

Informal document **WP.29-160-38**
160th WP.29 session, 25-28 June,
agenda item 20.

Proposal for a New GTR on Vehicle Indoor Air Quality (VIAQ)

MOLIT, The Republic of KOREA

(Ministry of Land, Infrastructure and Transport)

1. Background
2. Case Study in Korea
3. International Status
4. Conclusions

- ◆ Occupants are increasingly concerned about **indoor air quality**
 - ✓ 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** especillay for **children and the elderly**
 - ✓ Causes symptoms such as headaches, eye irritation, sneeze ...
 - ✓ 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 drivers feel a headache, eye irritation, sneeze and so on
- ✓ The main cause is the chemical materials that emitted from vehicle interiors



<Media : KBS news “Hazardous substances in new car interiors”>
- Interview : I feel slight headache and dizzy...

New car consumer survey

MOLIT
Ministry of Land,
Infrastructure and
Transport

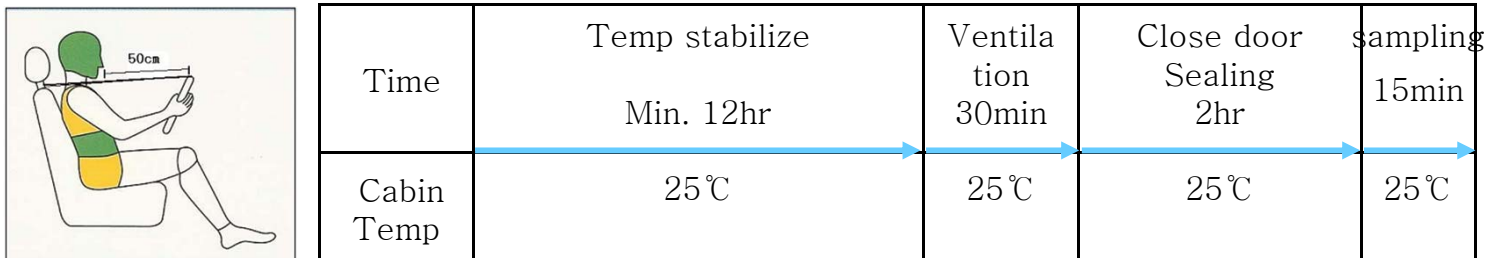
KATRI
Korea Automobile
testing & research
Institute

- ◆ Surveyed 800 people who purchased a new car (2005)
- ✓ 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

