

# Female Urinals

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## Abstract

Despite the fact that several female urinals have been developed several decades ago, they have not been successfully marketed in Europe. Two new types of female urinals were developed, constructed and tested. Before developing the female urinals, interviews among users of public restrooms have been conducted. Additionally, user surveys were carried out for the new female urinals. Eventually, results of all of the surveys and long term testing will be presented and discussed

## Keywords

Female urinal, water saving efficiency, drainage design.

## 1 Introduction

The call for female urinals is old, which has good reasons. A lot of women are afraid of getting infected with illnesses by touching toilet seats in public restrooms. Therefore, a lot of women try to suppress their need to urinate and contain their urine until they reach their own bathroom - which has been proven to result in health problems: for instance, recurrent infections of the urogenital tract which may even harm the upper urinary tract [1]. Several studies showed that 60 percent of the women with ureter infections have an enlarged bladder because of containing their urine [2]. Moreover, a chronic straining of the bladder can lead to the loss of the contraction ability and result in incontinence and other illnesses [3, 4].

Furthermore, using a WC means longer waiting time than to be expected for using a urinal. Women who want to use conventional public restrooms may, therefore, need to “stand in line” for a longer time. After all, women find it necessary there to flush more

often, e.g. to flush down the paper they use to cover the toilet seat in order to avoid infections by skin contact [5]. This unnecessarily results in high water consumption.

A urinal for women, which allows urinating in a pleasant position without any skin contact, would certainly be appreciated. For this reason, the laboratory of sanitary technology started a project during the course of which practically suitable urinals for women were developed. This project was carried through in cooperation with the Design faculty of Berlin University of Arts (HdK-Berlin) and supported by the Federal Ministry of Education, Science and Research.

## 2 Experimental Issues

The initial investigation made regarding respective literature and patents revealed that under the term “urinal for women” a number of solutions had already been worked out, but which had to be certified as unsuitable for practical use in every respect. They were “only” objects suitable for medical purposes - more or less similar to urine bottles - or just design studies without any practicality, made without any consideration of the relevant rules and regulations of sanitary technology. Moreover, criteria like cleanability, good flushing quality and safeness in view of vandalism were not taken into account. Additionally, there were a number of “urinating aids” which were said to enable women to urinate in a standing position, but which can cause disposal problems depending on the manufacturing material [6 - 17].

### 2.1 User Surveys

The next step was a detailed survey among women who use public restrooms (Figs 1-4).

