Annex H
(informative)

Alternate cleaning and drying assessment tables

H.1 General

Tables H.1 and H.2 for drying performance and cleaning performance are provided as alternates to those given in 7.2.2 (drying performance) and 7.3.1 (cleaning performance).

H.2 Alternate drying performance table

Table H.1 – Alternate drying performance table

RUN NUMBER	1	2	3	4	5	6	7	8
PROGRAMME SETTING								
DATE OF ASSESSMENT								
ASSESSOR								
Illuminance (Lux)								
ITEM & LOCATION	**SCORES (b)**	**SCORES (b)**	**SCORES (b)**	**SCORES (b)**	**SCORES (b)**	**SCORES (b)**	**SCORES (b)**	**SCORES (b)**
BOTTOM BASKET								
Load item 1								
Load item 2								
Load item 3								
Load item 4								
Load item 5								
Load item 6								
Load item 7								
Load item 8								
Load item 9								
Load item 10								
Load item 11								
Load item 12								
Load item 137								
Load item 138								
Load item 139								
Load item 140								
CUTLERY BASKET								
Load item 141								
Load item 142								
Load item 143								
Load item 144								
Load item 145								
Load item 146								
Load item 147								
Load item 148								
CALCULATIONS								
Parameter	**Symbol**							
Total number of scores for all items	N							
Sum of all scores	$\sum_D$							
Test dishwasher single drying index	$D_{T,i}$							
Reference dishwasher single drying index	$D_{R,i}$							
Single drying performance index	$P_{D,i}$							
Logarithm of single drying performance index	$Ln\ P_{D,i}$							
Average logarithm of all drying performance indices	$Ln\ P_D$							
Standard deviation of the logarithms of single drying performance indices	$Ln\ s_D$							
Half range of the logarithmic drying confidence interval	$Ln\ W_D$							

A table such as Table H.1 is prepared for each dishwasher to be tested. The load items are listed in the first column from the left in the order in which they are located in the dishwasher. Additional information can be provided in the right hand side of the first column to direct the

assessor to a specific position in a specific rack. The first column should correspond to the load plan supplied by the manufacturer. During the drying assessment, the list in the first column prompts the assessor to select items for assessment in a consistent order. The assessor records the score for each load item in the appropriate cell for the item and run being assessed. The procedure ensures that during the assessment the assessor always knows which items have been assessed and which ones have not. This procedure also ensures that every score for every item is recorded individually and can be traced and checked.

H.3 Alternate cleaning performance table

Table H.2 – Alternate cleaning performance table

RUN NUMBER		1	2	3	4	5	6	7	8
PROGRAMME SETTING									
DATE OF ASSESSMENT									
ASSESSOR									
Illuminance (Lux)									
ITEM & LOCATION	**SOIL**	**SCORES (b)**	**SCORES (b)**	**SCORES (b)**	**SCORES (b)**	**SCORES (b)**	**SCORES (b)**	**SCORES (b)**	**SCORES (b)**
BOTTOM BASKET									
Load item 1	Soil A								
Load item 2	Soil B								
Load item 3	Soil B								
Load item 4	Soil B								
Load item 5	Soil B								
Load item 6	Soil B								
Load item 7	Soil B								
Load item 8	Soil B								
Load item 9	Soil B								
Load item 10	Soil B								
Load item 11	Soil B								
Load item 12	Soil B								
Load item 137	Soil C								
Load item 138	Soil D								
Load item 139	Soil C								
Load item 140	Soil D								
CUTLERY BASKET									
Load item 141	No Soil								
Load item 142	No Soil								
Load item 143	No Soil								
Load item 144	No Soil								
Load item 145	No Soil								
Load item 146	No Soil								
Load item 147	No Soil								
Load item 148	No Soil								
CALCULATIONS									
Parameter	**Symbol**								
Total number of scores for all items	N								
Sum of all scores	$\sum_c$								
Test dishwasher single cleaning index	$C_{T,i}$								
Reference dishwasher single cleaning index	$C_{R,i}$								
Single cleaning performance index	$P_{C,i}$								
Logarithm of single cleaning performance index	$Ln\ P_{C,i}$								
Average logarithm of all cleaning performance indices	$Ln\ P_C$								
Standard deviation of the logarithms of single cleaning performance indices	$Ln\ s_C$								
Half range of the logarithmic cleaning confidence interval	$Ln\ W_C$								

