

**Disclaimer**

This sheet is intended for designers, specifiers and other members of construction project teams wishing to reuse this building material or product. It is part of a collection of sheets aimed at bringing together the available information to date that is likely to facilitate the reuse of building materials and products.

This sheet has been produced by Rotor vzw/asbl within the framework of the Interreg FCRBE project - Facilitating the Circulation of Reclaimed Building Elements, supported by the entire project partnership. Sources of information include the experience of reclamation dealers and involved project partners, lessons learned from exemplary projects, available technical documentation, etc.

The sheets have been produced between 2019 and 2021. As the reclamation sector is evolving, some information, notably regarding pricing and availability, may change over the time. When the text refers to European standards, it is up to the project team to refer, if necessary, to their national implementations and local specificities.

It is important to note that the information presented here is not exhaustive or intended to replace the expertise of professionals. Specific questions are always project related and should be treated as such.

The complete collection of sheets (including the introductory sheet) is freely available from different reference websites (a.o. [opalis.eu](http://opalis.eu), [nweurope.eu/fcrbe](http://nweurope.eu/fcrbe), [futureuse.co.uk](http://futureuse.co.uk)).

Non-exhaustive directories of dealers in reclaimed building materials are available on [www.opalis.eu](http://www.opalis.eu) and [www.salvoweb.com](http://www.salvoweb.com).

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Interreg FCRBE partnership: Bellastock (FR), the Belgian Building Research Institute / BBRI (BE), Brussels Environment (BE), the Scientific and Technical Center of Building / CSTB (FR), Confederation of Construction (BE), Rotor (BE), Salvo (UK) and University of Brighton (UK).

The information contained in this document does not necessarily reflect the position of all the FCRBE project partners nor that of the funding authorities.

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## Toilet bowl

### Product description

**The fairly trivial nature of their use and their ubiquity in the built-up environment should not obscure the inherent complexity of flush toilet systems. They come in many variations, with respective specificities, which must be taken into account when considering their reclamation. The most common models are:**

→ *floor-standing bowls* with adjoining or separate cistern: the constituent elements are accessible, which simplifies any repairs. They are usually mechanically fixed to the floor and a seal provides hygienic closure. Depending on the case, the cistern is in glazed sanitary ceramic (glaze on the outside and/or inside) or in synthetic material. Older models can also be made of cast iron or enamelled sheet metal.

→ *suspended bowls*: attached to a vertical support frame, generally camouflaged in a load-bearing wall (surface-mounted) or a partition wall (universal or self-supporting system). A control plate is used to activate the flushing mechanism. Cleaning the floor is easier.

Flush toilets present a high degree of technicality. Their general good functioning depends on the good functioning of all their parts. This implies paying attention to the good condition of each part and each mechanical device (in particular the filling and emptying systems but also the various gaskets, the flange, etc.). If necessary, some parts can be repaired or must be replaced with new parts.

Most reclaimed toilet bowls have a *rim* (folded over at the top) integrated into the ceramic, rarely glazed on the inside, and provided with perforations around the entire perimeter of the bowl. Some contemporary bowls have rimless rinsing technology, which is more hygienic, which improves cleanability and limits scaling.

Toilets are only a small part of a large system of pipelines and infrastructure providing water supply and wastewater management. This implies special attention to the connections and joints between all the elements in order to ensure the correct functioning of the assembly. For toilets, this particularly affects drain sleeves and supply taps, but also the issue of emptying volumes. This involves correctly anticipating the connections and possibly planning the use of new plumbing parts.

The installation of toilets is governed by national and European standards relating, among other things, to emptying volumes, the dimensions of the water connection and drainage, water consumption, installation procedures. However, these have changed little over the past 20 years. Therefore, it can be assumed that toilet systems installed less than 20 years ago will broadly meet current requirements. In all cases, it is necessary to ensure this and, if necessary, to provide for the necessary adaptations.

Material deposits and the visibly worn character of a toilet also influence the appraisal of future users. This equipment refers in a particularly sensitive way to the concepts that users have on hygiene and personal comfort. Fortunately, cleaning processes often make it possible to give this sanitary equipment a second life.

