Alignment & improvement of Hazard Banding (HB/OEB)

Theo.Scheffers@tsac.nl

Session G1 8th International Control Banding Workshop
Session 3 – Hazard Banding/Occupational Exposure Banding
Tue, 9/25: 1:45 PM - 2:45 PM

The 11th International Occupational Hygiene Association (IOHA) International Scientific Conference

IOHA 2015 (London)

LONDON 2015 IOHA 10th IOHA International Scientific Conference

DOHSBASE

The most comprehensive database of OEL's and measurement methods

The need for international alignment of OH tools

And IOHA's role in this

www.dohsbase.com
Theo.Scheffers@tsac.nl

Theo Scheffers alignment of OH Tools
7ICBW – Tuesday 28 April 2015 10:30-12:00

IOHA 2018 Washington DC

The wealth of 'chemicals in the workplace control tools'

- OELVs
- Health hazard classifications
- Hazard Banding Engines
- Exposure Models
- Compliance Statistics
- Handling Mixtures
- Strategies

EH40/2005

THE NORDIC EXPERT GROUP

ED 984 TRGS 900

Ausschuss für Gefahrstoffe (AGS)

GHS

EU/CLP

International Agency for Research on Cancer

World Health Organization

Einfaches Maßnahmen konzept für Gefahrstoffe EMKG

INTERNATIONAL LABOUR OFFICE

PROGRAMME ON SAFETY AND HEALTH AT WORK AND THE ENVIRONMENT

SAFEWORK

CHEMICAL CONTROL TOOLKIT

The technical basis for COSHH essentials: Easy steps to control chemicals

+ >20 HB-Engines from institutions etc

Stoffenmanager®7

chesar

ART ADVANCED REACH TOOL

IH SkinPer

IH Mod

m

EXPOSTATS

IHDataAnalyst

Altrex Chimie

BWStat

BSOH

SPEED

HYGINIST

HYGINIST version 4.3.4

Multilingual IHSTAT+

DOHS BASE COMPARE

mixie

$$\sum_{i=1}^{i=n} \left(\frac{C_i}{OELV_i}\right) \leq 1$$

Sum Score

Lead substance

XLUNIFAC

DPD+

Testing Compliance with Occupational Exposure Limits for Airborne Substances

British Occupational Hygiene Society
Pride Park Derby
DE24 8LZ, UK
www.bohs.org

September 2011

Vereniging voor Arbeidshygiëne
Postbus 1762,
5602 BT Eindhoven
The Netherlands
www.arbeidshygiene.nl/

EN 689

May 2018

A Strategy for Assessing and Managing Occupational Exposures AIHA

ECHA

Chapter R.14: Occupational exposure assessment

NIOSH

OCCUPATIONAL EXPOSURE SAMPLING STRATEGY MANUAL

TRGS 402

hazard banding engines in control banding tools

- OELVs
- Health hazard classifications
- 40+ GHS/CLP HB/OEB-Engines
- Control Banding tools
- Compliance Statistics
- Handling Mixtures
- Strategies

