

Korea comments on working items

The 5th VIAQ meeting

Geneva, June 8th

KATRI, The Republic of KOREA
(Korea Automobile Testing & Research Institute)

● Working Items

Working Item List **VIAQ-05-04**

1. Vehicle categories
2. Ambient mode (soak temperature)

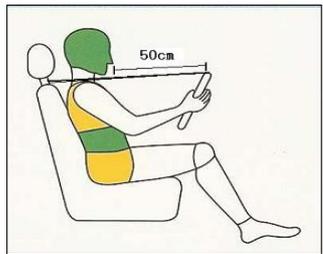
◆ The test method on VIAQ Standard

✓ Scope of Application

- Passenger cars, and light duty buses, vans and trucks
- 4 weeks(14-28 days) from the date of manufacture

✓ Measurement Substances

- Formaldehyde, Benzene, Toluene, Xylene, Ethylbenzene, Styrene, and Acrolein
(7 substances)



Time	Temp Stabilization Min. 12 hours	Ventilation 30 min	Doors Closed 2 hours	sampling 15min
Cabin Temp	$25 \pm 2 \text{ }^{\circ}\text{C}$	$25 \pm 2 \text{ }^{\circ}\text{C}$	$25 \pm 2 \text{ }^{\circ}\text{C}$	Day 1 : Sample 1,2,3 Day 2 : Sample 4,5,6

◆ VIAQ Test data for passenger cars and small pick-up trucks

- Vehicle category is a very difficult issue. All vehicles can be faced with vehicle interior air quality issues, since they are made from new materials. Due to practical problems, it is very difficult to address all vehicle categories. So, vehicle categories should be considered in a phased approach.
- The harmonized test procedure can apply to vehicle categories M1 and N1. So, contracting parties can choose the vehicle categories depending on their situations.

(unit : $\mu\text{g}/\text{m}^3$)

Type	Vehicles	Formaldehyde	Toluene	Ethylbenzene	Styrene	Benzene	Xylene	Acrolein
Passenger Cars		13	27	15	1	1	14	<0.01
		20	176	25	4	1	63	<0.01
		46	238	41	6	3	55	<0.01
		25	294	16	3	3	47	<0.01
		15	260	33	7	3	72	<0.01
Small pick-up Truck		47	315	11	2	3	40	<0.01
		9	893	59	22	12	244	<0.01

◆ Vehicle category

✓ Background

- After analyzing the existing standards, the vehicle category was investigated by the following table. Application on vehicle category is different for each country, and varies from test mode.

