

Informal document **GRPE-66-40**
66th GRPE, June 7th 2013
Agenda item 18(a)

PROPOSAL FOR AN NEW REGULATION FOR VEHICLE INDOOR AIR QUALITY (VIAQ)

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1. Background

2. Korea Case study

3. International Status

4. Conclusion

- ◆ Consumers are increasingly concerned about indoor air quality from household, workplace and vehicle
 - ✓ Various chemical materials are emitted from vehicle interiors
 - ✓ VOCs and Aldehydes are included in the vehicle indoor air
- ◆ Chemical materials are **harmful to human body**
 - ✓ Causes symptoms such as headaches, eye irritation, sneeze, and so on
 - ✓ Such symptoms may not only affect drivers' health but also safe driving.



Discussions on vehicle indoor air quality is necessary
to protect driver's health and safe driving

◆ Harmful Substances & Its Effect on Human Body

Item	IARC	Effect on Human Body
Formaldehyde	1	As colorless liquid with strong stimulating smell, it causes skin infections and invades the mucosa
Benzene	1	Causes skin and eye irritation, is extremely dangerous when inhaled, and in serious cases, causes leukemia and increases the occurrence rate of lymph cancer and blood cancer
Ethyl benzene	2B	Affects internal organs, lungs, central nervous system
Styrene	2B	Stimulates eyes, skin, nose, respiratory system, causes sleepiness or unconsciousness
Toluene	3	Stimulates central nervous system, causing nausea, and abnormalities in stomach and nerve system
Xylene	3	Causes nerve stimulation, skin infection, cornea damage and so on, damages kidney and reproductive functions

◆ Carcinogenic Classification Standard of International Agency for research on Cancer

- Group 1 : Carcinogenic to humans
- Group 2A : Probably carcinogenic to humans
- Group 2B : Possibly carcinogenic to humans
- Group 3 : Not classifiable as to its carcinogenicity to humans

- ◆ Sick House Syndrome & Sick Car Syndrome : became a social issue
- ✓ New car driver feel a headache, eye irritation, sneeze and so on
- ✓ The main cause is the chemical materials that emitted from vehicle interiors



<KBS news “Hazardous substances in new car interiors”>

Interview : I feel slight headache and dizzy...

New car consumer survey

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- ◆ Surveyed 800 people who purchased a new car
- ✓ Feeling the physical symptoms under driving : 51.5%,
- ✓ Headache 31.5%, Eyes irritation 31%, Sneeze 15.8%, Fatigue 11.1%...

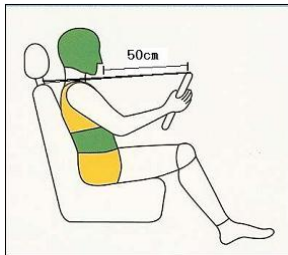


- ◆ 2005 Research on new car Indoor Air Quality basic investigation
- ◆ 2006 Research on Driver Risk Assessment of new car
- ◆ 2007 Private and Public Conference, Public Hearing, Seminar
- Public Announcement of 「Management Guideline of Vehicle Indoor Air Quality」
- ◆ 2010 Checkout test on 9 new vehicle model released in 2009
- ◆ 2011 Checkout test on 9 new vehicle model released in 2010

◆ Establish a VIAQ guideline on harmful substances

✓ reflecting the new vehicle's IAQ risk evaluation and the characteristics of the vehicle