Stoffenmanager®7

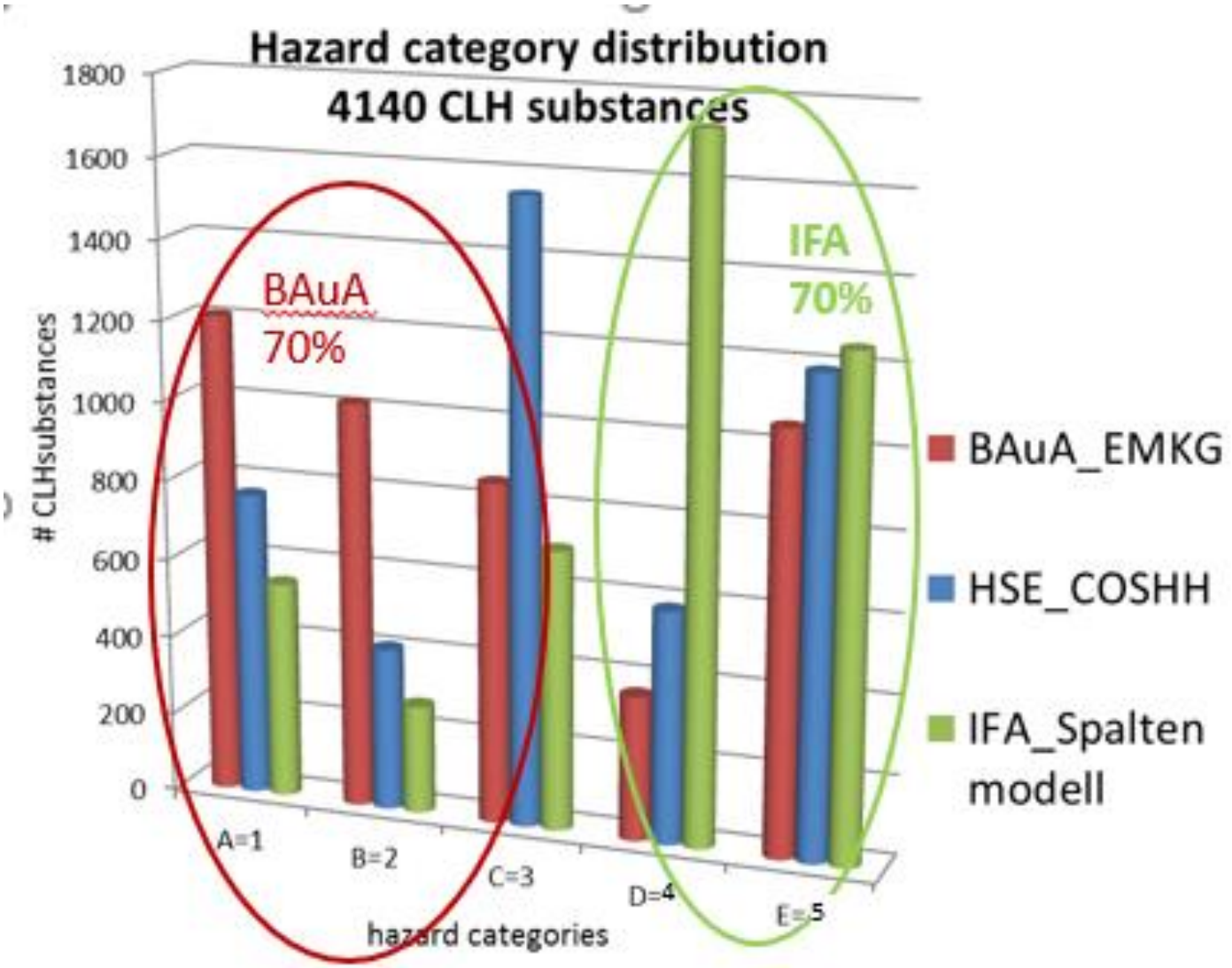
IOHA 2018

Expert driven allocation of H-codes

Hazard band	DGUV IFA Spaltenmodell	HSE COSHH	BAUA EMKG (inhalation)*	Solvay OEB
 E/5	300, 310, 330 (Tox) 340, 350, 350i (CM) EU032 (Tox gas release)	340, 341, 350(i) (CM) 334 (S) EU070 (Tox)	340, 350, 350i (CM) 360_F (R)	372 (Tox) 340, 350 (CM) 334 (ICS)
D/4	301, 311, 331, 370, 372 (Tox) 341, 351, 360_{xy} (CMR) EUH029, EUH031 (Tox gas release) 317, 334, 318, EUH070 (ICS)	300, 310, 330, 372 (Tox) 351, 360_{xy}, 361, 362 (CR)	300, 330, 372 (Tox) 360_D (R) EUH032 (Tox gas release)	300, 310, 330; 370, 373 (Tox) 314 (+ cat A), EUH071 (ICS), 341, 351, 360_{xy} (CMR)
C/3	302, 312, 332(Tox) 314 (pH ≥ 11,5, pH ≤ 2), 371, EUH071 $361_{f/d}$, 373, 362 non-toxic gases which may cause asphyxiation	301, 311, 331, 314, 370, 373 (Tox) 317, 318 , 335, EUH071 (IC)	301, 331, 314, 370, 371, 373 (Tox) 334 (S) 341, 351, 361f/d (CMR) EUH031 (Tox gas release)	301, 311, 331; 371 (Tox) 304, EUH070 (lung, eye damage) 314 cat B and C, 317, 318, 335 (ICS) 361, 362 (R & Lact)
B/2	315, 319, 335, ** (I) 304, EUH066, 336 (solvents) ***	302, 312, 332, 371 (Tox)	302, 332 (Tox) 318 (C)	302, 312, 332, 336 (Tox) 315, 319, EUH066 (I)
 A/1	substances which experience shows to be harmless (e.g. water, sugar, paraffin etc.)	303, 313, 333(GHS Tox4) 315, 316, (GHS) 319, 320 (I) 304, 305 (Aspiration) 336 , EUH066 (solvents) and all H-numbers not otherwise listed	319, 335 (I) 336 (solvent) 304 (Aspiration) Non health hazard H-statement codes	303, 313, 333 (GHS Tox 4) 305 (ICS) 316 (GHS-> noCLP), 320 (GHS eye irr 2b->CLP 319)

