

Summary

The Criteria: Three parameters have been developed which indicate when overheating is likely to be problematic. These standards apply outside the heating season and are for the occupied period of 09:00 to 15:30, Monday to Friday, from 1st May to 30th September.

The performance standards for summertime overheating in compliance with Approved document L2 for teaching and learning areas are:

- a) There should be no more than 120 hours when the air temperature in the classroom rises above 28°C
- b) The average internal to external temperature difference should not exceed 5°C (i.e. the internal air temperature should be no more than 5°C above the external air temperature on average)
- c) The internal air temperature when the space is occupied should not exceed 32°C.

In order to show that the proposed school will not suffer overheating two of these three criteria must be met.

Method: Our data starts on 19th August and finishes at the end of October, therefore we only have one full month outside the “heating Season”.

For August we “normalised” the data on a direct pro-rata basis to cover the whole month.

We also normalised the data for a working week by multiplying the frequencies by five-sevenths.

Criteria a: Using the normalised data for August and September, the number of hours over 28 degC were 39 for August and 25 for September.

If we apply the August figure to May, June and July then the total number of hours over 28 degC are:

$4 \times 39 + 25 = 181 \text{ hours. This is well in excess of the permissible 120 hours.}$

Although this result is based on an assumption, since the overheating is caused by solar radiation, we would expect *more* solar gain during May, June and July than we would in August; this is because Summer Solstice is in June, with May and July being symmetrical either side. We therefore believe that the assumption is conservative.

Summary Cont.

Criteria b: We did not record the outside air temperature, however this data is available from www.metoffice.gov.uk.

Unfortunately the data are provided in five minute intervals and can only be downloaded eight hours at a time: it is impractical to download five months data in this way (450 separate downloads each requiring manipulation). Instead we chose a typical day in August.

Taking 22nd August as an example, which had a peak temperature of 26.1 degC and a mean temperature of 23.6 degC, the prevailing outside mean temperature was 17.8 degC – **this is a temperature difference of 8.3 degC and well above the criterion limit of 5 degC.**

Criteria c: The highest temperature recorded was 30.4 degC, which is below the allowable limit, however we did not have data for May, June, July and most of August.

30.4 deg C was recorded in September. It is reasonable to assume that considerably higher temperatures would have occurred in June and July.

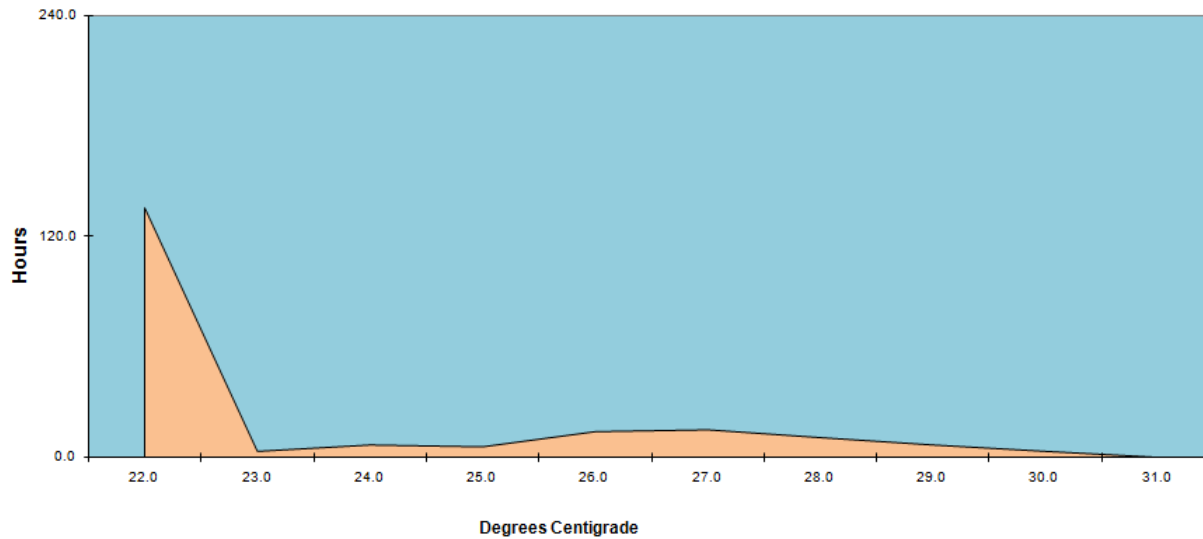
Conclusion: Based upon the incomplete data set that we have, we believe that all three criteria against which classrooms are assessed for overheating will be exceeded.

