

# Pipe work restoration

Thomas Emilsson, 2011-01-17

## Introduction and background

Studies show that over 880,000 apartment blocks were built in Sweden between 1961 and 1975. A bathroom's maximum lifetime is approximately 30 to 40 years and this means that in the coming years the large housing stock built during these years needs to have their bathrooms and drains renovated. There are three techniques that are competing for the big renovation projects: The traditional method of bathroom renovation, relining and the prefabricated-bathroom.

The traditional way of renovating bathroom drains, when the old bathroom is torn down and a new one is built using the old shell, is a full-scale and time-consuming project. In order to minimize, among other things, costs, building time and construction waste, new and less time-consuming techniques have been developed. There are now newer, cheaper and more flexible methods of renovating bathrooms.

Choosing the right technical solution is very important when one must take into account construction time, economy and the environment.

### Requirements and codes

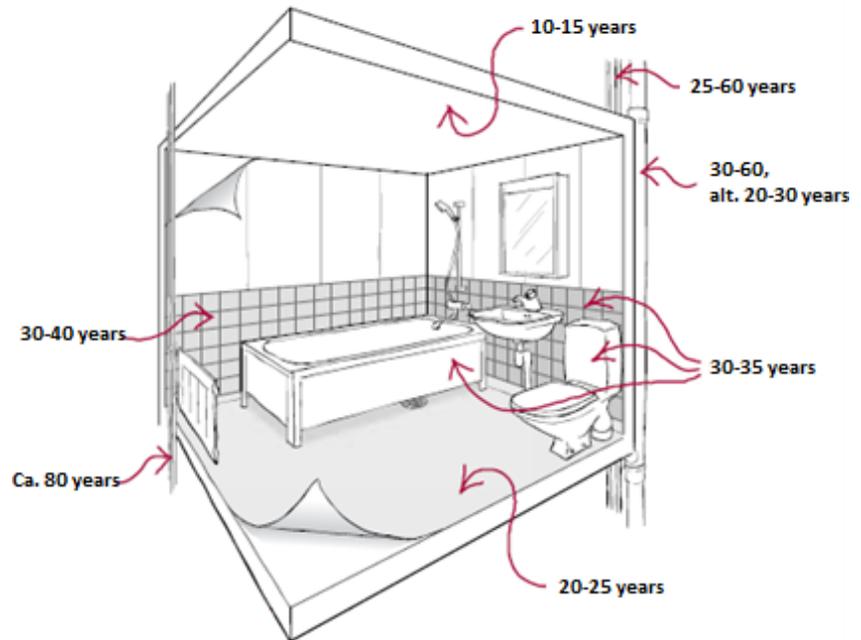
There are a number of laws, rules and regulations which need to be followed to ensure that the project has a good outcome.

Building Regulations, BBR, applies to new construction and contains rules developed by the State building and Planning Dept. In order to classify the work as made in a professional manner, those rules should be followed.

We use the Boverkets general advice when we renovate buildings. This general advice is called BÄR. The acronym BÄR stands for "General advice on alterations to buildings". It has another approach with practical advice other than that given in the BBR. Instead it has a more comprehensive system of requirements for how the whole process is to be performed, from the application of the general overview, to the final technical characteristics of the building process.

According to BÄR the renovations only need to meet the rules and requirements that existed in the construction laws when the building was originally built.

## Life expectancy of a bathroom



### *Technical life of the bathroom*

#### **Technical life of the bathroom**

- Toilet, sink and tub 30-35 years
- Plastic linoleum on floors 20-25 years
- Paint work 10-15 years
- Wall cladding, plastic 10-15 years
- Floor and wall ceramic inc. joints 30-40 years
- Drains of cast iron 30-60 years
- Drains of PVC - 1973 20-30
- Drains of PVC, 1973 - 30-50 years
- Water pipes made of galvanized steel 30-40 years
- Water pipes of copper 50-60 years
- Heating pipes about 80 years

### **Traditional pipe work renovation**

A traditional pipe work renovation is a very detailed procedure. You tear out virtually everything from the old bathroom and only allow the structure to remain. After demolition, the new bathroom is built. When renovating the bathroom in the classic way there are several options. Materials, technologies and design can differ depending on clients, contractors or planners.

