MEETING MINUTES: ROBO SURVEILLANCE PANEL

Meeting: ROBO SP Meeting

Date: February 3, 2022

Location: MS Teams (virtual)

Minutes by: Justin Mills – SP Chair

Actions:

1. Tom Schofield to update LTMS to require 2-test calibration when switching between NO2 delivery options (e.g. concentrated to dilute NO2).
2. Tom Schofield to add TVTM for the data dictionary for MRVVEOT to align with reporting in MRV method (ASTM D4684).
3. Next meeting tentatively scheduled for April 14th.

Membership and Attendance:

ASTM TMC	Tom Schofield
Afton	Shelia Thompson, ***Jeff Yang, *Todd Dvorak**
BG Products	Madeleine Dellinger
Chevron Oronite	***Robert Stockwell**
Evonik Oil Additives	***Justin Mills, *Gabe Walkup,** Justin Kontra
ExxonMobil	***Dennis Gaal**
Infineum	Andy Richie, Sapna Eticala
Intertek	***Joe Franklin**, Matt Schlaff, ***Rachel Stone**
Lubrizol	***Aimee Shinhearl**, ***Jerimiah Westbrook**
PetroChina	Li Shaohui , Sun Ruihua, Peng Wang, Xiaogang Li, Xu Li
SwRI	***Becky Grinfield**, Joe De La Cruz, Mike Birke, ***Yong-Li McFarland**
Valvoline	Amol Savant, ***Amy Ross, *Bruce Tonkel**
Vanderbilt Chemicals	Al Filho, ***Christine Katrenya**
Ace Glass	Dave Lawrence, ***Tom Petrocella,**
Koehler Instruments	Raj Shah, Vincent Colantuini
Tannas/Savant	Greg Miller, Ted Selby
General Interest	***Alan Flamberg**
Guests	

***** Denotes attendance

MEETING MINUTES: ROBO SURVEILLANCE PANEL

Summary:

- Meeting convened at 10:02EDT on February 3
- No modifications to agenda
- ASTM Antitrust and Recording Policy reviewed
- Membership review and update
  - Tom Schofield to retire on March 1st. Many thanks for his years of service to the ROBO Surveillance Panel and all the best in retirement!
  - Christine Katrenya added to roster for Vanderbilt.
- Meeting minutes from November 18, 2021 SP meeting were accepted.
- Actions from the November 18, 2021 meeting were reviewed.
  - Tom Schofield to update LTMS to reflect latest limits for 436 and incorporate the revised reference oil tables into the LTMS (approved at September 30, 2021 SP meeting).
    - Status - Limits are effective, but LTMS still needs to be updated – expected soon.
    - For reference, current limits for ROBO are shared below:

D7528 (ROBO) Aged Oil MRV Acceptance Bands, mPa·s and ln(mPa·s)

Oil	n	Natural Log Transformed Mean (ln)	Mean in Original Units	s.d. (ln)	95% band in mPa·s Min[1]	95% band in mPa·s Max[1]	95% Bands Min (ln)	95% Bands Max (ln)
434-2	36	[2]10.9284	[2]55,737	0.1551	[2]41,126	[2]76,008	[2]10.6244	[2]11.2386
434-3	22	[2]10.8172	[2]49,871	0.1389	[2]37,987	[2]65,473	[2]10.5450	[2]11.0894
435-1	22	11.0416	62,420	0.20295	[4]44570	92910	[4]10.7048	11.4394
436	36	[2]10.3319	[2]30696	0.1290	23840	39525	10.0791	10.5847

  - Justin Mills to tentatively schedule the next ROBO SP meeting for February 3, 2022. .
    - Status - Complete
- Test is running comparable to last semester. Precision is slightly worse than new target and test is running with slight mild bias.
  - Stats can be found here https://www.astmtmc.org/ftp/refdata/bench/robo on the recently moved TMC website.
- Dilute NO2
  - Information letter (IL21-01) went to ballot in D02 (22-01) on January 24th and will close February 23rd (30day ballot).
  - Surveillance panel agreed to require a 2-test calibration when switching between NO2 delivery options (e.g. concentrated to dilute NO2).
    - A motion was made by Joe Franklin, and seconded by Gabriel Walkup to "require a 2-test calibration when switching between nitrogen dioxide delivery methods (concentrated vs. dilute)". All affirmative and no negatives or further discussion, so the motion was accepted and carried. The LTMS will be updated accordingly.
- MRV Reporting
  - To align with the ASTM method for MRV (D4684) the SP agreed to add TVTM for the data dictionary for MRVVEOT.
    - A motion was made by Joe Franklin and seconded by Becky Grinfield to "add TVTM to the data dictionary for MRVVEOT". All affirmative and no negatives or further discussion, so the motion was accepted and carried.
    - A BETA will be required to prior to implementation in the data dictionary so timing expected to be 1-2 months.
- Flow meter calibration – nothing to report.
- Next meeting tentatively scheduled on April 14, 2022. Date may be postponed if necessary.
- Meeting adjourned

