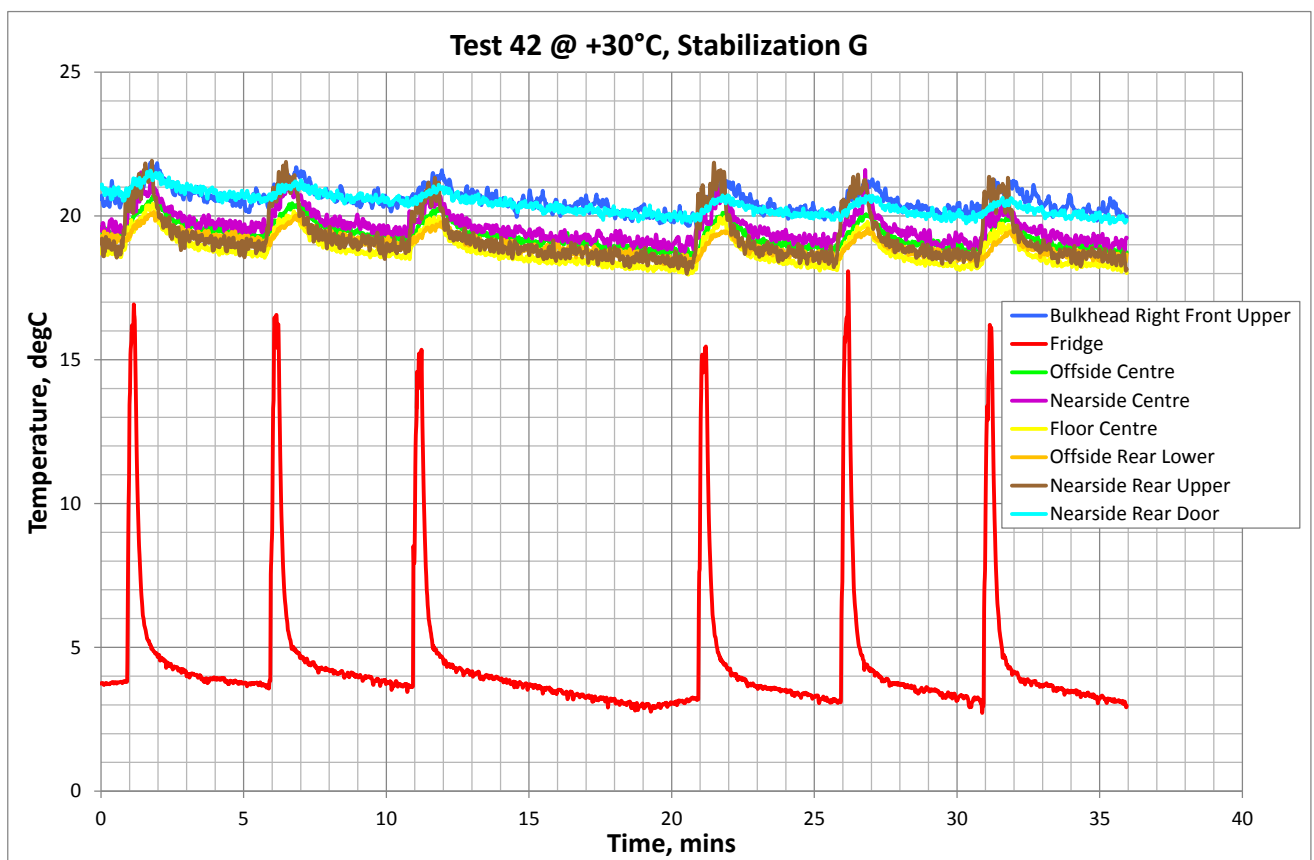