A table such as Table H.2 is prepared for each dishwasher to be tested. The load items are listed in the first column from the left in the order in which they are located in the dishwasher. The soil type applied to the load item is entered into the second column from the left. Additional information can be provided in the right hand side of the first column to direct the

assessor to a specific position in a specific rack. The first column should correspond to the load plan supplied by the manufacturer. During the cleaning assessment, the list in the first column prompts the assessor to select items for assessment in a consistent order. The assessor records the score for each load item in the appropriate cell for the item and run being assessed. The procedure ensures that during the assessment the assessor always knows which items have been assessed and which ones have not. This procedure also ensures that every score for every item is recorded individually and can be traced and checked.

Annex I
(normative)

Description of the reference machine

I.1 Specification of the reference machine

I.1.1 General

A suitable **reference machine** is the Miele[3] G 1222 SC Reference, referred to as Type 2 **reference machine**.

NOTE Contacting the supplier referenced in L.1.13 guarantees that the test equipment is suitable to meet the requirements of this standard.

The Miele G590 and G595, referred to as Type 1 **reference machine**, are not produced anymore and are therefore out of stock. A detailed description of the **reference machine** Type 1 can be found in IEC 60436:2004 (third edition). The **reference machine** Type 1 may be used for testing according to this edition of IEC 60436 if results are proven equivalent to those of the **reference machine** Type 2.

All following descriptions refer only to the Type 2 **reference machine**, the Miele G 1222 SC Reference (writing on front panel: Miele Reference), which has been specially prepared for use as a **reference machine** by Miele. A complying **reference machine** can be obtained from the supplier as specified in L.1.13.

I.1.2 General specifications

– Rated voltage 230 V a.c., rated frequency 50 Hz (refer to I.2)
– **Rinse aid** dosage: setting 3

Specifications of the reference **programme** “Reference EN/IEC” using a clean load with no **detergent** are as follows:

– Spray arm rotations per minute: top: 41 ± 9 (refer to I.3.2)
  middle: 24 ± 4
  bottom: 35 ± 5
– Water hardness of sump water
  in the 2 heated rinses [mmol/l]: ≤ 0,5 (refer to I.3.3)
– Water consumption [litres]: 14,4 ± 0,4 (refer to I.3.4)
  (run with **regeneration** of the **water softener**) [litres]: 16,9 ± 0,5
– Energy consumption [kWh]: 1,27 ± 0,05 (refer to I.3.4)
– Water level measured in the sump at the end of the **cycle** (refer to I.3.5)
– Maximum water temperatures measured in the sump [°C]:
  • Cleaning **operation**: 50 ± 2 (refer to I.3.6)
  • Heated rinse **operations**: 67 ± 2 (refer to I.3.6)
– **Cycle time** [min]: 98 ± 4 (refer to I.3.7)

[3] “Miele” is a trademark. This information is provided for the convenience of users of this international standard and does not constitute an endorsement by the IEC of this trademark. Items of similar specification may be used if they can be shown to lead to equivalent results.

NOTE As the Type 2 **reference machine** has no fan action after the **end of the programme** indication (as does Type 1) the **programme time** and **cycle time** are identical.

I.1.3 Specifications of performance values

Values for the reference **programme** “Reference EN/IEC” when tested in accordance with Clause 6 and Clause 7 (soiled load) using 20 g reference **detergent** type D should be:

– Cleaning performance – Oven drying method (refer to 6.5.2): 3,55 ± 0,25 (refer to I.3.8)

– Cleaning performance – Air drying method (refer to 6.5.3): 3,90 ± 0,25 (refer to I.3.8)

NOTE 1 These cleaning values for air dry and oven dry are based on preliminary tests and general experience with the **reference machine**. The values canbe revised as additional experience is gained.

Values for the reference **programme** “Reference EN/IEC” when tested in accordance with Clause 6 and Clause 7 (soiled load) using 20 g reference **detergent** type D should be:

– Drying performance: 0,82 ± 0,05

NOTE 2 These drying values are based on preliminary tests and general experience with the **reference machine**. The values canbe revised as additional experience is gained.