Criterion a. Over 28 degC for 181 hours . Limit is 120 hours.
Criterion b. Mean 8.3 degC above outside. Limit is 5.0 degC
Criterion c. Max temp of 30.4. Limit is 32 degC, but results were missing for May, June, July and most of August. 30.4 degC is very hot for a day in September.

I&S, Arts Block, Room 108, Temperature Data Log

Aug (from 19th)	Select Month and Times for Analysis																							
Quarter	Hour																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
00:15	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	Occ	Occ	Occ	Occ	Occ	Occ	Occ	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc
00:30	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	Occ	Occ	Occ	Occ	Occ	Occ	Occ	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc
00:45	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	Occ	Occ	Occ	Occ	Occ	Occ	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc
01:00	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	Occ	Occ	Occ	Occ	Occ	Occ	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc

Temp. less than (°C)	Distribution (Hrs)
22.0	136.0
23.0	3.3
24.0	6.8
25.0	5.8
26.0	14.0
27.0	15.0
28.0	10.8
29.0	6.8
30.0	3.3
31.0	0.0
Total	201.5
Max	30.1 °C



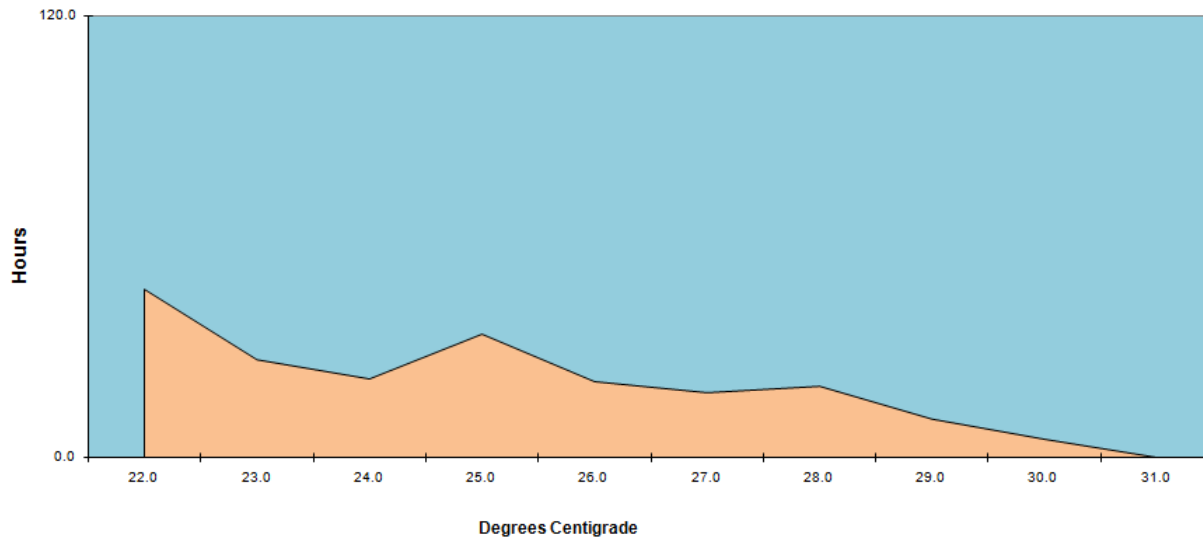
Between 09.00 and 15.30

Over 28: 21 hours in 12 days so 39 hours normalised for working weeks over whole month)
 Peaks at: 30.1 degC.

