



## TECHNOLOGY TEST

WASTE INCINERATION PLANT 2015

TechNiche Phase Change Material (PCM) Cooling Vest

*POWERED BY*

**COOLPAX**

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### TechNiche Phase Change Material (PCM) Cooling Vest

#### Test Brief

We were asked to supply our PCM Cool Pax vest for test purpose executed by a waste incineration plant in Europe.

During the test thermographic imaging was used to show the results of the test. Test subject where wearing standard PPE for their working environment temperature of 80°C

Normally workers within the incineration plant work for 1 hour followed by a 30 minutes break throughout the working day without any form of cooling technology.

# HEAT STRESS

## Typical example of a heat stress situation:

Someone wearing protective clothing and performing heavy work in hot and humid conditions could be at risk of heat stress because:

- sweat evaporation is restricted by the type of clothing and the humidity of the environment
- heat will be produced within the body due to the work rate and, if insufficient heat is lost, core body temperature will rise
- as core body temperature rises the body reacts by increasing the amount of sweat produced, which may lead to dehydration
- heart rate also increases which puts additional strain on the body
- if the body is gaining more heat than it can lose the deep body temperature will continue to rise
- eventually it reaches a point when the body's control mechanism itself starts to fail

## Typical symptoms are of heat stress:

- an inability to concentrate
- muscle cramps
- heat rash
- severe thirst - a late symptom of heat stress
- fainting
- heat exhaustion - fatigue, giddiness, nausea, headache, moist skin
- heat stroke - hot dry skin, confusion, convulsions and eventual loss of consciousness. This is the most severe disorder and can result in death if not detected at an early stage

Fig 1. Shows rubbish being incinerated, core temperature of the material during incineration is 1,300°C. The environment temperature that the workers are being tested in is 80°C with protective clothing on.

Fig 1.

