Title: **RADIANT HEAT**
Ref Number: **4**
Location: **NATIONAL COLLEGE LABORATORY**
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Academic: **KIKA YIAKOUMETTI**
Team Size: **~4**
Environment: **INDOORS**

OBJECTIVE

To examine the behaviour of thermometers in the presence of radiant heat.

To use the Kata Thermometer to measure air speeds within an occupied space, noting the various factors needed for accurate estimation.

APPARATUS

* Electric Fire
* Thermometers: unprotected, foiled shaded, globe and Kata
* Stopwatch
* Shield

PROCEDURE

1. Record FOUR readings, at 2 minute intervals, of the Globe, shielded and unshielded thermometers temperatures BEFORE switching on the electric fire.

2. Take THREE Kata thermometer readings (see back sheet- each reading takes 2 minutes)

3. Place the electric fire about 0.5m from the thermometers, in a safe positions for use.

4. Place the polished shield between the fire and thermometers

5. Switch on the electric fire. Take THREE readings of temperatures. At 2 minute intervals. (NOT the Kata).

6. Remove the shield take TEN readings at 1 minute intervals (NOT the Kata)

7. Switch off the electric fire and remove it to a safe place

8. Continue to take a further TEN readings at 1 minute intervals.

9. Plot the results on a graph, fully labelled

10. Replace the electric fire, without the shield, switch it on, leave for 10 minutes.

11. Take ONE reading of the temperatures AND take a Kata reading (THREE measurements which you should average)

RESULTS AND DISCUSSION

Plot the results on a graph, fully labelled. Comment on the respoonses

Calculate the air speed and mean radiant temperatures using both the formulae and the appropriate nomogram.

Kata Measurement Procedure

1. Fill a vacuum flask with boiling water, take GREAT care for your own and others safety.

2. Immerse the bulb of the Kata thermometer in the flask until the column of spirit in the thermometer stem just rises into the top bulb and the column is also free of bubbles. DO NOT allow excess spirit into the top bulb as it can break the glass.

3. Remove the Kata and wipe the bulb dry.

4. Using a stopwatch, observe the time taken for the column of liquid to fall between the two marked points on the stem of the Kata.

