



Brussels, 27th September 2002
TREN D1 D(2002)
M/324

**MANDATE TO CEN AND CENELEC FOR THE ELABORATION AND
ADOPTION OF MEASUREMENT STANDARDS FOR HOUSEHOLD**

APPLIANCES:

**WATER-HEATERS, HOT WATER STORAGE APPLIANCES AND WATER
HEATING SYSTEMS**

I. Justification

This standardisation mandate is related to Council Directive 92/75/EEC which lays down the legal basis for a compulsory system of energy labelling and information provision for certain energy using household appliances, in particular water-heaters, hot water storage appliances and water heating systems.

In order to provide this information on a comparable basis it is necessary that suppliers of these appliances use a uniform measurement standard. Existing European, and International standards provide a basis for obtaining this information, but common standard is required to ensure that all appliances covered by the implementing directive are measured on a comparable basis. Council Directive N° 92/75/EEC and its implementing directive can best be applied, following the adoption of a standard to be provided under this mandate. This will require that existing standards are revised so as to ensure that they provide measurement methods for consumption of energy based on the methodology in the annex and for supplementary information, which are representative and reproducible.

II. Description of mandated work

1. The Commission hereby requests CEN and CENELEC to elaborate adopt and adapt European measurement standards for water-heaters, hot water storage appliances and water heating systems, intended to cover the hot water requirements of a single household. These measurement standards should lay down the methods of measuring consumption of energy and supplementary information, with a view to meeting the requirements of Council Directive 92/75/EEC, for these appliances. These standards will use the common measurement methodology described in the annex 1. This standardisation work shall take into account any international and European standards in this field. In particular, the measurement methods shall, as far as possible, be independent of the type of appliances producing hot water.

When this is not already achieved by for example the tapping cycles (annex I) , it is essential that CEN and CENELEC jointly achieve the maximum possible degree of consistency across the measurement methods and standards adopted for different types of appliance (storage, instantaneous, fuel type etc.). This could be done by preparing basic standards for appliances (and systems) using the various fuels (Gas, Electricity, Oil, solid fuel (wood, coal), etc.) and producing common modules dealing with other aspects, such as heat input from heat pumps, solar energy, hot water (to deal with storage tanks with heat exchangers and district heating systems) and the treatment of combi-boilers and combined systems when used in the heating season.

CEN and CENELEC should take into account: -

- the variety of water-heating appliances, storage vessels, and water-heating systems which are or are likely to be placed on the EU market and for which there will be a requirement for reliable information on the comparative consumption of energy and other resources;
- the need to avoid distortion or bias which would unfairly favour one type of product or industry relative to another (where this is not covered by the tapping cycles (annex 1));
- the various fuels which may be used (gas, electricity, oil, solid fuel (wood, coal), etc.);
- the need for standard input conditions where heat (e.g. hot water) is supplied by external heat generators such as boilers, heat pumps, solar energy collectors, hot water from heat exchangers and district heating systems;
- the need for a seasonal treatment of water heating appliances when these could be part of combined space heating and hot water systems (including systems with both conventional and combi-boilers), and the need to distinguish between efficiency in and out of the heating season.
- The possibility of adapting the methods (for example by allowing testing over a longer period), to allow the evaluation of any energy efficiency benefits of 'intelligent' or 'predictive' appliances, while, if needed, avoiding any danger of an appliance being programmed to recognize the test cycles, and reacting specifically to them.

The measurement methods shall cover all appliances intended to meet the needs of a single household. Measurement methods for small appliances (to supply a single outlet), and large appliances/systems (to supply several households) are not the subject of this mandate. Nor are methods to measure the maximum output or size of an appliance.

In addition to defining how to measure the tapping cycles defined in annex 1, CEN and CENELEC may adopt alternative methodologies, calculation and calibration methods, which estimate the results of physical measurements, provided that they demonstrate that the methods give results no better than those which would be obtained from a physical test. This provision could also be applied to avoid the need, for example, for complete duplicate testing on 'dual fuel' systems such as combined heating and hot water systems including a hot water tank that incorporates an electrical resistance as well as heat exchanger, or the testing of solar systems at all the different combinations of solar input and hot water output.

The Commission will not object if the measurement standards adopted also define how to apply these measurement methods for other tapping cycles (for example the optional reference cycles referred to in annex 2).

