

Electric Appliance Energy Labeling Guideline

Energy Label Requirements for Household Refrigerating Appliances



Sustainable and Renewable Energy Development Authority (SREDA)

9,10th floor, IEB Building, Ramna, Dhaka
Ministry of Power, Energy and Mineral Resources



Constitution of Technical Committee for Labeling Program

No	Name Designation organization	Committee
01	Member, SREDA	Chairman
02	Minimum 3 person from technical institution	Member
03	Representative from BSTI	Member
04	Representative from BAB	Member
05	Representative from Consumer association	Member
06	Representative from SME foundation	Member
07	Representative from Related business association	Member
08	Representative from Ministry of Power, Energy and Mineral Resources	Member
09	Representative from Ministry of Commerce	Member
10	Representative from Ministry of Industry	Member
11	Representative from concern officials of SREDA	Member-Secretary

Foreword

0.1 This Guideline was prepared by Sustainable and Renewable Energy Development Authority after, thoroughly discussed and finalized by the Technical Committee for Labeling Program.

0.2 The Guideline is subject to periodical reviews and amendments in order to keep pace with the latest industrial and technological development. Any suggestion for improvement will be recorded and placed to revising the guideline by the Committee when the need may arise.

0.3 In the preparation of this guideline assistance has been drawn from relevant Minimum Energy Performance Standard (MEPS) set by BSTI and assistance so derived is acknowledged here with thanks.

CONTENTS		PAGE
1	SCOPE	5
2	NORMATIVE REFERENCES	5
3	DEFINITION	5
4	STAR RATING	7
5	LABELING	9
6	FEE OF EACH LABEL	10
7	HOUSEHOLD REFRIGERATING APPLIANCE GROUP	10

Household refrigerating appliances

Energy labeling requirements

1 Scope

This Guideline specifies the energy-efficiency ratings and labeling of electric refrigerating appliances suitable for connection to mains power, whatever the cooling technology. It does not specify any safety requirements. Appliances covered by this Guideline include refrigerators, refrigerator/freezers and freezers.

2 Normative References

“BDS 1850-1 Household refrigerating appliances — Part 1: Characteristics and test methods” is a reference document for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

3 Definitions

For the purpose of this Guideline, the definitions are described below-

3.1 Automatic ice-maker-

An ice-making, harvesting and storage device within a refrigerator or freezer which is fed from a water supply, and which, when ice is removed, automatically replenishes the stock without requiring any action by the user.

NOTE: Separate stand-alone icemakers are not within the scope of this Standard.

3.2 Cyclic defrost appliance

A household refrigerating appliance in which defrosting of all unfrozen food compartments is cyclic (Clause 3.4) and the frozen food storage compartments (if any) are not cooled by a frost-free system Clause 3.6).

Frozen food storage space in a cyclic defrost appliance may be manually, semi-automatically or automatically defrosted.

3.3 Defrost system

A means for removal of frozen atmospheric moisture from an evaporator and any refrigerated surfaces in a compartment and for disposal of the defrost water. Defined as follows:

(a) **Automatic defrost**— where no action is required of the user to initiate removal of frost accumulation, nor to restore normal operation. Also disposal of defrost water requires no action by the user.

(b) **Adaptive defrost**— A form of automatic defrosting system where total energy consumed over time is reduced by an automatic process which adjusts the time intervals between successive defrosts under normal use by using an operating condition variable (or variables) other than, or in addition to, elapsed time or compressor run time. It provides a defrosting frequency based more accurately on the defrosting need during normal use. An adaptive defrost system must operate during normal use and not just under test conditions.

NOTE: requirements to qualify as adaptive defrost are set out in BDS1850-1:2018 or Latest Version of it.

(c) **Cyclic defrost**—A form of automatic defrosting system where the refrigerated surfaces which cool an unfrozen food compartment in an appliance are automatically defrosted with automatic disposal of defrost water and defrosting occurs during each cycle of the refrigeration system.

(d) **Semi-automatic defrost**—Where an action is required of the user to initiate removal of frost accumulation and normal operation is restored automatically with defrost water disposal being either manual, requiring action by the user, or automatic, requiring no action by the user. Also where no action is required of the user to initiate removal of frost accumulation, and normal operation is restored automatically but where defrost water disposal is manual, requiring action by the user.

