



Comparison of HEPA, ULPA classification with dust classification

| IEC 60335-2-69<br>Include German standard<br>E DIN IEC 61/J/94/CD<br>(VDE 0700 Teil 69/A2)<br>Vacuum cleaner<br>penetration limit |                            |
|---|----------------------------|
| Dust class  | Degree of penetration in % |
| -   | -                          |
| L   | < 5                        |
| M   | < 0.5                      |
| H   | < 0.005                    |

| AMERICA<br>US MIL-STD 282<br>As per requirements of<br>IEST RP-CC001.3 |
|--|
| Filter Classification<br>(DOP test @ 0.3µm)                            |
| -  |
| 95%  |
| 99.97%<br><i>Minimum for HEPA</i>                                      |
| 99.99%<br><i>Tiger-Vac HEPA filters*</i>                               |
| 99.999%<br><i>Tiger-Vac ULPA filters**</i>                             |
| >99.999%<br><i>Tiger-Vac ULPA filters**</i>                            |

| EUROPE<br>EN1822      |  |   |
|-----------------------|--|---|
| Filter Classification | Efficiency (%) @ MPPS<br>Overall Value | Penetration (%) @ MPPS<br>Overall Penetration |
| H 10                  | 85                                     | 15  |
| H 11                  | 95                                     | 5   |
| H 12                  | 99.5                                   | 0.5   |
| H 13                  | 99.95                                  | 0.05  |
| H 14                  | 99.995                                 | 0.005   |
| U 15                  | 99.9995                                | 0.0005  |
| U16                   | 99.99995                               | 0.00005                                       |
| U17                   | 99.999995                              | 0.000005                                      |

\* TIGER-VAC HEPA FILTERS:

- HAVE A MINIMUM EFFICIENCY OF 99.99% ON 0.3µM
- FREQUENTLY EXCEED EFFICIENCY OF 99.99% ON 0.3µM

\*\* TIGER-VAC ULPA FILTERS:

- HAVE A MINIMUM EFFICIENCY OF 99.999% ON 0.12µM
- FREQUENTLY EXCEED EFFICIENCY OF 99.999% ON 0.12µM



## The vacuum cleaner division according to BIA ZH 1/487

Before 1997 six vacuum cleaner categories were known, namely: U, S, G, C, K1, K2 and B1.

| Description  | Before 1997<br>ZH 1/487, BG-Holz, TRGS 519 |   | Since 1997<br>EN 60335-2-69, IEC 335-2-69 |                                |
|--|--|---|---|--------------------------------|
|  | Category of use                            | Maximum degree of penetration             | Dust Class                                | Maximum degree of penetration  |
| Dust with MAC value <sup>1)</sup> > 1mg/m <sup>3</sup>   | <b>U</b>                                   | 5%  | <b>L</b>                                  | 1%                             |
| Dust with MAC value > 0,1 mg/m <sup>3</sup>  | <b>S</b>                                   | 1%  | <b>M</b>                                  | 0,1%                           |
| Dust with MAC value > 0,1 mg/m <sup>3</sup> <sup>2)</sup>  | <b>G</b>                                   | 0,5%                                      | <b>M</b>                                  | 0,1%                           |
| Dust with MAC value > 0,1 mg/m <sup>3</sup> not for carcinogenic materials (§35 GefStoffV / Dangerous material regulation) <sup>2)</sup> | <b>C</b>                                   | 0,1%                                      | <b>M</b>                                  | 0,1%                           |
| Dust with MAC value ≤ 0,1 mg/m <sup>3</sup> <sup>2)</sup>  | <b>G</b>                                   | 0,5%                                      | <b>H</b>                                  | 0,005%                         |
| Dust with MAC value ≤ 0,1 mg/m <sup>3</sup> and carcinogenic materials (§35 GefStoffV / Dangerous material regulation) <sup>2)</sup>     | <b>C</b>                                   | 0,1%                                      | <b>H</b>                                  | 0,005%                         |
| Carcinogenic Materials (§35 GefStoffV / Dangerous material regulation) including specially dangerous carcinogenic materials (8.15c)      | <b>K1</b>                                  | 0,05%                                     | <b>H</b>                                  | 0,005%                         |
| Pathogen and contaminating dust  | <b>K2</b>                                  | Same as K1                                | <b>H</b>                                  | 0,005%                         |
| Asbestos   | <b>K2</b> and additional request           | Same as K1                                | <b>H</b> additional request for Germany   | See H                          |
| Combustible dusts of the explosion classes St1, St2, St3 in Zone 22 (Previously Zone 11) <sup>3)</sup>                                   | <b>B1</b>                                  | According to category of use S, G, C or K | <b>B1</b> Germany                         | According to dust class M or H |
| Wood dust  | <b>H1</b>                                  | 0,2 mg/m <sup>3</sup>                     | <b>M</b>                                  | 0,1%                           |

<sup>1)</sup> **MAC or MAK value** = maximum concentration for working place. States the maximal concentration of dust allowed for working place in milligram per m<sup>3</sup> (mg/m<sup>3</sup>).

<sup>2)</sup> Equivalence of categories of use G and C with dust classes M and H depends on MAC values for dust.

<sup>3)</sup> In Germany for category B1 a 1200W vacuum cleaner and / or a 50 Liter Capacity tank is required

*Tiger-Vac does not endorse or guarantee the accuracy of informations in the above table. Source: TUV Germany.*

## Classification of cleanrooms, a comparison of international standards

| Country and standard  | U.S.A. 209D | U.S.A. 209E | Britain BS 5295 | Australia AS 1386 | France AFNOR X44101 | Germany VD I.2083 | ISO standard | GGMP PIC/EEC Annex 1 |
|-----------------------|-------------|-------------|-----------------|-------------------|---------------------|-------------------|--------------|----------------------|
| Date of current issue | 1988        | 1992        | 1989            | 1989              | 1972                | 1990 onwards      | 1997         | 1997                 |
|                       |             |             |                 |                   | -                   | 0                 |              |                      |
|                       | 1           | M1.5        | C               | 0.035             | -                   | 1                 | 3            |                      |
|                       | 10          | M2.5        | D               | 0.35              | -                   | 2                 | 4            |                      |
|                       | 100         | M3.5        | E or F          | 3.5               | 4 000               | 3                 | 5            | ~ A and B            |
|                       | 1 000       | M4.5        | G or H          | 35                | -                   | 4                 | 6            |                      |
|                       | 10 000      | M5.5        | J               | 350               | 400 000             | 5                 | 7            | ~ C                  |
|                       | 100 000     | M6.5        | K               | 3500              | 4 000 000           | 6                 | 8            | ~ D                  |

*Tiger-Vac does not endorse or guarantee the accuracy of informations in the above table. The above information on cleanroom standards have been extracted from the handbook 'Cleanroom Technology' written by Bill Whyte.*