



CYBERCHROME
Color Control for Industry

Instrument Performance

Software Manual



Instrument Performance Manual

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Overview

The purpose of the Instrument Performance software is to test and validate the long term repeatability performance of a color spectrophotometer using a stable set of ceramic color standards. Performing the test on a regular basis, such as weekly or monthly, assures and documents that your spectrophotometer is not drifting out of spec over time and that your color measurements are accurate and repeatable. This documentation can be used to validate the performance of your spectrophotometer for color compliance programs and international standards conformance.

Tile Series

- A series of stable ceramic color standards are used to track the performance and long term repeatability of a spectrophotometer
- CyberChrome recommends tile sets engineered especially for this purpose by Mount Baker Research or CERAM
- Any number of tiles can be used
- They can be either calibrated or uncalibrated
- If calibrated, then the calibrated values for each tile become the reference baseline for comparison
- If uncalibrated, then a baseline reference is established either on a master instrument or on the target instrument
- All subsequent readings are compared to this baseline

Reports

- Each time the tile set is measured, a report is generated
- The report compares the spectral readings of today's test with the baseline data and calculates a color difference between them.
- The color difference data (including DL^* , Da^* , Db^* , and DE^*) are reported
- The average DE over the set of tiles is computed and compared to a tolerance for this instrument
- Each tile is also compared to a tolerance for a single tile and a Pass/Fail assessment is reported for each as well as the average of all tiles

Data Storage and Other Reports

- The data is archived in a database so that reports on any given date can be retrieved
- The Instrument Performance database can store and manage the data for a number of instruments and a number of tile sets; it can be stored on a network
- For each tile, additional reports can be displayed in the OnColor software
- The Color Plot Report shows the scatter plot (for one colored tile at a time) in DL^* , Da^* , and Db^* coordinates.

- The Spectral Data for each tile can be viewed. This report can be useful in troubleshooting out of tolerance readings and diagnosing instrument failures.
- The Statistics Report shows a trend chart (for each tile) which allows the user to graphically see the performance of the instrument over time.
- A save-set file for each tile can be saved where the data can undergo further reporting, exporting, and manipulation.
- With the OnColor Premium version of the software, many additional reports can be displayed

What you need – Tile Set

You will need a set of ceramic tiles specially designed to perform this test. Tile sets that are suitable for this testing process include the Profiler Tile Set (32 tiles), Diagnostic Tile Set (16 tiles), or the Mini-Diagnostic Tile Set (8 tiles) from Mount Baker Research; or a set of the CCS II tiles (12 tiles) from CERAM. Any of these sets can be purchased from CyberChrome, the vendor, or several other suppliers. Please note that these tile sets have been specially designed and screened for many physical qualities. Common bathroom or kitchen tiles are not a suitable replacement.

Any number of tiles can be used for the test, but once the baseline data is established, the exact same tile set must be used for each test.

While it is possible to use color standards other than ceramic tiles, we don't recommend it. These tile sets have been specially designed and selected for their durability, translucency, thermochromism, planarity and long-term color stability.

The Tile Set can be either calibrated or uncalibrated. If it is calibrated, then the supplied calibration values must be entered as the reference or baseline data and your instrument will be compared to these calibrated values. Improved inter-instrument agreement can be obtained by using OnColor Profiler software. The OnColor Profiler is used to make a target or test instrument read the same as a master instrument. This technology can be used to make instruments read closer together—especially when they are different makes and models. To learn more about instrument profiling, go to

<http://www.cyberchromeusa.com/instrument-profiling/>

Or read our blog on this topic at <http://www.cyberchromeusa.com/Color-QC-and-Matching-Blog/bid/19695/How-to-improve-Inter-instrument-Agreement-with-Instrument-Profiling>

You can also use data from another master instrument as the reference data, such as the data measured on a master instrument used for instrument profiling with OnColor Profiler. In this case, your instrument will be compared back to the

master instrument and you will know how it is performing relative to that instrument.

The final option is to set the baseline data using the test instrument. Before setting the baseline data on the test instrument, it should be serviced or calibrated by the manufacturer and certified. You want to make sure your instrument is in good working order before setting the baseline data, as this becomes the point of reference for all future instrument performance tests.

If you are setting your own baseline data on the test instrument, then we recommend that you collect measurement data for the tile set over a period of 5 days. You can use the OnColor software to read the tiles once a day for 5 days; store the data and then create an average of the readings over the 5 days. This average obtained for each tile becomes the baseline data. Follow the procedure in the Appendix A to collect the baseline data over a five day period.

You will need this baseline or reference data—from whatever source—before you can continue. The reference data can be measured real time; recalled from a save-set WSV document; or recalled from an OnColor Database of Standards. The later option cannot be used with the stand alone version of Instrument Performance.

Before you begin the Instrument Performance Test

1. Connect your spectrophotometer to the PC, then go to **Options-->>Communications** and at the Instrument drop down list, select the model of instrument that you are connecting. Then click on the “**Test Settings**” button to test the communications. If the test was successful, click OK and proceed to the next step. If not, then you will need to troubleshoot the connection and resolve the problem. Refer to the OnColor Help for more detail instructions on how to connect your instrument. . While many instruments store the calibration data in memory on-board the instrument, certain other spectrophotometers need special calibration files to be loaded in a specific directory. You can locate these drivers on the Installation CD in the \Support folder and then under the manufacturer’s sub-folder.
2. Before calibrating the instrument, make sure that it is set to the instrument status that you want for the performance test. This must match the status of the baseline data for the reference instrument (namely the specular component, SCI or SCE). Go to **Options-->Instrument Settings** to check these settings and change them if needed.
3. Check the temperature in the room and make sure that it is within +/- 2° F. of the temperature when the tiles were read for the baseline data. While the tile colors were specially chosen to minimize thermochromism, certain tiles in the

red, yellow, and orange region can exhibit some color change due to temperature. The tile set needs to equilibrate to this temperature for at least 30 minutes before performing the test.

4. Inspect the tiles and clean any noticeable dirt, lint, smudges, or fingerprints according to the manufacturer's guidelines.

5. Finally, calibrate the instrument in OnColor: Go to **Options-->Calibration** or type the letter "C" on the keyboard, or click on the Calibration icon on the toolbar to initiate the calibration procedure. Follow the prompts to calibrate your instrument.

6. You are now ready to begin the test. To launch the Instrument Performance module, click on **Options-->Instrument Performance**. Note that there are three tabs on this dialog box as shown below:

Instrument Performance

Long Term Setup Report

Tile Series

CCS SERIES II
CCS SERIES II 45/0
MBR DIAGNOSTIC SET A D/8
MBR TEST TILES 45/0
MBR TEST TILES d8

Number of Tiles in the Series: 10

Single Tile Tolerance Warning: 0.30

Reference Data:

EB CM-2600d

Instrument Name: CM-2600d

Serial Number: 1001395

Target Instrument

Name: Demo Mode

Serial Number: 123456-0

Description: EFC CM2600d

Measure Tiles

OK Cancel Apply Help

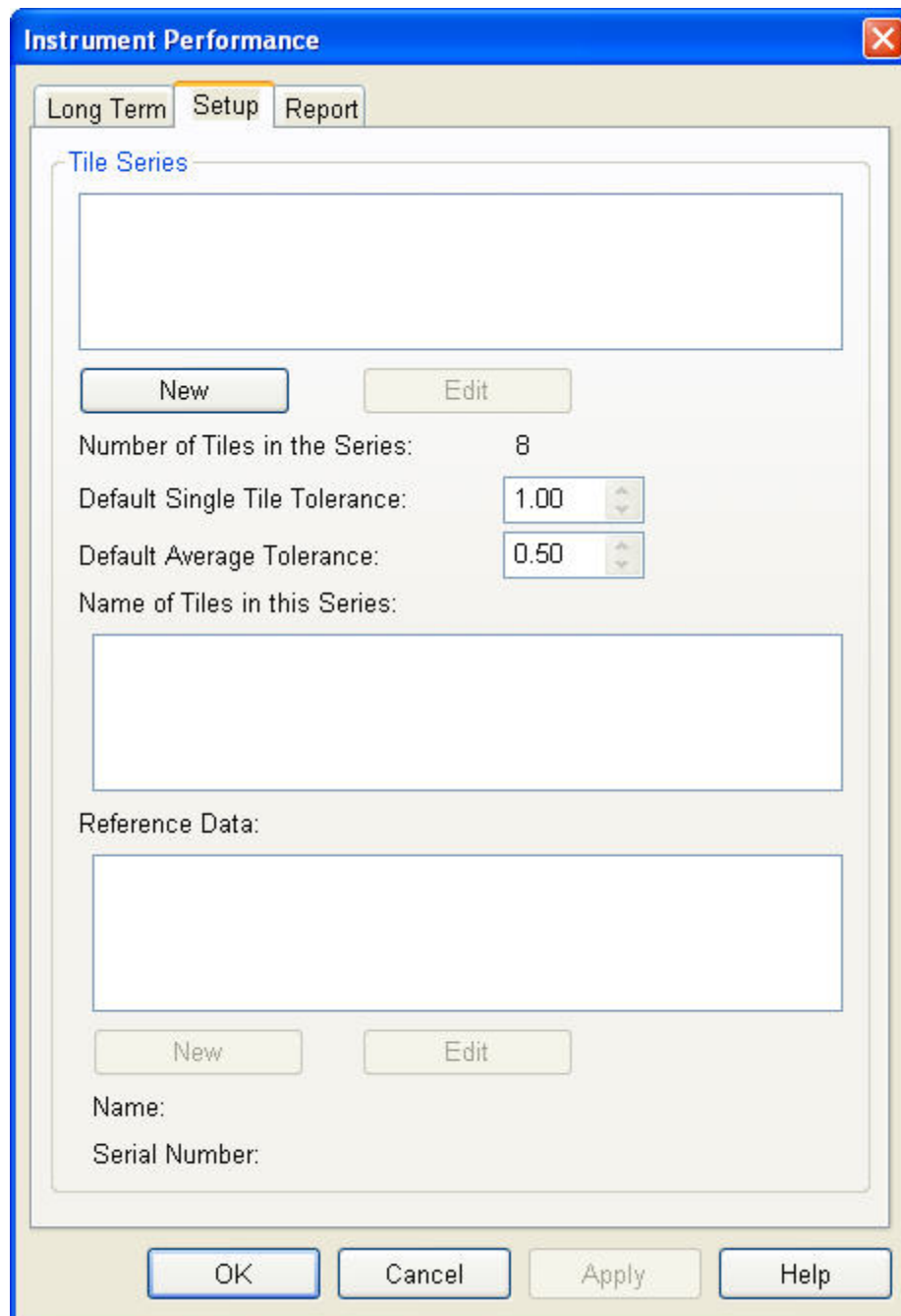
Long Term Tab – is used for the routine test procedure to measure the tile set and report the data.

Setup Tab – is used to create the Tile Series and enter the Reference or baseline data from the Reference instrument.

Report Tab – is used to generate a report for any previous performance test that was run. All of the results are stored in the Instrument Performance database and the user can go back at any time and view or print a report for any other point in time.

Setting up the Tile Series and Reference Data Using the Setup Tab

Before you can perform the Instrument Performance test for the first time, you will need to setup your Reference Instrument and Reference Data on the Setup Tab.



The screenshot shows the 'Instrument Performance' dialog box with the 'Setup' tab selected. The 'Tile Series' section contains a list box, 'New' and 'Edit' buttons, and fields for 'Number of Tiles in the Series' (8), 'Default Single Tile Tolerance' (1.00), 'Default Average Tolerance' (0.50), and 'Name of Tiles in this Series'. The 'Reference Data' section contains a list box, 'New' and 'Edit' buttons, and fields for 'Name' and 'Serial Number'. The bottom of the dialog has 'OK', 'Cancel', 'Apply', and 'Help' buttons.

Instrument Performance

Long Term **Setup** Report

Tile Series

[List Box]

New Edit

Number of Tiles in the Series: 8

Default Single Tile Tolerance: 1.00

Default Average Tolerance: 0.50

Name of Tiles in this Series:

[List Box]

Reference Data:

[List Box]

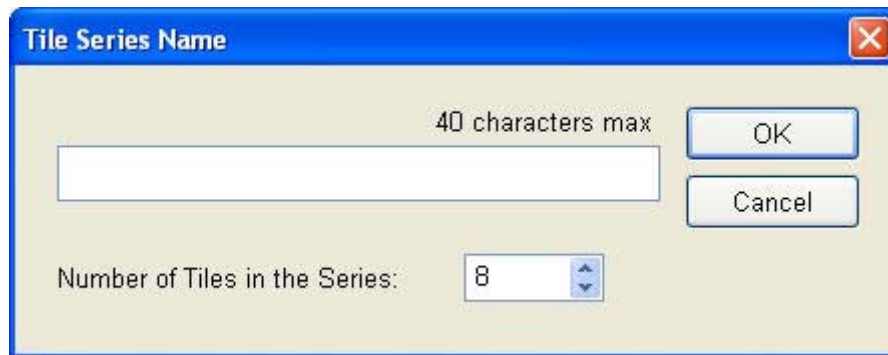
New Edit

Name:

Serial Number:

OK Cancel Apply Help

1. Click on the **NEW** button under the Tile Series list box



Tile Series Name

40 characters max

OK

Cancel

Number of Tiles in the Series: 8

2. Enter a name for this Tile Series, such as Diagnostic Set #1, or CCSII Set #123. In this case the name was MBR Mini-Diagnostic Set 1. Enter the Number of Tiles in this Series. The maximum number of tiles is 32; your entry here depends on how many tiles in the set you will be using. Click OK to complete this step.
3. Enter the tolerances that will be used for this tile set with this instrument. These tolerance specifications should be based on realistic working tolerances which consider the instrument repeatability and inter-instrument agreement specifications from the manufacturer along with the working environment. A reasonable starting point for this would be for a Single Tile Tolerance set to 0.50 DE with the Average Tolerance at 0.25 DE. This means that any one tile can deviate as much as 0.50 DE from the reference data, but the average of all tiles must be less than 0.25 DE in order for the instrument to pass.
4. You can then edit the names of each tile by double-clicking on Tile 1, Tile 2, Tile 3, etc to rename them to the color name given on the actual tile. An example is shown below

Instrument Performance

Long Term Setup Report

Tile Series

12-Tile Diagnostic Series SCI
 12-Tile Series Avg of 5 Baseline sce
 12-Tile Series Avg of 5 SCE

New Edit

Number of Tiles in the Series: 12

Default Single Tile Tolerance: 0.50

Default Average Tolerance: 0.25

Name of Tiles in this Series:

Ultra White
 Black
 Light Grey
 Medium Grey
 Dark Grey

Reference Data:

CM-2600d S/N 00359

New Edit

Name: CM-2600d
 Serial Number: 1001395

OK Cancel Apply Help

- After editing the names of the tiles, click on the **NEW** button under the Reference Data list box. To enter a description of this reference data, such as where it came from, whether it is from a Master Instrument, or what instrument it is from and the status of the specular component (SCI/ SCE), click on the drop down arrow and then click on **<Add New...>** and enter the description of this Reference Data and then check the appropriate box for SCI or SCE data and click OK.

