

モデル名称	EMKG-EXPO-TOOL		
開発国	ドイツ	開発機関 開発者	BAuA
入手方法 (URL・価格等)	下記 HP より、無料でダウンロード可能。 http://www.reach-helpdesk.de/en/Exposure/Exposure.html		
モデルの 目的概要	職場における労働時の吸入暴露について評価・予測するモデル。扱う物質が固体、もしくは液体の場合にのみ利用可能。物質の性質や沸点、作業温度、使用量、使用面積、管理状態、暴露期間などの簡単な情報を入力することで、暴露可能性や暴露量を簡易的に評価・予測することができるツール。		

操作手順

1. 評価したい職場で扱っている物質が固体である場合には「Solids」(固体)のタブを、液体の場合には「Liquids」(液体)のタブを開く。

The screenshot shows the Microsoft Excel interface for the EMKG-EXPO-TOOL spreadsheet. The title bar reads "Microsoft Excel - EMKG-EXPO-TOOL.xls". The spreadsheet content includes:

- Definition of dustiness bands**: A table with columns for Band (Low, Medium, High) and Description.
- Scale of use bands**: A table with columns for Band (Small, Medium, Large) and Description.
- Short term exposure**: A section with a question "Activity < 15 min. during a full 8 h shift?" and "Yes/No" buttons.
- Control strategies**: A table with columns for Control Approach (1, 2, 3), Type, and Description.
- Exposure potential bands (EP)**: A table with columns for Solids - EP band, Use band, Dustiness band, and Description.
- Predicted exposure ranges: Solids**: A table with columns for Control Approach, Solids EP Band 1, Solids EP Band 2, Solids EP Band 3, and Solids EP Band 4.

In the bottom navigation bar, the tabs are "Limitations", "Solids", and "Liquids". The "Solids" tab is circled in red, indicating it is the selected option for solid substances.

2. 「Solids」(固体)の場合

① Definition of dustiness bands (ほこりの程度の定義)

② Scale of use bands (使用スケールの分類)

③ Control strategies (管理計画)

④ Short term exposure (短期暴露)

の4つの項目すべてについて、扱う物質や評価したい職場環境に当てはまるものをそれぞれ選択する。選択する際は、当てはまる赤字部分をクリックする。

EMKG - Exposure assessment part for solids

Definition of dustiness bands

Band	Description
Low	Pellet-like, non friable solids. Little evidence of any dust observed during use. For example: PVC pellets, waxes
Medium	Crystalline, granular solids. When used, dust is seen, but it settles out quickly. Dust is seen on the surface after use. For example: soap powder, sugar
High	Fine, light powders. When used, dust clouds can be seen to form and remain airborne for several minutes. For example: cement, titanium dioxide,

Scale of use bands

Use band	Description
Small	gram up to 1 kilogram for solids
Medium	kilogram (batch sizes between 1 and 1000 kilograms for solids)
Large	tonnes (batch sizes of more than 1 tonne for solids)

Control strategies

Control Approach	Type	Description
1	General ventilation	Good general ventilation and good work practice
2	Engineering control	Local exhaust ventilation (e.g. single point extract, partial enclosure, not complete containment) and good work practice
3	Containment	Enclosed, but small breaches may be acceptable. Good work practice.

Exposure potential bands (EP)

Solids - EP band	Use band	Dustiness band	Description
1	Small	Low or Medium	Grams of low / medium dusty solid
2	Small	High	Grams of high dusty solid, Kg / Tonnes of low dusty solid
	Medium or Large	Low	Kg of medium / high dusty solid
3	Medium	Medium or High	Tonnes of medium / high dusty solid
4	Large	Medium or High	Tonnes of medium / high dusty solid

Predicted exposure ranges: Solids

Control Approach	Predicted exposure level for dust, mg/m ³			
	Solids EP Band 1 (g of low / medium dusty solid)	Solids EP Band 2 (g of high dusty solid, kg / t of low dusty solid)	Solids EP Band 3 (kg of medium/high dusty solid,	Solids EP Band 4 (t of medium / high dusty solid)
1	0.01 - 0.1	0.1 - 1	1 - 10	> 10
2	0.001 - 0.01	0.01 - 0.1	0.1 - 1	1 - 10
3	< 0.001	0.001 - 0.01	0.01 - 0.1	0.1 - 1

