

International Workshop:

Toxic gases and vapours in cargo. Don't get caught by surprise

Brussels, November 23, 2010



Security of import containers : Practical experiences at Benelux terminals

Ludo Luyts

THE ADVANTAGE OF THE SPECIALIST



Contents

- Risk indexation philosophy based on measurement statistics
- Strategy and methods of measurement
- Results based on 50.000 measurements

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Risk assessment and risk indexation

- Measuring frequencies determined according to risk index per product stream
- Product stream = cargo description (product item or article) + supplier + country of origin
- Risk evaluation using risk indexes

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Risk indexation system

Risk index	Defenition	Frequency of measurements
0.1	Riskless*	1/lot
0.3	Low risk*	25%
0.5	Estimated no or low risk*	Research measuring: 25 containers or 1 entire lot (low quantities) -> final classification in category red, green or yellow
0.7	Estimated high risk*	Research measuring: 50 containers or 3 entire lots (low quantities) -> final classification in category red, green or yellow
0.9	High risk*	100%

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Measurement strategy

Types of measurements:

- Serial measurement: large amounts on same place at same time
- Ad-Hoc: one or few containers on clients premises
- “FYCO”= Physical control for customs

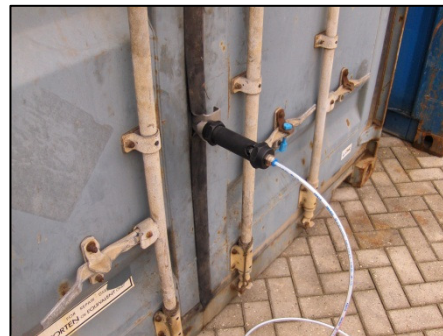
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Substances measured

Formula	Substance	MAC NL	MAC BE	Action in case of hazard
NH ₃	Ammonia	20.00 ppm	20.00 ppm	Ventilation – Maxiflow (Nordiko)
C ₆ H ₆	Benzene	1.00 ppm	1.00 ppm	Ventilation – Maxiflow (Nordiko)
CCl ₃ NO ₂	Chloropicrine	0.10 ppm	0.10 ppm	Ventilation – Maxiflow (Nordiko)
C ₂ H ₄ Cl ₂	1,2-Dichloroethane	1.70 ppm	10.00 ppm	Ventilation – Maxiflow (Nordiko)
H ₂ CO	Formaldehyde	0.10 ppm	0.30 ppm	Ventilation – Maxiflow (Nordiko)
HCN	Hydrogen cyanide	0.90 ppm	0.90 ppm	Ventilation – Maxiflow (Nordiko)
CH ₃ Br	Methylbromide	0.25 ppm	2,00 ppm	Ventilation – carbon filter Recapture
CH ₃ CL	Methylchloride	25.00 ppm	25.00 ppm	Ventilation recapture
PH ₃	Phosphine	0.10 ppm	0.10 ppm	Ventilation recapture
C ₈ H ₈	Styrene	25.00 ppm	25.00 ppm	Ventilation – Maxiflow
C ₇ H ₈	Toluene	40.00 ppm	50.00 ppm	Ventilation – Maxiflow
CO ₂	Carbon dioxide	5,000.00 ppm	5,000.00 ppm	Natural ventilation, source?
CO	Carbon monoxide	25.00 ppm	25.00 ppm	Natural ventilation, source?
O ₂	Oxygen	20.9 Vol%	20.9 Vol%	Natural ventilation
LEL	Explosion hazard	10.00 % LEL	10.00 % LEL	Natural ventilation
SO ₂ F ₂	Sulfuryl fluoride	3.00 ppm	5.00 ppm	Ventilation – Maxiflow (Nordiko)
C ₈ H ₁₀	Xylene	48.00 ppm	50.00 ppm	Ventilation – Maxiflow (Nordiko)

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Measuring equipment



- For serial measurement: SIFT (Selective Ion Flow Tube mass spectrophotometer) + Sensors for "Light gases" & LEL



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Measuring equipment


- For Ad Hoc situations and for conformity checks
= Handhold technology
 - PID for VOC's
 - Infrared (Spectros) only for SulfurylDifluoride
 - Sensors (CO, CO2, O2, PH3, LEL)
 - Colorimetric test tubes:

mainly = Methylbromide + 1,2 Dichloroethane (interference)
Benzene, Toluene, Chloropicrine, Styrene, Xylene