5. Repeat the process at least TWICE, taking the answer as the average of THREE readings.

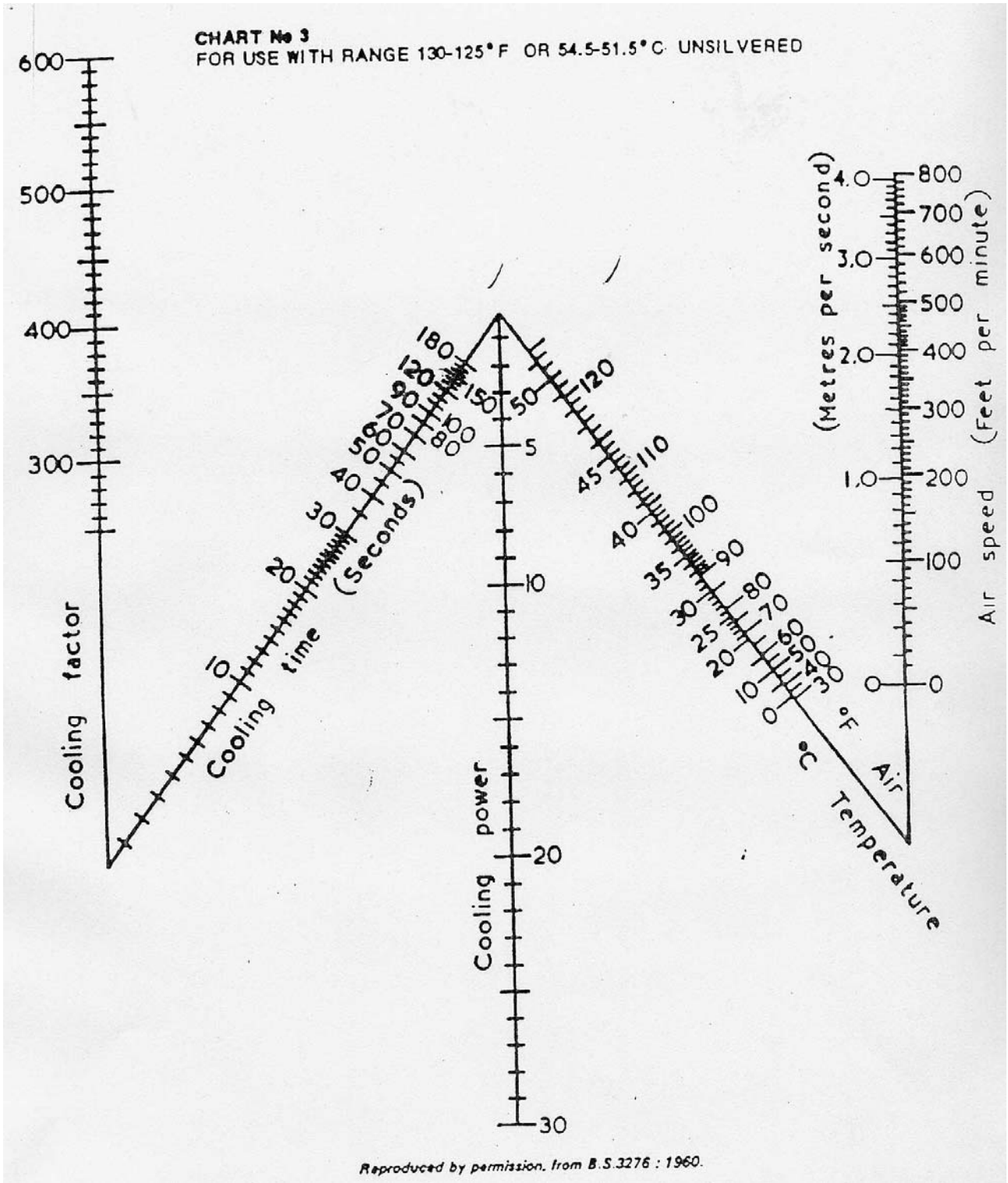
CHART No 3
FOR USE WITH RANGE 130-125°F OR 54.5-51.5°C UNSILVERED
Cooling factor
600
500
400
300
Cooling time (Seconds)
180
120
90
70
60
50
40
30
20
10
Cooling power
5
10
20
30
45
110
40
100
35
90
30
80
25
70
20
60
50
10
40
0
30
°F
°C
Air Temperature
(Metres per second)