すべての項目の入力を完了すると、「Exposure potential bands (EP)」(暴露可能性)と「Predicted

exposure ranges」(予測される暴露範囲)についての評価結果が表中に色付きで表示される。ここで、「Predicted exposure ranges」の表中の数値の単位は[mg/m^3]である。

Microsoft Excel - EMKG-EXPO-TOOL.xls

EMKG - Exposure assessment part for solids

Definition of dustiness bands ?
 Band Description
Low Pellet-like, non friable solids. Little evidence of any dust observed during use. For example: PVC pellets, waxes
Medium Crystalline, granular solids. When used, dust is seen, but it settles out quickly. Dust is seen on the surface after use. For example: soap powder, sugar
High Fine, light powders. When used, dust clouds can be seen to form and remain airborne for several minutes. For example: cement, titanium dioxide

Scale of use bands ?
 Band Description
Small gram up to 1 kilogram for solids
Medium kilogram (batch sizes between 1 and 1000 kilograms for solids)
Large tonnes (batch sizes of greater than 1 tonne for solids)

Short term exposure ?
 Activity < 15 min. during a full 8 h shift?
 Yes No

Control strategies ?
 Control Approach Type Description
1 General ventilation Good general ventilation and good work practice
2 Engineering control Local exhaust ventilation (e.g. single point extract, partial enclosure, not complete containment) and good work practice
3 Containment Enclosed, but small breaches may be acceptable. Good work practice.

Exposure potential bands (EP)
 Solids - EP band Use band Dustiness band Description
 1 Small Low or Medium Grams of low / medium dusty solid
 2 Small High Grams of high dusty solid, Kg / Tonnes of low dusty solid
 3 Medium or Large Low Medium or High Kg of medium / high dusty solid
 4 Large Medium or High Tonnes of medium / high dusty solid

Predicted exposure ranges: Solids
 Control Approach Predicted exposure level for dust, mg/m^3
 Solids EP Band 1 Solids EP Band 2 Solids EP Band 3 Solids EP Band 4
 (g of low / medium dusty solid) (g of high dusty solid, kg / t of low dusty solid) (kg of medium/high dusty solid, t) (t of medium / high dusty solid)
 1 0.01 - 0.1 0.1 - 1 1 - 10 > 10
 2 0.001 - 0.01 0.01 - 0.1 0.1 - 1 1 - 10
 3 < 0.001 0.001 - 0.01 0.01 - 0.1 0.1 - 1

Limitations Solids Liquids
 コマンド NUM

3. 「Liquids」(液体)の場合

- ① Definition of volatility bands (揮発性の定義)
- ② Scale of use bands (使用スケールの分類)
- ③ Control strategies (管理計画)
- ④ Short term exposure (短期暴露)
- ⑤ Applications on surface > 1m² (表面の塗装>1m²)

の5つの項目すべてについて、扱う物質や評価したい職場環境に当てはまるものをそれぞれ選択する。選択する際は、当てはまる赤字部分をクリックする。ただし①に関しては、「boiling point」(沸点)と「operating temperature」(作業温度)の両方を直接入力するのでも構わない(下図緑丸部分)。この二つの数値を入力すると自動的に「Definition of volatility bands」の項目は選択される。

EMKG - Exposure assessment part for liquids

Definition of volatility bands (①)

Band	At normal temperature (~20°C)	Operating temp. (o.t. [°C])	Vapour pressure (kPa at o.t.)
Low	boiling point above 150°C	b.p. ≥ 5 x o.t. + 50	< 0.5
Medium	boiling point between 50 and 150°C	other cases	0.5 - 25
High	boiling point below 50°C	b.p. ≤ 2 x o.t. + 10	> 25

Alternative input of boiling point [°C] and operating temperature [°C] (green circle):
input b.p. input o.t.

Scale of use bands (②)

Band	Description
Small	millilitres up to 1 litre for liquids
Medium	litres (batch sizes between 1 and 1000 litres for liquids)
Large	cubic metres (batch sizes of greater than 1 m ³ for liquids)

Short term exposure (④): Activity < 15 min. during a full 8 h shift?
Yes No

Applications on surfaces > 1m² (⑤): e.g. painting, applying adhesives etc. and more than 1 litre product used per shift!
Yes No

Control strategies (③)

Control Approach	Type	Description
1	General ventilation	Good general ventilation and good work practice
2	Engineering control	Local exhaust ventilation (e.g. single point extract, partial enclosure, not complete containment) and good work practice
3	Containment	Enclosed, but small breaches may be acceptable. Good work practice.