One can divide the building process into three areas: demolition, drying, and installation of the new bathroom.

- You start by tearing out all the fixtures in the bathroom. The floor and walls should be broken up to be able to find the old installation and dismantle them. During this process the bathroom cannot be in use. The residents need a temporary solution during this process. A vacant apartment for the tenant, barracks or a temporary installation in the basement is a way of providing the tenants a chance to live without being disturbed too much.
- After the demolition it is not uncommon to find that there is moisture damage in some of the bathrooms. This has to be dried out before the installation can begin. Moisture damage can take months to dry out if only room temperature is used. To speed up the process dehumidifying units are used.
- When the drying is complete, you start with the new bathroom. Installation of the new water pipes and sewage drains. Floor and wall ceramics and lastly the fixtures and fittings. Because you can start from scratch, you get the opportunity to install a modern bathroom with a better chance of avoiding moisture damage in the future. However, it is very important that the installation is done professionally to provide this assurance.

This process takes about 3-4 weeks. It is well known that this three stage process takes a long time, but there are opportunities to improve this process, both in terms of economic, environment and time. This can be done with more comprehensive planning when we consider the collection of waste, transportation of materials and the choice of materials to minimize the disturbance for the workers.

## **Summary**

The traditional method of renovation will produce a substantial rise in the standard of the apartment. Any moisture damage is removed and with the right choice of materials the bathroom will have a lifespan of at least 30 years.

The advantages of a traditional pipe work restoration are:

- The increase in standard usually results in a rental increase.
- The bathroom and the drains will function well for at least 30 years.

- The increase in standard will probably attract more tenants.

The disadvantages of traditional pipe work restoration are:

- It is an expensive investment.
- Large amounts of waste from the previously used materials and energy-intensive dehydration process affect the environment.
- Time, a renovation takes about 3-4 weeks.

## Relining

As recently as 1990 the first Relining renovation was made in Sweden. Today, this is intact and this shows that this kind of renovation technique has a service life of at least 20 years.

Over 17,000 renovations have been done with the relining method and new tests and samples continue to prove that this method is of good quality.

The method uses the existing old pipes that form to the new plastic pipe. The new pipe is between three to five millimeters thick.

In terms of size it can manage a pipe dimension of between 32 and 160 millimeters in diameter. The work can vary between different companies but only marginally in terms of technical differences or the use of different plastic materials for the casting of the new pipes.

The residents do not need to evacuate the apartment during the renovation and there is very little disturbance for the tenant.

- First the sanitary ware and floor drains are removed. Via access panels, floor drains and connections to the toilet and sink. The work begins by inserting cleanings tools that clean the pipes using water and revolving tools.
- Then the pipes are dried out and an inspection is carried out using video camera to ensure that the drains and pipes are intact. Any deviations are documented and if some part of the pipes or drains is in poor condition a repair is carried out.
- A new pipe is cast inside the old one. The new pipe is made out of polyester and core plastics. After curing, the whole pipe inside the old the new pipe achieves a thickness of about 3 millimeters, depending on how even or uneven the old inside of the pipe is.
- When the new pipe has tempered the quality is controlled using a camera for inspection. This inspection ensures that the pipe has the right amount of plastic and that nothing has gone wrong.

- Finally the sanitary ware is remounted and the bathroom can be used again. The whole process takes about one day.

## **Summary**

Because the pipes are cast, the new joints have no joints or splices. The only requirement for the older pipes is that they need to be whole and clean. It does not matter if the house was built in 1930 or in the late 1960's.

The relining can be a good choice if the rest of the bathroom is in good condition and you only wish to extend the life of the pipes.

The advantages of the relining method are:

- Inexpensive method that prolongs the life of the pipes.
- The tenants can stay in their apartments during the renovation.
- No waste, no noise or dust for the tenants.

The disadvantages of the relining method are:

- A short term solution. The bathroom will remain in its current condition and it will not result in an increase in the rent.
- There will still be a risk of moisture damage due to the fact that this method only focuses on the pipes and not on the other risks such as joints in the wall and floor cladding. Lack of damp-proofing in floors and wall cladding accounted for 37 percent of the total moisture damage which occurred in bathrooms during 2005.