4.0
3.0
2.0
1.0
0
800
700
600
500
400
300
200
100
0
Air speed (Feet per minute)
Reproduced by permission, from B.S.3276 : 1960.

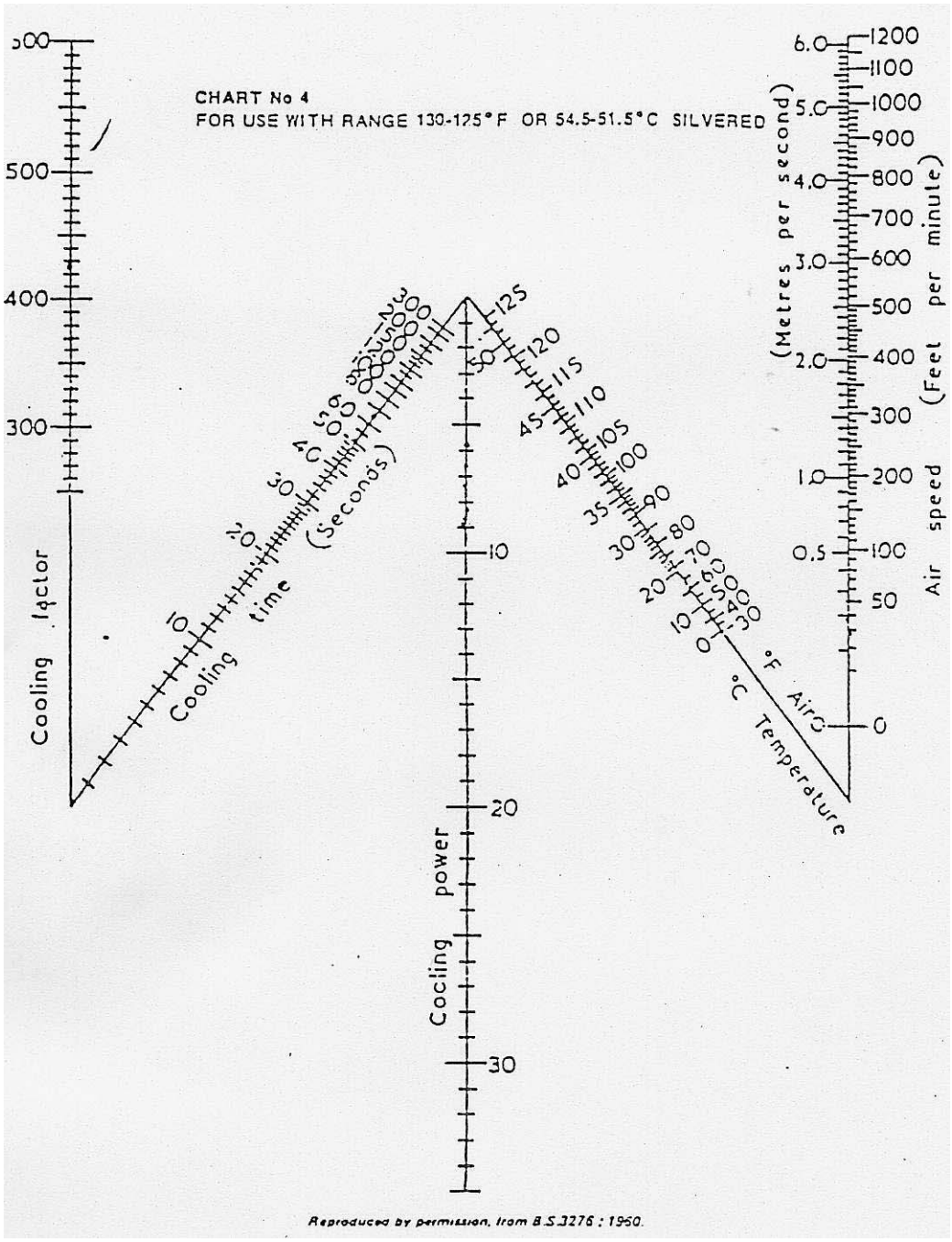
CHART No 4
FOR USE WITH RANGE 130-125°F OR 54.5-51.5°C SILVERED
Cooling factor
Cooling time (Seconds)
Cooling power
°F Air
°C Temperature
Air speed (Feet per minute)
(Metres per second)
Reproduced by permission, from B.S.3276 : 1960.

