PURCHASE MANUAL

PIPELINE REHABILITATION

Oliner
SYSTEM

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Introduction

This handbook primarily addresses pipeline rehabilitation for drainage systems, i.e. pipeline rehabilitation from the roof of a property via the building's plumbing system down to its basement and then under the ground out to the municipal sewer system. Pipeline rehabilitation is not a new field. It has existed for more than 30 years and at present this method comprises a financially attractive alternative to traditional stack pipe and drain replacement.

The objective of this book is to furnish purchasers with a more detailed basis for evaluating the different methods, products and solutions. There is no shortcut or miracle agent that is able to fix all pipes or piping systems. It requires experience, competency and the correct combination of methods and products for each installation.

Much of this handbook's content will be self-evident for some people, whereas for others it hopefully will provide abundant useful and instructive information. Our ambition is to increase the level of knowledge concerning the important criteria involved in ordering pipelining products.

I -What is pipeline rehabilitation / lining?

Pipeline rehabilitation is an umbrella term for the renovation of existing piping systems without having to dig up outdoor areas, rip up floors or tear through walls. Installation times are significantly reduced in comparison with traditional stack pipe replacement, as well as the inconveniences for the occupants being substantially fewer. Broadly put, we can say that instead of taking out and replacing piping, we install new piping inside to old piping.

There are many methods and products by which piping rehabilitation can be accomplished. Today, lining can be performed from the roof of a building, via the building's plumbing system down to the basement and from there under the ground out to the municipal sewer system. It should be self-evident that the same particular solution is not suitable everywhere. It may however be said that in all cases there are advantages in comparison with traditional piping replacement. In addition to avoiding the ripping up, tearing out and digging, the work of going through firewalls, managing the waste produced and/or relocating the occupants is also avoided. Or, views from the other side, i.e. that of the occupants, it is possible for life to continue as normal in the building.

Rehabilitation of water pipes and drainage pipes are two different matters, and this handbook is focused on the latter. The water supply pipes to a building also involve a considerable number of factors, so it is also quite important to be knowledgeable when inquiring about such piping rehabilitation. New experiences with products for lining lead to new regulations and directives, in the same manner that they in turn lead to new methods. Check that methods and products are approved by the health and environmental authorities. We should also mention that if the temperatures of the heating system do not exceed the maximum values of the plastic products, then solutions are also available today for repairing, for example, subfloor heating.

Water pipes, especially copper pipes, normally have a longer lifespan than drainage pipes made of ABS plastic and iron. Furthermore, due to their smaller dimensions, replacing water supply pipes does not require the same amount of intervention into a building as for the replacement of drainage pipes. And in particular, water pipes are pressurised and thus not dependent upon the laws of gravity in the same way that drainage pipes are.

Brief description of the work

The pipes are cleaned first. This is done to remove rust and coatings. The pipes then have the internal surfaces that are required for pipeline rehabilitation, and also regain their original dimensions. Once the cleaning has been performed, new piping is established inside the old piping and all transitions and couplings are renovated in order to build a new, fully complete piping system. In other words, the old piping is used as a framework for the new system. Floor drains are also cleaned and renovated.

Common misunderstandings

It has been stated from certain fields that rehabilitated piping does not have an adequate lifespan. This is incorrect. In order to receive Technical Approval from SINTEF Byggforsk, Scandinavia's largest independent testing institution, it is required that products and methods satisfy a 30-year lifespan.

Selection of method

There still are people today who choose a solution without checking inside the piping system. In the best case, this can be attributed to a lack of knowledge. As with everything else, good information is critical to making good decisions. Piping systems are seldom alike, and hence should be considered individually. The choice of method depends upon the requirements for quality. In addition, the desires of the occupants can also be taken into consideration. Such may concern, for example, the dates and times or individual desires for upgrading or altering the bathrooms and kitchens of existing living quarters. However, the method must always be selected based upon the possibilities that the piping system provides, and, as we have pointed out, these differ from case to case.

II - Condition and information

In this section we will explain how a piping system is designed and what the common causes of needs for renovation comprise. Thereafter, a description will be given of the specific information needed to select the right rehabilitation solution.

Main parts of the piping system:

Service piping extends from the point of arrival in the basement, under the building and the ground and out to the municipal sewer system.