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Reporting

 <p>Netherlands PPD/EWS B.V. PO Box 22 NL-4245 ZG Steeuwijk E info.nl@ews-fumigation.com www.ews-fumigation.com</p>	<p>Operations: Werkendam Tijd 14 NL-4251 PK Werkendam</p>	<p>Belgium PPD/EWS N.V. PO Box 94 BE-2170 Antwerp (Merkssem Centre) E info@ews-fumigation.com www.ews-fumigation.com</p>	<p>Operations: Antwerp Zomenweg 24 BE-2030 Antwerp T +32 (0)3 541 27 92 F +32 (0)3 541 88 38</p>																																																																																															
	<p>Operations: Oosterhout T +31 (0)85 210 05 81</p>	<p>Operations: Doetinchem T +31 (0)314 36 12 60</p>	<p>Operations: Turnhout T +32 (0)14 42 33 32 F +32 (0)14 42 91 64</p>																																																																																															
	<p>GASMEETRAPPORT / GAS MEASURING CERTIFICATE</p>																																																																																																	
	<p>Containernummer / Containernumber: TEST 123456-7 Lading / Cargo: Shoes Oude zegel / Old seal: 212121 Nieuw zegel / New seal: N.V.T</p> <p>Opdrachtgever / Client: EWS B.V. / EWS B.V. Locatie / Location: Meting / Measurement: Douane-/fyco-meting / Measurement for Customs Type meting / Type of measurement: vrije ruimte, van buiten Temperatuur / Temperature: 3,00 Datum / Date: 22-11-2010 Tijd / Time 13:50:00</p> <table border="1"> <thead> <tr> <th>Soort gas / Type of gas</th> <th>Afkorting / Short</th> <th>Grenswaarde / Limit value</th> <th>Waarde / Concentration</th> <th>Resultaat / Result</th> </tr> </thead> <tbody> <tr><td>Ammoniak / Ammonia:</td><td>NH3</td><td>20,00 ppm</td><td>0 ppm</td><td>Ok</td></tr> <tr><td>Benzeen / Benzene:</td><td>C6H6</td><td>1,00 ppm</td><td>5,00 ppm</td><td>Not Ok</td></tr> <tr><td>Chloropirine / Chloropicrine:</td><td>CCL3NO2</td><td>0,10 ppm</td><td>0 ppm</td><td>Ok</td></tr> <tr><td>1,2-Dichloorethaan / 1,2-DichloroEthane:</td><td>C2H4CL2</td><td>1,70 ppm</td><td>2,25 ppm</td><td>Not Ok</td></tr> <tr><td>Formaldehyde / Formaldehyde:</td><td>H2CO</td><td>0,10 ppm</td><td>0,01 ppm</td><td>Ok</td></tr> <tr><td>Waterstof cyanide / Hydrogen cyanide:</td><td>HCN</td><td>0,90 ppm</td><td>0 ppm</td><td>Ok</td></tr> <tr><td>Methylbromide / Methylbromide:</td><td>CH3BR</td><td>0,25 ppm</td><td>0 ppm</td><td>Ok</td></tr> <tr><td>Methylchloride / Chloro Methane:</td><td>CH3CL</td><td>25,00 ppm</td><td>0 ppm</td><td>Ok</td></tr> <tr><td>Fosfine / Phosphine:</td><td>PH3</td><td>0,10 ppm</td><td>0 ppm</td><td>Ok</td></tr> <tr><td>Styreen / Styrene:</td><td>CSH8</td><td>25,00 ppm</td><td>0 ppm</td><td>Ok</td></tr> <tr><td>Tolueen / Toluene:</td><td>C7H8</td><td>40,00 ppm</td><td>80,75 ppm</td><td>Not Ok</td></tr> <tr><td>Sulfuryldfluoride / Sulfuryldfluoride:</td><td>SO2F2</td><td>3,00 ppm</td><td>0 ppm</td><td>Ok</td></tr> <tr><td>Kooldioxide / Carbon Dioxide:</td><td>CO2</td><td>5.000,00 ppm</td><td>300,00 ppm</td><td>Ok</td></tr> <tr><td>Koolmonoxide / Carbon Monoxide:</td><td>CO</td><td>25,00 ppm</td><td>0 ppm</td><td>Ok</td></tr> <tr><td>Zuurstof / Oxygen:</td><td>O2</td><td>20,90 ppm</td><td>20,90 ppm</td><td>Ok</td></tr> <tr><td>Explosiemeting / Explosion:</td><td>LEL</td><td>10,00 ppm</td><td>0 ppm</td><td>Ok</td></tr> <tr><td>Xyleen / Xylene:</td><td>CSH10</td><td>48,00 ppm</td><td>0 ppm</td><td>Ok</td></tr> <tr><td>Voc / Voc:</td><td></td><td>100,00 ppm</td><td>150,00 ppm</td><td>Not Ok</td></tr> </tbody> </table> <p>Gasmeetdeskundige / Measuring expert: Verwerft Deskundigheidsbewijs / Nr of certificate of expert: GM09110447</p> <p>Resultaat / Result: Eén of meerdere metingen boven de grenswaarde</p> <p>Object is niet veilig te betreden - concentraties aan één of meer gassen boven grenswaarde Object NOT safe to enter - concentration of one or more gasses above TLV limits</p> <p>Advies / Advice: Container ventileren / ventilate container</p> <p><small>De gemiddelde waarde zijn slechts een weergave van de toestand op het moment van de meting. Aangezien gasconcentraties in een gesloten container kunnen fluctueren is de tijd tussen de 2de en 3de meting 60 min. Het is niet mogelijk om de gemiddelde waarde te berekenen. De opslaggegevens worden door EWS Nederland B.V. van alle mogelijke risico's aan de klant, die door de afwezigheid van de opdrachtgever kan ontstaan, zijn verzekerd.</small></p>				Soort gas / Type of gas	Afkorting / Short	Grenswaarde / Limit value	Waarde / Concentration	Resultaat / Result	Ammoniak / Ammonia:	NH3	20,00 ppm	0 ppm	Ok	Benzeen / Benzene:	C6H6	1,00 ppm	5,00 ppm	Not Ok	Chloropirine / Chloropicrine:	CCL3NO2	0,10 ppm	0 ppm	Ok	1,2-Dichloorethaan / 1,2-DichloroEthane:	C2H4CL2	1,70 ppm	2,25 ppm	Not Ok	Formaldehyde / Formaldehyde:	H2CO	0,10 ppm	0,01 ppm	Ok	Waterstof cyanide / Hydrogen cyanide:	HCN	0,90 ppm	0 ppm	Ok	Methylbromide / Methylbromide:	CH3BR	0,25 ppm	0 ppm	Ok	Methylchloride / Chloro Methane:	CH3CL	25,00 ppm	0 ppm	Ok	Fosfine / Phosphine:	PH3	0,10 ppm	0 ppm	Ok	Styreen / Styrene:	CSH8	25,00 ppm	0 ppm	Ok	Tolueen / Toluene:	C7H8	40,00 ppm	80,75 ppm	Not Ok	Sulfuryldfluoride / Sulfuryldfluoride:	SO2F2	3,00 ppm	0 ppm	Ok	Kooldioxide / Carbon Dioxide:	CO2	5.000,00 ppm	300,00 ppm	Ok	Koolmonoxide / Carbon Monoxide:	CO	25,00 ppm	0 ppm	Ok	Zuurstof / Oxygen:	O2	20,90 ppm	20,90 ppm	Ok	Explosiemeting / Explosion:	LEL	10,00 ppm	0 ppm	Ok	Xyleen / Xylene:	CSH10	48,00 ppm	0 ppm	Ok	Voc / Voc:		100,00 ppm	150,00 ppm
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- Immediate and digital measuring report



