



Air Quality Sensor (AQS)
14th May 2019

VIAQ-16-11

Powertrain Division

Project motivation



✓ Big Trend visible in future awareness of cabin-air-quality-measurement



✓ Currently no specific / mutli gas sensor on the market



- ✓ Evaluate system-integration-opportunities
- ✓ Complete technology scouting process
- ✓ Participate to OEMs benchmark test round
- ✓ Participate to regulation bodies working group

Poluttant adverse effect

› Pollutants have different toxicity indexes: measurement specificity is needed

CO	<p>Symptoms headache, tachypnea, nausea, lassitude (weakness, exhaustion), dizziness, confusion, hallucinations; cyanosis; depressed S-T segment of electrocardiogram, angina, syncope</p> <p>Target Organs cardiovascular system, lungs, blood, central nervous system</p>	Toxicity Index 1	PM_{2.5}	<p>Symptoms Nonfatal heart attacks, irregular heartbeat, aggravated asthma, decreased lung function, increased respiratory symptoms, such as irritation of the airways, coughing or difficulty breathing, premature death in people with heart or lung disease</p> <p>Target Organs Respiratory system, cardiovascular system</p>	Toxicity Index 124.2
NO	<p>Symptoms irritation eyes, wet skin, nose, throat; drowsiness, unconsciousness; methemoglobinemia</p> <p>Target Organs Eyes, skin, respiratory system, blood, central nervous system</p>	Toxicity Index 37.5			
NO₂	<p>Symptoms irritation eyes, nose, throat; cough, mucoid frothy sputum, decreased pulmonary function, chronic bronchitis, dyspnea (breathing difficulty); chest pain; pulmonary edema, cyanosis, tachypnea, tachycardia</p> <p>Target Organs Eyes, respiratory system, cardiovascular system</p>	Toxicity Index 41.1			
HCHO	<p>Symptoms irritation eyes, nose, throat, respiratory system; lacrimation (discharge of tears); cough; wheezing; [potential occupational carcinogen]</p> <p>Target Organs Eyes, respiratory system</p>	Toxicity Index 131.5			

Source: WHO (World Health Organisation) – VIAQ group (Vehicle Interior Air Quality)

L. Vershkov, V.L. Groshev, V.V. Gavrilov and others

Formaldehyde



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Regulation bodies: Recommendation

- › Recommendation to not exceed thresholds already WW available

Air quality guideline values

Russia

Pollutant	Air inside a vehicle	Air in populated areas									
	GOST 33554-2015*	RF*		WHO*		EU*		USA*		Korea*	
NO ₂ , µg/m ³	200	200	40	200	40	200	40	100	190	110	57
NO, µg/m ³	400	400	60	undefined		undefined		undefined		undefined	
PM ₁₀ , µg/m ³	undefined	300	60	50	20	50	40	150	100	50	
PM _{2.5} , µg/m ³	undefined	160	35	25	10	20		35	50	25	
O ₃ , µg/m ³	undefined	160	30	100		120		140	200	120	
CO, mg/m ³	5	5	3	undefined		10		41	11	29	10
SO ₂ , µg/m ³	undefined	500	50	500	20	350	125	200	400	130	53
VOC CH ₂ O, µg/m ³	50	50	10	undefined		undefined		undefined		undefined	
Benzene, µg/m ³	undefined	300	100	undefined		5		undefined		5	

*Exposure time	10 minutes	30 minutes	1 hour	8 hours	24 hours	1 year
	Short term					Long term



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State of the art technologies – CONTINENTAL statement

› Cannot fulfill complete analytic requirement!

	MOx	NDIR	Optical Scattering
Intended for	Total VOCs <input checked="" type="checkbox"/>	CO2 <input checked="" type="checkbox"/>	PM 2.5 and 10
Lower Detection Limit	ppb	ppm	ug/m3
Accuracy	ppb	ppm	ug/m3
Absolute measurement	N <input checked="" type="checkbox"/>	Y	Y
Response time	30s	20s	5s
Durability (15 years)	Contamination issues <input checked="" type="checkbox"/>	OK	OK
Cross sensitivity	Y <input checked="" type="checkbox"/>	N	N
Footprint	10 cm ³	10000 cm ³	100-150 cm ³
Cost	3 euros	10 to 30 euros	10 to 30 euros



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Thank you for your attention!



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