

How do we compare handrubs?

Handrubs may have very **different composition**. There are several standards that can help us to compare the effectiveness of any products. The two most commonly used standard procedures are the **EN 1500** standard (developed by CEN, the **European Committee for Standardization**) and the **ASTM E-1174** standard (by the **FDA's** Tentative Final Monograph – TFM) [1].

Both methods use experimental contamination on the hands, and counts \log_{10} reduction in the number of colonies, but the performance criteria and the experiment parameters of the two standards are not exactly the same. It means, if a handrub formulation passes the ASTM E-1174, it may not pass the EN 1500 or vice versa [1]. Table 1 summarizes the basic experimental parameters of the two standards.

	EN 1500	ASTM E-1174
Hands contaminated with	<i>Escherichia coli</i>	<i>Serratia marcescens</i> (<i>Escherichia coli</i> as an alternative)
Volume	2 x 3 ml	3 ml
Duration	2 x 30 sec	30 ± 5 sec
Microbiological sample	fingertips	glove juice*
Performance criteria	Not worst in \log_{10} reduction than 60% propan-2-ol	2 \log_{10} reduction after first use; 3 \log_{10} reduction after 10 th use

Table 1: Main experimental parameters of the two most commonly used standards for testing the efficacy of handrubs.

Source: CEN EN1500 [2] and TFM ASTM E-1174 standard [3].

* Glove juice technique: Gloves were placed on subjects' hands, then 75 ml of sampling solution was instilled into the gloves. Gloved hands were massaged for 1 minute. 3-5 ml of "glove juice" was removed and diluted for testing.

There are several other ASTM standards, closely related to the E-1174, like E-2613 for fungicide, E-2276 for bactericide, E-1838 and E-2011 for viricide effect [1]. CEN also has another standard, EN 1499 for antiseptic soaps, while the EN 1500 is for handrubs. EN 14347 is for determine sporocidal activity, EN 14348 is for mycobactericidal activity, EN 14349 is for bactericidal activity, EN 14476 is for virucidal activity, and the list is still not complete [4].

The above mentioned standards are all *in vivo* methods. *In vitro* methods would also be feasible, and even more cost effective, but results are not necessarily reflecting those of performed on human skin [1]. **Lopez-Gigosos et al. 2015** described a fluorescent method that focuses on the beta-D-glucuronidase activity to determine the biocide effect against *E. coli*. The \log_{10} reduction values determined with the fluorescent methods were highly correlated with the EN 1500 results in the case of the examined 5 handrubs [5].

Conclusion:

The two most commonly used standards for test the efficacy of handrubs are the EN 1500 in Europe and ASTM E-1174 in the United States and Canada. The two tests are not equivalent, if a product meets the requirements of one of the two, it does not necessarily meets with the other. Both standards have weaknesses, and this will be the topic of our next post.



References

- 1: WHO Guidelines on Hand Hygiene in Health Care, ISBN 978 92 4 159790 6
- 2: CEN – European Committee for Standardization: CEN/TC 216 Chemical disinfectants and antiseptics. EN 1500:2013 Chemical disinfectants and antiseptics - Hygienic handrub - Test method and requirements (phase 2/step 2)
- 3: ASTM International: ASTM E1174 – 13 Standard Test Method for Evaluation of the Effectiveness of Health Care Personnel Handwash Formulations
- 4: CEN – European Committee for Standardization: Standard searched for the term “disinfectant”
- 5: Lopez-Gigosos R.M. et al.: *Fluorescence assay for evaluating microbicidal activity of hand antiseptics*. Applied and Environmental Microbiology, 81(21):7443-7. 2015. DOI: 10.1128/AEM.01943-15