Changes to Validation Templates 2013 to 2017

Note: Some criteria in the validation templates have changed based upon EPAs decision to provide more definitive information on the acceptance criteria. Criteria that may have been in operational or systematic may have moved to critical based on the criteria being included in regulations. In this case this information will be included in the table below. EPA is also implementing a more consistent approach to the acceptance criteria related to rounding. For example, in the 2013 ozone validation template the 1-point QC acceptance criteria was "< ± 7%" and is now been revised to "< ± 7.1%". The acceptance criteria did not change but is written less ambiguously. In addition, the frequencies have also gotten more definitive. For example, the 1-point QC check for gaseous pollutants in 2013 was listed as "1 / 2 weeks" and is now revised to say "every 14 days". The frequency has not changed but is described in more detail. This table will not provide a list of the frequencies nor the acceptance criteria that have been changed as described in the examples above. However, those using the tables should be aware that the revisions will be reflected in how AQS evaluates the QC data that are reported to AQS.

Note: changes in the shading (green and blue) are used to denote a different pollutant.

Pollutant	Requirement	From (2013)	To (2017)	Comment
O3	Monitor	**Systematic table**- Meets requirements listed in FRM/FEM designation	**Critical Table**-Meets requirements listed in FRM/FEM designation	Moved from systematic to critical table but language not changed.
O3	One Point QC	< ± 7% (percent difference)	< ±7.1% (percent difference) or < ±1.5 ppb difference whichever is greater	Added 1.5 ppb difference for low concentration points.
O3	Zero Span	Zero drift ≤ ± 1.5 ppb Span drift ≤ ± 7 %	Zero drift < ± 3.1 ppb (24 hr) < ± 5.1 ppb (>24hr-14 day) Span drift < ± 7.1 %	Provided more flexibility in zero
O3	Verification/Calibration	All points within ± 2 % of calibration range of best-fit straight line Linearity error <5%	All points < ± 2.1 % or ≤ ±1.5 ppb difference of best-fit straight line whichever is greater and Slope 1 ± .05	Added 1.5 ppb difference for low concentration points and slope as additional guidance
O3	Noise	≤ 0.005 ppm	≤ 0.0025 ppm (standard range) ≤ 0.001 ppm (lower range)	Reflects 40 CFR Part 53 change
O3	Lower detectable limit	0.01 ppm	≤ 0.005 ppm (standard range) ≤ 0.002 ppm (lower range)	Reflects 40 CFR Part 53 change
O3	Annual Performance Evaluation	Every site 1/year 25% of sites quarterly	Every site every 365 days and 1/ calendar year	Not requiring Annual PEs across all quarters.

Pollutant	Requirement	From (2013)	To (2017)	Comment
O3	Annual PE Primary QA Organization (PQAO) Evaluation	95% of audit percent differences fall within the one-point QC check 95% probability intervals at PQAO level of aggregation	None	Removed check from CFR
CO	Monitor	**Systematic table-** Meets requirements listed in FRM/FEM designation	**Critical Table**-Meets requirements listed in FRM/FEM designation	Moved from systematic to critical table but language not changed.
CO	Zero/span check	Zero drift ≤ ± 0.03 ppm Span drift ≤ ± 10 %	Zero drift < ± 0.41 ppm (24 hr) < ± 0.61 ppm (>24hr-14 day) Span drift < ± 10.1 %	
CO	Annual Performance Evaluation	Every site 1/year 25% of sites quarterly	Every site every 365 days and 1/ calendar year	Not requiring Annual PEs across all quarters.
CO	Verification/Calibration	All points within + 2 % of calibration range of best-fit straight line	All points < ± 2.1 % or ≤ ± 0.03 ppm difference of best-fit straight line. whichever is greater and Slope 1 ± .05	Added 0.03 ppm difference for low concentration points and slope as additional guidance
CO	Zero Air/Zero Air Check	< 0.1 ppm CO	Concentrations below LDL	
CO	Annual PE Primary QA Organization (PQAO) Evaluation	95% of audit percent differences fall within the one-point QC check 95% probability intervals at PQAO level of aggregation	None	Removed check from CFR
NO2	Monitor	**Systematic table-** Meets requirements listed in FRM/FEM designation	**Critical Table**-Meets requirements listed in FRM/FEM designation	Moved from systematic to critical table but language not changed.
NO2	One Point QC	acceptance criteria from < ± 15%	< ±15.1% (percent difference) or < ±1.5 ppb difference whichever is greater	Added 1.5 ppb difference for low concentration points
NO2	Zero/Span	Zero drift ≤ ± 1.5 ppb Span drift ≤ ± 10 %	Zero drift < ± 3.1 ppb (24 hr.) < ± 5.1 ppb (>24hr-14 day) Span drift < ± 10.1 %	Provided more flexibility in zero
NO2	Verification/Calibration	Instrument residence time ≤ 2 min Dynamic parameter ≥ 2.75 ppm-min All points within ±2 % of calibration range of best-fit straight line	Instrument residence time ≤ 2 min Dynamic parameter ≥ 2.75 ppm-min All points <± 2.1 % or ≤ ± 1.5 ppb difference of best-fit straight line whichever is greater and Slope 1 ± .05	Added 1.5 ppb difference for low concentration points and slope as additional guidance