More broadly, reclaimed toilets have great advantages! The maintenance possibilities and durability of ceramic elements explain their durability and their presence on the reclamation market.

This sheet proposes addressing these issues, focusing on recent toilet systems (late 20th - early 21st century) including glazed sanitary ceramic or vitreous china bowls (or, occasionally, stainless steel or synthetic materials).



*Floor-standing toilet with adjoining cistern*



*Floor standing toilet with separate cistern*



*Suspended toilet*



**Product reclamation**

**Often easily removable, toilet bowls are good candidates for reuse, either on-site or through the professional channels of material resellers. These companies rarely just specialise in sanitary equipment, but integrate them into a wider range of products.**

→ *Potential assessment*: An “expert eye” generally makes it possible to estimate the potential for reclamation during an on-site visit or based on photos and technical information relating to the model, manufacturer, quantities, dimensions, etc. The points for consideration are among others:

- general condition: are the devices damaged (cracks, splits, fissures, scratches, etc.)? *A cracked device must not be reclaimed*. Is the equipment clogged (limescale, mould)? What is the cistern condition and capacity?
- condition of accessories: is the flushing mechanism functional? Is it cleanable/replaceable? If it is a suspended toilet, can the support frame be salvaged or replaced? What is the condition of the toilet seat, seals, etc.?
- Commercial interest, depending on model, quantity, resale potential, ease of maintenance, etc.;
- logistical arrangements, including deadlines, handling, organisation of transport, etc.

→ *Removal*. careful dismantling should aim to ensure the integrity of the installation, the equipment and its accessories whose reclamation is being considered. If the installation is still supplied with water, it is advisable to carry out a pre-cleaning. It is then necessary to cut off the power supply (shut-off valves or general supply) before proceeding with disassembly. If they are recovered, the functional accessories (cisterns, seats, support frames, etc.) must be correctly dismantled and listed. The seats can be held in place and secured with adhesive tape to prevent them from moving during transport. It is advisable to document the fixing principle of specific elements in order to facilitate their subsequent installation. Once dismantled, the bowls and cisterns will be properly emptied, sorted by qualities, colours and dimensions and packaged in such a way as to avoid knocks and breakage.

→ *Storage*. it is advisable to place the bowls so that their installation face rests on a flexible support, to avoid spillover from the pallets, and to provide dividers, strapping and possibly a packaging film. Once cleaned and ready to be used, it is preferable to store the elements away from water and dust.

*Checking the condition of the glaze*

*It is possible to test the condition of the glaze layer using an alcohol marker: if it is easily erased, the glaze is still in good condition, otherwise the glaze has probably become 'porous'.*



*'Porous' glaze (left) vs glaze in good condition (right)*



*Removal of toilet bowls for reclamation*





## Toilet bowl

→ **Treatments, maintenance and cleaning.** During use, toilets can undergo various forms of deterioration. One of the most common is the formation of material deposits which become embedded more or less deeply in the bowl and in the various parts with which these materials come into contact. This is particularly the case with scale, present in mains water and which, when it accumulates in large quantities, can lead to malfunctions.

→ Recent reclaimed toilet bowls are generally sold without any treatment other than surface cleaning with soapy water or even bleach. A descaler or vinegar are also sometimes used to remove the most visible scale.

→ Some professionals offer deep cleaning and disinfection of ceramic equipment (mainly suspended bowls), in order to remove tough deposits (limescale, mortar, paint, putty, etc.). After removing the metal and synthetic accessories, the devices are soaked in a specific acid solution, before being pressure washed and then rinsed. Because of its additional cost, this process is especially interesting for mid-range and top-of-the-range bowls, with a rim.

→ If superficial blows affect the glaze layer, it is possible to carry out spot repairs using a specific product. Ready-to-use kits are readily available on the market.

→ In all cases, it is advisable not to use abrasive products or metal objects to remove dirt, as this may damage the surface layer.