(e) **Manual defrost**—where an action is required of the user to initiate removal of frost accumulation and further action is required to restore normal operation, whether defrost water disposal is manual, requiring action by the user, or automatic, requiring no action.

NOTE: Refer also to 3.4 and Clause 3.6.

3.4 Food storage compartment type

A means of classification, whereby any compartment is defined by a combination of its purpose and an operating temperature range, within which it is capable of continuous operation. The types, divided into the three broad categories shown, are as follows:

(a) Unfrozen food storage—For storage of unfrozen food, specifically—

(i) cellar compartment—intended for storage of particular foods or beverages requiring temperatures warmer than those of fresh food space;

(ii) fresh food compartment—intended for storage of fresh food;

(iii) chill compartment—intended specifically for the storage of highly perishable food stuffs; and

(iv) special (unfrozen food) compartment—claimed by the manufacturer as being intended for storage of particular, unfrozen foods that require a specific temperature range which is different from that of Items (i), (ii) or (iii) above. A compartment with a claimed warmest and coldest temperature range that lies wholly within the range specified for Item (i), (ii) or (iii) above, shall be categorized and tested as the relevant compartment type above (i.e. Not as a special compartment).

(b) Frozen food storage—For ice-making, frozen food storage or freezing, specifically—

(i) ice-making compartment—intended solely for freezing and storage of water ice cubes;

(ii) short term frozen food storage compartment—intended specifically for short term storage of frozen food;

(iii) freezer compartment—intended for freezing fresh food and for long term storage of frozen food; and

(iv) special (frozen food) compartment—claimed by the manufacturer as being intended for storage of particular, frozen foods that require a specific temperature range which is different from that of Items (i), (ii) or (iii) above.

(c) Multi-use compartment — Intended for use as two or more of the compartment types defined in Items (a) and (b) above and capable of being set by a user to maintain continuously the operating temperature range applicable to each compartment type claimed.

Where a feature shifts temperatures in a compartment to a different operating temperature range continuously, e.g. a fast freeze facility) that feature does not qualify the compartment as having a multi-use classification.

NOTE: Throughout this Standard, the terms ‘storage type’ and ‘compartment type’ shall be taken to refer to the food storage compartment type.

3.5 Frost-free appliance

A household refrigerating appliance in which all frozen food storage space is cooled by a frost-free system. Unfrozen food storage space may or may not be cooled by a frost-free system but all storage space in the appliance whether for frozen or unfrozen food is automatically defrosted with automatic disposal of water.

In a frost-free system—

(a) cooling is provided by forced air circulation;

(b) the system is automatically operated to prevent permanent formation of frost on all refrigerated surfaces; and

(c) no accumulation of ice nor frost forms on stored food.

3.6 Refrigerating appliance configuration

Defined as follows:

(a) Chest—where access is from the top. Also known as ‘top opening’ type.

(b) Upright—where access is from the front. Also known as ‘vertical’ type.

(c) Side by side—An upright refrigerator/freezer where the largest fresh food Compartment and the largest freezer compartment are side by side.

Where an appliance has both chest and upright configurations, it shall be classified as a chest where the gross volume of the chest component exceeds 50% of the total gross volume.

3.7 Refrigerating appliance designation

Defined as follows:

(a) Refrigerator—An appliance for storage of unfrozen food in which at least half of the rated gross volume of the unfrozen food compartments is of the fresh food type. It may contain compartments of other unfrozen or frozen

food storage types, but does not contain a freezer compartment.

(b) Refrigerator/freezer—An appliance for storage of both unfrozen and frozen food and containing both fresh food and freezer compartments. It may contain compartments of other food storage types and—

- (i) not less than half of the total gross volume available for storage of unfrozen food is of the fresh food type; and
- (ii) not less than 80% of the total gross volume of compartments of the frozen food storage type is of the freezer type. In addition, the total gross volume of all frozen food storage compartments of types other than the freezer type does not exceed 30 litres*.

(c) Freezer— An appliance for storage of frozen food and containing only, or mostly, freezer space. It may contain compartments of other frozen food storage types. However, not less than 80% of the total gross volume of compartments of the frozen food storage type is of the freezer type. In addition, the total gross volume of all frozen food storage compartments of types other than freezer type does not exceed 30 litres*.

(d) Cooled appliance— An appliance which cannot be classified as either a refrigerator, refrigerator/freezer or freezer, as defined above.

