

**Society of Automotive Engineers
VOC Committee**

Comments For GRPE

January 13, 2016

SAE International



Agenda

- Soak Time Discussion
- Test Method Comments and Recommendations
- Backup - ISO Test Methods

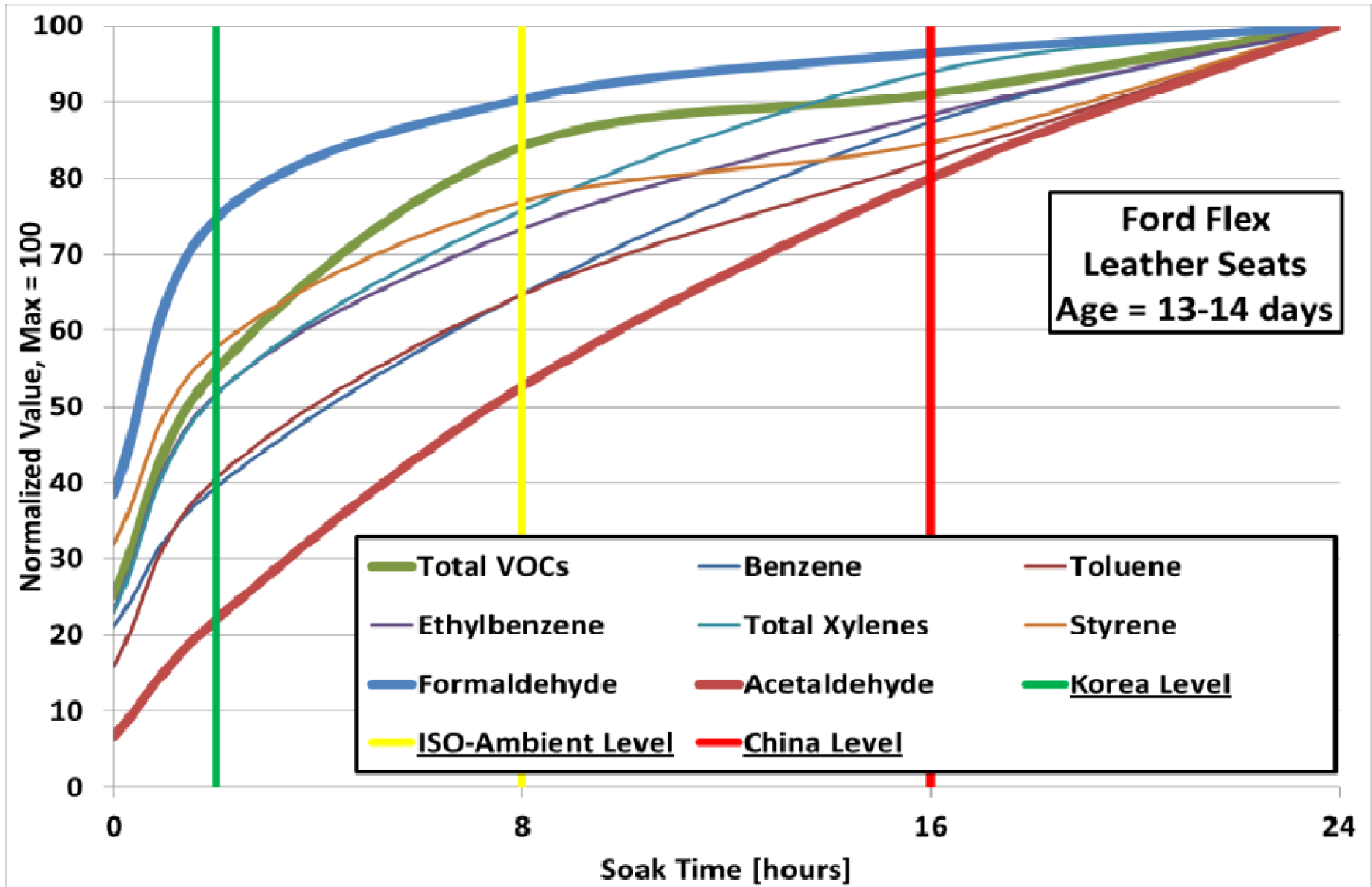
SAE Comments on Soak Times

- Main task is to align soak times of current methods. ISO method is a good method but need to consider changing the soak time.

- Korea = 2 hours
 - ❑ Running the test with 2 hours is not good because the Formaldehyde values are changing quickly at the 2 hour mark.
 - ❑ Plus you add the other 2 modes and you cannot complete it in one shift.