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Reporting

- Daily overview of serial measurements
- Risk Inventory and Evaluation = RI&E

Date	Time	Location	Temp	Humidity	Pressure	Ammoniak	Benzen	Chloropirine	Formaldehyde	HCN	CH3BR	CH3CL	PH3	Styreen	Tolueen	SO2F2	CO2	CO	O2	LEL		
07-10-2010	14,00					OK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
11-10-2010	10,00					OK	0	0,01	0	0	0	0	0	0,02	0,30	0	300,00	0	20,90	0	0	
18-10-2010	4,00					OK	0	0	0	0,02	0	0	0	0	0,01	0	300,00	0	20,90	0	0	
19-10-2010	7,00					OK	0	0	0	0	0	0	0	0,03	0,07	0,01	300,00	0	20,10	0	0,06	
19-10-2010	10,00					OK	0	0,01	0,01	0	0,02	0	0,07	0,35	0,05	300,00	0	20,50	0	0,90	26,40	
25-10-2010	5,00					OK	0	0	0	0	0	0	0	0,02	0,52	0,01	300,00	0	20,90	0	0,65	
25-10-2010	11,00					OK	0,01	0	0	0	0	0,01	0	0,01	2,65	0,07	700,00	3,00	20,60	0	0,09	
26-10-2010	9,00					OK	0	0	0	0	0	0	0	0,01	0,15	0	410,00	0	20,90	0	0,30	
01-11-2010	7,00					OK	0	0	0	0	0	0	0	0,02	0,09	0	300,00	0	20,90	0	0,04	
01-11-2010	10,00					OK	0	0	0	0	0	0	0	0	0,01	0,03	550,00	0	20,90	0	0	
08-11-2010	4,00					OK	0	0,02	0	0,03	0,04	0	0,04	0	0,07	0,62	0	300,00	1,00	20,90	0	0,36
08-11-2010	8,00					OK	0	0	0	0	0,03	0	0,03	0	0,04	0,25	0	420,00	1,00	20,90	0	1,10
08-11-2010	8,00					OK	0	0	0	0	0	0	0	0,01	0,58	0	430,00	0	19,70	0	0,10	
08-11-2010	8,00					OK	0	0	0	0,02	0	0	0	0,06	0,17	0	430,00	0	20,90	0	0,13	
08-11-2010	8,00					OK	0	0	0	0	0	0	0	0,05	0,10	0	410,00	1,00	20,90	0	0,10	
08-11-2010	7,00					OK	0	0	0	0	0	0	0	0,03	0,09	0	330,00	0	20,90	0	0,24	
10-11-2010	6,00					OK	0	0	0	0	0,04	0	0	0	0,04	0	410,00	1,00	20,90	0	0,22	
10-11-2010	4,00					NOT OK	0	0	0	0	0	0	0	0	0	0	300,00	0	18,50	0	0	
16-11-2010	6,00					OK	0	0	0	0,01	0,05	0	0	0	0,07	0,17	0	670,00	1,00	20,90	0	0,22
17-11-2010	3,00					OK	0	0	0	0	0	0	0	0,04	0,43	0	520,00	2,00	20,90	0	0,21	
17-11-2010	3,00					OK	0	0	0	0,01	0	0,01	0	0,02	0,20	0	550,00	0	20,90	0	0,28	
17-11-2010	4,00					OK	0	0	0	0	0,01	0	0	0	0,12	0	420,00	0	20,90	0	0,06	

Opgemaakt

EWS / PPD B.V.
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 info.nl@ews-fumigation.com
 www.ews-fumigation.com



20,00 ppm NH3	Ammoniak / Ammonia	0,10 ppm	PH3	Fosfine / Phosphine
1,00 ppm C6H6	Benzenen / Benzene	25,00 ppm	CBH8	Styreen / Styrene
0,10 ppm CCL3NO2	Chloropirine / Chloropicrine	40,00 ppm	C7H8	Tolueen / Toluene
1,70 ppm C2H4CL2	1,2-Dichloorethaan / 1,2-Dichloroethane	3,00 ppm	SO2F2	Sulfuryldifluoride / Sulfuryldifluoride
0,10 ppm H2CO	Formaldehyde / Formaldehyde	5000,00	CO2	Kooldioxyde / Carbon Dioxide
0,90 ppm HCN	Waterstofcyanide / Hydrogen Cyanide	25,00 ppm	CO	Koolmonoxyde / Carbon Monoxide
0,25 ppm CH3BR	Methylbromide / Methylbromide	20,90 %	O2	Zuurstof / Oxygen
25,00 ppm CH3CL	Methylchloride / Chloro Methane	10,00 ppm	LEL	Explosiemeting / Explosion

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Results and experiences

- Based on approximately 50.000 measurements
- Measurements (90%) in the main seaport locations, barge and rail terminals in the Netherlands and in Belgium.
- Rest of measurements at clients premises or at Customs scanning centra.

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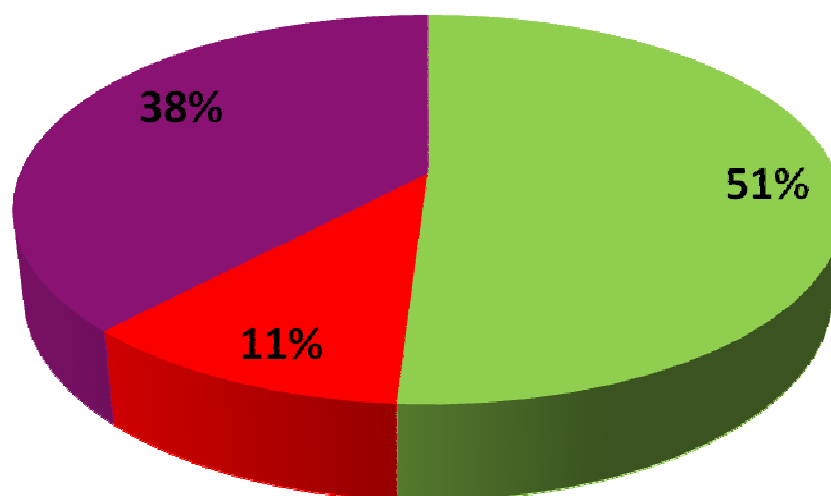