Stack piping is a technical term for the vertical pipes in a property. This connects a flat's drainage pipes to the collection piping and service piping.

Rainwater piping The piping that services downpipes, roof gullies, scuppers and storm drains.

Horizontal runs is a general term for horizontal piping in bathrooms.

Branch pipe is a pipe protruding out from another pipe.

Sanitary units are pipes that service washstands, toilets, multi-purpose sinks, kitchen sinks and floor drains.

Offset bends is the name of a part that comes out at 90 degrees from a vertical to a horizontal placement in, for example, a floor or on a roof, and which after at least 0.3 m turns 90 degrees again into a vertical position.

No digging, ripping up or tearing out

The piping system's layout

Pipes are most often concealed and the differences greater than one would think. The only sure manner by which to determine the scope of the renovation work is to perform a complete examination. Such documentation requires visual inspection, exterior pipe locating and interior piping inspection. In larger piping systems this is quite extensive work, which the client must assess against the uncertainty existing in the work description after only selected parts of the system have been examined. Describing and detailing the work is obviously very important for the pricing to be correct. In other words, one must know what one wants to receive a quotation for. It is important that the quotations that one receives are for the same work and that no omitted examination of the system will lead to extra costs later.

Material in existing pipes

With pipeline rehabilitation, the material in existing pipes is significant when the method is to be selected. Additional future connections and uses of the pipes must be taken into consideration. The pre-examination is crucial to the progress of the job, since deficient information during the start phase creates uncertainty and causes time to be wasted during the execution.

Drainage pipes do have different lifespans, however to simplify it we can say that pipes that are 30 - 50 years old may have lost must of their functionality. The condition of pipes is affected by factors such as the material they are made of, movements of the building and what runs through them. For example, it is not good if chemicals have often been used to open clogged pipes.

Before 1960, iron pipes were used nearly exclusively. The pipes that were produced immediately after the Second World War are most often of the same quality as those that were produced before the war. This is due to the availability of iron being poorer after the war and consequently much iron of poor quality being melted down and used. The plastic piping that came into use at the end of the 1960s could not tolerate UV radiation. The plastic pipes from this time that were exposed to sunlight during, for example, transport or outdoor storage today most often are of poor quality. PVC pipes have large variations because they have had 20-30 different production and installation methods.

Dimensions and transitions

The pipe dimensions and transitions between them may pose limitations. It is however possible to rehabilitate most pipes nevertheless with approved solutions that are currently available on the market.

Bends/changes of direction

Bends are changes of direction in the piping system. Many variants exist today, and this requires that the suppliers have a large range of products in order to be able to select the optimum solution.

Accessibility and availability

This can be described simply as access via drains, cleaning hatches, branches and ceiling hatches. When access is difficult with respect to tenants, customers or the like such has an effect on the price and choice of method.

Piping quality

Extremely poor piping or a collapse of the system can limit pipeline rehabilitation as a solution. In such cases the possibility exists to combine piping replacement with lining. Most often, people wait too long before undertaking measures to maintain piping systems and only first when leaks start occurring do they begin contemplating such. When there are multiple leaks. it begins to become time to undertake such measures. Insurance companies can become unwilling to continue to insure (due to multiple damages) and to require that something be done in order to limit the damages. Clogged pipes and water leaks with ensuing damages makes for higher operating costs, which causes lining to become highly interesting in financial terms. Buyers of condominiums and houses are often unaware of the condition of the plumbing system, which can lead to expensive surprises. A renovated piping system gives a condo or house a very high value, and it is strange that so few people examine the state of the plumbing before they purchase a residence. A nice bathroom or kitchen is a great thing, but if the pipes behind the walls are poor then large expenses are waiting for the homeowner or high monthly fees for the flat owner.

Pre-inspection

This is an important part of the work and unfortunately it is often neglected before a decision is made. A pre-inspection is often made when a customer desires a bid for pipeline rehabilitation. If you know that the problem is so large that stack replacement is the only way out, then you need to go into the details of the complexity of the entire system. If, in contrast, you wish to assess the condition inside the piping, then you should perform a pipe inspection with a camera. That can be carried out with random sampling at critical points or with a complete inspection of the system, which is quite expensive.