- ISO = 8 hours
 - ❑ Running with an 8 hour soak is ok but we would need to start the test on the midnight shift in order to run all three parts.
 - ❑ But it would be OK to start at the end of the day and pick up the samples in the morning if you only run the ambient mode.

- China = 16 hours
 - ❑ Running with a 16 hour soak makes it possible to run part 1, ambient mode, or all three parts on the day shift.



Soak Time Comparison

Korean example with 2 hour soak, 2 tests in 1 shift

<u>Length of operation</u>	<u>Start time of operation</u>	<u>Operation</u>	<u>Shift</u>
0	8:00:00 AM	Open door	Day Shift
1	9:00:00 AM	Close door	Day Shift
<u>2</u>	11:00:00 AM	Soak	Day Shift
0.5	11:30:00 AM	Sample	Day Shift
0	12:00:00 PM	Lunch / Next Vehicle	Day Shift
1	1:00:00 PM	Close door	Day Shift
<u>2</u>	3:00:00 PM	Soak	Day Shift
0.5	3:30:00 PM	Sample	Day Shift

Current ISO example with 8 hour soak, requires 2 or 3 shift operation

<u>Length of operation</u>	<u>Start time of operation</u>	<u>Operation</u>	<u>Shift</u>
0	11:00:00 PM	Open door	Night Shift
0.5	12:00:00 AM	Close door	Night Shift
<u>8</u>	8:00:00 AM	Soak	
0.5	8:30:00 AM	Sample	Day Shift
4	12:30:00 PM	Heat	Day Shift
0.5	1:00:00 PM	Sample	Day Shift
0.5	1:30:00 PM	Sample	Day Shift
1.5	2:00:00 PM	Cool back to 25C, retest	Day Shift

New China/ISO example with 16 hour soak, 1 shift operation but over 2 days, difficult to repeat tests.

<u>Length of operation</u>	<u>Start time of operation</u>	<u>Operation</u>	<u>Shift</u>
0	3:00:00 PM	Open door	Day Shift
0.5	4:00:00 PM	Close door	Day Shift
<u>16</u>	8:00:00 AM	Soak	
0.5	8:30:00 AM	Sample	Day Shift
4	12:30:00 PM	Heat	Day Shift
0.5	1:00:00 PM	Sample	Day Shift
0.5	1:30:00 PM	Sample	Day Shift
1.5	3:00:00 PM	Cool back to 25C, retest	Day Shift

Soak Time Comparison - 14 Hour Soak

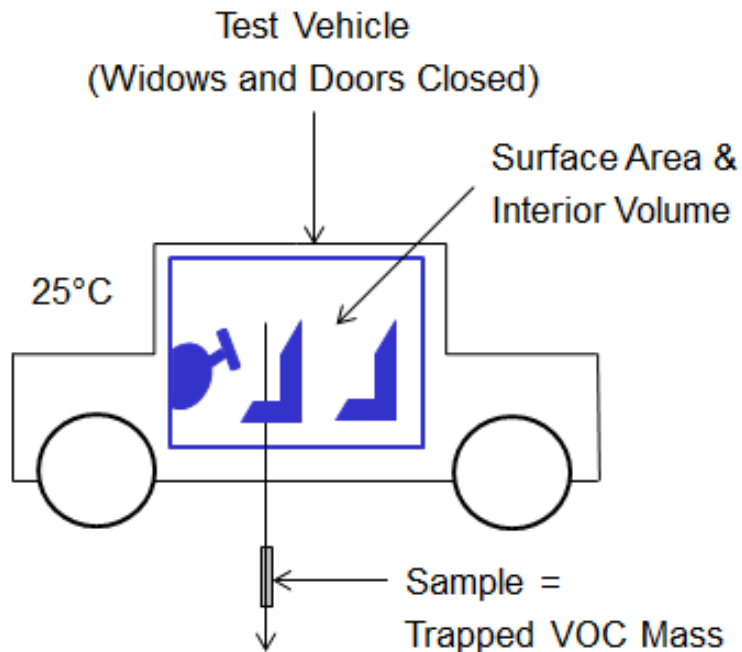
New example with 14 hour soak, 1 shift operation but over 2 days, ample time to repeat tests.