Reference Data

Description 40 characters max
 CM-2600d S/N 00359

OK
 Cancel

Name: (none)
 Serial Number: (none)

Specular Component
☒ SCI (Default) ☐ SCE

6. Then depending on where the Reference Data will be obtained, click on either:
7. **Measure** – to measure each tile to establish the data real time now. (please be sure that the instrument is calibrated and tiles are equilibrated to the temperature that you will normally be testing at)
8. **Recall from Database** – to recall the Reference Data that was previously stored in a Database of Standards. This option is only available with the full QC and Match versions of OnColor that support the Database of Standards feature. It is not available in the stand-alone Instrument Performance software. See the instructions below for this option.
9. **Recall from Document** – to recall the Reference or baseline data from a save-set WSV document. This is the file type supported by all versions of OnColor. Use this option to measure, average, and store the baseline data from any instrument and then recall the file here. See Appendix A on how to set the baseline data from an average of readings taken over 5 days.
10. Follow the instructions in the corresponding section below for the option you are using.

Reference Data

Description
 < Add New... >

OK
 Cancel

Instrument Name: (none)
 Serial Number: (none)

Tile Reflectance Data for Reference Data
 Measure
 Recall from Database Recall from Document

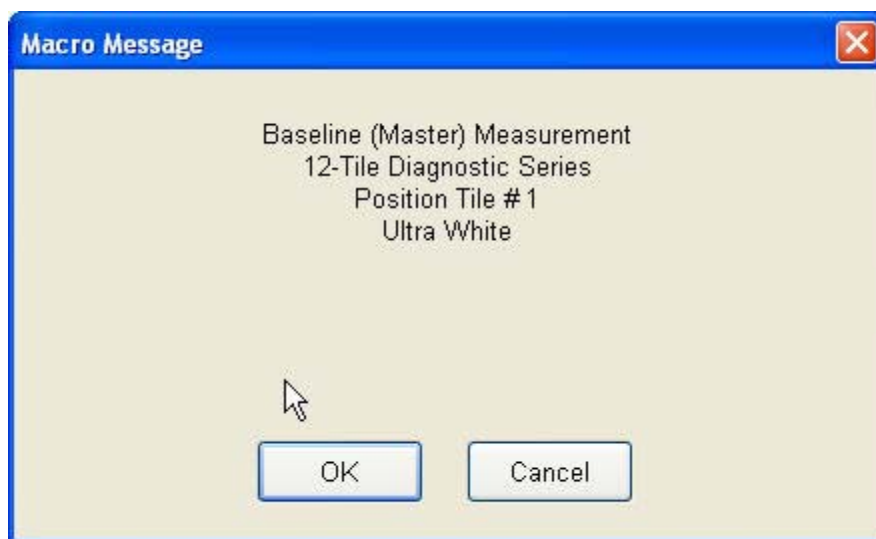
Measure Option – How To Measure the Reference Data on the Reference Instrument

The example below shows the Measure option. Skip to the sections on Recalling from the Database or Recalling from a Document if you will be using either of these options.

1. After clicking on the **MEASURE** button in the Reference Data dialog box, the following message is displayed:



2. Click OK to continue the Macro and begin measuring the tiles. Please note the room temperature before beginning.



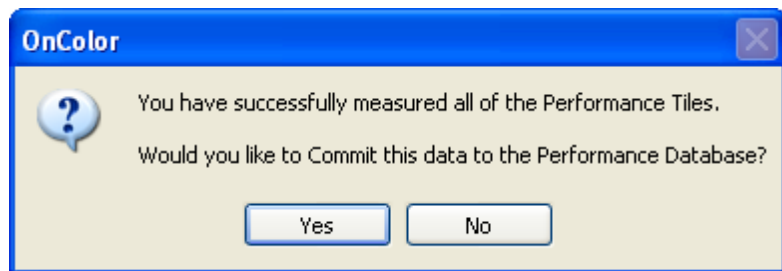
3. Follow the screens prompts to position and measure all of the tiles in the series. Note that the tile names are already entered as the default. You can add the room temperature in the notes field so that it is recorded, then click OK to initiate the measurement.

4. Review the data for the tile measurement as the macro instructs. Click OK to continue to the next tile.

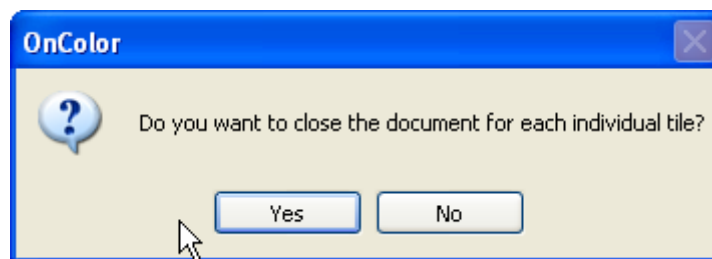


5. Continue to follow the screen prompts to measure all of the tiles in the series. After the last tile is read and reviewed, the following message is displayed. Click OK.

6. If you are satisfied with the data, then click on YES to save the baseline data to the Performance Database. If you want to re-measure any of the tiles or change anything, then click NO and begin again.



7. The final step is to close each document. During the process of measuring the tiles, one document or WSV file is generated for each tile. This is to allow the advanced user to do a more in-depth analysis of the data after several tests have been performed. The user can look at long term trends and analyze them over different regions of color space. Normally the user will choose to close the documents without saving them.

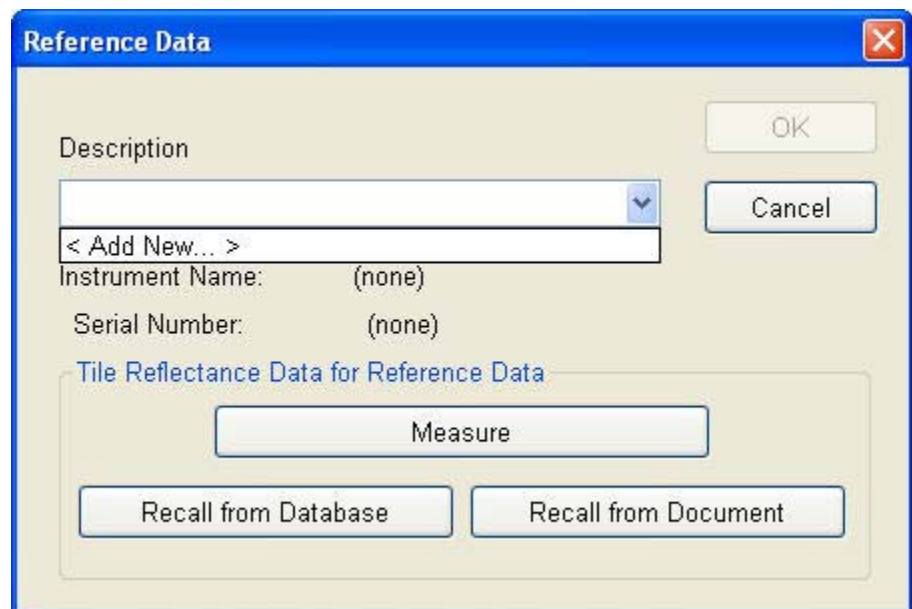


8. This completes the setup and entry of the Reference Data and Instrument. You are now ready to perform the routine long-term instrument repeatability test. If you are setting up a Tile Series using the Recall from Database option, follow the instructions below. If you are using the Recall from Document option, skip to that section below.

