

Measure what you see.

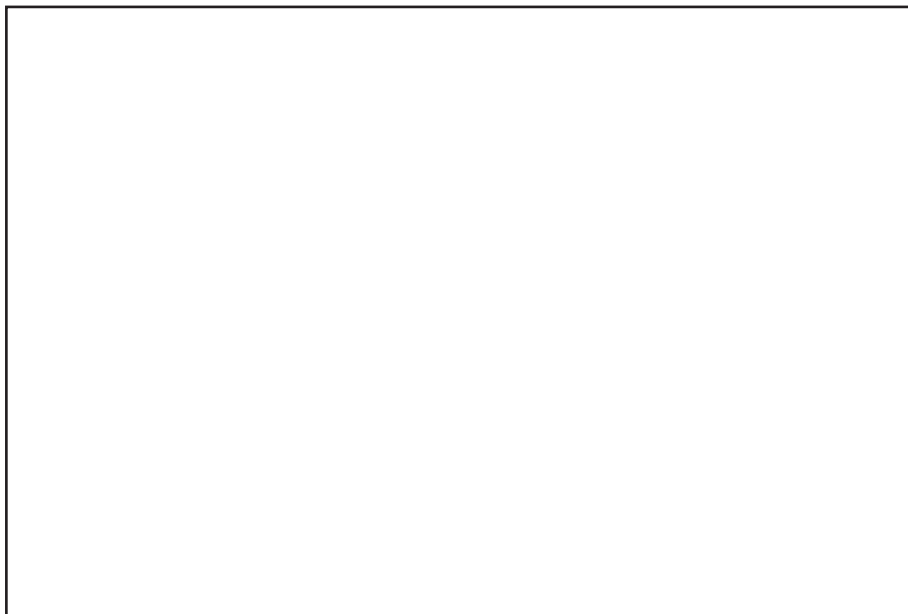
temp-chart Software



Manual

temp-chart
Software

Manual



Patent pending

255 022 039 E 1402

Dear customer,

thank you for having decided for a BYK-Gardner product. BYK-Gardner is committed to providing you with quality products and services. We offer complete system solutions to solve your problems in areas of color, appearance and physical properties. As the basis of our worldwide business, we strongly believe in total customer satisfaction. Therefore, in addition to our products, we offer many VALUE-ADDED services:

- Technical Sales Force
- Technical & Application Support
- Application and Technical Seminars
- Repair & Certification Service

BYK-Gardner is part of the Additives and Instrument Division of ALTANA AG, a leading supplier of additives for coatings and plastics. Together, we offer complete and unique solutions for you, our customer.

Thank you for your trust and confidence. If there is anything we can do better to serve your needs, do not hesitate to let us know.

Your BYK-Gardner Team

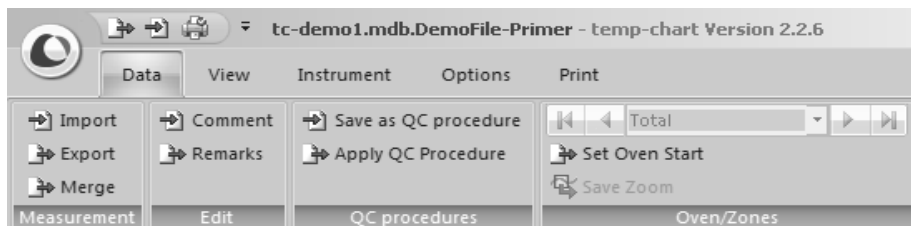
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1 Menus

1.1 Menu Data



The Data Tab contains commands for editing data files or measurements. **temp-gard**-measurements are saved in database. They do not only contain the data values of the connected sensors (the temperature curves) but also parameters describing the measurement setup. Therefore, the terms *File* and *Measurement* here mean the same thing. Please also refer to the chapter How to Work with QC Procedures as it contains useful advice for an easy operation of the program.

1.1.1 Section Measurement

The section Measurement contains the following commands:

Import

Allows to import a measurement saved in a single file into the current database. These files (*.txt) may be generated by the export command (see below) or by a previous version of the **temp-chart** software (*.btr).

Additionally it is possible to import CSV files. If you have questions to this item, please contact our application specialists.

Export

Saves the currently active measurement into a single file that may for example be sent via e-mail and then be imported again into a different database (save as *.txt). You may also choose to export the raw data into an Excel sheet (save as *.xls).

Merge

In this menu option measurements of different files can be merged. A selection window opens, in which the available measurements are listed on the left side. Both a complete data record, and individual sensors can be selected. By clicking the measurement and a following click on „add“, the measurement appears in the selection list on the right. There it still can be sorted.

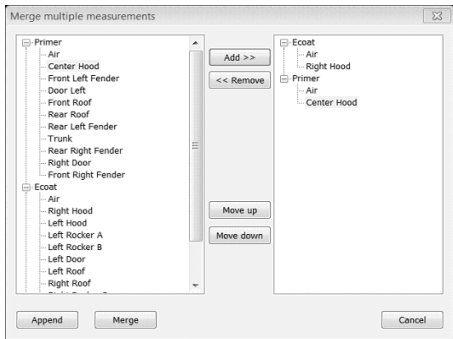
Alternatively a measurement in the measurement window can be overlaid temporarily by a right mouse click (S. chapter 4).

The unification can take place via overlaying (merging) or adding (appending).

Append

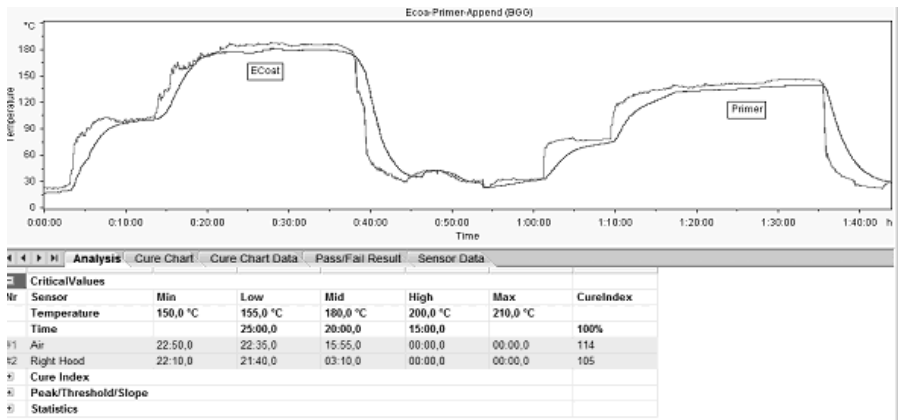
Attaching makes sense in order to represent different processes one behind the other in a row. Select a measurement with all test zones or individual test zone selected and click the button „Append“.

Selection window for the example append:



Assign a name.

This selection leads to the following result of analysis:



The selected measurements are represented one after the other.

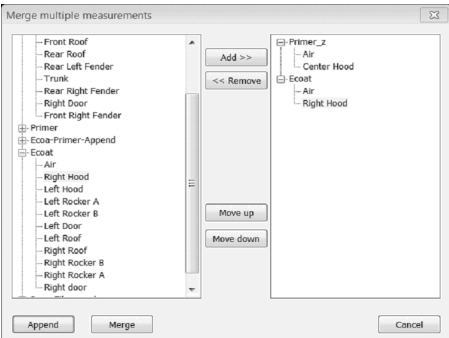
At the temperature analysis, the individual measurements are combined into a zone. Designation and analysis take place on basis of first measurement.

A new file is produced, which appears in the measurement window. In the course of the unification you can assign another name for the file and make further entries.