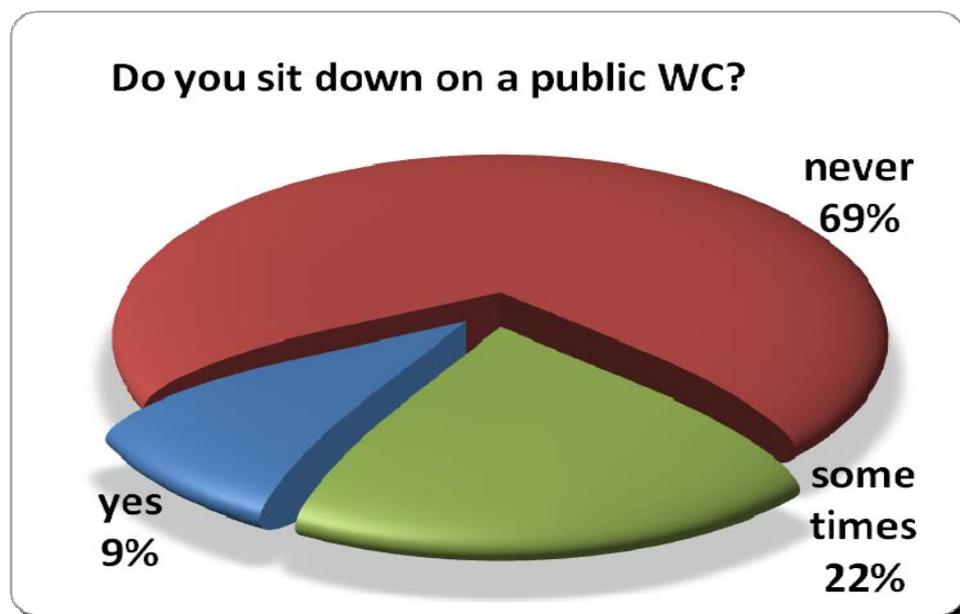
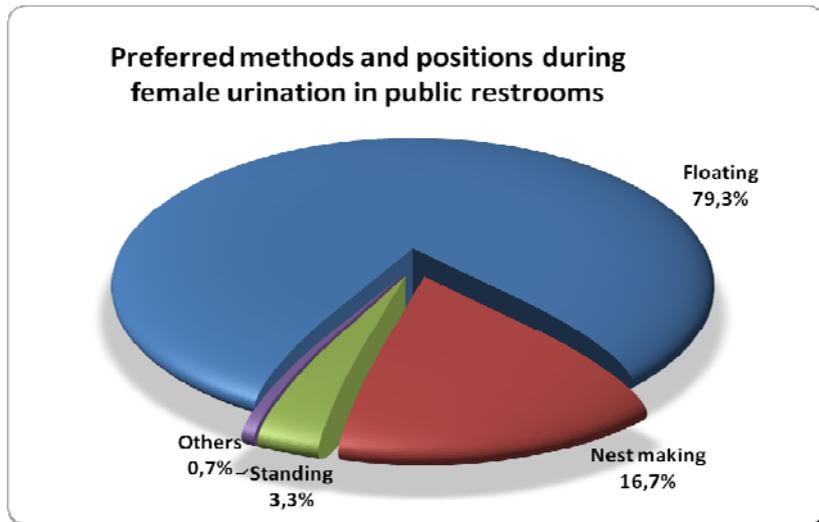
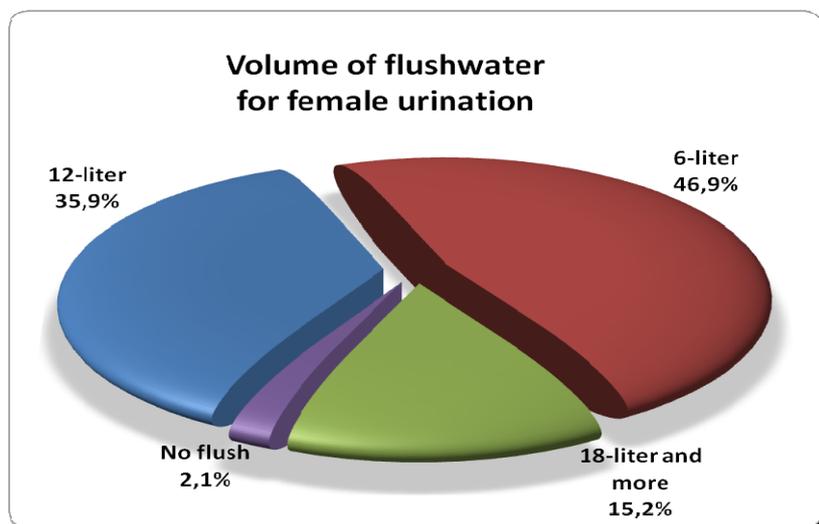


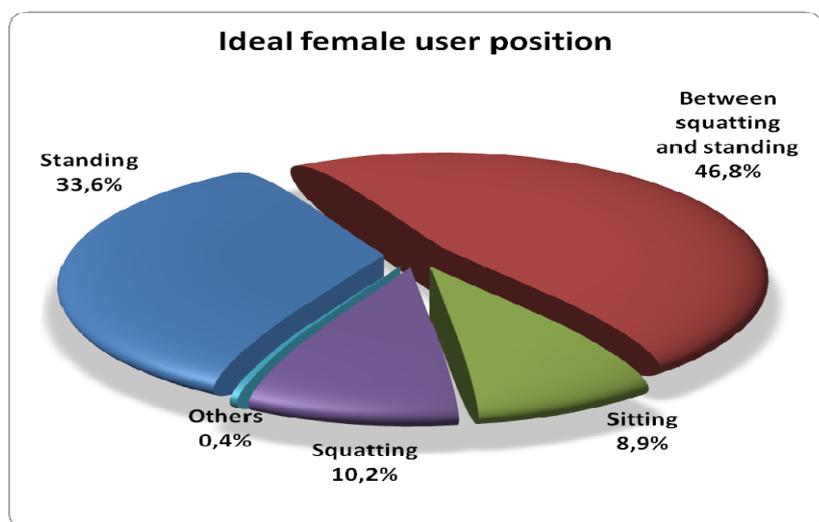
Figure 1 – Female use of public WC



**Figure 2 – Preferred methods and positions**



**Figure 3 - Volume of Flushwater**



**Figure 4 – Ideal Position for female users**

This survey gave important hints regarding the way women use public sanitary facilities as well as important criteria which had to be given priority to when planning the development, which were in particular:

- Using must be possible without any skin contact.
- There must not be any re-splash.
- Urinating must be possible in a comfortable position that can be taken easily.
- Handling the clothes must not cause any problems.
- In contrast to male urinals, the disposal of toilet paper must be possible without any problems.
- The relevant norms must be taken into account [18 - 25].
- The urinal should have an attractive design.

## 2.2 Prototypes

These criteria were considered during the production of two prototypes whose conformity to the norms was tested in extensive flush tests. The respective models were a squat urinal and a wall-mounted urinal (Figs 5 and 6).



**Figure 5 – Wall-mounted female urinal**



**Figure 6 – Female squat urinal**

First of all, the examinations focused on different water traps, which were also developed within the scope of this project. One of the targets set for this part of the project was a flush that could transport twelve pieces of toilet paper according to the norm with a three-liter flush volume five meters down the subsequent collecting main. For this purpose, a pre-wall element with a special 3-litre flush valve (DN 20) actuated by an infrared sensor was developed by the former company DAL - Georg Rost & Söhne Sanitär-Armaturen GmbH, Porta Westfalica (now: in Grohe AG integrated).



**Figure 7 – Wall-mounted urinal**



**Figure 8 – Squat urinal**

### **2.3 Installation**

The dimensions of this construction were chosen in a way that the urinals can be exchanged for a toilet bowl: suspension and sewage connection are placed at the same height as for a wall-mounted toilet bowl. The squat urinal can be installed in existing cubicles by means of a pedestal construction to be reached via two steps without the necessity of changing the position of the sewage connection. For both models a prewall-element with an integrated concealed flush valve was developed.

### **2.4 Design**

Great importance was attached to the outer appearance of the urinal in order to suit its ergonomic design to the anatomy and mobility of women. Thus, the sanitary design trend following the motto “Function follows Form”, forcing the female users to adapt to the form of the sanitary facility and not vice versa, was changed. The developed urinals, particularly those for women, are the result of numerous discussions, surveys and experiments. They are easy to use, have full practicality and an attractive design.

### **2.5 Tests**

The wall-mounted version „Efeu = Ivy“ (Fig. 5), which is approached backwards, appears to be particularly interesting to the German market as it meets the request by many female users. It can be installed in new buildings as well as in old buildings which are being refurbished. Female employees of Fachhochschule Gelsenkirchen / University

of Applied Sciences, who could test the urinals in cubicles at the laboratory of plumbing technologies under everyday life conditions (Figs 7 and 8), classified ergonomics and practicality as pleasant. The test persons were particularly impressed by the comfortable contact-free use and the flush.



**Figure 9 – Wall-mounted urinal**



**Figure 10 – Squat urinal**

A further long time test has been done in a cubicle in the restrooms at the main cafeteria of the University FH Gelsenkirchen. A stainless steel prototype of the wall-mounted female urinal has been installed. Only 10 % of the female students have used it so far.

### **3 Conclusion**

The new urinals allow women to urinate in a quick, hygienic way without any skin contact in public, semi-public and industrial sanitary facilities. They do not only solve the problems many women are facing at public restrooms but also clearly offer the operator economic advantages. With this kind of facility the short time spent in the toilet allows a higher frequency of use. Looked at from the business point of view, economizing on drinking water, which is getting more and more expensive, will lead to a noticeable decrease in costs. Based on the aforementioned survey and a hundred times' use, the water consumption sums up to 984 litres with conventional WCs, while, with the same frequency of use, an "Efeu/Ivy"-urinal with an automatic 3-litre-flush can save nearly 70 percent of this volume.

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## 5 The Author

Mete Demiriz is a professor at Fachhochschule Gelsenkirchen University of Applied Sciences in the Department Building Services and Environmental Technologies, where he is the head of the research and development lab of plumbing technologies. He is specialised in water saving and hygiene, water and waste water hydraulics and water support of special buildings.