(e) Wine storage cabinet/compartment — An appliance or a compartment within an appliance which is specifically designed exclusively for the storage and/or long term maturation of wine. Key characteristics of wine storage cabinets/compartment include constant temperature over time, specific humidity characteristics and low vibration. They may be designed to have stratified temperature zones. Typical characteristics include—

- (i) the capability of maintaining continuously a nominated temperature (typically 14°C to 16°C) at an ambient temperature either, above or below the nominated temperature usually with heating as well as cooling;
- (ii) the capability of maintaining temperatures within a variation over time of less than 0.5 K;
- (iii) Control of the compartment humidity; and
- (iv) construction to reduce the transmission of vibration to the compartment, whether from the refrigerator compressor or from external source.

4 Star ratings

4.1 Calculation of efficiency ratings

The efficiency rating shall be derived from the following formula and the results rounded off to three decimal places.

$$E_r = \frac{EC}{V^1}$$

Where, $V^1 = 1.83 \times V_f \times K_f + V_c \times K_c$

1.83 = Factor added for freezer compartment

V_f = Volume of frozen food storage Compartment in liters

V_c = Volume of fresh food storage compartment in liters

EC = Energy consumption in kWh/year

$K_f = 32 - T_f$, T_f = Temperature of the frozen food storage compartment in °C

$K_c = 32 - T_c$, T_c = Temperature of the fresh food storage compartment in °C

4.2 Determination of Star rating

Table 1- Star ratings for Group 1 appliances

Energy Rating Group	Number of stars
$E_r \leq 0.090$	***** (Five Stars)
$0.090 < E_r \leq 0.108$	**** (Four Stars)
$0.108 < E_r \leq 0.126$	*** (three Stars)
$0.126 < E_r \leq 0.144$	** (two Stars)
$0.144 < E_r \leq 0.162$	* (One Star)
$0.162 < E_r$	No stars

Table 2- Star ratings for Group 2 appliances

Energy Group	Rating	Number of stars
$E_r \leq 0.075$		***** (Five Stars)
$0.075 < E_r \leq 0.090$		**** (Four Stars)
$0.090 < E_r \leq 0.105$		*** (three Stars)
$0.105 < E_r \leq 0.120$		** (two Stars)
$0.120 < E_r \leq 0.135$		* (One Star)
$0.135 < E_r$		No stars

TABLE 3- Star Ratings for Group 3, 4, 5B, 5T & 5S appliances of capacity less than 500 L

Energy Group	Rating	Number of stars
$E_r \leq 0.040$		***** (Five Stars)
$0.040 < E_r \leq 0.052$		**** (Four Stars)
$0.048 < E_r \leq 0.060$		*** (three Stars)
$0.060 < E_r \leq 0.072$		** (two Stars)
$0.072 < E_r \leq 0.084$		* (One Star)
$0.084 < E_r$		No stars

Table 4- Star Ratings for Group 3, 4, 5B, 5T & 5S appliances of capacity more than 500 L

Energy Group	Rating	Number of stars
$E_r \leq 0.027$		***** (Five Stars)
$0.027 < E_r \leq 0.036$		**** (Four Stars)
$0.036 < E_r \leq 0.045$		*** (three Stars)
$0.045 < E_r \leq 0.054$		** (two Stars)
$0.054 < E_r \leq 0.063$		* (One Star)
$0.063 < E_r$		No stars

Table 5- Star Ratings for Group 6C, 6U & 7 appliances

Energy Group	Rating	Number of stars
$E_r \leq 0.028$		***** (Five Stars)
$0.028 < E_r \leq 0.034$		**** (Four Stars)
$0.034 < E_r \leq 0.040$		*** (three Stars)
$0.040 < E_r \leq 0.046$		** (two Stars)
$0.046 < E_r \leq 0.052$		* (One Star)
$0.052 < E_r$		No stars

Where E_r is the Energy Rating of the appliance under test. Note:

- Table 1, Table 2, Table 3 and Table 4 have been established assuming average energy rating (E_{av}) values for different Group as follows:

Table 6- Average energy rating (E_{av}) for different Group of appliances

Energy Rating Group	Average Energy Rating
1 and 2	0.099
3	0.083
4 and 5 less than 500L capacity	0.054
4 and 5 greater than 500L capacity	0.040
6 and 7	0.037

- The average Energy Rating for each Group of appliance need to be determined after testing samples of appliance available in the market. After determination of average energy rating for each Group, the tables may need revision.