The scope of the measurement standards shall include all types of hot water production appliances or systems, storage devices currently on the market in significant quantities, and any new ones likely to gain a significant market share in the future (e.g. micro CHP). In particular they should cover the appliances/systems dealt with in the following standards: -

Solar: ISO 9459 /EN 12976, EN 12977	[1997/2001]
Heat pump: EN 255	[1997]
Gas instantaneous: EN 26	[1998]
Gas storage: EN 89	[2000]
Gas combi: EN 625	[1995]
Gas WH rating: prEN 13203	[2001]
Oil: EN 303	[2000]
Solids: EN 12809	[2001]
Electric instantaneous: EN 50193	[1997]
Electric storage: HD 500 S1 (IEC 379)	[1988]
Gas fired central heating boilers type B11 : EN 297	[1994]
Gas fired central heating boilers type B11 : EN 483	[1999]
Gas fired condensing boilers < 70 kW : EN 677	[1998]
Heating systems in buildings - energy requirements and system efficiencies prEN 14335	[2002]

2. Characteristics to be dealt with in the standard

The standard should define the principal performance characteristics to be measured for each of the standardised hot water tapping cycles (as defined in annex 1), including: -

Energy consumption (main and auxiliary, including standby)
Water consumption (useful and wasted)
and supplementary information.

For all the characteristics used in the standard, methods of estimating the accuracy (margin of error) of the test results should be adopted.

III. Execution of request

1. The European Standards (EN) taking into account the characteristics referred to above will be adopted in accordance with the timetable in annex 2.
2. The standards will be available at adoption in three languages (DE, EN, FR), together with the correct titles in the other Community languages.
3. Accepting this standardisation mandate by CEN and CENELEC will open the standstill period referred to in Article 7 of the Directive 98/34/EC of 22 June 1998, OJ L204 of 21.07.98 (ex- Directive 83/189/EEC).
4. The Commission will communicate to CEN/CENELEC the implementing directive adopted pursuant to Council Directive 92/75/EEC, and reserves the possibility of specifying the minimal requirements more precisely, on this basis.
5. CEN and CENELEC will ensure a close collaboration between them in order to maintain a coherent set of European standards.
6. CEN and CENELEC may choose to adopt the harmonised standard on the basis of the International bodies standardisation activities, via the parallel vote procedure. However, if CEN or CENELEC notes that the target date referred to above, will not be met, they will undertake to do the necessary in order to prepare an European standard, after consulting with IEC and ISO, at their own level.

Annex 1

Definition of Tapping Cycles

1.

The Commission requests CEN and CENELEC to implement three tapping cycles in standards. These patterns are:-

:

1. Featuring 11 draw-offs and with the energy equivalent of a total volume of 36 litres at 60 °C per day (includes 1 modest shower in the evening).
2. Featuring 23 draw-offs and with the energy equivalent of a total volume of 100 litres at 60 °C per day (includes 2 showers).¹
3. Featuring 24 draw-offs with the energy equivalent of a total volume of 200 litres at 60 °C per day (includes 2 baths and 1 shower).

All patterns define a 24h-measurement cycle and within that cycle the starting times and the total energy content (in kWh equivalent of hot water tapped) of each draw-off are defined. Furthermore, the draw-offs can be characterised in two ways:

- a) .‘Basin’ type draw-offs (bath, dishwasher) versus ‘continuous flow’ draw-offs (shower, handwash, etc.). The aim of the former is to arrive at an average temperature of the tub, so all supplied energy can be considered useful from the very beginning of the draw-off (minimum useful temperature increase is 0°C). The latter start to be useful only from a certain temperature (minimum useful temperature increase is 15°C lower than the desired temperature).
- b) ‘Kitchen’ type draw-offs versus ‘other’ draw-offs. For the latter the specific flow rate (as given by the manufacturer) is applied. For the former the ‘kitchen flow rate’ is applied as described in prEN 13203, namely at 2/3 of the specific flow rate.

The patterns are given in the appendix.

2.

Energy measured.

All energy consumption, including auxiliary energy (e.g. pumps, fans, controls), should be measured on the 24h cycle and the energy form should be specified.

¹ EU average according to SAVE study . Task 4 report on water demand and influencing factors. 2001

3.

Components (e.g. indirectly heated water tank)

Energy consumption or losses to be measured according to tapping cycles indicated.²

Common input conditions for e.g. hot water supplied to a heat exchanger should be defined.

4.

Multi-fuel appliances

Complete tests for each fuel/energy source (with the others disabled).

5.

Multi-purpose (e.g. combi and indirectly fuelled tanks)

The method will require information on energy use for

- space heating only,
- water heating only and
- the both used together.

6.

Measurement methods and conditions, testing practice, declaration of measurements, etc. should be as consistent as possible across standards, in order to aim at comparable information from the common tapping cycle methodology.

Appendix:

Patterns

² E.G. the energy input into these devices that has to be reported, is hot water at a certain flow rate. Measurement according to the tapping cycle may not make the outcomes comparable to complete/other water heaters on a product level, but it will allow fair comparison on a system level (when heating device and control are known). And also, of course the different types of indirectly heated water tanks can be compared amongst each other.

