

August 1927.

Bulletin No. 9.

Technological Series No. 4.

Indian Central Cotton Committee
Technological Laboratory.

The Effect of Temperature and Humidity
on Cotton Spinning, with particular
reference to conditions in Bombay.

By

A. JAMES TURNER, M.A., B.Sc.,

Director of the Technological Laboratory, Matunga, Bombay,



BOMBAY:
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APPENDIX I.

Tables extracted from "Humidification in Indian Cotton Mills," by T. Maloney, (page 104).

TABLE No. 6.—*Monthly Temperatures in Mill XXVIII, Bombay No. 2 Card Room.*

	1st reading.		2nd reading.		3rd reading.		Daily Average.			Average outside temperatures.		
	D.B.	W.B.	D.B.	W.B.	D.B.	W.B.	D.B.	W.B.	*R.H. (%)	D.B.	W.B.	*R.H. (%)
November 1921 ..	98.0	84.4	96.6	84.5	95.4	84.4	96.3	84.4	59	82.4	69.8	51
December 1921 ..	95.7	80.4	95.8	81.0	96.1	83.0	95.9	81.5	52	80.2	68.2	51
January 1922 ..	95.9	82.0	95.5	81.8	95.3	81.5	95.6	81.8	53	79.1	69.6	60
February 1922 ..	95.3	81.4	95.7	82.3	95.4	82.0	95.5	81.9	54	81.4	72.1	62
March 1922 ..	97.4	82.6	96.7	82.8	95.5	84.2	96.5	83.2	55	83.1	72.7	58
April 1922 ..	98.7	82.8	97.9	84.3	96.7	82.6	97.8	83.2	52	88.2	79.0	65
May 1922 ..	96.4	83.7	96.0	83.6	96.9	82.7	96.4	83.3	56	90.2	80.6	65
June 1922 ..	96.3	84.4	97.7	84.3	97.1	83.2	96.9	84.0	56	86.3	80.2	76
July 1922 ..	96.8	86.0	95.4	85.0	95.4	84.5	95.9	85.2	63	81.9	78.3	85
August 1922 ..	95.0	84.1	96.8	85.2	96.5	86.0	96.1	85.1	62	82.2	77.9	82
September 1922..	98.3	87.0	97.5	86.0	95.0	82.3	96.9	85.1	60	82.4	78.2	82
October 1922 ..	97.7	86.1	97.1	85.9	96.9	85.3	97.2	85.8	62	86.2	75.9	60

*The values of the relative humidity given in this column have been calculated from the dry bulb and wet bulb temperatures, and added to the Table as given in the original.

APPENDIX I—*Cont'd.*

TABLE NO. 7.—*Monthly Temperature Averages.*

Blow Room—Mill XXVI, Bombay.

	1st reading.		2nd reading.		3rd reading.		Daily Average.			Average outside temperatures.		
	D. B.	W. B.	D. B.	W. B.	D. B.	W. B.	D. B.	W. B.	*R. H. (%)	D. B.	W. B.	*R. H. (%)
January 1922.. ..	76.4	68.2	85.3	74.6	85.5	73.2	82.4	72.0	58	79.1	69.6	60
February 1922.. ..	78.9	69.4	88.5	75.0	87.6	74.5	85.0	73.0	54	81.4	72.1	62
March 1922.. ..	79.8	70.9	91.1	75.6	89.5	75.5	86.8	74.0	52	83.1	72.7	59
April 1922.. ..	85.4	78.8	92.5	81.6	92.8	81.7	90.2	80.7	65	88.2	79.0	65
May 1922.. ..	86.1	80.3	93.7	82.9	93.7	82.8	91.2	82.0	66	90.2	80.6	64
June 1922.. ..	86.2	80.5	90.4	82.2	91.3	82.5	89.3	81.6	70	86.3	80.2	76
July 1922.. ..	82.9	78.8	85.8	80.5	86.2	80.5	85.0	79.9	79	81.9	78.3	85
August 1922.. ..	82.3	77.5	86.0	79.5	86.0	79.4	84.8	78.8	76	82.2	77.9	82
September 1922.. ..	83.0	77.8	85.9	79.3	86.7	79.5	85.2	78.9	74	82.4	78.2	82
October 1922.. ..	83.5	76.8	91.3	80.3	92.4	81.2	89.1	79.4	64	86.2	75.9	60
November 1922.. ..	81.6	72.7	90.0	77.0	90.3	77.7	87.6	75.8	56	82.4	69.8	51
December 1922.. ..	75.2	66.0	84.9	71.0	87.0	74.0	82.4	70.3	52	80.2	68.2	51
Annual Average ..	81.7	74.8	88.8	78.2	89.1	78.5	86.5	77.2	64	83.7	75.2	66