*Dirty suspended bowls*



*Scaling of the rim and obstruction of the flushing orifice holes*



*Scaling of the flushing mechanism*

→ **Transport and delivery.** the necessary precautions must be taken during transport and delivery in order to limit knocks and scratches (interlayer protection, corner protectors, strapping of pallets, etc.).

It is advisable to involve specialised professionals to ensure the smooth running of these operations.

### → Professional cleaning process



*Phase 1: soaking the elements in a specific acid bath*



*Phase 2: Pressure rinsing*



*Phase 3: Packaging*



### Applications and installation

**In principle, the recycling of reclaimed toilet bowls is no different from that of new toilets. It must meet the same use requirements, in particular - depending on the case - with regard to the properties and condition of the support (floor or wall), the installation height, use by people with reduced mobility, products and techniques for laying and grouting, connections and plumbing, waterproofing, taps, wastewater disposal, etc. In all cases, reference should be made to the European and national standards relating to the product (i.e. EN 997 and EN 14055), and to the rules of practice in force (or implementation standards).**

To facilitate the integration of reclaimed elements, the specifier takes care to formulate his expectations with regard to the following characteristics.

→ *Types and dimensions* of equipment. For example, the *drain* outlet of the bowl can be horizontal (rear or side) or vertical. Leaving some latitude on the dimensions generally makes it easier to find a lot on the reclamation market.

→ *Condition and degree of wear accepted*. It is important that the bowls do not have any major cracks or breaks that could damage their sealing. Depending on the case, on the other hand, traces of surface wear, light traces of limescale, minor stains are acceptable.

→ *Flushing volume*. Some contexts require specific performance in this regard. The current standard is to provide a general volume of 6 litres and a reduced flushing system of 3 litres. In general, it is interesting to seek to reduce the consumption of water in the toilets. In some cases, it is possible to replace the flushing mechanism or even the entire cistern of older equipment, which no longer meets these requirements. There are professional devices equivalent to the low-tech principle of the brick or the full bottle placed in the tank. It is however a question of ensuring the feasibility and the appropriateness of such an operation - in particular by taking into account the diameter and the slope of the downstream pipes. Where applicable, this involves describing precisely the operations expected in the specifications.

→ *Accessories*. Clearly specify in the specifications all the elements which, if applicable, must be provided by the company to replace or adapt existing toilet systems. Among the parts likely to be delivered as new, we can mention: seat, cistern, cistern cover, support frame, control plate, flushing mechanism, float valve, bell and bell basin, pull or push button, gasket seals (cistern, bell, drain, etc.), flush elbow, supply valve, etc. For each accessory, it is a question of ensuring compatibility with the existing system. This step is facilitated when the technical documentation is available. Some accessories are sometimes available from professional reclamation dealers. For the more recent models, most professional sanitary ware dealers are able to offer compatible accessories. As an example, some manufacturers of new toilets recommend the replacement of the toilet seat, the flushing mechanism and the float valve every 5 years, and the replacement of the seals after 10 years.

Most of the reclaimed building products are sold as is. The conditions of sale may however contain special guarantees specific to the product. Some suppliers are able to indicate the origin of the product and/or provide documentation on the product purchased (for more information, see the introductory sheet). Generally, it is also possible to find the manufacturer's technical documentation using the make and model number if the equipment is recent enough.



*Crackling or crazing is the phenomenon responsible for the appearance of a set of hairline cracks in the glaze. These can lead to the penetration of liquids inside the fissure, causing the appearance of lasting stains and causing the development of pathogens. It is therefore advisable to discard equipment with this defect.*

#### *Design tip!*

*To increase the chances of meeting the offer available on the reclamation market, the specifier can choose to accept several different batches and distribute them in an organised manner in the building. For example, plan for a uniform batch per floor.*



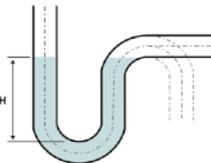
**Characteristics and fitness for use**

A large number of harmonised European standards and national standards establish performance requirements relating to the various constituent parts of a toilet system (bowl, cistern, flushing valves, support frame, etc.). We focus here on recent toilet bowls and cisterns (~ 20 years), drawing inspiration from the characteristics established by the harmonised European standards EN 997 ( WC bowls and bowls with adjoining cistern with integrated siphon ) and EN 14055 ( Flush cisterns for toilets and urinals ). Although itemised for new materials, their content may prove useful in considering the reclamation of toilet systems.