EU reference tapping cycle nr. 1						
	<i>hr.min start</i>	<i>energy (kWh)</i>	<i>type</i>	<i>ΔT desired(K), to be achieved during tapping</i>	<i>min. ΔT (K), =start of counting useful energy</i>	<i>flow rate, S=specific rate, R= $\frac{2}{3} * S$</i>
1	07.00	0,105	small		15	S
2	07.30	0,105	small		15	S
3	08.30	0,105	small		15	S
4	09.30	0,105	small		15	S
5	11.30	0,105	small		15	S
6	11.45	0,105	small		15	S
7	12.45	0,315	dishwash	45	0	R
8	18.00	0,105	small		15	S
9	18.15	0,105	clean		30	R
10	20.30	0,420	dishwash	45	0	R
11	21.30	0,525	large		30	S
total		2,1				

equivalent hot water litres at 60°C

36

S= measurement at specific flow rate

R= measurement at a minimum of 2/3 of the specific flow rate

EU reference tapping cycle nr. 2						
	<i>hr.min start</i>	<i>energy (kWh)</i>	<i>type</i>	<i>ΔT desired(K), to be achieved during tapping</i>	<i>min. ΔT (K), =start of counting useful energy</i>	<i>flow rate, S=specific rate, R=$\frac{2}{3} * S$</i>
1	07.00	0,105	small		15	S
2	07.15	1,400	shower		30	S
3	07.30	0,105	small		15	S
4	08.01	0,105	small		15	S
5	08.15	0,105	small		15	S
6	08.30	0,105	small		15	S
7	08.45	0,105	small		15	S
8	09.00	0,105	small		15	S
9	09.30	0,105	small		15	S
10	10.30	0,105	floor	30	0	S
11	11.30	0,105	small		15	S
12	11.45	0,105	small		15	S
13	12.45	0,315	dishwash	45	0	R
14	14.30	0,105	small		15	S
15	15.30	0,105	small		15	S
16	16.30	0,105	small		15	S
17	18.00	0,105	small		15	S
18	18.15	0,105	clean		30	R
19	18.30	0,105	clean		30	R
20	19.00	0,105	small		15	S
21	20.30	0,735	dishwash	45	0	R
22	21.15	0,105	small		15	S
23	21.30	1,400	shower		30	S
total		5,845				

equivalent hot water litres at 60°C

100,2

EU reference tapping cycle nr. 3

	<i>hr.min start</i>	<i>energy (kWh)</i>	<i>type</i>	<i>ΔT desired(K), to be achieved during draw- off</i>	<i>min. ΔT (K), =start of counting useful energy</i>	<i>flow rate, S=specific rate, R= $\frac{2}{3} * S$</i>
1	07.00	0,105	small		15	S
2	07.05	1,400	shower		30	S
3	07.30	0,105	small		15	S
4	07.45	0,105	small		15	S
5	08.05	3,605	bath	30	0	S
6	08.25	0,105	small		15	S
7	08.30	0,105	small		15	S
8	08.45	0,105	small		15	S
9	09.00	0,105	small		15	S
10	09.30	0,105	small		15	S
11	10.30	0,105	floor	30	0	S
12	11.30	0,105	small		15	S
13	11.45	0,105	small		15	S
14	12.45	0,315	dishwash	45	0	R
15	14.30	0,105	small		15	S
16	15.30	0,105	small		15	S
17	16.30	0,105	small		15	S
18	18.00	0,105	small		15	S
19	18.15	0,105	clean		30	R
20	18.30	0,105	clean		30	R
21	19.00	0,105	small		15	S
22	20.30	0,735	dishwash	45	0	R
23	21.00	3,605	bath	30	0	S
24	21.30	0,105	small		15	S
total		11,655				

equivalent hot water litres at 60°C

199,8

Explanatory table

The 3 tapping cycles are based on the following assumptions for volumes

Volumes, draw-off times indicated below are indicative and not prescribed

Cold water temperature = 10 °C

<i>type of draw-off</i>	<i>energy (kWh)</i>	<i>volume (litres)</i>	<i>Δ T desired(K)</i>	<i>draw-off time in minutes at flow rate indicated</i>			
				<i>3.5 l/min</i>	<i>5.5 l/min</i>	<i>7.5 l/min</i>	<i>9 l/min</i>
small	0,105	3	30	0,9	0,5	0,4	0,3
floor	0,105	3	30	0,9	0,5	0,4	0,3
clean	0,105	2	45	0,6	0,4	0,3	0,2
small dishwash	0,315	6	45	1,7	1,1	0,8	0,7
medium dishwash (cycle 1)	0,420	8	45	2,3	1,5	1,1	0,9
larger dishwash	0,735	14	45	4,0	2,5	1,9	1,6
"large" (in cycle 1)	0,525	15	30	4,3	2,7	2,0	1,7
shower	1,400	40	30	11,4	7,3	5,3	4,4
bath	3,605	103	30	29,4	18,7	13,7	11,4

Annex 2

Examples of other Tapping Cycles

Other possible tapping cycles include

4. Featuring 30 draw-offs with the energy equivalent of a total volume of 325 litres at 60 °C per day (includes 3 baths and 1 shower).
5. Featuring 30 draw-offs with the energy equivalent of a total volume of 420 litres at 60 °C per day (includes 3 baths and 4 showers).

