



Date

May 20, 2005

Our reference

05DV4/432/16695/brap

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CERTIFICATE

Summary

At the request of Dräger Safety AG & Co KGaA, Luebeck, TNO Defence, Security and Safety assessed the protective properties of Visor PVC material (Part-No. R54135). The following liquid chemical warfare agents were applied to the material:

- Mustard agent (HD), CAS-No.: 505-60-2
- Soman (GD), CAS-No.: 58868-94-3
- Sarin (GB), CAS-No.: 107-44-8
- VX, CAS-No.: 20820-80-8
- Tabun (GA), CAS-No.: 77-81-6
- Lewisite (L), CAS-No.: 541-25-3

The following gaseous toxic industrial chemicals were applied:

- Phosgene (COCl_2), (CG) CAS-No.: 75-44-5
- Arsine (AsH_3), (SA) CAS-No.: 7784-42-1
- Cyanogen Chloride (ClCN), (CK) CAS-No.: 506-77-4
- Hydrogen Cyanide (HCN), (AC) CAS-No.: 74-90-8

The assessment was based on the following documents:

Standard:

- For the liquid chemicals: FINABEL O.7.C, Methodes de mesures de la resistance des materiaux impermeables et permeables au passage des agents toxique, partie A, 15-03-2000
- For the gaseous chemicals: ISO 6529, Protective Clothing – Protection against chemicals – Determination of resistance of protective clothing materials to permeation by liquids and gases, 15-10-2001

Additional document:

- TNO letter report no. 05DV4/407A/16695, dated May 20, 2005.



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Conclusion

TNO Defence, Security and Safety has assessed the protective properties of Visor PVC material (Part-No. R54135) and concludes that this material is suitable to protect against the chemical warfare agents: Mustard Agent, Soman, Sarin, VX, Tabun and Lewisite. Evaluation of the material with Phosgene, Arsine, Cyanogen Chloride and Hydrogen Cyanide showed that the ISO 6529 criterion of $1.0 \mu\text{g}/\text{min}/\text{cm}^2$ is not exceeded in 480 minutes.

The experiments gave the following breakthrough time results:

- Mustard agent : > 48 hours
- Soman : > 48 hours
- Sarin : > 48 hours
- VX : > 48 hours
- Tabun : > 48 hours
- Lewisite : > 48 hours
- Phosgene : > 480 minutes
- Arsine : > 480 minutes
- Cyanogen Chloride : > 480 minutes
- Hydrogen Cyanide : > 480 minutes

SIGNATURES:

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R.J. van Eenennaam
Project Manager

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Dr. S. Van der Gijp
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b.a. P. van Hooft