Several performances associated with reclaimed toilets can be assessed while still installed (before dismantling). This situation is rare, and any adaptations (for example: replacing a 6 or 9 litre cistern with a low water consumption model or modifying the flushing mechanism) can greatly affect the performance of the equipment.

To meet the standards of use, it is recommended to opt for recent reclaimed sanitary equipment (less than 20 years old), and for which no major adaptation is to be considered. In fact, the regulations applying to sanitary facilities have changed little in recent years. For example, sanitary facilities in office buildings often meet these criteria. It is therefore easier to find technical documentation and thus validate their performance.

Please note the existence of specific standards dedicated to flush valves (EN 14124, EN 12541, EN 1509). Support frames for suspended toilets are not subject to harmonised standards. In general, the reclamation of these accessories is rather rare and should be considered based on the advice of a professional sanitary ware fitter.

Characteristics	Comments
<p><b>Cistern capacity and flush volume</b></p>	<p>The cistern capacity and the flush volume determine the amount of water released during operation. To reduce water consumption, the standards on toilet facilities evolved in the late 20 th century. The capacity of the tank has been reduced (max 9 litres) and flush-saving systems have appeared (3.5 to 6 litres in full flush and 2 to 4 litres in reduced flush). These modifications were accompanied by technological developments in the design of bowls and flushing mechanisms.</p> <p>In the absence of documentation, it is possible to approximate these volumes for toilets through experimenting with volumes.</p> <p>If necessary, it is possible to provide for the replacement of cisterns and flushing mechanisms, or even the switch to direct flush (without cistern) of an older toilet system. This operation must, however, take into account the following parameters: flushing flow rate, flushing efficiency, compatibility of the elements, overflow flow rate, inlet flow rate and pressure, slope and dimensions of the discharge pipes, shape and design of the bowl , national and regional regulations depending on the drainage network in place, etc.</p>
<p><b>Height of the water seal</b></p>	<p>The water seal is a hydraulic plug which remains in the siphon after rinsing in order to prevent the rise of odours coming from the drainage pipes. The height of the water seal must not be less than 50 mm. This characteristic can be evaluated under conditions of use.</p> <div style="display: flex; justify-content: space-around; align-items: center;">   </div>
<p><b>Functional characteristic - flushing efficiency</b></p>	<p>Flushing must be effective on the interior walls of the bowl. A visual inspection when installed makes it possible to assess this performance. For bowls with a rim, it should be ensured that the holes have not been blocked by scale. If necessary, specific cleaning is then recommended.</p> <p>Flushing must not cause any splashing to the outside of the bowl. It must allow the evacuation of liquid and solid residues without overflowing out of the bowl.</p> <p>The good quality of the flushing can be ensured by testing with particles of sand, paper or coloured liquids in a working bowl (as described in the EN 997 standard).</p>
<p><b>Functional characteristic - water absorption</b></p>	<p>Reclaimed sanitary ceramic toilet bowls must not absorb water. The presence of cracks, chips or signs of crazing in parts of the glaze that are in contact with water negatively influence this performance.</p> <p>This characteristic can be assessed by visual inspection of the functional surfaces of the bowls, using an appropriate light source. Some imperfections can be repaired.</p> <p>Experience shows that stainless steel bowls generally meet these requirements.</p>