EU reference tapping cycle nr 4						
	hr.min start	Energy (kWh)	Type	T desired(K), to be achieved during tapping	min. T (K), =start of counting useful energy	Litres
1	07.00	0,105	Small		15	3
2	07.15	1,82	Shower		30	52
3	07.26	0,105	Small		15	3
4	07.45	4,42	Bath	30	0	126
5	08.01	0,105	Small		15	3
6	08.15	0,105	Small		15	3
7	08.30	0,105	Small		15	3
8	08.45	0,105	Small		15	3
9	09.00	0,105	Small		15	3
10	09.30	0,105	Small		15	3
11	10.00	0,105	Small		15	3
12	10.30	0,105	Floor	30	0	3
13	11.00	0,105	Small		15	3
14	11.30	0,105	Small		15	3
15	11.45	0,105	Small		15	3
16	12.45	0,735	Dishwash	45	0	6
17	14.30	0,105	Small		15	3
18	15.00	0,105	Small		15	3
19	15.30	0,105	Small		15	3
20	16.00	0,105	Small		15	3
21	16.30	0,105	Small		15	3
22	17.00	0,105	Small		15	3
23	18.00	0,105	Small		15	3
24	18.15	0,105	Clean		30	2
25	18.30	0,105	Clean		30	2
26	19.00	0,105	Small		15	3
27	20.30	0,735	Dishwash	45	0	14
28	20.46	4,42	Bath	30	0	126
29	21.15	0,105	Small		15	3
30	21.30	4,42	Bath	30	0	126
		19,07				520
equivalent hot water litres at 60°C						

325

EU reference tapping cycle nr 5						

	hr.min start	Energy (kWh)	Type	T desired(K), to be achieved during tapping	min. T (K), =start of counting useful energy	L
1	07.00	0,105	Small		15	3
2	07.15	1,82	Shower		30	52
3	07.26	0,105	Small		15	3
4	07.45	6,24	Shower + Bath	30	0	178
5	08.01	0,105	Small		15	3
6	08.15	0,105	Small		15	3
7	08.30	0,105	Small		15	3
8	08.45	0,105	Small		15	3
9	09.00	0,105	Small		15	3
10	09.30	0,105	Small		15	3
11	10.00	0,105	Small		15	3
12	10.30	0,105	Floor	30	0	3
13	11.00	0,105	Small		15	3
14	11.30	0,105	Small		15	3
15	11.45	0,105	Small		15	3
16	12.45	0,735	Dishwash	45	0	6
17	14.30	0,105	Small		15	3
18	15.00	0,105	Small		15	3
19	15.30	0,105	Small		15	3
20	16.00	0,105	Small		15	3
21	16.30	0,105	Small		15	3
22	17.00	0,105	Small		15	3
23	18.00	0,105	Small		15	3
24	18.15	0,105	Clean		30	2
25	18.30	0,105	Clean		30	2
26	19.00	0,105	Small		15	3
27	20.30	0,735	Dishwash	45	0	14
28	20.46	6,42	Shower + Bath	30	0	178
29	21.15	0,105	Small		15	3
30	21.30	6,42	Shower + Bath	30	0	178
		24,89				676
equivalent hot water litres at 60°C						

420

Annex 3

Timetable for adoption of European Standards

In executing this mandate, the order of priority should be

- i) The development of basic measurement methods using the 3 tapping cycles, in particular cycle nr 2.
- ii) Definition of the measurement errors of test methods. Methods to determine the accuracy (error margin) of any particular test.
- iii) Correction factors to allow for variations within ambient conditions etc. within allowable range.

(Points ii and iii may require round robin or other testing)

Water heaters and heating systems (instantaneous and storage)

Gas Water heaters (adapted prEN 13203)	[31/12/2003]
Electric	[31/12/2003]
Oil fired	[30/6/2004]
Solid fuel	[31/12/2004]

Common Modules dealing with

Heat pump systems	[31/12/2004]
Solar systems	[31/12/2004]
Hot water storage tanks incorporating heat exchangers	[31/12/2004]
Heating season (winter) use of combi boilers, and combined systems	[30/6/2004]

This timetable is subject to consultation with the appropriate CEN/CENELEC Technical Committees.