SDR
PORTUGAL

SDR TECHNICAL SPECIFICATIONS

- RVM

RULES FOR RVM CERTIFICATION

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Introduction

Automatic collection takes place through reverse *vending* machines (hereinafter referred to simply as RVMs). The RVM operation is integrated through SDR Portugal's IT system and is characterised by:

- Packaging eligibility is confirmed automatically from a centralised database
- The counting of packaging for the purpose of returning it to the deposit and, where applicable, for payment of the Handling Value, is carried out automatically through the RVM's own software.
- The packaging is compacted and rendered unusable immediately after counting, for the purposes of fraud prevention and optimising the logistics of its storage and transport.
- Each bag of compacted packaging must be properly closed with a clamp supplied by SDR Portugal, which will have a unique code.

This document establishes the specifications for the certification of RVMs to be included in the deposit and refund system (SDR) network managed by SDR Portugal and the requirements for their proper and efficient operation at Automatic Collection Points. SDR Portugal reserves the right to revise and update these specifications at any time.

For a better understanding of this document, we recommend consulting the "SDR Glossary", available at **SDRPortugal.pt**, which contains the definition of technical terms, as well as acronyms and abbreviations used throughout the text.

1 Certification of automatic collection machines (RVM)

1.1 Approval of RVM suppliers

SDR Portugal has pre-qualified the main RVM suppliers represented on the European market for participation in the Portuguese SDR, with whom it has been in regular contact to clarify available technologies and good practices for the efficient operation of the SDR.

After the start-up and stabilisation of the SDR operation, SDR Portugal should consider opening new periods for the qualification of RVM suppliers.

The identification and contact details of approved RVM suppliers are publicised through the **"List of RVM Suppliers and Models Certified by SDR Portugal"**, available at **SDRPortugal.pt**.

1.2 Certification of RVM

All RVM models used in the SDR must fulfil the requirements established by SDR Portugal and are previously submitted for certification by SDR Portugal or through an entity accredited by SDR Portugal for this purpose.

It is the responsibility of the RVM Provider to obtain certification for each RVM model to be integrated into the SDR network by submitting the respective application to SDR Portugal, together with the relevant documents to demonstrate compliance with the technical specifications.

The RVM Provider must take into account the time required to complete the certification process, without which the RVMs of the model in question cannot be connected to the SDR.

Any change to a certified RVM that has an impact on compliance with these specifications requires the certification process to be renewed with SDR Portugal.

Failures to fulfil the requirements that were not detected during the RVM certification process must be corrected immediately after they are identified. If this is not possible, and if they jeopardise the proper functioning of the SDR, SDR Portugal has the right to temporarily suspend the RVM certificate and restart the certification process.

In the event that the RVM Supplier stops supplying *hardware*, *software* or other support for a certified RVM model that is in use and within its useful life, it must immediately inform SDR Portugal, as well as all Collection Points where the same model is used. At the request of SDR Portugal, the RVM Supplier is obliged to replace all RVMs of the model in question that are in use at the SDR within 12 months. At the end of the 12-month period, if replacement is not ensured, SDR Portugal has the right to disconnect the corresponding RVMs from the SDR.

All costs related to ensuring the conformity of the certified RVM models in accordance with the requirements established by SDR Portugal will be borne by the RVM supplier, including costs that may result from changes to the requirements established by SDR Portugal, to ensure the necessary adaptations or the replacement of installed RVMs whose change is not feasible. The support of costs relating to changes that are not the result of legal requirements and that represent changes In the case of structural changes to existing hardware or software, these must be agreed between the VMR supplier and SDR Portugal.

The RVM supplier and its equipment must comply at all times with the applicable Portuguese legislation, as well as with SDR Portugal's regulations and requirements.

SDR Portugal publicises certified RVM models through the **"List of Suppliers and RVM Models Certified by SDR Portugal"**, available at **SDRPortugal.pt**.