Ann. Occup. Hyg., 2016, 1–13 doi:10.1093/annhyg/mew050

Comparing 3 Hazard Banding Engines



Need for alignment in Hazard Banding Engines

baua: Einfaches Maßnahmen EMKG konzept für Gefahrstoffe
Bundesanstalt für Arbeitsschutz und Arbeitsmedizin

IOHA 2018

HB-engines variability

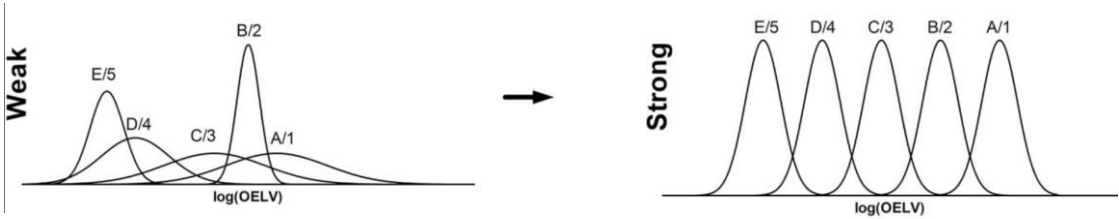
Substance	H-codes	Band# per HB-engine		
		IFA	COSHH	EMKG
Maleic anhydride 108-31-6	H302 H314 H334 H317	4	5	3
Diisobutylene (DIB) 25167-70-8	H304 H336	2	1	1
Cumene 98-82-8	H304 H335	2	3	1
Ethanol 64-17-5	(H225) (IARC 1)	-	-	-

In red: the H-code determining the band #

Band# determines control regime

Method to establish and improve the HB/OELV relation

the strength score method



Ann. Occup. Hyg., 2016, 1–13
doi:10.1093/annhyg/mew050

BOHS
The Chartered Society for Worker Health Protection

On the Strength and Validity of Hazard Banding

Theo Scheffers[1,2*], Blandine Doornaert[3], Nathalie Berne[4], Gerard van Breukelen[5], Antoine Leplay[4] and Erik van Miert[6]

ABSTRACT

Hazard Banding (HB) is a process of allocating chemical substances in bands of increasing health hazard based on their hazard classifications. Recent Control Banding (CB) tools use the classifications of

HB	IFA	COSHH	EMKG (inhalation)	Global
OSS=	12	10	14	Maximal
E/5	300, 310, 330 (Tox) 340, 350(i) (Car, M) EU032 (Tox gas release)	EU070 (Tox) 340, 341, 350(i) (Car, M) 334 (S)	340, 350(i) (Car,M) 360F (R)	
D/4	301, 311, 331, 370, 372 (Tox) 341, 351, 360xy (Car,M,R) EUH029, EUH031 (Toxic gas release) 317, 334, 318, EUH070 (I,C,S)	300, 310, 330, 372 (Tox) 351, 360xy, 361, 362 (Car,R) EUH070 (I,C)	300, 330, 372 (Tox) 360D (R) EUH032 (Toxic gas release)	
C/3	302, 312, 332, 371, 373 (Tox) 361 f/d, 362 (R) 314 (pH ≥ 11,5, pH ≤ 2), EUH071 (I,C) non-toxic gases which may cause asphyxiation	301, 311, 331, 314, 370, 373 (Tox) 317, 318 , 335, EUH071 (I,C)	301, 331, 314, 370, 371, 341, 351, 361f/d (Car,M,R) 373 (Tox) 334 (S) EUH031 (Toxic gas release)	
B/2	315, 319, 335 (I) 304, EUH066, 336 (solvents)	302, 312, 332, 371 (Tox)	302, 332 (Tox) 318 (C)	
A/1	substances for which experience showed them to be harmless (e.g. water, sugar, paraffin etc.)	303, 313, 333(Tox) 315, 319,316,320(I) 304, 305 (Aspiration hazard) 336 (Tox) , EUH066 (solvent effect) and all H-numbers not otherwise listed	319, 335 (I) 336 (Tox) 304 (Aspiration hazard) non health hazard H-codes	

https://doi.org/10.1093/annhyg/mew050

IOHA 2018

GHS/CLP H/EUH-code based kick-off levels

Proposed kick-off for dust/aerosols
(basis: COSHH Essentials)