Merge (overlay)

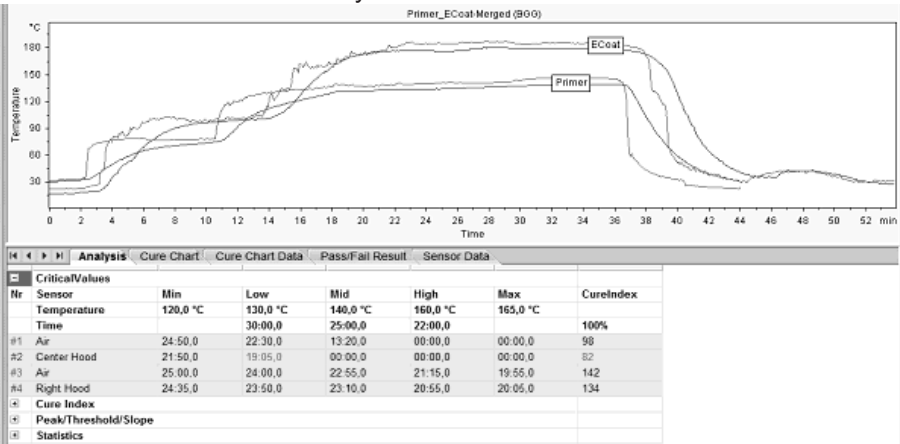
Merging makes sense in order to compare the same measuring process of different data to examine process stability.

Selection Window for the example (merge)



Select „Merge“ and assign a name.

This selection leads to the following result of analysis:

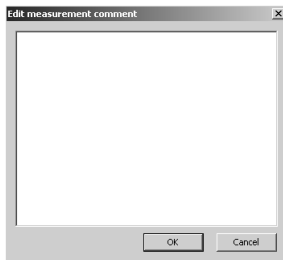


The measurements are represented merged into each other in the diagram. In the temperature anlaysis of both zones appear particularly. The analysis is accomplished on the basis of the tem- perature defaults of the measurement which was selected first.

A new file is produced, which appears in the measurement window. In the course of the unification you can assign another name for the file and make further entries.

1.1.2 Edit

Comment

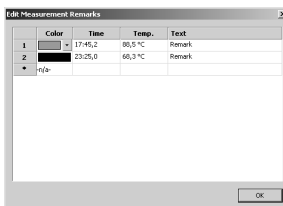


If you click the button „comment“, the window „Edit measurement comment“ opens.

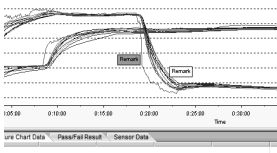
Here, in general, additional information is entered, which stands in connection with the measuring process.

However, they appear only in the printing area information.

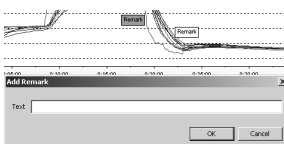
Remarks



By clicking the button „Remarks“, a selection window for a note opens within the diagram. First a color must be selected, afterwards the text can be entered.



The notes are freely adjustable in the diagram.



A further possibility is to open with a right mouse click a window directly in the diagram for the input of a note.

1.1.3 Section QC Procedures

The section QC Procedures contains the following commands:

- Save as QC Procedure**

Allows to save the current settings (Oven, Tolerance curve, Curing Conditions and Organizer) as a named QC Procure. Please also refer to the chapter How to Work with QC Procedures as it contains useful advice for an easy operation of the program.
- Apply QC Procedure**

Apply a different QC Procedure to the currently open measurement.

1.1.4 Section Oven/Zones

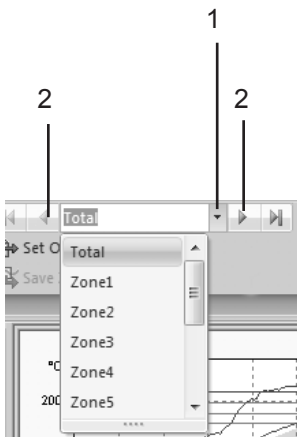
The section Oven/Zones allows to select a single oven zone and contains the following commands:

- Set Oven**

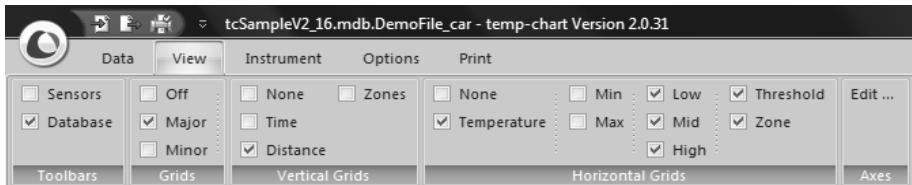
Allows to adjust the position of the oven start (with a time value of 0[s]).
- Save Zoom**

Allows to save the currently visible data into a new measurement

You can select zones, by opening the field with the zones (1), or with the buttons in the header (2).



1.2 Menu View



1.2.1 Section Toolbars

The section Toolbars contains the following commands:

Sensors	Hides or unhides the sensor selection pane
Database	Hides or unhides the left database pane

1.2.2 Section Grids

The section Grids controls the grids resolution:

Off	Check to suppress grids
Major	Check to draw major grids only
Minor	Check to draw major and minor grids

1.2.3 Section Vertical

The section Vertical Grids controls the settings for vertical grids:

None	Check to suppress vertical grids
Time	Check to draw grids for the time axis
Distance	Check to draw grids for the distance axis
Zones	Check to additionally draw zone margins

1.2.4 Section Horizontal

The section Horizontal Grids controls the settings for horizontal grids:

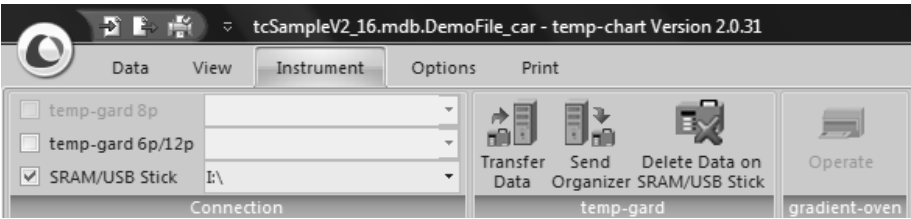
None	Check to suppress horizontal grids
Temperature	Check to draw grids for the temperature axis
Min	Check to mark the Min-value of the curing conditions
Max	Check to mark the Max-value of the curing conditions
Low	Check to mark the Low-value of the curing conditions

Mid	Check to mark the Mid-value of the curing conditions
High	Check to mark the High-value of the curing conditions
Threshold	Check to mark the Threshold-Value of the curing conditions
Zone	Check to mark the Temperature Range of the oven zones

1.2.5 Section Axes

The section Axes allows to edit the properties of the various axes:	
Edit	Edit Axes definitions
Styles	Edit Line Types definition

1.3 Menu Instrument



1.3.1 Section Connection

The section Connection of this tab can be used to select the type of instrument and or interface:

temp-gard 8p	To use a temp gard 8p, which is attached to the serial Interface of your PC. The SRAM card must be inserted in the Logger. The old temp-gard is not recognized automatically. Select the COM port from the list right. If the PC does not have a serial connection, an Adapter is needed (USB to serial port).
---------------------	--

temp-gard 6p/12p	Check to use a temp-gard 6p or a temp-gard 12p that is connected to the USB port of your PC. The new Logger (temp gard 6p/12p) is recognized and the Serial Number is indicated automatically.
SRAM/USB Stick	Check to use an USB-Stick (temp-gard 6p or temp-gard 12p) or a SRAM card from a temp-gard 8p

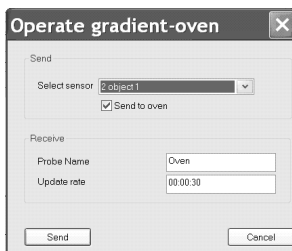
1.3.2 Section temp-gard

The section temp-gard contains the operation commands for the selected instrument:

Transfer Data	Use this command to import a measurement from the selected device.
Send Organizer	Use this command to prepare the selected device for a new measurement
Delete Data on SRAM/USB Stick	Use this command to delete data files from an USB Stick or a SRAM card

1.3.3 Section gradient-oven

The section gradient-oven contains the operation command for a BYK gradient oven:



gradient-oven

Sends temperature curves to the gradient-oven and controls the data flow of the instrument

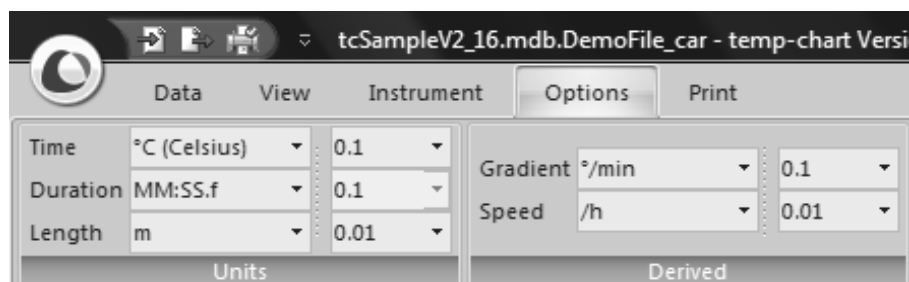
Attach the gradient-oven and select from its Main Menu:

- Point 3 byko-track or
- Point 4 byko-track 2.