It is important to be aware here that flushing of the pipes is necessary most often, especially for cast iron pipes. This can involve a risk that the pipes will not tolerate the pressure and that holes will arise. In connection with the camera inspection and flushing, an approved contractor should be on site to quickly perform local repairs or minor pipe replacement. Use existing drawings, but do not trust them to be correct. If pipes are ready for pipe rehabilitation or pipe replacement, a great deal has certainly been changed since the building was constructed. Always inspect the pipes!

The better the pre-inspection performed, the more correct the project description and bidding procedure will be in connection with pipeline rehabilitation.

III - Important things before piping rehabilitation and piping replacement

It needs to be stated first that pipeline rehabilitation also partially involves traditional pipe replacement. The replacement of supplies, seals and traps is often recommendable, and on occasion is absolutely necessary. It is also possible to take the desires of the individual occupants into account. This means that when an entire pipie system is to be renovated, both pipeline rehabilitation as well as traditional piping replacement are often used.

Pipeline rehabilitation involves minimal disruptions to the daily lives of the occupants.

Price

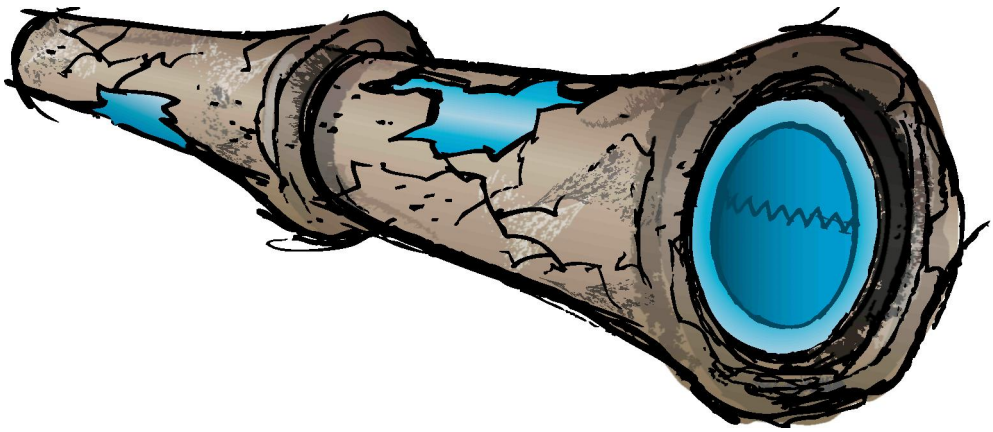
Traditional pipe replacement normally involves extensive access into the floors, walls, roofs and interior decorating. This is what makes it expensive. It becomes a total renovation, which includes all bathrooms having to be torn out and upgraded to the today`s standards. Pipeline rehabilitation is cost-efficient since the damage is minimal and the construction period is brief.

Be aware of what it is that is being priced. It is important that the offers from contractors contain the same items, otherwise you will be comparing apples and oranges. Be careful to ensure that all parts of the work are included in the offer, because they will always be included before the work is completed. Such can be:

- taking out and re-installing toilets, shower enclosures, bathtubs, water traps, etc.

cleaning of piping necessary before pipeline rehabilitation
documentation and filming of all pipes
work with taking out and re-installing for access to stack piping in basements

Before the work is started, the amount of access into the building and specification of the parts that are to be replaced will be agreed upon. Most often, the extent of the work can be agreed upon before the work is started, since it is both visibly apparent and the occupants are familiar with which parts are in poor condition. By doing so, many unpleasant and expensive surprises can be avoided.



Consequences

With traditional pipe replacement, the occupants normally need to move out of their living quarters for a period that usually spans 4 -10 weeks. This can also involve costs for the individual occupants. Some people include this in their cost calculations for pipe replacement, others do not.