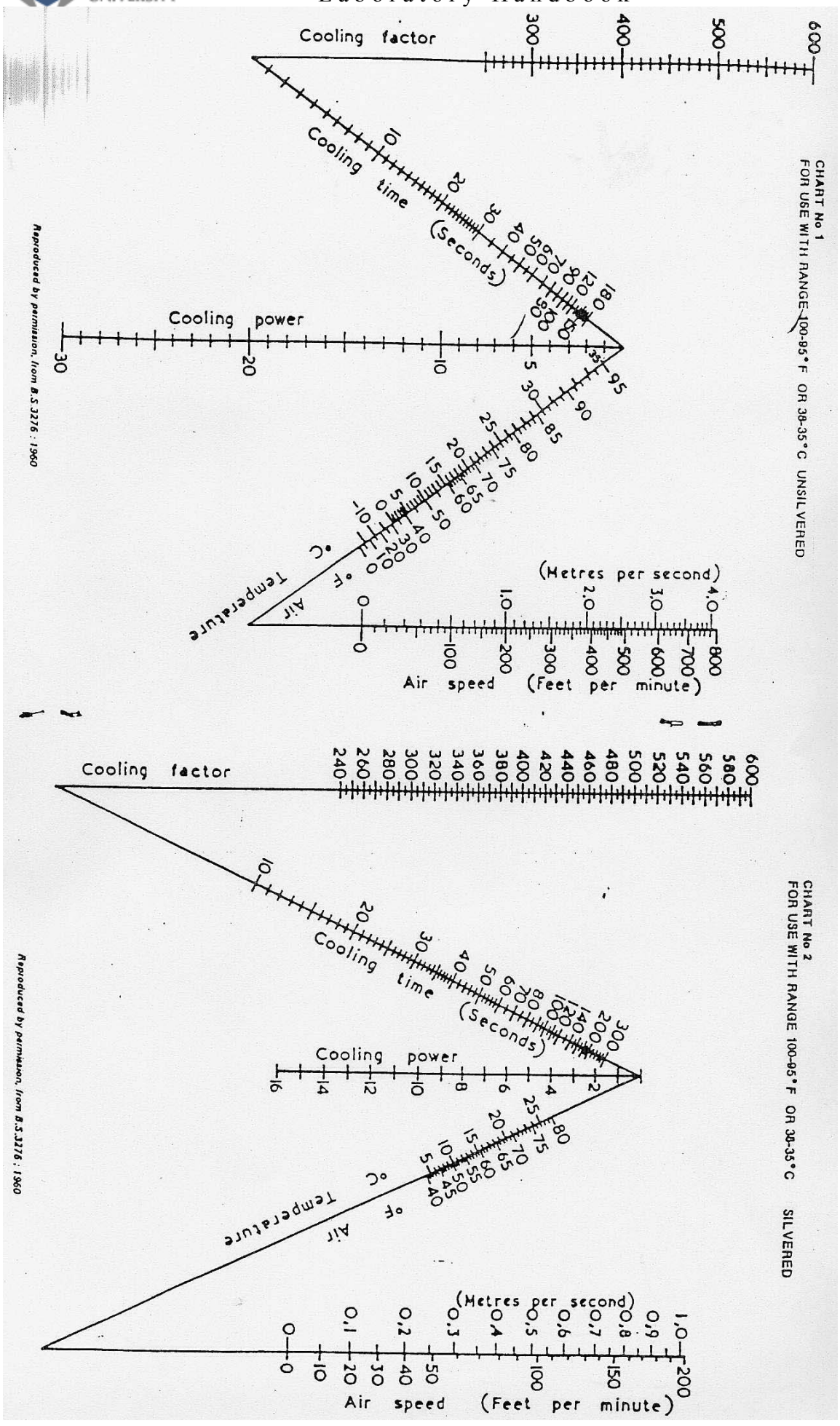
CHART No 1
FOR USE WITH RANGE 100-95°F OR 38-35°C UNSILVERED
Cooling factor
Cooling time (Seconds)
Cooling power
Air temperature °F °C
Air speed (Feet per minute)
(Metres per second)
Reproduced by permission, from B.S.3276 : 1960
CHART No 2
FOR USE WITH RANGE 100-95°F OR 38-35°C SILVERED
Cooling factor
Cooling time (Seconds)
Cooling power
Air temperature °F °C
Air speed (Feet per minute)
(Metres per second)
Reproduced by permission, from B.S.3276 : 1960

