

Product Registration System (PRS) specification document

**Supporting the introduction of
Minimum Energy Performance
Standards**

**UN Environment Programme's (UNEP) United
for Efficiency (U4E)**

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1. Abbreviations

AC	Air Conditioner
AEC	Annual Energy Consumption
APF	Annual Performance Factor
COP	Coefficient of Performance
CSPF	Cooling Seasonal Performance Factor
EER	Energy Efficiency Ratio
GWP	Global Warming Potential
IEC	International Electrotechnical Commission
ISO	International Organization for Standardization
MEPS	Minimum Energy Performance Standards
MVE	Measurement Verification and Enforcement
ODP	Ozone Depletion Potential
OWASP	Open Web Application Security Project
QR	Quick Response
TLS	Transport Layer Security
U4E	United for Efficiency (UN Environment)
UN	United Nations

2. Functional description

2.1. Key purpose & functionalities

The application's basic purpose consists of a registry of energy-consuming products that are available for purchase or direct import in a specific country or jurisdiction.

The application will be developed for a prototype case. It is envisioned that its source code will be used as the core structure for further applications. It is expected that deviations will be made in its adaption at the national or regional level.

The registry will consist of a web application, available to multiple user types, such as equipment manufacturers/importers, various government officials, the general public, etc.

The various user types will interact with the application through multiple user interfaces (e.g. manufacturers/importers will enter product data through a dedicated secure access site, while the general public will interact with an open-access portal that lists approved registered products). Further information on user roles is included in section 6.

In general, all products go through three phases:

- **Registration phase:** The products are registered into the application. These products must comply with the country's legal requirements for Minimum Energy Performance Standards (MEPS), therefore, the inclusion of products into the registry will follow a submission and approval process. A key feature of this phase is the possibility to request the registration of products through a bulk upload of product data. This process is defined in detail in section 3.2.5
- **Monitoring, Verification and Enforcement (MVE) phase:** Registered products will be imported/distributed for sale in the country. The quantities of each product sold in the country will be recorded in the application by the manufacturers and importers. As a controlling mechanism for imported products, customs department users will be able to enter imported and exported quantities of the products at the ports of entry as a separate MVE action. . Additionally, the program administrator will perform product compliance verification through independent product performance tests. Products that are found to be non-compliant may see their registration status revoked and/or receive further enforcement actions. The results of these verification and enforcement activities will be documented in the application. The various activities of the MVE phase are defined in sections 3.3.3 and 3.4.1.

- Registration expiry/renew phase: The applicable MEPS legislation is expected to be regularly updated (ca. every 5 years), typically making the minimum requirements more stringent as the technologies evolve in efficiency. As a consequence, the approved products under certain legislation scheme may or may not be eligible for sale under updated legislations. The application will be able to handle products with multiple legislation schemes associated to them, in the case that they transition to new MEPS requirements. This process is detailed in section 3.2.7.

The products included in the registry are grouped into categories. Currently four categories are required to be developed (which are expected to increase up to 20 categories in the future):

- Air conditioning equipment
- Refrigeration equipment
- Lighting
- Electric motors

The data points and database schema are indicated in sections 4 and 5.

It is expected that a total of 120'000 products from 400 different manufacturers/importers will be registered in the system.

2.2. Key technical requirements

2.2.1. Development

The software tools used to develop the application shall be based on mainstream frameworks in the application development industry. Particular attention will be paid to the employment of a low-cost maintenance solution (including hosting costs, software licenses, and especially **re-programming labor** cost). A solution developed under a Java Enterprise Edition or Microsoft .NET Core framework is preferred.

Software development shall be performed according to the Agile principles and values, including short feedback loops, constant interaction between the developers and United for Efficiency, potentially changing requirements, quality focus, iterative and frequent version deployment, etc. It should be noted that this specification document is intended to describe the most relevant functionalities of the software but that it is by no means an exhaustive compilation of all elements that need to be programmed to achieve a working product.

Prior to any programming work, the developer will provide an interactive prototype of the tool displaying a pre-production version of the Program manager and Manufacturer/Importer main pages as well as the workflows between them. The development of the application will be performed considering the feedback provided by UN Environment on this interactive prototype.

The utilization of a version management system is mandatory, with a preference for a Git-based system. The developer will provide United for Efficiency access to a platform to perform intermediate testing, report bugs, access file repositories, etc. The final as well as intermediate versions of the application shall be uploaded to this platform.

The application shall be developed to allow access from multiple platforms and architectures.

All system information is maintained in a main database, which is located on a web-server. The application is expected to be deployed in the cloud for the first country, however, it shall be developed to allow an easy deployment in a locally maintained server.

A layered architecture shall be employed. Each layer shall be built with modules.

Some end users will access the application from locations with slow and unstable internet connection, therefore, the amount of data transferred required by the application must be kept as low as possible, and features such as partial data transfer/display or server-side routine calculations to obtain summary results shall be used to improve the user experience.

The application development must be performed following best practices in terms of code structure, data integrity & safety, programming documentation and code maintenance/upgrades.

The application development will be performed exclusively in English, for example, comments inserted in the code, naming of variables, functions, etc...

2.2.2. Security

In general, the application shall be developed using OWASP Secure Coding Practices and shall achieve Level 2 of its Application Security Verification Standard (ASVS) v4.0. Amongst its safety features, the application will store sensitive user data using strong hashing techniques, use latest TLS communication protocol for all data transfers, manage user sessions with timeout periods, encrypted storage of uploaded files, etc.

The “general public” user interface will utilize an independent product database. This database will be limited to the data points displayed in the public portal. A routine will regularly update this database with the primary product database that is accessed by the users with individual credentials.

The application shall include protection against DDoS attacks, content scraping bots and other malicious agents.

Access to the application for users (other than the open “general public” user interface) will be restricted for each user with a username and password. All data access requests must be channeled through the Services layer to verify session details for every single request to the Database.

User sessions login-logout and edit activities shall be logged. Non-sensitive user information such as IP, associated country, device type, OS, etc. shall be included in the logs to enable further security features. This information will be available to Program management users.

2.2.3. User interface

The User Interface will be responsive and adapt to a variety of screen resolutions (e.g. desktops, smartphones, tables, etc...)

The application will be developed with a resource-based multi-language User Interface. Initially, the User Interface will only be available in English.

After a pre-defined period of inactivity, a user session will expire, and users shall be redirected to the login page.

Each user will be able to self-manage its account information, reset passwords, etc. Some fields will not be editable by the user to ensure the identity of users is maintained. Further information is available in the description of the various user interface pages.

The developer must indicate the minimum internet browser's version that is required for the application to function properly.

The application shall achieve a good user experience with efficient, clear workflows and attractive user interfaces. The use of a UX and UI expert in the development team is recommended.

2.3. Data sources

Product information may be reported in two ways:

- Through the data entry forms in the application.
- Through a zip file containing:
 - A spreadsheet template (.xls or .xlsx) containing the required data fields for the products (only refrigerators, air conditioners, lighting and electric motors under this assignment). The development team shall be responsible for the development of such excel template in collaboration with the UN Environment team. The spreadsheet shall be compatible with open-source “office” type of applications.
 - binary files associated with each product included in the excel file template.

Some of the data inputs will be used to perform calculations and validation checks. Further data validation details are indicated in section 4

Due to the diversity of products that are expected to be reported in the future, a series of modules will be used, some of them with generic data fields (used for the registration of all products) and some of them with the data inputs required for each product.

3. User interface pages

The user interface pages are divided into the various access portals that are to be developed.

The user interface will include contextual help (question marks: "?" next to each field). When clicking the question mark, a text box, which may include images and html links is displayed. The contextual help function will not be needed for all fields. The content of the text boxes will be provided during the software development phase.

Note that the example pages included in this document are purely for illustration purposes to the programming team. They should only serve as general guidance for the application development. The programming team is expected to develop an application that applies best practices to the layouts, workflows, color palettes, etc.

The data fields displayed in the sample pages are available on request.

In general, the fields indicated in the example pages are color-coded:

White – user entry

Grey – system assigned / non editable

Yellow – calculated

The developers are requested to include a similar visual guidance in the user interface (not necessarily the same color scheme indicated above)

3.1. General public user interface

The General public user interface serves as an open platform for the general public to obtain some basic information about available equipment for sale in the country. It also allows users to perform a comparison of energy consumption and associated costs for different equipment.

The “general public” user interface will utilize an independent product database. This database will be limited to the data points displayed in the public interface. A routine will regularly update this database with the primary product database that is accessed by the users with individual credentials.

3.1.1. Product list page

The product list page shows a list with basic product information for all products with “approved” registered status in the system for a certain product category. See section 7.1 for information on the various status flags for products. The selection of a product category shall be performed on a previous page by the end-user.

Each field will allow filtering of data, to allow for product searches. Filtering may be performed as free-text, table options (if data source for the field is a table), min/max date (if data source for the field is a date) or min/max values (if the field is numerical). It will be possible to perform filters from several fields simultaneously. The product list page will also include a contextual help function for all fields headings.

Clicking on an individual product will display a product information card with detailed information, including the product image, website for further information, etc. Each product will have its individual access page, so that this page may be coded into a QR code for access through a QR reader.

The list includes a column for selection of products to be compared (up to four units). Selecting two or more products from this list enables the action of the “Compare” button. Clicking on the “Compare!” button brings the user to the product comparison page.

An example of the product list page for the “Air Conditioning” product category is indicated below.

The variable “Annual running cost (CURRENCY)” is calculated as follows:

- $Annual\ running\ cost\ (CURRENCY) = Annual\ electricity\ consumption\ (kWh) * Average\ electricity\ tariff\ (CURRENCY/kWh)$

The variable “Average electricity tariff (CURRENCY/kWh)” is set by a Level 5 user as part of the system configuration. This field, however, may be edited by the general public to reflect its specific circumstances. This update will only affect the calculation displayed on the screen, not the stored electricity tariff values.

The other variables indicated in the product comparison page are taken directly from the product information database.

3.1.2.2. Refrigerator Product comparison page

The Refrigerator product comparison page displays the main characteristics of the Refrigerator units selected (up to four units). It also displays expected energy consumption, as per information submitted during the registration process.

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Print

Air Conditioner Comparison

	Selection 1	Selection 2	Selection 3	Selection 4
Brand	LG	Beko		
Model	RAS-B18UFV-A	MUFZ-KJ50VEHZ-A1		
Product type	Fridge-freezer	Fridge-freezer		
Total fresh food volume	250	300		
Total frozen food volume	50	60		
Adaptive defrost?	Yes	Yes		
Automatic icemaker?	Yes	No		
Energy efficiency class	C	A		
Annual electricity consumption (kWh)	500	325		
Average electricity tariff (USD/kWh)	0.15	0.15		
Annual running cost (USD)	75	49		

* Disclaimer: energy consumption is estimated using xyz average weather profile and typical operational time for residential use.

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Privacy
Copyright
Site Map

The variable “Annual running cost (CURRENCY)” is calculated as follows:

- $Annual\ running\ cost\ (CURRENCY) = Annual\ electricity\ consumption\ (kWh) * Average\ electricity\ tariff\ (CURRENCY/kWh)$

The variable “Average electricity tariff (CURRENCY/kWh)” is set by a Level 5 user as part of the system configuration.

The other variables indicated in the product comparison page are taken directly from the product information database.

3.1.2.3. *Lighting Product comparison page*

To be developed, based on U4E model regulations.

3.1.2.4. *Electric motors Product comparison page*

To be developed, based on U4E model regulations.

3.1.3. *Privacy page*

TBD – The specific text will be provided during the software development phase.

3.1.4. *Copyright page*

TBD – The specific text will be provided during the software development phase.

3.1.5. *Sitemap page*

TBD – The specific text & graph will be provided during the software development phase.

3.2. *Manufacturer / Importer user interface*

This user interface will be accessed by manufacturers and importers to register products that they wish to introduce in the country/group of countries. To do so, the manufacturer/importer will first apply to obtain a user account. This application will be reviewed by a “program manager” account and granted/rejected based on the suitability of the applicant. **Note that an importer/manufacturer account may be used by multiple users, as a manufacturer/importer may invite other users to its account. In addition, a program manager may also invite users to manufacturer/importer accounts.** Further information in sections 3.2.3. and 3.3.5

3.2.1. *User sign-up page*

The user sign-up page allows user to request registration into the platform as a manufacturer/importer. It follows standard user registration, including a required validation of email provided.

The email provided will be used as the username in the platform



Applicant Details

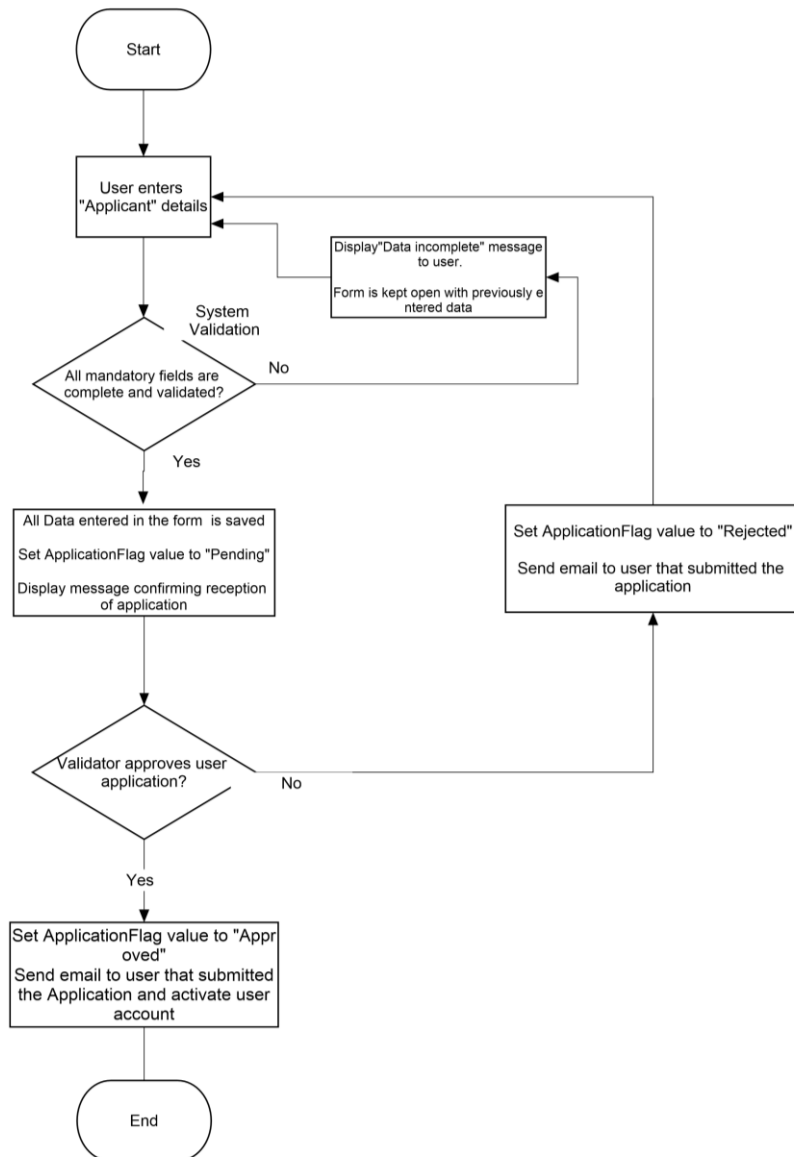
② Company name*	<input type="text"/>
② Role of the applicant*	<input type="text" value="▼"/>
② Contact persons name*	<input type="text"/>
② Contact persons title	<input type="text"/>
② Postal address*	<input type="text"/>
② Town/City*	<input type="text"/>
② State/Province	<input type="text"/>
② Country*	<input type="text"/>
② Postal code	<input type="text"/>
② Contact phone*	<input type="text"/>
② Contact mobile*	<input type="text"/>
② Contact fax	<input type="text"/>
② Contact Email (user login)*	<input type="text"/>
② Password*	<input type="password"/>
② Repeat Password*	<input type="password"/>

② Certificate of incorporation*	<table border="1"><tr><td>File Name</td><td>Browse</td></tr><tr><td>File Size</td><td></td></tr><tr><td>Note</td><td>View Delete</td></tr></table>	File Name	Browse	File Size		Note	View Delete
File Name	Browse						
File Size							
Note	View Delete						

② Tax clearance certificate *	<table border="1"><tr><td>File Name</td><td>Browse</td></tr><tr><td>File Size</td><td></td></tr><tr><td>Note</td><td>View Delete</td></tr></table>	File Name	Browse	File Size		Note	View Delete
File Name	Browse						
File Size							
Note	View Delete						

[Submit Application](#)

The user's account only becomes active (can log into the platform) after review and acceptance by a "program manager" user type, following the process diagram indicated below.



3.2.2. Product list page

This product list page is similar to the general public product list page, however, the data displayed is more detailed and limited to the products registered associated with the specific user account.

Product category	Brand	Model	Product type	Cooling Capacity (kW)		Heating Capacity (kW)		Seasonal Energy Efficiency Ratio (SEER)		Seasonal Coefficient of Performance (SCOP)		Energy rating (A-F)		Heat source	Heat sink	Refrigerant	Registration number	Registration status	Registration expiry date		Units distributed in the country in current year
				From	To	From	To	From	To	From	To	From	To						From	To	
Air Conditioner	mitsubishi heavy industries, ltd.	FDC335KXZ1	Multiple split - VRF	33.5	37.5	3.5424	3.9321	C	Air	Air	R410A	AAC1079	Approved	06/08/2019		6777					
Air Conditioner	mitsubishi heavy industries, ltd.	FDC1335KXZ1	Multiple split - VRF	33.5	37.5	3.5424	3.9321	C	Air	Air	R410A	AAC1079	Approved	06/08/2019		1115					
Air Conditioner	mitsubishi heavy industries, ltd.	FDC1400KXZ1	Multiple split - VRF	40	45	3.4398	3.9618	D	Air	Air	R410A	AAC1075	Approved	06/08/2019		1023					
Air Conditioner	mitsubishi heavy industries, ltd.	FDC4000KXZ1	Multiple split - VRF	40	45	3.4398	3.9618	D	Air	Air	R410A	AAC1075	Approved	06/08/2019		4168					
Air Conditioner	mitsubishi heavy industries, ltd.	FDC1400KXZ1	Multiple split - VRF	40	45	3.4398	3.9618	D	Air	Air	R410A	AAC1075	Pending	06/08/2019		5073					
Air Conditioner	mitsubishi heavy industries, ltd.	FDC1400KXZ1	Multiple split - VRF	40	45	3.4398	3.9618	D	Air	Air	R410A	AAC1075	Pending	06/08/2019		3611					
Air Conditioner	mitsubishi heavy industries, ltd.	FDC4500KXZ1	Multiple split - VRF	45	50	3.0595	3.7797	E	Air	Air	R410A	AAC1076	Pending	06/08/2019		5344					
Air Conditioner	mitsubishi heavy industries, ltd.	FDC4500KXZ1	Multiple split - VRF	45	50	3.0595	3.7797	E	Air	Air	R410A	AAC1076	Approved	06/08/2019		4238					
Air Conditioner	mitsubishi heavy industries, ltd.	FDC1450KXZ1	Multiple split - VRF	45	50	3.0595	3.7797	E	Air	Air	R410A	AAC1076	Approved	06/08/2019		7467					
Air Conditioner	mitsubishi heavy industries, ltd.	FDC475KXZ1	Multiple split - VRF	47.5	53	3.2229	3.8522	D	Air	Air	R410A	AAC1080	Approved	06/08/2019		3432					
Air Conditioner	mitsubishi heavy industries, ltd.	FDC475KXZ1	Multiple split - VRF	47.5	53	3.2229	3.8522	D	Air	Air	R410A	AAC1080	Approved	06/08/2019		5588					
Air Conditioner	mitsubishi heavy industries, ltd.	FDC1475KXZ1	Multiple split - VRF	47.5	53	3.2229	3.8522	D	Air	Air	R410A	AAC1080	Approved	06/08/2019		2699					
Air Conditioner	mitsubishi heavy industries, ltd.	FDC500KXZ1	Multiple split - VRF	50	56	3.3879	3.922	D	Air	Air	R410A	AAC1077	Approved	06/08/2019		4483					
Air Conditioner	mitsubishi heavy industries, ltd.	FDC500KXZ1	Multiple split - VRF	50	56	3.3879	3.922	D	Air	Air	R410A	AAC1077	Approved	06/08/2019		6316					
Air Conditioner	mitsubishi heavy industries, ltd.	FDC1500KXZ1	Multiple split - VRF	50	56	3.3879	3.922	D	Air	Air	R410A	AAC1077	Approved	06/08/2019		2284					
Air Conditioner	mitsubishi heavy industries, ltd.	FDC560KXZ1	Multiple split - VRF	56	63	3.2058	3.7504	D	Air	Air	R410A	AAC1078	Approved	06/08/2019		7064					
Air Conditioner	mitsubishi heavy industries, ltd.	FDC560KXZ1	Multiple split - VRF	56	63	3.2058	3.7504	D	Air	Air	R410A	AAC1078	Approved	06/08/2019		5465					
Air Conditioner	mitsubishi heavy industries, ltd.	FDC1560KXZ1	Multiple split - VRF	56	63	3.2058	3.7504	D	Air	Air	R410A	AAC1078	Approved	06/08/2019		4154					

Clicking into an individual line, brings up the data entry forms for that particular product and its recorded data. Similarly to a program manager account, the manufacturer/importer has access to the MVE section for a particular product, but the only accessible MVE action is “in-country product sales”. The manufacturer/importer account has read access to all the MVE actions recorded, however, it can only enter a “In-country product sales” MVE action. See section 3.3.3 for further details.