In the Software temp chart:

- load the measurement curve
- select gradient-oven in the Instrument tab
- select probes

1.4 Menu Options



The Options Tab contains the settings that control the display of various values:

Temperature Please choose between °Celsius, °Fahrenheit and Kelvin.

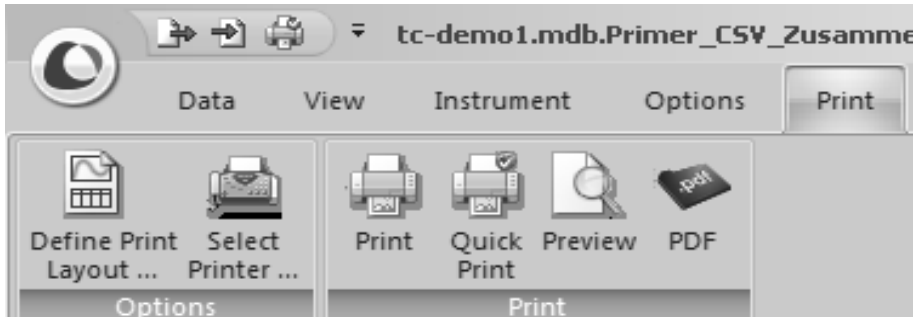
Duration Please select the appropriate setting for duration values.

Length Please select the appropriate setting for distance values.

Gradient Please select the appropriate setting for temperature gradients

Speed Please select the appropriate setting for speed values.

1.5 Menu Print



1.5.1 Section Options

The section Options contains commands to preselect various settings:

Define Print Layout Controls the content of the printed pages (more details find on p. 40).

Select printer Show the windows dialog to select a different printer

1.5.2 Section Print

The section Print contains the following commands:

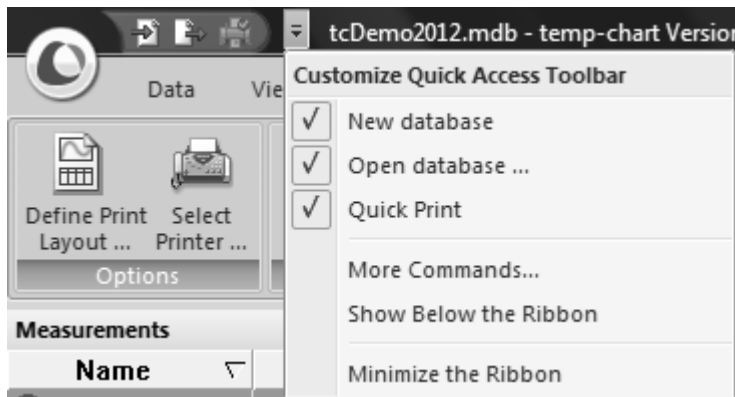
Print Select Printer and Print the current pages

Quick Print Print using the current settings

Preview Preview the current pages before printing

PDF Output as PDF file

1.6 Menu Quick Access Toolbar

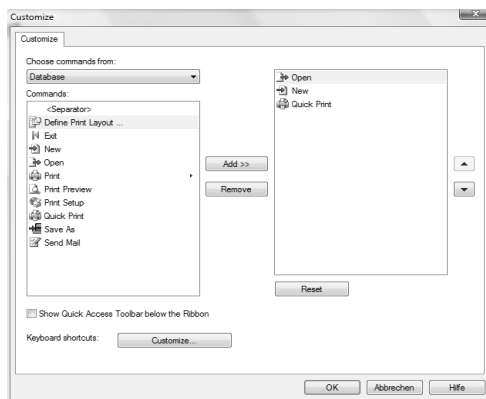


The commands “New database”, “Open database” and “Quick print” are already preselected to be displayed.

If you click on one of these items with the left mouse button, the checkmark disappears and the command is not displayed in the Quick Access Toolbar any more.

To redisplay it, click on the item again with the left mouse button.

To add more commands to the Quick Access Toolbar click on “More Commands”. The Customize window opens:



You can now add or remove commands.

Show Below the Ribbon

The Quick Access Toolbar is placed below the ribbon with the opened tabs.

Minimize the Ribbon

If you minimize the ribbon only the menu tabs are shown. To access a function you have to click on the appropriate menu tab. The ribbon for this menu tab will be redisplayed again.

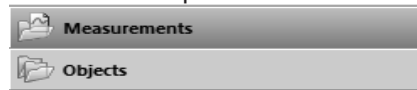
Consider whether it is worth to minimize the ribbon because that can draw a handicap in operation.

2 Objects for control and analysis

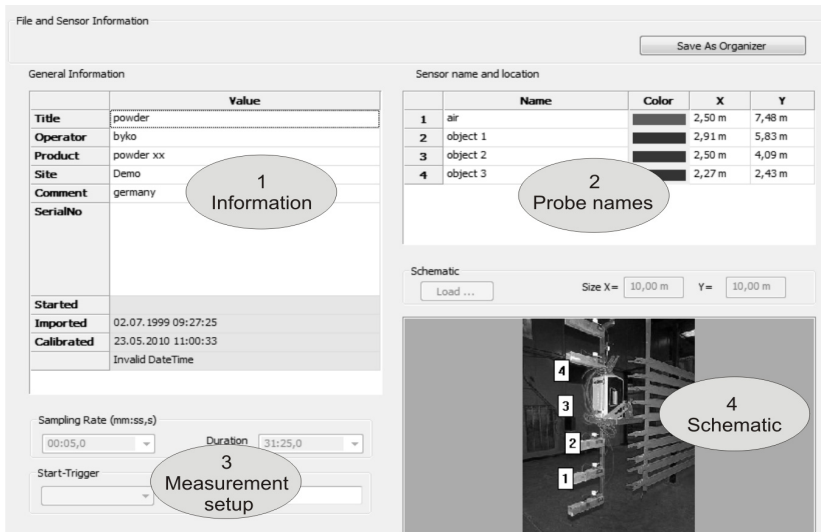
2.1 Measurement control with the organizer

Step 1:

The **temp-chart** software allows creating so-called organizers which define the „Setup parameters“ and names of the probe position. If you have not already done so, please • Select Objects in the left side database pane



- Right click Organizers and Create a new organizer
- Name the organizer by pressing the „Save As“ button (the name may have at most 8 characters)

The image shows the 'File and Sensor Information' dialog box. It has several sections: 'General Information' with fields for Title, Operator, Product, Site, Comment, and SerialNo; 'Sensor name and location' with a table of objects; 'Schematic' with a 'Load ...' button and size inputs; and a 'Schematic' image showing a probe setup. Numbered callouts are present: 1 points to the 'General Information' section, 2 points to the 'Sensor name and location' table, 3 points to the 'Sampling Rate' and 'Duration' fields, and 4 points to the 'Schematic' image.