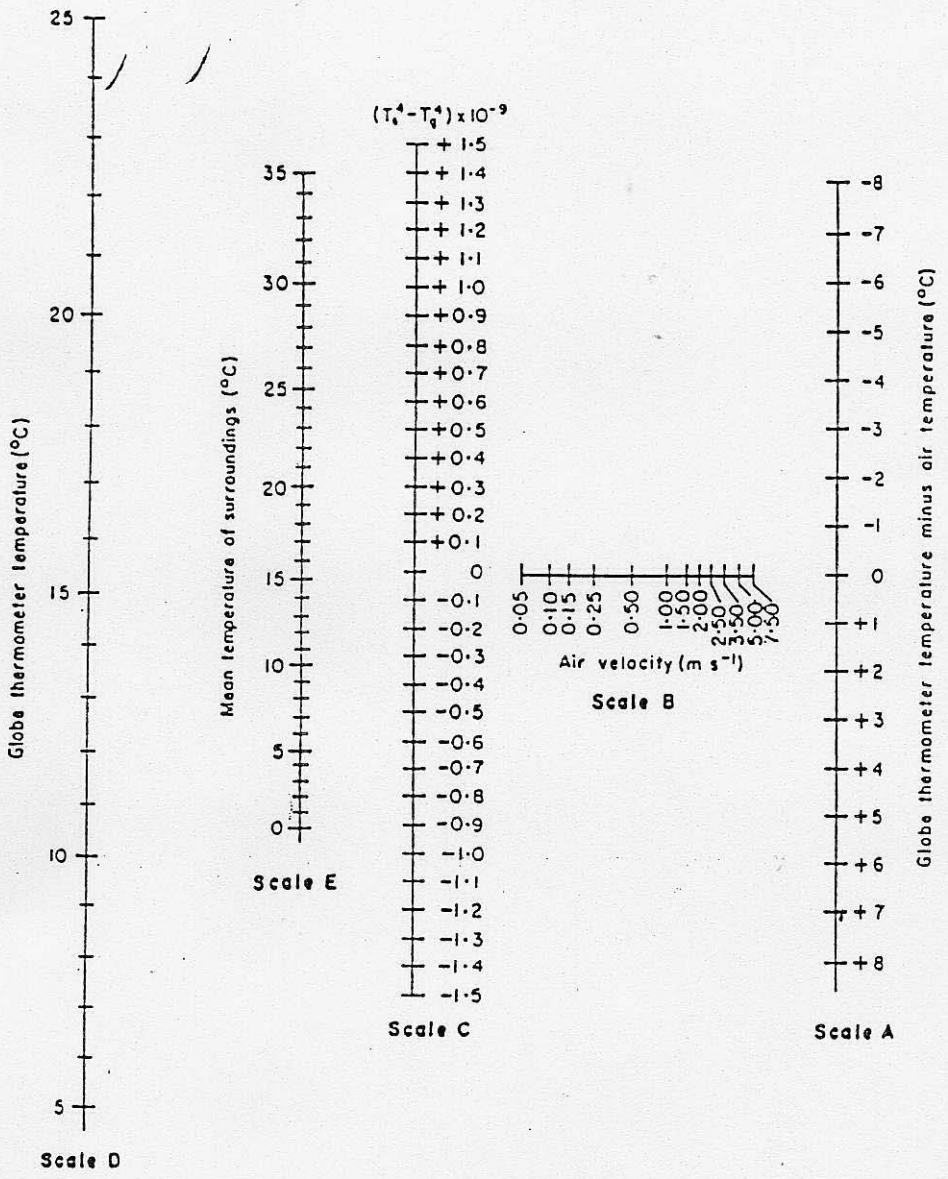

Figure 4 ; Nomogram for the estimation of mean radiant temperature

Range : 5-25°C

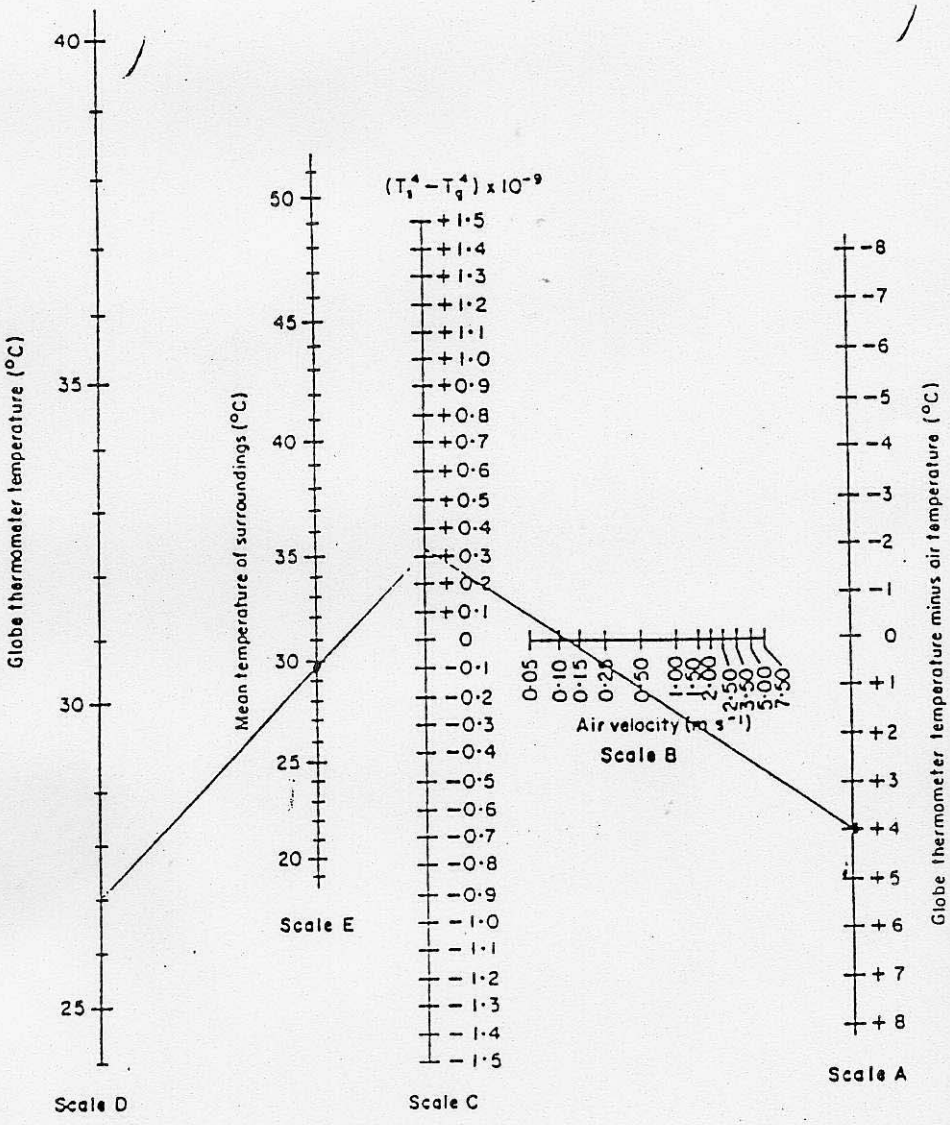

Figure 5 ; Nomogram of the estimation of mean radiant temperature .