I&S, Arts Block, Room 108, Temperature Data Log

September		Select Month and Times for Analysis																							
Quarter	Hour																								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
00:15	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	Dec	Dec	Dec	Dec	Dec	Dec	Dec	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	
00:30	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	Dec	Dec	Dec	Dec	Dec	Dec	Dec	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	
00:45	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	Dec	Dec	Dec	Dec	Dec	Dec	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	
01:00	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	Dec	Dec	Dec	Dec	Dec	Dec	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	

Temp. less than (°C)	Distribution (Hrs)
22.0	46.0
23.0	26.8
24.0	21.5
25.0	33.8
26.0	20.8
27.0	17.8
28.0	19.5
29.0	10.5
30.0	5.0
31.0	0.0
Total	201.5
Max	30.4 °C



Between 09.00 and 15.30

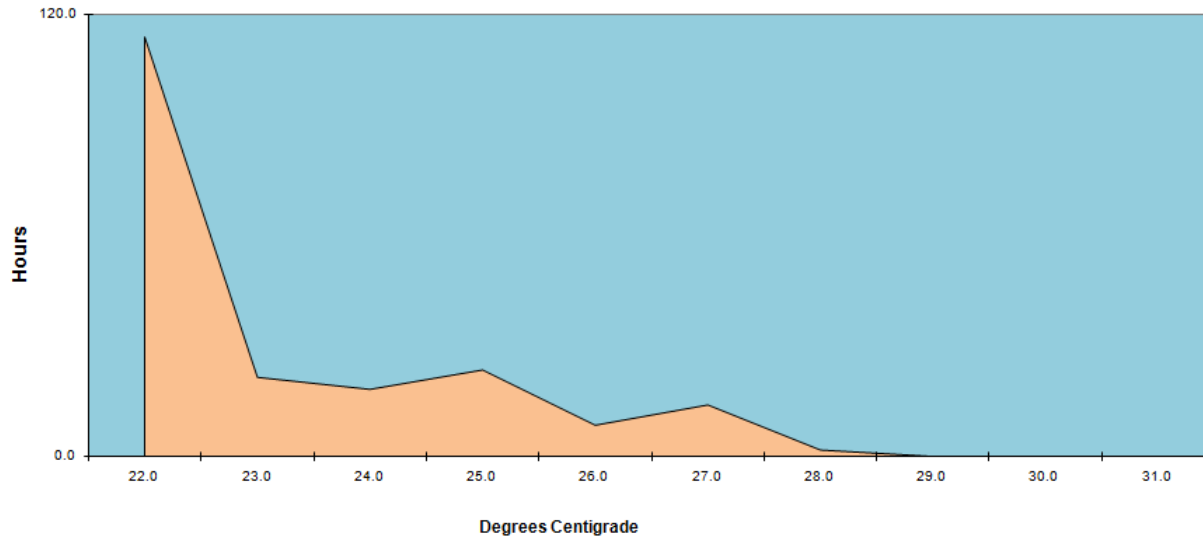
Over 28: 35 hours, 25 hours normalised for working weeks

Peaks at: 30.4 degC

I&S, Arts Block, Room 108, Temperature Data Log

October		Select Month and Times for Analysis																							
Quarter	Hour																								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
00:15	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	Occ	Occ	Occ	Occ	Occ	Occ	Occ	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	
00:30	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	Occ	Occ	Occ	Occ	Occ	Occ	Occ	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	
00:45	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	Occ	Occ	Occ	Occ	Occ	Occ	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	
01:00	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	Occ	Occ	Occ	Occ	Occ	Occ	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	Unocc	

Temp. less than (°C)	Distribution (Hrs)
22.0	114.0
23.0	21.5
24.0	18.3
25.0	23.5
26.0	8.5
27.0	14.0
28.0	1.8
29.0	0.0
30.0	0.0
31.0	0.0
Total	201.5



Between 09.00 and 15.30

Over 28: 2 hours, 1.25 normalised for working weeks

Peaks at: 27.2 degC