<u>Length of operation</u>	<u>Start time of operation</u>	<u>Operation</u>	<u>Shift</u>
0	3:00:00 PM	Open door	Day Shift
0.5	4:00:00 PM	Close door	Day Shift
14	6:00:00 AM	Soak	
0.5	6:30:00 AM	Sample	Day Shift
4	10:30:00 AM	Heat	Day Shift
0.5	11:00:00 AM	Sample	Day Shift
0.5	11:30:00 AM	Sample	Day Shift
1.5	1:00:00 PM	Cool back to 25C, retest	Day Shift

- “ Data shows good correlation between the regional methods and the ISO methods ambient mode.
- “ The main issue of harmonize is the ambient mode soak time: 2, 8 or 16 hours.
- “ Consider laboratory operations including an 8 hour operation with limited test site capacity. This works best with a 14 hour soak time.
- “ The longer the soak the more slower the emission rate will change resulting in a more repeatable the test method. Consider sampling when the emission rate of change is low, 14 hour soak time.
- “ Compound limit values should reflect method changes.

Vehicle Testing Calculations

Concentration is a function of (Material Properties, Temperature, Soak Time, and Ventilation)



$$VOC\ Mass = Concentration \cdot Flow\ Rate \cdot Sample\ Time \cdot conv.$$

$$\frac{VOC\ Mass}{VOC\ Volume}$$

$$VOC\ Mass = \frac{\mu g}{m^3} \cdot \frac{L}{min} \cdot min \cdot \frac{m^3}{L}$$

Sample Volume =
Flow Rate * Sample Time

$$VOC\ Mass = \frac{\mu g}{0.006\ or\ 0.025} \cdot 0.20\ or\ 0.83 \cdot 30 \cdot \frac{1}{1000}$$

VIAQ Test Method Comments

- Include more diagrams to explain procedures to help with language barriers.
- Improve test to test repeatability
 - “ Increase mass on the sample; a function of soak length, sample flow rate, soak temperature.
 - . Long soak times for higher more stable concentrations, 14 hours
 - . Higher sample flow rates but without break through, 0.2 L/m for TD tubes and 0.83 L/m for DNPH cartridges. Total volume = 6L for TD tubes and 25L for DNPH.
 - . Increase and harmonize soak temperature from 23C to 25C.
 - . Put limit values around soak times, suggest ± 1 min, long if data supports.
 - “ Include more quality control checks
 - . Report duplicate sample data and include void criteria.
 - . Report leak check results
- Standardize test reports with defined data fields and data format
- The full ISO test method, all three parts, should be discussed and adopted by the GRPE working group to achieve global harmonization.
 - Any modifications, if necessary, should be presented to ISO TC 146/SC 6/TC22 Joint WG 13 as improvements.
 - The next ISO JWG 13 meeting will be held in September 2016

Backup

▪ **ISO TC22/TC146 SC6 WG13 Test Methods**

- ISO 12219-1 **Published in 2012**
 - ❑ Part 1 - Whole vehicle test chamber - Specification and method for the determination of volatile organic compounds in cabin interiors
- ISO 12219-2 **Published in 2012**
 - ❑ Part 2: Screening method for the determination of the emissions of volatile organic compounds from car trim components . Bag method
- ISO 12219-3 **Published in 2012**
 - ❑ Part 3: Screening method for the determination of the emissions of volatile organic compounds from car trim components . Micro-scale chamber method
- ISO 12219-4 **Published in 2013**
 - ❑ Part 4: Method for the determination of the emissions of volatile organic compounds from car trim components . Small chamber method
- ISO 12219-5 **Published in 2014**
 - ❑ Part 5: Screening method for the determination of emissions of volatile organic compounds (VOC) from car trim components . Static chamber method
- ISO 12219-6 **CD with comments**
 - ❑ Part 6: Method for the determination of the emissions of semi-volatile organic compounds from vehicle interior parts and materials - Small chamber method
- ISO 12219-7 **CD with comments**
 - ❑ Part 7: Odour determination in interior air of road vehicles and test chamber air of trim components by olfactory measurements
- ISO 12219-8 **AWI Approved Work Item with comments**
 - ❑ Part 8: Handling and Packaging of Materials and Components for Emissions Testing
- ISO 12219-9 **NWIP New Work Item Proposal**
 - ❑ Part 9: Screening method for the determination of the emissions of volatile organic compounds from vehicle interior parts and materials - Large bag method
- The next JWG 13 meeting will be held in the week from 26 September to 30 September 2015 in Burlington, Vermont (United States).
- Other proposed new work items include photo and gravimetric fogging and material odor testing methods.