Since May 10, 2019 we deliver the 'Manhole' calculation module for IngSoft EasyPipe.
Benefits of the Structural Calculation of Soil Covered Pipes and Manholes

Structural calculations help to design pipes and manholes so that

- all the loads the occurrence of which is considered possible will not lead to a structural collapse, but also that
- not more material than necessary will be used to guarantee structural stability.

Whereas the need of structural calculations for buildings above ground or tunnels is widely accepted, buried pipes and manholes are not always designed based on static aspects. Again and again this leads to major follow-up costs in the event of damage. But even more often this causes over-dimensioned and overly expensive constructions.

Benefits for the client

Hence it is in the interest of the client to insist on individual calculations for the pipes or manholes during tendering. It is advisable to check the documents presented against your own calculations or to have a third party do this. The possible economic loss in the event of a collapsed pipe would be enormous and it is doubtful whether the provider of the pipe or manhole would be able to fulfill his warranty several years later.

Benefits for the planning engineer

Often planning engineers or offices are involved in infrastructure development. Many of them do not do the structural calculations but demand them from the supplier of the pipes or manholes.

But only by one’s own structural calculations during planning can show

- the fundamental factors which influence the stability of the components
- at which points in the calculation the provider has made assumptions which are beneficial for him
- and which of the given parameters have to be followed at the construction site in order to stay within the limits of the calculations
- Furthermore, an objective comparison of the advantages of different materials (plastics, concrete, etc.) can only be made with particular consideration of static aspects.

Benefits for the pipe and manhole provider

In most cases pipes and manholes have to be delivered “according to structural requirements”. Hence the risk of liability is delegated to the provider. This means that details about the installation have to be asked of the purchaser and individual calculations according to the state of the art have to be done.

In light of the hard competition today it is in the interest of the provider not to offer over-dimensioned components.
Software for the Structural Calculation of buried Pipes and Manholes

For more than ten years software products from IngSoft have helped producers and engineers with structural calculations of buried pipes and manholes.

Normally the purchase of the software is profitable after only a few structural calculations, which otherwise would have been done by the user or by a third party.

The IngSoft GmbH offers tried and tested solutions and emphasizes user-friendliness and smooth integration into modern IT infrastructures. By following current Microsoft Windows™ standards it is ensured that the software can be installed and maintained with little effort.

Although it is easy to learn how to use the software, it is nonetheless addressed to professionals with adequate knowledge of structural engineering.

Software for buried pipes

• **IngSoft EasyPipe** is the successor of the well-established EasyPipe98. Whereas EasyPipe98 allowed calculations of buried pipes only according to ATV-DVWK-A 127, IngSoft EasyPipe combines a number of calculation methods based on national and international standards (e.g. AWWA M45), also for jacking pipes according to DWA-A 161 [see separate product information].

• **EasyRohr98** is a specialized solution for the structural calculation of drainage pipelines for leachate water from landfills according to the ATV standard M 127-1 (March 1996).

• **EasyInliner** features the structural calculations for the rehabilitation of drains and sewers by lining and assembly methods according to ATV-DVWK-M 127-2 (January 2000), for round-shaped pipes and old pipe condition I or II. EasyInliner now is a calculation module for the software IngSoft EasyPipe [see separate product information].

Software for manholes

• As there is no universal standard available for the calculation of manholes, **EasySchacht98** is based on different publications, especially on those of the widely revered expert Dr.-Ing. A. Hoch. Concerning the distribution of loads due to earth pressure and due to dynamic loads EasySchacht98 is very close to the standard ATV-DVWK-A 127.

Since May 10, 2019 we deliver the “Manhole” calculation module for IngSoft EasyPipe.
Structural Calculation of Manholes Following the ATV - A 127 Standard

No calculation models for manholes being available, EasySchacht98 has been created on the basis of different publications, especially those of Dr.-Ing. A. Hoch. However, it closely follows the ATV - A 127 with regard to load partition due to earth pressure and traffic and with regard to proof of deformation.