If the information is locked for edit or the user has "Read-only" access, the fields are greyed-out and cannot be modified (see Submission process in section 3.2.4 for information edit locks).

The fields displayed and their position in the table will be configurable by a Program manager through the administration area.

The system shall allow users to download in a spreadsheet format all the product data available under their access rights. The downloadable data points for the manufacturer/importer are indicated in section 4.

Finally, the application shall automatically inform the manufacturer/importer of products that will reach its registration expiry date in less than 6 months. The application will send all the users from a manufacturer/importer account an email informing of all expiring registrations as soon as one of these products reaches that point in the timeline.

3.2.3. User management page

The user management page allows the user to access their account data, reset password, and modify their user profile except “Company name” and “Contact email”.

An additional functionality of the user management page is the ability to invite another user to join the account with read/only or read/write access rights (i.e. same access rights as the inviter).

The purpose of this functionality is to allow importers to share the product registration tasks between various employees, and to transfer account management, should the person in charge of the product registration leaves the company.

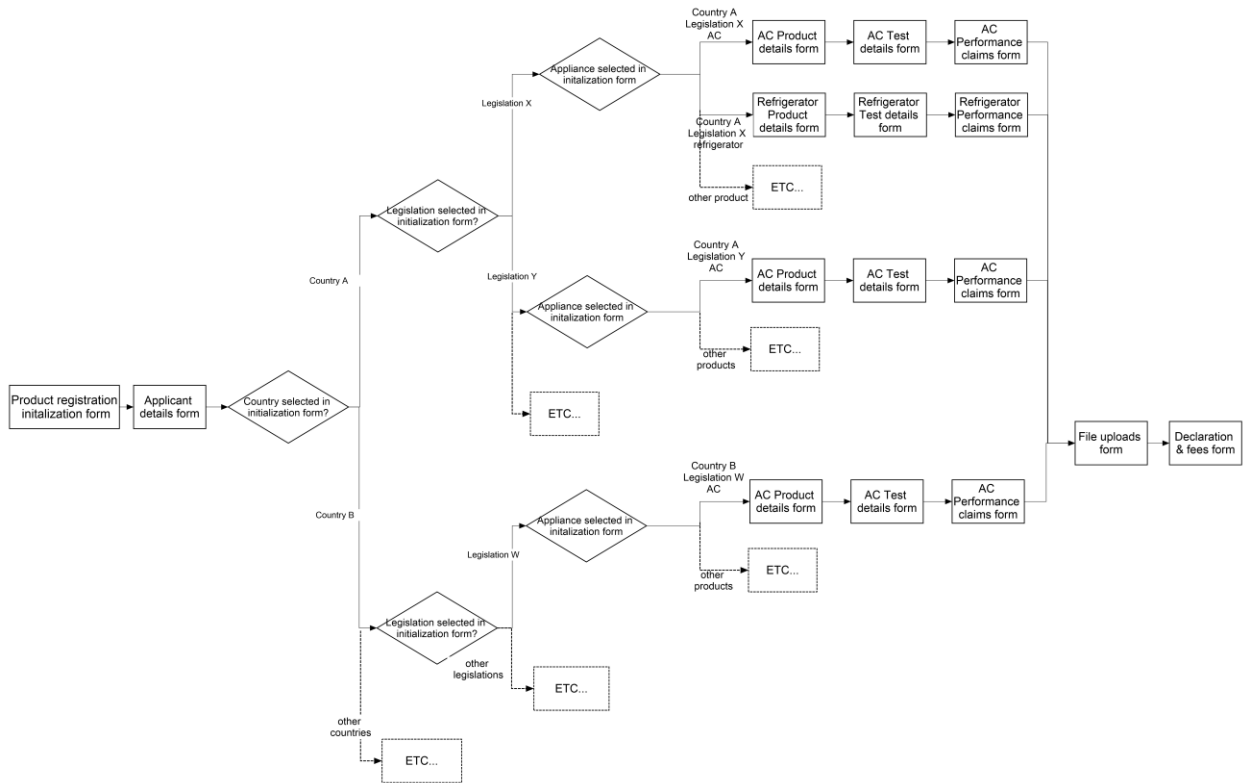
The user management page will also display the email addresses of users with access rights to the same account data and its level (read-only or read/write). Users with read/write access to the account may revoke access rights to other users.

To generate this invitation, the user indicates the email of the recipient and selects the level of access rights. The application then generates an invitation email to the selected user, with a link to a pre-populated user sign-up page. In the pre-populated sign-up page, the company information is pre-filled with the company information and is not modifiable by the new user.

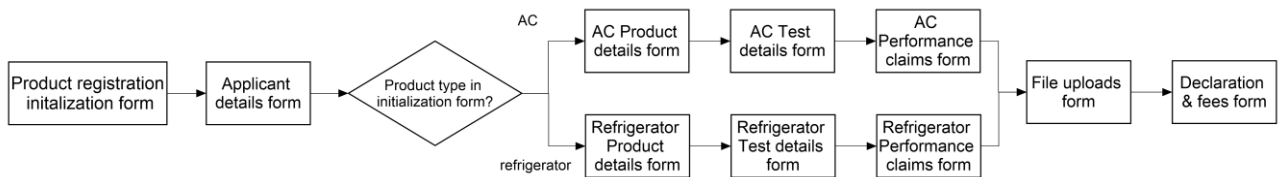
Once the new user completes the process, the application shall send the original user an email indicating the successful invitation.

3.2.4. Data entry forms (New product registration)

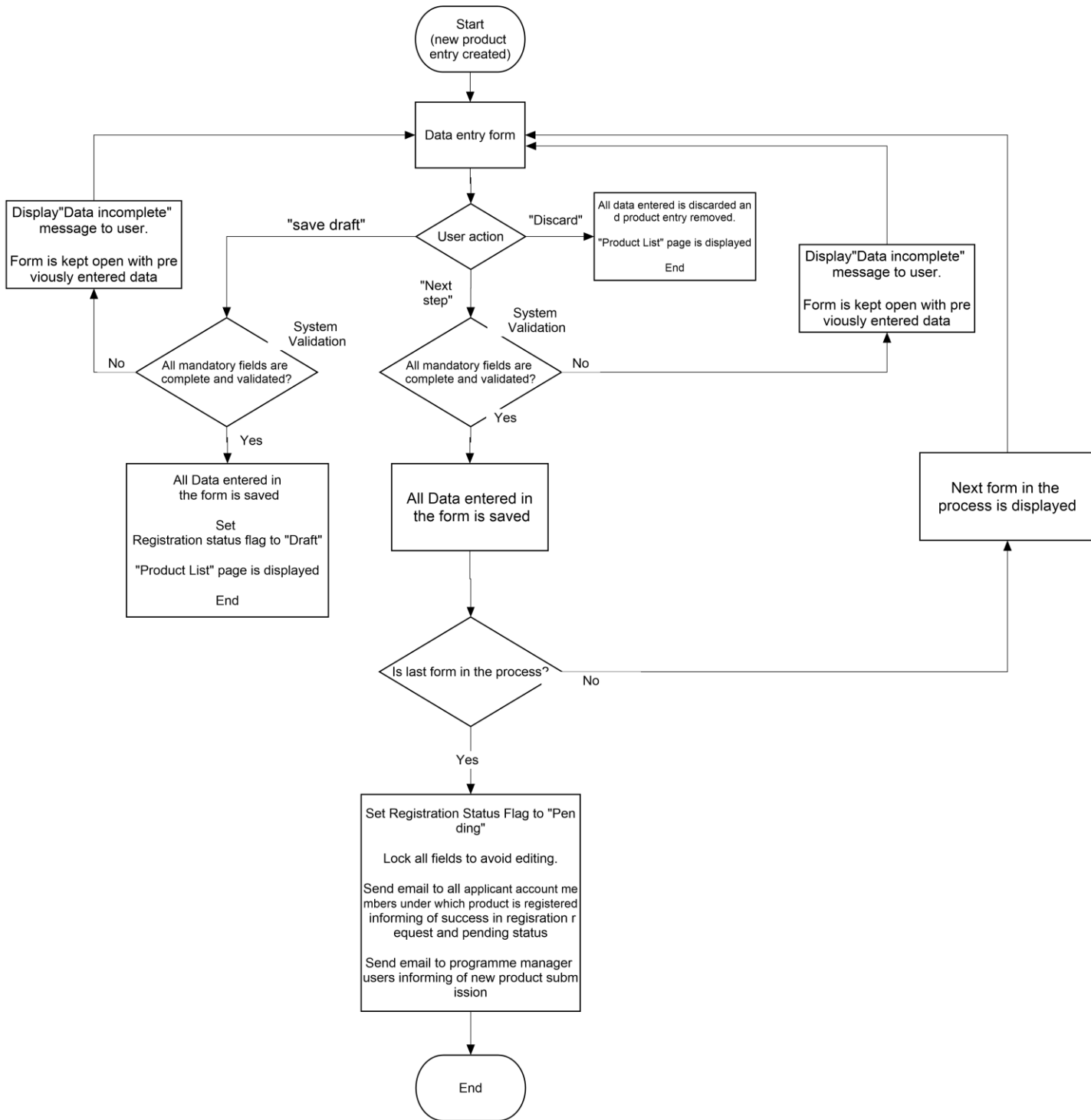
The data entry forms are displayed as an overlay of the main screens when the user clicks on "New product registration". The generic process flow for data entry in the various pages is indicated in the process diagram below.



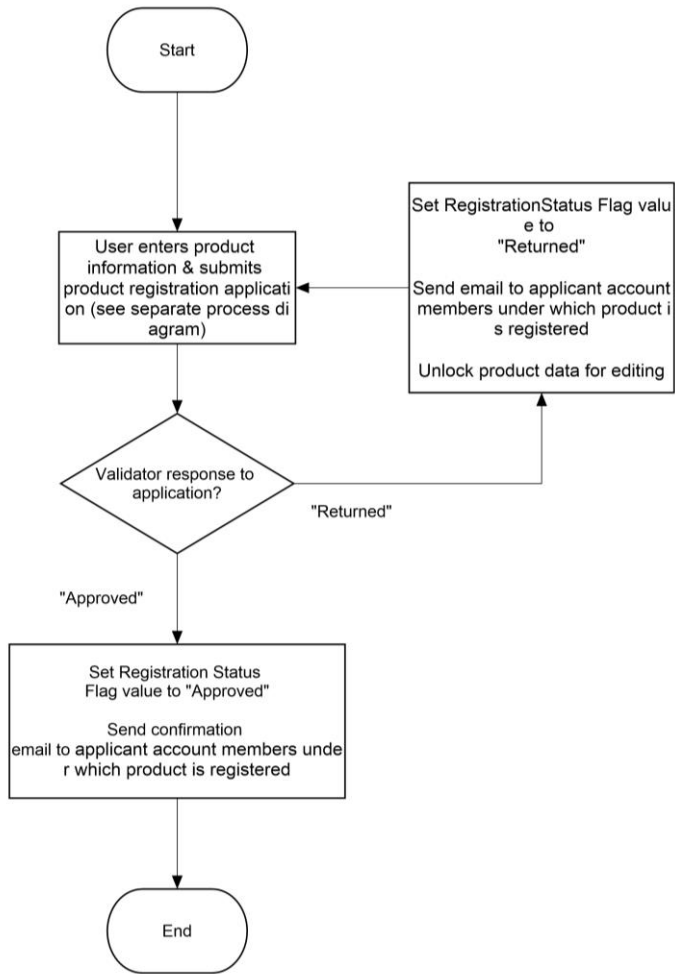
Note that the data entry flow allows for multiple legislations for the various products. The application shall be developed with only one form for each product (AC and refrigerators) for one country, resulting in the simplified structure indicated below. Nevertheless, the logic for selecting forms from different legislations shall be programmed in the system. This involves the utilization of specific tables addressing the needs of various legislations and testing standards, all based in the United for Efficiency Model Regulation Guidelines for AC and refrigerators. The data points and tables indicated in sections 5 and 7 are based on this model legislation.



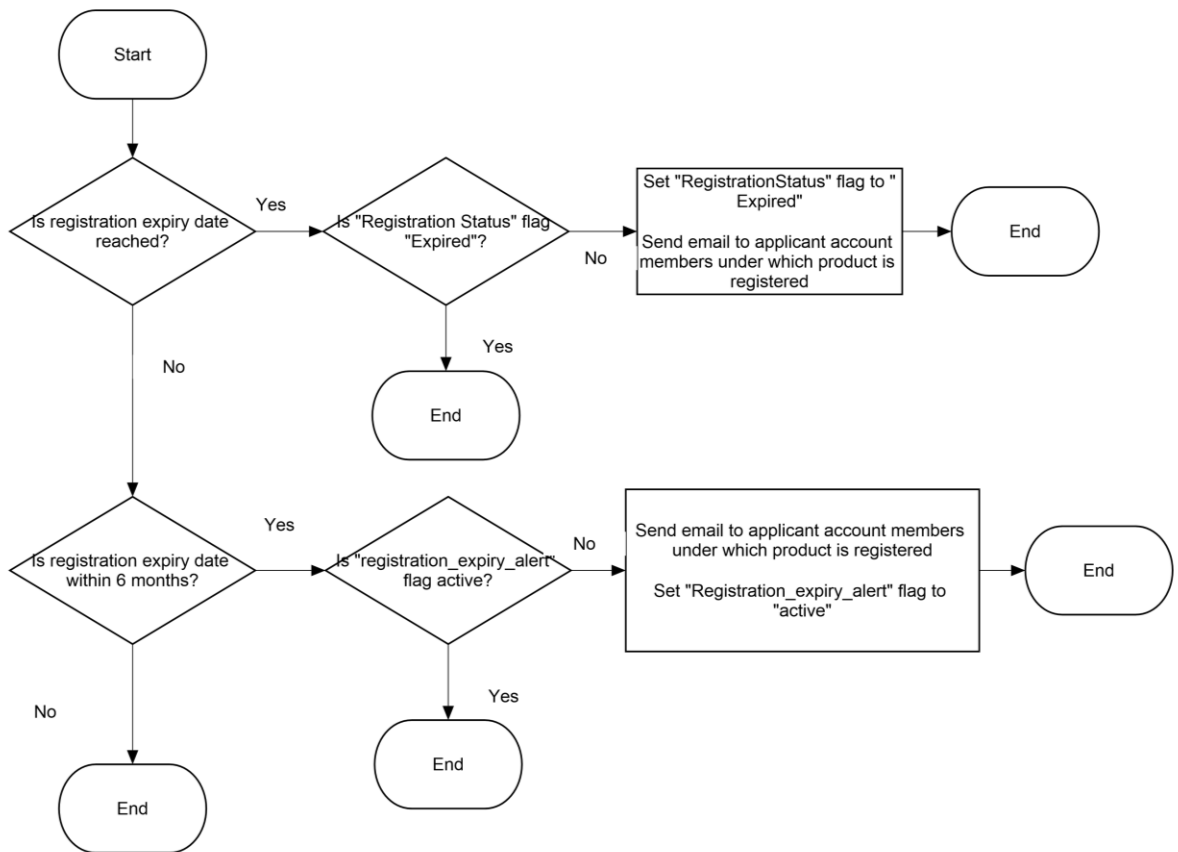
For illustration purposes only the forms for Air Conditioning (AC) are displayed as examples. The process flow between the various data input forms is indicated in the figure below.



Once a product registration is submitted for the program managers to approve, it follows the process diagram below:



Additionally, the system performs a daily routine through all product registrations to evaluate the status of registrations in terms of its expiration dates. The routine is described in the process diagram below.



3.2.4.1. Product registration initialization

The "product registration initialization" form allows the user to enter the basic information for the product to be reported.

Selecting the "Product category", enables the display of the relevant forms and fields. In the example below, the selection of an Air Conditioner, triggers the appearance of the corresponding forms in the following steps.

The screenshot displays a web interface for a product registration form. At the top left is the U4E logo with the text 'United for Efficiency'. The main title is 'Sample Product Registration Form', and a 'Logout >' button is in the top right. A breadcrumb trail reads 'Home > Registrations > Initiation'. The central heading is 'Product Registration Initiation'. On the left, a sidebar contains a blue button labeled 'Initiation'. The main form area contains four required fields, each with a question mark icon and an asterisk: 1. 'Country where applicant is applying for registration *' with an empty dropdown menu. 2. 'Select the type of product you wish to register *' with a dropdown menu showing 'Air-conditioner'. 3. 'Legislation framework (energy performance standards) *' with an empty dropdown menu. 4. 'Product origin *' with a dropdown menu showing 'Locally manufactured'. A blue 'Save and Continue >>' button is positioned below the fields. The footer includes 'An Initiative of UN Environment', 'Privacy', 'Copyright', and 'Site Map'.

3.2.4.2. Applicant details form

The form for the “Applicant details” consists of a series of fields which are pre-populated with information from the user account. These fields are “locked” and cannot be edited in this form. The purpose of including this form in the user interface is to serve as feedback to the user that the product being registered will be associated to their account.

U4E **Sample Product Registration Form - Air-conditioners** [Logout >](#)

Home > Registrations> Application forms> Refrigerators Record ID: PR000022

Applicant Details

Form Navigation

- ① **Applicant Details**
- ② Product Details
- ③ Test Details
- ④ Performance Claims
- ⑤ File Uploads
- ⑥ Declaration and Fees

Company name*

Role of the applicant*

Contact persons name*

Contact persons title

Postal address*

Town/City*

State/Province

Country*

Postal code

Contact phone*

Contact mobile*

Contact fax

Contact Email*

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3.2.4.3. Product Details form

The product details form is the first product-specific form. It is divided into a general product information section, which is valid for all product categories, and another section with information exclusively valid for the category of product being registered.