Results and experiences

(based on approximately 50.000 containers)

Rejection Non Food on 41.004 cts

■ 20.885 OK ■ 4.558 NOT OK ■ 50-100% MAC



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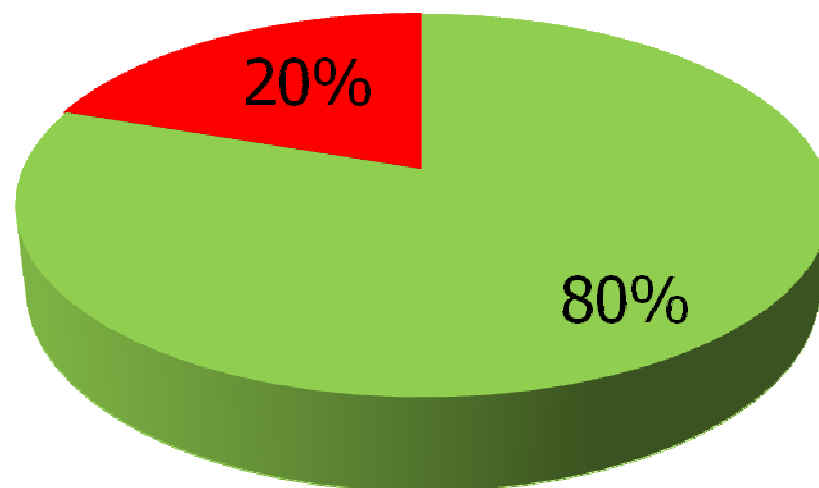


Results and experiences

(based on approximately 50.000 containers)

Rejection Food on 1.884 cts

■ 1.513 OK ■ 371 NOT OK



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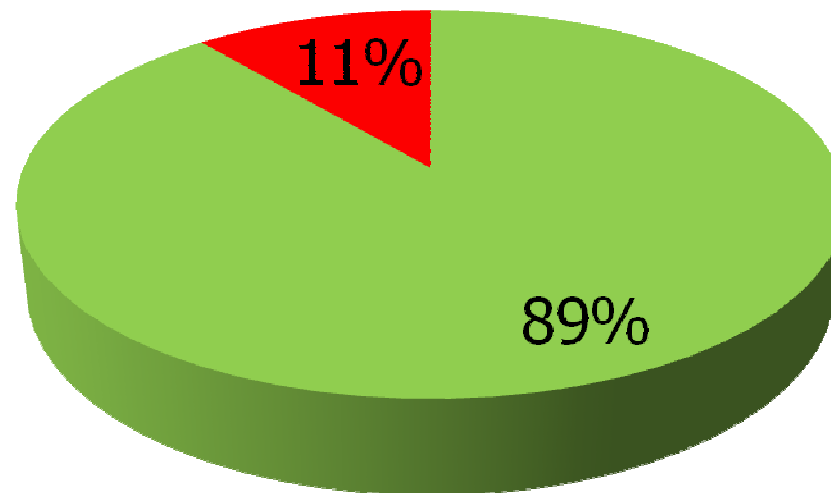


Results and experiences

(based on approximately 50.000 containers)