Recall from Database Option – How To Recall the Reference Data from an OnColor Database of Standards

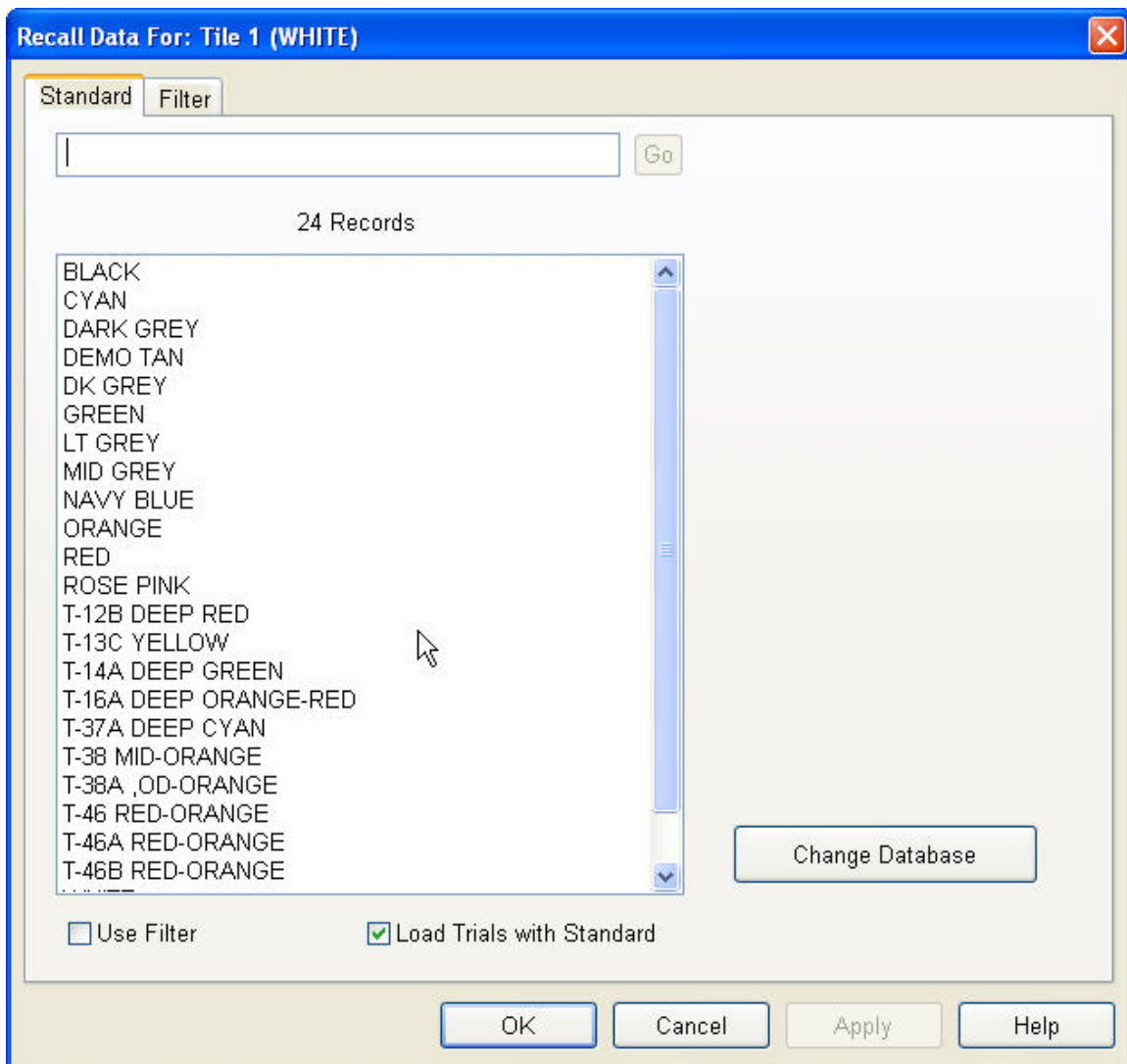
1. This option is available for users of the QC Premium and Match levels of OnColor software. It is not available with the stand alone version of Instrument Performance. Before proceeding with this option, please open the Database of Standards in OnColor that contains the reference data for each tile in the series.
2. Click on **Options-->Instrument Performance** and go to the **Setup** tab.

3. Click on the **Recall from Database** button.

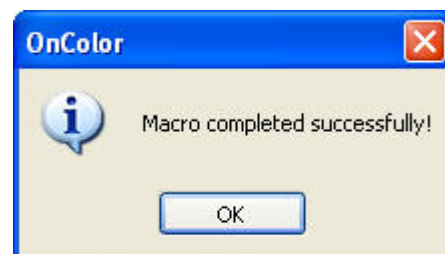


4. This message is displayed.

5. Click OK to continue. In the next window, click on the name of the Standard that you want to recall for the first tile in this series and then click OK to recall it.

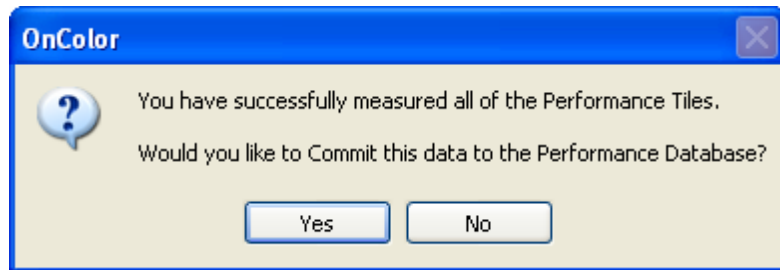


6. Review the data for this tile and click OK. The above dialog box will be shown again for you to recall the second tile in the series. Highlight that standard and then click OK to recall it.
7. Review the data and then continue this procedure as directed by the macro for the remainder of the tiles in the series. After the last tile data has been recalled and reviewed, the following message will be displayed.

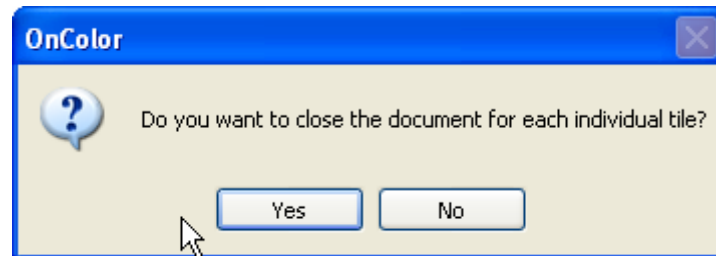


8. Finally, you will be asked if you want to commit this data to the Instrument Performance database.

9. If you are satisfied with the data, then click on YES to save the baseline data to the Performance Database. If you want to re-measure any of the tiles or change anything, then click NO and begin again.



10. The final step is to close each document. During the process of measuring the tiles, one document or WSV file is generated for each tile. This is to allow the advanced user to do a more in-depth analysis of the data after several tests have been performed. The user can look at long term trends and analyze them over different regions of color space. Normally the user will choose to close the documents without saving them.