Pollutant	Requirement	From (2013)	To (2017)	Comment
NO2	Annual Performance Evaluation	Every site 1/year 25% of sites quarterly	Every site every 365 days and 1/ calendar year	Not requiring Annual PEs across all quarters.
NO2	Annual PE Primary QA Organization (PQAO) Evaluation	95% of audit percent differences fall within the one-point QC check 95% probability intervals at PQAO level of aggregation	None	Removed check from CFR
SO2	Monitor	**Systematic table-** Meets requirements listed in FRM/FEM designation	**Critical Table**-Meets requirements listed in FRM/FEM designation	Moved from systematic to critical table but language not changed.
SO2	One Point QC	acceptance criteria from < ± 10%	< ±10.1% (percent difference) or < ±1.5 ppb difference whichever is greater	Added 1.5 ppb difference for low concentration points
SO2	Zero/Span	Zero drift ≤ ± 1.5 ppb Span drift ≤ ± 10 %	Zero drift < ± 3.1 ppb (24 hr.) < ± 5.1 ppb (>24hr-14 day) Span drift < ± 10.1 %	Provided more flexibility in zero
SO2	Verification/Calibration	All points within ± 2 % of calibration range of best-fit straight line	All points < ± 2.1 % or ≤ ±1.5 ppb difference of best-fit straight line whichever is greater and Slope 1 ± .05	Added 1.5 ppb difference for low concentration points and slope as additional guidance
SO2	Annual Performance Evaluation	Every site 1/year 25% of sites quarterly	Every site every 365 days and 1/ calendar year	Not requiring Annual PEs across all quarters.
SO2	Annual PE Primary QA Organization (PQAO) Evaluation	95% of audit percent differences fall within the one point QC check 95% probability intervals at PQAO level of aggregation	None	Removed check from CFR
PM2.5	Monitor	Meets requirements listed in FRM/FEM designation	Meets requirements listed in FRM/FEM designation	Moved from systematic to critical table but language not changed.
PM2.5	Pre-sampling holding time	**Operational Table**- < 30 days before sampling	**Critical Table**-≤ 30 days before sampling	Moved from operational to critical table but language not changed.
PM2.5	Design Flow Rate Adjustment	**Operational Table -**± 2% of design flow rat**e**	**Critical Table** < ± 2.1% of design flow rate	Moved from operational to critical table but language not changed.
PM2.5	Individual Flow Rates	**Operational Table**- no flow rate excursions > +5% for > 5 min	**Critical Table-** no flow rate excursions > ±5% for > 5 min	Moved from operational to critical table but language not changed
PM2.5	Filter Temp Sensor	**Operational Table**- no excursions of > 5° C lasting longer than 30 min	**Critical Table-** no excursions of > 5° C lasting longer than 30 min	Moved from operational to critical table but language not changed