✓ Vehicle's indoor air quality measurement method

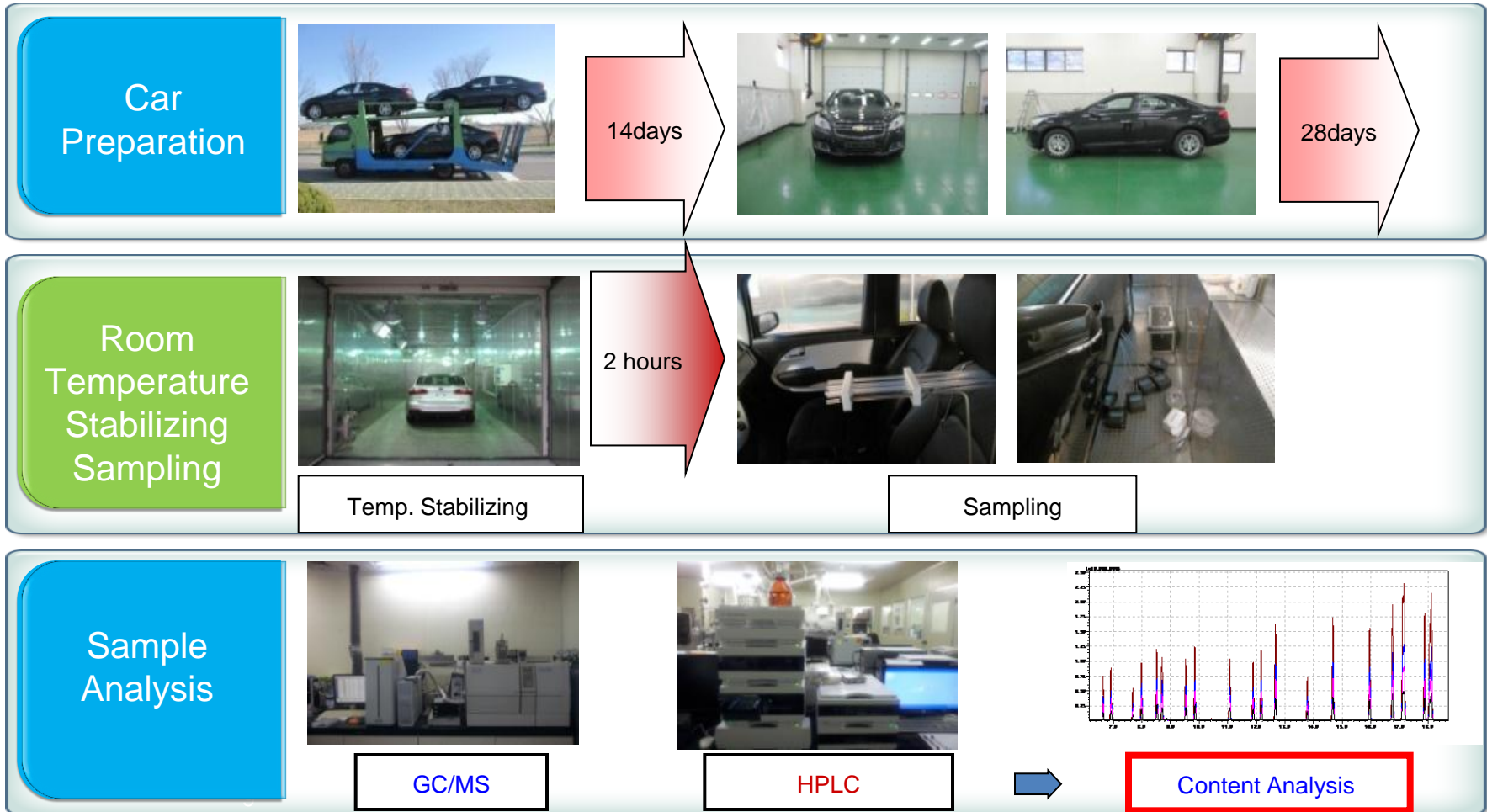


Time	Temp stabilize Min. 12hr	Ventilation 30min	Close door Sealing 2hr	sampling 15min
Cabin Temp	25°C	25°C	25°C	25°C

✓ Harmful substance limit

Item ($\mu\text{g}/\text{m}^3$)	Formaldehyde	Benzene	Toluene	Xylene	Ethyl benzene	Styrene
Limit	250	30	1,000	870	1,600	300

