

Rate of Cooling

Rate of cooling statistics are a measure of the rate at which an environment or product cools after reaching a peak value. Temprecord always calculates these statistics between the start (F7) and end (F8) marker samples, in the following way:

- The temperature record between the start and end samples is scanned for the maximum value.
- The interval between the maximum sample and the **Zone 1 End** temperature is called 'Zone 1' and is treated as the first rate of cooling interval.
- The interval between the point at which the **Zone 1 End** temperature is reached, and the point at which the **Zone 2 End** temperature is reached is called 'Zone 2' and is treated as the second rate of cooling interval, and so on.
- The statistics (duration, rate of cooling in degrees per hour) are calculated for each interval
- The statistics for these intervals are calculated until the end of the measurement period, which is until the number of zones specified has been reached, until 5 zones have been done, or until the end (F8) sample is reached.



Temprecord also prints and displays two total durations after the rate of cooling values. The first total is the time taken from the maximum temperature till the end of the measurement period. The second total is the time taken from the end of zone 1 (i.e. from flag 2) until the end of the measurement period - i.e. it does not include zone 1

Show Rate of Cooling Statistics

Check this box if you want the [Rate of Cooling](#) (ROC) statistics to be displayed and printed as well as the normal statistical data.



This option must be checked in order for Rate of Cooling statistics to be graphed, printed, or exported.

Rate of Cooling Options - Zones

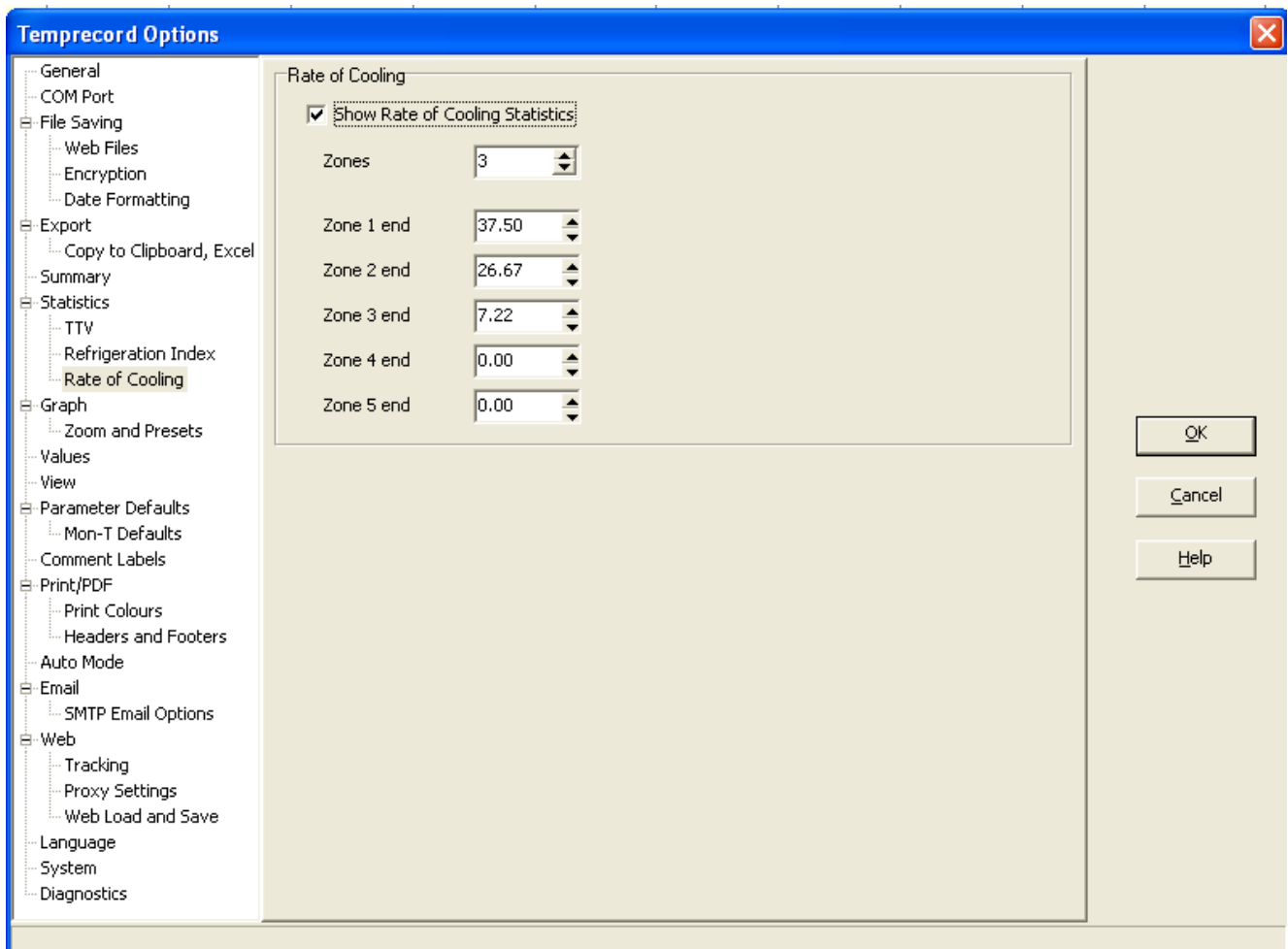
Specify the number of Rate of Cooling zones you want shown on the displayed graph, the printed graph, the displayed and printed Rate of Cooling statistics and the exported Rate of Cooling statistics.