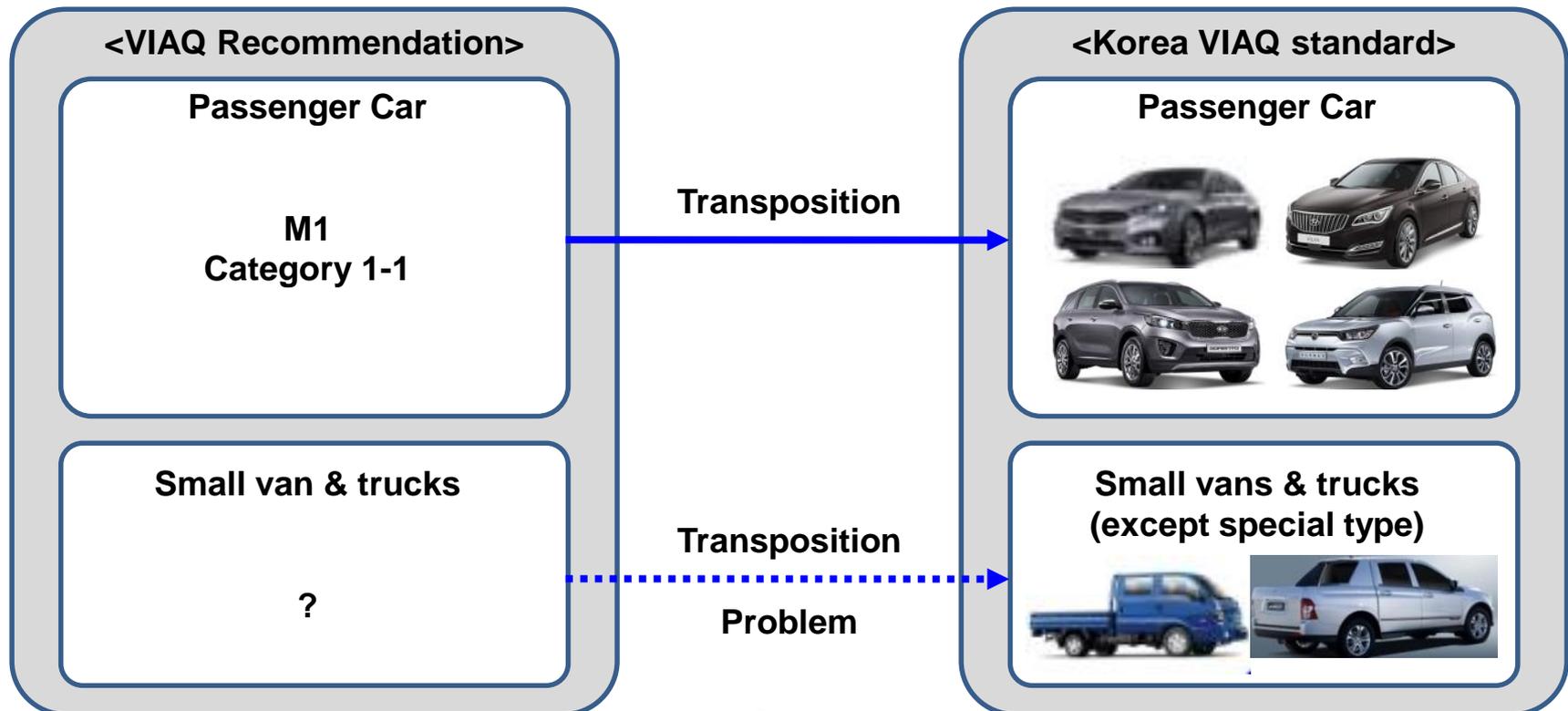
✓ Current Status

- It was generally agreed at the second meeting that M1 (light duty passenger cars) were included. Korea requests to include N1 (light duty trucks) into the standard. There is no experience with N1 measurement in parking and ambient mode in ISO standards. (VIAQ-04-11)

Test mode	KOREA	CHINA	JAPAN(JAMA)	ISO	VIAQ IWG
Ambient Mode	Passenger car, Small vans, Trucks	M1, M2, M3 and N	--	Passenger car	?
Parking Mode	-	-	Passenger car Bus Truck	Passenger car	?
Driving Mode	-	-	Passenger car Bus Truck	Passenger car	?
Reference	"MOLIT 2003-549"	"HJ/T 400-2007"	JAMA Report No.98	"ISO 12219-1"	

◆ Transposition into the Korea VIAQ standard

- ✓ It's very important to harmonize the test procedure. Korea is willing to embrace the VIAQ recommendation into our national standards.
- ✓ To enable harmonization, the coverage of VIAQ recommendation should include the coverage of existing standards.



◆ Vehicle category

✓ **Consideration**

- Vehicle category application was discussed very intensively as to what to cover and the extent of coverage. In establishing vehicle category coverage, we considered the following points.
 1. Every new car using a new interior material is to be included in principle.
 2. Vehicle category should be covered by test modes that are checked by technical data.
 3. Medium duty and heavy duty vehicles are not included in this test procedure for the time being, due to cost-efficiency (e.g. insufficient size test chamber, lower production, variety of vehicle models, etc.)

✓ **Possible option** : Prefer option 2

- Option 1: *Vehicle categories M1*
- Option 2: *Vehicle categories M1 and N1*
- Option 3: *Vehicle categories M1(All test mode) and N1(only ambient mode)*
- Other vehicle categories should be considered in a phased approach, and it will be discussed at a later stage. Contracting parties should be able to adopt vehicle categories depending on their own situations.

◆ Ambient Mode (Soak Temperature)