2 Packaging

2.1 Scope of application

The scope of application of the SDR covers non-reusable primary beverage packaging made of PET plastic, ferrous metals and aluminium with a volume of less than 3000 ml, which is placed on the market duly marked with the Volta symbol , after the date on which the deposit and refund system becomes operational.

RVMs must be able to accept packaging that has the reference dimensions defined for beverage bottles and cans.

Bottles and cans with dimensions within a tolerance margin of up to 10 per cent[1] can be accepted as long as the tests carried out show a good acceptance rate.

Table 1 - Dimensions of beverage bottles compatible with VKMs

Dimensions	PET bottles		Cans	
	Minimum	Maximum	Minimum	Maximum
Outer Diameter	50 mm	120 mm	50 mm	100 mm
Height (with lid)	85 mm	360 mm	85 mm	200 mm
Height to diameter ratio	Height> Diameter			

2.2 Identification of packaging

Packaging covered by the SDR must be identifiable by the RVMs so that it can be collected automatically in these machines and the deposit value for each package covered by the SDR can be returned.

Packaging covered by the SDR is marked with a barcode and the Volta symbol , the logo approved by SDR Portugal to signify that it is subject to the SDR.

SDR Portugal ensures the availability and updating of a packaging database accessible to each RVM supplier. This database gathers information on the characteristics (weight and dimensions), the barcode of each package, as well as the deposit value attached to it.

1 For guidance only, this tolerance should not exceed 10% of the ranges shown, depending on the different RVM models.

associated. The packages are previously subjected to acceptance tests with the various recognition and automatic collection equipment used in the SDR.

With this information, each manufacturer is obliged to keep up-to-date information on the packaging accepted by SDR Portugal in all its RVMs operating in the national market.

Each RVM must accept and process all packaging covered by the SDR and accepted by SDR Portugal.

2.3 Barcode recognition

Barcode recognition is the main method of identifying packaging. Packages are not accepted without recognising and validating each package's barcode. All RVMs must fulfil the following barcode reading criteria:

- read and recognise the barcodes on cylindrical and non-cylindrical packaging
- read and recognise barcodes with a maximum inclination of 30 degrees
- read and recognise at least 99.5% of undamaged barcodes that are within the maximum inclination conditions and comply with the printing standards and other conditions necessary for correct RVM operation
- read and recognise GS1 standard barcode formats, in particular EAN-8, EAN-13. UPC-A and UPC-E codes.

In addition, all RVMs must be able to read 2D data matrices and QR codes.

2.4 Detection of weight

RVMs should only accept empty packaging. In order to identify partially or completely full packages, each RVM must be able to detect weight, admitting only those packages whose weight corresponds to the recorded weight, within a previously agreed and established tolerance factor.

Packages must not weigh more than 100 grams, including excess liquid.

When a package deviates abnormally from the reference weight, it must be rejected. The default tolerance margin at cruising speed must be 15 per cent, if no other margin is established with SDR Portugal. For the start-up phase of the system, the tolerance margin will be 35 per cent.

The RVM must use the weight detection function in order to check, reject and not account for the deposit of packages that do not fulfil this criterion, with an accuracy of at least 95%.

2.5 Detection of metals

All RVMs must be able to detect aluminium or steel packaging. The metal detection rate must be at least 90 per cent.

2.6 Shape recognition and silhouettes

There are two possible types of shape recognition for fraud prevention and mitigation:

- Basic shape recognition
- Silhouette recognition.

All RVMs must be able to recognise basic shapes. The SDR Packaging Database includes basic information on the dimension (height and width) of each package. RVMs must have an accuracy level of at least 95 per cent for basic shape recognition.

Ideally, VMRs should be able to recognise the silhouette of the packaging. RVM suppliers should apply their own recognition logic and maintain their own silhouette database.

2.7 External barcode reader or bi-directional codes

All RVMs operating in Portugal must have an external barcode or QR code reader that can read codes printed on physical cards or from smartphone screens.