5 Labeling

5.1 The energy consumption label shall be a sticker and affixed to the front portion of the refrigerator, so that the label is prominent and clearly visible. The label shall display the approved star rating for the model of the refrigerator. The format of the label shall be as given in Figure 1.

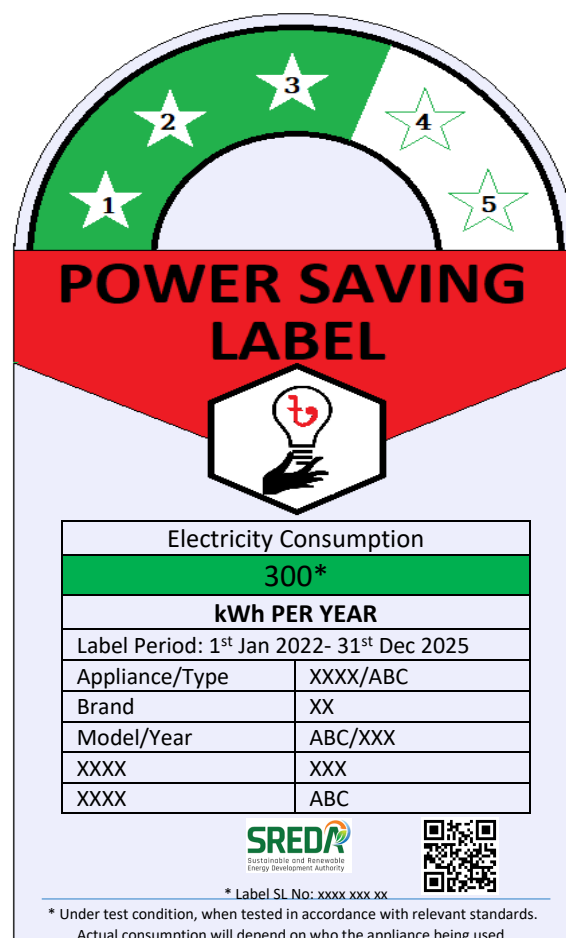


FIGURE 1— Format for the energy efficiency-rating label

- a) Number of stars appearing on the curved band depends on the energy rating determined as per 1.2.

The more stars mean more energy efficient.

b) Number of stars (in words) permitted for the model

c) Brand name and model number of the refrigerator, refrigerator-freezer and freezer shall be printed in the space provided

d) Volume of the refrigerator in litres

5.2 Sample energy rating label is given in Figure 2 for information only and the colors shall be the colors Green, White, Red, Black(borders and Text), RBG- 237,238,252 (Background) as in figure 1.

6 Fee of each Label

Applicants of model registration are required to pay the fee amount stated in table 7 for each label. Each label will have a unique identification. Applicants will be given unique identification number from SREDA.

For example: if an applicant want 500 number of label for group 1 product, he/she has to pay 500x100= 50000tk to SREDA and he will get 500 unique identification number which he/she can use this 500 unique identification number to 500 group 1 appliances.

7 Household Refrigerating Appliance Group

Category into which a refrigerating appliance is classified for the purpose of applying Minimum Energy Performance Standards (MEPS) and energy labeling rules. Defined for any appliance by Table 7 and the accompanying notes. Throughout this guideline, the word 'group' refers to 'refrigerating appliance group'.

Table 7- Household 1 Refrigerating Appliance Group

Appliance designation	Food storage compartment types						Configuration requirements (Refer to Note 4)	Defrost system requirements (Refer to Note 5)	Group	Fee Tk
	Unfrozen food storage			Frozen food storage						
	Cellar	Fresh Food	Chill	Ice-Making	Short term	Freezer				
Refrigerator	O	Y	O	N	N	N		Automatic defrost	1	100/-
Cooled appliance	L	L	L	N	N	N				
Refrigerator	O	Y	O	O	N	N			2	150/-
Cooled appliance	L	L	L	O	N	N				
Refrigerator	O	Y	O	O	Y	N			3	200/-
Cooled appliance	L	L	L	O	Y	N				
Refrigerator/freezer	O	Y	O	O	O	Y		Cyclic defrost (Refer to Note 6)	4	200/-
Cooled appliance	L	L	L	O	O	Y				
Refrigerator/freezer	O	Y	O	O	O	Y	Top freezer	Frost-free	5T	200/-
Cooled appliance	L	L	L	O	O	Y				
Refrigerator/freezer	O	Y	O	O	O	Y	Bottom freezer	Frost-free	5B	150/-
Refrigerator/freezer	O	Y	O	O	O	Y	Side by side	Frost-free		