You can enter any number from 1 to 5.

Rate of Cooling Options - Zones 1 through 5

Enter the temperature (in the currently selected units) that each Rate of Cooling zone is to end at. The first zone is defined as the interval between the first maximum and the temperature specified in the **Zone 1 End** field. The second zone is defined as the interval between the time the first zone temperature is reached and the time the second zone temperature is reached, and so on. The zone end temperatures must be descending, i.e. the zone 2 end temperature must be less than the zone 1 end temperature and so on. If they are not, Temprecord will re-order them for you.

Options View – Select Rate of Cooling Statistics



Temprecord Options

General
COM Port
File Saving
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Export
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 Refrigeration Index
 Rate of Cooling
Graph
 Zoom and Presets
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 Headers and Footers
Auto Mode
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 SMTP Email Options
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 Web Load and Save
Language
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Diagnostics

Rate of Cooling

Show Rate of Cooling Statistics

Zones: 3

Zone 1 end: 37.50

Zone 2 end: 26.67

Zone 3 end: 7.22

Zone 4 end: 0.00

Zone 5 end: 0.00

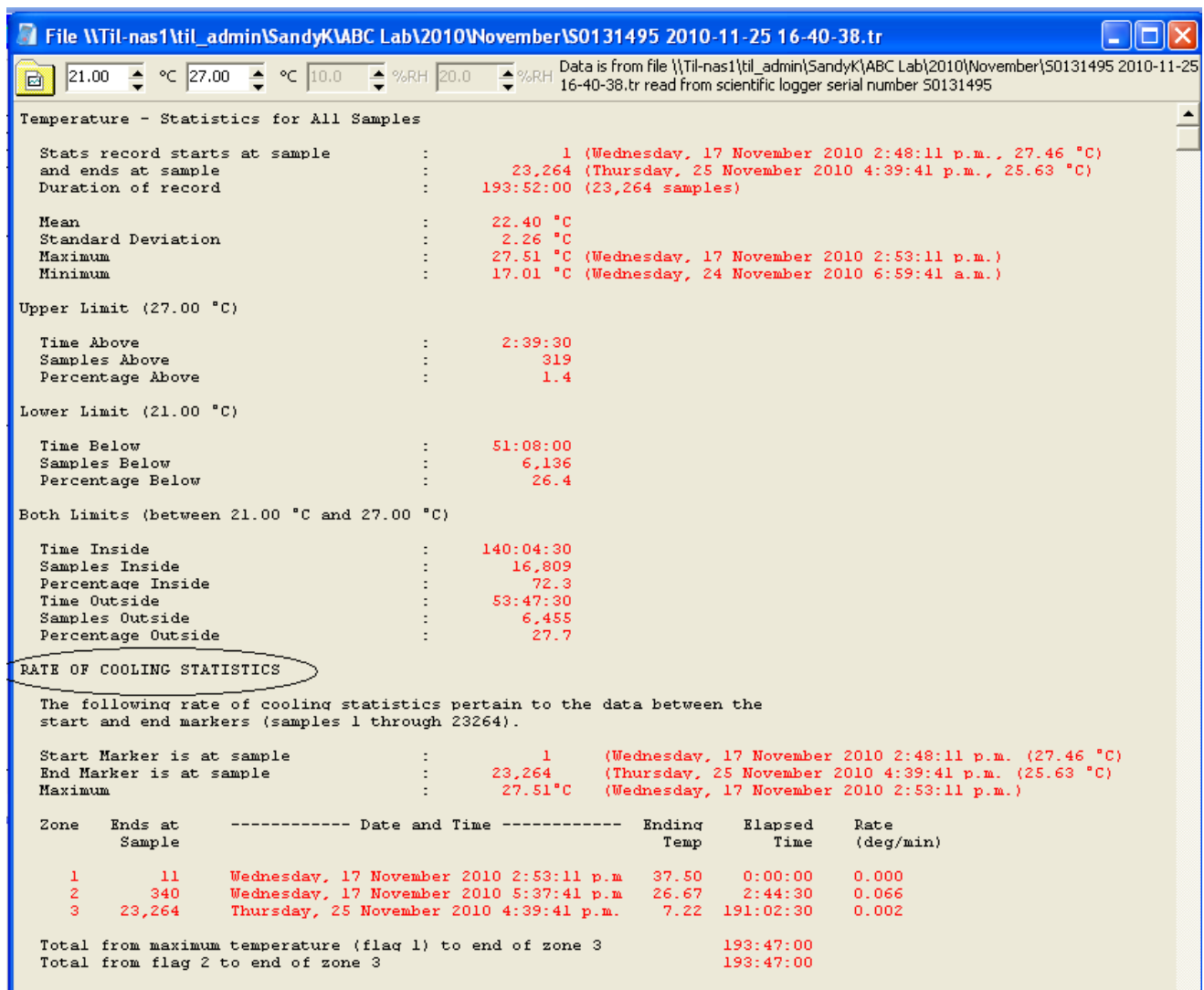
OK
Cancel
Help

Statistics View

All correspondence to:
Temprecord International Limited
PO Box 58 430, Greenmount, Auckland 2141, NEW ZEALAND.
Phone: (09) 274 9825, Fax: (09) 273 4020
Email/Web: info@temprecord.com, www.temprecord.com

Rate of Cooling information shown in the Statistics View:

- Zone is stated as desired temperature at end of zone
- End point – sample number
- Date and time
- End Temperature
- Elapsed Time
- Rate of cooling – degrees per minute