* The values of the relative humidity given in this column have been calculated from the dry bulb and wet bulb temperatures, and added to the Table as given in the original.

APPENDIX I—*Cont'd.*

TABLE NO. 8.—*Monthly Temperatures.*

Spinning Department—No. 2 Mills, Mill XXVII, Bombay.

	1st reading.		2nd reading.		3rd reading.		Daily Average.			Average outside temperatures.		
	D. B.	W. B.	D. B.	W. B.	D. B.	W. B.	D. B.	W. B.	*R. H. (%)	D. B.	W. B.	*R. H. (%)
January 1922.. ..	91.1	76.8	93.7	76.6	93.5	73.6	92.8	77.3	47	79.1	69.6	60
February 1922.. ..	91.5	79.2	94.4	80.5	93.6	80.0	93.2	79.9	54	81.4	72.1	62
March 1922.. ..	93.1	81.5	94.8	81.6	94.4	81.1	94.1	81.4	56	83.1	72.7	59
April 1922.. ..	94.3	83.7	95.3	82.9	95.7	83.1	95.1	83.2	59	83.2	79.0	65
May 1922.. ..	93.8	85.1	95.2	86.1	94.9	85.6	94.6	85.6	68	90.2	80.6	64
June 1922.. ..	94.7	84.8	95.0	84.4	97.4	85.7	95.7	85.1	63	86.3	80.2	76
July 1922.. ..	94.1	84.0	95.0	84.5	96.3	85.2	95.1	84.6	63	81.9	78.3	85
August 1922.. ..	93.4	82.9	94.4	83.6	95.4	84.5	94.5	83.7	62	82.2	77.9	82
September 1922.. ..	94.5	83.1	94.9	82.9	96.2	83.6	95.2	83.2	59	82.4	78.2	82
October 1922.. ..	95.9	82.7	97.0	82.9	97.7	84.4	96.9	83.3	55	86.2	75.9	60
November 1922.. ..	95.2	79.3	98.0	80.0	99.6	83.4	97.6	80.9	46	82.4	69.8	51
December 1922.. ..	92.2	74.5	95.6	76.9	95.2	77.7	94.3	76.4	42	80.2	68.2	51
Yearly Average ..	93.6	81.5	95.3	81.8	95.9	82.7	94.9	82.0	56	83.7	75.2	66

* The values of the relative humidity given in this column have been calculated from the dry bulb and wet bulb temperatures, and added to the Table as given in the original.

APPENDIX II.

TABLE 1.—Normal temperature for each day of the year from dry bulb thermograms for the years 1873 to 1920.

STATION—COLABA, BOMBAY.

