IEEE P2520.1 Working Group #21
Meeting Minutes
27 February 2023
WG Chair: James Covington
WG Secretary: H. Troy Nagle

Meeting link:
https://ieeesa.webex.com/ieeesa/j.php?MTID=mf96791b98f36d1a495cde56e593d7d92

1. Call to Order
   Chair called meeting to order at 10:04 AM EST. He announced that the meeting was being recorded for the purpose of preparing minutes.

2. Roll Call and Disclosure of Affiliation
   Affiliation FAQs: http://standards.ieee.org/faqs/affiliation.html
   The Chair announced that participants can sign-in at this link:
   https://docs.google.com/spreadsheets/d/1x3Le7jd_5h3bg1NcYMZIjbfjzE2XEd0U8Daon0008Ks/edit#gid=0.
   The Chair asked the Secretary to check for a quorum. No new members were participating. The List of Participants is shown in Attachment A. A quorum was achieved (13 of the 18 voting members were present).

3. Approval of Agenda
   The Chair asked for approval of the agenda. Krishna Persaud made the motion; Susan Schiffman seconded. Without objection to unanimous consent, the motion was adopted.

4. Approval of Previous Meeting Minutes
   Minutes for WG#20 will be considered at our next meeting.

5. IEEE-SA Patent & Copyright Policies
   a. Call for Patents
      Per standard IEEE SA WG meeting practice, the Chair displayed the required policy regarding potentially essential patents. No one raised concerns for consideration.
   b. Copyright Policy
      https://standards.ieee.org/ipr/copyright-materials.html
      Per standard IEEE-SA WG meeting practice, the Chair displayed the required policy regarding copyrights. There were no questions or concerns.

6. Discussion on scoring system for Level 2
   The Chair reviewed our most recent approach to evaluating Level 2 performance.
A possible replacement for our current scheme is to consider allowing some error in a MP. The following Exclusion Scoring method was reviewed.

POSSIBLE?

During MP1, there are 27 possible combinations for reporting the results. The three-correct result (ABC) is the only one combination; the other 26 are excluded. Two-correct results (AAC, ABA, ABB, ACC, BBC, CBC) total to six combinations; the other 21 are excluded. Similarly, a single-correct result totals 12 choices; the other 15 are excluded.

Suggestion to create a Exclusion Score (ES) for each MP. If all three gases are recognized, the ES is 26. If a single gas is not recognized in a MP, that ES is 21. If two are not recognized, the ES is 15.

- **LVL2-1** (std conditions): Sum the three MP ES scores. A perfect ES-std is 3 • 26 = 78. The passing ES-std allows for one mistake and is 2 • 26 + 21 = 73.
- **LVL2-2** (temperature): This adds two more sets of three MPs to the LVL2-1 data (forms Half-Set-1). The passing ES-temp for this level is 3 • 73.
- **LVL2-3** (relative humidity): This adds two more sets of three MPs to the LVL2-1 data (forms Half-Set-2). The passing ES-rh for this level is 3 • 73.
- **LVL2-4** (day test): Add the two Half-Sets to form the Complete Set. This adds the LVL-2 and LVL-3 ES values (ES-day = ES-temp + ES-rh). The passing ES-day is 6 • 73.
- **LVL2-5** (week test): This adds the three day ES values. ES-wk = ES-day1 + ES-day2 + ES-day-3. The passing ES-week is 3 • 6 • 73.
We will continue this discussion after the WG members have evaluated this concept. Rather than using the MPs as the passing criteria, we agreed to use instead an absolute number of tests. We will also allow some test failures. As higher levels are considered, excellent performance at lower levels can offset test failures. Our final scoring method will be adopted after we experiment with some currently available systems with varying capabilities to see if our requirements are reasonable.

7. **Discussion on testing of the standard**
   The Chair then transitioned to a discussion of the testing protocols.

**TESTING PROTOCOLS**

- Need to generate testing protocol to allow evaluation of the standard
- Will be included in P2520.1 standard
- Focus on main methods – currently 6 (!)
- Propose to develop “Method Sheets” that give examples of a specific method. This might need to be equipment specific as well
- These can be included in either at the front or in an appendix
- Need to use either cylinders, liquids, at different concentrations, with temperature and humidity changes – leaving pressure out.

The example methods can be equivalent to application notes. From our last session, the six methods are summarized below. Each method can have a “crib sheet” to help the operator set up the tests. This materials could be located in Appendix B.
The Methods table is summarized more concisely below. Permeation was added to the list.

Operators can use a combination of Methods but we won't provide guidelines for that.

Next the Chair began a more detailed discussion of Method 1.
METHOD 1: SYRINGE AUTOSAMPLER

Sample Collection:
- Both commercial and custom autosampler can be used.
- Syringe based method with sample in glass vial. Glass vial typically 10-20ml. Injection into system <5ml
- Multiple injections will be permissible.

Chemical Media:
- Liquid phase sample placed into syringe (we could provide liquid volume?).

Concentration Control:
- Mix with a diluant, potentially water or solvent with a low vapour pressure. Need to create different mixes associated with different temperatures – Example & Henry’s equation

Temperature Control:
- Place sample in a heater – most samplers are provided with auto sampler. Sample should be heated to ensure that the sample is homogenous.

Humidity Control:
- Humidity will be generated by? Water in sample? Double injection?

Pre-concentration:
- Could use purge and trap or similar system constructed into instrument. Will we allow multiple injections from the same syringe into the pre-concentrator?

These are liquid based samples. Dilution in water is normal. For some applications, water may not be compatible. Paraffin oil or some inert solvent with low vapor pressure may be necessary for some test chemicals. Humidity control is problematic for systems with autosamplers.

8. New Business/Activities for the Next Meeting
   There was no New Business.

9. Future Meetings
   The Chair announced the next meeting (WG#21) will take place on March 27 at 10:00 AM EST.

10. Adjourn
    Due to a fire alarm alert in the Chair’s office building and without objection to unanimous consent, the Chair adjourned the meeting at 10:55 AM.
## Attachment A: Participants (13)

<table>
<thead>
<tr>
<th>NAME</th>
<th>AFFILIATION</th>
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<tbody>
<tr>
<td>Carlos Diaz</td>
<td>Ambiente et Odora</td>
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<tr>
<td>Christopher Jensen</td>
<td>Self</td>
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<tr>
<td>Duke Oeba</td>
<td>Egerton University, Kenya</td>
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<tr>
<td>Ehsan Danesh</td>
<td>Advanced Sensing Technologies Ltd.</td>
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<tr>
<td>Ettore Massera</td>
<td>ENEA</td>
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<tr>
<td>Fengchun Tian</td>
<td>Chongqing University</td>
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<td>James Covington</td>
<td>University of Warwick</td>
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<td>Krishna Persaud</td>
<td>University of Manchester</td>
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<td>Paul Kagan</td>
<td>AWLDM Systems</td>
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<td>Radislav Potyrailo</td>
<td>GE Research</td>
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<td>Saverio De Vito</td>
<td>ENEA</td>
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<td>Susan Schiffman</td>
<td>North Carolina State University</td>
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<tr>
<td>Troy Nagle</td>
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