

# HEAT TOLERANCE TEST



LOUGHBOROUGH  
SPORT

Name:	
Date:	



LOUGHBOROUGH  
SPORT

Average Chamber Temp

33.2 °C

Average Chamber Humidity

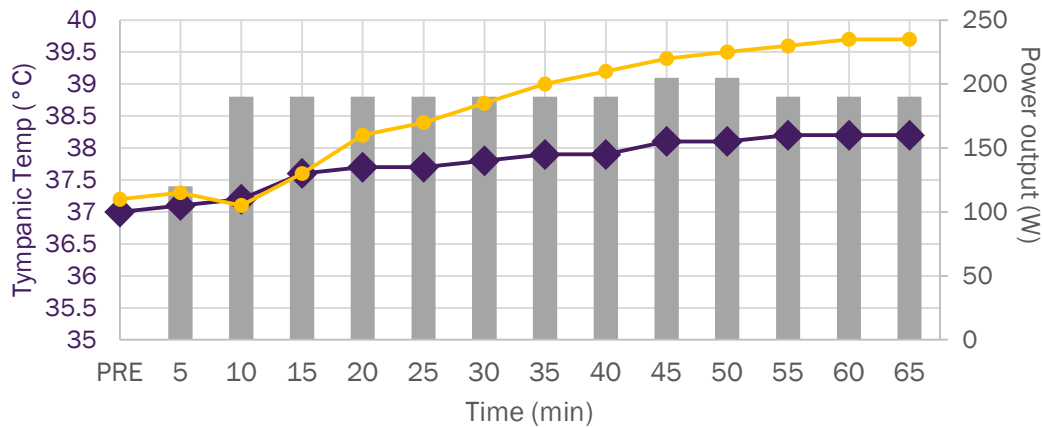
79.0 %

Well done for completing this heat tolerance test.

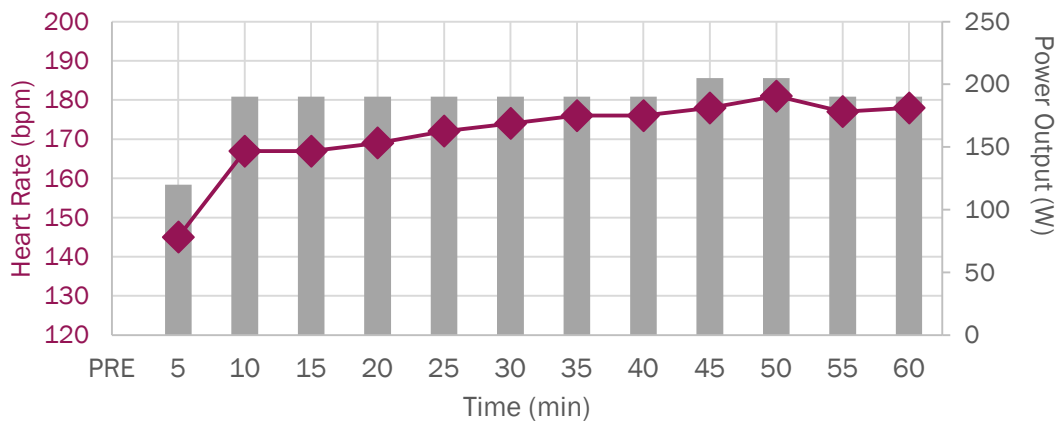
We set the heat chamber to match the conditions that are expected at the Ironman World Championships, with the average temperature recorded being 33.2°C and the average humidity being 79%. Over the course of the session, we measured your heart rate and tympanic temperature along with a few subjective measures, RPE, Thermal Comfort and Thermal Stress every 5 minutes. Below is a graphical representation of your responses, along with an interpretation of the data.