Date.	Jan'y.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
	°F.	°F.	°F.	°F.	°F.	°F.	°F.	°F.	°F.	°F.	°F.	°F.
1	74.0	73.3	70.4	80.4	85.1	85.3	81.5	80.1	70.6	80.6	80.5	77.3
2	74.2	73.4	70.5	80.3	85.1	84.0	81.0	80.2	70.7	80.7	80.4	77.3
3	73.8	73.3	70.4	80.3	85.1	84.0	81.0	80.0	70.8	80.8	80.3	77.0
4	73.0	73.4	70.5	80.4	85.3	84.8	81.4	80.1	80.1	80.8	80.2	76.7
5	74.1	73.8	70.4	80.5	85.4	84.7	81.3	80.2	80.3	80.8	80.1	78.4
6	74.3	73.2	70.7	81.0	85.5	84.0	81.2	80.3	70.8	80.9	80.0	76.3
7	74.7	73.4	70.8	81.0	85.7	84.3	81.4	80.2	70.6	81.0	80.1	76.3
8	74.0	73.0	70.9	81.0	85.7	84.0	81.3	80.2	70.0	81.2	70.0	76.2
9	74.5	73.8	71.1	81.0	85.7	83.0	81.2	80.2	70.8	81.3	70.9	76.3
10	74.2	73.7	71.3	80.0	85.8	83.4	81.1	80.2	70.8	81.4	70.0	76.0
11	74.0	73.0	71.6	81.1	85.0	83.1	81.1	80.2	70.6	81.6	70.5	75.8
12	73.7	73.8	71.9	81.3	84.0	83.2	81.1	80.3	80.0	81.5	70.3	75.3
13	73.6	74.1	78.0	81.7	84.2	83.0	81.0	80.1	80.0	81.5	70.4	76.7
14	73.9	74.5	78.2	81.9	84.2	83.0	81.2	80.1	80.2	81.5	70.3	76.7
15	73.9	74.7	78.2	81.9	84.3	82.8	81.1	80.0	80.0	81.5	70.2	76.5
16	73.5	74.5	78.3	81.9	84.3	82.5	80.7	80.2	70.8	81.4	70.1	76.0
17	73.5	74.3	78.4	81.9	84.3	82.4	80.8	80.3	70.8	81.4	70.0	75.7
18	73.6	74.1	78.6	82.1	84.4	82.2	80.7	80.4	70.0	81.2	70.0	76.6
19	73.8	74.5	78.5	82.3	84.5	82.2	80.7	80.3	80.0	81.1	70.0	76.6
20	74.1	74.8	78.6	82.2	84.7	82.4	80.6	80.1	80.0	81.0	70.0	76.7
21	74.0	75.2	78.8	82.2	84.7	82.5	80.4	80.1	80.0	80.9	70.5	76.4
22	73.9	75.4	79.0	82.2	84.8	82.5	80.5	80.0	80.0	81.1	70.3	76.2
23	73.8	75.5	79.2	82.3	85.0	82.2	80.5	80.0	80.0	81.1	70.0	76.2
24	73.6	75.7	79.3	82.5	84.9	82.0	80.5	80.0	80.0	81.1	70.0	76.2
25	73.7	75.8	79.6	82.7	84.8	81.9	80.5	80.0	80.1	81.1	70.0	76.5
26	73.5	76.0	79.8	82.6	85.1	81.8	80.5	80.1	80.3	80.8	70.0	74.5
27	73.7	76.1	79.9	82.8	85.3	81.9	80.6	80.0	80.3	80.7	70.0	74.7
28	73.6	76.3	80.0	83.0	85.2	81.9	80.5	80.0	80.0	80.7	70.0	74.7
29	73.4	76.7*	80.1	83.0	85.1	81.9	80.3	70.8	80.7	80.5	70.0	74.9
30	73.4	..	80.3	83.0	85.2	81.7	80.3	70.6	80.6	80.5	70.0	74.9
31	73.3	..	80.4	..	85.4	..	80.2	70.6	..	80.4	..	76.3
Monthly Mean.	73.9	74.4	78.2	81.7	84.3	83.0	80.0	80.1	80.0	81.0	70.0	75.7
Annual Variation.	-5.4	-4.9	-1.1	+2.4	+5.0	+3.7	+1.6	+0.8	+0.7	+1.7	-0.3	-3.0

* Based on 11 leap years.

Annual Mean—70.3°F.

TABLE 2.—Mean diurnal inequality of temperature for each month of the year derived from the dry bulb thermograms for the years 1873 to 1920.

STATION—COLABA, BOMBAY.

