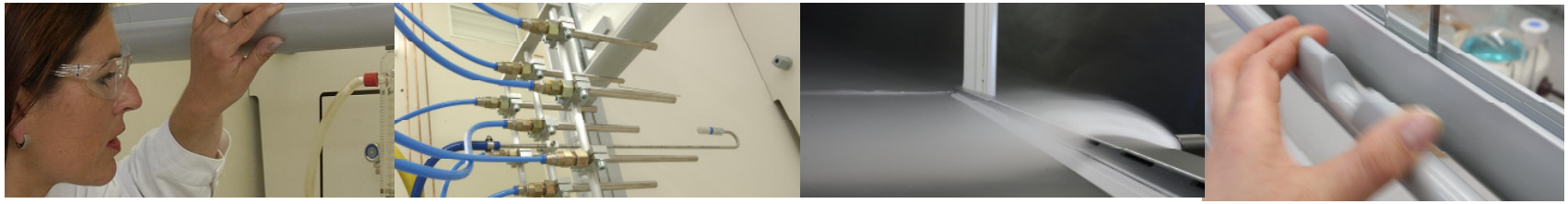


International Safety Standards

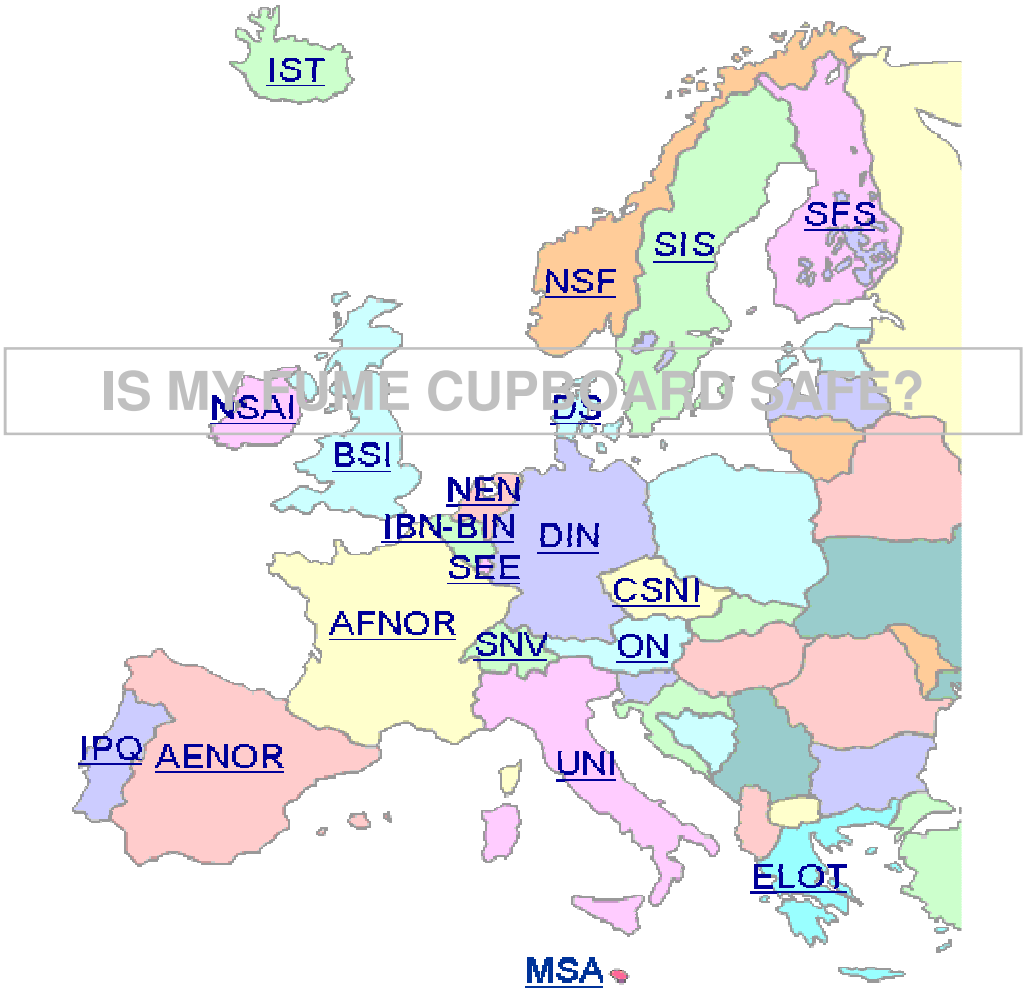
Waldner Seminar
London, 27 September 2006

Agenda

1. Various safety concepts
2. International containment thresholds explored
3. Testing and results

IS MY FUME CUPBOARD SAFE?