MEETING MINUTES: ROBO SURVEILLANCE PANEL

Meeting Outcome:

1) Surveillance panel agreed to require a 2-test calibration when switching between NO2 delivery options (e.g. concentrated to dilute NO2).
2) Surveillance panel agreed to add TVTM for the data dictionary for MRVVEOT to align with reporting in MRV method (ASTM D4684).
3) Next meeting tentatively April 14th.

-End report-

ASTM D7528: Bench Oxidation of Engine Oils by ROBO Apparatus

ROBO Surveillance Panel Meeting

February 3, 2022

Justin Mills

Agenda

- Welcome, ASTM statement
- Review membership of surveillance panel
- Minutes and actions from prior meeting (November 18, 2021)
- Current status of ROBO including statistics
- Dilute nitrogen dioxide update
  - Calibration requirements
- Additional business
- Set next meeting

ASTM Antitrust and Recording Policy

ASTM International is a not-for-profit organization and developer of voluntary consensus standards. ASTMs leadership in international standards development is driven by the contributions of its members: more than 30,000 technical experts and business professionals representing 135 countries.

The purpose of antitrust laws is to preserve economic competition in the marketplace by prohibiting, among other things, unreasonable restraints of trade. In ASTM activities, it is important to recognize that participants often represent competitive interests. Antitrust laws require that all competition be open and unrestricted.

It is ASTMs policy, and the policy of each of its committees and subcommittees, to conduct all business and activity in full compliance with international, federal and state antitrust and competition laws. The ASTM Board of Directors has adopted an antitrust policy which is found in Section 19 of ASTM Regulations Governing Technical Committees. All members need to be aware of and compliant with this policy. The Regulations are accessible on the ASTM website http://www.astm.org/COMMIT/Regs.pdf).

Electronic recording of ASTM meetings is prohibited.

Membership

ASTM TMC	Tom Schofield
Afton	Shelia Thompson, **Jeff Yang, Todd Dvorak**
BG Products	Madeleine Dellinger
Chevron Oronite	**Robert Stockwell**
Evonik Oil Additives	Justin Mills, Gabe Walkup, Justin Kontra
ExxonMobil	**Dennis Gaal**
Infineum	Andy Richie, Sapna Eticala
Intertek	**Joe Franklin**, Matt Schlaff, **Rachel Stone**
Lubrizol	**Aimee Shinhearl**, **Jerimiah Westbrook**
PetroChina	Li Shaohui , Sun Ruihua, Peng Wang, Xiaogang Li, Xu Li
SwRI	**Becky Grinfield**, Joe De La Cruz, Mike Birke, **Yong-Li McFarland**
Valvoline	Amol Savant, **Amy Ross, Bruce Tonkel**
Vanderbilt Chemicals	Al Filho, **Christine Katrenya**
Ace Glass	Dave Lawrence, **Tom Petrocella,**
Koehler Instruments	Raj Shah, Vincent Colantuini
Tannas/Savant	Greg Miller, Ted Selby
General Interest	**Alan Flamberg**
Guests	

Summary of changes:

1. Tom Schofield to retire on March 1st. Many thanks for his years of service to the ROBO Surveillance Panel and all the best in retirement!
2. Christine Katrenya added to roster.

Motion to accept November 18, 2021 meeting minutes

November 2021
Meeting Minutes

MEETING MINUTES: ROBO SURVEILLANCE PANEL

Meeting: ROBO SP Meeting

Date: November 18, 2021

Location: MS Teams (virtual)

Minutes by: Justin Mills – SP Chair

Actions:

1. Tom Schofield to update LTMS to reflect latest limits for 436 and incorporate the revised reference oil tables into the LTMS (approved at September 30, 2021 SP meeting).
2. Tom Schofield to incorporate editorial changes to IL21-01 proposed by Terry Bates.
3. Justin Mills to tentatively schedule the next ROBO SP meeting for February 3, 2022.