◆ Checkout whether automobile manufactures comply with guideline



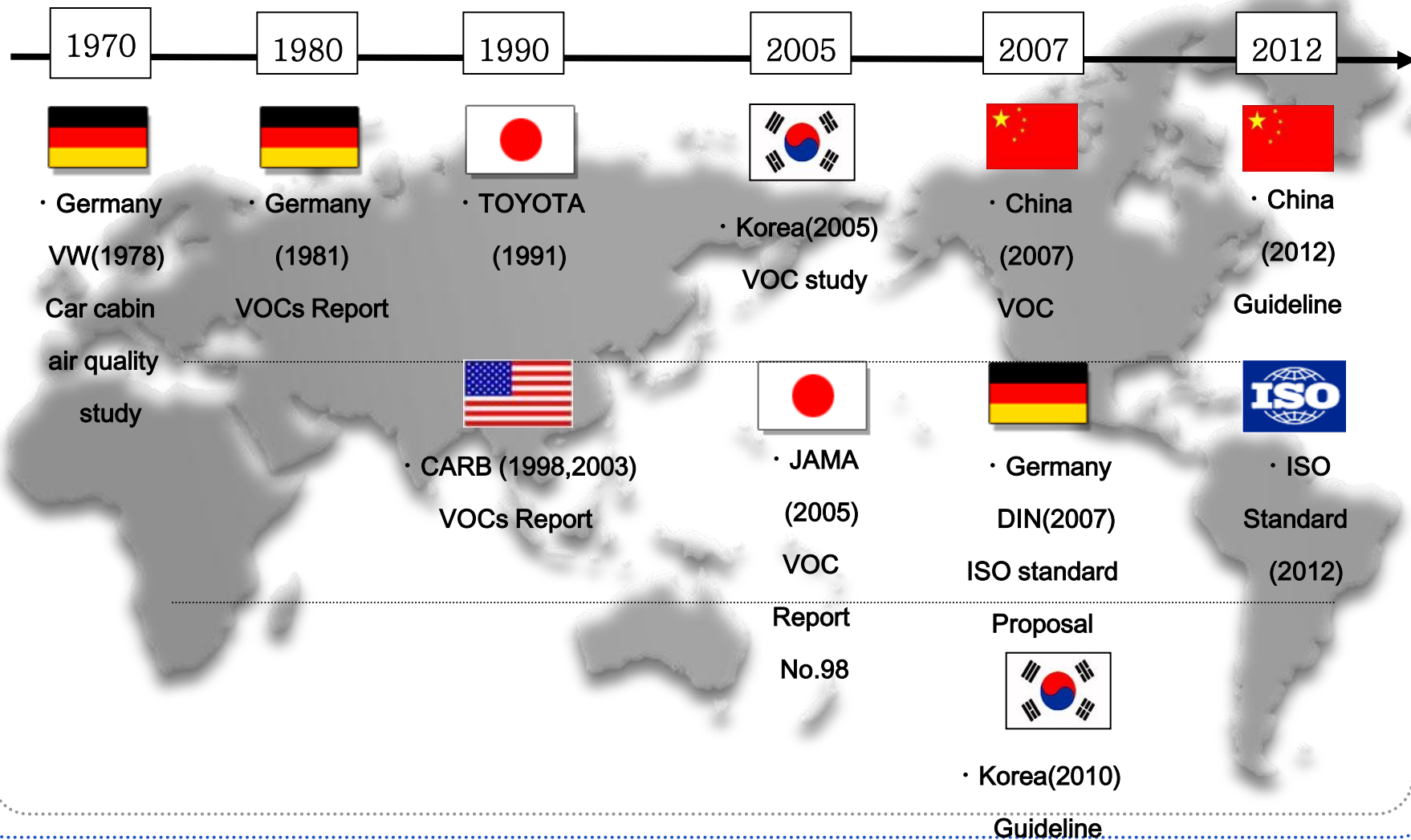
◆ The result of checkout test

Year	Item	Formalde hyde	Toluene	Ethyl benzene	Styrene	Benzene	Xylene
		Limit	250	1,000	1,600	300	30
2011	Avg	35	1,046	102	14	-	-
	Min	8	108	20	7	-	-
	Max	56	2,846	470	25	-	-
2012	Avg	20	328	66	33	7	199
	Min	4	85	18	4	5	45
	Max	29	753	131	136	13	379

