الهيئة السعودية للمواصفات والمقاييس والجودة

Saudi Standards, Metrology and Quality Org
(SASO)

**SASO 2885:2025**

غسالات الملابس الكهربائية – متطلبات الأداء للطاقة والمياه

ومتطلبات البطاقات

**Electrical Clothes Washing Machines - Energy and
Water Performance Requirements and Labelling**

ICS: 97.060

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**مقدمة**

قامت الهيئة السعودية للمواصفات والمقاييس والجودة بإعداد المواصفة القياسية السعودية رقم (SASO 2885) بعنوان "غسالات الملابس الكهربائية – متطلبات الأداء للطاقة والمياه ومتطلبات البطاقات" بعد استعراض المواصفات القياسية الدولية والمؤلفات المرجعية ذات الصلة.

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# Foreword

Saudi Standards, Metrology and Quality Organization (SASO) has prepared the Saudi Standard (SASO 2885) " Electrical Clothes Washing Machines - Energy and Water Performance Requirements and Labelling" based on relevant International and National foreign Standards and references.

## CONTENTS

## 1. SCOPE

This standard specifies the Minimum Energy Performance Standard (MEPS) and testing requirements of electric mains-operated washing machines and washer-dryers with a capacity up to 25 kg, including built-in and multi-drum washing machines and washer-dryer, also electric mains-operated that can be powered by batteries

It shall apply to machines that operate in AC single-phase circuits of 230V with a frequency of 60 Hz according to SASO GSO 1899.

This standard shall not apply to:

- battery-operated washing machines and washer-dryers that can be connected to the mains through an AC/DC converter.

- washing machines and washer-dryers with a rated capacity lower than 2 kg.

Note: For any additional requirements such as safety, off mode and standby, please refer to SASO related standards and regulations.

## 2. NORMATIVE REFERENCES

The following normative reference standards apply. However, this Standard supersedes the below reference standards in case of conflicting requirements. For undated references, the latest published version applies.

- EN 60456:2016 Clothes washing machines for household use – Methods for measuring the performance.

- EN 60456:2016/A12:2023 Clothes washing machines for household use – Methods for measuring the performance.

- EN IEC 62512:2020+A12:2023 Washer-dryers for household use – Methods for measuring the performance.

- SASO GSO 1899 - GCC Standard Voltages and Frequencies for AC Transmission and Distribution Systems.

### 3. TERMS AND DEFINITIONS

For the purposes of this standard, the following terms and definitions shall apply:

### 3.1 Annual Standard energy consumption (AECref)

The energy consumption taken as a reference, as a function of the rated capacity of a washing machine or a washer-dryer, expressed in kilowatt hour.

### 3.2 Automatic washing machine

Washing machine where the load is fully treated by the washing machine without the need for user intervention at any point during the program

### 3.3 Built-in washing machine or washer-dryer

Machine that is designed, tested and marketed exclusively:

- to be installed in cabinetry or encased (top and/or bottom, and sides) by panels.
- to be securely fastened to the sides, top or floor of the cabinetry or panels.
- to be equipped with an integral factory-finished face or to be fitted with a custom front panel.

### 3.4 Complete cycle

Washing and drying process, consisting of a washing cycle and a drying cycle.

### 3.5 Continuous cycle

Complete cycle without interruption of the process and with no need for user intervention at any point during the program.

### 3.6 Cupboard dry

The status of treated textiles dried in a drying cycle to a final moisture content of 0 %.

### 3.9 Drying cycle

Complete drying process as defined by the required program, consisting of a series of different operations including heating and tumbling.

### 3.11 Energy Efficiency Index (EEI)

The ratio of the annual energy consumption to the annual standard energy consumption.

### 3.12 Final moisture content

The amount of moisture contained in the load at the end of the drying cycle of washer-dryers

### 3.13 Motor operated washing machine

Appliance operating with motor only, without any internal heater

**3.14 Multi-drum machine**

Washing machines or washer-dryers which equipped with more than one washing drum, whether in separate or in the same casing.

**3.15 Program**

Series of operations that are pre-defined, and which are declared as suitable for washing, drying or continuously washing and drying certain types of textiles.

**3.16 Program duration ($T_t$)**

The length of time beginning with the initiation of the program selected, excluding any user programmed delay, until the end of the program is indicated, and the user has access to the load.

**3.17 Rated capacity**

The maximum mass in kilogram of dry textiles of a particular type, which can be treated in one washing cycle of a washing machine, or in one complete cycle of a washer-dryer respectively, on the selected program.

**3.18 Rated washing capacity**

The maximum mass in kilogram of dry textiles of a particular type, which can be treated in one washing cycle of a washing machine, or in one washing cycle of a washer-dryer respectively, on the selected program.

**3.19 Rated drying capacity**

The maximum mass in kilogram of dry textiles of a particular type, which can be treated in one drying cycle of a washer-dryer respectively, on the selected program.

**3.20 standard cotton 60°C and cotton 40°C programs**

The cycles are suitable to clean normally soiled cotton laundry.

**3.21 Washing cycle**

Complete washing process as defined by a selected program, consisting of a series of different operations including washing, rinsing, and spinning.

**3.22 Washing efficiency index ($I_w$)**

Washing efficiency of washing machine and for the washing cycle of washer-dryers

**3.24 Washing machine**

An automatic washing machine which cleans and rinses laundry by using water, chemical, mechanical and thermal means, which also has a spin extraction function,

**3.25 Washer-dryer**

Washing machine which, in addition to the functions of an automatic washing machine, in the same drum includes a means for drying the textiles by heating and tumbling

### 3.26 Water Extraction Index (WEI)

The amount of moisture contained in the load at the end of the washing cycle which refers to remaining moisture content

### 3.27 Weighted energy consumption ($E_t$)

The weighted average of the energy consumption of washing machines and the washing cycle of washer-dryers for the standard 60°C cotton program at full and half loads, and for the standard 40°C cotton program at half load, expressed in kilowatt hour per cycle.