Pollutant	Requirement	From (2013)	To (2017)	Comment
PM2.5	External Leak Check	**Operational Table**-< 80.1 mL/min	**Critical Table-** < 80.1 mL/min	Moved from operational to critical table but language not changed
PM2.5	Internal Leak Check	**Operational Table**- < 80.1 mL/min	**Critical Table-** < 80.1 mL/min	Moved from operational to critical table but language not changed
PM2.5	Post-sampling Weighing	≤10 days from sample end date if shipped at ambient temp, or ≤30 days if shipped below avg ambient (or 4° C or below for avg sampling temps < 4° C) from sample end date	Protected from exposure to temperatures above 25C from sample retrieval to conditioning ≤10 days from sample end date if shipped at ambient temp, or ≤ 30 days if shipped below avg ambient (or 4° C or below for avg sampling temps < 4° C) from sample end date	additional language about protecting from exposure.
PM2.5	Microbalance **Auto-Calibration**		**Critical Table** Prior to each weighing session	Added. This is not to be confused with a calibration of the microbalance once a year that remains in the operational table.
PM2.5	Flow Rate Multi-point Verification/ Calibration	± 4% of transfer standard	< ± 2.1% of transfer standard	New method guidance suggest that the annual flow rate verification and calibration meet tighter limits so that follow-on verifications and audits will be achieved, and also to meet the design flow rate adjustment in the regulations.
PM2.5	Temperature Audit	1/yr	every 180 days and at time of flow rate audit.	Changed as recommendation in Method 2.12 to perform these checks during semi-annual flow rate audits
PM2.5	Pressure Audit	1/yr	every 180 days and at time of flow rate audit	Changed as recommendation in Method 2.12 to perform these checks during semi-annual flow rate audits
PM2.5	Filter Housing Assembly Cleaning		Cleaned every 30 days	Added to 2017 validation template operational table

Pollutant	Requirement	From (2013)	To (2017)	Comment
PM2.5	Inlet/Down tube Cleaning	Every 15 events	None	Inlet and down tube cleaning seperated in 2017 template to individual criteria (see below)
PM2.5	Inlet Cleaning	Inlet/Down tube combined	every 30 days	Seperated criteria
PM2.5	Downtube Cleaning	Inlet/Down tube combined	every 90 days	Seperated criteria
PM2.5	Microbalance Audit	$\pm$ 0.050 mg or manufacturers specs, whichever is tighter	$<\pm$ 0.003 mg or manufacturers specs, whichever is tighter	
PM2.5	Lab Temp Check	1/6 months	Every 90 days	Due to lab temp humidity issue frequency of check was revised in Method 2.12 Sec. 10.10
PM2.5	Lab Temp Check	1/6 months	Every 90 days	Due to lab temp humidity issue frequency of check was revised in Method 2.12 Sec. 10.10
PM2.5	Lab Temperature Certification		$<\pm$ 2.1°C (every 365 days and once a year)	This was added in Method 2.12 as guidance to ensure that the lab temperature system has some independent certification annually
PM2.5	Lab Humidity Certification		$<\pm$ 2.1% (every 365 days and once a year)	This was added in Method 2.12 as guidance to ensure that the lab humidity system has some independent certification annually
PM2.5	Working Mass Stds. Verification Compared to primary standards	0.025 mg	$<\pm$ 2.1 ug (Every 90 days)	This was combined with the primary standard but in 2017 is seperated into its own row
PM2.5	Primary standards certification		0.025 mg tolerance (Class 2)	Not its own row in 2013 document
PM2.5 Continuous (Cont). Note: Due to new monitors being approved and additional QC added, there are a number of changes made to the Continuous PM2.5 Validation Templates**.**				
PM2.5 Cont	Monitor	**Systematic table-** Meets requirements listed in FRM/FEM designation	**Critical Table**-Meets requirements listed in FRM/FEM designation	Moved from systematic to critical table but language not changed.
PM2.5 Cont	Firmware of monitor		At Setup- 1. Must be the firmware (or later version) as identified in the	Added to critical