Characteristics	Comments
<b>Functional characteristic - load resistance</b>	<p>This characteristic mainly concerns suspended equipment. It is possible to test it when installed by applying a static load to it (e.a. load of 150 to 400 kg for 1 hour). The bowl and cover must not crack, collapse or show any permanent deformation.</p> <p>Experience shows that sanitary ceramic free-standing toilet bowls which show no defect after their first use can be presumed to meet this requirement.</p>
<b>Sealing</b>	<p>The seal concerns the connections, the fixings and the drain valve (bell). A detailed visual inspection of the installed equipment makes it possible to assess this performance. If necessary, the replacement of certain faulty parts is possible.</p>
<b>Valve reliability</b>	<p>The float valve must supply the cistern when it is empty and shut off when the nominal volume is reached. Special specifications are applicable to the flush valve (inlet pressure, non-return valve, watertightness, inlet flow, materials, operating endurance, etc.). These parameters are difficult to check on reclaimed equipment.</p> <p>The main consequence of a failure of the float valve is to waste water (continuous flushing). This can be detected with the naked eye, by the ear (a seized mechanism emits a whistle) or by monitoring consumption. Most common failures can be corrected by cleaning the system or replacing failed parts (especially gaskets).</p>
<b>Seat</b>	<p>For bowls that no longer have their original seat and cover, or if these are too damaged, it is advisable to replace this part with a compatible model, possibly fitted with a slow closing system.</p> 
<b>Acoustic performance</b>	<p>The support frames may have polystyrene panels to limit the noise created through flushing. The design and installation of the equipment, valves and piping also influence the sound level of the installation.</p>
<b>Cleanability - chemical resistance</b>	<p>The surface of sanitary equipment must be resistant to common chemicals and cleaning products. Experience shows that bowls made of sanitary ceramic and stainless steel meet this requirement. Note that bleach (and chlorine products in general) is not recommended for cleaning stainless steel equipment.</p>



Chiro Itterbeek (BE) © Rotor



Bureaux de VLA-architecture (BE) © Sophie Boone



**Availability**

Ceramic toilets are a very common product in the reclamation market. However, availability depends on the quantities required. As an example:

Frequent	Batch of 1 piece
Occasional	Batch of 2 to 20 identical pieces
Rare	Batch of > 20 identical pieces

**Find specialised businesses**



[salvoweb.com](http://salvoweb.com)

[opalis.eu](http://opalis.eu)

**Indicative prices (Excl. tax)**

Random sampling of the reclamation market in Western Europe (Belgium, France, Great Britain and the Netherlands) made it possible to extract some indicative prices. These vary depending on the models, materials and original manufacturer. Prices for private customers.

→ *Supply price:*

- Standing toilet + cistern: 15 to 150 € / item
- Suspended toilet + support frame: 100-130 €/unit

→ *Removal cost:* around 35-50 €/unit

→ *Specific cleaning service:* 10-20 €/unit

However, the replacement of missing or defective parts should also be budgeted for.

Even taking into account these operations specific to reclamation logic, toilet equipment is generally competitive with new products, in particular for mid-range and high-end models.

**Dangerous substances and precautions**

To our knowledge, no hazardous material is likely to be present in reclaimed toilet equipment.

**Embodied carbon (Cradle to gate - production A1-A3)**

	kg CO <sub>2</sub> eq./PU
INIES database (FR) – Generic data *	173
AFISB (French Association of Bathroom Industries) - Collective declaration **	79.2
AFISB (French Association of Bathroom Industries) - Collective declaration ***	55.1

\*Indicative value for PU (Product Unit) = standard range ceramic (vitreous porcelain) toilet pack (bowl and cistern) with a reference lifespan of 20 years. Mechanism and seat included.

\*\* Indicative value for PU (Product Unit) = standard range ceramic (vitreous porcelain) toilet pack (bowl and cistern) with a reference lifespan of 20 years. Drain pipe, shut-off valve, mechanism, float valve, seat, gaskets and fixing screws included.

\*\*\* Indicative value for PU (Product Unit) = standard range suspended toilet (without support frame) in ceramic (vitrified porcelain) for a reference lifetime of 20 years. Drain pipe, shut-off valve, mechanism, float valve, seat, gaskets and fixing screws included.



According to the sources, reusing a standard range toilet bowl prevents the equivalent production of ~ 55 to ~ 174 kg of CO<sub>2</sub> related to the manufacture of new equipment (production phase only). By way of comparison, this corresponds to the emissions caused by a small diesel car during a trip of ~ 330 to ~ 1040 km.