### 3.28 Weighted energy consumption ($E_{WD}$)

The weighted average of the energy consumption of the washer-dryer for the wash and dry cycle for the standard 60°C cotton program at full and half loads, and for the standard 40°C cotton program at half load, expressed in kilowatt hour per cycle.

### 3.29 Weighted water consumption ($W_t$)

The weighted average of the water consumption of washing machines and the washing cycle of washer-dryers for the standard 60°C cotton program at full and half loads, and for the standard 40°C cotton program at half load, expressed in liters per cycle.

## 4. GENRAL REQUIREMENTS

### 4.1 Program requirements

### 4.1.1 Washer-dryers

a) Washer-dryers shall provide a complete cycle for cotton laundry, named 'wash and dry'.

– Continuous if the washer-dryer provides a continuous cycle.

b) The washing cycle is the standard cotton 60°C program or standard cotton 40°C program

– The drying cycle achieves cupboard dry status.

– The wash and dry cycle shall be clearly identifiable in the user instructions.

– If the washer-dryer provides a continuous cycle, the rated capacity of the wash and dry cycle shall be the rated capacity for this cycle.

c) If the washer-dryer does not provide a continuous cycle, the rated capacity of the wash and dry cycle shall be the lower value of the rated washing capacity of the standard cotton 60°C program and the rated drying capacity of the drying cycle achieving cupboard dry status.

### 4.1.2 Top load and twin tub washing machine

d) Top load and twin tub washing machines with a heating function shall include a washing cycle program called standard cotton 60°C program or standard cotton 40°C program.

e) Otherwise, a simulated program representing standard cotton 60°C and 40°C programs, where the water temperature in the drum during the washing cycles shall be 60°C and 40°C with -15 ℃ tolerance for each temperature.

f) The following information of simulated programs shall be available in the instruction sheet or manual, including the following:

– Number of washing cycles, and water quantity for each washing cycle in (L), time for each washing cycle in (min).

– Number of rinse cycles, and water quantity for each rinse cycle in (L), time for each rinse cycle in (min).

– Number of spin cycles and time for each spin cycle in (min).

### 4.1.3 Program duration

Program duration for washing machine and the washing cycle of washer-dryers is based on the weighted average program time ($T_t$ - see Annex B) and shall not exceed 300 minutes.

### 4.2 Multi-drum machines

• For a machine supplied by one power cord, all requirements shall be calculated based on the bigger drum capacity.

• For a machine supplied by separate power cords, all requirements shall be calculated based on each drum capacity separately.

### 4.3 Declaration of rated values

• The rated capacity shall be expressed only in terms of weight (kg) as multiples of 0.5 kg.

• If the heating is included in the washing machine, the declaration of the rated power shall be expressed only in terms of watt (W) as multiples of 50 W.

• The declaration of annual energy consumption as a multiple of 1 kWh.

• The declaration of the annual water consumption as a multiple of 1 liter.

• The declaration of the washing efficiency index is rounded to three decimal places.

• Program duration is expressed in minutes and rounded to the nearest minute.

## 5. MINIMUM ENERGY PERFORMANCE STANDARD (MEPS) AND ADDITIONAL LIMITS

### 5.1 Minimum Energy Performance Standard (MEPS)

The Minimum Energy Performance Standard (MEPS) requirements for washing machine and the washing cycle of washer-dryers are based on the rated Energy Efficiency Index (EEI - see Annex B) according to Table 1:

| Table 1 – MINIMUM ENERGY PERFORMANCE STANDARD (MEPS) | |
|---|---|
| Type of washing machines | Rated Energy efficiency index EEI |
| Front load washing machines, Washer-dryer (washing cycle) | $EEI \leq 41$ |
| Top load and Twin tub washing machines | $EEI \leq 68$ |

### 5.2 Water consumption limits

The Limit values of water consumption for washing machine and the washing cycle of washer-dryers are based on the Water Consumption Index (WCI- see Annex C) according to Table 2:

| Table 2 – MINIMUM LIMITS OF WATER CONSUMPTION INDEX (WCI) | |
|---|---|
| Type of washing machines | Water Consumption Index |
| Front load washing machines, Washer-dryer (washing cycle) | $\geq 5.0$ |
| Top load and Twin tub washing machines | $\geq 3.0$ |

**5.3 Washing Efficiency Index limits**

The limit values for washing efficiency are based on washing efficiency index ($I_W$ - see Annex A) according to Table 3:

| Table 3 – MINIMUM LIMITS OF WASHING EFFICIENCY INDEX | |
|---|---|
| Type of washing machines | Rated Washing efficiency index |
| Front load washing machines, Washer-dryer (washing cycle) | $I_W \geq 103$ |
| Top load and Twin tub washing machines | $I_W \geq 90$ |

**5.4 Water Extraction Index limits**

The value of the Water Extraction index is based on the weighted Water Extraction Index (WEI- see Annex D) and shall not exceed 81%.