Pollutant	Requirement	From (2013)	To (2017)	Comment
			published method designation summary. 2. ***Firmware settings must be set for flowrate to operate and report at "local conditions" (i.e., not STP).***	
PM2.5 Cont	Data Reporting Period (Previously called "Hourly estimates")	Every hour	1. The calculation of an hour of data is dependent on the design of the method. 2. ***A 24-hour period is calculated in AQS if 18 or more valid hours are reported for a day.***	
PM2.5 Cont	PM10 Inlet (if applicable to method designated)		At Setup- Must be a Louvered PM10 size selective inlet as specified in 40 CFR 50 appendix L, Figures L-2 through L-19	
PM2.5 Cont	PM2.5 second stage separator (if applicable to method designated)		At Setup-Must be a BGI Inc. Very Sharp Cut Cyclone (VSCC^{TM}) or equivalent second stage separator approved for the method.	
PM2.5 Cont	Design Flow Rate Adjustment	**Operational Table -**$\pm$ 2% of design flow rat**e**	**Critical Table** < $\pm$ 2.1% of design flow rate	Moved from operational to critical table but language not changed.
PM2.5 Cont	External Leak Check	**Operational Table**-< 80.1 mL/min	**Critical Table-** < 80.1 mL/min	Moved from operational to critical table but language not changed
PM2.5 Cont	Internal Leak Check	**Operational Table**- < 80.1 mL/min	**Critical Table-** < 80.1 mL/min	Moved from operational to critical table but language not changed
PM2.5 Cont	**BAM** check of membrane span foil	**Critical Table** -$\pm$ 4% of ABS Value	**Operational Table**- Avg. < $\pm$ 5.1% of ABS	Moved from critical to operational
PM2.5 Cont	**BAM** electrical grounding		1. Is the chassis of the BAM grounded? 2. Is the downtube grounded to the chassis at the collar (i.e., with setscrews)	Added
PM2.5 Cont	**BAM** Zero test	No acceptance criteria (referred to SOP)	Standard deviation of the data from a 72-hour zero test < 2.4 µg/m^3	Added

Pollutant	Requirement	From (2013)	To (2017)	Comment
PM2.5 Cont	**Thermo BAM** Leak Test		Every 30 days- ≤ 0.42 L/min (every 30 days)	Added
PM2.5 Cont	**Grimm**-Relative Humidity Setting		At Set-up-Per Operators manual (55%) unless otherwise directed and approved to use at a different value	Added
PM2.5 Cont	**Grimm**-Calibration of spectrometer		Yearly -+/- 5% for mass (yearly)	Added
PM2.5 Cont	**Grimm**- Cleaning or changing of the Nafion in inlet		As needed	Added- We are seeking clarification from GRIMM on this
PM2.5 Cont	**TEOM-** Replace TEOM filters	Every 30 days -As filter loading approached 100%	As needed-Change TEOM filter as filter loading approaches 90%, but must be changed before reaching 100%.	
PM2.5 Cont	**TEOM-** Replace the dryers	replaced	Review dryer dew point data to determine acceptable performance of dryer	
PM2.5 Cont	Flow Rate Multi-point Verification/ Calibration	± 4% of transfer standard	< ± 2.1% of transfer standard	New method guidance suggest that the annual flow rate verification and calibration meet tighter limits so that follow-on verifications and audits will be achieved, and also to meet the design flow rate adjustment in the regulations.
PM2.5 Cont	Shelter Temp range	20 to 30° C. (Hourly avg) or per manufacturers specifications if designated to a wider temperature range	per operator manual	If in its own shelter you can follow operators manual if in with Gaseous pollutants, then FRM/FEM requirements dictate shelter temperature.
PM2.5 Cont	Monitor maintenance- $PM_{2.5}$ Separator (WINS)		every 5 sampling events-cleaned/changed	Added since 2013 version only included VSCC
PM2.5 Cont	Downtube Cleaning	none	every 90 days	Not included in 2013
PM10c Low Vol	Monitor	Meets requirements listed in FRM/FEM designation	Meets requirements listed in FRM/FEM designation	Moved from systematic to critical table but language not changed.