Reporting obligation for construction projects

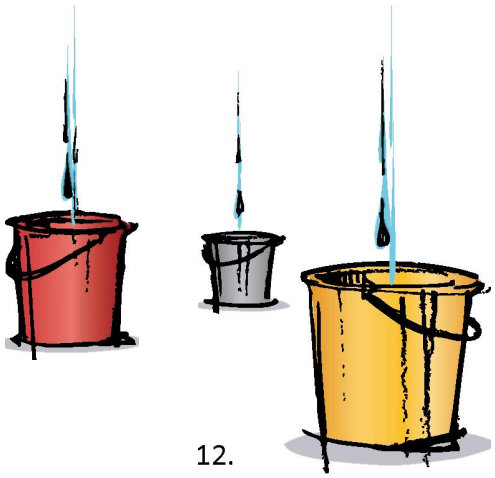
For extensive repairs into a building, there may be a reporting obligation and a permit may be required from the municipality before the renovation commences. Previously, this was primarily due to one making substandard, however today there are also other planning and building regulations included in the considerations.

Environmental considerations

Pipe replacement is a much greater burden on the environment than pipe rehabilitation, in part due to the new material and in part due to the management of the old.

Governmental and municipal requirements

These requirements concern first and foremost pipes under the ground outside the building. However in individual cases permits may be needed for changes to piping runs, dimensions and other solutions arising from piping replacement.



Eliminating conflicts between occupants

The selection of a solution may lead to conflicts between the occupants. You should be aware of this and avoid it as much as possible. For people who have renovated their bathroom or kitchen, or both, it is frustrating to be told that it must be done yet again. On top of this, they must also participate in paying for this duplication of the work via increased monthly fees for a long time into the future. For people who are contemplating a new kitchen or bathroom, completely independently of plumbing renovation, traditional pipe replacement may be a good solution since the contractor can give a better price because the work will be more comprehensive when it includes bathroom and kitchen renovations.

Satisfying the desires of everyone need not be a problem. With good planning, individual solutions can be provided for. If renovating a bathroom is desired simultaneously with renovating the piping system, traditional pipe replacement is chosen more often. You need to be aware however that if changes are made to the design, it makes it substantially more expensive. What is meant by changed design is that new piping runs are added to the existing ones.

Replacement or renovation of floor drains

Much leakage is dependant upon the seals between floors and floor drains. With traditional replacement of floor drains, the old drain is cut or concrete-drilled out. Mounting must be able to be adapted to the sealing of the bathroom.

The above can be the cause of alternative solutions being preferred. Pipeline rehabilitation can be such an alternative.

Water supply pipes inside buildings

Even though pressurised water pipes, which most often are of copper, normally have a significantly longer lifespan than drainage pipes, it is also important to check them before replacing drainage pipes. A much more substantial repair is usually involved in replacing drainage pipes than for water supply pipes, but it is important to possess an overview. The fact that water supply pipes are under pressure means that they can be mounted more independently then drainage pipes, which must have a drop. And the dimensions are much less, which also makes it easier to mount and adjust them.

Summary

There are many factors that must be considered when selecting the type of pipeline rehabilitation. Traditional pipe replacement in bathrooms or kitchens is usually the solution when a completely new set-up is desired where the renovation of the bathroom is a part of the work.

When the building is empty and the house's design makes the tearing up, ripping out and concrete drilling possible, then traditional piping replacement is a good alternative. This requires however a plan for waste management.

In order to comply with the governing requirements of the governmental authorities, it is a precondition that approved piping parts and other components be used. Of course, competently performed work is equally important.

IV - Contract, bid and offer

Contract variants and guidelines

when piping rehabilitation has been selected as a solution, then the form of the contract must be decided. There are different forms of contracts that govern the overall work. These can generally be categorised as subcontracts, general contracts, controlled general contracts and all-in contracts. If pipeline rehabilitation is a part of a larger contract, it becomes a subcontract to the all-in contract. If there are doubts concerning contract forms, you should hire a consultant in this field, because it may otherwise become extremely expensive in the end.

Production and project planning, documentation and invoicing

It is important that the contract be clearly formulated when it concerns partial delivery when such is relevant. The documentation of the work and the invoicing schedule must also be described carefully.

Invoicing is most often connected with completed units, stairwells or houses, but should never exceed 90 % of the work that has been performed. For invoicing, the quantity of work that has been performed must be documented. The documentation should encompass video of all the pipes that have been rehabilitated. The video should be edited after it is taken, so that a general understanding of the product quality can be attained.

For larger contracts, partial inspections should be performed.
You should take note that there currently, in September of 2011, exists no functioning code of regulations for pipeline rehabilitation/relining. This is clearly a deficiency that hopefully can be remedied soon. Until then, it is more important that the company performing the work be able to present documentation pf the company's certification, training, products, etc.