**6. ACCEPTANCE CRITERIA FOR LABELLING AND MARKET SURVEILLANCE**

The energy label shall be accepted as valid when a single sample of an appliance or unit model, tested for an initial screening test, meets the criteria in the below table as applicable:

| Table 5 - ACCEPTANCE CRITERIA | |
|---|---|
| **Parameter** | **Verification tolerances** |
| Tested power | $\geq 0.90$ x rated value |
| | $\leq 1.05$ x rated value |
| Tested power (motor operated) | $\leq 1.15$ x rated value |
| Tested energy consumption (Et and EWD) for each load capacities | $\leq 1.10$ x rated value |
| Tested water consumption (Wt) for each load capacities | $\leq 1.10$ x rated value |

| Tested program time for each load capacities | ≤ 1.05 x rated value or 10 minutes, whichever is smaller |
|---|---|
| Tested Water Extraction Index (WEI) for each load capacities | ≥ 0.90 x rated value |
| Tested Maximum Spin speed (S) (if available) | ≥ 0.90 x rated value |

**7. LABEL AND CLASSIFICATION**

**7.1 Determining the energy efficiency class**

The energy efficiency class of a washing machine and washing cycle of a washer-dryer shall be determined based on Energy Efficiency Index (EEI) as outlined in Table 6A.

| Table 6A: WASHING CYCLE ENERGY EFFICIENCY CLASSES | | | |
|---|---|---|---|
| Bar color | Energy efficiency class (Arabic) | Energy efficiency class (English) | EEIW |
| Dark green | أ | A | EEI < 21 |
| Green | ب | B | 21 ≤ EEI < 31 |
| Light green | ج | C | 31 ≤ EEI < 41 |
| Yellow | د | D | 41 ≤ EEI < 51 |
| Orange | هـ | E | 51 ≤ EEI < 61 |
| Red | و | F | 61 ≤ EEI < 68 |
| Dark red | ز | G | 68 ≤ EEI |

The energy efficiency class of the complete cycle of the washer-dryer shall be determined based on Energy Efficiency Index (EEI$_{WD}$) as set out in Table 6B.

| Table 6B: COMPLETE CYCLE ENERGY EFFICIENCY CLASSES | | |
|---|---|---|
| Energy efficiency class (Arabic) | Energy efficiency class (English) | EEIWD |
| أ | A | EEIWD < 14 |
| ب | B | 14 ≤ EEIWD < 24 |
| ج | C | 24 ≤ EEIWD < 34 |
| د | D | 34 ≤ EEIWD < 44 |
| هـ | E | 44 ≤ EEIWD < 54 |
| و | F | 54 ≤ EEIWD < 64 |
| ز | G | 64 ≤ EEIWD |

### 7.2 Determining the water consumption class

The water consumption class of a washing machine and washing cycle of a washer-dryer shall be determined based on the Water Consumption Index (WCI) as set out in Table 7.

| Table 7: WATER CONSUMPTION CLASSES | | | |
|---|---|---|---|
| Item color | Water consumption class (Arabic) | Water consumption class (English) | WCI |
| Dark green | أ | A | 6.0 ≤ WCI |
| Green | ب | B | 5.5 ≤ WCI < 6.0 |
| Light green | ج | C | 5.0 ≤ WCI < 5.5 |
| Yellow | د | D | 4.5 ≤ WCI < 5.0 |
| Orange | هـ | E | 3.5 ≤ WCI < 4.5 |
| Red | و | F | 3.0 ≤ WCI < 3.5 |
| Dark red | ز | G | WCI < 3.0 |

### 7.3 Determining the water extraction efficiency class

The water extraction efficiency class of a washing machine and washing cycle of a washer-dryer shall be determined based on the Water Extraction Index (WEI) as set out in Table 8.

| Table 8: WATER EXTRACTION EFFICIENCY CLASSES | | |
|---|---|---|
| Water extraction efficiency class (Arabic) | Water extraction efficiency class (English) | WEI (%) |
| أ | A | WEI < 45 |
| ب | B | 45 ≤ WEI < 54 |
| ج | C | 54 ≤ WEI < 63 |
| د | D | 63 ≤ WEI < 72 |
| هـ | E | 72 ≤ WEI < 81 |
| و | F | 81 ≤ WEI < 90 |
| ز | G | WEI ≥ 90 |

**7.4 Design and placement of the label**

The label shall be printed as illustrated in (Figure 1 and 2). And it shall be 100 mm wide and 170 mm high.

The label shall be visible and fixed on the most prominent part of the product. Also, another label shall be fixed and non-removable on the product packaging.

**7.5 Information and values contained on the label for washing machine and washer-dryer**

Figure 1 illustrates the energy efficiency label for washing machines, fields (a) to (j) shall comply with the following requirements:

- **Field (a):** this field shall display the logo of the Saudi Standards, Metrology and Quality Organization (SASO).
- **Field (b):** this field shall reflect the energy efficiency class, which the product attained.
- **Field (c):** this field shall reflect the annual energy consumption in kWh.
- **Field (d):** this field shall reflect the capacity of the product in kg.
- **Field (e):** this field shall reflect the water extraction efficiency class.
- **Field (f):** this field shall reflect the annual water consumption and water consumption class.
- **Field (g):** this field shall reflect the type of washing machine.
- **Field (h):** this field shall have a QR code representing the main characteristics of washing machines, this may include the following items based on the data provided in the registration form:
  o Manufacturer name
  o Model number
  o Brand name
  o Country of origin
  o Rated input power (W)
  o Rated voltage (V)
  o Rated capacity (kg)
  o Energy Classification (unit-less)
  o Water consumption classification (unit-less)
  o Rated Annual Energy Consumption - AEC (kWh)
  o Rated Annual Water Consumption - AWC (liters)
- **Field (i):** this field shall reflect the identification of the product.
- **Field (j):** this field shall reflect the registration number and standard reference number.
- **Field (k):** this field shall reflect the legal statement attached to energy efficiency labels.