International VIAQ Status

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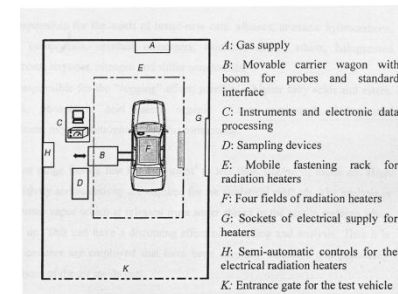
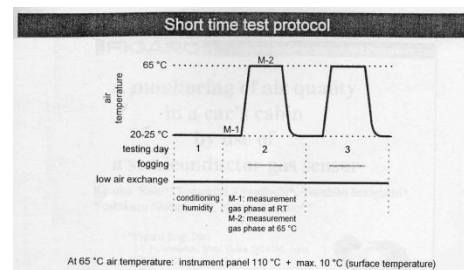
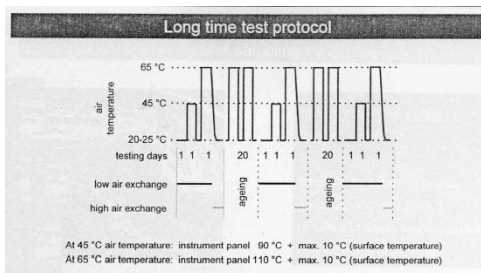
◆ VOCs related research began since 1970

✓ **Netherlands, France, Sweden** and other countries conducted researches

✓ **Germany** conducted researches from a long time ago related to the smell suppression of new cars

• From the beginning of 1990s, research on VOSc evaluation method of a new car's indoor space was conducted, led by **TÜV NORD**, TÜV (Technology Inspection Association)

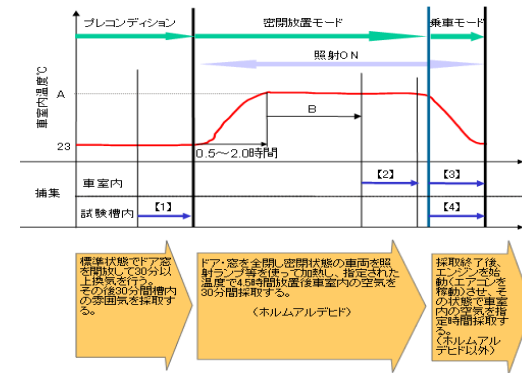
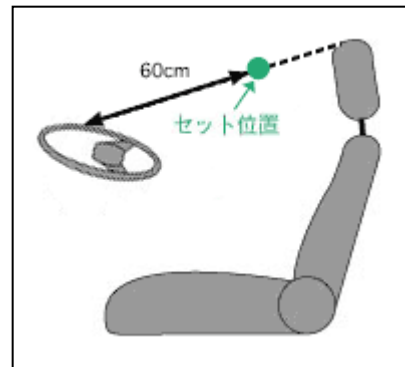
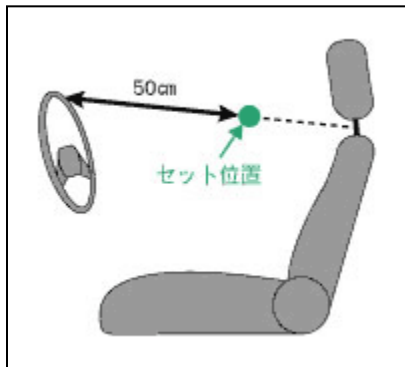
• In TÜV Rheinland, TOXPROOF certification system on new car's indoor air quality is operated



< Composition of TÜV NORD Vehicle Indoor Air Quality Measuring System >

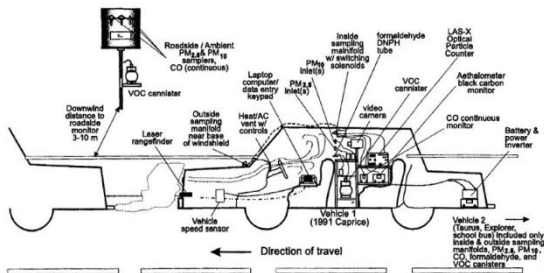
◆ Japan Automobile Manufacturers Association (JAMA) leads IAQ Research

- ✓ In February 2005, led by **JAMA**, “Countermeasure Guidance on the Reduction of vehicle Indoor VOCs” is announced
- In March 2006, trucks and buses are added and the guideline is amended
- ✓ In case of sedans, in 2007 and in case of commercial vehicles such as trucks and buses, in 2008, new cars sold within Japan is recommended to meet the guidelines