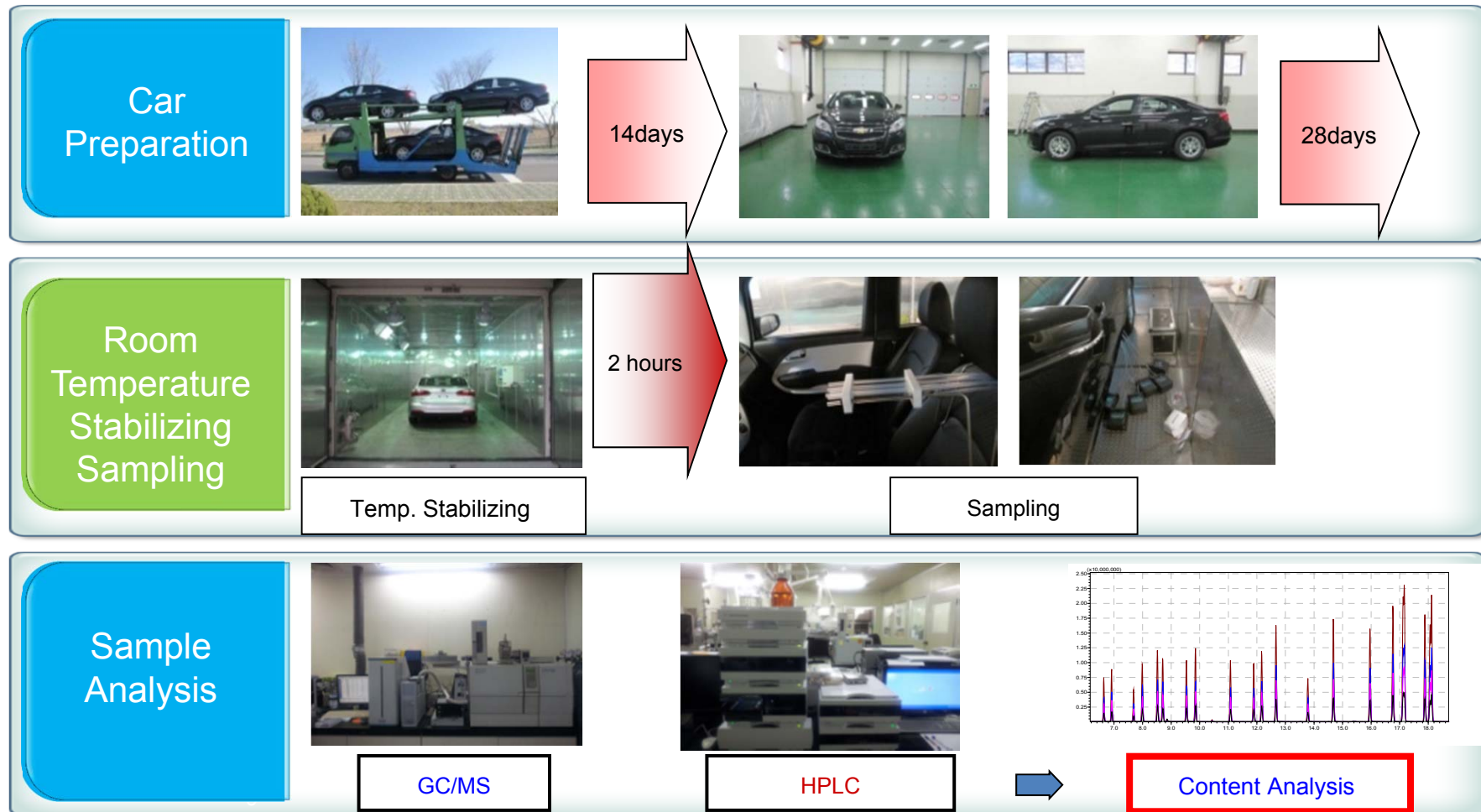
- ◆ Establish a VIAQ guideline on harmful substances
 - ✓ reflecting the new vehicle's IAQ risk evaluation and the characteristics of the vehicle
 - ✓ Vehicle's indoor air quality measurement method



- ✓ 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

◆ Verification test whether automobile manufactures comply with guideline



◆ The result of checkout test of New Car Models

Year	Item	Formaldehyde	Toluene	Ethyl benzene	Styrene	Benzene	Xylene
	Limit	250	1,000	1,600	300	30	870
2011 (9 models)	Avg.	35	1,046	102	14	-	-
	Min	8	108	20	7	-	-
	Max	56	2,846	470	25	-	-
2012 (8 models)	Avg.	20	328	66	33	7	199
	Min	4	85	18	4	5	45
	Max	29	753	131	136	13	379