(a)

المواصفات السعودية
Saudi Standards
SASO

بطاقة كفاءة الطاقة
ENERGY EFFICIENCY LABEL

(b)

غسـالة ملابـس | WASHING MACHINE

أ

أ

ب

ج

د

هـ

و

ز

الإستهلاك السنوي للماء
ANNUAL WATER CONSUMPTION

كفاءة استخلاص المياه
WATER EXTRACTION EFFICIENCY

السعة
CAPACITY

الإستهلاك السنوي للطاقة
ANNUAL ENERGY CONSUMPTION

LITERS       لتـر

kg       كجم

kWh       كيلو واط ساعة

(f)

ب

أ

(e)

أ ب ج د هـ و ز

أ ب ج د هـ و ز

(c)

(d)

حوضيـن
TWIN TUB

تحميل أمامي
FRONT LOAD

تحميل علوي
TOP LOAD

النوع
TYPE

(g)

(i)

MADE IN       بلد الصنع

BRAND NAME       العلامة التجارية

MODEL NUMBER       رقم الطراز

رقـم التسجيـل
REGISTRATION NO

(h)

(j)

STANDARD REFERENCE NO

الرقـم المرجعي للمواصفـة

إزالة أو تغطية أو العبث بهذه البطاقة قبل البيع يجعلك عرضة للمسؤولية النظامية
Removing, covering or altering this label before sale can subject you to legal liability

(k)

**Figure 1**

Figure 2 illustrates the energy efficiency label for washer-dryer, fields (a) to (j) shall comply with the following requirements:

- **Field (a):** This field shall display the logo of the Saudi Standards, Metrology and Quality Organization (SASO).
- **Field (b):** this field shall reflect the energy efficiency class of washing cycle, which the product attained.
- **Field (c):** this field shall reflect the annual energy consumption in kWh for the washing cycle and complete cycle.
- **Field (d):** this field shall reflect the capacity of the product in kg for the washing cycle and complete cycle.
- **Field (e):** this field shall reflect the water extraction efficiency class.
- **Field (f):** this field shall reflect the annual water consumption and water consumption class.
- **Field (g):** this field shall reflect the type of washing machine.
- **Field (h):** this field shall have a QR code representing the main characteristics of washer-dryers, this may include the following items based on the data provided in the registration form:
  o Manufacturer name
  o Model number
  o Brand name
  o Country of origin
  o Rated input power (W)
  o Rated voltage (V)
  o Rated capacity (kg)
  o Energy Classification (unit-less)
  o Water consumption classification (unit-less)
  o Rated Annual Energy Consumption - AEC (kWh)
  o Rated Annual Water Consumption - AWC (liters)
- **Field (i):** this field shall reflect the identification of the product.
- **Field (j):** this field shall reflect the registration number and standard reference number.
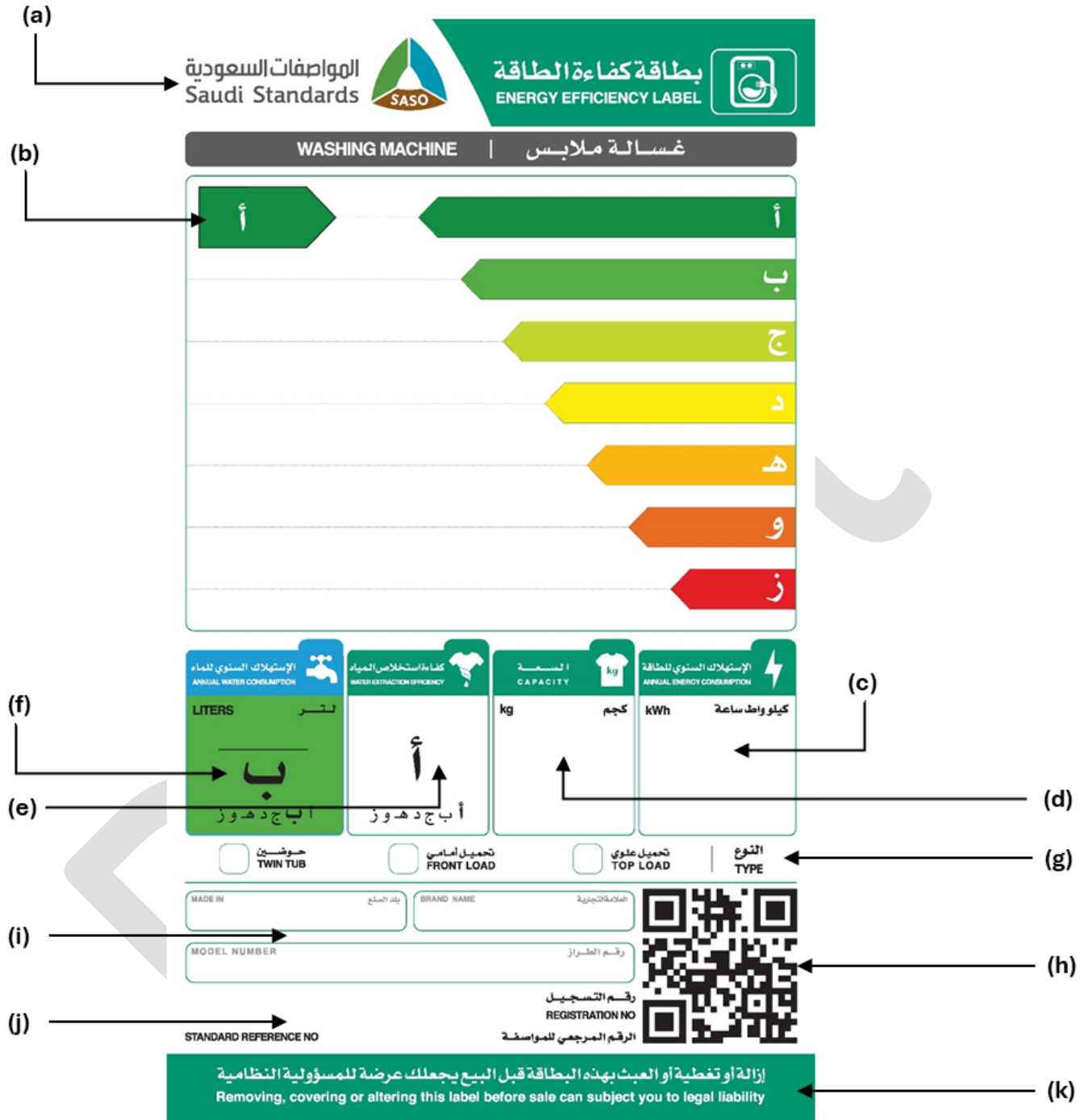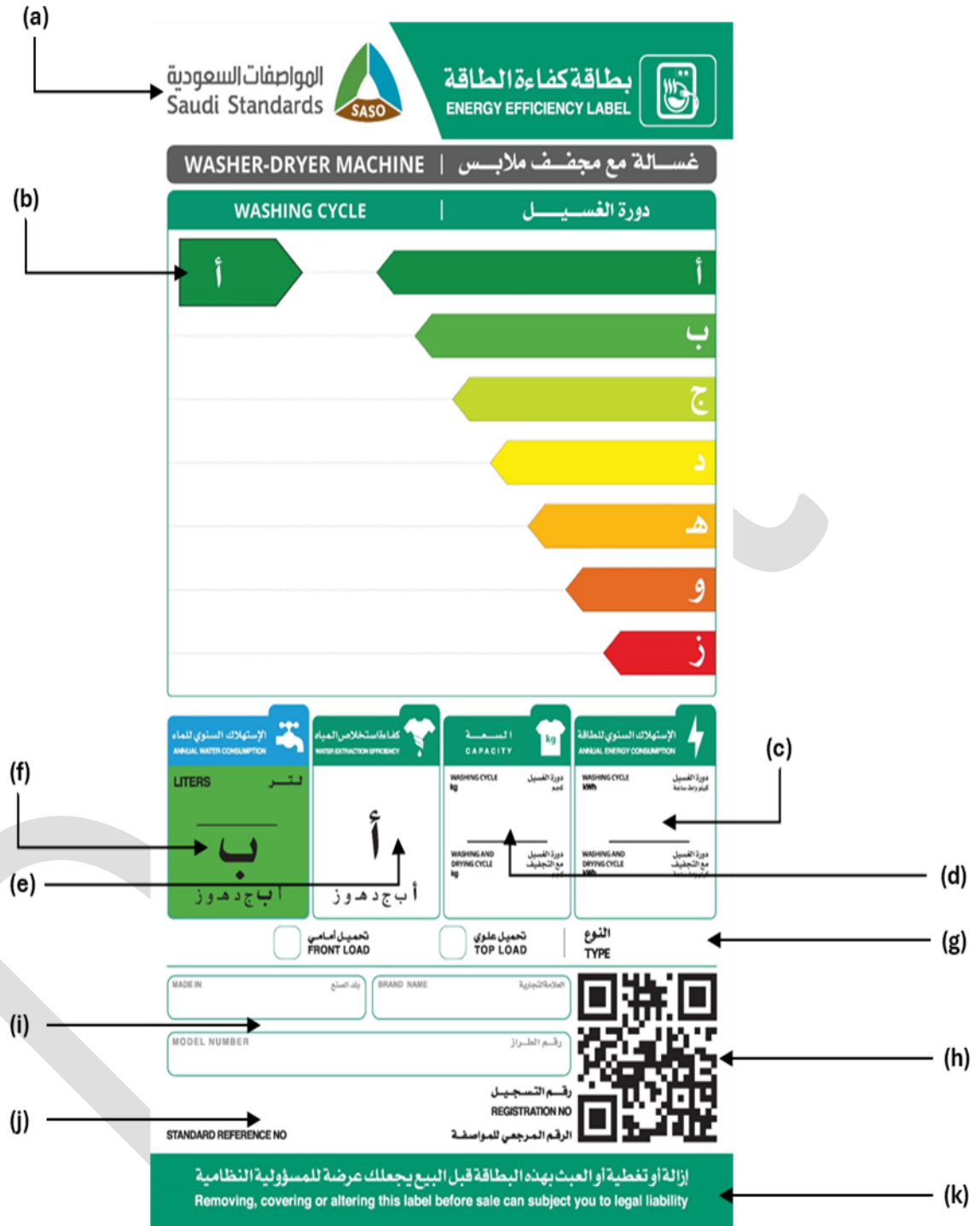- **Field (k):** this field shall reflect the legal statement attached to energy efficiency labels

**Figure 2**

## 8. MARKING AND INSTRUCTIONS

### 8.1 General

The following information shall be marked on the nameplate of the product in (English) or (Arabic and English). The marking shall not be on a detachable part of the unit and shall be indelible, durable and easily legible.

Any information related to energy performance added on any part of the product unit or packaging shall not have any ambiguity or lead to misunderstanding of the performance of the unit.