✓ Background

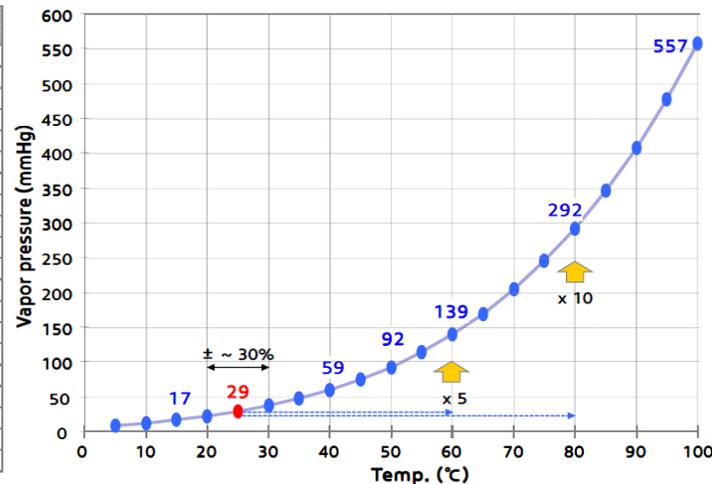
- Interior air emissions from materials can vary depending on the temperature. Emission rates increase gradually as temperature rises. The soak temperature is an important factor because it directly affects the test results.

✓ Current Status

- Ambient temperature is still being discussed. China and Korea recommend 25 °C. OICA recommend 23 °C, (VIAQ-04-11)

● Vapor pressure curve of Toluene : 20 → 25 °C, Vp increases ~ 30 %

Temp (°C)	Vp (mmHg)	Rel. Emission
5	9	
10	12	
15	17	
20	22	76
25	29	100
30	37	127
35	47	
40	59	
45	74	
50	92	
55	114	
60	139	479
65	169	583
70	204	
75	245	
80	292	1007
85	346	
90	408	
95	478	
100	557	



< VIAQ-04-08 Hyundai GRPE VIAQ IWG >

Ambient Mode (Soak Temperature)

◆ Ambient Mode (Soak Temperature)