As indicated in the data points and database schema in sections 4 and 5, several data points are user-configurable lists, therefore, the entry form has to allow for the user to update those lists. Those lists are user-specific, and not available to other users.

3.2.4.3.1. Product Details form - AC

The sample Product details form for Air Conditioners for the U4E model regulations is included below:



Product Details

Form Navigation

- ① Applicant Details
- ② **Product Details**
- ③ Test Details
- ④ Performance Claims
- ⑤ File Uploads
- ⑥ Declaration and Fees

General Details

- ② **Brand name*** [Add Another Brand](#)
- (Select from dropdown list - if your brand does not appear in the dropdown list then select "Add Another Brand")
- ② **Model number/s*** 1 [Add >](#)
- (include both indoor and outdoor unit model numbers for split systems)
- ② **Global trade item number**
- ② **Manufacturers name***
- ② **Country/s of manufacture*** 1 [Add >](#)
- ② **Date of product availability***
- ② **Website address for further product information**

Appliance Specific Details

- ② **Applicable climate class of air-con.***
- ② **Available operating modes ***
- ② **Type of unit ***
- ② **Condenser cooling medium? ***
- ② **Does the air-conditioner have adjustable output capacity? ***
- COOLING MODE**
- ② **Rated Input Power - Cooling *** kW
- ② **Rated Output Capacity - Cooling *** kW
- ② **Rated EER** kW/kW
- HEATING MODE**
- ② **Rated Input Power - Heating *** kW
- ② **Rated Output Capacity - Heating *** kW
- ② **Rated COP** kW/kW

Refrigerant data

- ② **Refrigerant type***
- ② **Refrigerant charge*** kg
- ② **Is refrig. pre-charged?***
- ② **Refrigerant GWP***
- ② **Refrigerant ODP***

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The fields under “Heating Mode” are only displayed if the product sub-category (see section 7.3) includes a “heat-pump” functionality.


The rated EER is calculated as rated output capacity cooling/rated input power cooling

The rated COP is calculated as rated output capacity heating/rated input power heating

The refrigerant GWP and ODP values are obtained from the tables in section 7.

3.2.4.3.2. Product Details form - Refrigerators

The sample Product details form for Refrigerators for U4E model regulations is included below:



Sample Product Registration Form - Refrigerators

[Logout >](#)

Home > Registrations > Application forms > Refrigerators
Record ID: PR000022

Form Navigation

- ① Applicant Details
- ② Product Details
- ③ Test Details
- ④ Performance Claims
- ⑤ File Uploads
- ⑥ Declaration and Fees

Product Details

General Details

Brand name*
(Select from dropdown list - if your brand does not appear in the dropdown list then select "Add Another Brand") [Add Another Brand](#)

Model number/s* 1 [Add >](#)

Global trade item number

Manufacturers name*

Country/s of manufacture* 1 [Add >](#)

Date of product availability*

Website address for further product information

Appliance Specific Details

Type of refrigerating appliance*

Has the appliance automatic defrost?*

Total number of compartments*

Compartment Details*

Compartment 1	Add >
Compartment type	<input style="width: 150px;" type="text"/>
Design operating temperature	<input style="width: 150px;" type="text"/>
Net storage volume	<input style="width: 150px;" type="text"/> (Litres)

Total fresh food volume (Litres)

Total frozen food volume (Litres)

Automatic icemaker?*

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The total fresh food volume is calculated as the sum of the volumes of all “Fresh food” compartment types.
The total frozen food volume is calculated as the sum of the volumes of all “Frozen food” compartment types.

3.2.4.3.3. Product Details form - Lighting

To be developed, based on U4E model regulations.

3.2.4.3.4. Product Details form - Electric motors

To be developed, based on U4E model regulations.

3.2.4.4. Test Details form

The test details form serves to enter information about the results of the testing performed by the manufacturer. This data serves as background information to the performance claims entered in the following form.

As indicated in the data points and database schema in sections 4 and 5, several data points are user-configurable lists, therefore, the entry form has to allow for the user to update those lists. Two of those user-configurable lists will be system-wide available, while others will be exclusive to each user.

3.2.4.4.1. Test Details form - AC

The sample form for ISO 16358:2013 test standard on which the U4E model regulations for air conditioners are based, is indicated below:

Sample Product Registration Form - Air-conditioners

[Logout >](#)

Home > Registrations > Application forms > Refrigerators
Record ID: PR000022

Test Details

Form Navigation

- ① Applicant Details
- ② Product Details
- ③ Test Details
- ④ Performance Claims
- ⑤ File Uploads
- ⑥ Declaration and Fees

Testing Details

① **Test method***

① **Test laboratory***

(Select from dropdown list - if your lab. does not appear in the dropdown list then select "Add Another Laboratory")

[Add Another Laboratory](#)

① **Test laboratory accreditation***

① **Test Report or CAR**

Test Report/Certificate Number/s

Test Report Date/s

Serial Number of Test Unit/s

Report No 1

Test report must be uploaded in file upload page

Test Results

COOLING MODE

① **Tested full capacity - Standard T (35C) *** W

① **Tested full power input - Standard T (35C) *** W

① **Tested half capacity - Standard T (35C)** W

① **Tested half power input - Standard T (35C)** W

① **Tested min. capacity - Standard T (35C)** W

① **Tested min. power input - Standard T (35C)** W

① **Tested full capacity - Low T (29C)** W

① **Tested full power input - Low T (29C)** W

① **Tested half capacity - Low T (29C)** W

① **Tested half power input - Low T (29C)** W

① **Tested min. capacity - Low T (29C)** W

① **Tested min. power input - Low T (29C)** W

① **Tested degradation coefficient full cap. - Low RH & cyclic**

① **Tested degradation coefficient half cap. - Low RH & cyclic**

① **Tested degradation coefficient min cap. - Low RH & cyclic**

① **Tested EER** W/W

① **Cooling seasonal energy consumption (CSEC)** Wh

① **Cooling seasonal total load (CSTL)** Wh

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The factors which are used to determine the compliance of portable type of units is rather straight forward, and only involves the calculation of EER

(TBD norm ISO 18326:2018 not available)

The factors which are used to determine the compliance of ductless split units and self-contained units with the legislation and its corresponding energy efficiency rating are indicated in the points below:

Cooling Seasonal Energy Consumption (CSEC)

Cooling Seasonal Total Load (CSTL)

Cooling Seasonal Performance Factor (CSPF)

Heating Seasonal Total Load (HSTL)

Heating Seasonal Energy Consumption (HSEC)

Heating Seasonal Performance Factor (HSPF)

Annual Performance Factor (APF)

To be able to perform those calculations, further variables with special notation need to be defined:

- t_j indicates an ambient temperature (in Celsius) of a certain “bin” j. Weather profiles are continuous sets of data points, which are binned (also known as “bucketed” or “quantized”) into an “n” number of groups. The values of bin temperatures and corresponding hours of occurrence (h_j^{mode}) for each climatic zone and for both cooling and heating modes are indicated in section 7.9.
- $\Phi_{condition}^{mode}(temp)$ indicates capacity of the AC unit at a certain condition (full, half or partial load), operating mode (heating or cooling) and ambient temperature. For example, $\Phi_{ful}^c(35)$ indicates the full cooling capacity of the AC unit at 35C ambient temperature. It refers to a physical property of the AC unit, which is not fixed, as it changes with the ambient temperature.

3.2.4.4.1.1. Test Details form – AC – CSEC, CSTL and CSPF calculations for fixed capacity, air condensed units (cooling).

The CSTL in this case is calculated with two components:

$$CSTL = \sum_{j=1}^m L^c(t_j) \times h_j^c + \sum_{j=m+1}^n \Phi_{ful}^c(t_j) \times h_j^c$$

Where:

- $L^c(t_j)$ is the cooling load experienced by the AC unit at certain bin temperature (t_j). This is dependent on external factors and is calculated as follows:

$$L^c(t_j) = \Phi_{ful}^c(t_{FL}) \times \frac{t_j - t_{NL}}{t_{FL} - t_{NL}}, \text{ where:}$$

- $t_{NL} = 20 \text{ }^\circ\text{C}$
- $t_{FL} = 35 \text{ }^\circ\text{C}$

- h_j^c are the number of hours occurring at the bin temperature “j” for a particular weather profile during cooling operation (see section 7.9)
- $\Phi_{ful}^c(t_j)$ is calculated as follows: $\Phi_{ful}^c(t_j) = \Phi_{ful}^c(35) + \frac{\Phi_{ful}^c(29) - \Phi_{ful}^c(35)}{(35 - 29)} \times (35 - t_j)$ where:
 - $\Phi_{ful}^c(35)$ is the “Test result cooling - full capacity at standard T(35C)” entered by the user (mandatory input in this case).
 - $\Phi_{ful}^c(29)$ is the “Test result cooling - full capacity at low T(29C)” entered by the user, or $1.0777 \times \Phi_{ful}^c(35)$ in the case that the user does not enter this optional entry.

- m is an intermediate bin between 1 and n , at which in the AC starting to operate at full load, i.e. the cooling load experienced by the AC unit is lower than its full cooling capacity, or expressed mathematically:
 $L^c(t_j) \leq \Phi_{ful}^c(t_j)$

The CSEC is calculated as follows:

$$CSEC = \sum_{j=1}^n X_{ful}^c(t_j) \times P_{ful}^c(t_j) \times \frac{h_j^c}{F_{PL-ful}^c(t_j)}$$

Where:

- $X_{ful}^c(t_j) = \min \left(1, \frac{L^c(t_j)}{\Phi_{ful}^c(t_j)} \right)$ where those components are defined in the calculation of the CSTL
- $P_{ful}^c(t_j) = P_{ful}^c(35) + \frac{P_{ful}^c(29) - P_{ful}^c(35)}{35 - 29} \times (35 - t_j)$ where
 - $P_{ful}^c(35)$ is the “Test result cooling - full power input at standard T(35C)” entered by the user (mandatory input in this case),
 - $P_{ful}^c(29)$ is the “Test result cooling - full power input at low T(29C)” entered by the user, or $0.914 \times P_{ful}^c(35)$ in the case that the user does not enter this optional entry.
- $F_{PL-ful}^c(t_j) = 1 - C_{D-ful}^c \times [1 - X_{ful}^c(t_j)]$ where
 - C_{D-ful}^c is the “Test result cooling - degradation coefficient at full capacity - Low RH & cycl.” entered by the user, or 0.25 in its absence.
- h_j^c is, again, are the number of hours occurring at the bin temperature “ j ” for a particular weather profile during cooling operation (see section 7.9)

The CSPF is calculated as follows:

$$CSPF = \frac{CSTL}{CSEC}$$

3.2.4.4.1.2. Test Details form – AC – CSEC, CSTL and CSPF calculations for two-stage, air condensed units (cooling).

The CSTL is calculated in the same way as with the fixed capacity units indicated in section Test Details form – AC – CSEC, CSTL and CSPF calculations for fixed capacity, air condensed units (cooling).

The CSEC is calculated as follows:

$$CSEC = \sum_{j=1}^k \frac{X_{min}^c(t_j) \times P_{min}^c(t_j) \times h_j^c}{F_{PL-min}^c(t_j)} + \sum_{j=k+1}^m P_{mf}^c(t_j) \times h_j^c + \sum_{j=m+1}^n P_{ful}^c(t_j) \times h_j^c$$

Where:

- $X_{min}^c(t_j) = \min \left(1, \frac{L^c(t_j)}{\Phi_{min}^c(t_j)} \right)$ where $L^c(t_j)$ is defined in the calculation of the CSTL and $\Phi_{min}^c(t_j)$ is calculated as follows:
 - $\Phi_{min}^c(t_j) = \Phi_{min}^c(35) + \frac{\Phi_{min}^c(29) - \Phi_{min}^c(35)}{35 - 29} \times (35 - t_j)$ where:
 - $\Phi_{min}^c(35)$ is the “Test result cooling - minimum capacity at standard T(35C)” entered by the user. or $\Phi_{min}^c(29) \div 1.077$ in the case that the user does not enter this optional entry.
 - $\Phi_{min}^c(29)$ is the “Test result cooling - minimum capacity at low T(29C)” entered by the user (mandatory input in this case).

- $P_{min}^c(t_j) = P_{min}^c(35) + \frac{P_{min}^c(29) - P_{min}^c(35)}{35 - 29} \times (35 - t_j)$ where
 - $P_{min}^c(35)$ is the “Test result cooling - minimum power input at standard T(35C)” entered by the user, or $P_{min}(29) \div 0.914$ in the case that the user does not enter this optional entry.
 - $P_{min}^c(29)$ is the “Test result cooling - minimum power input at low T(29C)” entered by the user (mandatory input in this case).
- $F_{PL-min}^c(t_j) = 1 - C_{D-min}^c \times [1 - X_{min}^c(t_j)]$ where
 - C_{D-min}^c is the “Test result cooling - degradation coefficient at minimum capacity - Low RH & cycl.” entered by the user, or 0.25 in its absence.
- $P_{mf}^c(t_j) = X_{mf}^c(t_j) \times P_{min}^c(t_j) + (1 - X_{mf}^c(t_j)) \times P_{ful}^c(t_j)$ where
 - $X_{mf}^c(t_j) = \frac{\Phi_{ful}^c(t_j) - L^c(t_j)}{\Phi_{ful}^c(t_j) - \Phi_{min}^c(t_j)}$ where $\Phi_{ful}^c(t_j)$ is defined in CSTL calculation
- $P_{ful}^c(t_j)$ is defined in the CSEC calculation of the “fixed speed” AC units in section 3.2.4.4.1.1
- h_j^c are, again, the number of hours occurring at the bin temperature “j” for a particular weather profile during cooling operation (see section 7.9)
- k is an intermediate bin between 1 and n, at which in the AC starts to operate at minimum capacity, i.e. the addition from j=1 until j=k is active while cooling load experienced by the AC unit is lower than its minimum cooling capacity, or expressed mathematically: $L_c(t_j) \leq \Phi_{min}^c(t_j)$
- m is an intermediate bin between k and n, at which in the AC starting to operate at full load, i.e. the addition from j=k+1 until j=m is active while the cooling load experienced by the AC unit is greater than its minimum cooling capacity but lower than its full cooling capacity, or expressed mathematically: $\Phi_{min}^c(t_j) \leq L^c(t_j) \leq \Phi_{ful}^c(t_j)$

The CSPF is calculated as follows:

$$CSPF = \frac{CSTL}{CSEC}$$

3.2.4.4.1.3. Test Details form – AC – CSEC, CSTL and CSPF calculations for multi-stage, air condensed units (cooling).

The CSTL is calculated in the same way as with the fixed capacity units indicated in section Test Details form – AC – CSEC, CSTL and CSPF calculations for fixed capacity, air condensed units (cooling).

The CSEC is calculated as follows:

$$CSEC = \sum_{j=1}^k \frac{X_{min}^c(t_j) \times P_{min}^c(t_j) \times h_j^c}{F_{PL-min}^c(t_j)} + \sum_{j=k+1}^p P_{mh}^c(t_j) \times h_j^c + \sum_{j=p+1}^m P_{hf}^c(t_j) \times h_j^c + \sum_{j=m+1}^n P_{ful}^c(t_j) \times h_j^c$$

Where:

- $X_{min}^c(t_j)$ is defined in the CSEC calculation of the “two-stage” AC units in section 3.2.4.4.1.2
- $P_{min}^c(t_j)$ is defined in the CSEC calculation of the “two-stage” AC units in section 3.2.4.4.1.2
- $F_{PL-min}^c(t_j)$ is defined in the CSEC calculation of the “two-stage” AC units in section 3.2.4.4.1.2
- $P_{mh}^c(t_j) = X_{mh}^c(t_j) \times P_{min}^c(t_j) + (1 - X_{mh}^c(t_j)) \times P_{haf}^c(t_j)$ where
 - $X_{mh}^c(t_j) = \frac{\Phi_{haf}^c(t_j) - L^c(t_j)}{\Phi_{haf}^c(t_j) - \Phi_{min}^c(t_j)}$ where $L^c(t_j)$ is defined in the calculation of the CSTL, $\Phi_{min}^c(t_j)$ is defined in the CSEC calculation of the “two stage” AC units in section 3.2.4.4.1.2 and $\Phi_{haf}^c(t_j)$ is calculated as follows:
 - $\Phi_{haf}^c(t_j) = \Phi_{haf}^c(35) + \frac{\Phi_{haf}^c(29) - \Phi_{haf}^c(35)}{35 - 29} \times (35 - t_j)$ where:

- $\Phi_{haf}^c(35)$ is the “Test result cooling - half capacity at standard T(35C)” entered by the user. or $\Phi_{haf}^c(29) \div 1.077$ in the case that the user does not enter this optional entry.
- $\Phi_{haf}^c(29)$ is the “Test result cooling - half capacity at low T(29C)” entered by the user (mandatory input in this case).
- $P_{haf}^c(t_j) = P_{haf}^c(35) + \frac{P_{haf}^c(29) - P_{haf}^c(35)}{35 - 29} \times (35 - t_j)$ where
 - $P_{haf}^c(35)$ is the “Test result cooling - half power input at standard T(35C)” entered by the user, or $P_{haf}^c(29) \div 0.914$ in the case that the user does not enter this optional entry.
 - $P_{haf}^c(29)$ is the “Test result cooling - half power input at low T(29C)” entered by the user (mandatory input in this case).
- $P_{hf}^c(t_j) = X_{hf}^c(t_j) \times P_{haf}^c(t_j) + (1 - X_{hf}^c(t_j)) \times P_{ful}^c(t_j)$ where
 - $X_{hf}^c(t_j) = \frac{\Phi_{ful}^c(t_j) - L^c(t_j)}{\Phi_{ful}^c(t_j) - \Phi_{haf}^c(t_j)}$ where $L^c(t_j)$ and $\Phi_{ful}^c(t_j)$ are defined in the calculation of the CSTL, and $\Phi_{haf}^c(t_j)$ is defined above in this section.
 - $P_{haf}^c(t_j)$ is defined above in this section.
- $P_{ful}^c(t_j)$ is defined in the CSEC calculation of the “fixed speed” AC units in section 3.2.4.4.1.1
- h_j^c are, again, the number of hours occurring at the bin temperature “j” for a particular weather profile during cooling operation (see section 7.9)
- k is an intermediate bin between 1 and n, at which in the AC starts to operate at minimum capacity, i.e. the addition from j=1 until j=k is active while the cooling load experienced by the AC unit is lower than its minimum cooling capacity, or expressed mathematically: $L^c(t_j) \leq \Phi_{min}^c(t_j)$
- p is an intermediate bin between 1 and n, at which the AC starts to operate at half capacity, i.e. the addition from j=k+1 until j=p is active while the cooling load experienced by the AC unit is greater than its minimum cooling capacity but less than half of its cooling capacity, or expressed mathematically: $\Phi_{min}^c(t_j) \leq L^c(t_j) \leq \Phi_{haf}^c(t_j)$
- m is an intermediate bin between k and n, at which in the AC starting to operate at full load, i.e. the addition from j=k+1 until j=m is active while the cooling load experienced by the AC unit is greater than its half of its cooling capacity but lower than its full cooling capacity, or expressed mathematically: $\Phi_{haf}^c(t_j) \leq L^c(t_j) \leq \Phi_{ful}^c(t_j)$

As the minimum capacity and power input are not mandatory data entries for multi-stage units, in the case that the user does not provide those points, the CSEC for multi-stage units may be calculated as follows:

$$CSEC = \sum_{j=1}^p \frac{X_{althaf}^c(t_j) \times P_{haf}^c(t_j) \times h_j^c}{F_{PL-haf}^c(t_j)} + \sum_{j=p+1}^m P_{hf}^c(t_j) \times h_j^c + \sum_{j=m+1}^n P_{ful}^c(t_j) \times h_j^c$$

where

- $X_{althaf}^c(t_j) = \min \left(1, \frac{L^c(t_j)}{\Phi_{haf}^c(t_j)} \right)$
- $F_{PL-haf}^c(t_j) = 1 - C_{D-haf}^c \times [1 - X_{haf}^c(t_j)]$ where
 - C_{D-haf}^c is the “Test result cooling - degradation coefficient at half capacity - Low RH & cycl.” entered by the user, or 0.25 in its absence.
 - $X_{haf}^c(t_j) = \min \left(1, \frac{L^c(t_j)}{\Phi_{haf}^c(t_j)} \right)$ where $L^c(t_j)$ is defined in the calculation of the CSTL and $\Phi_{haf}^c(t_j)$ is calculated as follows:
 - $\Phi_{haf}^c(t_j) = \Phi_{haf}^c(35) + \frac{\Phi_{haf}^c(29) - \Phi_{haf}^c(35)}{35 - 29} \times (35 - t_j)$ where:
 - $\Phi_{haf}^c(35)$ is the “Test result cooling - half capacity at standard T(35C)” entered by the user. or $\Phi_{haf}^c(29) \div 1.077$ in the case that the user does not enter this optional entry.
 - $\Phi_{haf}^c(29)$ is the “Test result cooling - half capacity at low T(29C)” entered by the user (mandatory input in this case).
- due to the absence of a minimum capacity, p’s lower bound is 0
- the rest of the variables are previously defined.