Pollutant	Requirement	From (2013)	To (2017)	Comment
PM10c Low Vol	Pre-sampling holding time	**Operational Table**- < 30 days before sampling	**Critical Table**-≤ 30 days before sampling	Moved from operational to critical table but language not changed.
PM10c Low Vol	Design Flow Rate Adjustment	**Operational Table** -± 2% of design flow rat**e**	**Critical Table** < ± 2.1% of design flow rate	Moved from operational to critical table but language not changed.
PM10c Low Vol	Individual Flow Rates	**Operational Table**- no flow rate excursions > +5% for > 5 min	**Critical Table-** no flow rate excursions > ±5% for > 5 min	Moved from operational to critical table but language not changed
PM10c Low Vol	Filter Temp Sensor	**Operational Table**- no excursions of > 5o C lasting longer than 30 min	**Critical Table-** no excursions of > 5° C lasting longer than 30 min	Moved from operational to critical table but language not changed
PM10c Low Vol	External Leak Check	**Operational Table**-< 80.1 mL/min	**Critical Table-** < 80.1 mL/min	Moved from operational to critical table but language not changed
PM10c Low Vol	Internal Leak Check	**Operational Table**- < 80.1 mL/min	**Critical Table-** < 80.1 mL/min	Moved from operational to critical table but language not changed
PM10c Low Vol	Post-sampling Weighing	≤10 days from sample end date if shipped at ambient temp, or ≤30 days if shipped below avg ambient (or 4° C or below for avg sampling temps < 4° C) from sample end date	Protected from exposure to temperatures above 25C from sample retrieval to conditioning ≤10 days from sample end date if shipped at ambient temp, or ≤ 30 days if shipped below avg ambient (or 4° C or below for avg sampling temps < 4° C) from sample end date	additional language about protecting from exposure.
PM10c Low Vol	Collocated Samples	CV ≤ 15% of samples > 3 µg/m^3	CV < 10.1% of samples ≥ 3.0 µg/m^3	Changes due to 2013 check related to overall precision of PM10-2.5. revision just refers to PM10 measurement which is the same as PM2.5 guidance.
PM2.5	Temperature Audit	1/yr	every 180 days and at time of flow rate audit.	Changed as recommendation in Method 2.12 to perform these checks during semi-annual flow rate audits
PM2.5	Pressure Audit	1/yr	every 180 days and at time of flow rate audit	Changed as recommendation in Method 2.12 to perform these checks during semi-annual flow rate audits

Pollutant	Requirement	From (2013)	To (2017)	Comment
PM10c Low Vol	Inlet/downtube Cleaning	every 15 sampling events		Seperated inlet and down tube cleaning as seen below
PM10c Low Vol	Inlet Cleaning	Inlet/Down tube combined	every 30 days	Seperated criteria
PM10c Low Vol	Downtube Cleaning	Inlet/Down tube combined	every 90 days	Seperated criteria
PM10c Low Vol	Flow Rate Multi-point Verification/ Calibration	$\pm$ 4% of transfer standard	< $\pm$ 2.1% of transfer standard	New method guidance suggest that the annual flow rate verification and calibration meet tighter limits so that follow-on verifications and audits will be achieved, and also to meet the design flow rate adjustment in the regulations.
PM10c Low Vol	Microbalance Audit	$\pm$ 0.050 mg or manufacturers specs, whichever is tighter	<$\pm$ 0.003 mg or manufacturers specs, whichever is tighter	
PM10c Low Vol	Lab Temp Check	1/6 months	Every 90 days	Due to lab temp humidity issue frequency of check was revised in Method 2.12 Sec. 10.10
PM10c Low Vol	Lab Temp Check	1/6 months	Every 90 days	Due to lab temp humidity issue frequency of check was revised in Method 2.12 Sec. 10.10
PM10c Low Vol	Lab Temperature Certification		< $\pm$ 2.1^{o}C (every 365 days and once a year)	This was added in Method 2.12 as guidance to ensure that the lab temperature system has some independent certification annually
PM10c Low Vol	Lab Humidity Certification		< $\pm$ 2.1% (every 365 days and once a year)	This was added in Method 2.12 as guidance to ensure that the lab humidity system has some independent certification annually
PM10c Low Vol	Working Mass Stds. Verification Compared to primary standards	0.025 mg	< $\pm$ 2.1 ug (Every 90 days)	This was combined with the primary standard but in 2017 is seperated into its own row
PM10c Low Vol	Primary Mass. Verification/Calibration Standards	Primary standards certification 0.025 mg	Primary Mass. Verification/Calibration Standards 0.025 mg tolerance (Class 2)	This suggests that both the working standards and the primary standards should have the same tolerance at