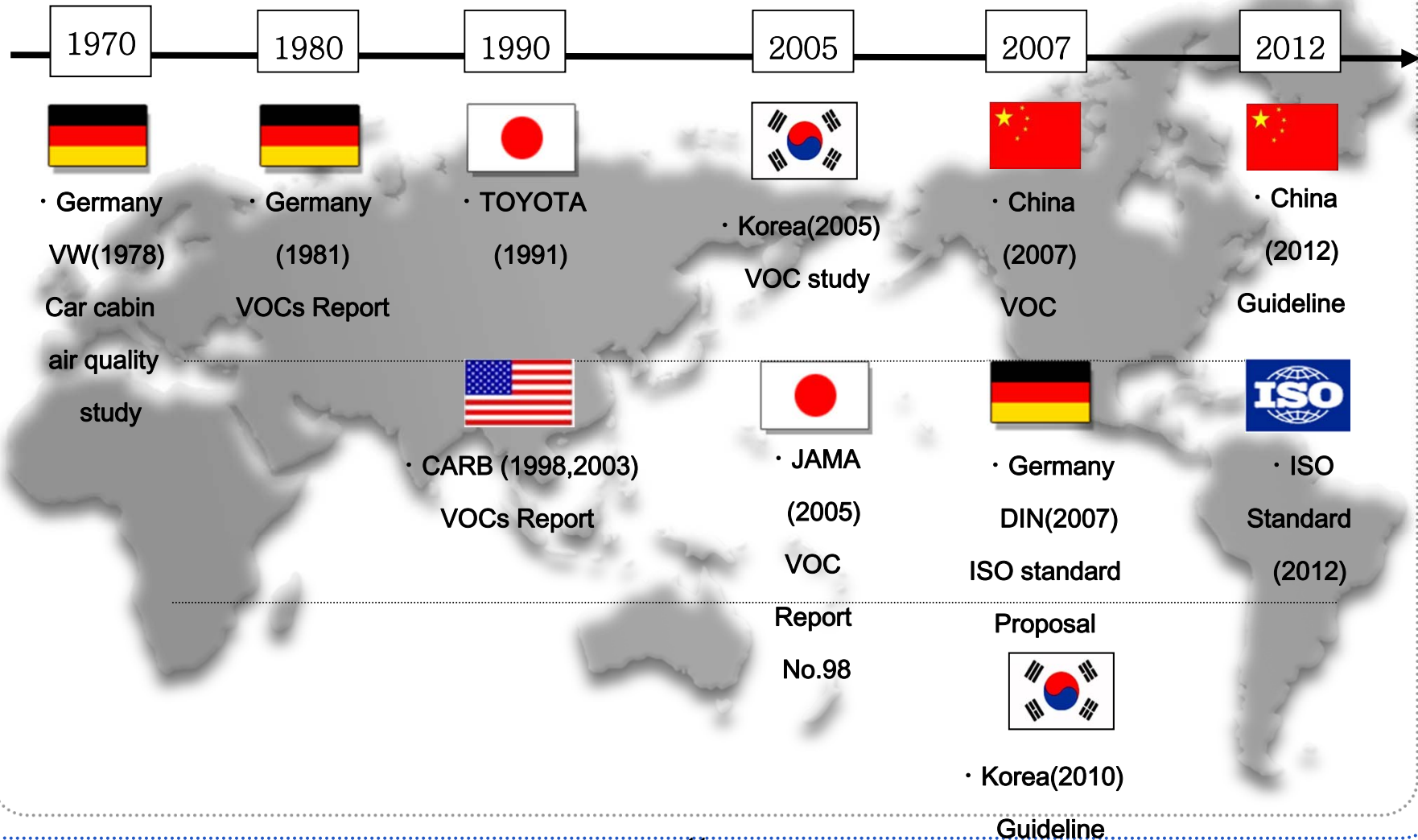
International Status

MOLIT

Ministry of Land,
Infrastructure and
Transport

KATRI

Korea Automobile
testing & research
Institute



◆ VOCs related research began since 1970



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



✓ **Germany** conducted researches related to the smell suppression of new cars

- In TÜV Rheinland, TOXPROOF certification system on new car's indoor air quality



◆ JAMA(Japan Automobile Manufacturers Association) leads IAQ Research

✓ In 2005, "Countermeasure Guidance on the Reduction of vehicle Indoor VOCs"

◆ VOCs researches began from the end of 1990s



✓ **CARB and EPA** report on the necessity of indoor air quality research

✓ **SAE Technical PAPER 2010-36-0390** "New Vehicles Cabin Indoor Air Quality"



- ✓ [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	-

- ISO standard describes a Specification and method for the determination of VOCs

◆ 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 to discussion on the unified regulation before more regulations in each 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 very much ! !