The CSPF is calculated as follows:

$$CSPF = \frac{CSTL}{CSEC}$$

3.2.4.4.1.4. *Test Details form – AC – CSEC, CSTL and CSPF calculations for variable capacity, air condensed units (cooling).*

The calculations of the CSTL, CSEC and CSPF are the same as with multi-stage units, including the case where the minimum capacity and power input data are not available. The only difference is that the mandatory inputs at half capacity are those at 35C. The conditions at 29C may be calculated reversing the equation.

3.2.4.4.1.5. *Test Details form – AC – CSEC, CSTL and CSPF calculations for water condensed units (cooling).*

The Model regulations exclude water-condensed units, therefore, the application must display an error message to the user with this information.

3.2.4.4.1.6. *Test Details form – AC – HSTL, HSEC, HSPF and APF calculations for fixed capacity, air condensed units (heating).*

The HSTL is calculated as follows:

$$HSTL = \sum_{j=1}^n L^h(t_j) \times h_j^h$$

Where:

- $L^h(t_j)$ is the heating load experienced by the AC unit at certain bin temperature (tj). This is dependent on external factors and is calculated as follows:

$$L^h(t_j) = \frac{\Phi_{ful}^h(7) \times 0.82 \times (17 - t_j)}{(17 - 0)}$$
 where
 - $\Phi_{ful}^h(7)$ = "Test result heating - full capacity, standard T (7C)" as entered by the user.
- h_j^h are the number of hours occurring at the bin temperature "j" for a particular weather profile during heating operation (see section 7.9)

The HSEC is calculated as follows:

$$HSEC = \sum_{j=1}^n \frac{X_{ss}^h(t_j) \times P_{ss}^h(t_j) \times h_j^h}{PLF_{ss}(t_j)} + \sum_{j=1}^n P_{RH-ss}^h(t_j)$$

Where:

- $X_{ss}^h(t_j) = \begin{cases} \text{if } -7^\circ\text{C} < t_j < 5^\circ\text{C}, \text{ then } X_{ss}^h(t_j) = \min\left(1, \frac{L^h(t_j)}{\Phi_{ful,f}^h(t_j)}\right) \\ \text{if } t_j \leq -7^\circ\text{C} \text{ or } t_j \geq 5^\circ\text{C}, \text{ then } X_{ss}^h(t_j) = \min\left(1, \frac{L^h(t_j)}{\Phi_{ful}^h(t_j)}\right) \end{cases}$ where
 - $L^h(t_j)$ is defined in the HSTL calculation above.
 - $\Phi_{ful,f}^h(t_j) = \Phi_{ful}^h(-7) + \frac{\Phi_{ful,f}^h(2) - \Phi_{ful}^h(-7)}{2 - (-7)} \times (t_j - (-7))$ where:

- $\Phi_{ful}^h(-7)$ "Test result heating - full capacity, extra-low T (-7C)" as entered by the user, or $0.64 \times \Phi_{ful}^h(7)$ in the case that the user does not enter this optional entry.
 - $\Phi_{ful,f}^h(2)$ = "Test result heating - full capacity frosting, low T (2C)" as entered by the user.
 -
 - $\Phi_{ful}^h(t_j) = \Phi_{ful}^h(-7) + \frac{\Phi_{ful}^h(7) - \Phi_{ful}^h(-7)}{7 - (-7)} \times (t_j - (-7))$ where:
 - $\Phi_{ful}^h(7)$ "Test result heating - full capacity, standard T (7C)" as entered by the user.
 - $\Phi_{ful}^h(-7)$ is previously defined.
- $P_{ss}^h(t_j) =$

$$\begin{cases} \text{if } -7^\circ\text{C} < t_j < 5^\circ\text{C}, \text{ then } P_{ss}^h(t_j) = P_{ful}(-7) + \frac{P_{ful,f}(2) - P_{ful}(-7)}{2 - (-7)} \times (t_j - (-7)) \\ \text{if } t_j \leq -7^\circ\text{C} \text{ or } t_j \geq 5^\circ\text{C}, \begin{cases} \text{if } X_{ss}^h(t_j) < 1 \text{ then } P_{ss}^h(t_j) = P_{ful}(-7) + \frac{P_{ful}(7) - P_{ful}(-7)}{7 - (-7)} \times (t_j - (-7)) \\ \text{if } X_{ss}^h(t_j) = 1 \text{ then } P_{ss}^h(t_j) = 0 \end{cases} \end{cases}$$

where

 - $P_{ful}(7)$ = "Test result heating - full power input, standard T (7C)" as entered by the user.
 - $P_{ful,f}(2)$ = "Test result heating - full power input, low T (2C)" as entered by the user.
 - $P_{ful}(-7)$ = "Test result heating - full power input, ultra-low T (-7C)" as entered by the user, or $0.82 \times P_{ful}(7)$ in the case that the user does not enter this optional entry.
- $PLF_{ss}(t_j) = 1 - C_{D-ful}^h \times (1 - X_{ss}^h(t_j))$ where
 - C_{D-ful}^h is the "Test result heating - degradation coefficient at full capacity – Cyclic heating" entered by the user, or 0.25 in its absence.
- $P_{RH-ss}^h(t_j) = \begin{cases} \text{if } -7^\circ\text{C} < t_j < 5^\circ\text{C}, \text{ then } P_{RH-ss}^h(t_j) = (L^h(t_j) - \Phi_{ful,f}^h(t_j)) \\ \text{if } t_j \leq -7^\circ\text{C} \text{ or } t_j \geq 5^\circ\text{C} \begin{cases} \text{if } X_{ss}^h(t_j) < 1 \text{ then } P_{RH-ss}^h(t_j) = (L^h(t_j) - \Phi_{ful}^h(t_j)) \\ \text{if } X_{ss}^h(t_j) = 1 \text{ then } P_{RH-ss}^h(t_j) = 0 \end{cases} \end{cases}$ where
all the variables have been previously defined.

3.2.4.4.1.7. *Test Details form – AC – HSTL, HSEC, HSPF and APF calculations for two-stage, air condensed units (heating).*

TBD, as per ISO 16358-2

3.2.4.4.1.8. *Test Details form – AC – HSTL, HSEC, HSPF and APF calculations for multi-stage, air condensed units (heating).*

TBD, as per ISO 16358-2

3.2.4.4.1.9. *Test Details form – AC – HSTL, HSEC, HSPF and APF calculations for variable capacity, air condensed units (heating).*

TBD, as per ISO 16358-2

3.2.4.4.1.10. *Test Details form – AC – HSTL, HSEC and APF calculations for water condensed units (heating).*

The Model regulations exclude water-condensed units, therefore, the application must display an error message to the user with this information.

3.2.4.4.2. Test Details form - Refrigerators

The sample form for IEC 62552:2015 test standard on which the U4E model regulations for air conditioners are based, is indicated below:

The adjusted volume is calculated as follows:

$$\text{Adjusted Volume (AV)} = \sum_{i=1}^n (\text{Volume}_i \times K_i \times F_i)$$

where

Volume_i = net volume of compartment i

F_i is frost adjustment factor of compartment i. F=1.1 for frozen food compartments that have automatic defrost. F=1.0 is applied to all other compartments and frozen food compartments without automatic defrost.

K_i is volume adjustment factor for compartment i:

K_i=1 for fresh food compartments

$K_i = \frac{T_1 - T_c}{T_1 - T_2}$ (rounded to two decimal places), for all other compartments where

T1 is reference ambient temperature selected by the country (defined in each regulation for refrigerators, in the U4E model regulations, this is 24°C)

T2 is temperature of fresh-food compartment (4°C), and

Tc is temperature of the individual compartment concerned.

The Weighted energy consumption (Wh in 24h) is calculated as interpolation of the tested energy consumption at 16°C and 32°C, using the reference ambient temperature selected by the country as interpolation value.

For example, in the case of reference ambient temperature = 24°C, the weighted energy consumption is $0.5 \times (\text{Test energy consumption } 16^\circ\text{C}) + 0.5 \times (\text{Test energy consumption } 32^\circ\text{C})$

Annual energy consumption (AEC) = Weighted energy consumption * (365/1000) in kWh. This is the “calculated energy consumption” by the system, which will be compared with the “claimed energy consumption” in the performance claims page.

3.2.4.4.3. Test Details form - Lighting

To be developed, based on U4E model regulations.

3.2.4.4.4. Test Details form - Electric motors

To be developed, based on U4E model regulations.

3.2.4.5. Performance Claims form

The performance claims form allows the user to enter key data about the product being registered. The application also performs calculations based on the data entered and the test method applicable.

3.2.4.5.1. Performance Claims form - AC

The sample form for the U4E model regulations for air conditioners is indicated below:

Claimed annual performance factor will be entered by the manufacturer/importer and will be compared to the annual performance factor calculated by the tool in the test details page. If the claimed annual performance factor is higher than the calculated one, an error message will be displayed.

The maximum permitted annual performance factors depend on the type of air conditioner, and whether it has cooling or cooling+heating capability.

Ductless and self-contained air-conditioners:

In the case that the ductless or self-contained air conditioner has “cooling” capability only, the maximum permitted annual performance factor is determined from the table below:

Category	Group 1	Group 2	Group 3
CC ≤ 4.5 kW	6.10	5.00	5.30
4.5 kW < CC ≤ 9.5 kW	5.10	4.30	4.60
9.5 kW < CC ≤ 16.0 kW	4.50	3.80	4.10

Where

CC corresponds to “Cooling Capacity” of the unit and,

The group number corresponds to the primary group of the country where the registration is being performed. See section 7 for group equivalencies of each country.

In the case that the ductless or self-contained air conditioner has “heating and cooling” capabilities, the maximum permitted annual performance factor is determined from the table below:

Category	Group 1	Group 2	Group 3
----------	---------	---------	---------

CC ≤ 4.5 kW	5.00	4.00	3.10
4.5 kW < CC ≤ 9.0 kW	4.00	3.60	2.50
9.5 kW < CC ≤ 16.0 kW	3.60	3.40	2.30

Where

CC corresponds to “Cooling Capacity” of the unit and,

The group number corresponds to the primary group of the country where the registration is being performed. See section 7 for group equivalencies of each country.

In addition to the above requirements, countries in Group 3 can optionally have additional minimum requirements for coefficient of performance (COP) at the extremely low temperature heating capacity test, as per table below

Extremely low temperature heating capacity	COP
Temperature of air entering indoor side DB/WB 20 °C / 15 °C Temperature of air entering outdoor side DB/WB -15 °C / -	2.00

Portable air conditioners

Portable air conditioner have common requirements for all units. The minimum permitted annual performance factor for cooling operation (EER, in this case) and for heating operation (COP), if it had this capability, are indicated below:

Category	Cooling (EER)	Heating (COP)
All	3.1	3.1

If the product’s calculated performance factor is larger than the minimum permitted annual energy performance factor, then the product meets with the minimum energy performance requirements

If the product’s refrigerant ODP and GWP are below the required refrigerant ODP and GWP in the AC regulation, then the product meets the minimum refrigerant performance requirements.

The energy efficiency rating for air conditioners with cooling-only capability, is derived from the table below:

Climate Group	Grade	Rated Cooling Capacity ≤ 4.5 kW	4.5 kW < Rated Cooling Capacity ≤ 9.5 kW	9.5 kW < Rated Cooling Capacity ≤ 16.0 kW
Group 1	High Efficiency	8.00 ≤ CSPF	7.60 ≤ CSPF	7.10 ≤ CSPF
	Intermediate	7.10 ≤ CSPF < 8.00	6.40 ≤ CSPF < 7.60	5.80 ≤ CSPF < 7.10
	Low Efficiency	6.10 ≤ CSPF < 7.10	5.10 ≤ CSPF < 6.40	4.50 ≤ CSPF < 5.80
Group 2	High Efficiency	6.50 ≤ CSPF	6.20 ≤ CSPF	5.80 ≤ CSPF
	Intermediate	5.80 ≤ CSPF < 6.50	5.30 ≤ CSPF < 6.20	4.80 ≤ CSPF < 5.80
	Low Efficiency	5.00 ≤ CSPF < 5.80	4.30 ≤ CSPF < 5.30	3.80 ≤ CSPF < 4.80

Group 3	High Efficiency	$6.70 \leq \text{CSPF}$	$6.40 \leq \text{CSPF}$	$6.00 \leq \text{CSPF}$
	Intermediate	$6.00 \leq \text{CSPF} < 6.70$	$5.50 \leq \text{CSPF} < 6.40$	$5.10 \leq \text{CSPF} < 6.00$
	Low Efficiency	$5.30 \leq \text{CSPF} < 6.00$	$4.60 \leq \text{CSPF} < 5.50$	$4.10 \leq \text{CSPF} < 5.10$

Where the CSPF is the Cooling Seasonal Performance Factor calculated in the “Test details” page. In the case of cooling-only equipment this corresponds to the Cooling Seasonal Performance Factor.


The energy efficiency rating for air conditioners with heating and cooling capability, is derived from the table below:

Climate Group	Grade	Rated Cooling Capacity ≤ 4.5 kW	4.5 kW < Rated Cooling Capacity ≤ 9.5 kW	9.5 kW < Rated Cooling Capacity ≤ 16.0 kW
Group 1	High Efficiency	$7.10 \leq \text{APF}$	$6.40 \leq \text{APF}$	$5.80 \leq \text{APF}$
	Intermediate	$6.10 \leq \text{APF} < 7.10$	$5.20 \leq \text{APF} < 6.40$	$4.70 \leq \text{APF} < 5.80$
	Low Efficiency	$5.00 \leq \text{APF} < 6.10$	$4.00 \leq \text{APF} < 5.20$	$3.60 \leq \text{APF} < 4.70$
Group 2	High Efficiency	$5.20 \leq \text{APF}$	$4.80 \leq \text{APF}$	$4.60 \leq \text{APF}$
	Intermediate	$4.60 \leq \text{APF} < 5.20$	$4.20 \leq \text{APF} < 4.80$	$4.00 \leq \text{APF} < 4.60$
	Low Efficiency	$4.00 \leq \text{APF} < 4.60$	$3.60 \leq \text{APF} < 4.20$	$3.40 \leq \text{APF} < 4.00$
Group 3	High Efficiency	$4.60 \leq \text{APF}$	$4.00 \leq \text{APF}$	$3.70 \leq \text{APF}$
	Intermediate	$3.90 \leq \text{APF} < 4.60$	$3.30 \leq \text{APF} < 4.00$	$3.00 \leq \text{APF} < 3.70$
	Low Efficiency	$3.10 \leq \text{APF} < 3.90$	$2.50 \leq \text{APF} < 3.30$	$2.30 \leq \text{APF} < 3.00$

Where the APF is the Annual Performance Factor calculated in the “Test details” page.

3.2.4.5.2. Performance Claims form - Refrigerators

The sample form for the U4E model regulations for refrigerators is indicated below:



Sample Product Registration Form - Refrigerators

Logout >

Home > Registrations > Application forms > Refrigerators
Record ID: PR000022

Form Navigation

- ① Applicant Details
- ② Product Details
- ③ Test Details
- ④ Performance Claims
- ⑤ File Uploads
- ⑥ Declaration and Fees

Performance Claims

Energy Performance

Claimed annual energy consumption* kWh/year

Maximum permitted annual energy consumption* kWh/year

Does this product meet the min. energy performance requirements?*

Energy efficiency rating*

Refrigerant Performance

Refrigerant type*

Refrigerant GWP*

Refrigerant ODP*

Does the refrigerant meet the min. performance requirements?*

Blowing Agent Performance

Blowing agent type*

Blowing agent GWP*

Blowing agent ODP*

Does the blowing agent meet the min. performance requirements?*

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Claimed annual energy consumption will be entered by the manufacturer/importer and will be compared to the annual energy consumption calculated by the tool with the data from the test details page. If the claimed energy consumption is lower than the calculated one, an error message will be displayed.

The maximum permitted annual energy consumption (AEC_{Max}) is determined from the formulas below:

Product Category	AEC_{Max} (kWh/year)
Refrigerators	$A_r \times AV + B_r$
Refrigerator-Freezers	$A_{rf} \times AV + B_{rf}$
Freezers	$A_f \times AV + B_f$

Where AV is the Adjusted Volume calculated in the Test Details page.

A_r is calculated as interpolation of the A_{r20} and A_{r32} at 20°C and 32°C, using the reference ambient temperature selected by the country as interpolation value. A_r is rounded to 3 decimals

B_r is calculated as interpolation of the B_{r20} and B_{r32} at 20°C and 32°C, using the reference ambient temperature selected by the country as interpolation value. B_r is rounded to the nearest integer.

A_{rf} is calculated as interpolation of the A_{rf20} and A_{rf32} at 20°C and 32°C, using the reference ambient temperature selected by the country as interpolation value. A_{rf} is rounded to three decimals

B_{rf} is calculated as interpolation of the B_{rf20} and B_{rf32} at 20°C and 32°C, using the reference ambient temperature selected by the country as interpolation value. B_{rf} is rounded to the nearest integer.

A_f is calculated as interpolation of the A_{f20} and A_{f32} at 20°C and 32°C, using the reference ambient temperature selected by the country as interpolation value. A_f is rounded to three decimals

B_f is calculated as interpolation of the B_{f20} and B_{f32} at 20°C and 32°C, using the reference ambient temperature selected by the country as interpolation value. B_f is rounded to the nearest integer.

Refrigerators		Refrigerators-Freezers		Freezers	
A_{r20}	0.134	A_{rf20}	0.188	A_{f20}	0.175
A_{r32}	0.22	A_{rf32}	0.288	A_{f32}	0.268
B_{r20}	84	B_{rf20}	137	B_{f20}	161
B_{r32}	137	B_{rf32}	210	B_{f32}	247

The product meets the minimum energy performance requirements if the claimed annual energy consumption is lower than the maximum permitted annual energy consumption.

If the product's refrigerant ODP and GWP are below the required refrigerant ODP and GWP in the AC regulation, then the product meets the minimum refrigerant performance requirements.

If the product's blowing agent ODP and GWP are below the required blowing agent ODP and GWP in the AC regulation, then the product meets the minimum blowing agent performance requirements.