Range : 25-40°C

Example : Using a globe temperature of 27.0°C , a dry bulb temperature of 23.0°C and an air velocity of 0.11m/s , we obtain a mean radiant temperature of 29.5°C .

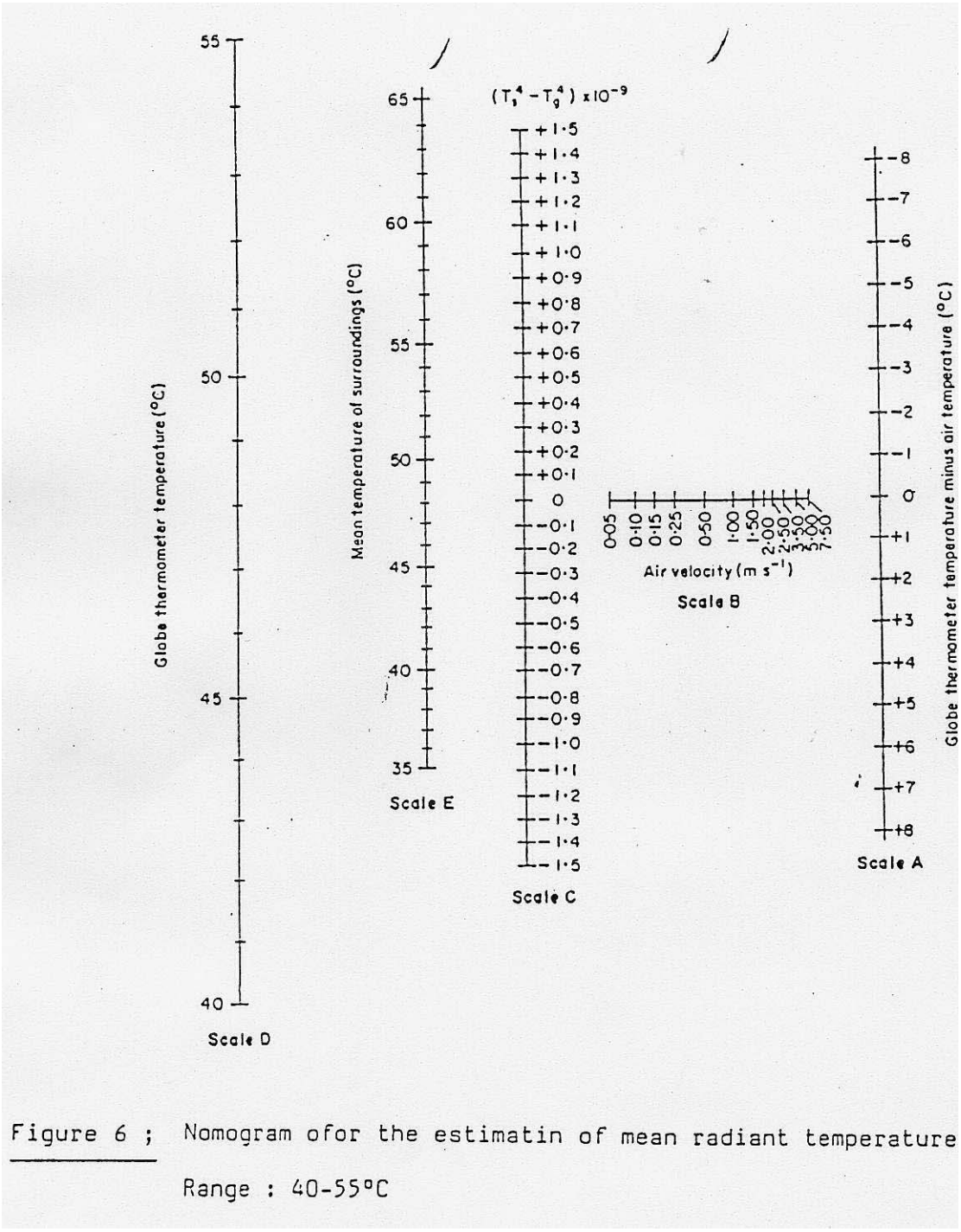