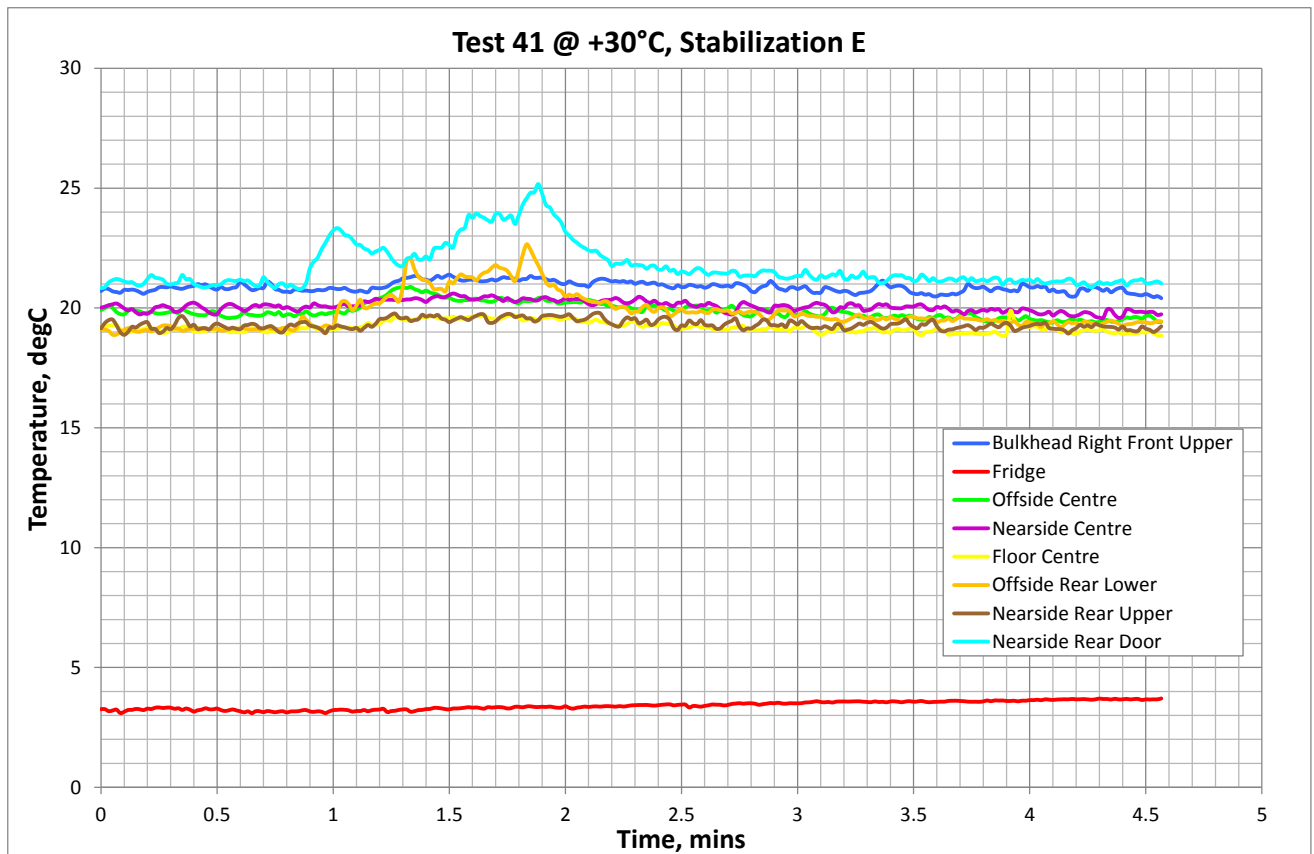