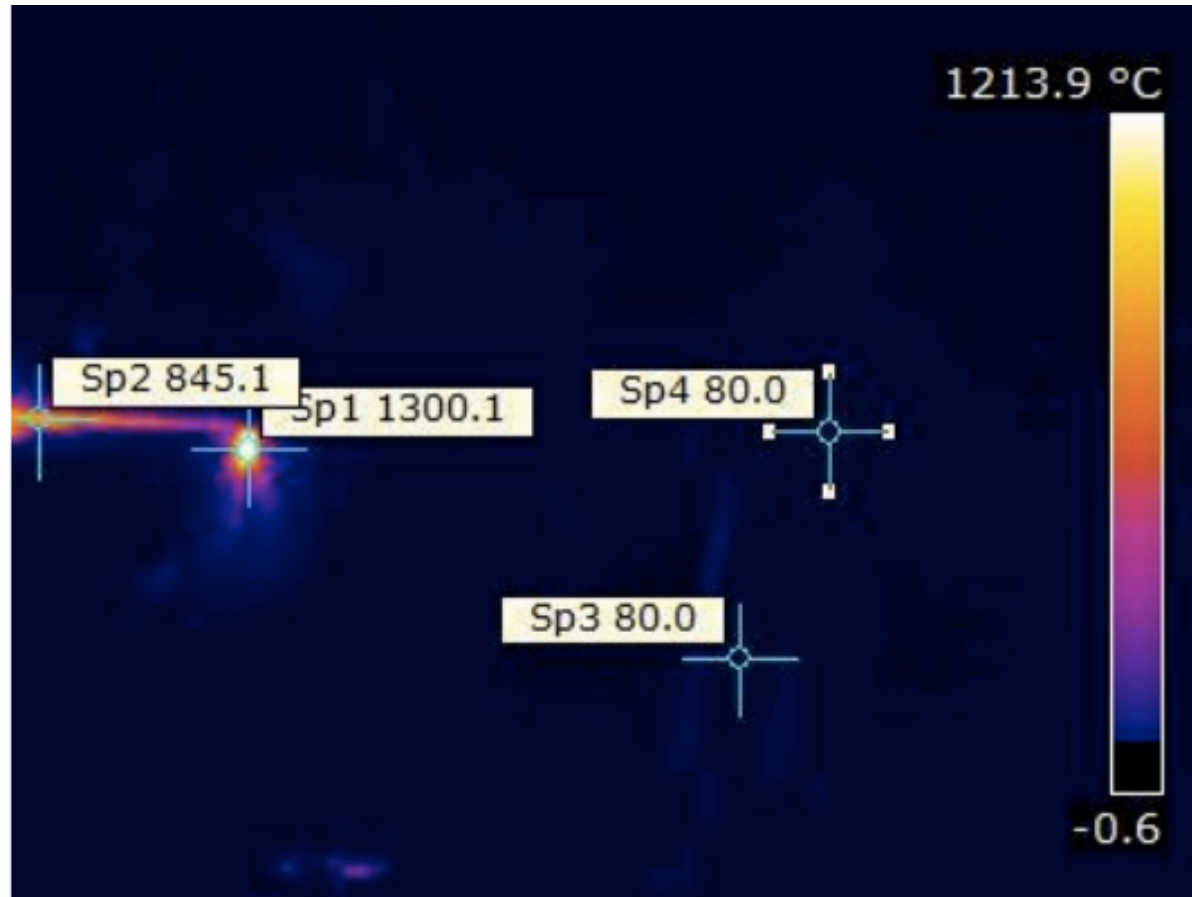


Fig 2. On the right side of the photo you can see the outline of the subject in protective clothing. Thermographics also indicate the temperature within the room at 80°C

Fig 2.



Fig 3. Test subject in working area without PCM cooling vest. Image shows nearly dangerous levels of thermal body heat after working in the plant.

Fig 3.