## **Prefabricated bathrooms**

The Prefabricated-bathroom, of which the technique is also new, consists of a new bathroom which is built inside of the old one. The construction process is mainly made in a factory which means that you can achieve a more organized structure in the building stage. Like relining, you can still run the risk of having moisture damage in the current bathroom. If the humidity is not too high, it can be ventilated through the doorstep out of the bathroom. If the moisture damage is major, you have to dry it out which can cause delays in the construction process.

This is a price worthy renovation that has considerations regarding the future, when possible leakage can be located directly so that no damage will occur. Most prefabricated bathrooms are made for new buildings but can be used for specific renovations. There is however a risk that there is a sense of a "prefabricated feeling", that is to say there are less options when it comes to the design.

The process is divided in the following steps.

- Firstly, the old fixtures and sanitary ware are removed. The old pipes are cleaned and sealed.
- A gap-forming mat is placed on the floor and then the whole floor is filled to provide a smooth surface. Then new holes are drilled where the prefab cartridge containing all of the new pipes and drains will be placed.
- Metal studs are attached on the walls and the floor and walls are screwed into place. The new sewer pipe module is put in where the new wall-hung toilet is also to be mounted.
- Finally the new bathroom is inspected and then ready for use.

## **Summary**

There are many different systems of prefab cartridges. Moisture damage is expensive, and to then have a technique that directly reveals any possible leakage makes it possible to fix the problems before any damage occurs. Prefabricated bathrooms provide a good opportunity for better logistics, a reduction in working hours and reduced disturbance for the tenants compared with the traditional method of pipe work restoration.

The advantages of the prefabricated bathrooms are:

- Less waste, good logistics and a good working environment.
- An increase in the bathrooms standard and it usually results in an increased rent.
- Less expensive than the traditional way of restoring pipes.
- The possibility of detecting future moisture damage early.

The disadvantages of the prefabricated bathroom are:

- A reduction in surface area in the bathroom because of the new walls and ceiling.
- Fewer choices regarding the design of the bathroom.
- If moisture damage is discovered during the installation the bathroom needs to be broken up anyway.

## Conclusion

There is no right or wrong method when choosing between the alternative ways of carrying out pipe work restoration in bathrooms. A thorough investigation of the property and the bathroom must be performed before you can take a decision about which alternative is best.

The traditional way is time consuming but is the method most proven with good results. The relining method is probably the best way of restoring pipes if the bathroom is in good condition except for the sewage pipes. The prefabricated bathroom is a good alternative in bathrooms without known moisture damage and has the advantage of detecting future leakage directly.

## Sources

[www.vvsforetagen](http://www.vvsforetagen)

[www.proline.se](http://www.proline.se)

[www.boverket.se](http://www.boverket.se)

“Problematik och lösningar vid våtrumstambyten”  
By Magnus Andersson

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## Group Work

What to consider when you need to do a bathroom renovation?

Should you choose a traditional pipe replacement or choose one of the newer methods available such as prefabricated bathrooms?

Should we reline the pipes to move a major bathroom renovation in the future?

### **Björken 12, Karlstad, Sweden**

In the city of Karlstad, we have a property which we have problems with water damage in the bathrooms. The property was built in 1948. There are a total of 24 apartments in the building and rent level is €89.05 per sqm.

Three bathrooms have previously been renovated because of water damage. Therefore 21 apartments remain that need attention.

In addition to the problems with water damage, there are also some other problems with the property.

#### *Installations:*

All water and sewage pipes needs to be replaced due to water leakage.

#### *Bathrooms:*

The walls and floors lack the proper moisture protection. A total renovation of the bathroom is needed.

#### *Electrical installations:*

All electrical installations needs to be replaced.

#### *Balconies:*

The fronts are damaged and the balcony floor is cracked due to corroded reinforcement irons.

#### *Windows:*

Needs painting externally, or changed to new more energy efficient windows.

**Questions:**

Which of the above stated factors are important to consider in the choice of method? Discuss and justify each factor.

What additional factors should be considered in the selection of restoration method?

Which method should be chosen with the starting point of the problems outlined above and why?