

Table of contents

Abstract.....	I
Zusammenfassung	III
1. Introduction	1
2. Background	3
2.1. Need for a reference system	3
2.2. Dishwasher standards	7
2.2.1. Standardization	7
2.2.2. IEC 60436 reference system	8
2.2.3. EN 60436 and European energy labelling	10
2.3. Consumer relevance	12
2.4. Electric dishwashers	15
2.4.1. Mechanisms of action.....	15
2.4.2. Structure and programmes.....	17
2.5. Detergents for electric dishwashing	22
2.5.1. Mechanisms of action.....	24
2.5.2. Structure	28
3. Objectives	39
4. Materials and methods	41
4.1. Experiments conducted	41
4.1.1. Preliminary tests	41
4.1.2. Comparative tests	42
4.1.3. Development of an adjustment factor	44
4.2. General conditions for conducting the experiments	46
4.3. Equipment used.....	47

4.4. Soiling materials	52
4.5. Statistical evaluation.....	53
5. Results.....	59
5.1. Comparative tests.....	59
5.1.1. Detergent type D vs. detergent type E	59
5.1.2. Modifications of detergent type E	65
5.1.3. Current reference system vs. experimental, new reference system	72
5.2. Development of an adjustment factor.....	75
6. Summary and discussion	79
6.1. Results.....	79
6.1.1. Detergent type D vs. detergent type E	79
6.1.2. Modifications of detergent type E	80
6.1.3. Current reference system vs. experimental, new reference system	83
6.1.4. Development of an adjustment factor	86
6.2. Error evaluation	89
6.2.1. Statistical errors.....	89
6.2.2. Systematic errors	90
6.3. Criticism of the standard testing method in contrast to consumer relevance	94
7. Conclusion and proposals for standardization work.....	101
References	105
Appendix A	113
A.1 List of abbreviations	113
A.2 List of tables	115
A.3 List of figures.....	117

A.4 List of equations	121
Appendix B: Results of regression analyses	123
B.1 Comparison of detergent type D vs. detergent type E	123
B.2 Current reference machine vs. experimental, new reference machine	132
Appendix C – Curriculum vitae	141
Acknowledgements.....	IX