The energy efficiency rating for a product is determined from the table below:

Grade	Refrigerators	Refrigerator-Freezers	Freezers
High Efficiency	$1.50 \leq R$	$1.50 \leq R$	$1.50 \leq R$
Intermediate	$1.25 \leq R < 1.50$	$1.25 \leq R < 1.50$	$1.25 \leq R < 1.50$
Low Efficiency	$1.00 \leq R < 1.25$	$1.00 \leq R < 1.25$	$1.00 \leq R < 1.25$

Where $R = AEC_{Max} / AEC$ of the product.

R is rounded to two decimals.

3.2.4.5.3. Performance Claims form - Lighting

To be developed, based on U4E model regulations.

3.2.4.5.4. Performance Claims form – Electric motors

To be developed, based on U4E model regulations.

3.2.4.6. File uploads form

In the file upload form, the user is able to upload a test report, a letter of authority and an image of the product. The file formats shall be limited to images (jpg, png, etc.), or general documents (pdf, doc, dox, xls, etc.). The maximum filesize shall be 5MB. The user shall be informed of any errors during the upload process and receive confirmation if the upload has been successful.

U4E **Sample Product Registration Form - Air-conditioners** [Logout >](#)

Home > Registrations> Application forms> Refrigerators Record ID: PR000022

File Uploads

Applicants must upload copies of documents as noted below. Simply click on the "Browse" button below each item, then use the file browser. Locate and upload the applicable document/s.

Test Report *

File Name	File Size	Note	
			View Delete

[Browse](#)

Letter of Authority *

File Name	File Size	Note	
			View Delete

[Browse](#)

Product image (optional)

File Name	File Size	Note	
			View Delete

[Browse](#)

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3.2.4.7. *Declaration and fees form*

The declaration page allows the user to attest that the product conforms with the requirements of the applicable directives and pay any applicable fees.

The payment of fees may be performed online or offline (through bank transfer). The development team shall propose the implementation of a payment gateway to be integrated in the application. The payment gateway must be available in a wide range of developing countries and not be subject to maintenance fees.

The user will be requested to select a payment method:

If the user selects online payment, the payment gateway will process payment and automatically change the status of the “Registration fee paid online” flag to “Yes”.

If the user the payment offline (through bank transfer) an overlaid page will be displayed with payment instructions such as bank account, name, bank address and reference number to be quoted in the transfer description. The page will include a mandatory entry check-box confirming that payment will be processed. The confirmation of offline payment will be an MVE action, as defined in section 3.3.3.

A sample “declaration and fees” page as well as a process diagram detailing the various options are indicated below. A validation condition for the user to submit the application consists in that either the “Registration fee paid offline user confirmation” flag or the “Registration fee paid online” flag must have been set to “Yes”.

Declaration and Fees

Form Navigation

[① Applicant Details](#)[② Product Details](#)[③ Test Details](#)[④ Performance Claims](#)[⑤ File Uploads](#)[⑥ Declaration and Fees](#)

Fees

The following fee is applicable

NOTE:

To pay this fee electronically left mouse click on the "Pay Fee" Button below. If you intend to, or have already paid the required fee directly to the finance section of the department insert the receipt number issued to you in the field below.

[Pay Fee online >>](#)[Pay Fee through bank transfer >>](#)

Receipt Number (if applicable)

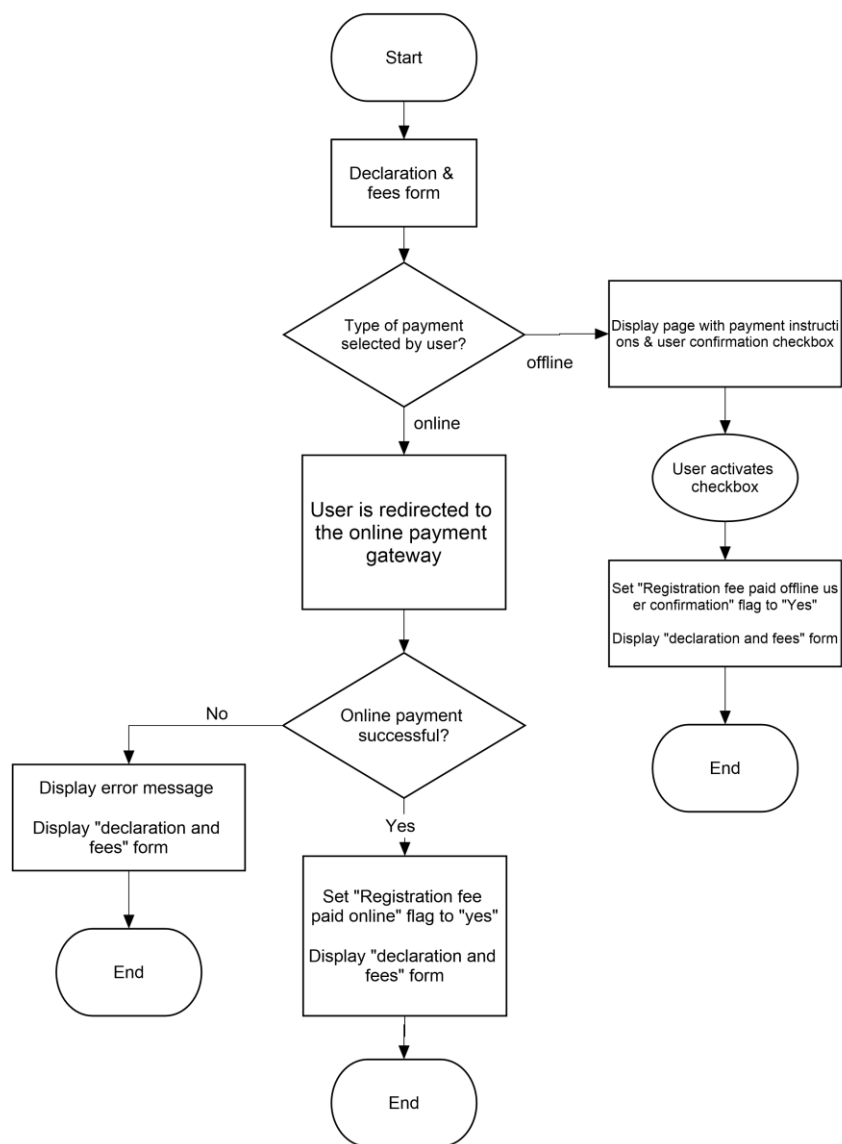
Declaration

At the time of making this application I declare that I:

- am the Authorised Officer for the entity submitting the application;
- am authorised by the applicant to make this application, to deal with all aspects of the registration process for the application and to bind the applicant accordingly;
- take full responsibility for the accuracy and completeness of the material that I have provided as part of this application;
- understand that is an offence to provide false or misleading information in this application;
- understand that by submitting this application that I make this declaration.

By ticking the checkbox below you confirm this declaration:

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3.2.5. Bulk upload page (New product registration for multiple products)

The bulk upload page allows users to report multiple products in one step, without entering them one by one through the data entry forms.

The bulk registration is performed by uploading a zip file, which includes:

- A spreadsheet file with predefined column titles corresponding to the fields filled out by the end user through the various data entry forms.
- A single folder with binary files (e.g. pdf, jpg, png, etc...) for all the attachments associated with the products being registered. Those filenames are referenced in the excel file, to be able to associate a specific product with its corresponding associated files (e.g. test reports, letter of authority, etc...)

Once the zip file is uploaded, the application will perform a routine to import all records and will perform data validation (with the same validation conditions as it would be done for products registered individually through the data input forms). Following the data validation, the application will display a summary, listing all products imported, with their corresponding data fields and associated attached files. All errors from the validation process will be shown in the corresponding data field, highlighted so the user can quickly identify them. An additional message will be shown on screen indicating the number of validation errors encountered in the process and for which product codes.

The user will then be able to select which records they wish to actually import and either continue with the import process or cancel it. Only records without errors are allowed to be imported, If the user chooses to import the selected records, those entries are created in the database and the application continues in the “Declaration and fees” page for the user to pay the corresponding fee and finalize the registration process.

To facilitate the data entry to users, templates and sample zip files are provided to the end user for download in the “bulk upload” page. The templates are tightly controlled, with predefined column titles and a limited number of unlocked cells, allowing simple data entry into the corresponding column. The software development team will develop the spreadsheet templates in close collaboration with UN Environment.

It is expected that the bulk upload feature will only be used in the first stages of product registration in a country. The availability of this feature for product manufacturers and importers will be defined by the program manager, through a “disable switch”.

A conceptual graphical representation of the bulk upload page in its initial stage and following the selection of zip file is indicated in the graphs below.

Bulk upload Logout >

Product details

Product category: Air conditioners Select Zip file

Cancel Import selected products

Select	Brand	Model	Product type	Cooling capacity (kW)	Heating Capacity (kW)	Seasonal Energy Efficiency Ratio (SEER)	Seasonal Coefficient of Performance (SCOP)	Energy rating (A-F)	Test report file	Letter of authority file	Product image file
	Search...	Search...	Search...	From To	From To	From To	From To	Search...	Search...	Search...	Search...

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U4E Bulk upload Logout >

Product details

Product category: Air conditioners Select Zip file

File selected: C:\Users\sysadmin\Desktop\AC_mitsubishi2019_import.zip

Cancel Import selected products

Select	Brand	Model	Product type	Cooling capacity (kW)	Heating Capacity (kW)	Seasonal Energy Efficiency Ratio (SEER)	Seasonal Coefficient of Performance (SCOP)	Energy rating (A-F)	Test report file	Letter of authority file	Product image file
	Search...	Search...	Search...	From To	From To	From To	From To	Search...	Search...	Search...	Search...
<input type="checkbox"/>	MITSUBISHI HEAVY I	FDC450KXZE1	Multiple split - VRF	45	50	3.0595	3.7797	E	test1.pdf	loa1.pdf	image1.jpg
	MITSUBISHI HEAVY I	FDCL450KXZE1	Multiple split - VRF	45	50	3.0595	3.7797	E	loa2.pdf	image2.jpg	
<input checked="" type="checkbox"/>	MITSUBISHI HEAVY I	FDC(L)450KXZE1	Multiple split - VRF	45	50	3.0595	3.7797	E	test3.pdf	loa3.pdf	image3.jpg
	MITSUBISHI HEAVY I	FDC475KXZE1	Multiple split - VRF	47.5	error	3.2229	3.8522	D	test4.pdf	loa4.pdf	image5.jpg
<input checked="" type="checkbox"/>	MITSUBISHI HEAVY I	FDCL475KXZE1	Multiple split - VRF	47.5	53	3.2229	3.8522	D	test5.pdf	loa5.pdf	image6.jpg
<input type="checkbox"/>	MITSUBISHI HEAVY I	FDC(L)475KXZE1	Multiple split - VRF	47.5	53	3.2229	3.8522	D	test6.pdf	loa6.pdf	image7.jpg

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3.2.6. Copy records page

This page enables a manufacturer/importer to generate a new product registration entry using data stored from other products registered in their account (either in pending or approved status). The main purpose of this functionality is to enable the registration of products in various jurisdictions or products with similar characteristics under the same legislation. This low-complexity solution is developed as a potentially complementary feature of the bulk upload system, which may not be suited to the specifics of that country legislation.

This function allows the selection of multiple products, and generates a new product entry (in draft status) for each of the products selected, appending the text string “copy_of_” to the product model name, and “generated as copy of product xxxx” in the “comment” field.

3.2.7. Product re-registration page

The product re-registration page allows a manufacturer/importer to request the registration of an existing product into another legislation framework. The re-registration process is only intended for products that require the same data inputs as the original legislation framework, but have more stringent efficiency thresholds in the new legislation framework (see performance claims form, section 3.2.4.5)

The basic layout of the product re-registration page is similar to the product list page, however, it includes a column with checkboxes.

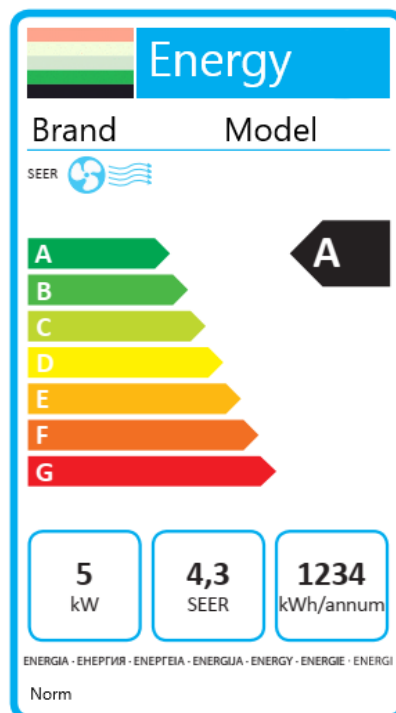
The user selects the products that they wish to re-register and continues with the process. The application then displays the list of selected products, together with a list of the available legislation frameworks for each particular product category. Once the user selects the re-registration framework and continues with the process, the declaration and fees page will be displayed, for the user to continue the process.

If the product meets the requirements of the new legislation framework, a new entry will be created with the same user entry figures, updated calculated values, (except the registration expiry date, which will be kept the same as that of the original product), and a “Registration status flag” set as “Approved”.

The “old” product registration entry, and its associated calculated values will be kept, but the “Registration status flag” will be set to “Superseded”.

3.2.8. Label & certificate download page

The system shall be able to generate an energy label (.pdf format) for the manufacturer/importer to print and include in their products. This feature will only be available for products with an approved registration status. The information for the label will be obtained from the product information file, without any additional input from the user. A sample label is indicated in the graph below. Detailed graphic design characteristics will be given in the development phase.



In addition to the label generation document, the system will also be able to generate a certificate of approval document (.pdf format) for products approved in the system. The certificate will be generated on-demand from the manufacturer/importer users for specific products. A template of the certificate format to be used will be provided during the development phase of the project.

3.2.9. About page

The about page contains a general description of the application and a list of all documents available for download. The list of documents will include the upload date, a brief description and a link for upload. This information is entered by the program manager through the documentation upload page in their user interface.

The specific text in the About page will be provided during the software development phase.

3.3. Program manager user interface

The program manager user interface is designed for government officials to manage the registration of applicants and products, obtain statistical information, log enforcement actions and provide information in the platform to the applicants. It is divided into several administration pages.

3.3.1. User management page

The user management page allows the user to access their account data, reset password, and modify their user profile except “Company name” and “Contact email”.

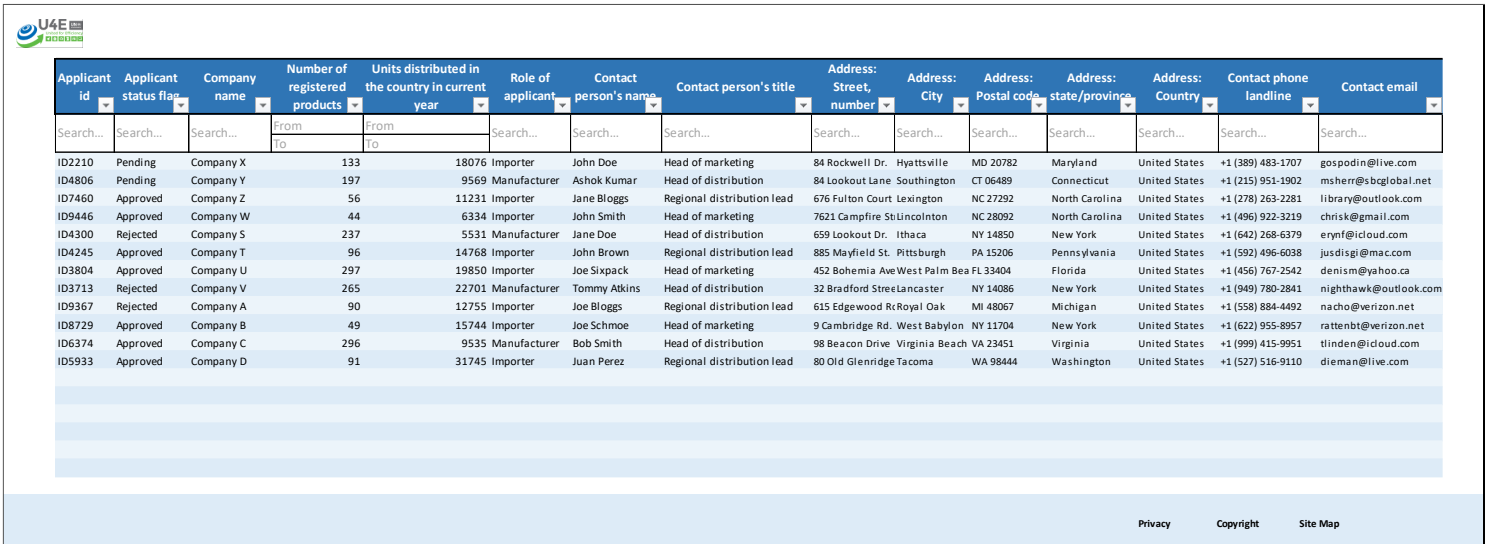
The user management page will also display the email addresses of users with access rights to the same account data.

3.3.2. Applicants page (administrator area)

The applicants page consists of a list of current applicants registered in the system and their status. Once a manufacturer/importer completes the sign-up process, its status is flagged as “pending”. The applicant sign-up and approval process is indicated in the process diagram in section 3.2.1.

The program manager shall be able to select one of the applicants from the list, which will bring up the same data entry forms filled by the applicant (with read-only access to the data). The program manager will review the information submitted and either accept or reject the application.

If the application is accepted, the applicant may log into the platform and start submitting products for registration. If the application is rejected, the applicant will only be able to access the sign-up forms to edit the data entered and re-send the application.



The screenshot shows the U4E logo in the top left corner. Below it is a table with the following columns: Applicant id, Applicant status flag, Company name, Number of registered products, Units distributed in the country in current year, Role of applicant, Contact person's name, Contact person's title, Address: Street, number, Address: City, Address: Postal code, Address: state/province, Address: Country, Contact phone landline, and Contact email. The table contains 15 rows of data, including applicant IDs like ID2210, ID4806, ID7460, ID9446, ID4300, ID4245, ID3804, ID3713, ID9367, ID8729, ID6374, and ID5933, with various status flags (Pending, Approved, Rejected) and contact information.


Applicant id	Applicant status flag	Company name	Number of registered products	Units distributed in the country in current year	Role of applicant	Contact person's name	Contact person's title	Address: Street, number	Address: City	Address: Postal code	Address: state/province	Address: Country	Contact phone landline	Contact email
ID2210	Pending	Company X	133	18076	Importer	John Doe	Head of marketing	84 Rockwell Dr.	Hyattsville	MD 20782	Maryland	United States	+1 (389) 483-1707	gospodin@live.com
ID4806	Pending	Company Y	197	9569	Manufacturer	Ashok Kumar	Head of distribution	84 Lookout Lane.	Southington	CT 06489	Connecticut	United States	+1 (215) 951-1902	msherr@bglglobal.net
ID7460	Approved	Company Z	56	11231	Importer	Jane Bloggs	Regional distribution lead	676 Fulton Court	Lexington	NC 27292	North Carolina	United States	+1 (278) 263-2281	library@outlook.com
ID9446	Approved	Company W	44	6334	Importer	John Smith	Head of marketing	7621 Campfire St.	Lincolnton	NC 28092	North Carolina	United States	+1 (496) 922-3219	chrisrk@gmail.com
ID4300	Rejected	Company S	237	5531	Manufacturer	Jane Doe	Head of distribution	659 Lookout Dr.	Ithaca	NY 14850	New York	United States	+1 (642) 268-6379	erynf@icloud.com
ID4245	Approved	Company T	96	14768	Importer	John Brown	Regional distribution lead	885 Mayfield St.	Pittsburgh	PA 15206	Pennsylvania	United States	+1 (592) 496-6038	justisgi@mac.com
ID3804	Approved	Company U	297	19850	Importer	Joe Sixpack	Head of marketing	452 Bohemia Ave	West Palm Bea	FL 33404	Florida	United States	+1 (456) 767-2542	denism@yahoo.ca
ID3713	Rejected	Company V	265	22701	Manufacturer	Tommy Atkins	Head of distribution	32 Bradford Street	Lancaster	NY 14086	New York	United States	+1 (949) 780-2841	nighthawk@outlook.com
ID9367	Rejected	Company A	90	12755	Importer	Joe Bloggs	Regional distribution lead	615 Edgewood R	Royal Oak	MI 48067	Michigan	United States	+1 (558) 884-4492	nacho@verizon.net
ID8729	Approved	Company B	49	15744	Importer	Joe Schmoie	Head of marketing	9 Cambridge Rd.	West Babylon	NY 11704	New York	United States	+1 (622) 955-8957	rattenbt@verizon.net
ID6374	Approved	Company C	296	9535	Manufacturer	Bob Smith	Head of distribution	98 Beacon Drive	Virginia Beach	VA 23451	Virginia	United States	+1 (999) 415-9951	tlinden@icloud.com
ID5933	Approved	Company D	91	31745	Importer	Juan Perez	Regional distribution lead	80 Old Glenridge	Tacoma	WA 98444	Washington	United States	+1 (527) 516-9110	dieman@live.com

At the bottom right of the page, there are links for Privacy, Copyright, and Site Map.