	Value
Title	powder
Operator	byko
Product	powder xx
Site	Demo
Comment	germany
SerialNo	
Started	
Imported	02.07.1999 09:27:25
Calibrated	23.05.2010 11:00:33
	Invalid DateTime

	Name	Color	X	Y
1	air		2,50 m	7,48 m
2	object 1		2,91 m	5,83 m
3	object 2		2,50 m	4,09 m
4	object 3		2,27 m	2,43 m

Sampling Rate (mm:ss,s) 00:05,0 Duration 31:25,0

Start-Trigger

Schematic Size X= 10,00 m Y= 10,00 m

Schematic

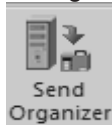
Then

1. Enter the General information like customer name, locations, comments

2. Enter the probe names and select the color for display
3. Enter the sampling rate, trigger information and measurement duration
4. Load a picture (most graphic formats like bmp, gif, jpeg are supported) and position the sensors by dragging the numbered squares from the upper left corner of the picture

Step 2:

Connect the temp-gard to the PC or insert the USB-Stick. Then activate the Instrument tab, make sure you have selected the appropriate connection settings and press



Select the newly created organizer in the upcoming dialog and press OK.

The Organizer will now be transferred to the USB stick or the connected device and can be used for new measurements. Already existing QC-procedures can likewise be selected and assigned.

2.2 Set Curing Conditions

The paint makers recommend temperature/time conditions will be compared to the actual temperature/time during the heating process.

temp-chart allows you to define and modify objects of type „Curing Condition“ where you can enter the supplied target values. These values are then used in the analysis pane and in the protocols temperature defaults, Cure index and Peak/Threshold/Slope. On the basis of the equivalence time the Cure index is computed.

Used Product Parameters

Coating Name

powder xx

Critical values (Cure index)

	Temperature	Time
Minimum	140,0 °C	
Low	180,0 °C	15:00,0
Mid/Ref	190,0 °C	12:00,0
High	200,0 °C	08:00,0
Maximum	220,0 °C	
Threshold	0,0 °C	
A.Energy	56,0	[kJ/mol]

☒ Calculate Equivalence Time only if above Minimum

This page contains the critical values and duration times required for controlling the hardening process. In most cases, these values are furnished by the supplier of the material.

Fill in the respective limiting value in the Temperature column, and the required duration time in the Time column:

Min	the minimum temperature that should be reached	
Low	lower limit	duration time of the lower temperature limit
Mid/Ref	mean or reference temperature	duration time of the reference temperature
High	upper limit	duration time of the upper temperature limit
Max	the maximum temperature that should not be exceeded	
Threshold	limiting value for the calculation of the threshold analysis	
A.Energy	Activation Energy	

The activation energy is calculated automatically on basis of the retention times at the lower and upper temperature. It is the basis for the calculation of the equivalence time.

For calculating the Equivalent Holding Time, you can either enter the activation energy of the material directly, or you can have the program do the calculation for you:

For this purpose, enter the required temperature as well as the duration time into the Low and High boxes as the program needs two reference values for calculating the activation energy. Next, look at the tables and compare the calculated equivalent time with the required duration time of the reference temperature. This will give you a measure for the quality of the hardening process.

With the option box „Calculate Above Minimum“ you can exclude temperature values below the minimum temperature from the calculation of the equivalent time.

2.3 Set Oven Specifications

Defining some parameters for the oven used during heating is optional, but has some advantages during analysis

- With the given speed of the oven, the software can add a distance axis in addition or instead of the time axis
- you can partition the heating process into zones which can be analyzed separately

You should create an Oven Specification once. It can then be assigned to different measurements or added to the QC-Procedure:

- Select Objects/Oven Specifications in the database pane
- Right click and Create a new object
- Name the object with a suitable description and press the „Save As“ button
- Enter the oven specifications

Assigned Oven Parameters

Name:

Speed: OvenStart by:

	Name	Time		Distance		Threshold	
		Start	Duration	Position	Length	Low	High
1	Zone1	00:00,0	08:00,0	0,00 m	8,00 m	40,0 °C	60,0 °C
2	Zone2	08:00,0	09:00,0	8,00 m	9,00 m	60,0 °C	90,0 °C
3	Zone3	17:00,0	12:30,0	17,00 m	12,50 m	90,0 °C	110,0 °C
4	Zone4	29:30,0	17:30,0	29,50 m	17,50 m	20,0 °C	96,0 °C
*							

Zone1 Zone2 Zone3 Zone4

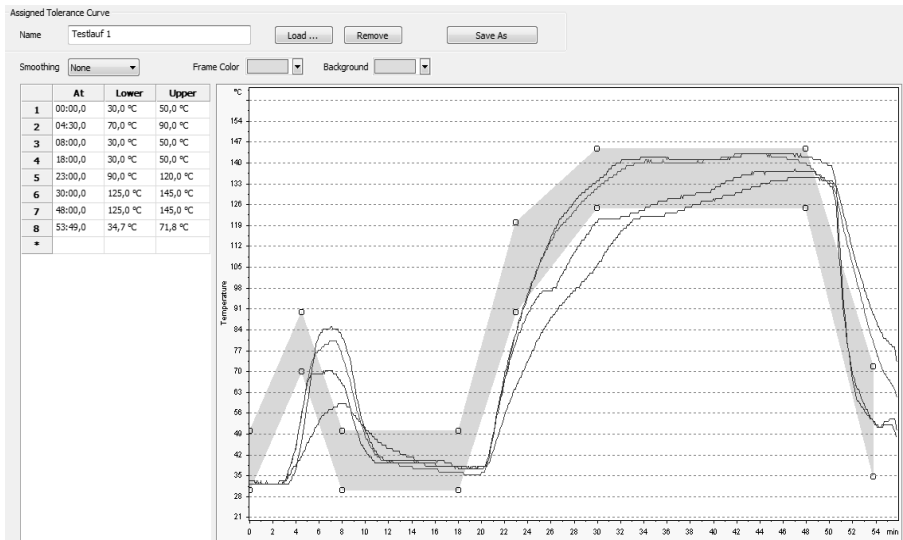
- The Oven Name can be freely chosen
 - Enter the speed of your oven in the Speed box. If you fill in nothing or 0 m/s, the program will be unable to show a distance axis.
 - In the OvenStart box, please enter the time your oven needs to reach the first „real“ zone. All data values recorded before this point of time will then appear on the time axis with a negative sign. (Note: This offset can also be changed afterwards by switching to the chart page and moving the zero zone on the zone axis. Or, you can press the right mouse button in the area of the temperature curves and select the command Oven Offset in the opening context menu.)
 - To divide your measurement into Zones, please add additional lines to the zone list. Then, in the table, enter the zone length as Duration. The zone tables normally only show the times, but if you have entered a speed there, you can also enter the position and length in meters.
- If you want to delete a zone right click in the number-column and select the desired command.

2.4 Set Tolerance Curve

A Tolerance Curve is a collection of reference values the program will take as a basis for creating the tolerance curve shown in the chart page facilitating the evaluation of measurements.

You should create a Tolerance Curve once. It can then be assigned to different measurements or added to the QC-Procedure:

- Select Objects/Oven Specifications in the Select Tolerance Curves database pane
- Right click and Create a new object
- Name the object with a suitable description and press the „Save As“ button
- Enter the tolerance settings



- The Name of the Tolerance Curve can be freely chosen.
- The Frame Color and Background choices determine the colors used in the chart page. Please select None in the Background field if you want to show only the outline.

- By selecting None in the Smoothing option box you can linearly link the defined reference values. When you choose the options Yes or More, however, help values will be created to obtain as round a curve as possible.

There are two ways of creating reference values:

- Add additional lines to the list of reference values; enter the position (A_t) and both limiting values (Lower and Upper) in the table. Then, the reference values will be shown in the chart.
- Move the cursor into the chart and drag it from the upper to the lower limiting value while pressing the mouse button. When releasing the button, the program will insert a new reference value.

In the chart, the reference values are indicated as small circles; these circles can be moved with the mouse in order to move the reference value.

2.5 Create a Cure Chart

Cure chart is a diagram of the duration time at certain temperatures. So it is to be seen at a glance whether the curing process lies within the defaults of the paint manufacturer.

