

## Certificate for the Antibacterial Effectiveness

For Company: DUROPAL GmbH  
 Westring 19 – 21  
 59759 Arnsberg

Product: **DUROPAL microPLUS®**

According to the order of the DUROPAL GmbH, DUROPAL microPLUS® Products were tested concerning their antibacterial effectiveness. Regarding all microbiological evaluations (in accordance to JIS Z 2801) a strong antibacterial effectiveness of DUROPAL microPLUS® Products could be obtained, that means minimum 99% of the bacteria were killed within 24 hours. The examination was performed against the hygienic-relevant test-bacteria:

- Pseudomonas aeruginosa
- Staphylococcus aureus
- Salmonella choleraesuis
- Escherichia coli

The bacteria named above represent especially for the food-industry and the pharmaceutical domain very important test-germs.

### Examination of the Long Lasting Effectiveness

The examination of the long-lasting effectiveness of antibacterial treated DUROPAL microPLUS® Products achieved exclusively positive results for all relevant test-variations. DUROPAL microPLUS® Surfaces were maximum-affected while simulating the life-cycle of the product. In the process the antibacterial effectiveness was totally kept.

Using different, commercially available cleaners with different pH, the influence of UV-light and the storatation under warm conditions did not result in a reduction of the antibacterial effectiveness even if the surfaces were stressed before. Even after the abrupt temperature-treatment using 180°C pot-bottoms and an additional stress of surfaces the antibacterial effectiveness could be confirmed.

DUROPAL microPLUS® Products were treated for the resistance-tests as following:

- Exposure of commercially available cleaners with different pH and wiping-materials
- Exposure of UV-light after stressing with a usual cleaner and wiping-material
- Exposure of abrupt temperature (180°C)
- Exposure of abrupt temperature (180°C) after stressing with usual cleaner and wiping-material
- Exposure of long-lasting temperature after stressing with a usual cleaner and wiping-material

### Test of the Long-Lasting Effectiveness of DUROPAL microPLUS® Products

For pre-damage the test-surfaces of DUROPAL microPLUS® Products were stressed 65.700 times using the rough surface of a sponge and a non-diluted cleaner in a wiping-test-machine. To achieve the maximum of stress every 100 wipes new sponges and new cleaner were used. As cleaners a commercially available acetic cleaner (pH 2-3), an all purpose cleaner (pH 8-9) and a strong alkaline cleaner (pH 11-12) were chosen. Subsequent the stressed surfaces were contaminated with selected test-bacteria and evaluated after defined incubation-times regarding the antibacterial effectiveness.

#### SGS INSTITUT FRESENIUS GMBH



i. V. Dr. Christian Wunderlich



i. V. Bettina Tietze