Bombay Civil Time.	Jan'y.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
H.	°F.	°F.	°F.	°F.	°F.	°F.	°F.	°F.	°F.	°F.	°F.	°F.
0	-2.4	-2.3	-2.1	-2.1	-2.1	-1.1	-0.7	-0.9	-1.1	-2.0	-2.5	-2.6
1	-2.8	-2.7	-2.4	-2.4	-2.3	-1.3	-0.9	-1.0	-1.3	-2.3	-2.8	-2.9
2	-3.1	-3.1	-2.7	-2.7	-2.6	-1.5	-1.0	-1.1	-1.5	-2.5	-3.1	-3.3
3	-3.5	-3.5	-3.2	-3.1	-2.7	-1.7	-1.1	-1.1	-1.7	-2.8	-3.5	-3.6
4	-3.9	-3.8	-3.0	-3.4	-3.0	-1.8	-1.3	-1.3	-1.9	-3.1	-3.7	-3.9
5	-4.3	-4.2	-3.9	-3.7	-3.1	-1.9	-1.3	-1.5	-2.1	-3.3	-4.1	-4.3
6	-4.5	-4.5	-4.3	-3.8	-3.0	-1.9	-1.2	-1.4	-2.1	-3.5	-4.4	-4.5
7	-4.7	-4.7	-3.7	-2.4	-1.7	-1.8	-0.9	-1.1	-1.7	-2.0	-4.0	-4.5
8	-3.3	-2.8	-1.5	-0.5	-0.2	-0.5	-0.3	-0.5	-0.7	-1.5	-2.5	-3.1
9	-1.5	-0.8	+0.3	+1.0	+1.0	+0.5	+0.2	+0.2	+0.1	-0.1	-0.8	-1.4
10	+0.8	+1.5	+2.1	+2.3	+2.1	+1.3	+0.9	+0.9	+1.1	+1.6	+1.5	+0.9
11	+2.9	+3.3	+3.2	+3.1	+2.0	+1.9	+1.3	+1.5	+1.7	+2.9	+3.4	+3.1
12	+4.7	+4.0	+4.1	+3.6	+3.5	+2.3	+1.5	+1.9	+2.3	+3.9	+5.0	+5.0
13	+5.6	+5.1	+4.5	+4.1	+3.8	+2.5	+1.9	+1.9	+2.5	+4.3	+5.7	+6.1
14	+5.0	+5.5	+4.7	+4.3	+4.0	+2.5	+1.8	+2.0	+2.8	+4.5	+5.9	+6.4
15	+5.7	+5.2	+4.5	+4.0	+3.7	+2.3	+1.5	+1.7	+2.5	+4.2	+5.4	+5.9
16	+5.0	+4.6	+3.9	+3.5	+3.1	+1.9	+1.1	+1.5	+2.2	+3.6	+4.3	+5.1
17	+3.4	+3.3	+2.8	+2.4	+2.1	+1.3	+0.7	+0.8	+1.3	+2.1	+2.4	+3.1
18	+1.8	+1.5	+1.1	+0.7	+0.5	+0.3	+0.1	+0.4	+0.9	+1.3	+1.3	+1.7
19	+0.9	+0.7	+0.2	-0.3	-0.6	-0.3	-0.3	-0.3	-0.1	+0.1	+0.7	+0.9
20	+0.5	+0.2	-0.3	-0.7	-1.0	-0.5	-0.3	-0.6	-0.4	-0.3	+0.1	+0.3
21	-0.3	-0.3	-0.5	-1.1	-1.3	-0.8	-0.5	-0.6	-0.6	-0.7	-0.6	-0.5
22	-1.1	-1.1	-1.1	-1.3	-1.5	-0.9	-0.5	-0.8	-0.7	-1.2	-1.4	-1.4
23	-1.9	-1.7	-1.7	-1.7	-1.7	-1.1	-0.7	-0.8	-1.0	-1.7	-2.1	-2.2

APPENDIX II.—*contd.*TABLE 3.—*Normal relative humidity for each day of the year derived from data obtained during the years 1873 to 1920.*

STATION—COLABA, BOMBAY.