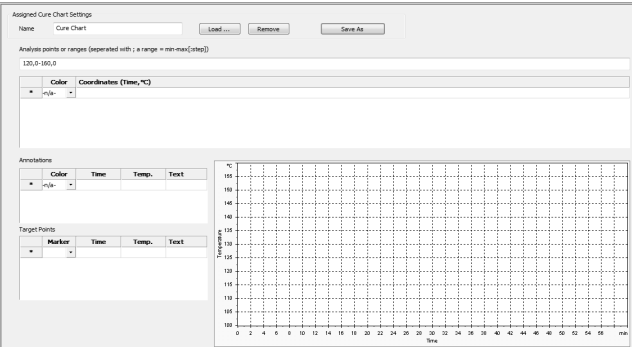
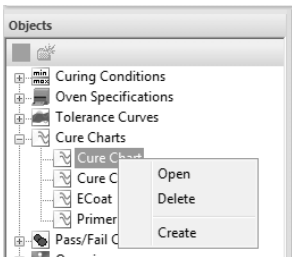
In the edit pane of the cure chart settings a curing window is created according to the defaults of the paint manufacturer. It can contain different ranges, e.g. good, still OK, overcured.

The data is entered in a table and can also be edited in the diagram window.

Right click on cure-chart from the Objects pane. The selection windows opens. Select "Create" to create a new cure-chart.

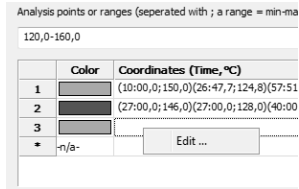
The cure-chart window opens. Here you can enter coordinates (time, temperature), annotations, target points and analysis points or ranges.

Give the object a definite name and specify the temperatures for the analysis. The pre-setting is at 120 - 160 °C and must be adapted according to the measuring range if necessary.

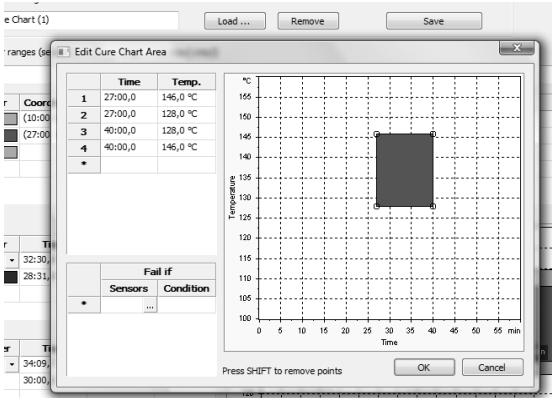


Afterwards you must select a color for the range. With a left mouse click into an empty color field you open the selection. select the color and confirm it with another left mouse click.

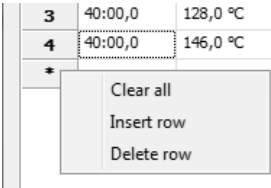
To edit the area, right click into the correspondent row and then left click onto the "Edit"-button.



The Edit Cure Chart Area appears.



The area can be changed either by entering data directly into the “Time” and “Temp” fields or by picking the corners of the diagram, in order to move it where you need to.

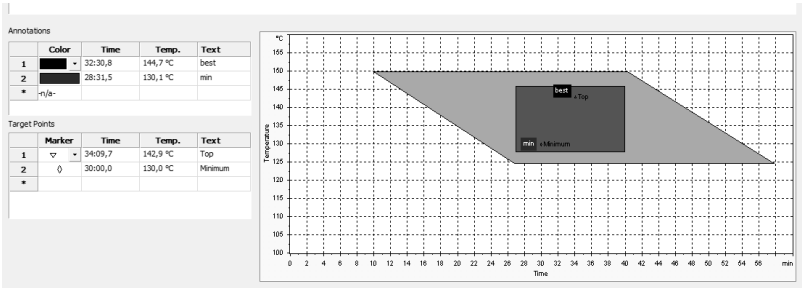


To add delimitation points move the cursor over the diagram and make a left mouse click. You can also make a right mouse click into the table.

You can terminate your input by pressing the “OK” button. The Cure Chart setting pane appears with the assigned cure window.

It is possible to add additional areas by following the same procedure. Right mouse click into the cure window chart for setting the axes.

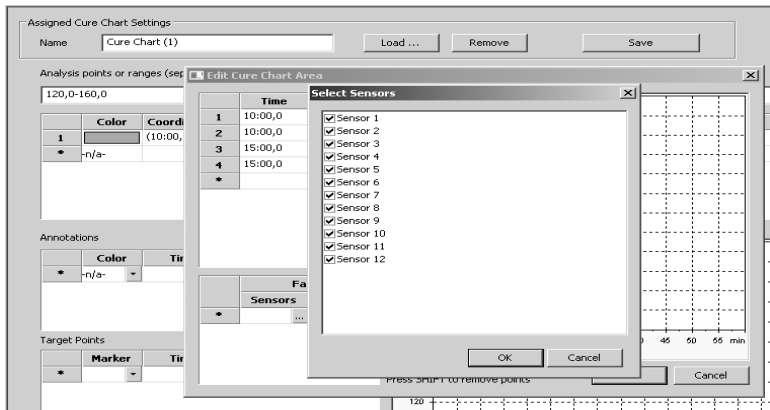
To complete the cure chart you can add Annotations and Target Points. If all inputs are terminated, finish with store.



Pass/Fail function in Cure chart

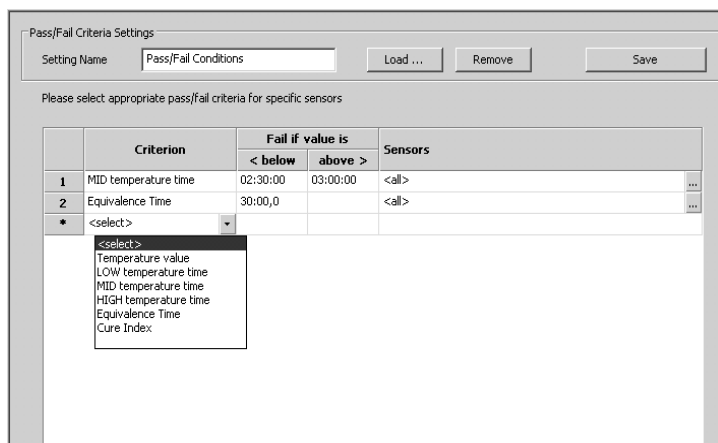
You can adjust a Pass/Fail warning in the Cure chart for each sensor by

- Creating a Cure chart
- selecting the color for the Cure chart
- calling the editing function of the Cure chart range with a right mouse click into the coordinate line
- selecting the function “Fail if “for the desired sensor



2.6 Set Pass/Fail

The Pass/Fail conditions can be set in the Pass/Fail Tab.



Pass/Fail Criteria Settings

Setting Name: Load ... Remove Save

Please select appropriate pass/fail criteria for specific sensors

	Criterion	Fail if value is		Sensors
		< below	above >	
1	MID temperature time	02:30:00	03:00:00	<all> ...
2	Equivalence Time	30:00,0		<all> ...
•	<select>			

<select>

- Temperature value
- LOW temperature time
- MID temperature time
- HIGH temperature time
- Equivalence Time
- Cure Index

Therefore you can select temperature-values and all conditions of the Cure index as criteria and can cover them with values.

Exceeding or falling short of the corresponding value, is shown in red color in the analysis table.

In the Tab Pass/Fail events, sensor, criterion and reason are shown.

In the data base list, the measurement is marked according to Pass/Fail result with a red or green point.

Analysis Cure Chart Cure Chart Data Pass/Fail Result Sensor Data				
	Sensor	Criterion	Reason	
1	#1 air	Temperature value	is below configured minimum (50,0 °C)	
2	#2 object 1	Temperature value	is below configured minimum (50,0 °C)	
3	#3 object 2	Temperature value	is below configured minimum (50,0 °C)	
4	#4 object 3	Temperature value	is below configured minimum (50,0 °C)	
5	#1 air	LOW temperature time	is below configured minimum (01:40:00)	
6	#2 object 1	LOW temperature time	is below configured minimum (01:40:00)	

Measurement Cure Chart Tolerance Oven Curing Condition Pass/Fail Organizer QC Procedure

2.7 Work with QC Procedures

QC Procedure

Procedure Name

A QC Procedure rules the interpretation of the temperature curves.
Please assign a predefined object to every component below.