Membership and Attendance:

Ace Glass	Dave Lawrence, Tom Petrocella
Afton	Shelia Thompson, Jeff Yang, Todd Dvorak
ASTM TMC	*Tom Schofield
BG Products	*Madeleine Dellinger
Chevron Oronite	Robert Stockwell
ExxonMobil	*Dennis Gaal
Infineum	Andy Richie, Sapna Eticala
Intertek	Joe Franklin, Matt Schlaff, *Rachel Stone
Lubrizol	*Aimee Shinhearl, Jerimiah Westbrook
PetroChina	Li Shaohui , Sun Ruihua, Peng Wang, Xiaogang Li, Xu Li
Evonik Oil Additives	*Justin Mills, Justin Kontra, *Gabriel Walkup
Vanderbilt Chemicals	*Al Filho, *Christine Katrenya
SwRI	Becky Grinfield, Joe De La Cruz, *Mike Birke, *Young-Li McFarland
Valvoline	Amol Savant, *Amy Ross, Bruce Tonkel
Koehler Instruments	Raj Shah, Vincent Colantuini
Tannas/Savant	Greg Miller, Ted Selby
General Interest	*Alan Flamberg
Guests	

* Denotes attendance

ASTM D7528 ROBO SP Meeting November 18, 2021

MEETING MINUTES: ROBO SURVEILLANCE PANEL

Summary:

- Meeting convened at 10:01EDT on November 18, 2021
- No modifications to agenda
- ASTM Antitrust and Recording Policy reviewed
- Membership review and update
  - Ron Hiza of Vanderbilt has retired, and Christine Katrenya has replaced him.
  - Kris Flectcher represented in Oronite in place of Robert Stockwell at this meeting.
- Meeting minutes from September 30, 2021 SP meeting were accepted
- Actions from the July 22nd meeting were reviewed.
  - Tom Schofield to incorporate accepted changes to Section 13 and Appendix X7 into information letter.
    - Status= Complete
  - Tom Schofield to update limits for reference oil 436.
    - Status= New 436 are active/effective, but LTMS still needs to be updated.
  - Tom Schofield to make reference oil 438 and 438-2 obsolete. Tom also to send test keys to labs with remaining 438/438-2 inventory so they may either dispose of or use internally.
    - Status= Complete
  - Tom Schofield to incorporate the revised reference oil tables into the LTMS
    - Status= Awaiting next update to LTMS
  - Justin Mills to tentatively schedule the next ROBO SP meeting for November 18, 2021. Current status of ROBO
    - Status= Complete
- Last semester (4/1/2021 through 9/30/21) finished slightly mild (-0.37), but precision in line with target (0.1992).
  - New precision limits have been set based on current reference oils → 0.1551
  - Stats can be found here https://www.astmtmc.org/ftp/refdata/bench/robo on the recently moved TMC website.
- Dilute NO2
  - ROBO Information Letter 21-01 was issued November 3, 2021 by the TMC with an effective date of December 1, 2021. Upon review of the IL, there were several editorial changes recommended by Terry Bates. SP agreed that all changes could be adopted without issue. Note, adopting these editorial changes does not impact the December 1, 2021 effective date. Summary of changes is below:
    - Add color code to IL to explain what each color means (e.g. red vs blue)
    - Change "% volume" and "concentration" to "volume fraction" to comply with ASTM standards. Many of the SP member felt "% volume" and "concentration" better described what we were trying to convey, but in the end agreed that change could be implemented to comply with ASTM standards.
    - Changes to format temperature is reported
  - Reporting NO2 volume delivered during test was discussed at length. In the revised method it states "13.3.6.1 If the dilute nitrogen dioxide option was used, calculate and report the total amount of nitrogen dioxide delivered to the reactor. See Appendix X.7 for an example calculation."; however, the data dictionary (and report forms) will include an entry for "TOTAL NITROGEN DIOXIDE DELIVERED". As a result, there was some debate whether volume of concentrated NO2 delivered should be reported. Specifically, concern was raised that if this field was reported on the report form / certificate shared with customers, then there would be confusion/concern for it is blank. In the end, we agreed that reporting volume of dilute NO2 delivered is mandatory and reporting volume of liquid/concentrated volume is non-mandatory (can either be reported or left blank at the discretion of each lab).
- Summary prepared for upcoming D02.B0.07 meeting was shared with the SP.