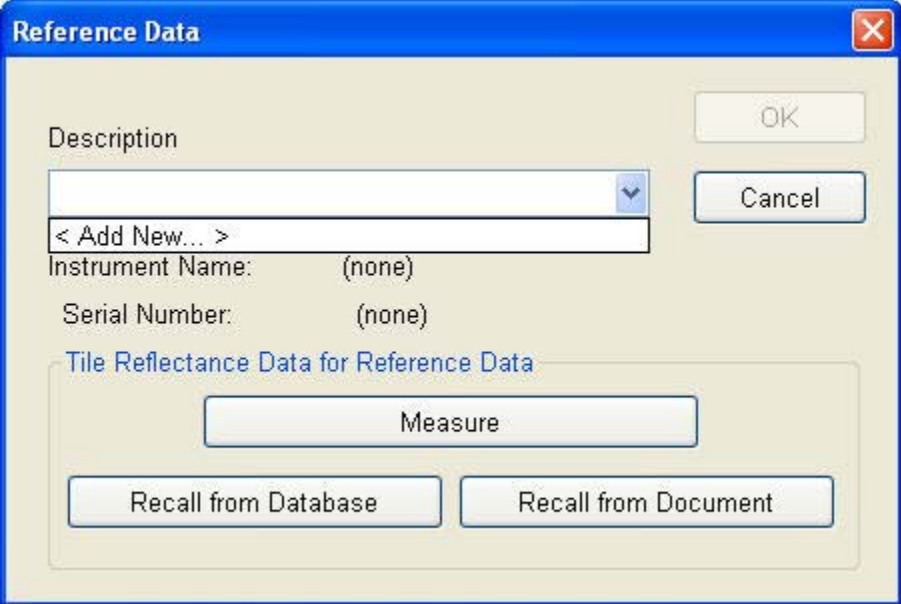


11. This completes the setup and entry of the Reference Data and Instrument. You are now ready to perform the routine long-term instrument repeatability test.

Recall from Document Option – How To Recall the Reference Data from a Save-set Document

This option is available in the stand alone version of Instrument Performance as well as in the full OnColor software package. If you followed the procedure in Appendix A to create an average of multiple readings over a period of 5 or more days, you can use this option to setup a new tile series and load the resulting data into the Instrument Performance database.

1. Click on the **Recall from Document** button. This will open a macro that will guide you through the process of recalling the individual tile data from this save-set document.



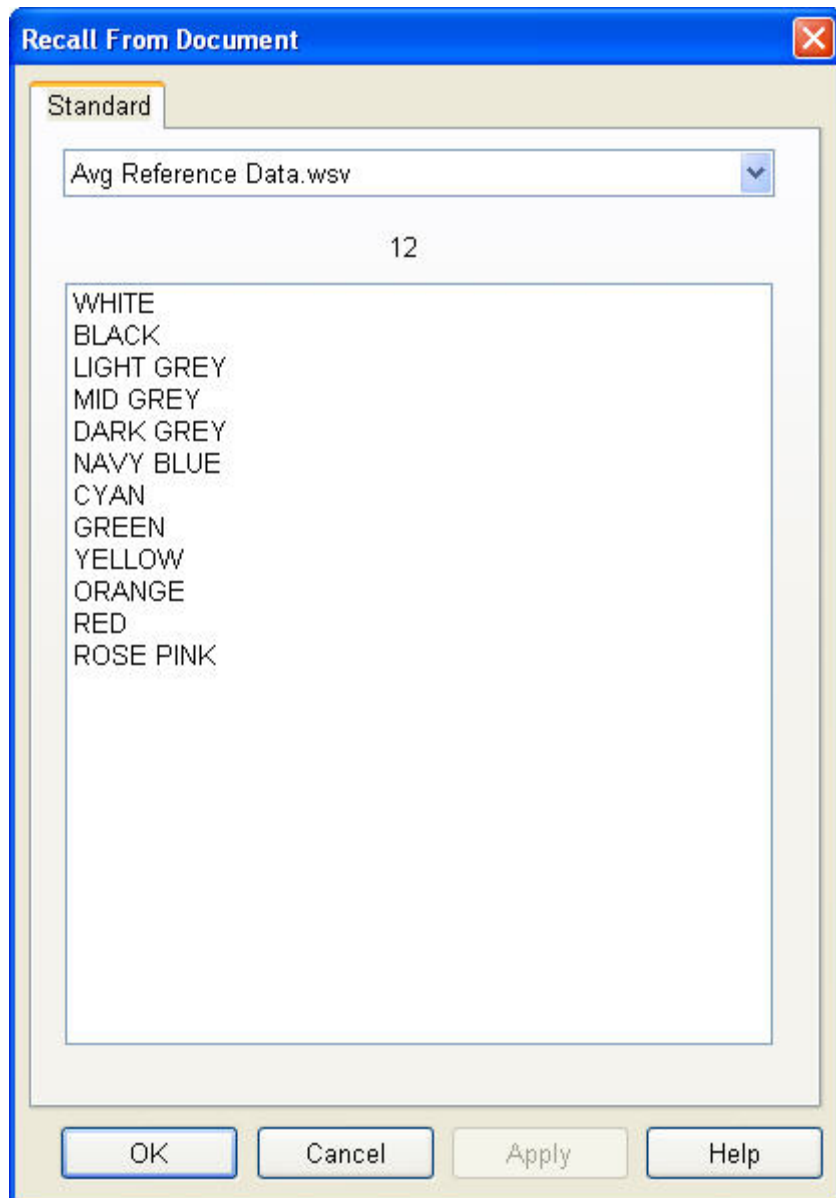
The 'Reference Data' dialog box has a blue title bar with a close button. It contains a 'Description' label above a text field with a dropdown arrow. Below this is a button labeled '< Add New... >'. Further down are labels for 'Instrument Name:' and 'Serial Number:', both followed by '(none)'. A section titled 'Tile Reflectance Data for Reference Data' contains a 'Measure' button. At the bottom are two buttons: 'Recall from Database' and 'Recall from Document'. 'OK' and 'Cancel' buttons are in the top right corner.



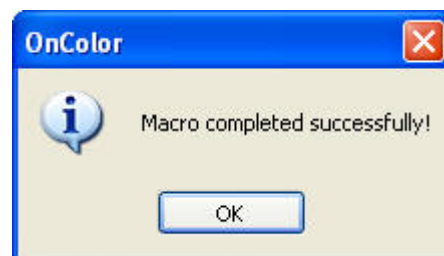
The 'Macro Start' dialog box has a blue title bar with a close button. It contains the text: 'You may press F9 to stop or pause the Macro while it is running.' At the bottom are three buttons: 'OK', 'Cancel', and 'Help'.

2. The following message is displayed.

3. Click OK to continue. In the next window, click on the name of the record that you want to recall for the first tile in this series and then click OK to recall it.

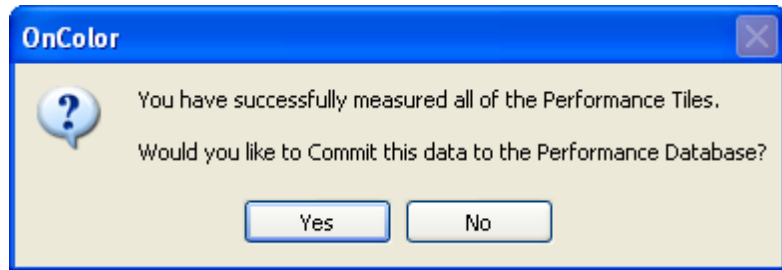


4. Review the data for this tile and click OK. The above dialog box will be shown again for you to recall the second tile in the series. Highlight that standard and then click OK to recall it.
5. Review the data and then continue this procedure as directed by the macro for the remainder of the tiles in the series. After the last tile data has been recalled and reviewed the following message is displayed.