Pollutant	Requirement	From (2013)	To (2017)	Comment
				purchase. 2013 just listed the primary standard
PM10 Dichot (STP)	Monitor	**Systematic table-** Meets requirements listed in FRM/FEM designation	**Critical Table**-Meets requirements listed in FRM/FEM designation	Moved from systematic to critical table but language not changed.
PM10 Dichot (STP)	Primary Mass Stds. (compare to NIST-traceable standards)	None	every 365 days and once a calendar year NIST traceable (e.g., ANSI/ASTM Class 1, 1.1 or 2)	Added to 2017 template (operational)
PM10 High Vol	Monitor	Meets requirements listed in FRM/FEM designation	Meets requirements listed in FRM/FEM designation	Moved from systematic to critical table but language not changed.
PM10 High Vol	Clock/timer Verification	5 min/mo	15 min/day	Regulations 40 CFR Part 50 app J section 7.1.5 does not explicitly say 15 min/day but is more definitive than 2013 which was a recommendation.
PM10 High Vol	Primary Mass Stds. (compare to NIST-traceable standards)	None	every 365 days and once a calendar year NIST traceable (e.g., ANSI/ASTM Class 1, 1.1 or 2)	Added to 2017 template (operational)
PM10 Cont	Monitor	**Systematic table-** Meets requirements listed in FRM/FEM designation	**Critical Table**-Meets requirements listed in FRM/FEM designation	Moved from systematic to critical table but language not changed.
PM10 Low Vol STP	Monitor	Meets requirements listed in FRM/FEM designation	Meets requirements listed in FRM/FEM designation	Moved from systematic to critical table but language not changed.
PM10 Low Vol STP	Pre-sampling holding time	**Operational Table**- < 30 days before sampling	**Critical Table**-$\leq$ 30 days before sampling	Moved from operational to critical table but language not changed.
PM10 Low Vol STP	Design Flow Rate Adjustment	**Operational Table -**$\pm$ 2% of design flow rat**e**	**Critical Table** < $\pm$ 2.1% of design flow rate	Moved from operational to critical table but language not changed.
PM10 Low Vol STP	Individual Flow Rates	**Operational Table**- no flow rate excursions > +5% for > 5 min	**Critical Table-** no flow rate excursions > $\pm$5% for > 5 min	Moved from operational to critical table but language not changed
PM10 Low Vol STP	Flow Rate Multi-point Verification/ Calibration	$\pm$ 4% of transfer standard	< $\pm$ 2.1% of transfer standard	New method guidance suggest that the annual flow rate verification and calibration meet tighter limits so that follow-on verifications and audits will be achieved, and also to meet the design flow rate adjustment in the regulations.

Pollutant	Requirement	From (2013)	To (2017)	Comment
PM10 Low Vol STP	Filter Temp Sensor	**Operational Table**- no excursions of > 5° C lasting longer than 30 min	**Critical Table-** no excursions of > 5° C lasting longer than 30 min	Moved from operational to critical table but language not changed
PM10 Low Vol STP	External Leak Check	**Operational Table**-< 80.1 mL/min	**Critical Table-** < 80.1 mL/min	Moved from operational to critical table but language not changed
PM10 Low Vol STP	Internal Leak Check	**Operational Table**- < 80.1 mL/min	**Critical Table-** < 80.1 mL/min	Moved from operational to critical table but language not changed
PM10 Low Vol STP	Post-sampling Weighing	≤10 days from sample end date if shipped at ambient temp, or ≤30 days if shipped below avg ambient (or 4° C or below for avg sampling temps < 4° C) from sample end date	Protected from exposure to temperatures above 25C from sample retrieval to conditioning ≤10 days from sample end date if shipped at ambient temp, or ≤ 30 days if shipped below avg ambient (or 4° C or below for avg sampling temps < 4° C) from sample end date	additional language about protecting from exposure.
PM10 Low Vol STP	Inlet/downtube Cleaning	every 15 sampling events		Seperated inlet and down tube cleaning as seen below
PM10 Low Vol STP	Inlet Cleaning	Inlet/Down tube combined	every 30 days	Seperated criteria
PM10 Low Vol STP	Downtube Cleaning	Inlet/Down tube combined	every 90 days	Seperated criteria
PM10 Low Vol STP	Flow Rate Multi-point Verification/ Calibration	± 4% of transfer standard	< ± 2.1% of transfer standard	New method guidance suggest that the annual flow rate verification and calibration meet tighter limits so that follow-on verifications and audits will be achieved, and also to meet the design flow rate adjustment in the regulations.
PM10 Low Vol STP	Microbalance Audit	± 0.050 mg or manufacturers specs, whichever is tighter	<± 0.003 mg or manufacturers specs, whichever is tighter	
PM10 Low Vol STP	Lab Temperature Certification		< ± 2.1°C (every 365 days and once a year)	This was added in Method 2.12 as guidance to ensure that the lab temperature system has some independent certification