Date.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
1	68	66	70	72	74	74	84	85	84	83	71	68
2	67	66	71	72	74	75	83	85	84	83	72	67
3	67	68	71	73	75	75	84	86	83	83	72	66
4	68	68	70	74	74	76	84	85	83	82	72	66
5	70	66	71	74	73	76	84	85	82	83	72	67
6	69	67	72	73	74	77	85	85	83	83	72	67
7	69	67	72	72	73	77	84	85	83	82	71	68
8	59	67	72	73	73	78	85	84	83	81	72	69
9	68	67	72	73	74	79	84	84	83	81	72	70
10	67	67	71	74	73	80	85	84	83	80	72	67
11	68	66	71	74	73	81	84	84	83	80	72	67
12	68	68	71	73	74	81	84	83	82	80	71	67
13	68	69	70	72	74	81	84	84	83	79	69	67
14	69	70	71	72	74	82	84	84	82	79	70	67
15	68	71	72	74	73	82	84	84	82	79	70	67
16	69	71	73	75	73	82	85	83	83	79	70	67
17	68	68	73	70	73	83	85	83	83	78	70	68
18	69	67	71	75	73	83	85	83	83	78	69	67
19	69	67	72	74	73	83	85	83	83	77	68	67
20	69	67	72	75	73	82	85	84	84	78	68	67
21	69	68	73	75	73	82	85	83	84	77	69	67
22	70	70	74	74	73	83	85	84	84	77	68	68
23	69	71	72	74	73	82	85	84	84	76	66	69
24	68	70	72	75	73	83	85	84	84	76	65	68
25	68	70	72	74	74	83	85	84	84	75	69	66
26	69	69	72	75	74	84	85	83	84	75	68	68
27	69	70	72	75	74	83	85	84	84	75	68	68
28	68	69	73	75	74	83	85	83	88	74	69	68
29	66	..	74	75	74	83	85	84	83	72	69	69
30	67	..	74	75	74	83	85	84	83	71	68	69
31	69	..	74	..	73	..	85	84	..	72	..	69
Monthly Mean.	68	68	72	74	74	81	85	84	83	78	70	68
Annual Variation.	-7	-7	-3	-1	-1	+6	+10	+9	+8	+3	-6	-7

Annual Mean.—75 Per cent.

TABLE 4.—*Normal diurnal inequality of relative humidity for each month of the year derived from data obtained during the years 1873 to 1920.*

STATION—COLABA, BOMBAY.

Bombay Civil Time.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
H.												
0	+6	+5	+6	+5	+4	+3	+1	+2	+2	+4	+6	+6
1	+6	+6	+6	+5	+4	+2	+1	+2	+2	+5	+7	+6
2	+6	+6	+7	+6	+4	+2	+1	+2	+3	+5	+7	+6
3	+6	+6	+8	+6	+4	+3	+1	+2	+3	+5	+7	+6
4	+5	+6	+8	+7	+5	+3	+1	+2	+4	+5	+6	+6
5	+5	+6	+8	+7	+5	+3	+1	+2	+4	+5	+7	+5
6	+5	+6	+8	+7	+5	+3	+1	+2	+4	+5	+6	+5
7	+5	+5	+7	+5	+3	+1	+1	+2	+5	+6	+6	+5
8	+3	+2	+2	0	-1	+1	+1	+2	+3	+2	+3	+5
9	-1	-3	-2	-3	-3	-1	0	0	+2	-1	-1	+3
10	-5	-7	-6	-5	-5	-3	-1	0	0	-1	-1	-1
11	-10	-10	-7	-6	-7	-4	-2	-2	-2	-4	-6	-5
12	-14	-11	-8	-7	-7	-4	-2	-3	-3	-8	-11	-10
13	-14	-10	-8	-7	-8	-5	-3	-3	-1	-10	-14	-13
14	-11	-9	-8	-8	-8	-5	-3	-3	-5	-10	-14	-16
15	-9	-8	-8	-8	-8	-5	-3	-3	-5	-10	-12	-14
16	-7	-6	-7	-7	-6	-4	-2	-3	-5	-8	-10	-10
17	-3	-4	-5	-5	-4	-3	-2	-2	-4	-7	-6	-6
18	+1	-1	-2	-4	-1	-1	-1	-1	-2	-4	-1	-1
19	+3	+1	0	+1	+1	0	0	0	-1	+1	+2	+3
20	+3	+2	+1	+2	+2	+1	0	0	0	+1	+3	+5
21	+4	+2	+2	+3	+3	+1	0	+1	+1	+2	+5	+6
22	+3	+3	+4	+4	+4	+2	0	+1	+1	+2	+5	+5
23	+4	+4	+5	+5	+4	+2	+1	+1	+2	+3	+5	+4

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