### 8.2 Nameplate information

The nameplate information shall include, for conformity to this standard the following information:

- Manufacturer's name and/or trademark.
- Country of origin.
- Manufacturer's model or type reference and serial number of the unit.
- Rated voltage or rated voltage range in volts (V).
- Rated frequency in hertz (Hz).
- Rated input power in Watt (W) or Kilowatts (kW)
- Rated Capacity in (kg) for the washing machine
- Rated Capacity in (kg) for the washer-dryer (washing cycle and the complete cycle)
- Annual Energy Consumption (kWh/year or kWh) for the washing machine
- Annual Energy Consumption (kWh/year or kWh) for the washer-dryer (washing cycle and the complete cycle)
- Annual Water Consumption (liters/year or liters) for the washing machine and washing cycle of the washer-dryer

### 8.3 Instruction sheet

An instruction sheet and manual in both Arabic and English shall be delivered with each Product. Tables, drawings, and circuit diagrams may be depicted in English only.

The instruction sheet or manual shall include the following information as a minimum:

- The information specified in clause 8.2 except 'Country of origin' and 'serial number'
- Dimensions of the unit
- Instruction for mounting and connection to the pipes
- Instruction for connection to the electrical installation
- Instructions necessary for the correct operation of the unit and any special precautions to be observed to ensure its safe use and maintenance

- Instructions for packing and unpacking the unit
- Instructions on unit handling and rigging
- Net weight of the unit

**9. REGISTRATION REQUIREMENTS**

Product registration is mandatory, whereby information about registration requirements shall be available in the Saudi Standards, Metrology, and Quality Organization (SASO) website, and reference shall be made to the separate SASO registration forms and requirements.

## ANNEX A – DETERMINATION OF WASHING EFFICIENCY

### A.1 Preparation of the test load

Test loads are prepared as given in EN60456 Annex ZA.2

For washing machines with a rated capacity up to 15 kg, conditions for the preparation of the loads expressed in EN60456 Table ZA.1 apply

For washing machines with a rated capacity from 15 kg up to 25 kg the following rules apply as a supplement to Table ZA.1 in EN 60456

- For test load masses to the whole or half kilogram rating which are greater than those specified in the table ZA.1, the number of stain test strips is equal to the nominal test load mass (rounded to the nearest kilogram), the number of sheets is the nominal test load mass divided by $(3 \times 0.725)$ (rounded to the nearest whole sheet) and the number of pillowcases is the nominal test load mass divided by $(3 \times 0.24)$ (rounded to the nearest whole pillow case). The balance of the required nominal test load mass is made up of towels as required. The mass of all base load items can be expected to decline slightly with increasing age.

- The difference between base load mass and test load mass is due to the mass of the test strips.

- The actual number of towels may be different than the number indicated above (which is intended to be indicative).

### A.2 Criteria for washing efficiency index

For washing efficiency test purposes, the tests are conducted with a water hardness of 2.5 $(\pm 0.2)$ mmol/l of $CaCO_3$ equivalent.

### A.3 Calculation of the washing efficiency index

For the calculation of the Washing Efficiency Index $(I_w)$, the weighted washing efficiency of the washing machine and washing cycle of the washer-dryer for the standard 60°C cotton program at full and half load and for the standard 40°C cotton program at half load is compared to the washing efficiency of a reference washing machine, where the reference washing machine shall have the characteristics indicated in the generally recognized state-of-the-art measurement methods, including methods set out in EN60456.

The Washing Efficiency Index $(I_w)$ is calculated as follows and rounded to three decimal places

$$I_w = (3 \times I_{w;60;full} + 2 \times I_{w;60;half} + 2 \times I_{w;40;half})/7 \qquad \text{Formula (A.1)}$$

Where:

$I_{w;60;full}$ : washing efficiency index of the washing machines and the washing cycle of washer-dryers of the standard 60°C cotton program at full load.

$I_{w;60;half}$ : washing efficiency index of the washing machines and the washing cycle of washer-dryers of the standard 60°C cotton program at half load.

$I_{w;40;half}$ : washing efficiency index of the washing machines and the washing cycle of washer-dryers of the standard 40°C cotton program at half load.

The Washing Efficiency Index of one standard cotton program ($I_{W,p}$) is calculated as follows:

$$I_{W,p} = \frac{1}{n} \times \sum_{i=1}^{n} \left( \frac{W_{T,i}}{W_{R,a}} \right)$$

Formula (A.2)

Where:

$W_{T,i}$ = Washing Efficiency of the washing machine under test for one test cycle (i);

$W_{R,a}$ = Average Washing Efficiency of the reference washing machine;

n = number of test cycles, n ≥ 3 for the standard 60°C cotton program at full load, n ≥ 2 for the standard 60 °C cotton program at half load and n ≥ 2 for the standard 40°C cotton program at half load.

Washing Efficiency ($W_{T,i}$) is the average of the reflectance values of each test strip after completion of a test cycle.

## ANNEX B – CALCULATION OF ENERGY EFFICIENCY INDEX AND ANNUAL ENERGY CONSUMPTION

### B.1 Energy Efficiency Index (EEI) and annual energy consumption of washing machines and the washing cycle of washer-dryers

For the calculation of the Energy Efficiency Index (EEI), the weighted annual energy consumption of the standard 60°C cotton program at full and half load, and for the standard 40°C cotton program at half load is compared to its standard annual energy consumption.

a) The Energy Efficiency Index (EEI) is calculated according to Formula (B.1), rounded to one decimal place:

$$EEI = 100 \times \frac{AEC}{AEC_{ref}}$$

Formula (B.1)

Where:

AEC = The weighted annual energy consumption of the washing machines and the washing cycle of washer-dryers in (kWh).