ASTM D7528 ROBO SP Meeting November 18, 2021

MEETING MINUTES: ROBO SURVEILLANCE PANEL

Status	Test Aspect	Comments
✓	Method	**Test method is in good standing.** • IL 21-01 effective December 1, allowing usage of dilute NO2 as alternative to concentrated NO2.
✓	Parts Availability	**All ROBO hardware and test materials are available** • Nitrogen dioxide, the primary catalyst for ROBO, is available from multiple suppliers • Alternative procedure with dilute nitrogen dioxide effective December 1.
✓	Reference Oils	**All current reference oils are in good supply at TMC:** multiyear supply of each oil • Final limits set for 436 • Surveillance panel replaced 438-2 with 436
✓	Test Availability	**Test is available with no significant queues to report.** • Less activity than prior semesters • Available at 5 labs with 22 calibrated stands
✓	Severity and Precision	**In last semester (Apr 2021 – Sep 2021) precision was on target and test ran with a slight mild bias:** • N = 106, Pooled s = 0.1992 and Mean Δ/s = -0.37

- During the meeting it was also confirmed by Denny Gaal (Chair of B.07) that additional time (up to 10 minutes) will be available for SP to present their reports since the session was extended from one hour to two hours.
- Flow meters
  - The method describes the use of two flowmeters/rotameters: "6.10.1 Acrylic Block Airflow Meter" and "6.10.2 Airflow Meter". One of the SP members inquired if there was described way or best practices to calibrate these meters. The outcome of this discussion is below:
    - Rotameters have no means of adjustment so if out of tolerance rotameters should first be cleaned. If still out of tolerance, then rotameter may need to be discarded.
      - Also recommended to allow time for meter to acclimate/stabilize.
    - Validated/verified vs. calibrated. Performance of rotameters can be compared against a known standard to validate/verify its performance (measurements). It within the tolerance range meter can be considered calibrated; however, if not, there is no way to adjust it.
    - Tolerances of the flow meters are not included in the method, so it was recommended to use tolerances provided by manufacturer when validating performance.
    - There also the option to send rotameters for calibration. Maddie Dellinger recommended the company Applied Technical Services.
  - Will keep a placeholder at next meeting to discuss best practices for equipment calibration
- Instatherm update
  - Rachel Stone provided a short update on their reactors experiencing "burn out" after a limited number of runs. Ace Glass was able to find an electrical short in the affected reactors, but unable to determine a root cause. At this time, it appears this issue may be isolated to just small number of reactors produced earlier this year. SP will continue to monitor.
- Other topics
  - ISO 17025: Maddie Dellinger inquired if any of the SP members had or were seeking ISO 17025 on their ROBO units. Some labs reported interest, but it appears that no labs have ISO 17025 for their ROBO units.
  - J-Chem controllers: Maddie inquired if anyone had experience troubleshooting J-Chem controllers. No immediate feedback from any SP members.
- Next meeting tentatively scheduled on February 3, 2022. Date may be postponed if necessary.
- Meeting adjourned 11:17EDT

Meeting Outcome:

1. Surveillance panel agreed to accept editorial changes proposed by Terry Bates in ROBO Information Letter 21-01.
2. Surveillance panel agreed that reporting volume of liquid/concentrated NO2 delivered is non-mandatory and can therefore be included or left blank on the report forms.

-End report-

ASTM D7528 ROBO SP Meeting November 18, 2021

Actions from November 18, 2021 meeting

- Tom Schofield to update LTMS to reflect latest limits for 436 and incorporate the revised reference oil tables into the LTMS (approved at September 30, 2021 SP meeting).
  - Limits are effective, but LTMS still needs to be updated.
- Tom Schofield to incorporate editorial changes to IL21-01 proposed by Terry Bates.
- Justin Mills to tentatively schedule the next ROBO SP meeting for February 3, 2022.