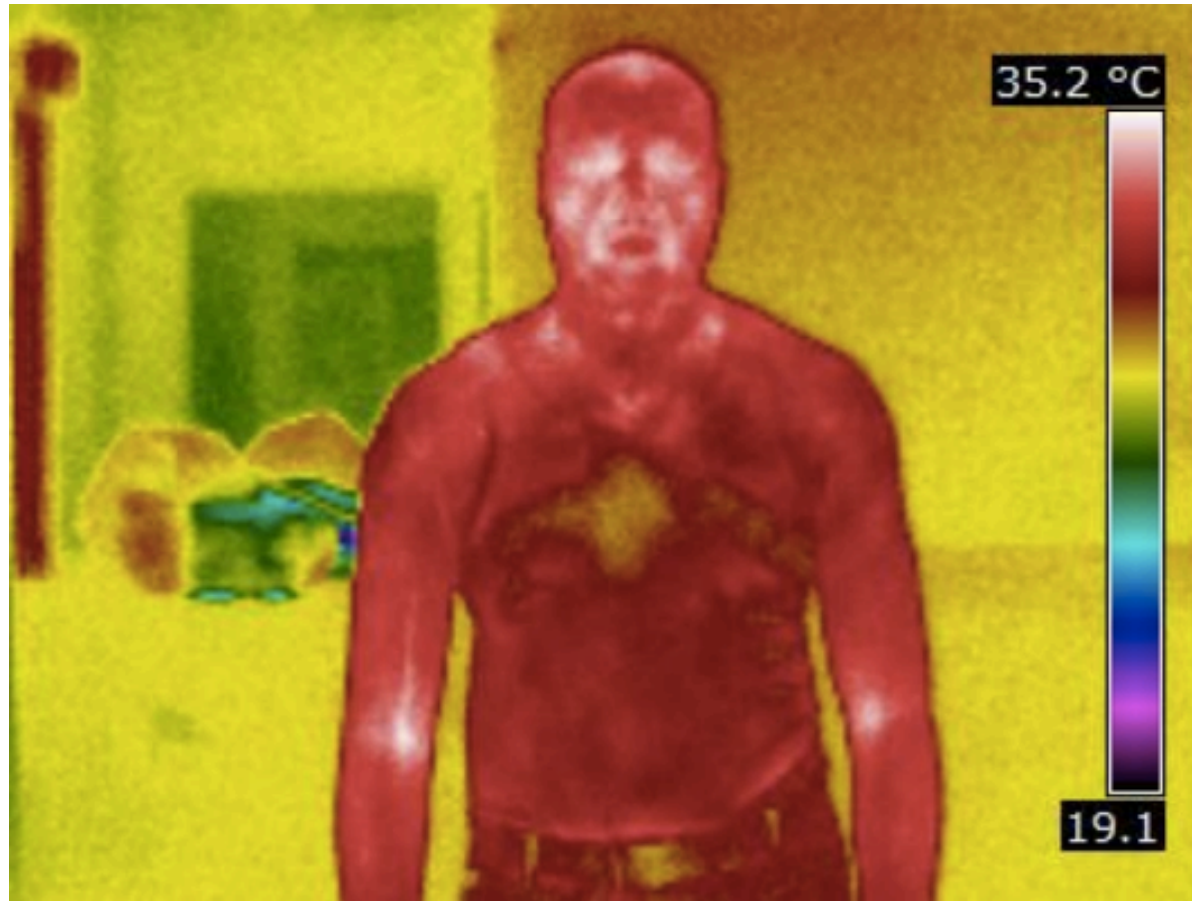


Fig 4. Test subject in working area with PCM cooling vest at the start of the test

Fig 4.



Fig 4. Shows test subject in working area with PCM cooling vest on

Fig 4.

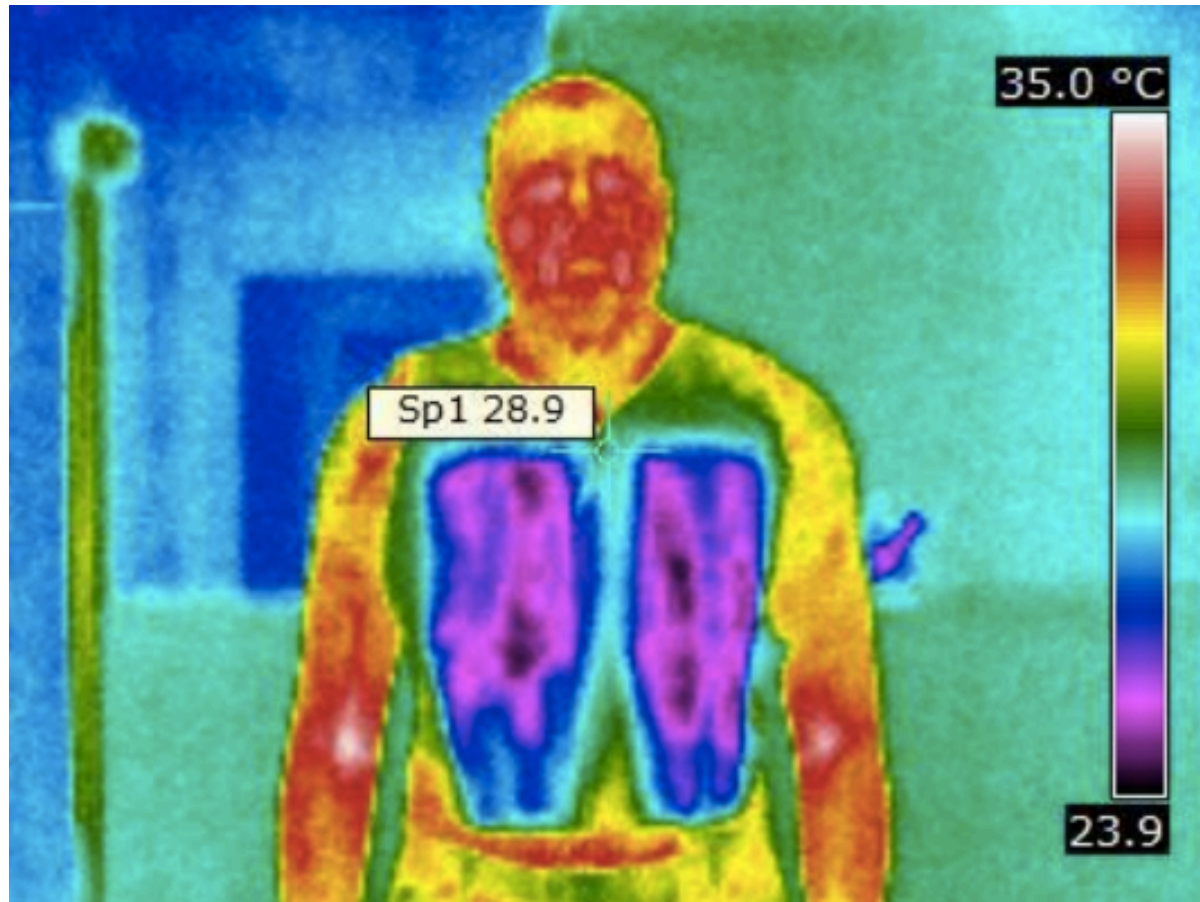




Fig 5. Show environment temperature after 2 hours working in PCM cooling vest

Fig 5.