Details on verifying the performance of the **reference machine** are set out in I.3.

I.2 Installation and use of the reference machine

The manufacturer of the **reference machine** measures and checks each individual **reference machine** prior to supplying it.

When installing the **reference machine** in the laboratory ensure that the hoses are not kinked and the height of the drain hose (measured from the bottom of the machine to the highest point of the hose) is: (60 ± 10) cm.

The **reference machine** shall always be installed as a **free-standing** type, irrespective of the type of **test machine**(s).

The supply voltage of the **reference machine** shall be 230 V a.c. ± 1 %. The supply frequency of the **reference machine** shall be 50 Hz ± 1 %. The **reference machine** supply voltage and supply frequency values are irrespective of the voltage and frequency of the **test machine**(s).

The **reference machine** shall always be loaded with 12 **place settings** according to Annex A.

I.3 Specification check of the reference machine

I.3.1 General

Regularly, and at least every six months, a specification check of the **reference machine** shall be undertaken. To perform a specification check on the **reference machine**, the following measurements or observations shall be made and compared with the specifications and requirements given in I.1.

NOTE 1 When performing a test, data from a **reference machine cycle** can be reviewed to confirm results are within specification. Data include: energy consumption, water consumption, drying results, cleaning results, and **cycle time**.

If the machine does not comply with I.1.2, the test conditions, equipment and procedure shall be checked and the measurements repeated as appropriate. If there are no apparent faults but the **reference machine** still does not meet the specifications, contact the manufacturer to get this rectified.

Prior to performing specification checks, ensure that all filters have been cleaned and that spray arm jets are free from any blockages. **Rinse aid** and salt are used according to the manufacturer's instruction. It is recommended that specification checks are undertaken in the following order.

NOTE 2 The checks on the **reference machine** specified in I.3.2 to I.3.7 can be verified with a single **cycle** with a clean load and without **detergent**. Tasks specified in I.3.8 are verified over 5 **cycles**.

I.3.2 Checking spray arm rotation

A service viewing window and associated key shall be used with the **reference machine** to facilitate the performance of specification checks of spray arm rotations. Spray arm rotations may be determined on any **programme** on the **reference machine** with a clean load installed and no **detergent**. If the spray arm requirements specified in I.1.2 are not met, remedial action shall be taken, e.g. contact the manufacturer.

I.3.3 Checking the water hardness

When the **reference machine** is run on reference **programme** "Reference EN/IEC" with a clean load and no **detergent**, the values specified in I.1.2 shall be achieved. The hardness is to be set within the prescribed range of tolerance degree exactly.

I.3.4 Checking the energy consumption and water consumption

When the **reference machine** is run on reference **programme** "Reference EN/IEC" and in accordance with Clause 6 and Clause 7, except with a clean load at ambient temperature and no **detergent**, the energy consumption and water consumption values specified in I.1.2 shall be achieved.

In each 5th **cycle** a **regeneration operation** occurs and the **water softener** is rinsed out. The water consumption value of a normal run and of a run where **regeneration** takes place is noted in I.1.2.

I.3.5 Checking the water level in the sump

The water level left in the sump is used as an indicator of the drain pump performance. The water level shall be measured at the completion of a **cycle** by removing the sieve. There is no adjustment for this parameter; a machine that operates outside the specified range will require servicing.

IEC

I.3.6 Checking the water temperature in the sump

The water temperature in the sump is used as an indicator of temperature control performance of the heating system in the **reference machine**. The water temperature shall be measured on the reference **programme** during the heated wash **operation** and the heated rinse **operation**s by means of a temperature sensor installed in the central hole of the sump (to prevent any bending of sieves). The temperature sensor shall be fully immersed. The

temperature during each heating **operation** should be logged at regular intervals to verify compliance with I.1.2.

I.3.7 Checking the cycle time

When the **reference machine** is run on reference "Reference EN/IEC" and in accordance with Clause 6 and 7, except with a clean load at room temperature and no **detergent**, the **cycle time** specified in I.1.2 shall be achieved.

I.3.8 Checking the cleaning and drying performance

When the **reference machine** is run on reference **programme** "Reference EN/IEC" and in accordance with Clause 6 and 7 (with a soiled load and **detergent**) and the loading plan in I.4, the values specified in I.1.3 should be achieved (average value based on 5 runs).