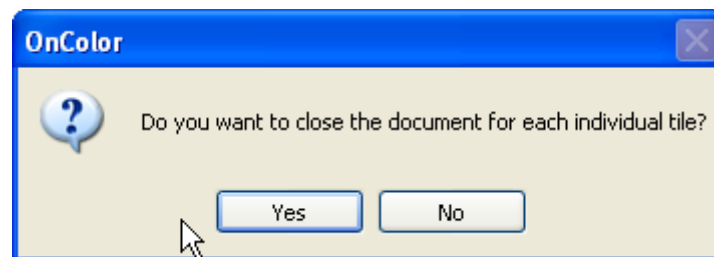


6. Finally, you will be asked if you want to commit this data to the Instrument Performance database. Click on Yes to save it to the Instrument Performance database. This completes the setup of this tile series using the Recall from Database Option.

7. If you are satisfied with the data, then click on YES to save the baseline data to the Performance Database. If you want to re-measure



- any of the tiles or change anything, then click NO and begin again.
8. The final step is to close each document. During the process of measuring the tiles, one document or WSV file is generated for each tile. This is to allow the advanced user to do a more in-depth analysis of the data after several tests have been performed. The user can look at long term trends and analyze them over different regions of color space. Normally the user will choose to close the documents without saving them.



9. This completes the setup and entry of the Reference Data and Instrument. You are now ready to perform the routine long-term instrument repeatability test.

Performing the Instrument Performance Test Using the Long Term Tab

The Long Term (Repeatability) tab is the tab you will use to perform the weekly or monthly long term repeatability test. Once tile series setup is complete, the routine test takes only a few minutes to perform. We recommend that it be done once a week to validate the performance of your spectrophotometer. This way if any readings arise that are questionable, you can always go back to the most recent Instrument Performance report to verify that the instrument was performing properly. Maintaining a log book of the results can be invaluable in arbitrating color disputes. By saving the data into the Instrument Performance database, any report for any test can be generated out of the database.

1. Make sure the ambient room temperature is at the nominal temperature $\pm 2^{\circ}\text{F}$ and that the tile set has had time to equilibrate to this temperature. Remember to calibrate the instrument before doing the test.

The screenshot shows the 'Instrument Performance' dialog box with the 'Long Term' tab selected. The 'Tile Series' section contains a list box with '12-Tile Diagnostic Series' selected. Below it, 'Number of Tiles in the Series' is set to 12, and 'Single Tile Tolerance Warning' is set to 0.50. The 'Reference Data' section shows 'CM-2600d S/N 00359' selected. The 'Instrument Name' is 'CM-2600d' and the 'Serial Number' is '1001395'. The 'Target Instrument' section shows 'Name: CM-2600d', 'Serial Number: 1001395', and 'Description: (none)'. A 'Measure Tiles' button is at the bottom of the dialog. At the very bottom are 'OK', 'Cancel', 'Apply', and 'Help' buttons.

2. To start the Long Term Repeatability test for Instrument Performance, go to **Options-->Instrument Performance** and make sure you are on the Long Term tab.
3. Under Tile Series you will see a listing of all the tiles sets that have been setup in the Setup Tab. You may see one or more entries. Highlight the Tile Series that you will be using for this test. The number of tiles and tolerance for the single tile are shown along

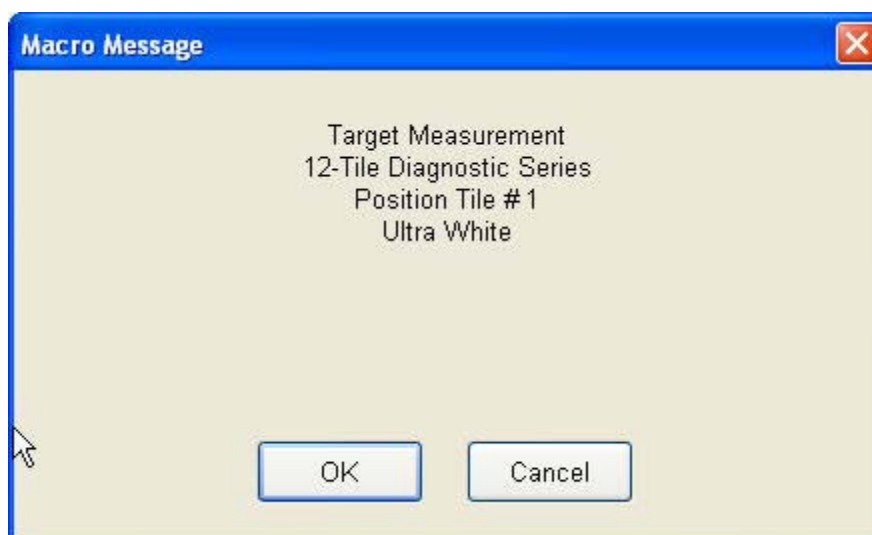
with the name of the Reference Data. If there is more than one entry shown for the reference data, highlight the one that is appropriate for your test.

4. Under Target Instrument, the name and serial number are shown. Click in the Description box to enter a description for this instrument (such as how you commonly refer to this instrument; example, color lab spectro). Click the **APPLY** button. When you are ready to begin the test, click on the **MEASURE TILES** button.



5. The Macro Start message is displayed. Click OK to continue.

6. The next message prompts the user to position the first tile in the series at the measuring port. Click OK to continue.



Naming -- Tile01

Std Trial Options Std Defaults Trial Defaults

Name: 40 characters max
Ultra White - 0001

Alternate Name: 40 characters max
1/30/2013 -- 10:42:03 AM

Alternate Name 2: 40 characters max

Palette: 20 characters max

Notes: 80 characters max

Date/Time: 1/30/2013 -- 10:42:03 AM

User Name: EBecker

Sensor Serial: 1001395

OK Cancel Apply Help

7. The next dialog prompts the user to enter a name for this tile. You can accept the default entry or change it. Note that the date and time of measurement is automatically recorded. In the notes field we suggest that you record the temperature in the lab. Click OK to measure the first tile.

8. After the tile is measured, the following message prompts the user to review the data to see if it is reasonable. It is expected that the resulting color differences would be small and less than the tolerance set for a single tile. If the DE is larger than

Macro Message

Target Measurement
12-Tile Diagnostic Series
Please review the data for Tile #1
Ultra White

OK Cancel

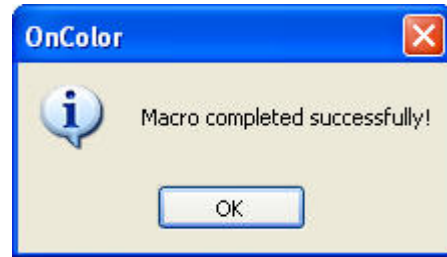
expected, end the macro by pressing F9, correct the problem, and start the procedure again. Click OK to continue to the next tile.

9. The user is prompted for the next tile and to enter its name. If you want to speed the process slightly, go to the Trial Defaults tab and check the box for Auto Naming as shown below. Click APPLY and then OK to continue. When using the Auto Naming option, the user will not be prompted to change the name of the tile. It will automatically be entered.

The screenshot shows a dialog box titled "Naming -- Tile03" with a close button (X) in the top right corner. The dialog has five tabs: "Std", "Trial", "Options", "Std Defaults", and "Trial Defaults". The "Trial Defaults" tab is currently selected. Inside the dialog, there are three text input fields, each with a "40 characters max" label and a dropdown arrow on the right. The first field is labeled "Name:" and contains the text "Trial #nnn". The second field is labeled "Alternate Name:". The third field is labeled "Alternate Name 2:". Below these fields is a larger text area labeled "Notes:" with an "80 characters max" label. At the bottom of the dialog, there is a checkbox labeled "Auto Naming" which is checked. The bottom of the dialog features four buttons: "OK", "Cancel", "Apply", and "Help". A mouse cursor is visible over the "Auto Naming" checkbox.