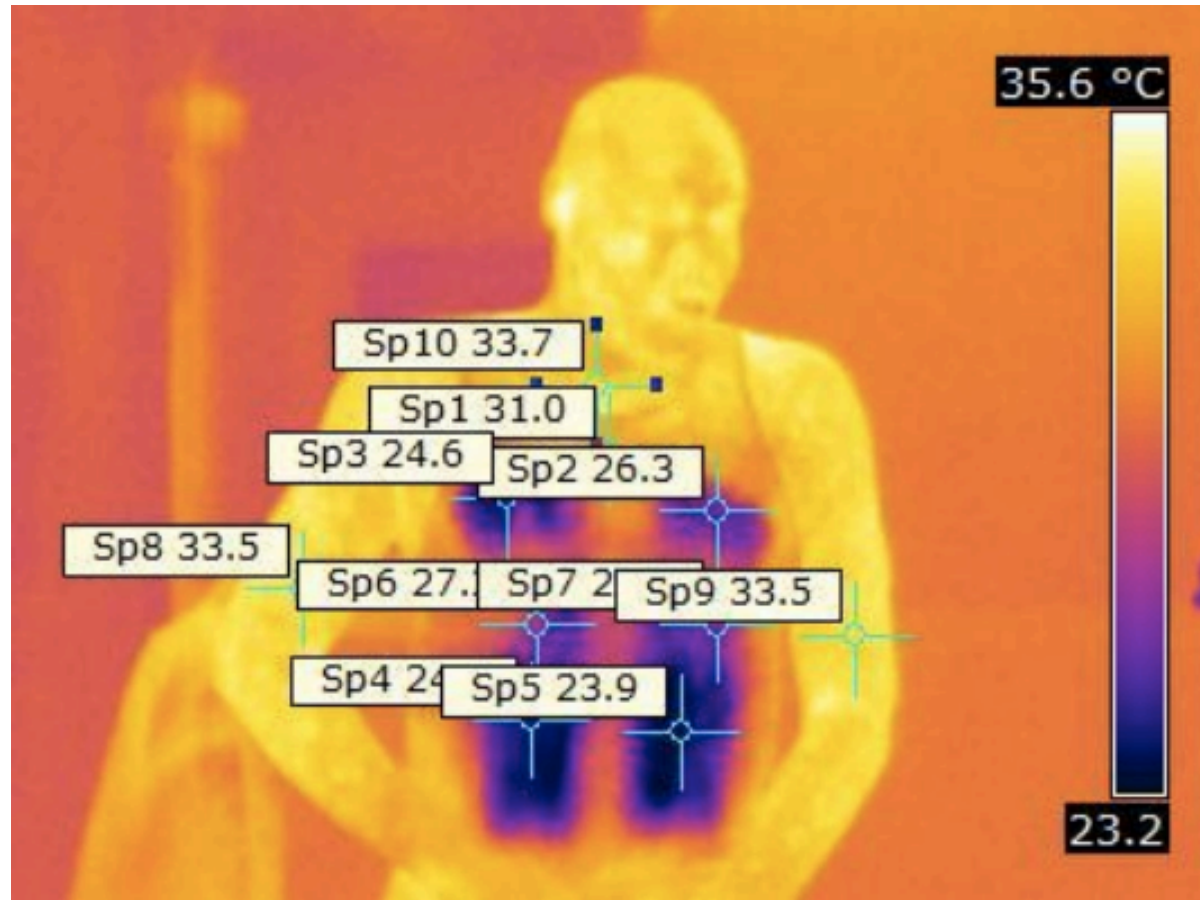


Fig 6. Core body temperature is cool after 3 hours of work shown below

Fig 6.