2.8 Combinations of recognition

The minimum recognition combinations for a package to be accepted by an RVM are:

Barcode recognition (99.5%)+ Basic shape recognition (95%)

+ Weight detection (95%)+ Metal detection (90%).

It is intended that a combined accuracy level of at least 90 per cent is guaranteed in this combination.

2.9 Fraud

RVMs can only accept packages that fulfil a combination of recognition criteria. RVMs must be prepared with functionalities to identify fraud attempts.

All RVMs must ensure that the recognition methods relate to the same packaging without human interaction. The RVM must be equipped with a locking system that prevents packages from moving in the opposite direction after the package has been validated and accepted and its deposit value has been calculated.

In the event of obstruction and/or stoppage of the various modules, components or circuits of the RVM (conveyor belts, sensors, sorting system, etc.) or the routing devices of the RVM press, there must be a function that interrupts operation and prevents the validation and admission of packages.

Fraud attempts detected are recorded in accordance with the catalogue of potential fraud situations to be agreed with SDR Portugal.

2.10 Recognition of the logo (Volta symbol)

Recognition of the Volta® logo/symbol is not a prerequisite for SDR accreditation. However, SDR Portugal reserves the right to implement the Volta® logo/symbol recognition feature in the future in order to reduce the system's exposure to the risk of fraud.

3 Packaging processing by RVMs

3.1 Commingling (joint collection of PET and cans)

All RVMs certified for the domestic market must be able to operate with *commingling* of materials, guaranteeing the minimum compaction volumes specified in the following point.

Dedicated or hybrid compactors can be used, but they must guarantee the quality of the materials and a maximum fines percentage of 2%[2].

Commingling is an option but not a requirement. Collection points that wish to do so can choose to separate the materials.

[2]"Fines" is the fraction by weight of the pieces that come loose from the body of the packaging, including lids, labels and other components, which pass through a 20 mm circular mesh.

3.2 Compacting

RVMs must have a compacting function to reduce the volume of accepted packaging. RVM compactors must reduce the volume of PET beverage bottles by at least 50% and the volume of aluminium and/or steel cans by at least 65%, regardless of whether or not *commingling* is used. RVMs must maintain this level of performance throughout their useful life.

The compactor must damage the original shape of all packaging to ensure that it is unequivocally rejected if further attempts are made to return it to the RVM.

The compacted materials must remain whole after compaction and no loose fragments of the packaging body material must be formed. PET bottles must be perforated or torn to let the air out of the bottles, so that they cannot regain their shape after compaction.

Compaction must be carried out in such a way as not to jeopardise subsequent actions in the logistics chain and the recycling process. The following are examples of some methods not approved by SDR Portugal for use in VMR:

- Compacting cans into a "disc" shape (the cans are compacted along the vertical axis, becoming flat and disc-shaped) - the packaging cannot be compacted later into larger bales
- Crushing of PET bottles in which the material is transformed into small fragments - the material becomes contaminated and makes recycling difficult
- Thermal processing of PET bottles burns the labels into the material, making it difficult to separate the materials afterwards and therefore making it impossible to recycle them.

It is recommended to contact SDR Portugal before using a specific compaction method, in order to determine whether or not the chosen compaction method is permitted.

3.3 Packaging compacted

The structure of each RVM must allow the compacted packaging to be packed in a transport container approved by SDR Portugal. The basic solution to be adopted is the use of single-use plastic bags, with two capacity options available:

- 500 litres, adjustable to a container with a base equivalent to ½ europallet[3]
- 1000 litres, adjustable to a container with a base equivalent to 1 europallet[4].

The technical characteristics and dimensions of these plastic bags are defined by SDR Portugal.

[3] ½ EuP approx. 800x600mm
[4] 1 EuP approx. 1200x800mm

The dimensions and material of the transport packaging may vary as the system evolves. In collaboration with RVM Suppliers and Collection Point Operators, SDR Portugal can define other solutions, taking into account needs to optimise SDR efficiency.