Hazard Group	4	3	2 *	1
H-statements	H334, H340, H341, H350, H350i	H300, H310, H330, H351, H360F/D/FD/Fd /Df, H361f/d/fd, H362, H372	H301, H302, H311, H312, H314, H317, H318, H331, H332, H335, H370, H371, H373, EUH071	H303, H304, H305, H313, H315, H316, H319, H320, H333, H336, EUH066, other H-statements n.o.s., REACH Annex IV
Dusts (mg/m³)	**0,0001**	**0,01**	**0,1**	**1**

*: COSHH Essential Groups B+C combined

Proposed kick-off for gases/vapors
(basis: DGUV IFA Spaltenmodell)

Hazard Group	4	3	2	1
H-statements	H300, H310, H330, H340, H350, H350i, EUH032	H301, H311, H317, H318, H331, H334, H341, H351, H360F/D/FD/Fd/Df, H370, H372, EUH029, EUH031, EUH070	H302, H312, H314, H332, H361f/d/fd, H362, H371, H373, EUH071	H304, H315, H319, H335, H336, EUH066, other H-statements n.o.s., REACH Annex IV
Gases/vapors (ppm)	**0,001**	**0,01**	**0,1**	**5**

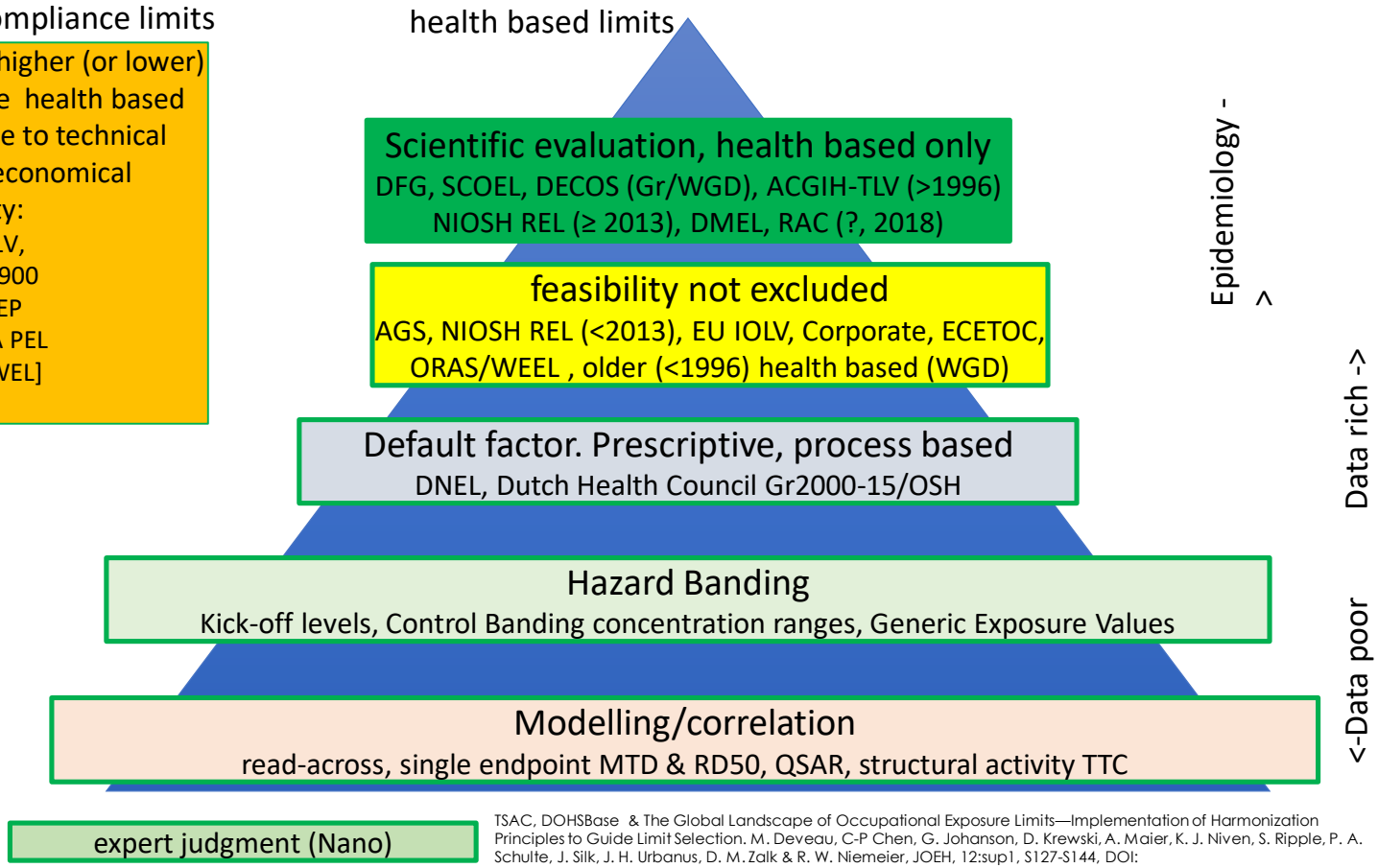
https://www.dohsbase.nl/en/content-2-2-2/kick-off-levels-2014/