Content of offer/quotation

The offer to bid, is the desire to enter into an agreement in accordance with a contract. This is done in order to ensure competition under equal terms and conditions. By doing this, one ensures that there is true competition and you are operating with a definable and controllable process for all parties. One should aim for the contract to be awarded to the party that is able to fulfil it at the best price, quality, execution and timetable.

Normally, the bidding process can be divided up into the following points:
- The invitation to submit bids with the associated documentation and the deadline for bids.
- Define whether it is an open or closed bid.
  For an open bid, bidders as a rule have the right to be present at the opening of the bids, and for a closed bid, this is done without the bidders being present.
- The opening of the bids will be on the date for opening the bids received.
- The deadline for bids specifies for how long bidders will be bound to their bids.
  Clarification meetings will be held if the definitions in the bidding points are difficult to interpret or express.
-Selection of contractor.
- Possible more detailed clarification of bid.

Before ordering pipe rehabilitation, the following should be evaluated:

- Approval of product and method.
- Price.
- Price guarantee.
- Quantity specification.
- Substantiation of precisely what is required by groups from other trades.
- Insurance and guarantees.
- Work involving changes and additions
- Exceptions for pipes that cannot be addressed
- Approval of products and methods
- Other exceptions
- Product certification
- Rank-ordering of method and product
- History and experience
- References
- Insurance and guarantee

- Substantiation of training program
- Competency, capacity and product line
- Financial stability of the contractor
- Effect/burden imposed on occupants
- Environmental plan
- Quality assurance plan
- Operating and maintenanceÂdocumentation
- Timetable
- 1-year evaluation

Points in the offer

Regard to pipe rehabilitation, it is important to have a detailed description of the work that will be included. It is also important that there is a specification of quantities that will form the basis for the points below. In order to perform quality assurance on the quantity descriptions, the client should require that the contractor deliver drawings with descriptions of lengths, dimensions, couplings, bends, accessibility, etc. See also the point *Price* under section III, concerning comparing different bids and offers.

The following points will assist the client in comparing bids. Information about product suppliers as well as any possible subcontractors must be specified. The points are intended for assuring the quality of the contract and that the bids will be comparable.

1. Flushing and cleaning of piping.
2. Video documentation after cleaning.
3. Pipeline rehabilitation of service piping involves piping rehabilitation of all piping from the building to the municipal sewer system.
4. Pipeline rehabilitation of vertical stack piping involves the standing pipes that have connection points to the unit`s kitchen, bathrooms and other wetrooms.
5. Connection piping/branch piping involves piping from the vertical stack piping in to the unit's bathrooms and kitchens.
6. Floor drains.
7. Coupling: point where connection piping/branch piping meets collection piping/vertical stack piping.
8. Detailed inspection video of all interior piping. For the use of polyester coating it is important that filming be conducted from two directions.
9. Operation and maintenance.
10. Video inspection performed by an authorised/certified piping inspection company.
11. Disturbances for tenants.
12. Timetable/project plan.

V - Requirements of clients

When contracts are established, it is essential that purchasers/clients understand precisely what requirements must be fulfilled.

First and foremost, it is important that the financing, equity capital and security for the order be in place. Furthermore, the timetable/project plan must accord with what is delivered and the documentation that is described in chapter IV, Contract, bid and offer. One must first and foremost secure (outside) objective competence, so that the project will be provided for both with respect to its execution and its contract. Normally this is done with a separate project manager who represents the client but is not necessary

Value of piping rehabilitation

More and more people are becoming aware of the condition of piping and the significance of such. A plumbing system reflects to an increasing degree the value of a residence. A well-functioning piping system lowers the operating expenses and can help to lower the insurance costs.

[Images]

AREAS OF RESPONSIBILITY AND OWNERSHIP CONDITIONS

We are able, together with our network, to offer solutions for pipe rehabilitation for the entire path from the kitchen and bath to the municipal main. A brief explanation follows of pipe rehabilitation methods for those pipes that are used on a daily basis.

(1) WATER AND SEWER SYSTEMS / MUNICIPAL PIPES

Piping rehabilitation for municipal pipes with polyester-reinforced lining of diameters up to 1400 mm with a pipe thickness of up to 50 mm and lengths of up to 250 metres in an installation. Connection points in to each house/resident/subscriber are made with a robot.