4 Collection Point Operations

4.1 Installation

Each RVM must be installed with a unique Collection Point Identifier, to be determined and supplied by SDR Portugal. The collection point must be previously registered on the SDR Portugal Portal.

If the location of an RVM changes after installation, the RVM supplier must notify SDR Portugal. The supplier must then update the Unique Collection Point Identifier on the RVM.

The connection of an RVM must be tested during installation to ensure that the different indicators are properly communicated to the system and that the RVM and collection point are correct.

SDR Portugal must be notified 15 days in advance of any change to the RVM infrastructure, whether it is a new installation or the relocation of an existing RVM.

4.2 consumer interface

A VMR should be easy to use and should consistently provide useful and relevant information.

The VMR should display relevant messages and visual indicators that help and instruct the user during the use of the VMR.

SDR Portugal provides guidelines for standardised messages and images that must be consistent across all Collection Points and validated by SDR Portugal.

The RVM must allow customisation with the SDR Portugal brand image, both on the physical machine and on the electronic display.

The messages shown on the RVM's display must be in Portuguese and, optionally, at least in English.

4.3 Refund of the deposit

All Collection Points must guarantee the user a refund of the deposit amount. The refund amount must be available in the form of a paper voucher to be redeemed by the user.

Collection point operators and RVM providers may develop other refund methods in addition to those mentioned above, namely digital voucher solutions or equivalent, under terms to be established jointly with SDR Portugal.

With SDR Portugal's authorisation, users can choose to donate to pre-defined entities, take part in loyalty programmes or opt to receive a digital voucher.

The RVM should be able to provide proof of donations (using a unique identifier) if the user so wishes, allowing them to opt for a paper or digital voucher.

Each voucher must have a unique EAN code for the whole of Portugal, in accordance with the specifications issued by SDR Portugal. Vouchers must contain a summary of each transaction completed by a user, clearly showing and indicating the breakdown of packages that were accepted, by material category, the associated deposit amount and the total amount of the deposit returned. The voucher must indicate the place, time and date of the transaction.

The format and content of vouchers and receipts must be standardised and follow the guidelines defined by SDR Portugal.

5 Information technology and databases

5.1 Availability

Under normal operating conditions, all of SDR's VMRs must be available for use for at least 99.5 per cent of the time that the collection point is open to customers, excluding downtime attributable to functional maintenance of the equipment, such as changing bags, changing consumables, cleaning, etc. They need electricity and internet access to connect to RVM suppliers and SDR Portugal. This availability will be calculated as an annual average. Downtime must be monitored and reported to ensure minimum downtime.

The RVM's *software* and *firmware* must be kept up to date with the latest versions available or, at the very least, with the latest n-1 version.

The packaging database on all RVMs in operation must be updated at a frequency to be defined by SDR Portugal, but no less than once a day. The RVM must be able to carry out these updates remotely.

If an RVM goes *offline*, the data stored in the RVM should not be lost. If the RVM experiences network problems, it must be able to queue and send transaction data the next time it connects. If the RVM is *offline* for two or more days, the RVM Provider must inform SDR

Portugal. The RVM Provider must provide a report with information regarding the RVM ID and the reason why the RVM is *offline*. The structure of the report is agreed with SDR Portugal.

5.2 SDR interface and integration PORTUGAL

RVMs must be able to respect the interfaces agreed with SDR Portugal and which are based on API (*Application Programming Interface*).

5.3 Data security and other requirements

Access to the data stored in the VMRs or on the VMR manufacturer's servers must be forbidden to anyone except the VMR manufacturer or the service provider legally contracted by it. Said data, with the exception of "consumer" customer data if it exists, may be used by the RVM manufacturer for the purposes of managing and improving performance and service and may only be transmitted to the owner of the respective RVM and to SDR Portugal.