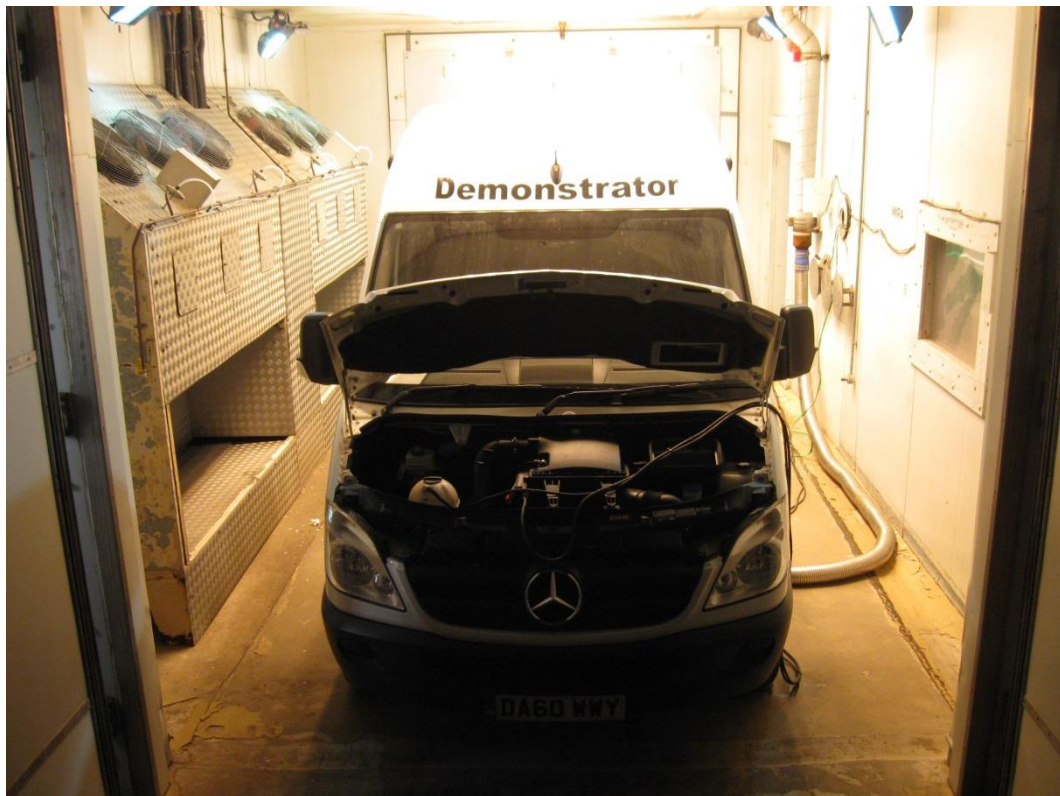








## Photographs



**Photo 1**



**Photo 2**



**Photo 3**



**Photo 4**





**Photo 5**



**Photo 6**

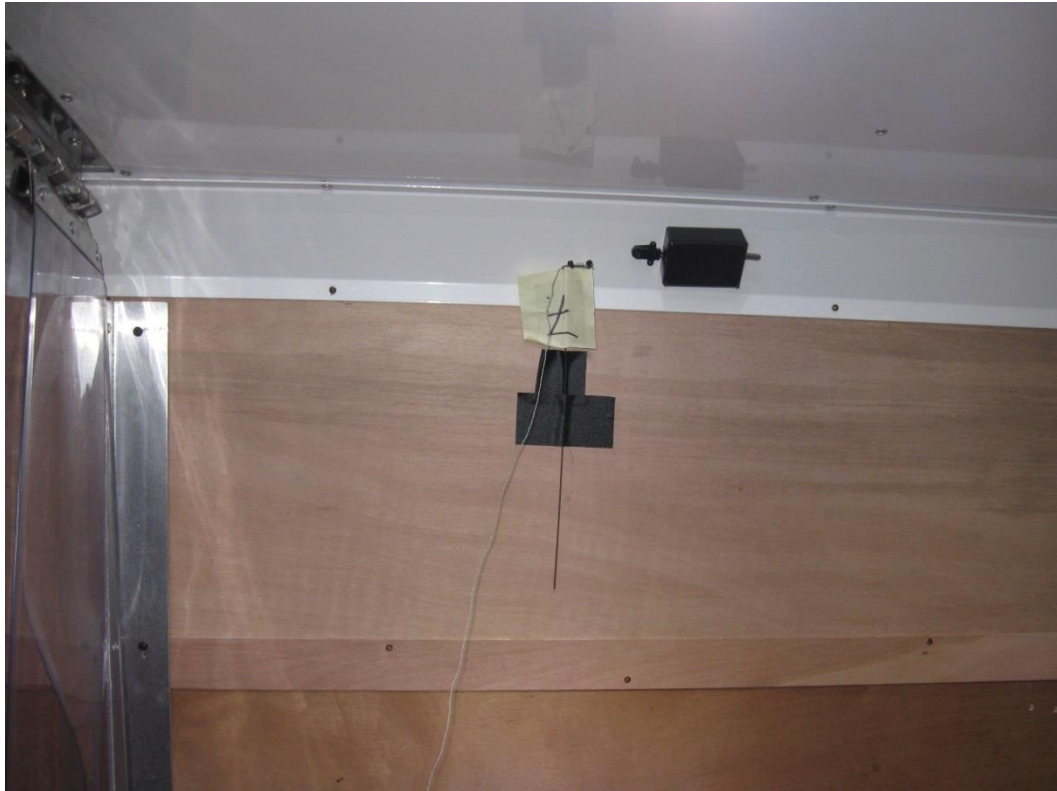


**Photo 7**



**Photo 8**





**Photo 9**



**Photo 10**

## Appendix 1

### ***Fleetservice Test. 11th, 12th, 13th of November 2014 (Test notes as recorded during the test session)*** **1207315**

#### ***Tuesday 11th November***

##### ***Test***

##### ***Cond.***

##### ***Notes.***

Temp -15°C	Stabilization	0916hrs Opened side door, fridge door and cracked rear door. 0950hrs Fridge door closed. 1008hrs All doors closed, climate system switched on. 1040hrs fridge temp at 5.90°C, heater system stopped working. 1118hrs Exhaust extraction removed from heater exhaust. Temps started to rise once Darren had reset heater. 1130hrs Battery flat, heater stopped, battery charger switched on. 1135hrs Heater system had to be switch power off then on. 1340hrs Stopped overnight soak and stabilization graph/Das.
Temp -15°C	A	Das started at 1342hrs Side door opened for 1min Fridge door opened for 15sec
Temp -15°C	E	Das started at 1354hrs Rear R/H door opened for 1min Rear curtain opened for 15sec
Temp -15°C	D	Das started at 1401hrs Rear R/H door opened for 1min