$AEC_{ref}$ = The standard annual energy consumption of the washing machines and the washing cycle of washer-dryers in (kWh).

b) The standard annual energy consumption ($AEC_{ref}$) is calculated according to Formula (B.2) in kWh, rounded to two decimal places:

$$AEC_{ref} = 47.0 \times c_{rated} + 51.7$$

Formula (B.2)

Where:

$C_{rated}$ = The rated capacity of the washing machines and the washing cycle of washer-dryers of the standard 60°C cotton program at full load or the standard 40°C cotton program at full load, whichever is the lower.

c) The annual energy consumption (AEC) is calculated according to Formula (B.3) in kWh, rounded to two decimal places:

$$AEC = E_t \times 220 + \left[ \frac{p_0 \times \frac{525600 - (T_t \times 220)}{2} + p_l \times \frac{525600 - (T_t \times 220)}{2}}{60 \times 1000} \right]$$

Formula (B.3)

Where:

$P_o$ = weighted power in 'off-mode (in W).

$P_l$ = weighted power in the 'left-on mode' ( in W).

$T_t$ = weighted program time (in minutes – min).

220 = total number of standard washing cycles per year.

525600 = constant (time).

Where the washing machine is equipped with a power management system, with the washing machine reverting automatically to 'off-mode' after the end of the program, the weighted annual energy consumption (AEC) is calculated taking into consideration the effective duration of 'left-on mode', according to the following formula B.8

$$AEC = E_t \times 220 + \left[ \frac{P_l \times T_l \times 220 + P_0 \times [252600 - (T_t \times 220) - (T_l \times 220)]}{60 \times 1000} \right]$$

Where:

$T_l$ = time in 'left-on mode'.

### B.1.1 Calculation of the weighted energy consumption

The weighted energy consumption ($E_t$) is calculated in kWh as follows and rounded to three decimal places:

$$E_t = (3 \times E_{t;60;full} + 2 \times E_{t;60;half} + 2 \times E_{t;40;half})/7$$

Formula (B.4)

Where:

$E_{t;60;full}$ = The energy consumption per cycle of the standard 60°C cotton program at full rated load and rounded to three decimal places in (kWh).

$E_{t;60;half}$ = The energy consumption per cycle of the standard 60°C cotton program at half load and rounded to three decimal places in (kWh).

$E_{t;40;half}$ = The weighted energy consumption per cycle of the standard 40°C cotton program at half load and rounded to three decimal places in (kWh).

### B.1.2 Calculation of the weighted power in 'off-mode'

The weighted power in 'off-mode' ($P_o$) is calculated in Watt as follows and rounded to two decimal places:

$$P_o = (3 \times P_{o;60;full} + 2 \times P_{o;60;half} + 2 \times P_{o;40;half})/7$$

Formula (B.5)

Where:

$P_{o;60;full}$ : power in 'off-mode' of the washing machines and the washing cycle of washer-dryers of the standard 60°C cotton program at full load.

$P_{o;60;half}$ : power in 'off-mode' of the washing machines and the washing cycle of washer-dryers of the standard 60°C cotton program at half load.

$P_{o;40;half}$ : power in 'off-mode' of the washing machines and the washing cycle of washer-dryers of the standard 40°C cotton program at half load.

### B.1.3 Calculation of the weighted program time

The weighted program time ($T_t$) is calculated in minutes as follows and rounded to the nearest minute:

$$T_t = (3 \times T_{t;60;full} + 2 \times T_{t;60;half} + 2 \times T_{t;40;half})/7 \qquad \text{Formula (B.6)}$$

Where:

$T_{t;60;full}$ : program time of the washing machines and the washing cycle of washer-dryers of the standard 60°C cotton program at full load;

$T_{t;60;half}$ : program time of the washing machines and the washing cycle of washer-dryers of the standard 60°C cotton program at half load;

$T_{t;40;half}$ : program time of the washing machines and the washing cycle of washer-dryers of the standard 40°C cotton program at half load.

### B.1.4 Calculation of the weighted power in left-on mode

The weighted power in the 'left-on mode' ($P_l$) is calculated in Watt as follows and rounded to two decimal places:

$$P_I = (3 \times P_{I;60;full} + 2 \times P_{I;60;half} + 2 \times P_{I;40;half})/7 \qquad \text{Formula (B.7)}$$

Where:

$P_{l;60;full}$ : power in 'left-on mode' of the washing machines and the washing cycle of washer-dryers of the standard 60°C cotton program at full load;

$P_{l;60;half}$ : power in 'left-on mode' of the washing machines and the washing cycle of washer-dryers of the standard 60°C cotton program at half load;

$P_{l;40;half}$ : power in 'left-on mode' of the washing machines and the washing cycle of washer-dryers of the standard 40°C cotton program at half load.

### B.1.5 Calculation of the weighted time in 'left-on' mode

The weighted time in 'left-on mode' ($T_l$) is calculated in minutes as follows and rounded to the nearest minute:

$$T_I = (3 \times T_{I;60;full} + 2 \times T_{I;60;half} + 2 \times T_{I;40;half})/7 \qquad \text{Formula (B.8)}$$

Where:

$T_{l;60;full}$ : time in 'left-on mode' of the washing machines and the washing cycle of washer-dryers of the standard 60°C cotton program at

full load.

$T_{l;60;half}$ : time in 'left-on mode' of the washing machines and the washing cycle of washer-dryers of the standard 60°C cotton program at half load.