Curing Condition

Oven Specification

Tolerance Curve

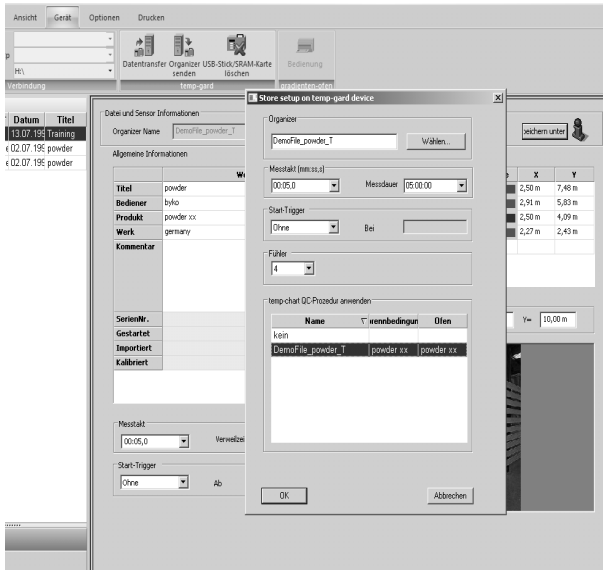
temp-chart-QC-Procedures are the best solution for recurring tasks:

Most measurements are serial measurements which have to be carried out more than once, and it is often difficult to keep the measurement setup, i.e. the sampling interval or the number of sensors, identical or at least comparable. The matter becomes even more difficult when new parameters, such as the product type and oven speed, the tolerance and critical values have to be defined anew for each measurement. For these tasks, **temp-chart**-QC-Procedures are the ideal solution because they represent „measurements“ which - as yet - have no data values but which already contain some or even all the parameters.

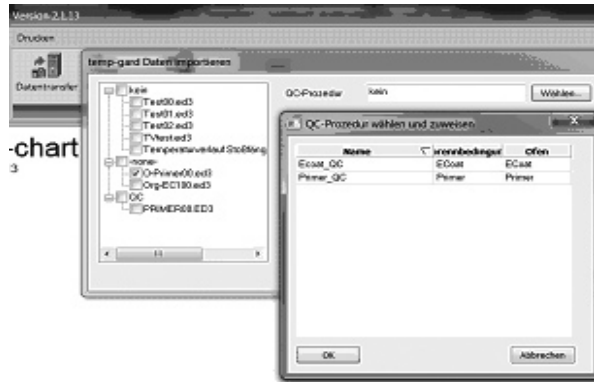
Anyway, in the QC-procedure the complete measurement setup is saved, and in addition you can enter and save all the additional information in the organizer, such as comments, critical values, tolerance and reference curves, oven setups etc., that are already known before the measurement. This ensures that measurements prepared with the same procedure are really comparable.

QC Procedures can be assigned in three places

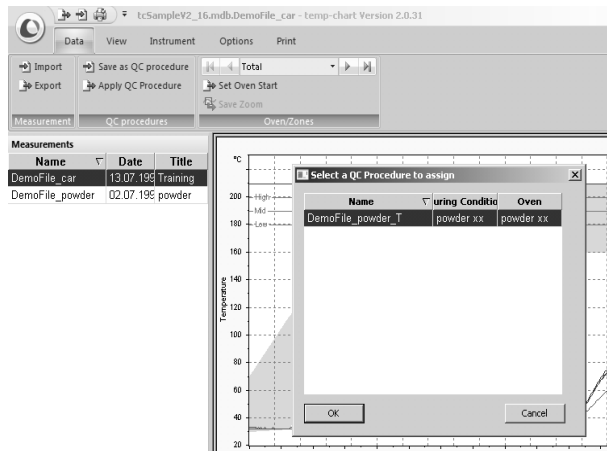
- Together with the organizer during the preparation of the measurement, this leads directly to an automatic analysis of the measuring data according to the assigned objects after the import of the measurement:



- When importing the measuring data into the database first the QC-Procedur and then the desired measuring file is to be select, then directly the analysis of the measuring data takes place after the import.



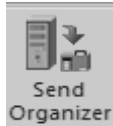
- In the menu data with the function „Apply QC Procedur“. This way, a QC Procedur can be assigned to an already imported measurement. So it is also possible to evaluate the results of measurements with a new analysis (e.g. changed curing conditions or another Cure chart)



3 Handling and Preparation

3.1 Prepare a Measurement

Connect the temp-gard to the PC or insert the USB-Stick. Then activate the Instrument tab, make sure you have selected the appropriate connection settings and press



Select an organizer in the upcoming dialog and press OK.

The Organizer will now be transferred to the USB stick or the connected device and can be used for new measurements. Already existing QC-procedures can be selected and linked likewise.

3.2 Read Measurement Data

Step 1:

Measurements can be imported from the instrument either directly (connected via USB or the serial Port) or via a transport medium (an USB-stick in case of a temp-gard 6p or temp-gard-12p, or a SRAM card in case of temp-gard 8p). The procedure is almost the same in all cases.

For a temp-gard 12p for example:

- Switch the temp-gard logger on
- Connect the USB Stick to the temp-gard logger
- Data will be transferred to the stick automatically. If there are Organizers on the stick, the Selection Menu „Configuration Files“ appears

and a selection must be made. With “NO Configuration” the Organizer which is already loaded remains in the Instrument and the Data are sent to the stick. If another Organizer is loaded, the Data in the instrument are deleted after transferring to the USB.Stick.

- Remove the stick from the logger and connect it to your PC
- In the **temp-chart** software
- Select the tab, fill in the connection choices and press



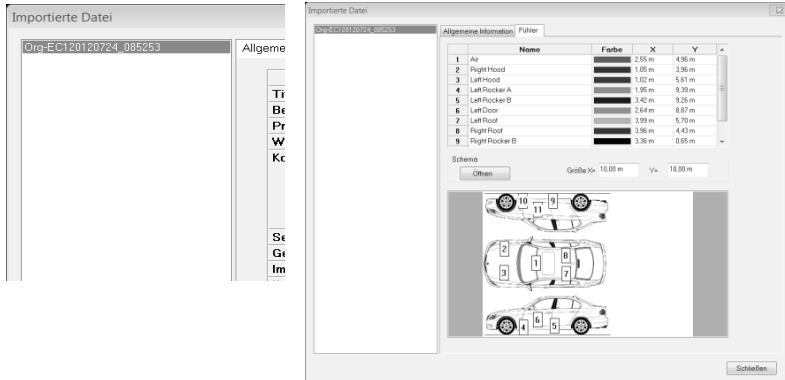
Step 2:

There may be more than one measurement file on the stick. Please select the appropriate file(s) and then fill in the organizer information:

A screenshot of a software dialog box titled "temp-gard Daten importieren". On the left is a file tree with a folder icon and the text "-none-". Inside the folder, there are two files: "O-Primer00.ed3" and "Org-EC100.ed3", with the latter being selected. To the right of the file tree is a form with the following fields: "Name" (containing "Org-EC120120724_085253"), "Einstellungen" (a section header), "Gerät" (containing "1065602"), "Messzeit" (containing "00:05.0"), "Messdauer" (containing "53:55.0"), and "Fühler" (containing "11"). Below these fields is a checkbox labeled "USB Stick nach Import löschen". At the bottom right are two buttons: "OK" and "Abbrechen".

Note that this information is already filled in if the device was prepared with **temp-chart** and the used organizer does still exist.

As soon as you press Close the selected measurement(s) is/are imported and opened in the software.



These windows contain only the control information if the instrument was not prepared with an organizer.

As soon as you press close, the selected measurement is imported and opened inside the software.

This data is already registered, if the instrument was prepared with temp chart and the used organizers still exists.

As soon as you press close, the selected measurement is imported and opened inside the software.

If the measurement was taken with a QC procedure, an automatic analysis takes place. Otherwise, the QC procedure can be selected with the data transfer.