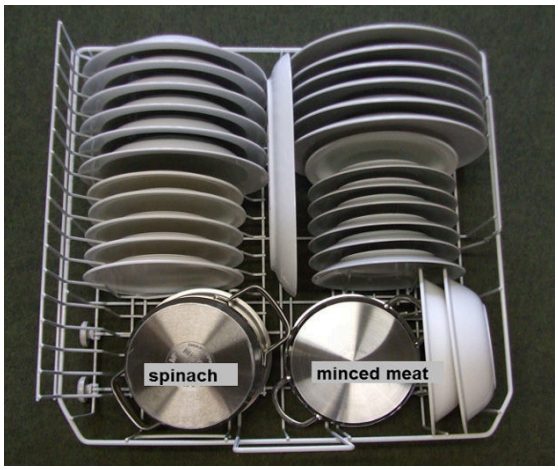
I.4 Reference machine loading plan

The **reference machine** shall be loaded as indicated in the following pictures for each **rack**:

Cutlery rack

4 cups are loaded in a row. 2 cups are hidden by the dessert bowls

Marked glasses are soiled with milk



IEC

Upper basket **Lower basket**

Annex J
(informative)

Shade chart

J.1 General

Annex J specifies the relation between reflection value R_y, an NCS shade chart and a certain shade number. Each NCS shade chart corresponds to one shade number. The shade number scale from 4 to 15 should be used to assess the degree of browning.

J.2 Classification of shade numbers

Table J.1 – Shade chart

Measured reflection value R_y			NCS shade chart	Shade number
≥	<	=		
9,3	*12,2*	*10,4*	S 6030 -Y50R	15
12,2	*16,4*	*14,2*	S 5040 - Y40R	14
16,4	*20,1*	*18,8*	S 4050 - Y30R	13
20,1	*22,9*	*21,4*	S 4040 - Y30R	12
22,9	*26,5*	*24,5*	S 4030 - Y30R	11
26,5	*31,7*	*28,7*	S 3020 - Y30R	10
31,7	*38,5*	*34,9*	S 2060 - Y20R	9
38,5	*46,9*	*42,3*	S 2040 - Y20R	8
46,9	*54,2*	*51,7*	S1050 - Y20R	7
54,2	*64,3*	*56,9*	S 1040 - Y20R	6
64,3	*75,2*	*72,3*	S 0530 - Y10R	5
75,2		*78,3*	S 0520 - Y10R	4

A separate colour gauge and more detailed information can be found in IEC 60350 (see L.1.7 for details).

Annex K
(normative)

Additional aspects of energy consumption of dishwashers

K.1 General

Annex K sets out determination of **left-on mode** power, **end of progamme mode** power**, off mode** power and **delay start mode** power. The first three are steady-state modes that can persist for an indefinite period, while **delay start mode** is a short duration mode associated with active mode (selection and use of a particular **programme**). The **end of programme mode** is an intermediate mode that may persist until the user accesses the load. These are the only four low-power modes specified in this document. Other low-power modes can exist in some products, but for the current designs of **dishwashers**, these are not considered important in terms of duration and energy consumption.

Where low power modes are determined, they shall be determined in accordance with Annex K.

Ensure that the following conditions remain relevant for the duration of the measurement:

- instructions for use regarding installation, **operation** and settings of the **dishwasher** (as applicable) are followed;
- the appliance shall be connected to mains power for the duration of the test;
- no adverse warning indicators (including **rinse aid** and salt indicators, where applicable) are present;
- laboratory supply water is left on at the specified pressure;
- ensure that no network is connected to the product;
- follow manufacturer's instructions regarding the configuration of the **dishwasher** when there is no network present (where applicable).

Power measurements for **left-on mode**, **end of programme mode**, **off mode** and **delay start mode** shall be made in accordance with the requirements of IEC 62301, except for the measurement procedure. The measurement procedure and measurement duration is specified in Annex K.

The average power is measured in watts and rounded to second decimal place.

Data for the required parameters, power and energy consumption, shall be recorded at regular intervals of 1 s or less throughout the test using a data logger or computer.