$T_{l;40;half}$ : time in 'left-on mode' of the washing machines and the washing cycle of washer-dryers of the standard 40°C cotton program at half load.

*B.2* **Energy Efficiency Index (EEI$_{WD}$) and annual energy consummation of washer-dryers**

For the calculation of the Energy Efficiency Index (EEI$_{WD}$), the weighted annual energy consumption of the wash and dry cycle at full and half rated capacity for wash and dry cycle compared to its standard annual energy consumption.

a) The Energy Efficiency Index (EEI$_{WD}$) is calculated according to Formula (B.9), rounded to one decimal place:

$$EEIWD = 100 \times \frac{AECWD}{AEC_{ref;WD}}$$  Formula (B.9)

Where:

AEC$_{WD}$ = The annual energy consumption of the wash and dry cycle of washer-dryer in (kWh).

AEC$_{ref;WD}$ = The standard annual energy consumption of the wash and dry cycle for washer-dryer in (kWh).

b) The standard annual energy consumption (AEC$_{ref;WD}$) is calculated according to Formula (B.10) in kWh, rounded to two decimal places:

$$AEC_{ref;WD} = 237.7 \times d_{rated} + 261.4$$  Formula (B.10)

Where:

$d_{rated}$ = The rated capacity of the washer-dryer for the wash and dry cycle.

c) The annual energy consumption of the washer-dryer for the wash and dry cycle is calculated according to Formula (B.11) in kWh, rounded to two decimal places

$$AEC = E_{WD} \times 220$$  Formula (B.11)

$$E_{WD} = (3 \times E_{WD;60;full} + 2 \times E_{WD;60;half} + 2 \times E_{WD;40;half}) / 7$$  Formula (B.12)

Where:

$E_{WD}$ = is the weighted energy consumption of the complete cycle of the washer-dryer rounded to three decimal places in (kWh).

$E_{WD;60;full}$ = The energy consumption per cycle of the washer-dryer for the wash (standard 60°C cotton program) and dry cycle at full load rounded to three decimal places in (kWh).

$E_{WD;60;half}$ = The energy consumption per cycle of the washer-dryer for the wash (standard 60°C cotton program) and dry cycle at half load rounded to three decimal places in (kWh).

$E_{WD;40;half}$ = The energy consumption per cycle of the washer-dryer for the wash (standard 40°C cotton program) and dry cycle at half load rounded to three decimal places in (kWh).

220 = total number of the wash and dry cycle per year.

## ANNEX C - CALCULATION OF WATER CONSUMPTION INDEX (WCI) AND ANNUAL WATER CONSUMPTION (AWC)

### C.1 Calculation of the Water Consumption Index (WCI) of washing machines and the washing cycle of washer-dryers

The water consumption index (WCI) of washing machine is calculated according to Formula (C.1), based on the water consumption of one cycle of standard 60°C cotton program at full rated washing capacity and rounded up to two decimal places.

$$\text{WCI} = 1 + \frac{\text{Log}_e \left(\frac{W_{t;60;full}}{30 \times c_{rated}}\right)}{\text{Log}_e (1 - F)}$$

Formula (C.1)

Where:

$W_{t;60,full}$ = The water consumption of the washing machine or of the washing cycle of a washer-dryer at full rated washing capacity and rounded to one decimal place in (liters).

30 = base water consumption per kg of capacity.

$c_{rated}$ = The rated capacity of the washing machine or the rated washing cycle capacity of the washer-dryer.

$F$ = The water reduction factor (0.30).

### C.2 Calculation of the weighted Annual Water Consumption (AWC) of washing machines and the washing cycle of washer-dryers

a) The weighted annual water consumption (AWC) of the washing machines and the washing cycle of washer-dryers is calculated according to Formula (C.2) in liters and rounded to the nearest integer:

$$\text{AWC} = W_t \times 220$$

Formula (C.2)

$$W_t = (3 \times W_{t;60;full} + 2 \times W_{t;60;half} + 2 \times W_{t;40;half})/7$$

Formula (C.3)

Where:

$W_t$ = The weighted water consumption per cycle of the washing machines and the washing cycle of washer-dryers rounded to one decimal places in (liters).

$W_{t;60;full}$ = The water consumption per cycle of the standard 60°C cotton program at full rated load and rounded to one decimal place in (liters).

$W_{t;60;half}$ = The water consumption per cycle of the standard 60°C cotton program at half load and rounded to one decimal place in (liters).

$W_{t;40;half}$ = The water consumption per cycle of the standard 40°C cotton program at half load and rounded to one decimal place in (liters).

220 = total number of washing cycles per year.

## ANNEX D - CALCULATION OF THE WATER EXTRACTION INDEX (WEI)

The weighted remaining moisture content which is referred to as the Water Extraction Index (WEI) of the washing machines and the washing cycle of washer-dryers is calculated according to Formula (D.1) in percentage, rounded to the nearest whole percent:

$$WEI = (3 \times WEI_{60;full} + 2 \times WEI_{60;half} + 2 \times WEI_{40;half})/7$$

Formula (D.1)

Where:

$WEI_{60;full}$ = The Water Extraction Index per cycle of the standard 60°C cotton program at full rated washing capacity and rounded to the nearest whole percent.

$WEI_{60;half}$ = The Water Extraction Index per cycle of the standard 60°C cotton program at half rated washing capacity and rounded to the nearest whole percent.

$WEI_{40;half}$ = The Water Extraction Index per cycle of the standard 40°C cotton program at half rated washing capacity and rounded to the nearest whole percent.