10. Continue to follow the screen prompts to review the measurement data and measure all the tiles in the series. To end the macro at any time, press F9.

11. After all tiles have been measured, the macro completed message is displayed. Click OK to continue to the report.



12. The following report showing the results of the test is displayed and can be printed by clicking on the PRINT button. The report details the information on the tile series measured, the Reference Data, and Test Data. For each tile the test data is compared to the reference data and the color difference and components for CIE $L^*a^*b^*$ D65 - 10° are reported. A PASS/FAIL determination is made based on the tolerance entered for a single tile. The Tested Instrument is given a PASS/FAIL rating based on the tolerance entered for the average DE of all tiles in the tile series.

Certificate of Instrument Performance

12-Tile Diagnostic Series	Reference Data	Test Data
Make & Model	CM-2600d	CM-2600d
Serial Number	1001395	1001395
Description	CM-2600d S/N 00359	color lab spectro
Status	CRBIMM	CRBIMM
Company	CyberChrome, Inc.	CyberChrome, Inc.
Operator	EBecker	EBecker
Date Measured	1/28/2013 -- 4:40:34 PM	1/30/2013 -- 10:46:54 AM

The tested instrument has been checked using the Tile Series listed above and compared with the reference data. The results below show the conformance of the tested instrument as compared to the reference data according to the Delta E Tolerance Limits given. The data is reported for CIE L*a*b*; Illuminant D65 - 10° Observer.

Tile Name	P/F	ΔL^*	Δa^*	Δb^*	ΔE^*_{ab}
Ultra White	PASS	0.01	-0.01	0.00	0.02
Black	PASS	0.00	-0.00	-0.03	0.03
Light Grey	PASS	-0.01	-0.04	-0.00	0.04
Medium Grey	PASS	0.10	-0.01	-0.04	0.11
Dark Grey	PASS	0.04	-0.01	0.01	0.05
Navy Blue	PASS	-0.14	0.10	-0.16	0.24
Cyan	PASS	-0.03	-0.05	0.05	0.08
Green	PASS	0.15	-0.16	0.05	0.23
Yellow	PASS	0.10	-0.14	0.08	0.19
Orange	PASS	0.06	-0.02	0.18	0.19
Red	PASS	-0.02	0.00	0.01	0.02
Rose Pink	PASS	0.04	0.09	0.06	0.12
Average Delta E					0.11

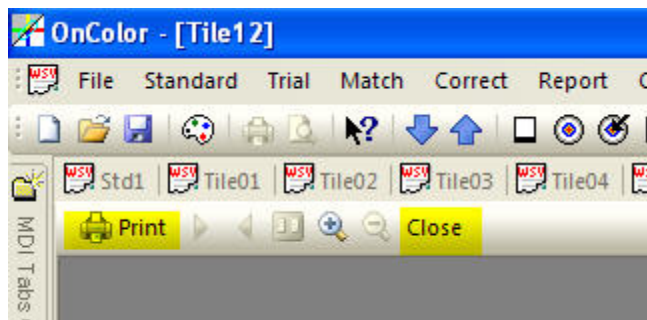
Total Number of Tiles: 12
 Number of Tiles PASSED: 12
 Number of Tiles FAILED: 0

Single Tile Delta E Limit: 0.50
 Average Tile Delta E Limit: 0.25

Results for Tested Instrument: PASS

Certified by: _____ Name: _____

Date: Wednesday, January 30, 2013 Time: 11:08:05 AM

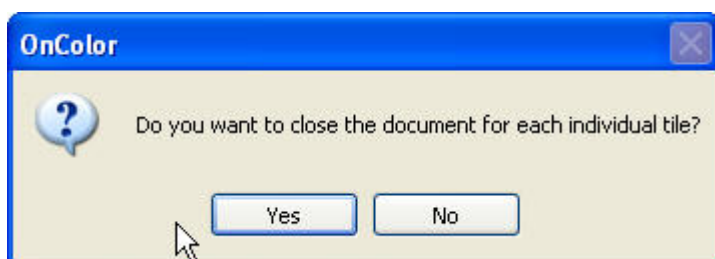
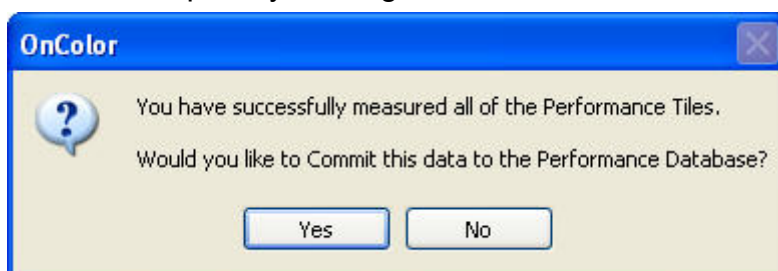


13. Buttons for Printing and Closing this report are shown in the upper left corner of the screen.

14. After printing the report, close this report by clicking on the Close Icon.

The user will then be prompted to commit this data to the database for future tracking and reporting. Normally, if the results of the test are good, the

data should be saved to the database. If an error was detected and the test will be repeated, then the data should not be saved to the database.



15. Finally, the user is asked if he wants to close the document for each tile. Unless further analysis of the data is desired, you can answer YES to

this question and end the test. After the long term repeatability test has been performed a number of times, you might want to look at the trends of the data for each individual tile. This is what the individual documents are intended for. Using the OnColor QC Premium or higher level software allows you to look at the trend charts of the data over time on the Statistics Report or at a listing of the data on the Data Table report. The Color Plot report will show a scatter plot of each point in either 2D or 3D color space.

Printing Certificates of Instrument Performance using the Report Tab

As long as you commit the data to the Instrument Performance database, you can go back and print the Certificate of Instrument Performance for any test date that was saved.

1. Go to **Options-->Instrument Performance**, and then click on the **Report Tab** to display the following screen.

Instrument Performance

Long Term Setup **Report**

Tile Series

12-Tile Diagnostic Series

Number of Tiles in the Series: 12

Reference Data

CM-2600d S/N 00359

Instrument Name: CM-2600d
Serial Number: 1001395

Date of Performance Measurement:

1/30/2013 -- 10:46:54 AM
1/30/2013 -- 11:26:28 AM
1/30/2013 -- 2:47:31 PM

Watermark File Name: Watermark small.jpg

Print Report

OK Cancel Apply Help

2. If more than one Tile Series or Reference Data are shown, click on the desired choices. A list of the date and times that the test was performed and saved is shown under the Date of Performance Measurement. Select the entry for the report that you want to view and print and then click on the **PRINT REPORT** button.
3. It will take a few moments for OnColor to extract the data, open the save-sets and compile the report. When complete, you can print the report and

if necessary, look at the data for each individual tile in the individual save-set documents.