Current status of ROBO

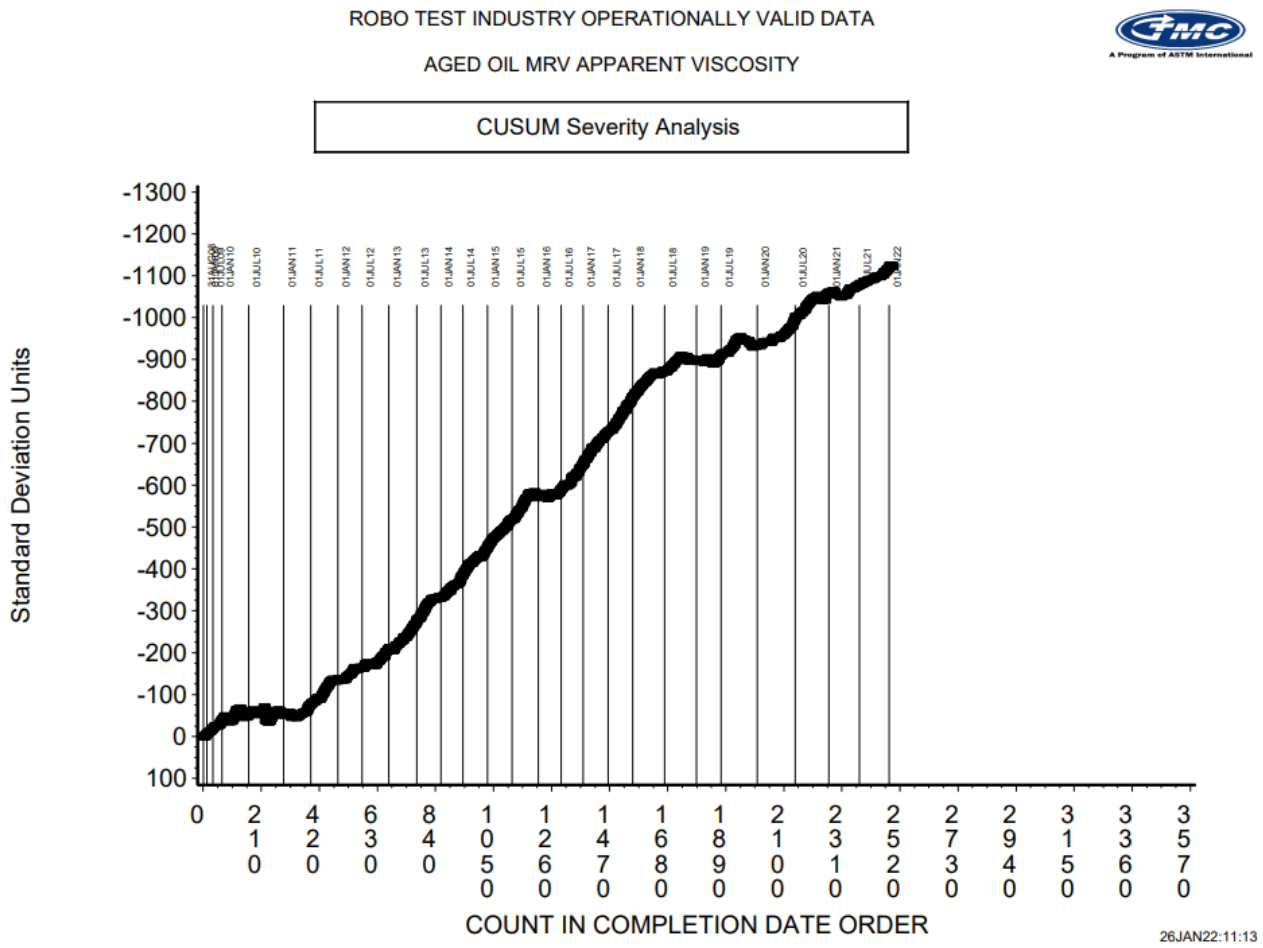
ROBO Industry Statistics

Period	N-size	Degrees of Freedom	Pooled s	Mean Δ/s
Current Targets	80	77	0.1551	------
10/1/17 through 3/31/18	91	87	0.2367	-0.91
4/1/18 through 9/30/18	126	122	0.2184	-0.49
10/1/18 through 3/31/19	100	96	0.2738	0.04
4/1/19 through 9/30/19	95	91	0.2492	-0.32
10/1/19 through 3/31/20	158	153	0.2723	-0.10
4/1/20 through 9/30/20	119	113	0.2264	-0.76
10/1/20 through 3/31/21	113	108	0.3188	-0.11
4/1/21 through 9/30/21	116	110	0.1992	-0.37
10/1/21 through 3/31/22	65	61	0.2196	-0.39

- Test is running comparable to last semester. Precision is slightly worse than new target and test is running with slight mild bias.