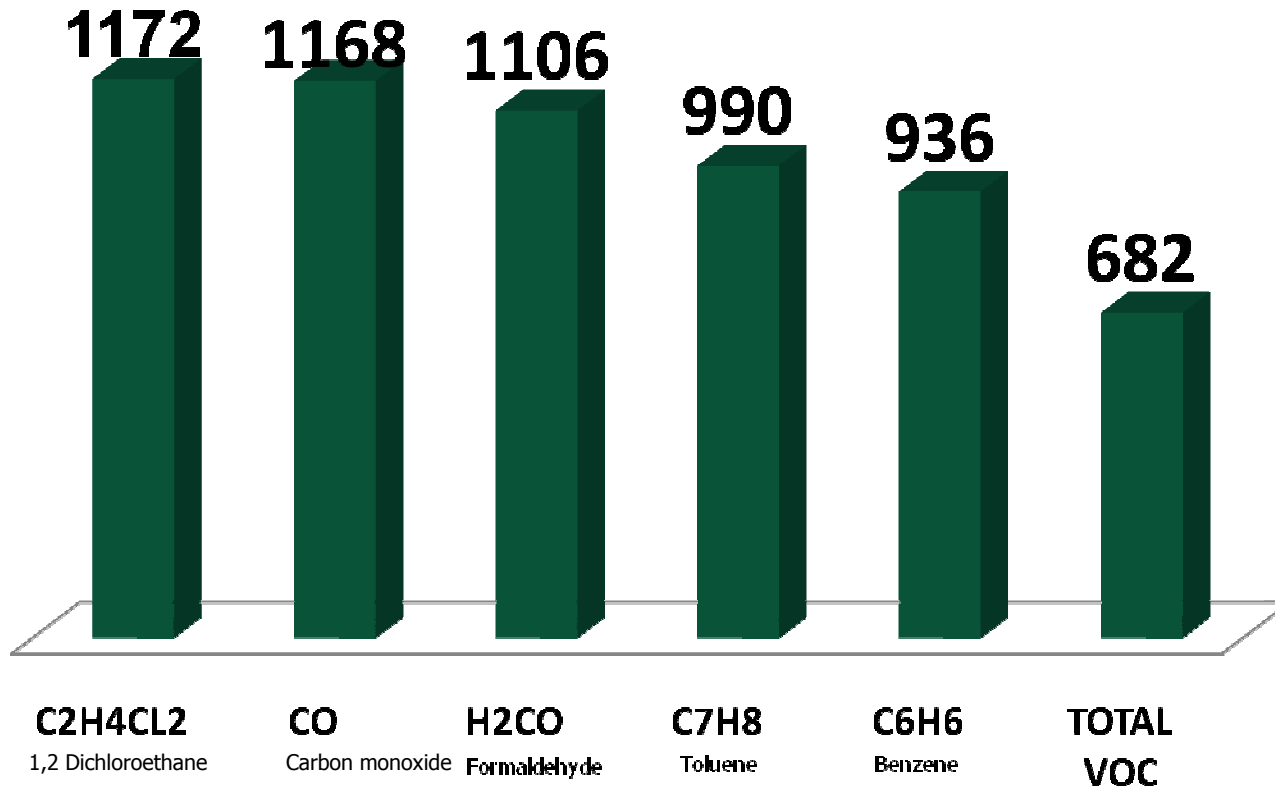
Total rejections on 42.888 cts

■ 37.959 OK ■ 4.929 NOT OK

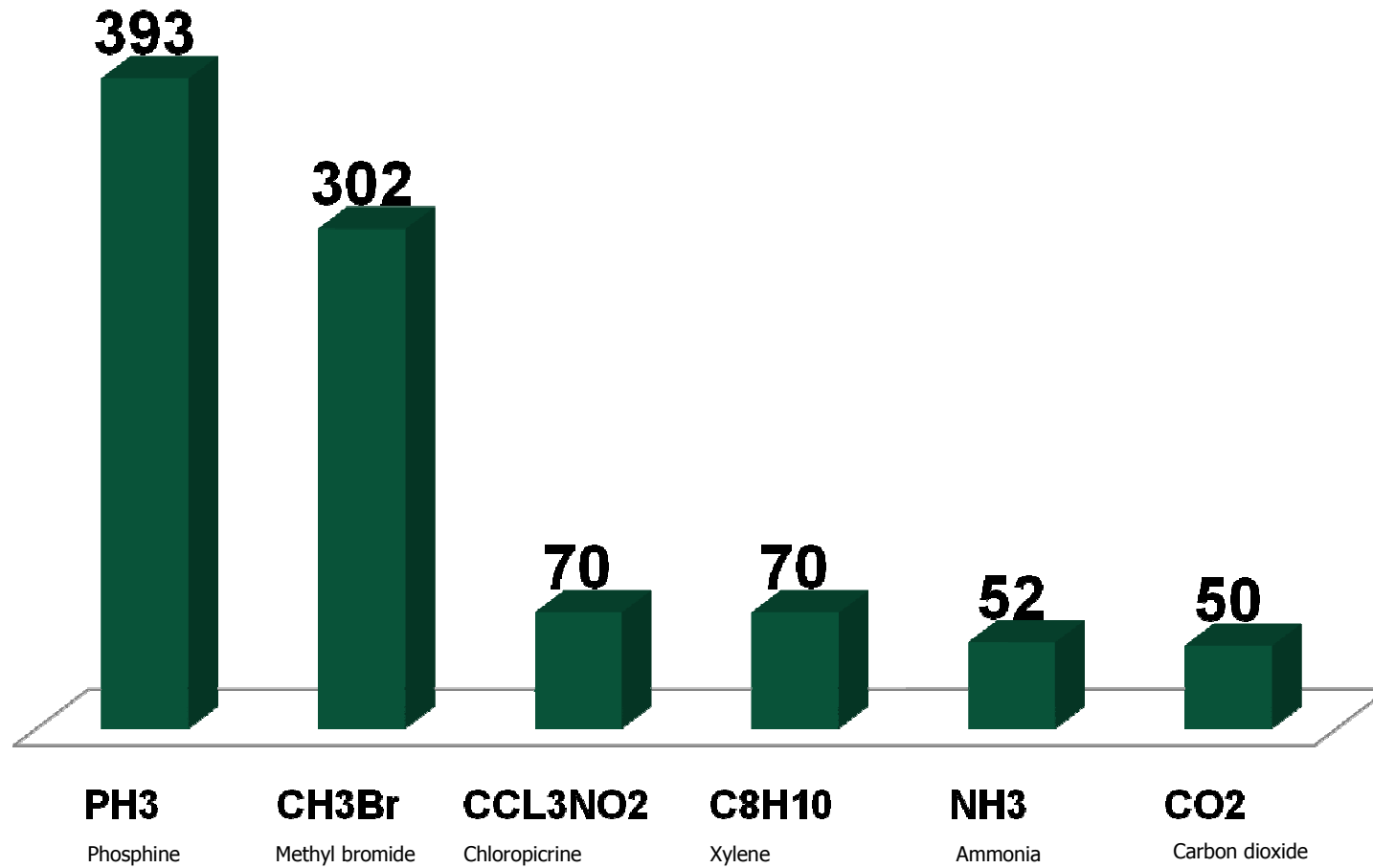


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