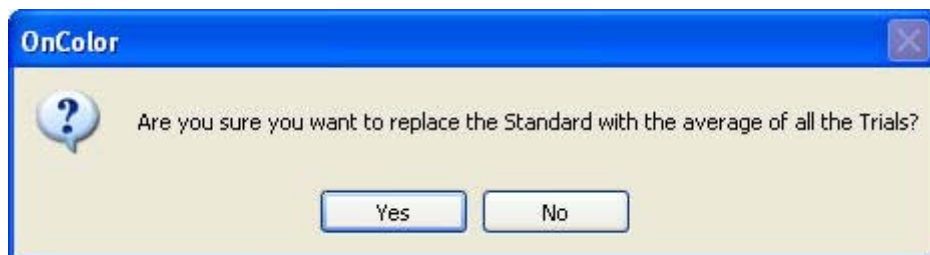
Appendix A: How to Average Readings over a Period of 5 (or n) days

Using the Averaging method to create the reference or baseline data minimizes the small error that is inherent in a single measurement on one day. We recommend that reference data be obtained by averaging the readings over a minimum period of 5 days. OnColor can help you do this.

You will create a document or save-set WSV file for each tile. You will measure each tile as a Trial on each of 5 or “n” days. At the end of this period, OnColor will average all of the trial readings and create a new Standard which is the average of these 5 (or “n”) readings. After creating the average for each tile, you will then copy the resulting data to either a Database of Standards or a single WSV document. This is where the Instrument Performance routine will obtain the Reference Data.

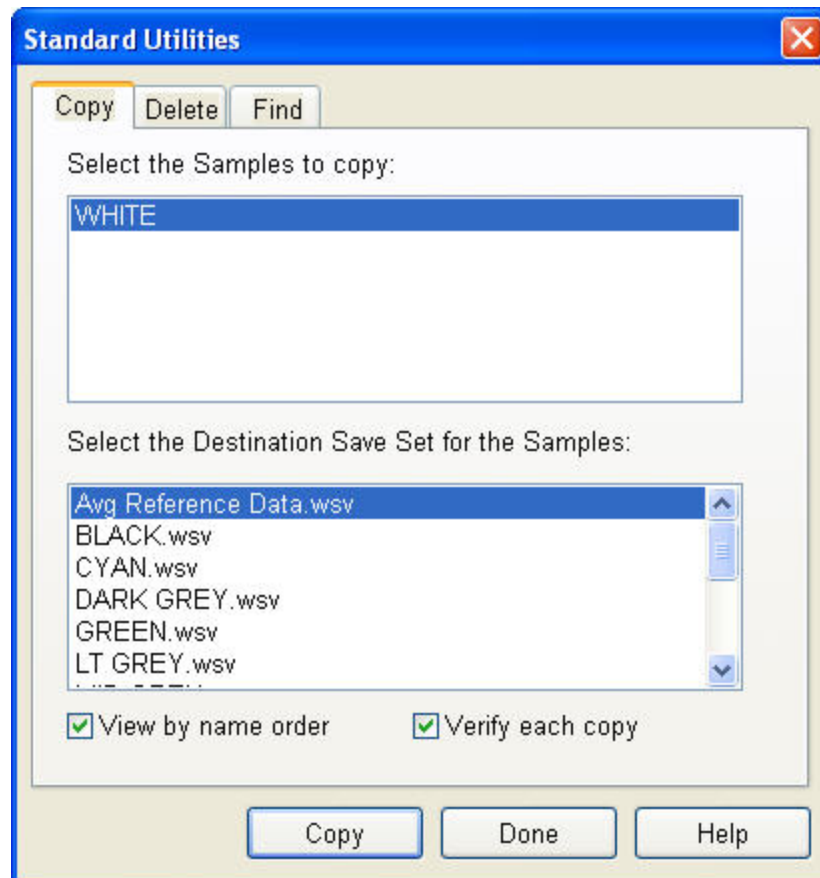
1. Check the temperature in the room making sure that it is within $\pm 2^{\circ}$ F. of your desired nominal value and let the tiles equilibrate for at least 30 minutes. Check the cleanliness of the tile set and clean them if needed according to the manufacturer’s instructions.
2. Calibrate the spectrophotometer: Go to Options-->Calibrate, or simply type “C” on the keyboard. Follow the screen prompts to calibrate the instrument.
3. Click on File-->New-->OnColor WSV file or type Ctrl N.
4. Click on Standard-->Measure or type “S” on the keyboard. Enter the name of the tile and click OK.
5. Click on Trial-->Measure or type “T” on the keyboard. Use the default name of Trial 001 or whatever name you desire. Click OK to measure the tile again. The resulting DE should be very close to zero.
6. Click on File-->Save As and then browse to a folder on your computer where you will save this file. It is good practice to organize these files in a separate folder, so you may want to create a new folder somewhere on your computer to store this data. Name this file according to the name on the tile. It will be saved as a save-set document or WSV file. Click on OK to save this file. Remember the location where you saved it.
7. Close this file.

8. Repeat steps 3 – 7 for each tile in the series. At the end of today's session you will have measured each tile and stored it in a save-set file.
9. On the next day, follow steps 1 and 2 to check the temperature in the room and then calibrate the instrument.
10. Click on File-->Open and browse to the location where you stored the files in step 6. Highlight the name of the file for the first tile in the series and open it.
11. Click on Trial-->Measure or type "T" on the keyboard. Use the default trial name and click OK to measure the tile again. The resulting DE should be very close to zero.
12. Click on File-->Save to store this file with the same name and replace it with the additional data. Click on OK to save this file
13. Close this file.
14. Repeat steps 10 - 13 for each tile in the series.
15. Repeat steps 9 – 14 for a total of 4 days so that you have at least 5 trial measurements on each tile.
16. At the end of this process you should have one save-set document for each tile with one Standard and 5 Trials.
17. The next steps will guide you through the process of averaging the data.
18. Open the file for the first tile by clicking on File-->Open and browse the location where you saved this data. Open the file for the first tile.
19. Click on Standard-->Average Trials. The following message is displayed:



20. Click on YES. You will then be asked for a name for this new Standard. Enter the name of the tile and click OK. The Standard data will be replaced with an average of all the trials. This averaged data is what will be used as your baseline or reference data.
21. It is not necessary to close the file at this point as you will be further manipulating the data to put the averaged data into one save-set document.
22. Repeat steps 18-20 for each tile in the series. At the end of this process you will have computed the average data over 5 days and will have one save-set file for each tile. The final step is to copy all of the averaged data into one save-set file as outlined below.
23. Start by making sure that you have one save-set document open for each tile in the series. Then create an empty save-set file for the averaged data by clicking on File-->New and choose OnColor WSV file. Click on File-->Save As and give it a name, such as Avg. Reference Data)

24. Make sure the first tile in the series (typically the white tile) is the active document. You can use CTRL+Tab to cycle through all of the open documents or go to Window and click on the document that you want to make active.
25. Click on Standard-->Utilities to get the following dialog box and click on the COPY tab.



26. Highlight the name of the white tile in the Samples to copy dialog and then highlight the destination filename (this will be the name of the file created in step 23) in the lower dialog. Click on the COPY button to copy this data to the destination save-set. If the Verify Copy box is checked, then you will be asked to confirm this action.
27. Click on Done to close this dialog box. Then make the file for the second tile in the series the active document. You can use either the CTRL + Tab keys to scroll through the files or go to Windows and click on the second filename. The order that you copy these records to this destination save-set will be the order that the Instrument Performance routine uses for the tile series.

28. Repeat steps 25 and 26 for each save-set document for each tile. When you are done, your destination file should contain on record for each tile which is the averaged data over 5 days. The Standard in this destination file should be the first tile, usually the white, and the Trials will be the remaining tiles.
29. Be sure to save this Destination file when it contains all of the averaged tile information in the order that you want it in.
30. Use this save-set document as the input document for the Reference Data **Setting up the Tile Series and Reference Data Using the Setup Tab**.