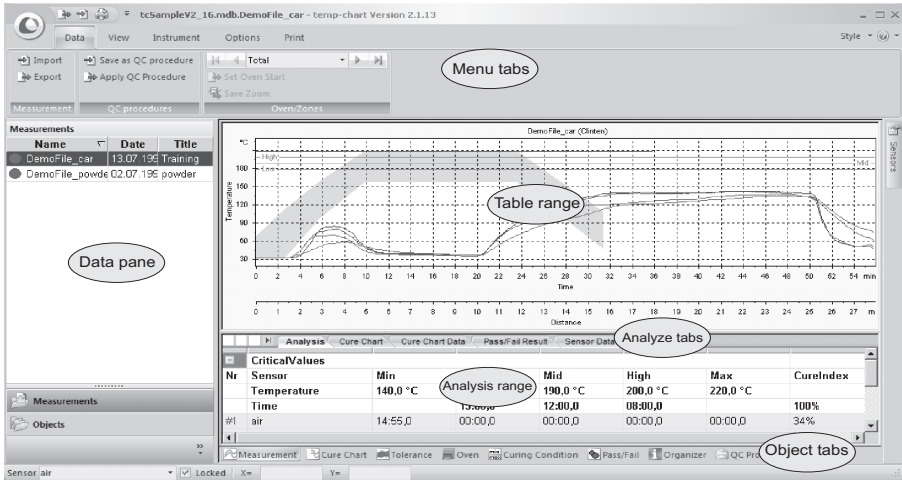
Step 3:

It may be necessary to adjust the oven start position. In this case

- Go to the Data menu
- Execute function Set Oven Start
- A vertical line will appear which can be fixed on the real start point

4 Display and Analysis

4.1 The Display



The **temp-chart** screen is made up of the following elements (from top to bottom):

- the Caption Bar showing the name of the program as well as the name of the active database and the active measurement
- the Menu for selecting and executing commands,
- the Database pane with the stored measurements and objects,
- the Display Area which is divided into several pages accessible via the object tabs,
- the Status Bar that shows sensor values and coordinates.

The Display Area is made up like a notebook. You can open the page of your choice by clicking on the Object tabs at the lower margin of the area:

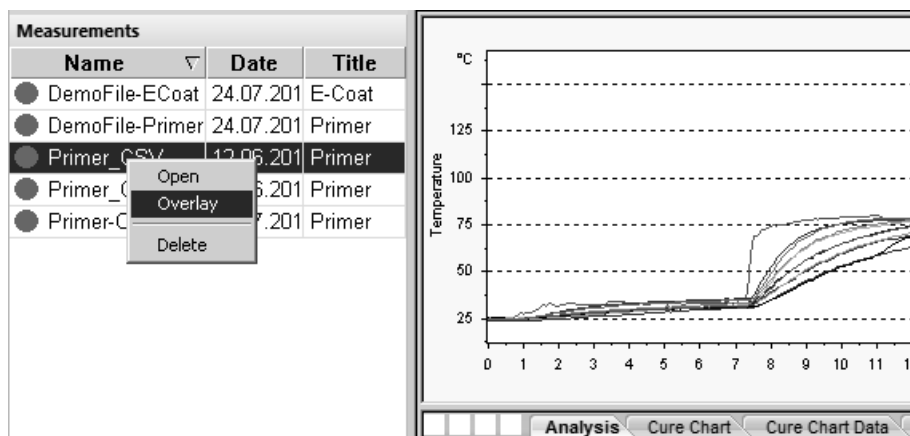
The Measurement page is again split into two areas (which may be resized by dragging the divider line):

- the Chart pane with the temperature curves, and
- the Analysis pane with selected analysis results

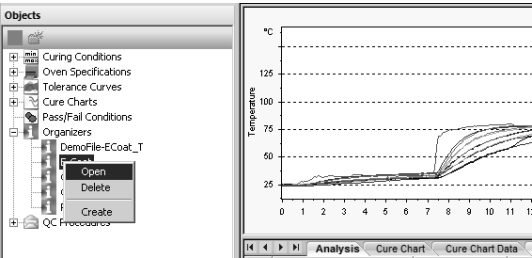
The other pages allow for inspection/assignment/changes of various helper objects:

- Cure Chart
- the Tolerance Curve
- the Oven settings
- the Curing Condition
- Pass/Fail
- the Organizer, and
- the QC-Procedure

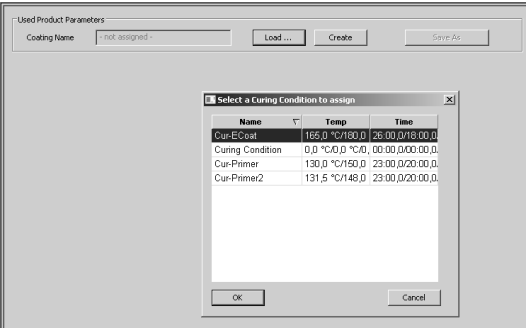
With the right mouse button in the measurements window you can open and delete measurements and in addition you can temporarily overlay them.



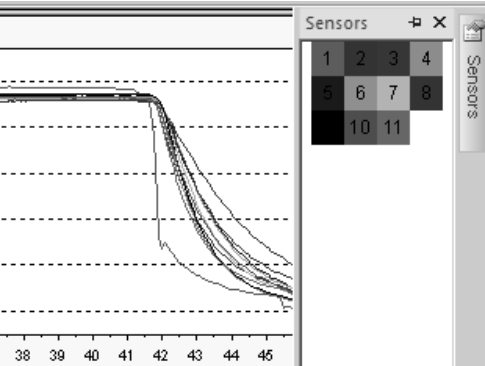
With the right mouse button in the Objects window you can open, delete or create objects.



The Tabs below the analysis range fulfill the same function. By clicking on the Tab you get to its functions.



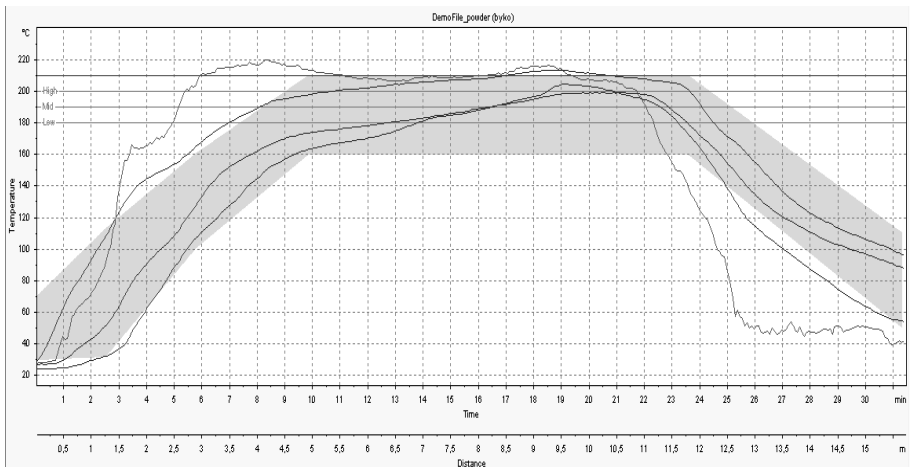
By clicking the Sensor Tab on the right hand side of the graphic you open the selection of the sensors. Here, you can switch them on or off by clicking them..



4.2 Analyze Measurement Data

All measurements that have been acquired with this software were saved under a certain name. Directly after the import of the measuring data, the measuring curve will be indicated in the chart range, all analysis tables are closed and can be opened if necessary. They can be searched for and opened in the database pane at any later point of time. If a measurement is not already visible, please go to the database pane and double click the desired measurement.

4.2.1 The Chart area



The following things are indicated:

- the temperature curves of all sensors; individual curves can be indicated or hidden with the button in the sensor window.

Pull the mouse over the curves, and the program shows the data values of the time and temperature axes at the lower edge of screen.

If you would like to expand a certain section of the measurement you can either:

- move the axes with the mouse or
- draw a square over the section, which interests you, by keeping the mouse button pressed.

A following double click indicates the cutout (See section: Scale Axes).

- the tolerance curve, which can be indicated or hidden with the button T in the sensor window.

With the scaling of the temperature and time axes preset by the program, the entire measurement is visible. However, you can also select a fixed scaling in the axis section of the View-menu in order to be able to easily compare various measurements. Here, you can also determine if and where distance and zone axes shall be drawn, whether or not a scaling grid is shown and which auxiliary lines are given.