		Rear curtain opened for 1min
Temp -15°C	B	Das started at 1425hrs Both rear doors opened for 1min Rear curtain opened for 15sec
Temp -15°C	C	Das started at 1437hrs Both rear doors opened for 1min Rear curtain opened for 1min
	Stabilization	1458hrs chamber temp change to -10°C Das started at 1500hrs
Temp -10°C	A	Das started at 1500hrs Side door opened for 1min Fridge door opened for 15sec
Temp -10°C	B	Das started at 1533hrs Both rear doors opened for 1min Rear curtain opened for 15sec
Temp -10°C	C	Das started at 0000hrs Both rear doors opened for 1min Rear curtain opened for 1min
Temp -10°C	D	Das started at 1608hrs Rear R/H door opened for 1min Rear curtain opened for 1min
Temp -10°C	E	Das started at 1623hrs



Rear R/H door opened for 1min

Rear curtain opened for 15sec

Stabilization 1631hrs chamber temp change to -5°C  
Das started at 1632hrs

Temp -5°C A Das started at 1632hrs

Temp -5°C B Das started at 1656hrs

Temp -5°C C Das started at 1717hrs

Temp -5°C D Das started at 1730hrs

Temp -5°C E Das started at 1743hrs

Overnight  
soak

1755hrs chamber temp change to -5°C

Das started at 1157hrs

No battery charger, Vehicle switched off, All doors closed on vehicle.

### **Wednesday 12th November**

<b>Test Cond.</b>	<b>Notes.</b>
Temp -5°C Overnight soak	0700hrs chamber temp at -4.85°C on arrival. 0815hrs Das stopped.
Stabilization	0823hrs change sample rate 1sec, Das started 0823hrs, fridge switched on.

0923hrs Climate system switched on.  
 1027hrs Das stopped  
 1028hrs Changed chamber temp -15°C  
 1122hrs Defrost of chamber finished. 20min cycle.

Temp -15°C      F      Das started at 1244hrs  
 Side door opened for 1min, 3 at 10mins apart, 3 at 5mins apart.  
 Fridge door opened for 15sec, 3 at 10mins apart, 3at 5mins apart.  
**Battery died at end of test, battery charger turned up.**

Stabilization      1350hrs changed chamber temps 0°C

Temp 0°C      A      Das started at 1422hrs

Temp 0°C      B      Das started at 1436hrs

Temp 0°C      E      Das started at 1440hrs

Temp 0°C      C      Das started at 1449hrs

Stabilization      1459hrs changed chamber temps +5°C

Temp +5°C      A      Das started at 1519hrs

Temp +5°C      B      Das started at 1525hrs

Temp +5°C      E      Das started at 1531hrs

Stabilization      1538hrs changed chamber temps +10°C

Temp +10°C	A	Das started at 1601hrs
Temp +10°C	B	Das started at 1606hrs
Temp +10°C	E	Das started at 1611hrs
	Stabilization	1630hrs changed chamber temps +15°C
Temp +15°C	A	Das started at 1636hrs
Temp +15°C	B	Das started at 1641hrs
Temp +15°C	E	Das started at 1654hrs
	Stabilization	1700 hrs changed chamber temps +20°C

**Thursday 13th November****Test****Cond.****Notes.**

Temp +20°C	Overnight soak	0800hrs chamber temp at +19.89°C on arrival. 0805hrs Das stopped.
	Stabilization	Sample rate 1sec, Das started 0810hrs, fridge and climate switched on. 1030hrs Das stopped
	No solar	
Temp +20°C	A	Das started at 1031hrs

Temp +20°C	B	Das started at 1035hrs
Temp +20°C	E	Das started at 1042hrs
	500w/m2 solar	added @ 1058hrs vehicle soaked for 30 mins Vehicle air con started @ 1138
Temp +20°C	A	Das started at 1203hrs
Temp +20°C	B	Das started at 1209hrs
Temp +20°C	E	Das started at 1214hrs
	Stabilization	1223hrs changed chamber temps +25°C
	700w/m2 solar	added @ 1223. Vehicle soaked until 1329 Vehicle aircon started at 1329
Temp +25°C	A	Das started at 1404hrs
Temp +25°C	B	Das started at 1411hrs
Temp +25°C	E	Das started at 1416hrs
	Stabilization	1420hrs changed chamber temps +30°C
	900w/m2	added @ 1421. Vehicle soaked until

solar                    1521  
Vehicle aircon started at 1522

Temp +30°c	A	Das started at 1541hrs
Temp +30°c	B	Das started at 1546hrs
Temp +30°c	E	Das started at 1551hrs
Temp +30°c	G	Das started at 1557hrs Side door opened for 1min, 3 at 5mins apart Fridge door opened for 15sec, 3 at 5mins apart. Side door opened for 1min, 1 at 10mins apart Fridge door opened for 15sec, 1 at 10mins apart. Side door opened for 1min, 2 at 5mins apart Fridge door opened for 15sec, 2 at 5mins apart.