Source https://www.astmtmc.org/ftp/refdata/bench/robo/data/statistics.txt (January 31, 2022)

CUSUM severity analysis



Source: https://www.astmtmc.org/ftp/refdata/bench/robo/plots/mrv%20INDUSTRY.pdf (January 31, 2022)

Dilute NO_2

ROBO Information Letter
Issued November 3 → Effective December 1

ROBO IL 21-01

Test Monitoring Center

A Program of ASTM International

203 Armstrong Drive, Freeport, PA 16229, USA

www.astmtmc.org
412-365-1000

ROBO Information Letter 21-01
Sequence No. 3
November 3, 2021

ASTM consensus has not been obtained on this information letter. An appropriate ASTM ballot will be issued in order to achieve such consensus.

TO: ROBO Mailing List

SUBJECT: Revisions to ROBO Test Method D7528

The ROBO Surveillance Panel has approved revisions to the D7528 ROBO Test Method. The revisions are attached. The changes add an option to use dilute nitrogen dioxide in air. These changes are effective December 1, 2021.

Justin Mills
Chair
ROBO Surveillance Panel

Frank M. Farber
Director
ASTM Test Monitoring Center

Ballot issued for in ASTM Ballot D02 (22-01)

Technical Contact = Justin Mills

- 30-day ballot
- Concurrent with B0.07
- Issue Date = January 24, 2022
- Close Date = February 23, 2022

- Note, editorial changes proposed by Terry Bates in November 2021, are not captured in the Information Letter sent to ballot.

Calibration Requirements for dilute NO2

- In prior meetings we agreed that NO2 delivery should not change between calibrations, but it appears we never determined 1 or 2-test calibration should be required when switching NO2 delivery on existing stand.
  - Section 43.B.3.e of LTMS requires 2-test calibration for changes including:
    - Vacuum control valve set point
    - Exchanging the reactor vessel or the vacuum pump
    - Changing the heating voltage setting by more than ± 1 volt

- Does changing the NO2 delivery method (dilute or concentrated) warrant a 2-test calibration or is the change minor enough to allow a standard 1-test calibration?

Any Additional Topics?

Reporting MRV in flat files

- From the method:
  - 12.3 Apparent Viscosity—Report as follows:
  - 12.3.1 If the apparent viscosity is less than 5000 mPa·s, then report the apparent viscosity as less than 5000 mPa·s.
  - 12.3.2 If the apparent viscosity is between 5000 mPa·s and 100 000 mPa·s, then report the apparent viscosity to the nearest 100 mPa·s.
  - 12.3.3 If the apparent viscosity is between 100 000 mPa·s and 400 000 mPa·s, then report the apparent viscosity to the nearest 1000 mPa·s.
  - 12.3.4 If the apparent viscosity is greater than 400 000 mPa·s, then the apparent viscosity should be reported as greater than 400 000 mPa·s.
  - 12.3.5 If the rotor did not move with the application of the 150 g weight, report that the sample was “Too Viscous To Measure” (or “TVTM”).

- 480 2 ROBO MRVVEOT 8 0 A mPa-s AGED OIL D4684 MRV APPARENT VISCOSITY [<,>]
- 490 2 ROBO MRVYSEOT 4 0 A Pa AGED OIL D4684 YIELD STRESS [<,>]

- Can “TVTM” added to the data dictionary?

Flow meter calibration

- ROBO test makes use of two flow meters
  - 6.10.1 *Acrylic Block Airflow Meter* (King Instrument Co., 7520 Series, Order number 2C-17), [7] having a scale of 0.4 to 4 Standard Cubic Feet per Minute (SCFM), with $^1/_4$ in. NPT threaded female pipe end. It is used for measuring air flow in 10.3.2. The machined fitting for the top of the flow meter shall accommodate the vacuum line from the condenser to the reactor with a $^3/_8$ in. inside diameter or larger. The machined fitting for the bottom of the flow meter shall accommodate the $^1/_4$ in. vacuum control valve.
  - 6.10.2 *Airflow Meter,* with a scale calibrated in mL/min for measuring subsurface airflow of 185 mL/min in 10.3.1 and 10.3.2. Two air flow meters may be used in the dilute nitrogen dioxide configuration depending on the location of the switching valve.

    6.10.2.1 A digital mass flow controller may also be used to measure and control the flow rate. This type of flow controller is recommended, but not required, for the dilute nitrogen dioxide in air option.

- Calibration procedures as well as 3rd parties able to certify meters were discussed at last meeting. Any additional updates?

Next Meeting

- No immediate need for next SP meeting.
  - Suggest we meet in late March or early April.