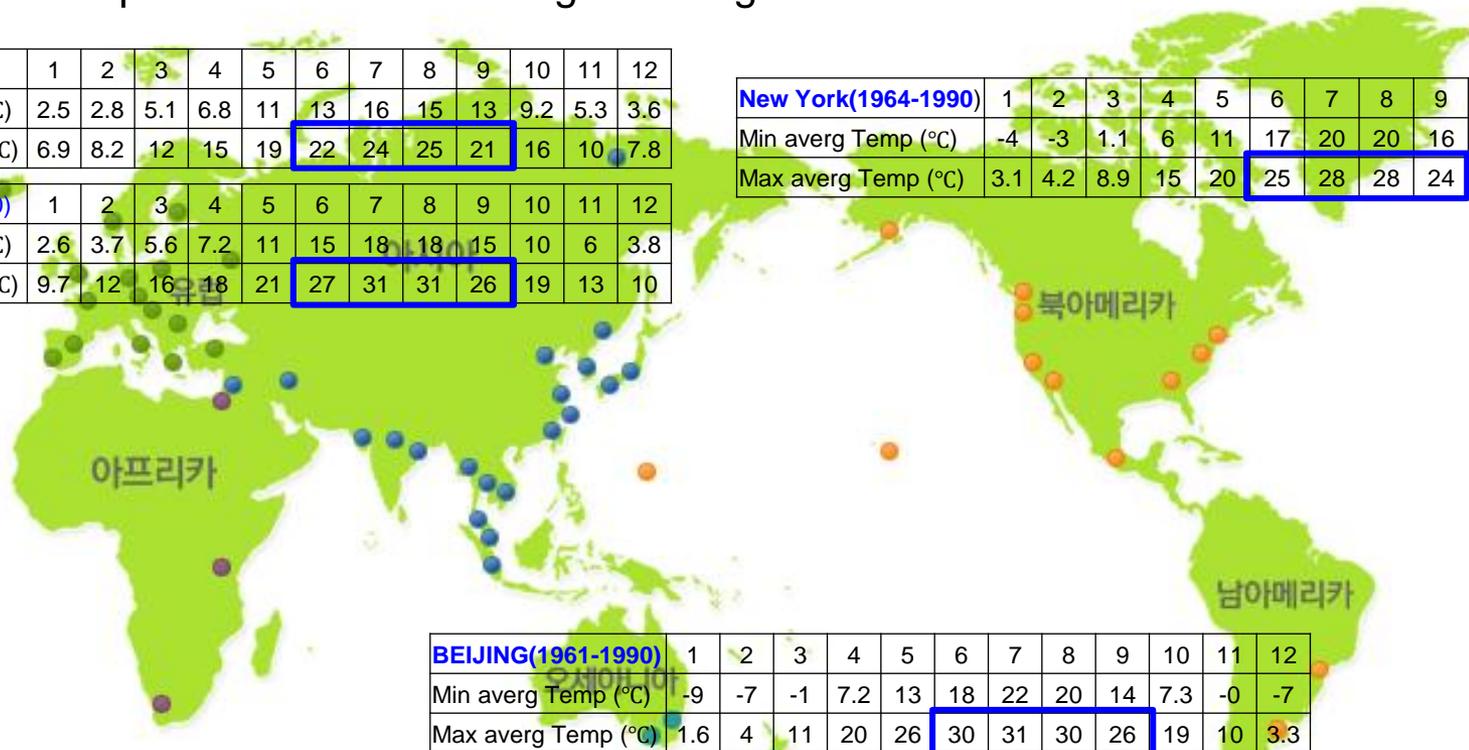
✓ Worldwide Ambient Temperature

- Ambient temperature varies from region to region

Paris(1971-2000)	1	2	3	4	5	6	7	8	9	10	11	12
Min averg Temp (°C)	2.5	2.8	5.1	6.8	11	13	16	15	13	9.2	5.3	3.6
Max averg Temp (°C)	6.9	8.2	12	15	19	22	24	25	21	16	10	7.8

Madrid (1971-2000)	1	2	3	4	5	6	7	8	9	10	11	12
Min averg Temp (°C)	2.6	3.7	5.6	7.2	11	15	18	18	15	10	6	3.8
Max averg Temp (°C)	9.7	12	16	18	21	27	31	31	26	19	13	10

New York(1964-1990)	1	2	3	4	5	6	7	8	9	10	11	12
Min averg Temp (°C)	-4	-3	1.1	6	11	17	20	20	16	9.6	4.7	-1
Max averg Temp (°C)	3.1	4.2	8.9	15	20	25	28	28	24	18	12	5.9



BEIJING(1961-1990)	1	2	3	4	5	6	7	8	9	10	11	12
Min averg Temp (°C)	-9	-7	-1	7.2	13	18	22	20	14	7.3	-0	-7
Max averg Temp (°C)	1.6	4	11	20	26	30	31	30	26	19	10	3.3

SEOUL (1971-2000)	1	2	3	4	5	6	7	8	9	10	11	12
Min averg Temp (°C)	-6	-4	1.1	7.3	13	18	22	22	17	9.8	2.9	-3
Max averg Temp (°C)	1.6	4.1	10	18	23	27	29	30	26	20	12	4.2

*www.kma.go.kr (Korea Meteorological Administration)



◆ Ambient Mode (Soak Temperature)

✓ Indoor air quality testing standards process (Korea Ministry of Environment Protection 2010-24)

- Concentration unit ($\mu\text{g}/\text{m}^3$) is based on 25°C, 1atm

✓ Standard reference conditions for temperature and pressure

* IUPAC (SATP, Standard Ambient Temperature and Pressure): 25.0 °C

* 40 CFR 50.3 - Reference conditions(all measurement of air quality): 25.0 °C, 760 mmHg

Standard reference conditions in current use

Temperature	Absolute pressure	Relative humidity	Publishing or establishing entity
°C	kPa	%	
0	100.000		IUPAC (STP) ^[1]
0	101.325		NIST, ^[7] ISO 10780, ^[8] formerly IUPAC ^[1]
15	101.325	0 ^{[2][9]}	ICAO's ISA, ^[9] ISO 13443, ^[2] EEA, ^[10] EGIA ^[11]
20	101.325		EPA, ^[12] NIST. ^[13] This is also called NTP, Normal Temperature and Pressure. ^[14]
22	101.325	20-80	American Association of Physicists in Medicine ^[15]
25	100.000		IUPAC (SATP) ^[1]
25	101.325		EPA ^[16]
20	100.000	0	CAGI ^[17]
15	100.000		SPE ^[18]
20	101.3	50	ISO 5011 ^[19]
°C	mmHg	%	
20	760.0	0	GOST 2939-63

< Standard conditions for temperature and pressure from Wikipedia>

◆ Ambient Mode (Soak Temperature)

✓ **Consideration**

- We considered the temperature most commonly used by people in buildings, homes and vehicles. The temperature range is 20°C ~ 30°C.
- using 25°C as our national standard, and the soak temperature was related to the limit values of harmful substances.

✓ **Possible option** : Prefer option 1

- Option 1: 25 °C
- Option 2: 23 °C
- Option 3: 25 °C *and* 23 °C
- 25°C for the soak temperature as a harmonized level taking into account standard ambient conditions