3.3.3. Product list page

This product list page is similar to the manufacturer/importer product list page, however, the program manager has read access to all products in the system, including the name of the applicants associated with them.

The system shall also allow users to download in tabular form product data available under their access rights. The downloadable data points for the program manager are indicated in section 4.



Product category	Manufacturer / Importer	Brand	Model	Product type	Cooling capacity (kW)		Heating Capacity (kW)		Seasonal Energy Efficiency Ratio (SEER)	Seasonal Coefficient of Performance (SCOP)	Energy rating (A-F)	Heat source	Heat sink	Refrigerant	Registration number	Registration status	Registration expiry date	Units distributed in the country in current year
					from to	from to	from to	from to										
Air Conditioner	REFRICON LLC	DAIKIN	FDC335KXZE1	Multiple split - VRF	33.5	37.5	3.5424	3.9321	C	Air	Air	R410A	AAC1079	Approved	06/08/2019	6777		
Air Conditioner	REFRICON LLC	DAIKIN	FDCL335KXZE1	Multiple split - VRF	33.5	37.5	3.5424	3.9321	C	Air	Air	R410A	AAC1079	Approved	06/08/2019	1115		
Air Conditioner	REFRICON LLC	DAIKIN	FDCL335KXZE1	Multiple split - VRF	33.5	37.5	3.5424	3.9321	C	Air	Air	R410A	AAC1079	Approved	06/08/2019	1023		
Air Conditioner	REFRICON LLC	LG	FDC400KXZE1	Multiple split - VRF	40	45	3.4398	3.9618	D	Air	Air	R410A	AAC1075	Approved	06/08/2019	4168		
Air Conditioner	REFRICON LLC	LG	FDC400KXZE1	Multiple split - VRF	40	45	3.4398	3.9618	D	Air	Air	R410A	AAC1075	Pending	06/08/2019	5073		
Air Conditioner	REFRICON LLC	LG	FDCL400KXZE1	Multiple split - VRF	40	45	3.4398	3.9618	D	Air	Air	R410A	AAC1075	Pending	06/08/2019	3611		
Air Conditioner	MITSUBISHI INDIA	MITSUBISHI HEAVY INDUSTRIES, LTD.	FDC450KXZE1	Multiple split - VRF	45	50	3.0595	3.7797	E	Air	Air	R410A	AAC1076	Pending	06/08/2019	5344		
Air Conditioner	MITSUBISHI INDIA	MITSUBISHI HEAVY INDUSTRIES, LTD.	FDCL450KXZE1	Multiple split - VRF	45	50	3.0595	3.7797	E	Air	Air	R410A	AAC1076	Approved	06/08/2019	4238		
Air Conditioner	MITSUBISHI INDIA	MITSUBISHI HEAVY INDUSTRIES, LTD.	FDCL450KXZE1	Multiple split - VRF	45	50	3.0595	3.7797	E	Air	Air	R410A	AAC1076	Approved	06/08/2019	7467		
Air Conditioner	MITSUBISHI INDIA	MITSUBISHI HEAVY INDUSTRIES, LTD.	FDC475KXZE1	Multiple split - VRF	47.5	53	3.2229	3.8522	D	Air	Air	R410A	AAC1080	Approved	06/08/2019	3432		
Air Conditioner	MITSUBISHI INDIA	MITSUBISHI HEAVY INDUSTRIES, LTD.	FDCL475KXZE1	Multiple split - VRF	47.5	53	3.2229	3.8522	D	Air	Air	R410A	AAC1080	Approved	06/08/2019	5588		
Air Conditioner	MITSUBISHI INDIA	MITSUBISHI HEAVY INDUSTRIES, LTD.	FDCL475KXZE1	Multiple split - VRF	47.5	53	3.2229	3.8522	D	Air	Air	R410A	AAC1080	Approved	06/08/2019	2699		
Air Conditioner	AC IMPORTS LTD	GREE	FDC500KXZE1	Multiple split - VRF	50	56	3.3879	3.922	D	Air	Air	R410A	AAC1077	Approved	06/08/2019	4483		
Air Conditioner	AC IMPORTS LTD	GREE	FDCL500KXZE1	Multiple split - VRF	50	56	3.3879	3.922	D	Air	Air	R410A	AAC1077	Approved	06/08/2019	6316		
Air Conditioner	AC IMPORTS LTD	GREE	FDCL500KXZE1	Multiple split - VRF	50	56	3.3879	3.922	D	Air	Air	R410A	AAC1077	Approved	06/08/2019	2384		
Air Conditioner	AC IMPORTS LTD	GREE	FDC560KXZE1	Multiple split - VRF	56	63	3.2058	3.7504	D	Air	Air	R410A	AAC1078	Approved	06/08/2019	7064		
Air Conditioner	AC IMPORTS LTD	CARRIER	FDCL560KXZE1	Multiple split - VRF	56	63	3.2058	3.7504	D	Air	Air	R410A	AAC1078	Approved	06/08/2019	5465		
Air Conditioner	AC IMPORTS LTD	CARRIER	FDCL560KXZE1	Multiple split - VRF	56	63	3.2058	3.7504	D	Air	Air	R410A	AAC1078	Approved	06/08/2019	4154		

Privacy Copyright Site Map

Clicking an individual line, brings up the data entry forms for that particular product and its recorded data. The main difference with the manufacturer/importer data entry forms, is that the program manager can enter all the Monitoring, Verification and Enforcement actions of the MVE form for a certain product.

Additionally, as in the case of the general public user interface, each product will have its individual access page, so that this page may be coded into a QR code for access through a QR reader. The purpose is to facilitate the entry of MVE actions for products that have the corresponding QR code in the packaging.

The MVE actions include:

- Offline fee payment for product registration.
- Product registration approval
- In-country product sale
- Product import
- Product export
- 3rd party test
- Enforcement actions
- Product registration revoked

To enter an MVE action, the program manager performs the following steps:

- Selection of the type of MVE action
- Entry of the number of products imported/exported/sold (mandatory only for the “in-country product sales”, “product import” and “product export” actions)
- Entry of Start period and end period dates, only available for “in-country product sales” MVE action)
- Input comments
- Upload attachment (mandatory only for the “3rd party test” action)

The application automatically records the creation date and user that entered the MVE action. Submitted MVE actions are not editable by the user. The purpose is to serve as audit trail of MVE action taken on certain products.

Product MVE details

① Registration number	AAC1079
② Manufacturer/Importer	REFRICON LLC
③ Brand	DAIKIN
④ Model	FDC(L)335KXZE1
⑤ Product type	Multiple split - VRF

[New MVE action](#)

Date	MVE action	Created by	Quantity - units	Period start date	Period end date	Comment	Attachments download
From To	Search...	Search...	From To			Search...	Search...
26.08.2017	Registration approved	MEPS@enegy.gov	N/A				
15.09.2017	Product import	customs@treasury.gov	200				
12.01.2018	In-country product sale	john.doe@manufacturer.	150	01.01.2017	31.12.2017	units sold in 2017	
05.03.2018	3rd party test	MEPS@enegy.gov	N/A			Product testing performed due to inconsistencies with other products registered by importer.	File
15.03.2018	Enforcement action	MEPSadmin@enegy.gov	N/A			Test report provided by importer was inaccurate. Warning to applicant.	
15.03.2018	Registration revoked	MEPS@enegy.gov	N/A			Registration revoked	

If the user enters an “Offline fee payment for product registration” MVE action, the application automatically sets the “Registration fee paid offline” flag to “Yes”. Further, the application only allows the creation of a “Product registration approval” MVE action if either the “registration fee paid online” or “registration fee paid online” flags are set to “Yes”.

3.3.4. Documentation upload page (administrator area)

The product documentation upload page allows the program manager to upload documents and make them available for the manufacturers/importers.

This page allows the user to enter a description of the document for display in the “About” page of the Manufacturer/Importer user interface.

3.3.5. Accounts management page (administrator area)

The accounts management page allows the program manager to:

- Create additional “program management” accounts, in order to share the workload with other government officials.
- Create “customs” accounts.
- Revoke access rights to specific manufacturer/importer accounts
- Send invitation emails for new users to specific manufacturer/importer accounts (similarly to the invitation feature of the manufacturer/importer). In this case, the application will also send an additional email to the original user informing them of the invitation, and another one if this is successful.

3.3.6. Dashboard page

A dedicated dashboard page will display the following information:

- Pending actions: user account application approval (application status flag “pending”), product registration approval (registration status flag “pending”), offline product payment confirmation (if a “Registration fee paid offline user confirmation” flag is set to “yes”, and its corresponding “registration fee paid offline” is set to “no”)
- Latest product activity: list of latest approved products, list of latest enforcement actions, overall product registration numbers per category, overall product registration numbers per registered account, etc.
- Latest user activity: logins, logouts, invitations to other users, request of new accounts, approval of new accounts, removal of accounts, user information changes

The information in the various lists will be downloadable by the user.

3.3.7. Contextual help page (administrator area)

This page allows configuring the contextual help text that is displayed in each field of the manufacturer/importer user interface. This feature is available for all languages in which the application is configured.

This page lists all the fields from the various forms available in the Manufacturers/Importers user interface. Next to each field a text box is included, where the user may enter the text to be displayed as contextual help when the manufacturer/importer selects the “?” icon next to each field.

3.3.8. Variables configuration page (administrator area)

This page allows the program managers to configure variables and lists that are used throughout the application.

These include:

- Refrigerant gases (most common and standard) see section 7
- Blowing agents (most common and standard) see section 7
- Currency abbreviation (to be used in energy prices and total annual energy cost)
- Electricity price (in Currency/kWh)

3.3.9. Product list configuration page (administrator area)

This page allows configuring the fields displayed in the product list page of manufacturers/importers and the general public for each of the product types existing in the system. It will use a similar layout to a ribbon configuration page in the Microsoft Office applications.

Product list configuration Logout >

Field configuration

Product category: Air conditioners
 User type: General public

Cancel Apply

Available fields		Product list fields displayed
Product category	Add >>>	Product category
Manufacturer / Importer		Manufacturer / Importer
Brand	Remove <<<	Brand
Model		Model
Product type		Cooling capacity (kW)
Cooling capacity (kW)		Heating Capacity (kW)
Heating Capacity (kW)		Seasonal Energy Efficiency Ratio (SEER)
Seasonal Energy Efficiency Ratio (SEER)		Seasonal Coefficient of Performance (SCOP)
Seasonal Coefficient of Performance (SCOP)		Energy rating (A-F)
Energy rating (A-F)		
Heat source		
Heat sink		
Refrigerant		
Electrical supply		
Registration number		
Registration status		
Registration expiry date		
Units distributed in the country in current year		

▲ Move up
▼ Move down

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3.4. Customs user interface

The “Customs” user interface is designed to allow customs officers to easily review the registration status of products being imported in the country and to enter quantities of products being imported.

This user interface is a scaled-down version of the Program manager user interface, containing only the product list page (and the associated “Product MVE details” form). The only action available for the customs officers in the product list page is “product import”

3.4.1. Product list page

This product list page is similar to the manufacturer/importer product list page, however, the customs officer has read access to all registered products, including the name of the applicants associated with them.

Product category	Manufacturer / Importer	Brand	Model	Product type	Cooling capacity (kW)		Heating Capacity (kW)		Seasonal Energy Efficiency Ratio (SEER)	Seasonal Coefficient of Performance (SCOP)	Energy rating (A-F)	Heat source	Heat sink	Refrigerant	Registration number	Registration status	Registration expiry date	Units distributed in the country in current year
					from to	from to	from to	from to										
Air Conditioner	REFRICON LLC	DAIKIN	FDCL335KXZE1	Multiple split - VRF	33.5	37.5	3.5424	3.9321	C	Air	Air	R410A	AAC1079	Approved	06/08/2019	6777		
Air Conditioner	REFRICON LLC	DAIKIN	FDCL335KXZE1	Multiple split - VRF	33.5	37.5	3.5424	3.9321	C	Air	Air	R410A	AAC1079	Approved	06/08/2019	1115		
Air Conditioner	REFRICON LLC	DAIKIN	FDCL335KXZE1	Multiple split - VRF	33.5	37.5	3.5424	3.9321	C	Air	Air	R410A	AAC1079	Approved	06/08/2019	1023		
Air Conditioner	REFRICON LLC	LG	FDC400KXZE1	Multiple split - VRF	40	45	3.4398	3.9618	D	Air	Air	R410A	AAC1075	Approved	06/08/2019	4168		
Air Conditioner	REFRICON LLC	LG	FDC400KXZE1	Multiple split - VRF	40	45	3.4398	3.9618	D	Air	Air	R410A	AAC1075	Pending	06/08/2019	5073		
Air Conditioner	REFRICON LLC	LG	FDC(L)400KXZE1	Multiple split - VRF	40	45	3.4398	3.9618	D	Air	Air	R410A	AAC1075	Pending	06/08/2019	3611		
Air Conditioner	REFRICON LLC	LG	FDC(L)400KXZE1	Multiple split - VRF	40	45	3.4398	3.9618	D	Air	Air	R410A	AAC1075	Pending	06/08/2019	5344		
Air Conditioner	MITSUBISHI INDIA	MITSUBISHI HEAVY INDUSTRIES, LTD.	FDCL450KXZE1	Multiple split - VRF	45	50	3.0595	3.7797	E	Air	Air	R410A	AAC1076	Approved	06/08/2019	4238		
Air Conditioner	MITSUBISHI INDIA	MITSUBISHI HEAVY INDUSTRIES, LTD.	FDCL450KXZE1	Multiple split - VRF	45	50	3.0595	3.7797	E	Air	Air	R410A	AAC1076	Approved	06/08/2019	7467		
Air Conditioner	MITSUBISHI INDIA	MITSUBISHI HEAVY INDUSTRIES, LTD.	FDCL450KXZE1	Multiple split - VRF	45	50	3.0595	3.7797	E	Air	Air	R410A	AAC1076	Approved	06/08/2019	3432		
Air Conditioner	MITSUBISHI INDIA	MITSUBISHI HEAVY INDUSTRIES, LTD.	FDCL475KXZE1	Multiple split - VRF	47.5	53	3.2229	3.8522	D	Air	Air	R410A	AAC1080	Approved	06/08/2019	5588		
Air Conditioner	MITSUBISHI INDIA	MITSUBISHI HEAVY INDUSTRIES, LTD.	FDCL475KXZE1	Multiple split - VRF	47.5	53	3.2229	3.8522	D	Air	Air	R410A	AAC1080	Approved	06/08/2019	2699		
Air Conditioner	MITSUBISHI INDIA	MITSUBISHI HEAVY INDUSTRIES, LTD.	FDCL475KXZE1	Multiple split - VRF	47.5	53	3.2229	3.8522	D	Air	Air	R410A	AAC1080	Approved	06/08/2019	4483		
Air Conditioner	AC IMPORTS LTD	GREE	FDC500KXZE1	Multiple split - VRF	50	56	3.3879	3.922	D	Air	Air	R410A	AAC1077	Approved	06/08/2019	6316		
Air Conditioner	AC IMPORTS LTD	GREE	FDC500KXZE1	Multiple split - VRF	50	56	3.3879	3.922	D	Air	Air	R410A	AAC1077	Approved	06/08/2019	2384		
Air Conditioner	AC IMPORTS LTD	GREE	FDC(L)500KXZE1	Multiple split - VRF	50	56	3.3879	3.922	D	Air	Air	R410A	AAC1077	Approved	06/08/2019	7064		
Air Conditioner	AC IMPORTS LTD	GREE	FDC560KXZE1	Multiple split - VRF	56	63	3.2058	3.7504	D	Air	Air	R410A	AAC1078	Approved	06/08/2019	5465		
Air Conditioner	AC IMPORTS LTD	CARRIER	FDC(L)560KXZE1	Multiple split - VRF	56	63	3.2058	3.7504	D	Air	Air	R410A	AAC1078	Approved	06/08/2019	4154		
Air Conditioner	AC IMPORTS LTD	CARRIER	FDC(L)560KXZE1	Multiple split - VRF	56	63	3.2058	3.7504	D	Air	Air	R410A	AAC1078	Approved	06/08/2019	4154		

Clicking an individual line, brings up the data entry forms for that particular product and its recorded data. The customs officer also has access to the MVE form where all the Monitoring, Verification and Enforcement actions on a product are recorded.

The customs account has read access to all the MVE actions recorded, however, it can only enter a “Product import” and “Product export” MVE action. Similarly to the program manager case, to enter an MVE action, the customs officer performs the following steps:

- Selection of the type of MVE action (only “Product import”)
- Entry of the number of products imported/exported (mandatory)
- Input comments
- Upload attachment

The application automatically records the creation date and user that entered the MVE action. Submitted MVE actions are not editable by the user. The purpose is to serve as audit trail of MVE action taken on certain products.

Product MVE details

- ① Registration number
- ② Manufacturer/Importer
- ③ Brand
- ④ Model
- ⑤ Product type

New MVE action

Date	MVE action	Created by	Quantity - units	Comment	Attachments download
From To	Search...	Search...	from to	Search...	Search...
26.08.2017	Registration approved	MEPS@enegy.gov	N/A		
15.09.2017	Product import/sale	customs@treasury.gov	200		
12.11.2017	Product import/sale	customs@treasury.gov	150		
05.03.2018	3rd party test	MEPS@enegy.gov	N/A	Product testing performed due to inconsistencies with other products registered by importer.	File
15.03.2018	Enforcement action	MEPSadmin@enegy.gov	N/A	Test report provided by importer was inaccurate. Warning to applicant.	
15.03.2018	Registration revoked	MEPS@enegy.gov	N/A	Registration revoked	

4. Data points

Data entries in the database must be performed with at least the data fields indicated in the table below.

Intermediate results variables, database entry identifiers, timestamps, or users creating/modifying/approving entries are not explicitly mentioned in this table, but should be nevertheless recorded.

The programming team should note that this list, although as accurate as possible at this moment, is not comprehensive and may require additional fields for the development of the application. It is also foreseen that once new product categories (e.g. washing machines, lighting, etc.) are added to the tool, additional data points will be required, therefore, tables and dependencies shall be programmed with this planned evolution.