The screenshot shows the 'Temperature - Statistics for All Samples' window. It displays various statistical data points for a temperature record. A section titled 'RATE OF COOLING STATISTICS' is circled in red. Below this section, there is a table with columns for Zone, Ends at Sample, Date and Time, Ending Temp, Elapsed Time, and Rate (deg/min).

Temperature - Statistics for All Samples

Stats record starts at sample : 1 (Wednesday, 17 November 2010 2:48:11 p.m., 27.46 °C)
 and ends at sample : 23,264 (Thursday, 25 November 2010 4:39:41 p.m., 25.63 °C)
 Duration of record : 193:52:00 (23,264 samples)

Mean : 22.40 °C
 Standard Deviation : 2.26 °C
 Maximum : 27.51 °C (Wednesday, 17 November 2010 2:53:11 p.m.)
 Minimum : 17.01 °C (Wednesday, 24 November 2010 6:59:41 a.m.)

Upper Limit (27.00 °C)

Time Above : 2:39:30
 Samples Above : 319
 Percentage Above : 1.4

Lower Limit (21.00 °C)

Time Below : 51:08:00
 Samples Below : 6,136
 Percentage Below : 26.4

Both Limits (between 21.00 °C and 27.00 °C)

Time Inside : 140:04:30
 Samples Inside : 16,809
 Percentage Inside : 72.3
 Time Outside : 53:47:30
 Samples Outside : 6,455
 Percentage Outside : 27.7

RATE OF COOLING STATISTICS

The following rate of cooling statistics pertain to the data between the start and end markers (samples 1 through 23264).

Start Marker is at sample : 1 (Wednesday, 17 November 2010 2:48:11 p.m. (27.46 °C)
 End Marker is at sample : 23,264 (Thursday, 25 November 2010 4:39:41 p.m. (25.63 °C)
 Maximum : 27.51 °C (Wednesday, 17 November 2010 2:53:11 p.m.)

Zone	Ends at Sample	Date and Time	Ending Temp	Elapsed Time	Rate (deg/min)
1	11	Wednesday, 17 November 2010 2:53:11 p.m	37.50	0:00:00	0.000
2	340	Wednesday, 17 November 2010 5:37:41 p.m	26.67	2:44:30	0.066
3	23,264	Thursday, 25 November 2010 4:39:41 p.m.	7.22	191:02:30	0.002
Total from maximum temperature (flag 1) to end of zone 3				193:47:00	
Total from flag 2 to end of zone 3				193:47:00	

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