Pollutant	Requirement	From (2013)	To (2017)	Comment
PM10 Low Vol STP	Lab Humidity Certification		< ± 2.1% (every 365 days and once a year)	This was added in Method 2.12 as guidance to ensure that the lab humidity system has some independent certification
PM2.5	Working Mass Stds. Verification Compared to primary standards	0.025 mg	< ± 2.1 ug (Every 90 days)	This was combined with the primary standard but in 2017 is seperated into its own row
PM2.5	Primary standards certification		0.025 mg tolerance (Class 2)	Not its own row in 2013 document
Pb Hi-Vol	Monitor	Meets requirements listed in FRM/FEM designation	Meets requirements listed in FRM/FEM designation	Moved from systematic to critical table but language not changed.
Pb Hi-Vol	Initial Calibration Blank		Before first sample- < 0.001 µg/mL	Added since it was in 40 CFR Part 50, App G sec 8.8
PM10- Pb Low Vol	Monitor	Meets requirements listed in FRM/FEM designation	Meets requirements listed in FRM/FEM designation	Moved from systematic to critical table but language not changed.
PM10- Pb Low Vol	Pre-sampling holding time	**Operational Table**- < 30 days before sampling	**Critical Table**-≤ 30 days before sampling	Moved from operational to critical table but language not changed. Only required if sample is used for PM10 Lo-Vol Mass
PM10- Pb Low Vol	Design Flow Rate Adjustment	**Operational Table** -± 2% of design flow rat**e**	**Critical Table** < ± 2.1% of design flow rate	Moved from operational to critical table but language not changed.
PM10- Pb Low Vol	Individual Flow Rates	**Operational Table**- no flow rate excursions > +5% for > 5 min	**Critical Table-** no flow rate excursions > ±5% for > 5 min	Moved from operational to critical table but language not changed
PM10- Pb Low Vol	Flow Rate Multi-point Verification/ Calibration	± 4% of transfer standard	< ± 2.1% of transfer standard	New method guidance suggest that the annual flow rate verification and calibration meet tighter limits so that follow-on verifications and audits will be achieved, and also to meet the design flow rate adjustment in the regulations.
PM10- Pb Low Vol	Filter Temp Sensor	**Operational Table**- no excursions of > 5o C lasting longer than 30 min	**Critical Table-** no excursions of > 5° C lasting longer than 30 min	Moved from operational to critical table but language not changed
PM10- Pb Low Vol	External Leak Check	**Operational Table**-< 80.1 mL/min	**Critical Table-** < 80.1 mL/min	Moved from operational to critical table but language not changed

Pollutant	Requirement	From (2013)	To (2017)	Comment
PM10- Pb Low Vol	Internal Leak Check	**Operational Table**- < 80.1 mL/min	**Critical Table-** < 80.1 mL/min	Moved from operational to critical table but language not changed
PM10- Pb Low Vol	Post-sampling Weighing	≤10 days from sample end date if shipped at ambient temp, or ≤30 days if shipped below avg ambient (or 4° C or below for avg sampling temps < 4° C) from sample end date	Protected from exposure to temperatures above 25C from sample retrieval to conditioning ≤10 days from sample end date if shipped at ambient temp, or ≤ 30 days if shipped below avg ambient (or 4° C or below for avg sampling temps < 4° C) from sample end date	additional language about protecting from exposure.
PM10- Pb Low Vol	Inlet/downtube Cleaning	every 15 sampling events		Seperated inlet and down tube cleaning as seen below
PM10- Pb Low Vol	Inlet Cleaning	Inlet/Down tube combined	every 30 days	Seperated criteria
PM10- Pb Low Vol	Downtube Cleaning	Inlet/Down tube combined	every 90 days	Seperated criteria