Data point name	Type	calculated / user entry / system assigned	Input form (entered or displayed)	Product category	Entry req.	Valid. Req.	validation rules	Download by manufacturer/importer user	Download by program manager user	Comment
Country	predefined list	user entry	Initialization form	N/A	YES	NO		YES	YES	
Product category	predefined list	user entry	Initialization form	N/A	YES	NO		YES	YES	
Legislation framework	predefined list	user entry	Initialization form	N/A	YES	NO		YES	YES	
Legislation entry into force date	date	predefined	N/A	N/A	N/A	N/A		YES	YES	
Legislation expiry date	date	predefined	N/A	N/A	N/A	N/A		YES	YES	
Applicant id	integer	system assigned	N/A	N/A	N/A	N/A		YES	YES	
Applicant status flag	predefined list	calculated	N/A	N/A	N/A	N/A		NO	YES	
Company name	free text	user entry	Applicant details	N/A	YES	NO		NO	YES	Applicant details shall be filled out during applicant registration process
Role of applicant	predefined list	user entry	Applicant details	N/A	YES	NO		NO	YES	
Contact person's name	free text	user entry	Applicant details	N/A	YES	NO		NO	YES	
Contact person's title	free text	user entry	Applicant details	N/A	NO	NO		NO	YES	
Address: Street, number	free text	user entry	Applicant details	N/A	YES	NO		NO	YES	
Address: City	free text	user entry	Applicant details	N/A	YES	YES	The city, postal code and	NO	YES	

Data point name	Type	calculated / user entry / system assigned	Input form (entered or displayed)	Product category	Entry req.	Valid. Req.	validation rules	Download by manufacturer/importer user	Download by program manager user	Comment
							country must return a valid address in "mapquest.com" - API available			
Address: Postal code	free text	user entry	Applicant details	N/A	YES	YES		NO	YES	
Address: state/province	free text	user entry	Applicant details	N/A	NO	NO		NO	YES	
Address: Country	predefined list	user entry	Applicant details	N/A	YES	YES		NO	YES	
Contact phone landline	free text	user entry	Applicant details	N/A	YES	NO		NO	YES	
Contact phone mobile	free text	user entry	Applicant details	N/A	NO	NO		NO	YES	
Contact fax	free text	user entry	Applicant details	N/A	NO	NO		NO	YES	
Contact email	free text	user entry	Applicant details	N/A	YES	YES	valid domain	NO	YES	
Certificate of incorporation	binary file	user entry	Applicant details (registration only)	N/A	YES	NO		NO	YES	
Tax clearance certificate	binary file	user entry	Applicant details (registration only)	N/A	YES	NO		NO	YES	
Registration id	integer	system assigned	N/A	All	N/A	N/A		YES	YES	
Registration date	date	system assigned	N/A	All	N/A	N/A		YES	YES	
Registration expiry date	date	system assigned	N/A	All	N/A	N/A		YES	YES	
Registration Status flag	predefined list	calculated	N/A	All	N/A	N/A		YES	YES	
Country of application	predefined list	user entry	Product details - General	All	YES	NO		YES	YES	
Performance standard (AC)	predefined list	calculated	Product details - General	All	YES	NO		YES	YES	
Brand name	list, updateable by end-user	user entry	Product details - General	All	YES	NO		YES	YES	
Model number	free text	user entry	Product details - General	All	YES	NO		YES	YES	

Data point name	Type	calculated / user entry / system assigned	Input form (entered or displayed)	Product category	Entry req.	Valid. Req.	validation rules	Download by manufacturer/importer user	Download by program manager user	Comment
Global Trade Item Number (GTIN)	integer	user entry	Product details - General	All	NO	YES	TBD	YES	YES	
Manufacturer's name	list, updateable by end-user	user entry	Product details - General	All	YES	NO		YES	YES	
Country of manufacture	predefined list	user entry	Product details - General	All	YES	NO		YES	YES	
Date of product availability	date	user entry	Product details - General	All	YES	NO		YES	YES	
Website with product information	free text	user entry	Product details - General	All	NO	YES	website must not return an error page	YES	YES	optional
QR code	free-text (hyperlink)	calculated	Product details - General	All	N/A	N/A		YES	YES	calculated from PRS unique product data page
HS code	predefined list	calculated	Product details - General	All	N/A	N/A		YES	YES	
Climate group	predefined list	calculated	Prod. details - Appl. Specific, U4E model regulation	AC specific	YES	NO		YES	YES	
Operating modes	predefined list	calculated	Prod. details - Appl. Specific, U4E model regulation	AC specific	YES	NO		YES	YES	
Type of unit	predefined list	user entry	Prod. details - Appl. Specific, U4E model regulation	AC specific	YES	NO		YES	YES	
Heat source medium	predefined list	user entry	Prod. details - Appl. Specific, U4E model regulation	AC specific	YES	NO		YES	YES	
Heat sink medium	predefined list	user entry	Prod. details - Appl. Specific, U4E model regulation	AC specific	YES	NO		YES	YES	
Variable output capacity (inverter driven)?	Yes/No	user entry	Prod. details - Appl. Specific, U4E model regulation	AC specific	YES	NO		YES	YES	

Data point name	Type	calculated / user entry / system assigned	Input form (entered or displayed)	Product category	Entry req.	Valid. Req.	validation rules	Download by manufacturer/importer user	Download by program manager user	Comment
Cooling mode - rated power (electrical)	floating point number	user entry	Prod. details - Appl. Specific, U4E model regulation	AC specific	YES	NO		YES	YES	
Cooling mode - rated output capacity (cooling)	floating point number	user entry	Prod. details - Appl. Specific, U4E model regulation	AC specific	YES	YES	within country's applicable MEPS legislation (update)	YES	YES	
Cooling mode - rated EER	floating point number	user entry	Prod. details - Appl. Specific, U4E model regulation	AC specific	YES	YES	between 1.5 and 7	YES	YES	
Heating mode - rated power (electrical)	floating point number	user entry	Prod. details - Appl. Specific, U4E model regulation	AC specific	YES	NO		YES	YES	
Heating mode - rated output capacity (heating)	floating point number	user entry	Prod. details - Appl. Specific, U4E model regulation	AC specific	YES	YES	within country's applicable MEPS legislation (update)	YES	YES	
Heating mode - rated COP	floating point number	user entry	Prod. details - Appl. Specific, U4E model regulation	AC specific	YES	YES	between 2.5 and 8	YES	YES	
Refrigerant type	predefined list	user entry	Prod. details - Appl. Specific, U4E model regulation	AC specific	YES	NO		YES	YES	
Refrigerant charge	floating point number	user entry	Prod. details - Appl. Specific, U4E model regulation	AC specific	YES	YES	between 0.5 and 15 (update with legislation)	YES	YES	
Is refrigerant pre-charged in appliance?	Yes/No	user entry	Prod. details - Appl. Specific, U4E model regulation	AC specific	YES	NO		YES	YES	
Refrigerant GWP	integer	calculated	Prod. details - Appl. Specific, U4E model regulation	AC specific	N/A	N/A		YES	YES	
Refrigerant ODP	integer	calculated	Prod. details - Appl. Specific, U4E model regulation	AC specific	N/A	N/A		YES	YES	

Data point name	Type	calculated / user entry / system assigned	Input form (entered or displayed)	Product category	Entry req.	Valid. Req.	validation rules	Download by manufacturer/importer user	Download by program manager user	Comment
Test method	predefined list	user entry	Test details - U4E model reg	AC specific	YES	NO		YES	YES	
Test laboratory	list, updateable by end-user	user entry	Test details - U4E model reg	AC specific	YES	NO		YES	YES	
Test laboratory accreditation	predefined list	user entry	Test details - U4E model reg	AC specific	YES	NO		YES	YES	
Test report number	free text	user entry	Test details - U4E model reg	AC specific	YES	NO		YES	YES	
Test report date	date	user entry	Test details - U4E model reg	AC specific	YES	NO		YES	YES	
Test report - serial number of test units	free text	user entry	Test details - U4E model reg	AC specific	YES	NO		YES	YES	
Tested input power - cooling mode (standard temperature as per ISO 16358-1)	floating point number	user entry	Test details - U4E model reg	AC specific	YES	YES	±20% of rated rated output capacity (cooling)	YES	YES	
Tested capacity - cooling mode (standard temperature as per ISO 16358-1)	floating point number	user entry	Test details - U4E model reg	AC specific	YES	YES	±20% of rated input power (cooling)	YES	YES	
Tested EER (standard temperature)	floating point number	calculated	Test details - U4E model reg	AC specific	N/A	N/A		YES	YES	
Cooling seasonal energy consumption	floating point number	user entry	Test details - U4E model reg	AC specific	YES	YES	TBD	YES	YES	
Cooling seasonal total load	floating point number	user entry	Test details - U4E model reg	AC specific	YES	YES	TBD	YES	YES	
Tested input power - heating mode	floating point number	user entry	Test details - U4E model reg	AC specific	YES	YES	±20% of rated input power (heating)	YES	YES	

Data point name	Type	calculated / user entry / system assigned	Input form (entered or displayed)	Product category	Entry req.	Valid. Req.	validation rules	Download by manufacturer/importer user	Download by program manager user	Comment
Tested capacity - heating mode	floating point number	user entry	Test details - U4E model reg	AC specific	YES	YES	±20% of rated rated output capacity (heating)	YES	YES	
Tested COP	floating point number	calculated	Test details - U4E model reg	AC specific	N/A	N/A		YES	YES	
Extremet T (-15C) Tested capacity- heating mode	floating point number	user entry	Test details - U4E model reg	AC specific	YES	NO		YES	YES	
Extremet T (-15C) Tested input power - heating mode	floating point number	user entry	Test details - U4E model reg	AC specific	YES	NO		YES	YES	
Extreme T Tested COP	floating point number	calculated	Test details - U4E model reg	AC specific	N/A	N/A		YES	YES	
Heating seasonal energy consumption	floating point number	user entry	Test details - U4E model reg	AC specific	YES	YES	TBD	YES	YES	
Heating seasonal total load	floating point number	user entry	Test details - U4E model reg	AC specific	YES	YES	TBD	YES	YES	
Annual performance factor heating	floating point number	user entry	Test details - U4E model reg	AC specific	N/A	N/A		YES	YES	
Claimed annual performance factor cooling (Seasonal Energy Efficiency Ratio - SEER)	floating point number	calculated	Performance claims	AC specific	YES	YES	TBD	YES	YES	
Minimum permitted annual performance factor	floating point number	calculated	Performance claims	AC specific	N/A	N/A		YES	YES	
Does this product meet the min. energy performance requirements?	Yes/No	calculated	Performance claims	AC specific	N/A	N/A		YES	YES	

Data point name	Type	calculated / user entry / system assigned	Input form (entered or displayed)	Product category	Entry req.	Valid. Req.	validation rules	Download by manufacturer/importer user	Download by program manager user	Comment
Energy Efficiency Rating (label)	predefined list	calculated	Performance claims	AC specific	N/A	N/A		YES	YES	
Does the product meet the refrigerant requirements?	Yes/No	calculated	Performance claims	AC specific	N/A	N/A		YES	YES	
Test report file	file	user entry	File uploads	All	YES	YES	valid file format	NO	YES	
Letter of authority	file	user entry	File uploads	All	YES	YES	valid file format	NO	YES	
Product image	image	user entry	File uploads	All	YES	YES	valid file format	NO	YES	
Reference number	free text	user entry	Fee processing	All	NO	NO		YES	YES	
Declaration confirmation	Yes/No	user entry	Fee processing	All	YES	N/A		YES	YES	
Registration fee paid online	Yes/No	system assigned	Fee processing	All	N/A	N/A		NO	YES	
Registration fee paid offline	Yes/No	user entry (Level 5 only)	Fee processing	All	YES	NO		NO	YES	
Registration fee paid offline user confirmation	Yes/No	user entry	Fee processing	All	YES	NO		NO	YES	
Registration fee paid	Yes/No	calculated	Fee processing	All	N/A	N/A		YES	YES	
Performance Standard (refrigerator)	predefined list	calculated	Prod. details - Appl. Specific, U4E model regulation	Refrigerator specific	N/A	N/A		YES	YES	
Type of refrigerating appliance	predefined list	user entry	Prod. details - Appl. Specific, U4E model regulation	Refrigerator specific	YES	NO		YES	YES	
Has the appliance automatic de-frost capability?	Yes / No	user entry	Prod. details - Appl. Specific, U4E model regulation	Refrigerator specific	YES	NO		YES	YES	
Number of compartments	integer	user entry	Prod. details - Appl. Specific, U4E model regulation	Refrigerator specific	YES	YES	between 1 and 4 (TBD)	YES	YES	

Data point name	Type	calculated / user entry / system assigned	Input form (entered or displayed)	Product category	Entry req.	Valid. Req.	validation rules	Download by manufacturer/importer user	Download by program manager user	Comment
Compartment details - type	predefined list	user entry	Prod. details - Appl. Specific, U4E model regulation	Refrigerator specific	YES	NO		YES	YES	for each compartment
Compartment details - design operating temperature	integer	user entry	Prod. details - Appl. Specific, U4E model regulation	Refrigerator specific	YES	YES	TBD	YES	YES	for each compartment
Compartment details - Net storage volume	floating point number	user entry	Prod. details - Appl. Specific, U4E model regulation	Refrigerator specific	YES	YES	TBD	YES	YES	for each compartment
Total fresh food volume	floating point number	calculated	Prod. details - Appl. Specific, U4E model regulation	Refrigerator specific	N/A	N/A		YES	YES	
Total frozen food volume	floating point number	calculated	Prod. details - Appl. Specific, U4E model regulation	Refrigerator specific	N/A	N/A		YES	YES	
Automatic icemaker?	Yes / No	user entry	Prod. details - Appl. Specific, U4E model regulation	Refrigerator specific	YES	NO		YES	YES	
Refrigerant type	predefined list	user entry	Prod. details - Appl. Specific, U4E model regulation	Refrigerator specific	YES	NO		YES	YES	
Refrigerant charge	floating point number	user entry	Prod. details - Appl. Specific, U4E model regulation	Refrigerator specific	YES	YES	TBD	YES	YES	
Blowing agent type	predefined list	user entry	Prod. details - Appl. Specific, U4E model regulation	Refrigerator specific	YES	NO		YES	YES	
Refrigerant GWP	integer	calculated	Prod. details - Appl. Specific, U4E model regulation	Refrigerator specific	N/A	N/A		YES	YES	
Refrigerant ODP	integer	calculated	Prod. details - Appl. Specific, U4E model regulation	Refrigerator specific	N/A	N/A		YES	YES	

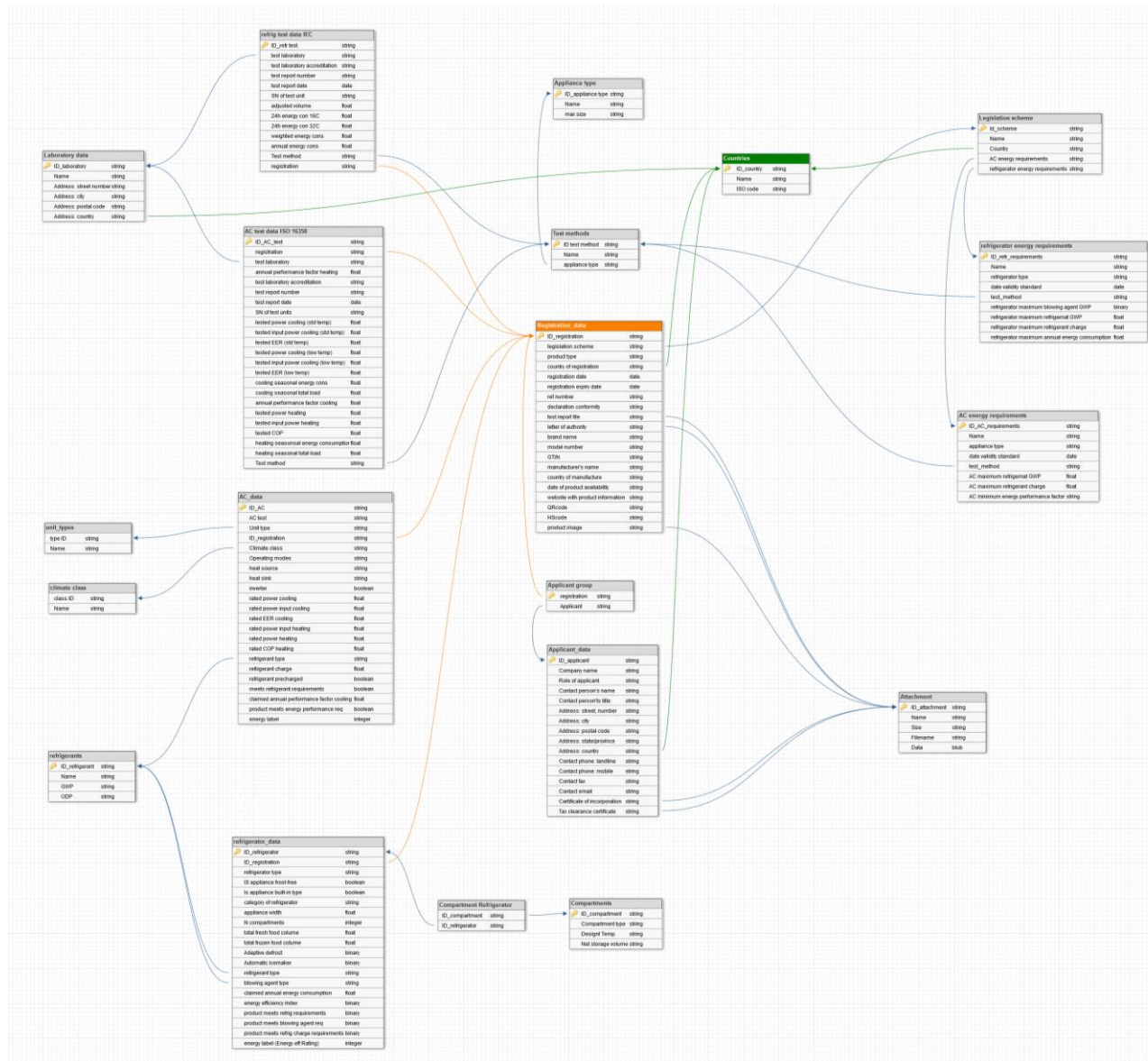
Data point name	Type	calculated / user entry / system assigned	Input form (entered or displayed)	Product category	Entry req.	Valid. Req.	validation rules	Download by manufacturer/importer user	Download by program manager user	Comment
Blowing Agent GWP	integer	calculated	Prod. details - Appl. Specific, U4E model regulation	Refrigerator specific	N/A	N/A		YES	YES	
Blowing Agent ODP	integer	calculated	Prod. details - Appl. Specific, U4E model regulation	Refrigerator specific	N/A	N/A		YES	YES	
Does the roduct meet the refrigerant requirements?	Yes/No	calculated	Prod. details - Appl. Specific, U4E model regulation	Refrigerator specific	N/A	N/A		YES	YES	
Does the roduct meet the blowing agent requirements?	Yes/No	calculated	Prod. details - Appl. Specific, U4E model regulation	Refrigerator specific	N/A	N/A		YES	YES	
Does the roduct meet the refrigerant charge limit requirements?	Yes/No	calculated	Prod. details - Appl. Specific, U4E model regulation	Refrigerator specific	N/A	N/A		YES	YES	
Test method	predefined list	user entry	Test details - U4E model reg	Refrigerator specific	YES	NO		YES	YES	
Test laboratory	list, updateable by end-user	user entry	Test details - U4E model reg	Refrigerator specific	YES	NO		YES	YES	
Test laboratory accreditation	predefined list	user entry	Test details - U4E model reg	Refrigerator specific	YES	NO		YES	YES	
Test report number	free text	user entry	Test details - U4E model reg	Refrigerator specific	YES	NO		YES	YES	
Test report date	date	user entry	Test details - U4E model reg	Refrigerator specific	YES	NO		YES	YES	
Test report - serial number of test units	free text	user entry	Test details - U4E model reg	Refrigerator specific	YES	NO		YES	YES	
Adjusted volume	floating point number	calculated	Test details - U4E model reg	Refrigerator specific	N/A	N/A		YES	YES	
24h energy consumption 16C	floating point number	user entry	Test details - U4E model reg	Refrigerator specific	YES	YES	TBD	YES	YES	

Data point name	Type	calculated / user entry / system assigned	Input form (entered or displayed)	Product category	Entry req.	Valid. Req.	validation rules	Download by manufacturer/importer user	Download by program manager user	Comment
24h energy consumption 32C	floating point number	user entry	Test details - U4E model reg	Refrigerator specific	YES	YES	TBD	YES	YES	
Weighted energy consumption	floating point number	calculated	Test details - U4E model reg	Refrigerator specific	N/A	N/A		YES	YES	
Annual energy consumption - calculated	floating point number	calculated	Test details - U4E model reg	Refrigerator specific	N/A	N/A		YES	YES	
Claimed annual energy consumption	floating point number	user entry	Performance claims	Refrigerator specific	YES	YES		YES	YES	
Does this product comply with storage temperature requirements within the standard?	Yes/No	calculated	Performance claims	Refrigerator specific	NO	NO		YES	YES	
Maximum permitted annual energy consumption	floating point number	calculated	Performance claims	Refrigerator specific	N/A	N/A		YES	YES	
Does this product meet the min. energy performance requirements?	Yes/No	calculated	Performance claims	Refrigerator specific	N/A	N/A		YES	YES	
Energy Efficiency Index	floating point number	calculated	Performance claims	Refrigerator specific	N/A	N/A		YES	YES	
Energy Efficiency Rating (label)	predefined list	calculated	Performance claims	Refrigerator specific	N/A	N/A		YES	YES	
MVE action	predefined list	user entry (Level 4&5 only)	MVE data	All	YES	NO		NO	YES	
MVE action quantity	integer	user entry (Level 4&5 only)	MVE data	All	CONDITIONAL	NO		NO	YES	

Data point name	Type	calculated / user entry / system assigned	Input form (entered or displayed)	Product category	Entry req.	Valid. Req.	validation rules	Download by manufacturer/importer user	Download by program manager user	Comment
MVE comment	free text	user entry (Level 4&5 only)	MVE data	All	NO	NO		NO	YES	
MVE attachment	file	user entry (Level 4&5 only)	MVE data	All	CONDITIONAL	NO		NO	YES	
Currency abbreviation	free text	user entry (Level 5 only)	Administration	N/A	N/A	N/A		NO	NO	
Energy price	floating point number	user entry (Level 5 only)	Administration	N/A	N/A	N/A		NO	NO	

5. Database schema

Available as high-res image.