◆ VOCs related researches began from the end of 1990s

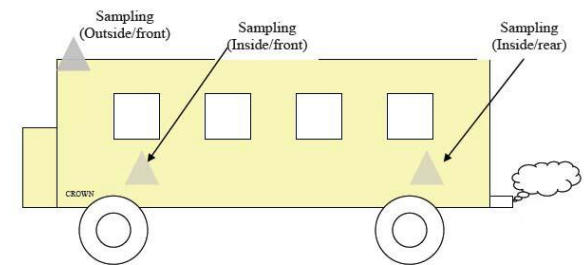
- ✓ In case of **CARB**(California Air Resources Board), indoor air quality research result on 2 sedans, 1 SUV and 1 school bus in 1998 and 7 school buses in 2003 was announced
- ✓ **EPA** (Environmental Protection Agency) Report on the necessity of indoor air quality research
- ✓ “Journal of Exposure Analysis and Environmental Epidemiology” 2003
- ✓ **SAE** Technical PAPER 2010-36-0390 “New Vehicles Cabin Indoor Air Quality”



<Composition of CARB Indoor Air Quality Measuring System>



<CARB Bus Indoor Air Quality Measuring System>



<CARB Bus Indoor Air quality Measuring System>

◆ IAQ Research by China's Indoor Decoration Association Indoor Air Reduction Center & Guangzhou Environment Inspection Center

✓ Conducted indoor air quality situation investigation on vehicles respectively (in 2007)

◆ Announcement of IAQ Regulation by Chinese Environment Protection Agency (2012)

✓ Enactment of relevant Acts of national level based on situation investigation and research results

- HJ/T 400-07 December 2007 "Determination of Volatile Organic Compounds and Carbonyl Compounds in Cabins of Vehicles"

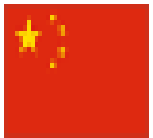
- GB/T 27630-2011 01 March 2012 "Guideline for air quality assessment of Passenger car"



- ✓ ISO 12219-1:2012 "Interior air of road vehicles -- Part 1:Whole vehicle test chamber – Specification and method for the determination of volatile organic compounds in cabin interiors



- ✓ Automobile Management Act Article 33-3, 18 Dec. 2012
(Newly Manufactured Vehicle Indoor Air Quality Management)
- ✓ Ministry of Land, Infrastructure and Transportation Notification No. 2007-539, 5 June 2007)
“Newly Manufactured Vehicle Indoor Air Quality Management Standard”



- ✓ HJ/T 400-07 December 2007 "Determination of Volatile Organic Compounds and Carbonyl Compounds in Cabins of Vehicles“
- ✓ GB/T 27630-2011 01 March 2012 “Guideline for air quality assessment of Passenger car”

◆ Comparison of vehicle indoor air quality limit

Harmful Substances	Korea	China	ISO
Formaldehyde	250	100	-
Benzene	30	110	-
Toluene	1,000	1,100	-
Ethyl Benzene	1,600	1,500	-
Xylene	870	1,500	-
Styrene	300	260	-
Acetaldehyde	-	50	-
Acrolein	-	50	-
Total	6 types	8 types	-

◆ Management status of manufacturers

Manufacturers	Management Status
GM	VOC management based on GM standard
FORD	VOC management based on FORD standard
VOLVO	Management based on Chinese regulations
Nissan, Honda, Toyota	Management based on Japanese Automobile Manufacturers Association (JAMA) guideline
Porsche	Management based on German Automobile Industrial Association VDA 270 (smell test) , VDA 275 (measurement of formaldehyde emission), VDA 278 (volatile organic compound) regulations
Jaguar Land-rover	Applies Japanese and Chinese regulations
Hyundai, Kia	Management based on Korean regulations

- ◆ To protect driver and passenger's health and safe driving, discussions are needed for Vehicle indoor air quality
- ◆ Need for discussion on a unified standard before more standards per country are enacted



- ◆ New regulation proposal on vehicle's indoor air quality
 - ✓ Harmful substance permissible limit emitted from vehicle's interior materials
 - ✓ Vehicle's indoor air quality measurement method

Thank you

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