Freezer	N	N	N	O	O	Y	Chest	Frost-free	6C	50/-
Cooled appliance	N	N	N	O	L	L				
Freezer	N	N	N	O	O	Y	Upright	Not frost-free	6U	50/-
Cooled appliance	N	N	N	O	L	L				
Freezer	N	N	N	O	O	Y	Upright	Frost-free	7	50/-
Cooled appliance	N	N	N	O	L	L				

NOTES:

1. To define the group to which an appliance belongs, its designation (Clause 3.8), constituent compartment types (Clause 3.5), configuration (Clause 3.7), defrost system (Clause 3.4) and whether it is frost-free or not (Clause 3.6) must first be established. Each row of Table 7 is then considered until the applicable row, and hence the Group, is established.

2. In defining the group of an appliance, Table 7 is applied to compartments. Convenience features are not considered.

3. Requirements to be met by the appliance in question regarding food storage compartment types.

‘Y;- indicates ‘yes’. i.e. the appliance shall have at least one compartment of each of the type marked Y

‘N’- indicates ‘no’. i.e. the appliance shall have no compartment of the types marked N.

‘L’- indicates ‘at least one’. i.e. the appliance shall have at least one compartment from the type marked L. within each of the food storages types(unfrozen or frozen, as applicable).

‘O’ – indicates ‘optional’. i.e. the appliance may or may not have any compartment from the types marked O.

4. This column sets out the requirements to be met by the appliance in question regarding household refrigerating appliance configuration. A blank cell in this column indicates no particular requirements regarding configuration and therefore includes any configuration. A frost-free cooled appliance with a freezer and unfrozen food storage shall be classified as group 5T irrespective of configuration.

5. This column sets out the system requirements to be met by the appliance in question regarding the prevention or removal of frost. A blank cell in this column indicates no particular system requirements. The entry ‘not frost-free’ indicates that the appliance shall have at least one frozen compartment that is any category of system except frost-free. The entry ‘frost-free’ indicates that all frozen compartments are frost-free. Refer to frost-free Clause 3.6.

6. Any refrigerating appliance which is configured as a Group 4 appliance but does not meet the defrost type criteria shall be deemed to be a Group 3 appliance. This particular requirement applies even though the appliance contains a freezer compartment. Refer to in Clause 3.3.

7. An appliance with both chest and upright frozen food configurations shall be classified as Group 6C only where the gross volume of the chest component exceeds 50% of the total gross volume. Otherwise it shall be classified in the appropriate upright group. Refer as for Clause 3.7.

8. For the purpose of determining the Group of an appliance which contains one or more multi-use compartments, each compartment shall be treated as if it were of its coldest claimed type. Where, however, the group of an appliance can be changed by selecting different modes for one or more multi-use compartment the supplier may choose to determine the compliance and energy consumption of the appliance for more than one group, and have it tested in this/these other group configuration(s) in addition to that with all compartments set to their coldest claimed type. Where an appliance can be configured to more than one group and the manufacturer claims this, then the product shall be marked with each configurations/designations and groups clearly stated.

9. When determining the Group of an appliance which contains one or more special compartments, each special type compartment shall be treated as though it were of one of the specified types described in Clauses 3.5 (a)(i), (ii) or (iii) or Clauses 3.5 (b)(i), (ii) or (iii). This type shall be determined by the claimed warmest of the operating temperature range for the compartment in accordance with the following table.

Claimed maximum of operating temperature range	Equivalent specified compartment type
Warmer than 6°C	Cellar
Warmer than 3°C but not warmer than 6°C	Fresh food*
Warmer than -2°C but not warmer than 3°C	Chill
Warmer than -9°C but not warmer than -2°C	Ice-making
Warmer than -15°C but not warmer than -9°C	Short term frozen food storage
-15°C or colder	Freezer

10. If a product can be classified as a Group 1 and 2, it shall be Group 1.