6. User levels

A total of five user levels have been defined. These generally correspond to the various user interfaces indicated in the previous sections, except in the case of Manufacturer/Importer, which has two different

Functionality	Level 5 Program manager	Level 4 Customs officials	Level 3 Manufacturer / Importer (Read/Write access)	Level 2 Manufacturer / Importer (Read-only access)	Level 1 General Public
Platform access through login	Yes	Yes	Yes	Yes	No
Data access rights	All users	All users	Only account	Only account	Only account
Own account self-management	Yes	Yes	Yes	Yes	Yes
Primary database access	Yes	Yes	Yes	Yes	No
Secondary database access (mirror of primary with scaled-down data fields)	No	No	No	No	Yes
Invite users to own account	No	No	Yes	No	No
Invite users to other Level 3 accounts	Yes	No	No	No	No
Create Level 5 accounts	Yes	No	No	No	No
Create Level 4 accounts	Yes	No	No	No	No
Level 2&3 accounts approval & removal	Yes	No	No	No	No
Bulk product upload	No	No	Yes	No	No
Download own data in spreadsheet format	Yes (see data points flag)	No	Yes (see data points flag)	Yes (see data points flag)	No
Submission of products to registry (create new, edit applications in process)	No	No	Yes	No	No
Electricity tariff edit	Yes	No	No	No	No
Bulk upload disable switch	Yes	No	No	No	No
Access MVE actions	Yes, all	Yes, only Product Import and Product export	Yes, only "In-country product sales"	No	No
Dashboard page (Level 5)	Yes	No	No	No	No
Upload files to "About" section	Yes	No	No	No	No
Access contextual help page	Yes	No	No	No	No

7. Tables

7.1. Multi-status flags

Applicant status flag	Registration status flag	Role of applicant
Draft (invitations only)	Draft	Marketing manager
Pending	Pending	Product registration manager
Approved	Approved	Compliance officer
Rejected	Rejected	Data entry assistant
	Expired	Other
	Revoked	

7.2. Codes, norms, legislations

Legislation framework	Performance Standard		Test methods	
	AC	Refrigerators	AC	Refrigerators
U4E model regulations 2019	U4E model regulation AC 2019	U4E model regulation Refrigerators 2019	ISO 16358-1: 2013	IEC 62552:2015

7.3. HS Codes according to Product Categories, sub-categories

Product category			
Fridges		Air conditioners	
Subcategory (type of refrigeration appliance)	HS Code	Subcategory (combination of type of unit & operating mode)	HS Code
Refrigerators	841821	Ductless split - air conditioner	841510
Refrigerator-Freezers	TBD	Ductless split - reversible air conditioner (AC + heat pump)	841581
Freezers	TBD	Self-contained - air conditioner	841510
		Self-contained - reversible air conditioner (AC + heat pump)	TBD
		Portable - air conditioner	TBD
		Portable - reversible air conditioner (AC + heat pump)	841581

7.4. AC tables

Operating modes (AC)	Heat source medium (AC)	Heat sink medium (AC)	Type of unit	Adjustable output capacity?	Energy Efficiency Rating (AC) U4E model regulation 2019
Cooling only	Air	Air	Ductless (split unit)	No, fixed capacity	High Efficiency
Heating & Cooling	Water	Water	Self-contained (window-type)	Yes, two stage	Intermediate
			Portable	Yes, multi-stage	Low Efficiency
				Yes, variable (inverter)	

Climate Group (primary)	Climate sub-group (secondary)	Sub-group Description
1	0A	Extremely Hot-Humid
2	0B	Extremely Hot-Dry
1	1A	Very Hot-Humid
2	1B	Very Hot-Dry
1	2A	Hot-Humid
1	2B	Hot-Dry
1	3A	Warm-Humid
1	3B	Warm-Dry
1	3C	Warm-Marine
3	4A	Mixed-Humid
3	4B	Mixed-Dry
3	5A	Cool-Humid
3	5B	Cool-Dry
3	6A	Cold-Humid
3	6B	Cold-Dry
3	7	Very Cold
3	8	Subarctic/Arctic

7.5. Refrigerator tables

Type of refrigerator	Energy Efficiency Rating (refrigerator)	Compartment type (refrigerator)
Refrigerators	High Efficiency	Fresh food

Refrigerator-Freezers	Intermediate	Frozen food (one star)
Freezers	Low Efficiency	Frozen food (two star)
		Frozen food (three star)
		Frozen food (four star)

7.6. ODP & GWP of refrigerants and blowing agents

The lists of refrigerants and blowing agents are displayed in two sections, one of the most common refrigerants or blowing agents on top, followed by a more comprehensive list of refrigerants and blowing agents below.

The GWP values are temporary and have been obtained from the U4E Country Energy Assessments Methodology.

Refrigerants				Blowing Agents			
Most common	Name	ODP	GWP	Most common	Name	ODP	GWP
Yes	R-134a	0	1300	Yes	HCFC-141b	0.11	725
Yes	R600A	0	3	Yes	HCFC-142b	0.065	2310
Yes	R22	0.055	1760	No	TBD	TBD	TBD
Yes	R290	0	3				
Yes	R407C	0	1774				
Yes	R410A	0	1924				
Yes	R32	0	677				
No	TBD	TBD	TBD				

7.7. MVE Actions

MVE action
Offline fee payment for product registration.
Product registration approval
In-country product sales
Product import
Product export
3rd party test
Enforcement actions
Product registration revoked

7.8. Country weather groups

Country	Tool climate group	Tool climate sub-group
Afghanistan	2	4A
Albania	1	3A
Algeria	1	3A
Angola	1	1A
Antigua and Barbuda	1	0A
Argentina	1	3A
Armenia	3	4A
Azerbaijan	3	4B
Bahamas	1	1A
Bahrain	2	0B
Bangladesh	1	1A
Barbados	1	0A
Belarus	3	6A
Belize	1	0A
Benin	1	0A
Bhutan	1	3A
Bolivia	1	1A
Bosnia and Herzegovina	3	4A
Botswana	1	2B
Brazil	1	2A
Brunei Darussalam	1	0A
Burkina Faso	1	0B
Burundi	1	1A
Cambodia	1	0A
Cameroon	1	0A
Cape Verde	2	1B
Central African Republic	1	0A
Chad	2	0B
Chile	1	3C
China	1	2A
Colombia	1	3A
Comoros	1	0A
Costa Rica	1	2A
Côte d'Ivoire	1	1A

Cuba	1	1A
Democratic People's Republic of Korea	3	5A
Democratic Republic of the Congo	1	1A
Djibouti	2	0B
Dominica	1	0A
Dominican Republic	1	0A
Ecuador	1	3A
Egypt	1	2B
El Salvador	1	0A
Equatorial Guinea	1	0A
Eritrea	2	0B
Ethiopia	1	2A
Federated States of Micronesia	1	0A
Fiji	1	1A
Gabon	1	0A
Gambia	1	0A
Georgia	3	4A
Ghana	1	0A
Grenada	1	0A
Guatemala	1	2A
Guinea	1	0A
Guinea-Bissau	1	1A
Guyana	1	0A
Haiti	1	0A
Honduras	1	2A
India	1	0A
Indonesia	1	0A
Iran	1	3B
Iraq	2	1B
Israel	1	2A
Jamaica	1	0A
Jordan	1	3B
Kazakhstan	3	5A
Kenya	1	2A
Kiribati	1	0A
Kuwait	2	0B
Kyrgyz Republic	3	5A
Lao People's Democratic Republic	1	0A
Lebanon	1	2A
Lesotho	1	3B
Liberia	1	1A

Libya	1	2B
Macedonia, FYR	3	4A
Madagascar	1	3A
Malawi	1	3A
Malaysia	1	0A
Maldives	1	0A
Mali	1	0A
Marshall Islands	1	0A
Mauritania	1	0B
Mauritius	1	1A
Mexico	1	3A
Mongolia	3	8
Montenegro	3	3A
Morocco	1	3A
Mozambique	1	1A
Myanmar	1	0A
Namibia	1	2B
Nepal	1	2A
Nicaragua	1	0A
Niger	1	0A
Nigeria	1	0A
Oman	2	0B
Pakistan	2	1B
Panama	1	0A
Papua New Guinea	1	0A
Paraguay	1	2A
Peru	1	2B
Philippines	1	0A
Qatar	2	0B
Republic of Congo	1	1A
Republic of Moldova	3	5A
Russia	3	6A
Rwanda	1	2A
Saint Kitts and Nevis	1	0A
Saint Lucia	1	0A
Saint Vincent and the Grenadines	1	0A
Samoa	1	0A
Sao Tome and Principe	1	1A
Saudi Arabia	2	0B
Senegal	2	1B
Serbia	3	4A

Seychelles	1	0A
Sierra Leone	1	1A
Singapore	1	0A
Solomon Islands	1	0A
Somalia	1	0A
South Africa	1	3C
South Sudan	2	0B
Sri Lanka	1	0A
State of Palestine	1	3A
Sudan	1	0A
Suriname	1	0A
Swaziland	1	3A
Syrian Arab Republic	1	3B
Tajikistan	1	3A
Thailand	1	0A
Timor-Leste	1	0A
Togo	1	0A
Tonga	1	1A
Trinidad and Tobago	1	0A
Tunisia	1	2A
Turkey	3	4A
Turkmenistan	1	3B
Uganda	1	2A
Ukraine	3	5A
United Arab Emirates	2	0B
United Republic of Tanzania	1	1A
Uruguay	1	3A
Uzbekistan	3	4B
Vanuatu	1	1A
Venezuela	2	0B
Vietnam	1	0A
Yemen	1	3B
Zambia	1	3A
Zimbabwe	1	3A

7.9. Weather data

Temperature bins for calculating CSPF in Group 1 countries

Outdoor temperature	Reference	0A	1A	2A	3A	2B	3B	3C
°C	Bin hours	Bin hours	Bin hours	Bin hours	Bin hours	Bin hours	Bin hours	Bin hours
21	ISO 16358-1: 2013	5	33	49	32	30	34	34
22		23	86	92	62	64	60	60
23		76	167	128	83	102	84	73
24		205	250	161	99	138	98	75
25		383	327	191	103	169	108	74
26		537	360	210	101	201	109	60
27		646	388	219	93	216	109	50
28		671	395	212	85	221	105	41
29		630	371	188	79	217	97	32
30		596	332	149	72	203	88	27
31		501	285	118	63	200	75	18
32		361	227	86	52	191	61	12
33		206	153	58	41	180	50	6
34		86	90	37	29	147	36	3
35		32	55	22	18	113	27	2
36		11	35	13	11	80	16	1
37		3	22	8	7	53	10	0
38		1	16	4	4	34	6	0
39		0	12	3	2	21	3	0
40		0	10	1	1	13	1	0
41		0	7	1	1	8	1	0
42		0	5	1	0	4	0	0
43		0	3	0	0	3	0	0
44		0	1	0	0	1	0	0
45		0	0	0	0	0	0	0
46		0	0	0	0	0	0	0
47		0	0	0	0	0	0	0
48		0	0	0	0	0	0	0
49		0	0	0	0	0	0	0
50		0	0	0	0	0	0	0
Total	1817	4973	3630	1951	1038	2609	1178	568

Temperature bins for calculating CSPF in Group 2 countries

Outdoor temperature	Reference	0B	1B
°C	Bin hours	Bin hours	Bin hours
21	ISO 16358-1: 2013/Amd.1: 2019	18	22
22		40	47
23		74	83
24		130	113
25		198	151
26		241	182
27		290	228
28		329	253
29		364	277
30		381	289
31		388	289
32		393	287
33		372	288
34		307	257
35		255	234
36		213	189
37		185	164
38		155	134
39		131	116
40		106	97
41		88	78
42		71	59
43		55	40
44		41	22
45		27	11
46		19	4
47		11	1
48		6	0
49		3	0
50		1	0
Total	6492	4892	3915

Temperature bins for calculating CSPF in Group 3 countries

Outdoor temperature	Reference	4A	5A	6A	4B	5B	6B	7	8
°C	Bin hours	Bin hours	Bin hours	Bin hours	Bin hours	Bin hours	Bin hours	Bin hours	Bin hours
21	16	20	20	13	22	13	18	14	10
22	31	39	39	22	45	26	36	25	19
23	44	55	55	28	67	38	52	35	25
24	54	70	67	30	85	49	65	41	30
25	61	82	76	30	100	57	75	43	29
26	65	90	80	29	109	64	82	43	30
27	66	95	79	26	115	69	79	41	28
28	64	97	78	22	115	72	71	36	24
29	59	93	70	17	117	73	60	28	21
30	55	91	62	12	115	74	50	23	17
31	48	83	49	8	111	72	35	18	13
32	42	74	38	5	104	70	25	13	9
33	35	60	28	3	92	67	15	9	8
34	26	42	19	1	72	58	7	6	5
35	19	28	12	1	56	49	4	3	3
36	13	15	6	1	40	39	2	1	2
37	8	8	3	0	26	28	1	0	1
38	5	4	2	0	15	19	0	0	0
39	2	2	1	0	7	11	0	0	0
40	1	1	0	0	3	6	0	0	0
41	0	0	0	0	2	3	0	0	0
42	0	0	0	0	0	1	0	0	0
43	0	0	0	0	0	0	0	0	0
44	0	0	0	0	0	0	0	0	0
45	0	0	0	0	0	0	0	0	0
46	0	0	0	0	0	0	0	0	0
47	0	0	0	0	0	0	0	0	0
48	0	0	0	0	0	0	0	0	0
49	0	0	0	0	0	0	0	0	0
50	0	0	0	0	0	0	0	0	0
Total	714	1049	784	248	1418	958	677	379	274

Temperature bins for calculating HSPF in Group 1 countries

Outdoor temperature	Reference	1A	2A	3A	2B	3B	3C
°C	Bin hours	Bin hours	Bin hours	Bin hours	Bin hours	Bin hours	Bin hours
-7	ISO 16358-2: 2013	0	0	0	0	1	0
-6		0	0	1	0	2	0
-5		0	0	2	0	4	0
-4		0	0	4	0	7	0
-3		0	0	8	1	12	1
-2		0	1	13	1	19	3
-1		0	2	20	2	28	5
0		0	2	16	3	24	8
1		0	5	41	7	46	15
2		0	8	54	13	63	23
3		0	12	72	20	78	34
4		0	18	97	32	98	49
5		1	25	126	45	117	68
6		1	34	154	58	137	89
7		3	49	187	72	159	117
8		5	55	201	82	165	131
9		7	64	208	90	162	143
10		10	67	216	90	168	159
11		13	71	211	94	155	163
12		15	72	196	91	150	179
13	17	70	164	82	138	191	
14	17	65	135	70	119	184	
15	15	53	95	49	96	139	
16	10	33	49	28	53	76	
Total	2866	114	706	2270	930	2001	1777

Temperature bins for calculating HSPF in Group 2 countries

Outdoor temperature	Reference	0B	1B
°C	Bin hours	Bin hours	Bin hours
-7	ISO 16358-2: 2013	0	0
-6		0	0
-5		0	0
-4		0	0
-3		0	0
-2		0	1
-1		0	1
0		0	1
1		0	3
2		1	5
3		2	9
4		4	15
5		6	26
6		8	36
7		11	48
8		15	58
9		18	67
10		22	68
11		25	70
12		27	68
13	27	63	
14	25	51	
15	20	39	
16	12	20	
Total	2866	223	649

Temperature bins for calculating HSPF in Group 3 countries

Outdoor temperature	Reference	4A	5A	6A	4B	5B	6B	7	8
°C	Bin hours	Bin hours	Bin hours	Bin hours	Bin hours	Bin hours	Bin hours	Bin hours	Bin hours
-7	108	47	109	137	50	86	158	144	134
-6	119	62	127	158	60	102	158	148	142
-5	135	84	143	185	81	122	157	160	148
-4	150	112	169	200	102	139	166	163	150
-3	169	144	192	232	129	173	174	162	148
-2	191	176	225	265	160	204	172	168	160
-1	212	204	249	308	186	246	171	169	163
0	162	177	194	247	184	173	94	113	120
1	252	253	287	424	217	318	183	175	164
2	239	249	259	371	227	317	167	162	162
3	224	252	236	301	226	315	160	157	147
4	218	255	228	264	232	305	154	157	151
5	261	309	266	299	281	376	188	189	187
6	239	286	241	258	267	329	177	172	187
7	218	262	215	232	241	299	163	164	172
8	197	237	197	213	209	259	147	154	165
9	176	209	174	192	185	225	138	143	149
10	158	187	158	178	161	196	122	129	135
11	136	158	135	156	137	158	108	120	121
12	116	133	116	142	114	127	91	103	102
13	94	107	94	115	94	97	75	88	82
14	73	83	74	87	70	69	60	70	71
15	49	56	51	58	49	45	41	49	44
16	24	28	26	28	25	21	22	24	21
Total	3920	4070	4165	5050	3687	4701	3246	3283	3225