You can also use this page to define zone-independent measurement sections. Please also refer to the chapter: Scaling.

Immediately below the chart you will see the Analysis pane (resize by dragging the divider line):

	CriticalValues					
Nr	Sensor	Min	Lower	Mid	Upper	Max
	Threshold	140,0 °C	180,0 °C	190,0 °C	200,0 °C	220,0 °C
	Duration		15:00,0	12:00,0	08:00,0	
#1	air	20:35,0	17:25,0	16:50,0	16:15,0	00:00,0
#2	object 1	23:05,0	17:30,0	15:55,0	12:45,0	00:00,0
#3	object 2	19:25,0	10:35,0	06:20,0	00:00,0	00:00,0
#4	object 3	17:15,0	09:20,0	06:00,0	02:10,0	00:00,0
	Cure Index					
	Peak/Threshold/Slope					
	Statistics					

4.2.1.1 Scale Axes

The chart view normally shows the entire measurement. If you want to look at a particular detail or determine measurement sections for analyzing purposes (e.g. an ascending or descending branch for slope calculation) you have two options:

4.2.1.2 Zoom Square

Draw a square around the part of the graphic that you are interested in by moving the mouse over it while holding the mouse button pressed.

Releasing the mouse button will display the zoom square. You can change the position and size of the square by dragging the corners.

When the zoom square is showing the section as you want it you can activate it by double-clicking the mouse.

Before, you have to choose "Autorange" in the menu View -> Axes -> Edit at the item Time from the Axes list.

Note: The shape of the cursor indicates whether you are only moving the square to a different position or changing its size.

4.2.1.3 Moving the Axes

Move the cursor into the scaling legend of an axis (e.g. of the temperature axis in order to change the temperature section, or the time axis in order to change the time section) and „drag“ the axis in the desired direction by holding the mouse button pressed.

When you release the mouse button the axis will be displayed in the new scaling.

If you only want to move the axis, i.e. leave the expansion as it is, you must hold the shift key pressed while moving the mouse!

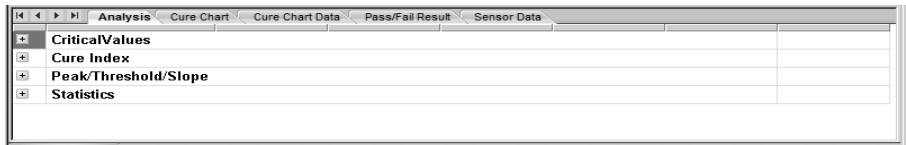
Note: The shape of the cursor indicates whether you are only moving the axis to a different position or changing the size of the section.

4.2.1.4 Restoring the Original Scaling

In order to restore the original scaling you can

- Right click anywhere in the chart area and select the Rezoom command in the context menu.

4.2.2 Analysis area



The analysis of the measurement is indicated in the analysis window. It takes place via application of the objects: Cure Chart, Tolerance Curve, Oven, Curing Conditions, Pass/Fail

These objects are automatically assigned if you work with QC procedures (see section 2,7) If this is not the case, the assignment can be made by the Object Tabs. Here, objects already provided can be opened, or new one's be created.

4.2.2.1 Critical values

CriticalValues						
Nr	Sensor	Min	Lower	Mid	Upper	Max
	Threshold	140,0 °C	180,0 °C	190,0 °C	200,0 °C	220,0 °C
	Duration		15:00,0	12:00,0	08:00,0	
#1	air	14:55,0	00:00,0	00:00,0	00:00,0	00:00,0
#2	Sensor 1	00:00,0	00:00,0	00:00,0	00:00,0	00:00,0
#3	Sensor 2	18:15,0	00:00,0	00:00,0	00:00,0	00:00,0
#4	Sensor 3	00:00,0	00:00,0	00:00,0	00:00,0	00:00,0

The table of results consists of five columns:

- Min** indicates for how long the curve was at the minimal threshold value
- Low** indicates for how long the curve was at the lower threshold value
- Mid** indicates for how long the curve was at the mean threshold value

- High** indicates for how long the curve was at the upper threshold value
- Max** indicates for how long the curve was at the maximum threshold value
- Cure Index** which was computed on the basis of the equivalent holding time

Note: The first two lines in the header show the set threshold values and duration times; to change them, please use the Curing conditions page.

4.2.2.2 Cure Index

Cure Index					
Nr	Sensor	Lower	Mid	Upper	EquTime
#1	air	00:00,0	00:00,0	00:00,0	04:10,7
#2	Sensor 1	00:00,0	00:00,0	00:00,0	02:50,2
#3	Sensor 2	00:00,0	00:00,0	00:00,0	04:20,4
#4	Sensor 3	00:00,0	00:00,0	00:00,0	02:30,8

The table Cure index permits a simple evaluation of the curing process. Here the Cure index - a measure for the quality of the hardening process - is computed. An optimal Cure index of 100% is reached, if the equivalence time for the respective sensors is calculated and indicated in the column Equ Time corresponds with the period passed at the reference temperature (middle temperature).

Similar to the results in the „Critical Values“ section, the „Equivalent Time“ index is calculated to indicate the quality of the heating process:

The table of results consists of four columns:

- Low** indicates for how long the curve was at the lower threshold value
- Mid** indicates for how long the curve was at the mean threshold value
- Upper** indicates for how long the curve was at the upper threshold value

Equ Time	indicates the corresponding equivalent heating time (see Equivalent Time)
Cure Index	in the column Cure Index, the % is computed using the middle temperature time as the optimal curing = 100%. All values above 100% are marked as over-cured

4.2.2.3 Peak/Threshold/Slope

+ Peak/Threshold/Slope						
#3	Sensor 2	143,0 °C	42:25,0	00:00,0	55:55,0	2,6 °C/min
#4	Sensor 3	135,0 °C	46:25,0	00:00,0	55:55,0	2,2 °C/min

The table of results consists of five columns:

Peak	indicates the peak temperature
TimeToReach	indicating the time at which the peak was reached
TimeBelow	indicates for how long the curve was below the threshold value
TimeAbove	indicates for how long the curve was above the threshold value
Slope	for the temperature slope of the current section

4.2.2.4 Statistics

Statistics						
Nr	Sensor	Min	Max	Mean	StdDev	PeakTime
#1	air	32,0 °C	143,0 °C	93,7 °C	43,3808	41:50,0
#2	Sensor 1	32,0 °C	138,0 °C	86,0 °C	39,8884	47:00,0
#3	Sensor 2	32,0 °C	143,0 °C	92,5 °C	44,657	42:25,0
#4	Sensor 3	32,0 °C	135,0 °C	85,1 °C	38,1762	46:25,0

The table of results consists of five columns:

Min	indicates the minimum temperature
Max	indicates the maximum temperature
Mean	indicates the mean temperature
StdDev	indicates the standard deviation of the temperature values
PeakTime	indicates the time up to the maximum temperature value

4.3 Print Protocol

temp-chart offers a variety of protocol types, in general, the standard protocol is the one most commonly used for print-outs. It shows not only the comments and measurement descriptions but also the charts and selected analysis results.

- Open the desired measurement unless it is already loaded.
- Activate the chart page and ensure that the entire measurement (resp. the section that you want the protocol of) is visible.
- Activate the Print tab and open the dialog to Define Print Layout

Printing Options

Information elements

☒Title

☒Operator

☐Product

☐Process

☒Site

☒SerialNo

Print page

☒Standard Page

☐Analysis Page

☐Graphics Page

Margins

Print

Preview

Save

- Choose the format „Standard“ and confirm with Print or Preview:

BYK Gardner

PrimerOrg20100721_102711(DC-Pr-Ecoat)

Information

Title: Primer

Operator: Rottmüller

Product: kombi

Site: munich

SerialNo: 1005567

Started: 21.07.2010 10:27:11

Imported: 08.08.2012 11:12:38

Calibrated: 00.00.00

Sampling Rate: 00.05.0

Trigger Mode: None

Duration: 01:00:40

Comments

Time

Temp

1

2

3

4

5

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