(2) SERVICE PIPING / COLLECTION PIPING

The property owner is normally responsible for the pipes the entire way to the municipal pipes. These pipes are rehabilitated with a lining that is saturated with thermosetting plastic (resins) in the same manner as the municipal pipes, but with smaller dimensions.
We make any possible connecting pipes with an interior robot and then make a branch reinforcement with a hat profile of the same material.

(3) INTERIOR STACK PIPING
and rainwater piping

Interior stack piping and rainwater piping that goes through the entire property are also rehabilitated with a lining that is saturated with thermosetting plastic (resins). Branch pipes to connecting pipes are opened with a robot and hat profiles installed.

(4) HORIZONTAL PIPING
to bathrooms and kitchen

From branch pipes and further along in to bathrooms and kitchens, we rehabilitate the piping with an epoxy-saturated lining or a two-component polyester coating that is sprayed in three layers. This is carried out after the piping has been flushed and ground completely clean. The choice of method depends on the specific condition that the piping is in, what the pipes are made of and what the accessibility is. Based on this, we select the method that will give the optimum result.

(5) IMPROVEMENT OF FLOOR DRAINS

We grind and flush floor drains before we apply a polyester coating in three layers. Water traps are drilled out and receive a new plug. We are also able to improve floor drains with a new insert/top for later improvement of a bathroom in order to meet the norm for wetrooms.

[Image text pages 20-21]
We seal all couplings between two piping stacks, as extra security for an area that is often a weak point. This reinforcement is called a "hat" or a branch reinforcement.

VI - Product and methods

Pipe rehabilitation has two options:

1. Internal spraying of the pipes. In this case, either self-hardening material is used or the hardening process is accelerated by a temperature increase or lighting. The material is applied in multiple rounds, i.e. in several layers.

Benefit: The thickness of the coating can be adjusted and wrinkles thus avoided in, for example, bends.

Drawback: The method is extremely operator-dependent and it is difficult to coat the same thickness the entire way through. It is also difficult to perform subsequent checks on the material thickness. Selection of the incorrect product may result in a shorter lifespan than expected.

2. Lining, often called socks, with different flexibility and wearing strength on the outer surface (coating). This sock is fed into the pipes in different manners, but most often with the use of compressed air. The hardening process is accelerated most often with the use of heat or light in different manners.

Benefits: An even layer is achieved in the entire section of pipe. It is easy to check. The product receives an extra lining against wear(coating). With the right choice of product, a new pipe is obtained inside the old one.

Drawback: Large variations exist in products and properties that are difficult for the client to obtain information about. A poorly executed lining can create wrinkles in the pipe. If the wrong product is selected, the hardening process can damage the surface layer several months after the installation and result in a shorter lifespan than expected.

The 2 plastic products that are used are:

Epoxy, a liquid plastic compound in which the molecules are polymerised when they are exposed to heat. When hardener is added, it accelerates the process further. Epoxy binds to most substrates, like a type of glue.

Benefits: A flexible self-hardening product that tolerates vibration and movements. Most suitable for environments with stable temperatures without sunlight.

Drawback: Has low viscosity and thus is quite difficult to spray with a good result. Large variations in execution. Large product line of epoxies with different properties. Difficult to check.

[Images]

23.

Glossary

Drain pipe - a pipe that transports wastewater from bathrooms, showers, drains and kitchens
Bend - a change of direction in a pipe
Concrete pipe - pipe produced of concrete. Used to a lesser extent today.
Epoxy - a type of plastic. Its hardening is accelerated with the use of heat or light (UV light)
Epoxy coating - a pipe is sprayed internally with an epoxy coating
Casing - often called a sock. It is mounted inside pipes with the use of compressed air. Its hardening is accelerated with the use of heat
Milling - opening of branch pipe/coupling with the use of an internal robot after the casing/sock has been mounted
Clay or VC pipe - pipe produced of clay with surface treatment called glazing. No longer used
Branch reinforcement - a special product for reinforcing the transition/coupling between two pipes. Most often used with epoxy-saturated casings
Branch coupling - a separate pipe that is connected to a different pipe. For example, a pipe connected to
stack piping
Hat - see branch reinforcement
Core drilling - method for drilling through concrete. For example through tiers of beams and joists separating the storeys in a building
Short pipe - normally a PE pipe that is pressed into an old pipe
Conduit - a conduit is a pipe
MA pipe - cast iron pipe that is surface-treated with epoxy internally and rust-protected externally
Rainwater piping - handles randomly occurring runoff water for example rainwater, melt water, wash water or permeating groundwater
Concrete ripping out - removal of concrete in, for example, walls and floors. For stack piping
old pipes and drains are ripped out in walls and floors and removed or replaced
Polyester coating - consists of polyester, often reinforced with glass fibres. Also used for
production of, for example, boats and automotive parts
PP pipe - plastic pipes of polypropylene
PVC pipe - PVC plastic is stiff and easy to colour. Large application area