OELV domains and health-based hierarchy

legal compliance limits

may be higher (or lower) than the health based OELV due to technical and/or economical feasibility:

- EU BLV,
- TRGS900
- Fr VLEP
- OSHA PEL
- [UK WEL]
- ….



TSAC, DOHSBase & The Global Landscape of Occupational Exposure Limits—Implementation of Harmonization Principles to Guide Limit Selection. M. Deveau, C-P Chen, G. Johanson, D. Krewski, A. Maier, K. J. Niven, S. Ripple, P. A. Schulte, J. Silk, J. H. Urbanus, D. M. Zalk & R. W. Niemeier, JOEH, 12:sup1, S127-S144, DOI: 10.1080/15459624.2015.1060327

NVvA Conference 2018

IST Institute for Work and Health
Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra
scaht

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Route de la Corniche 2, Epalinges-Lausanne
Switzerland

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Original Article
BOHS The Chartered Society for Worker Health Protection
OXFORD

Original Article

ART, Stoffenmanager, and TRA: A Systematic Comparison of Exposure Estimates Using the TREXMO Translation System

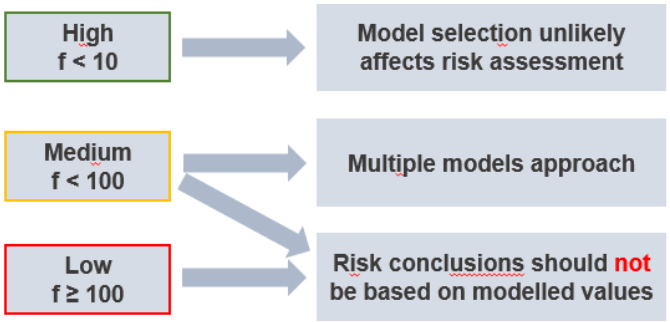
Nenad Savic[1]*, Bojan Gasic[2] and David Vernez[1]

Abstract

Several occupational exposure models are recommended under the EU's REACH legislation. Due to limited availability of high-quality exposure data, their validation is an ongoing process. It was shown, however, that different models may calculate significantly different estimates and thus lead to potentially dangerous conclusions about chemical risk. In this paper, the between-model translation rules

Conclusion

- Differences of few orders of magnitude
- ART (Tier 2) calculates often higher predictions with exposure parameters that describe higher exposure concentrations (e.g. high VP and conc, spraying etc)
- The tiered approach is not applicable always
- Different model - different risk conclusion
- Multiple model approach reasonable



Developments in last 3 years

- strength based scientific method to improve HB-OELV relation is now available!
- Alignment is supported by EU platform of Industrial Hygiene Societies
- No new CB's
- Good contacts with Pharma , no intention to voluntary improve or align enterprise HB engines
- No response from national institutes on plea to support alignment

Conclusion & Recommendations

- Current HB engines with 5 bands are over precise: 4 bands makes more sense
- Much room to improve HB-OELV relation; strength based method available!
- Claims that >10 different CB's supports SME's is unrealistic

- CB use should be discouraged if no mutual alignment is reached in say 3 years

- Possible solutions:
  - Alignment of I/OH tools must become a part of IOHA strategy
  - IOHA alignment ambassador ?
  - Alignment Award ?
  - support to align tools (EU-platform, ILO?)

Alignment & improvement of Hazard Banding (HB/OEB)

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