The Past



And Today

The situation in the UK

BS 7258

Face velocity

No acceptance value

Superseded

Test gas concentration

No acceptance value

Superseded

IS MY FUME CUPBOARD SAFE?

EN 14175

Face velocity

Test gas concentration

No acceptance value

No Safety Threshold

Containment Factor

Air exchange efficiency

No acceptance value

No Safety Threshold

Safety concepts

Face Velocity	•No thresholds according to EN •Common practice: 0.5m/s
	•Do I really need such volumes?
Test gas concentration	•No thresholds according to EN •Common practice: 0.005ppm
	•Do I really need such levels?
Containment Factor	•No thresholds according to EN
	•Which factors do I need?
Air exchange efficiency	•No thresholds according to EN
	•Which factors do I need?

What is the minimum acceptable safety level in order to maximise energy efficiency?

European initiatives

Holland

Guideline on permissible containment factors

France

www.afnor.fr

Guideline on permissible test gas containment levels

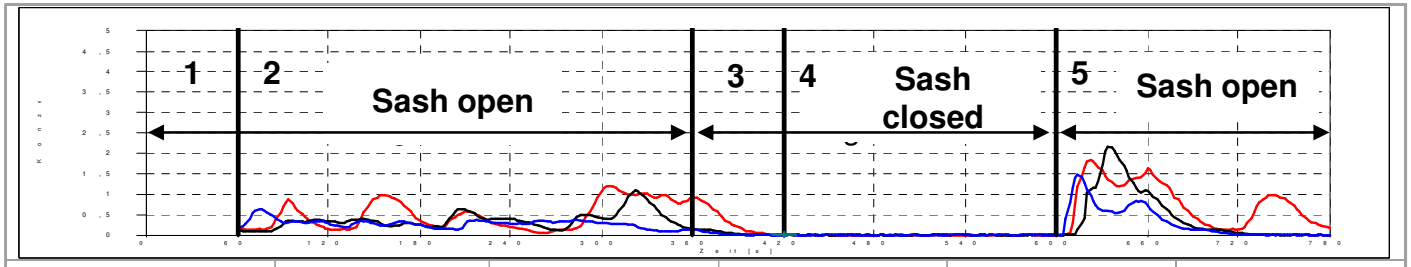
Germany

www.bgchemie.de

Guideline on permissible test gas containment levels

Germany / Switzerland

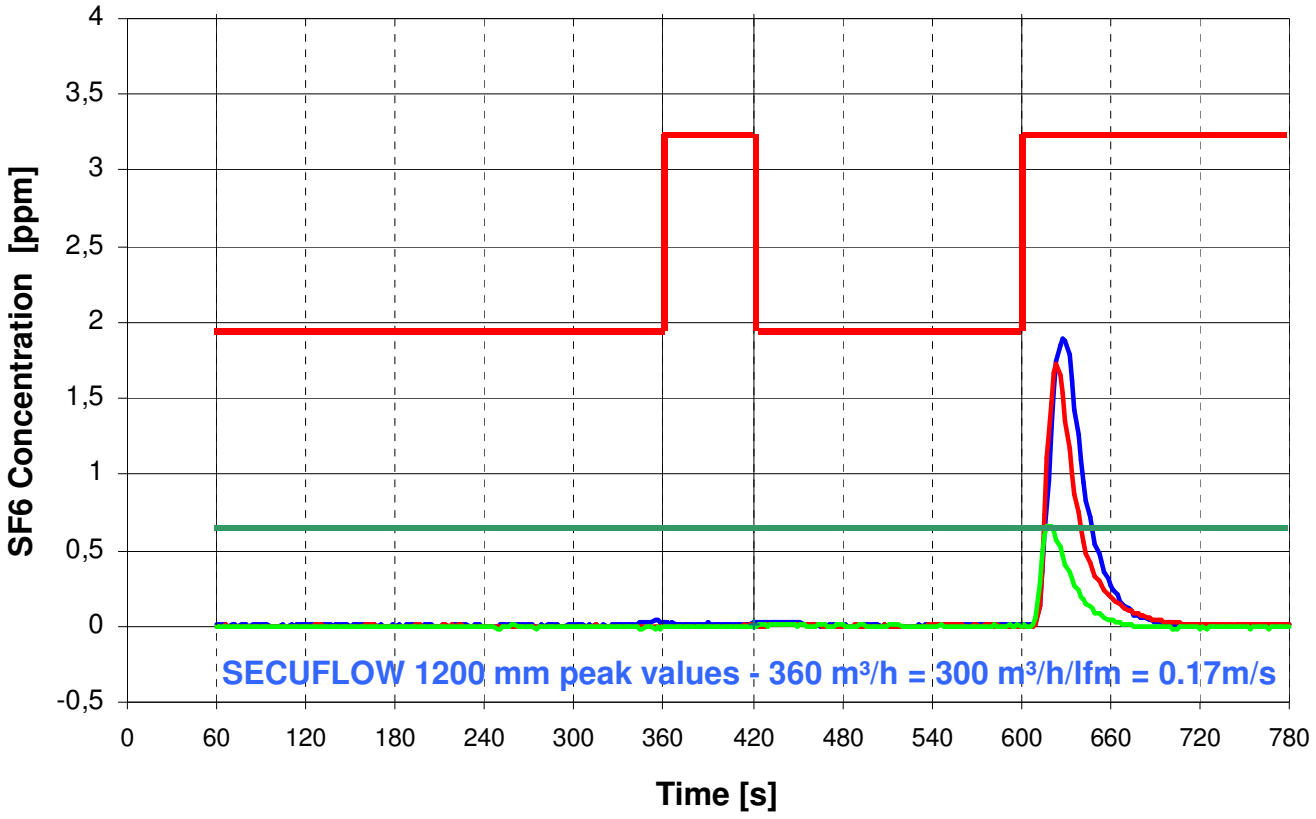
Test gas acceptance value according to BG Chemie



Phase Time [s]	**1** 0 – 59	**2** 60 – 360	**3** 361 – 420	**4** 421 – 600	**5** 601 – 780
$\varphi_{max}(SF_6)$ [ppm]	—	**0,65**	**0,65**	**0,65**	**0,65**
Acceptance value [ppm]	—	**3 x 0,65**	**5 x 0,65**	**3 x 0,65**	**5 x 0,65**
Bezug in prEN 14175-3:2003	5.3.5.3 und 5.3.6.2 a)	5.3.5.3 und 5.3.6.2 b)	5.3.5.3 und 5.3.6.2 c)	5.3.5.3 und 5.3.6.2 d)	5.3.5.3 und 5.3.6.2 e)

Germany / Switzerland

Acceptance values outer measuring plane (dynamic test)