Coupling - see branch pipe

Relining - a different word for piping rehabilitation

Cleaning of pipe - coating, hardened compounds, rust or growths of rot are removed via
high pressure flushing and/or mechanical cleaning

Ring stiffness - designation of the pressure the pipe can withstand

Rubbing - rubbing down the inside of a pipe in order to ensure that all internal coating disappears and thus creating better bonding for a coating or lining

Stack replacement - traditional replacement of drain pipe via ripping out, etc.

Pipe inspection - control filming if pipes internally, also called TV inspection

Drain - collection receptacle for a shower or on the roof for example

Renovation of floor drain - surface treatment of floor drain with, for example, polyester coating (after flushing/cleaning)

Wastewater pipe - drainage pipe

Flushing - cleaning of pipes with high pressure water

Clean out - opening in pipe for cleaning or inspection

Stack - collection piping/vertical piping from roof to basement

Plug pipe - connecting pipe that connects the drainage unit to the stack/collection piping

Sock - see casing

TV inspection - see pipe inspection

Horizontal runs - trade term for wastewater piping in bathroom floors

Wet room - umbrella designation for rooms that have incoming water and/or outgoing drainage. Usually bathroom, shower, laundry room or the like

Sock - see casing

TV inspection - see pipe inspection

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26.

Oliner System

Oliner System is part of the Olimb Group. Olimb are pioneers in the industry, and the relining consept (NO DIG) was established by us in 1959.

- We have placed an emphasis on the quality of the products, as well as the individual operator's competency. We know this is completely crucial to the final result.
- We handle, with our own personnel, installation of even the largest dimensions of drainage pipes and we are confident that this is possible because we place emphasis on training of our employees at the forefront.
- Our founder, the Olimb Group, was a part-owner of the first manufacture of flexible lining material, so-called "socks".
- We have developed methods for installation of offshore pipes in lengths of several kilometres in one operation.
- We are developing and testing at the moment a method for the pre-installation of public water pipes with an excavation-free technology.
- We were the initiative-taker behind SINTEF* developing a full-scale model for testing and approval of piping rehabilitation in buildings. Oliner Systems technical approval (TG 20045) involves, among other things, a technical lifespan of at least 30 years.
- All our installations go through thorough training for the products we use. In order for the final result to maintain the highest quality, a careful analysis is made of the project's different factors before the product and method are selected.

Each piping system is unique and requires its own solution.

** SINTEF Byggforsk is Scandinavia's largest independent research institute.*

Today, pipe rehabilitation is a satisfactory and viable alternative to traditional piping replacement. For clients, it has however been difficult to know what pipeline rehabilitation involves with respect to its lifespan, guarantees, costs and disturbances for the building occupants. As a client, it is difficult to know how one should ask the right questions. It is also difficult to compare offers, because they often contain different concepts and have different scopes. This makes it difficult to make decisions.

The goal of this book is to make things easier for people who are, or who will become, purchasers of pipeline rehabilitation. We wish to give you a tool to be able to assess the different methods, products and solutions that are available for pipe rehabilitation.

Oliner System AB was, among other things, the first to receive Technical Approval (TG 20045) from SINTEF. We view this book as still another stage in the work of ensuring quality and standards in the industry.

There is no shortcut or any miracle agent that will fix all pipes. Pipeline rehabilitation requires experience, competence and access to goof methods and products. All drain/sewer systems are unique, so each pipe system requires its own unique solution.