Exposure potential bands (EP)

Solids - EP band	Use band	Volatility band	Description
1	Small	Low	Millilitres of low volatility liquid
2	Small	Medium or High	Millilitres of medium / high volatility liquid, litres / cubic metres of low volatility liquid
	Medium or Large	Low	
3	Large	Medium	Cubic metres of medium volatility liquid, litres of medium / high volatility liquid
	Medium	Medium or High	
4	Large	High	Cubic metres of high volatility liquid

Predicted exposure ranges: Liquids

Control Approach	Predicted exposure level for vapour, ppm			
	Solids EP Band 1 (mL of low VP liquid)	Solids EP Band 2 (mL of med. / high VP liquid or L / m ³ of low VP liquid)	Solids EP Band 3 (m ³ of med. VP liquid or L of med. / high VP liquid)	Solids EP Band 4 (m ³ of high VP liquid)
1	< 5	5 - 50	50 - 500	> 500
2	< 0.5	0.5 - 5	5 - 50	5 - 500
3	< 0.05	0.05 - 0.5	0.5 - 5	0.5 - 5

すべての項目の入力を完了すると、「Exposure potential bands (EP)」(暴露可能性)と「Predicted exposure ranges」(予測される暴露範囲)についての評価結果が表中に色付きで表示される。ここで、「Predicted exposure ranges」の表中の数値の単位は[ppm]である。

Microsoft Excel - EMKG-EXPO-TOOL.xls

質問を入力してください

EMKG - Exposure assessment part for liquids

Definition of volatility bands

Band	At normal temperature ($\approx 20^{\circ}\text{C}$)	Operating temp. (o.t.) [°C]	Vapour pressure (kPa at o.t.)
Low	boiling point above 150°C	b.p. $\geq 5 \times \text{o.t.} + 50$	< 0.5
Medium	boiling point between 50 and 150°C	other cases	0.5 - 25
High	boiling point below 50°C	b.p. $\leq 2 \times \text{o.t.} + 10$	> 25

Alternative input of boiling point [°C] and operating temperature [°C]

input b.p.	input o.t.

Scale of use bands

Band	Description
Small	millilitres up to 1 litre for liquids
Medium	litres (batch sizes between 1 and 1000 litres for liquids)
Large	cubic metres (batch sizes of greater than 1 m ³ for liquids)

Short term exposure

Activity < 15 min. during a full 8 h shift?

Yes	No
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Applications on surfaces > 1m²

e.g. painting, applying adhesives etc. and more than 1 litre product used per shift!

Yes	No
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Control strategies

Control Approach	Type	Description
1	General ventilation	Good general ventilation and good work practice
2	Engineering control	Local exhaust ventilation (e.g. single point extract, partial enclosure, not complete containment) and good work practice
3	Containment	Enclosed, but small breaches may be acceptable. Good work practice.

Exposure potential bands (EP)

Solids - EP band	Use band	Volatility band	Description
1	Small	Low	Millilitres of low volatility liquid
2	Small	Medium or High	Millilitres of medium / high volatility liquid, litres / cubic metres of low volatility liquid
	Medium or Large	Low	
3	Large	Medium	Cubic metres of medium volatility liquid, litres of medium / high volatility liquid
	Medium	Medium or High	
4	Large	High	Cubic metres of high volatility liquid

Predicted exposure ranges: Liquids - short term exposure

Control Approach	Predicted exposure level for vapour, ppm			
	Solids EP Band 1 (mL of low VP liquid)	Solids EP Band 2 (mL or med. / high VP liquid or L / m ³ of low VP liquid)	Solids EP Band 3 (m ³ or med. VP liquid or L of med. / high VP liquid)	Solids EP Band 4 (m ³ of high VP liquid)
1	< 0.5	0.5 - 5	5 - 50	5 - 500
2	< 0.05	0.05 - 0.5	0.5 - 5	0.5 - 50
3	< 0.05	< 0.05	0.05 - 0.5	0.05 - 0.5