Figure 6 ; Nomogram ofor the estimatin of mean radiant temperature

Range : 40-55°C

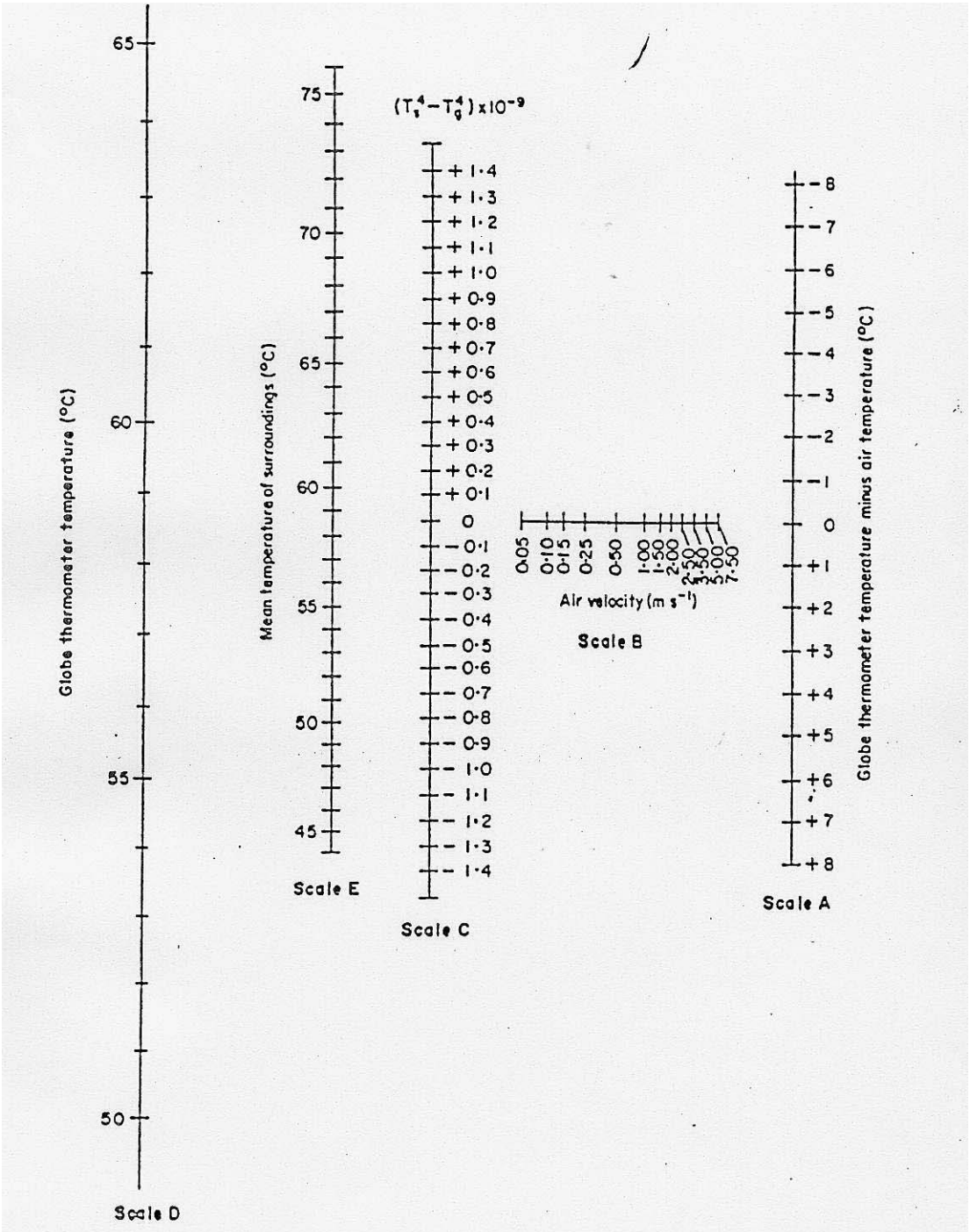

Figure 7 ; Nomogram for the estimation of mean radiant temperature

Range : 50-65°C