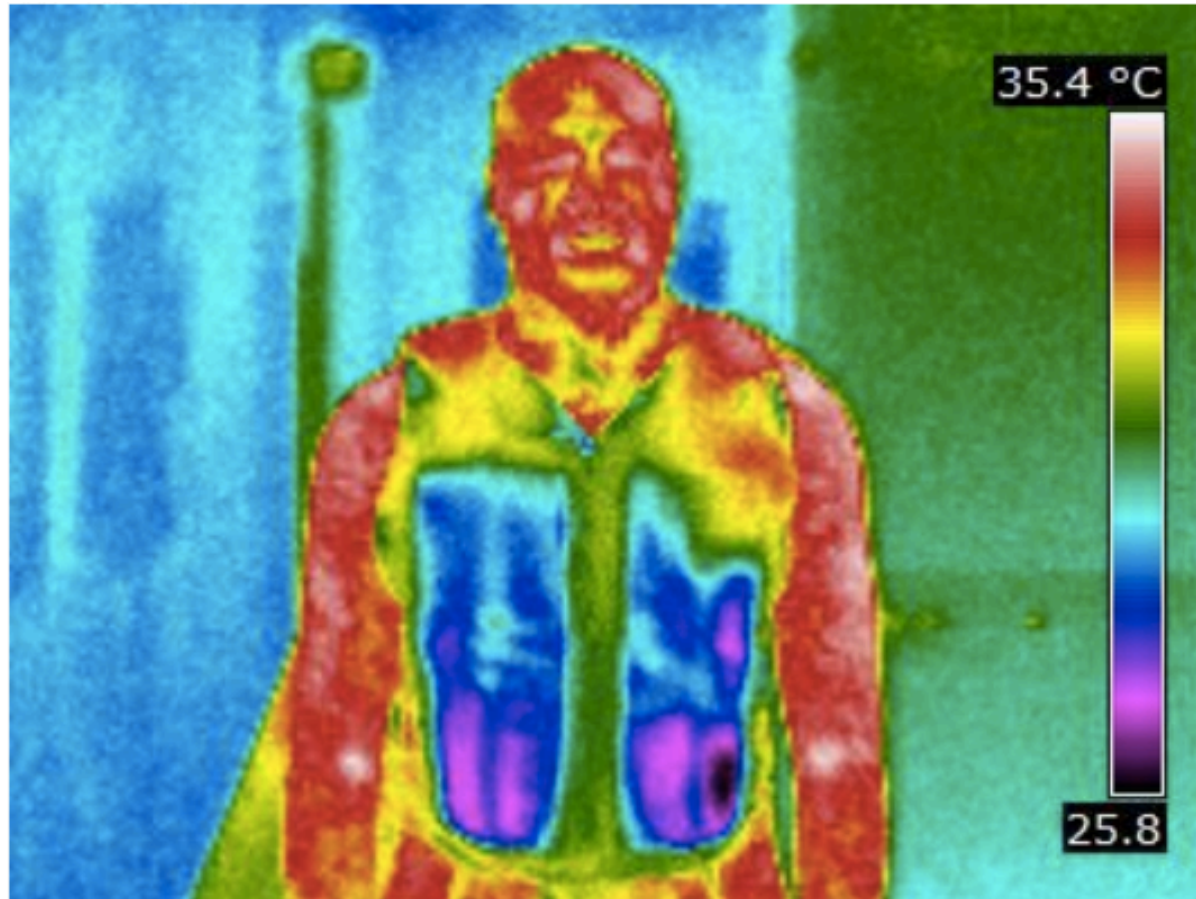


FIG 8.