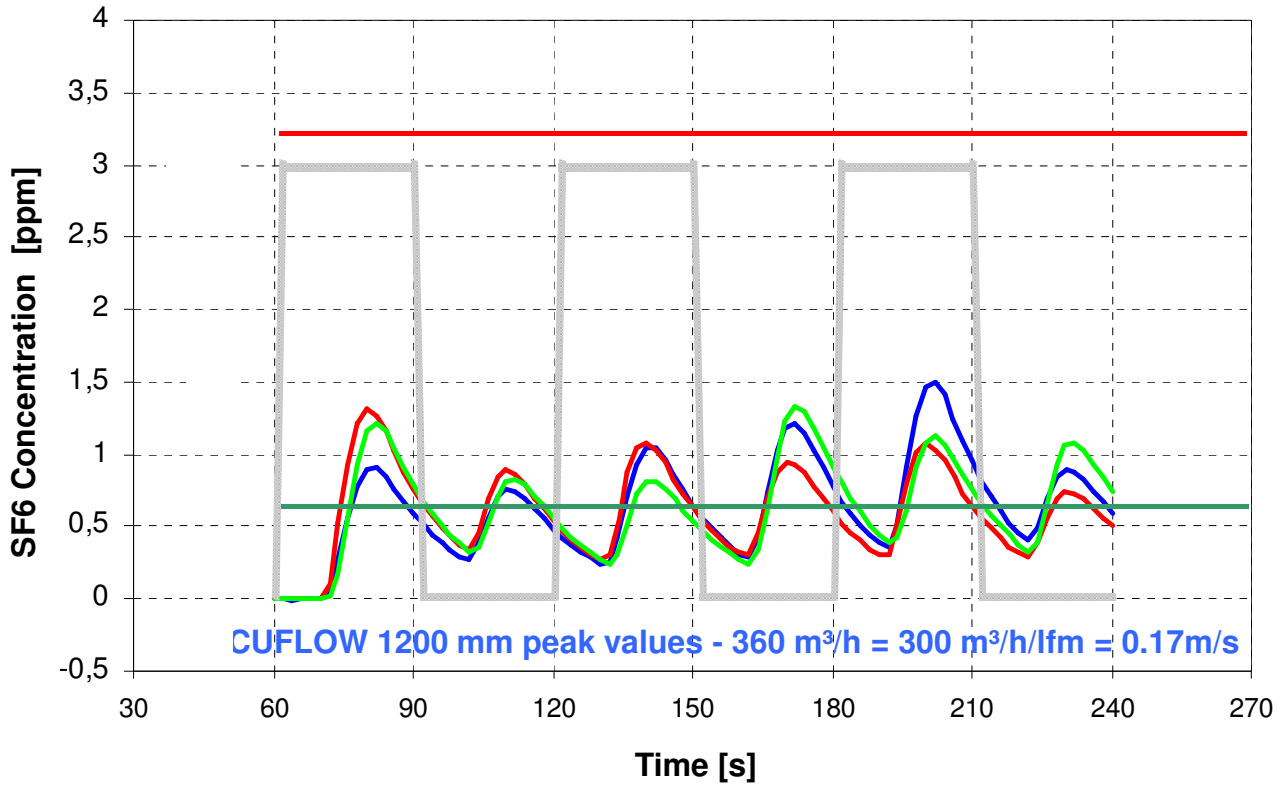


1.95 / 3.25
Permissible peak values

0,65
Permissible average value

Germany / Switzerland

Acceptance values robustness test



3,25

Permissible peak values

0,65

Permissible average value

France

1. AFNOR standard XP X 15-206 was issued in January 2005

2. Average values at inner measuring grid (static test) must not ecxeed 0.1ppm

Holland

1. Draft of Dutch practice guidline NPR 14175 in discussion

2. Proposal for dynamic test:
    1. Phase 1 $C_F > 500$
    2. Phase 2/3/4: $C_F > 2000$
    3. Phase 5: $C_F > 1000$
3. Proposal for robustness test:
    1. $C_F > 500$

United Kingdom

1. Although no standard provides acceptance values, the Health & Safety Executive (HSE) issued a publication called „Workplace exposure limits“, EH 40/2005; issued 5 April 2005

Substance	CAS number	Workplace exposure limit				Comments
		Long-term exposure limit (8-hour TWA reference period)		Short-term exposure limit (15-minute reference period)		
		ppm	mg.m^{-3}	ppm	mg.m^{-3}	
2-Ethylhexyl chloroformate	24468-13-1	1	8	-	-	-
Ethyl acetate	141-78-6	200	-	400	-	R11, 36, 66, 67
Ethyl acrylate	140-88-5	5	21	15	62	R11, 20/21/22, 36/37/38, 43
Ethylamine	75-04-7	2	3.8	6	11	R12, 36/37
Ethylbenzene	100-41-4	100	441	125	552	Sk R11, 20
Ethyl chloroformate	541-41-3	1	4.5	-	-	R11, 22, 26, 34
Ethyl cyanoacrylate	7085-85-0	-	-	0.3	1.5	R36/37/38
Ethyl formate	109-94-4	100	308	150	462	R11, 20/22, 36/37
Ethylene oxide	75-21-8	5	9.2	-	-	Carc R45, 46, 12, 23, 36/37/38
4-Ethylmorpholine	100-74-3	5	24	20	96	Sk

Summary

1. Ask for fume cupboard type tests according to EN because this is the only way to objectively compare the containment of different makes

2. In countries where safety thresholds have been defined, face velocity is not included as a measure of safety

3. If energy efficiency or construction space (i.e. floor height) are issues, the question is: what level of safety is required to keep extract volumes at a minimum?

4. Other European countries provide guidance on acceptance values but H&S Executive publication EH40/2005 can also be used to determine acceptable workplace exposure limits