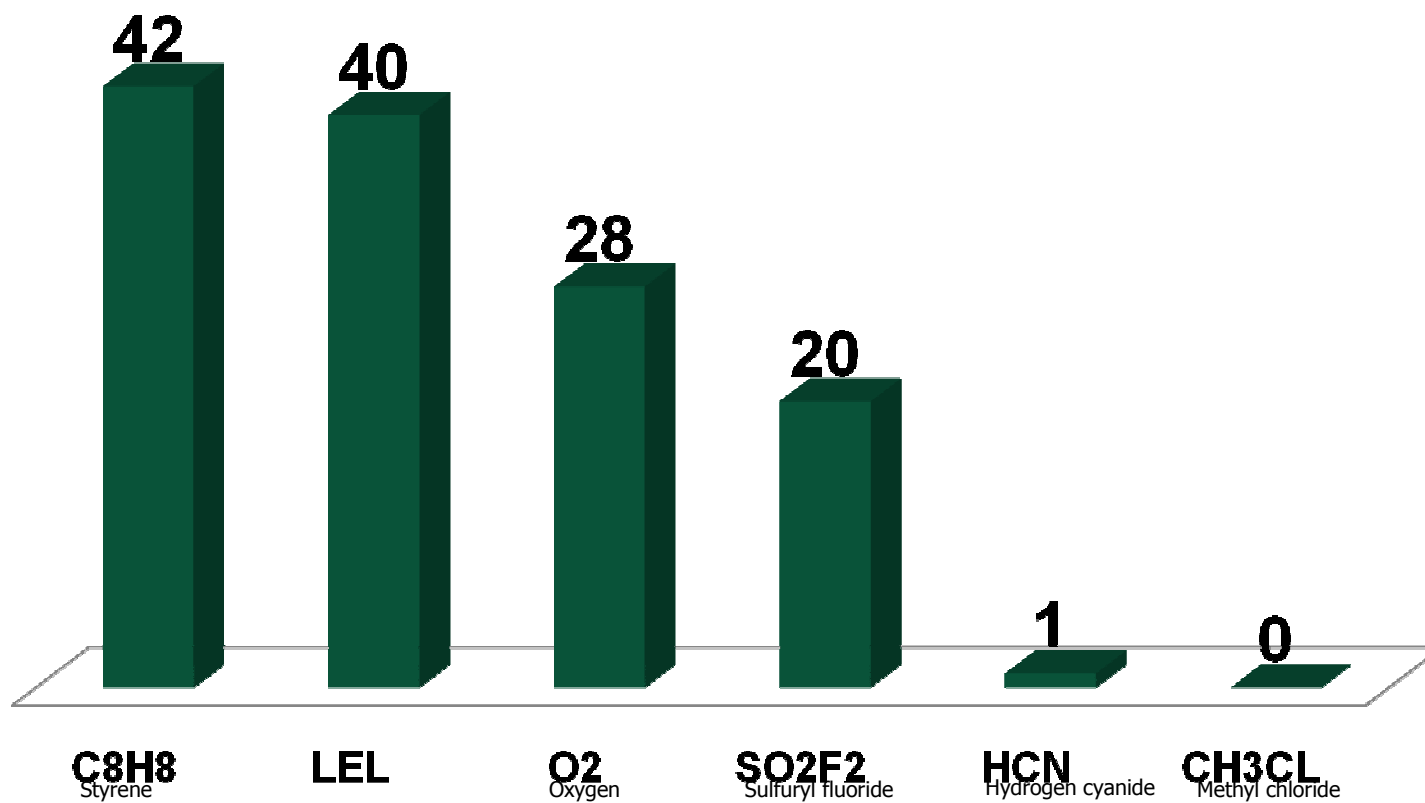
Total measurements: 51.174 including the 7.286 Re-measurements and release measurements after ventilation



