

TECHNICAL BULLETIN

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Subject: PeCOD Sensor Guidelines

Sensor life is determined by several factors including date of manufacture, sample matrix, concentration, number of runs and time in use.

Average Sensor Life

Sensors are expected to last 150 runs when used consistently for an average of 50 samples per week (samples, calibrations and QC checks). However, should a sensor be intermittently used, it is recommended that it be changed after 3-4 weeks of use regardless of the number of completed runs, or based on consistently failing calibration values. When analyzing higher sample concentrations (especially red range) the sensor life expectancy is likely to be shorter, ranging from 60 – 150 total measurements.

Samples containing harsh chemicals, interferences, or those run with the sample pH outside of the recommended range (i.e. pH 4-10) can also cause sensors to degrade more quickly. For optimal use it is recommended that sensors are opened and used for the first time within 4 months of manufacturing. The date of manufacture is printed on the sensor package. Once installed it is recommended that the sensor remains installed in the unit until it is replaced.

Monitoring Sensor Life During Calibration

The calibration results obtained (i.e. M and C values) are good indicators of whether a sensor is functioning as expected. The M and C calibration values have expected ranges, which are displayed at the top of the calibration report.

The M value should be between 0.02 - 0.06 COD/uC. As a sensor ages, the M value will increase. Once an M value greater than 0.06 is reached, the sensor should be changed.

C values are measured in uC, and indicate the raw charge generated during the blank oxidation. The expected C value ranges depend on the color range you are working in (blue and green range have lower C values than yellow and red range), and in this case the charge starts higher and gets lower as the sensor ages. The C value is important, as it not only

indicates that the sensor is functioning properly, but it also gives the user a sense about the quality of the blank solution, which in turn provides information about the quality of the electrolyte. The expected C value varies by range, and is outlined below:

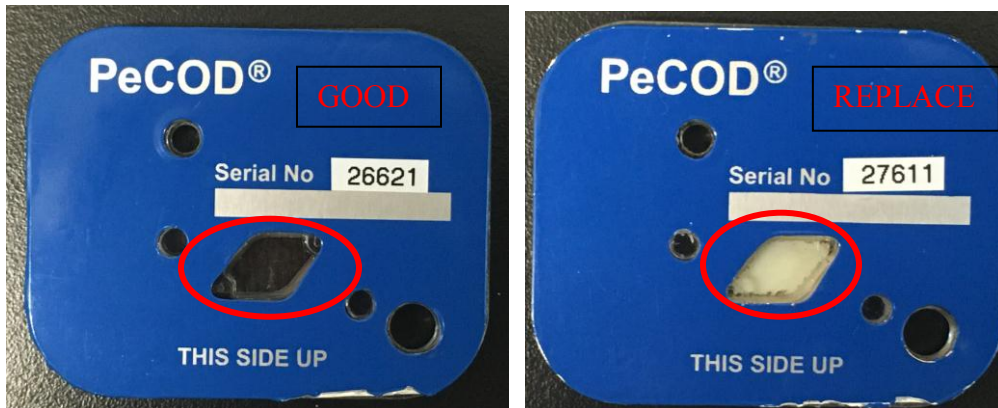
- Blue: 250 – 500
- Green: 250 – 700
- Yellow: 300 – 750
- Red: 300 - 800

It is recommended that a user monitor both the C and M values to determine the optimal life of a sensor.

Visual Inspection

Additionally, sometimes a user can visually see if a sensor is viable or not. The sensor element is visible through the window and it should be grey/black in color as indicated on sensor 26621.

As a sensor ages the color will fade and a non-uniform colored surface will result. When the surface shows partial delamination as indicated on sensor 27611 shown below, this would indicate that the sensor should be replaced.



Additionally, if a sensor has lost much of its color, while it may still result in passing M and C calibration values, it may indicate a loss in chloride tolerance. For more information about chloride protection see Technical Bulletin #2011-16.

Establishing a Standard Operating Procedure for Sensor Management

While customers may choose to monitor sensor performance and change the sensor only when needed, MANTECH recommends that a Standard Operating Procedure is put in place to replace sensors on a set schedule to always ensure sensor reliability. This timeline may be determined based on the factors outlined previously, otherwise a 3-4 week sensor change SOP is recommended.