## With PCM

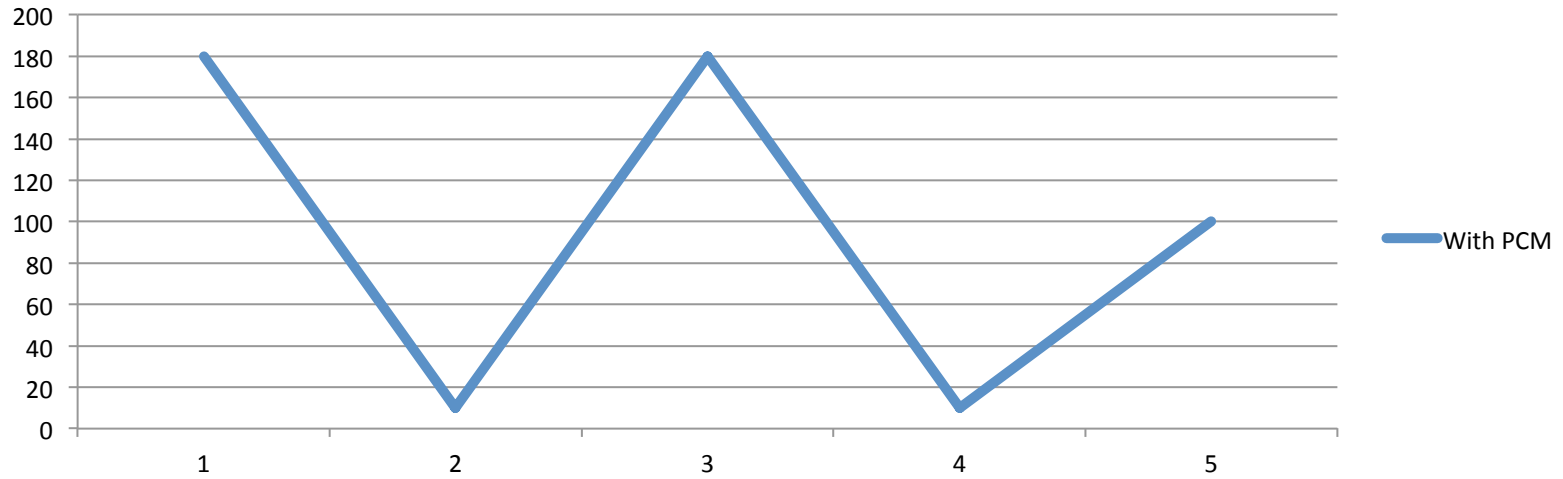


FIG 9.

## Without PCM

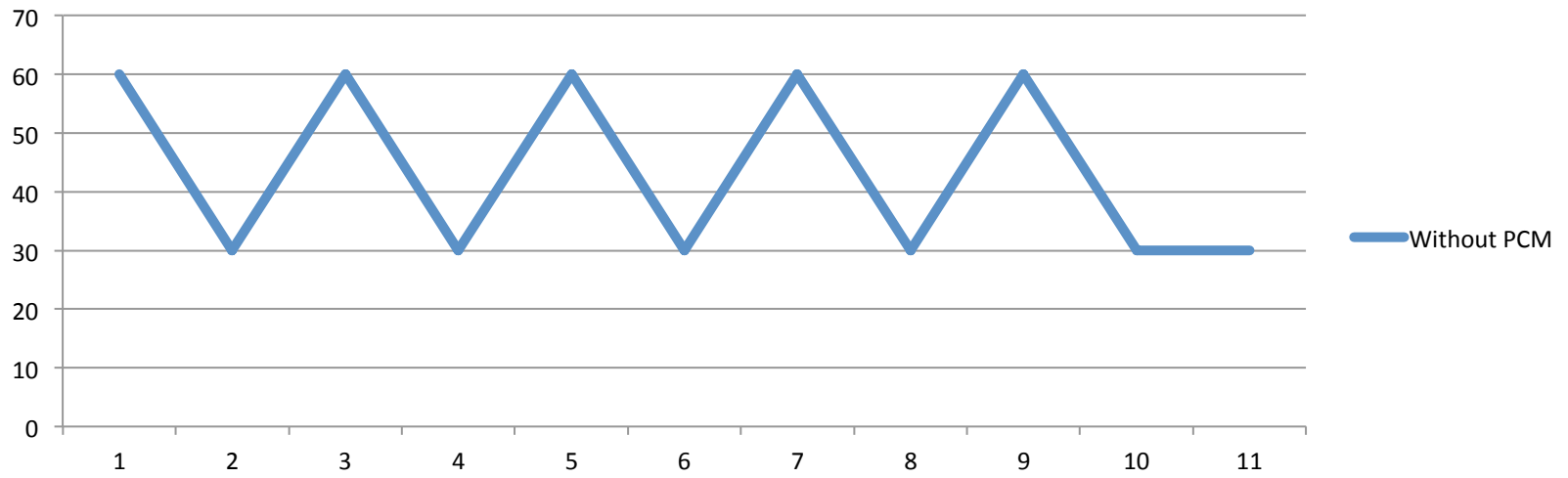


FIG 8. shows worker on 8 hour shift using TechNiche PCM vest. This graph shows that much shorter breaks with increased working intervals. FIG 9. shows workers without having to break regularly due to discomfort and feelings of heat stress

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## CONCLUSION

- Test subject feel comfortable, have shown a decrease in core and thermal skin temperature
- Vest increased performance and concentration whilst working
- Workforce are now working for 3 hours with a 10 minutes break due to using TechNiche PCM vest