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Relation between type of cargo and rejection parameters

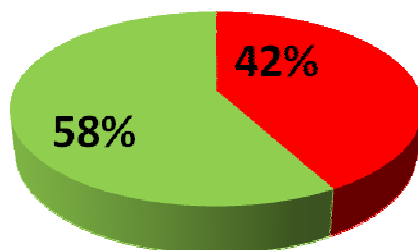


Substance	No.	MAC		Max		Shoes	Electronics	Wood	Toys	Consumables	Textiles	Food	Decoration	Polyresin	Rubber	Concrete	Insulation	Packaging
Formaldehyde (H2CO)	1106	0.1	ppm	40	ppm	X	X	X		X	X			X	X	X		X
Methyl bromide (CH3BR)	302	0.25	ppm	88	ppm	X	X	X	X	X		X						X
Carbon monoxide (CO)	1168	25	ppm	1,502	ppm	X	X	X	X	X	X	X						X
Phosphine (PH3)	393	0.1	ppm	368	ppm			X		X	X	X						X
Toluene (C7H8)	990	40	ppm	791	ppm	X	X			X	X			X				X
1,2-Dichloroethane (C2H4CL2)	1172	1.7	ppm	239	ppm	X	X		X	X	X		X	X		X		X
Benzene (C6HC)	936	1	ppm	119	ppm	X	X	X			X			X	X	X		
VOC	682	100	ppm	12,000	ppm	X	X	X	X	X	X	X	X	X	X			X
Chloropicrine (CCL3NO2)	70	0.1	ppm	26	ppm	X	X	X						X				
Oxygen (O2)	28	20.9	%	11	%		X				X	X				X		
Xylene (C8H10)	70	48	ppm	676	ppm	X	X			X							X	
LEL	40	10	%	64	%		X											
Ammonia (NH3)	52	20	ppm	228	ppm	X	X			X								
Styrene (C8H8)	42	25	ppm	302	ppm	X	X			X			X			X	X	
Sulfuryl fluoride (SO2F2)	20	3	ppm	15	ppm	X		X		X								X
Carbon dioxide (CO2)	50	5,000	ppm	50,890	ppm	X	X			X		X	X	X	X			
Hydrogen cyanide (HCN)	1	0.9	ppm	25	ppm		X											

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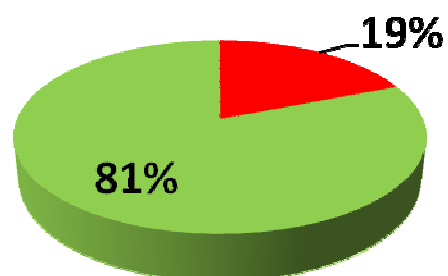
Shoes

■ NOT OK ■ OK



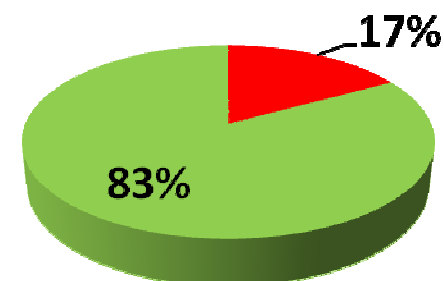
Electronics

■ NOT OK ■ OK



Consumables*

■ NOT OK ■ OK



* e.g. Garden furniture, Tools, Materials for pets

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International Workshop:

Toxic gases and vapours in cargo. Don't get caught by surprise

- Time for questions

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