The VMR's programs and stored data must be protected with access and authorisation codes, including providing access to the interfaces within the VMR through which the stored data can be accessed. All changes made to the data must be traceable backwards, i.e. who and when made the changes, what the reason was and what specifically was done.

It is not permitted to change the identity or access codes of the RVM in the course of RVM maintenance and repair operations in which components are replaced.

The article register and transaction register must be able to be transferred to the new component if necessary, and the information must not be lost due to poor storage or loss of data or memory.

5.4 Back- Ups

The RVM must store the detailed transaction data and information updates for at least two weeks as a backup. This is in case the data is lost or corrupted during transfer or processing by an RVM Provider.

In the event of data loss, the VMR Provider must inform SDR Portugal within two days and provide accurately recreated data. This responsibility lies with the VMR Provider, who must also provide SDR Portugal with a report on the incident.

5.5 Integrity of data

All RVM data must be treated confidentially due to its sensitive nature. The integrity of this data must be maintained and access restricted. Only authorised users should have access to RVM data, and the data should be protected with access controls and user authorisation. All default passwords must be changed immediately. VMRs must provide an audit trail of any changes made to the data. Information such as:

- Who made the change.
- What time the change was made.
- What was changed.

5.6 Agreement to process data

All RVM providers need prior approval to operate on the SDR managed by SDR Portugal. RVM providers must sign a data processing agreement with SDR Portugal prior to the certified RVM installation.

5.7 Packaging Database SDR

The SDR Packaging Database contains information on all the packages approved and registered in the system, including a list of the attributes of each package that is used for its validation when it is presented at an RVM.

All RVMs must have the capacity to store 250,000 beverage packages in their local database. Only SDR Portugal is allowed to edit this file.

The RVM software is constantly synchronised with the SDR Packaging Database.

RVM suppliers must ensure that any information updates reach each RVM within 48 hours. The RVM Supplier must inform SDR Portugal if any machine has not successfully received a database update after 48 hours, stating the reason for the non-update and recording the date of the previous update.

5.8 Transactions

The RVM must record all transactions of successfully collected packaging, as well as those of rejected packaging and/or fraud attempts. Each interaction represents a transaction unit, all of which must be

recorded and reported. Each transaction is classified according to the catalogue to be established between the RVM suppliers and SDR Portugal.

All RVM transactional data must be exported to SDR Portugal, as well as vouchers issued and redeemed.

RVMs must store a local record of transactions. These must be recorded with the date and time. Transaction data stored locally must not be lost. SDR Portugal recommends that the RVM keep a record of its transaction data for at least two weeks after the data has been transferred to the RVM provider's database.

Payments are made to the collection points based on the calculation of what was returned and the deposit accepted via the machine.

SDR Portugal uses RVM information for statistical, process improvement and anti-fraud purposes.

5.9 Registering the exchange of bags

RVMs must have a feature that records the exchange of sacks.
It is recommended, if the available functionality allows it, that the RVM's bag exchange information be included in the interfaces with SDR Portugal and sent digitally. It should contain at least the following information:

- Shop ID.
- RVM ID.
- Emptying ID
- Bag tag ID
- Number of packages per deposit value.
- Estimated weight of the bag.
- Total amount (deposit value and handling fee).
- Date and time of the operation.

5.10 rejection reports

Rejections represent failed transactions and attempts to redeem deposits. In order to identify fraud situations, rejections must be controlled and reported for each RVM, according to the catalogue of reasons defined by SDR Portugal.

Version history

Version	Date	Summary of changes made
V 0.0	03/04/2025	(1.2) clarification of responsibility for changes to RVMs; (2.7) New Point - Requirement for external barcode reader or bidirectional codes; 3.2 Reference to compactor with forks has been removed; (5.1) Clarification on the calculation of the availability rate; (5.9) clarification of the text on the optional condition of recording bag exchange information.
V 1.0	26/06/2025	Definition of fines included in point (3.2).