## Your Physiological Responses

Tympanic Temperature & CORE Temperature



HEART RATE



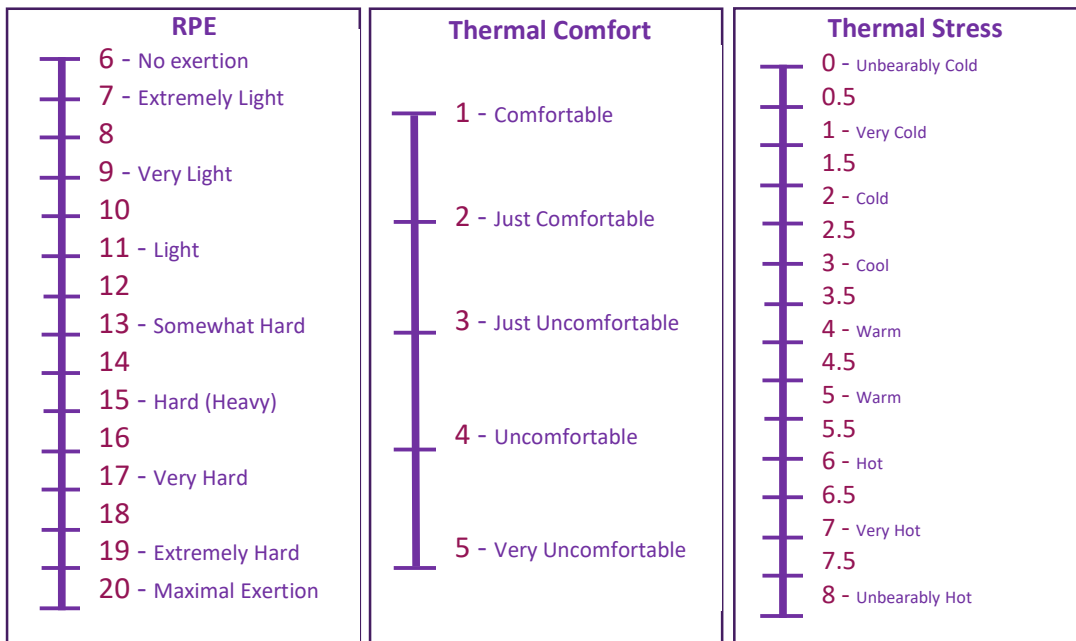
## Your Subjective Responses

Your subjective markers are a great way to track how you're feeling while performing in the heat. In the heat chamber we asked you to select how you feel on three scales: Rating of Perceived Exertion (RPE), Thermal Stress and Thermal Comfort. Below is a reminder of what these scales were for.

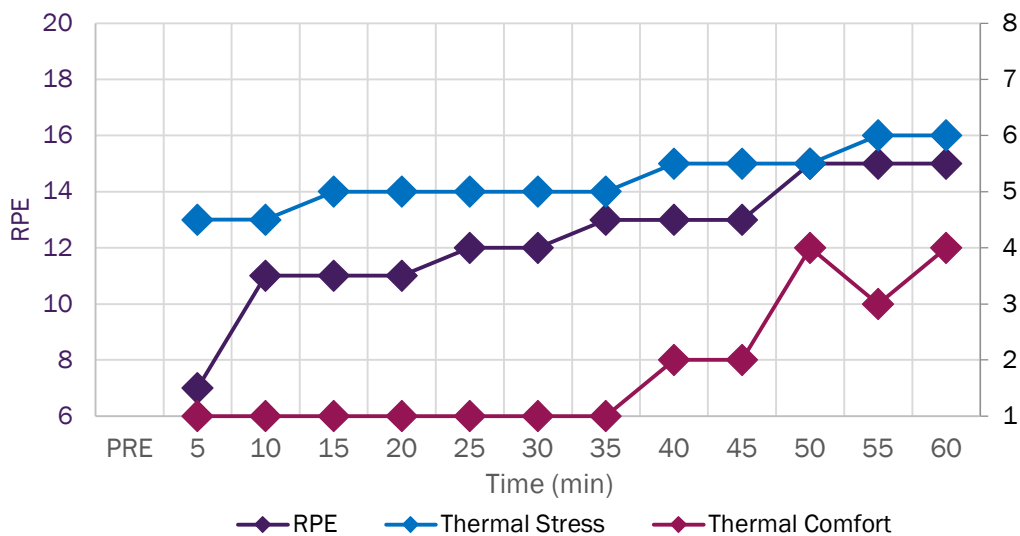
RPE is a measure of how difficult you perceive your exercise to be, from extremely light to maximal exertion. We expect your RPE to be higher in the heat than it would be for the same exercise intensity in temperate conditions.

Thermal comfort is a measure of how comfortable you are in the heat, whereas thermal stress is a measure of how hot you feel. For example, you may feel extremely hot but still feel comfortable, or feel not so hot but feel uncomfortable.

As you get used to working at a higher temperature, your RPE and thermal comfort should reduce.



RPE, THERMAL STRESS & THERMAL COMFORT BY TIME



Hydration Data		
Fluid consumption	ml	1040
Sweat Loss	ml	1540
Sweat Rate	l/hr	1.4
Sweat Sodium Concentration	mmol/L	48

Sodium Concentration		
HIGH	> 80	mmol/L
MEDIUM	40 - 80	mmol/L
LOW	< 40	mmol/L

Based on your average sweat sodium concentration of **48** mmol/L,  
 You are considered a **MEDIUM** sodium sweater.

Hi, well done on a great session in the chamber. You coped well with the conditions which should give you confidence moving forwards. Please bear in mind that this data should be used as a guide only - the conditions in Kona and your effort in the swim and changes in intensity on the bike will all influence your physiological responses on the day. But hopefully this information will allow you to go into the race with a plan and an understanding of how to adapt that plan as appropriate.

The idea during the session was to ride at a power output that is likely to be higher than what you aim for in Kona, and see what happened physiologically. Your temperature climbed as would be expected, but it was a very gradual climb, and essentially after an hour you were still in a good place with regards thermoregulation. As mentioned in the chamber, when we are trying to help people acclimate we aim to push their temperature to 38.5 - 39.5C. Your temperature remained below 38.5C. Even when you did 10 minutes at 15W higher power output it only increased by 0.2 degrees compared to 0.1 degrees at 190W. And when you brought the power down your temperature stabilised and your heart rate dropped a little.

As discussed it is normal to see a higher heart rate in the heat, and we have commonly seen heart rates 20b/min higher than the same intensity in cool conditions.

Obviously if you had continued at 190W for 4 hours your temperature would have continued to rise. Extrapolating from the rate of increase in the first hour would give a temperature of 40.6C at 4 hours, which would be too high to then run successfully. So even if you felt like 190W was sustainable from a performance perspective, we would suggest that right now, that would be risky with regards allowing you to run well off the bike.

If you get the chance to do a long ride in Kona before the race, try to get a feel for how stable your heart rate is at a slightly lower power output. You can use the CORE unit for guidance on temperature but note how it differed from tympanic temperature over the course of the session!

The data from this session would suggest you can push harder for sections of the bike with it likely not to have much of an impact on your overall thermoregulation. Again bear in mind things could be different on the day, but your heart rate going over 175b/min, thermal comfort 4 or over and thermal stress 5.5-6+ would all be signs to ease back the effort so as not to risk sending your temperature too high on the bike.

### Fluid Consumption and Sweat Loss:

In the chamber you lost 1.5L in sweat, and drank 1L during your session. That is pretty well matched, as 1 - 1.5L is as much as can be absorbed in an hour.

Your sweat sodium concentration was 48mmol/L, classing you as a 'medium' sodium sweater. With your sweat rate of 1.4l/hour you are losing 1.5g of sodium per hour. This should be replacable with standard electrolyte solutions.

If it ends up particularly hot on the day, or as you continue to use hot baths to adapt you find you are sweating more, you could consider using sodium loading as a strategy to delay dehydration but as things stand now that doesn't look necessary. (If you want more info on this let me know).

### Raw Data:

Time (min)	Power (w)	Gradient (%)	Tympanic Temp (°C)	HR	RPE	Thermal Comfort	Thermal Stress	Chamber Temp (°C)	Chamber Humidity (%)	CORE Temp
PRE			37							37.2
5	120		37.1	145	7	1	4.5	32.3	82.1	37.3
10	190		37.2	167	11	1	4.5	32.5	81.2	37.1
15	190		37.6	167	11	1	5	32.5	81	37.6
20	190		37.7	169	11	1	5	32.9	80.1	38.2
25	190		37.7	172	12	1	5	32.8	80.6	38.4
30	190		37.8	174	12	1	5	33	79.7	38.7
35	190		37.9	176	13	1	5	33.2	78.9	39
40	190		37.9	176	13	2	5.5	33.3	78.5	39.2
45	205		38.1	178	13	2	5.5	33.3	78.2	39.4
50	205		38.1	181	15	4	5.5	33.3	78.3	39.5
55	190		38.2	177	15	3	6	33.3	78.5	39.6
60	190		38.2	178	15	4	6	33.2	78.4	39.7
65	190		38.2	179	15	4	6	33.2	78.5	39.7