Features, riser types

EasySchacht98 allows the calculation of manholes equipped with one of the following types of shaft risers:

- flexible and rigid solid-wall pipes
- profiled pipes
- solid-wall pipes with nominal stiffness (i.e. GRP)

Up to 4 openings or pipe nozzles are included in the calculations. In the case of pipe nozzles, their supporting effects are taken into account in the calculations.

With the exception of reinforced concrete, risers made of all the other materials mentioned in ATV – A 127 can be employed, for example:

- asbestos cement, concrete, stoneware
- polymer concrete
- HD-PE, PVC-U (thermoplastics)
- steel, cast iron
- UP-GF (duroplastics)

For example, in the case of plastic manholes, EasySchacht98 allows all calculations for proof of stability concerning:

- deformation
- stress in axial direction
- stress in radial direction
- transverse strain in the manhole foot
- equivalent strain in the manhole foot
- buckling in axial direction
- buckling in radial direction
- combined buckling in both directions

Features of EasySchacht98 for manhole foundations

For a manhole foundation EasySchacht98 offers four different types of constructions; additionally, it is possible to calculate without a bottom plate:

- A flat reinforced concrete foundation slab
- Reinforced concrete foundation slab with elevated rim (advisable in case of groundwater)
- Reinforced concrete foundation slab with solid encasement (advisable in case of groundwater)

Features of EasySchacht98 for manhole lids

The strength of EasySchacht98 lies in its flexibly with different manhole construction types. It is thus possible to use lids of the different types of construction; it is also possible to calculate without lid:

- Standard concrete cone
- Simple steel-reinforced concrete slab
- Bedded steel-reinforced concrete slab
- Lid made of same material as the riser
- Free indication of sectional forces

In the case of a standard concrete cone, the number of concrete elements required and the total weight can be determined.

For the simple concrete slab, not only the weight is determined but also the required reinforcement of the reinforced concrete.

For the bedded concrete slab as well, both the weight and the required reinforcement are determined.

A structural calculation of the lid made of the same material as the riser can be carried out. In this case stiffeners can be considered as well.

By means of the free indication of sectional forces at the upper end of the riser, the influence of other lid construction types on the riser can be determined correctly.

The traffic loads adjacent to and on the lid can be chosen separately.
EasySchacht98 allows the following calculations for proof of stability of the foundation slab:

- stress for the midspan
- stress adjacent to the welding
- calculation of the minimum thickness of the welding
- determination of amount of reinforcement necessary in the reinforced concrete foundation slab or of the precast part.

**Features Safety against buoyancy**

A complete structural analysis for a manhole also includes a proof of safety against buoyancy, which is provided by EasySchacht98.

**User-friendliness**

- Every entry is instantly tested for plausibility. The colour of the input field will change immediately if an invalid input value is used.
- The most important results are immediately shown in the lower part of the screen, and as soon as an input value is altered, the result will be updated and displayed instantly. ("Play & See"-technology). This is a great help when in search of potential savings.
- If a profile database is available, the program can automatically choose the suitable pipe from the recorded range of products (Optimization). In the same way the necessary wall thickness of a solid-wall pipe can be determined automatically.
- EasySchacht98 has been developed according to Microsoft’s “The Windows Interface Guidelines for Software Design” and is therefore easily accessible for every user acquainted with other Windows programs.
- If EasySchacht98 has been purchased in more than one language, it is possible to switch between the languages while the application is still running, thus making it possible to produce multilingual printouts of the same project.
- The final output on paper and screen is optically appealing: Greek letters and subscripts appear correctly, while the individual company letterheads printed on each page.
- The profiles and nominal diameters of pipes available from one or more manufacturers can be stored in a database compatible with MS Access. The implementation can be carried out either by the IngSoft GmbH, with MS Access (not included in the offer), or by a special help program custom-written for the customer and his production range. This profile database can be used by every program of the IngSoft ’98 series (e.g. EasyPipe98, EasyRohr98).
- For producers of profiled pipe developing individual profile geometries for single projects, a special entry section can be included in EasySchacht98. Variations in the geometrical profile dimensioning and their effects on the calculation (safety coefficients) can be directly observed ("Play & See").
- Material characteristic values can also be stored in a database and can be used by all programs of the IngSoft ’98 series.
- Of course, all entries can be stored in a project file and will always lead to the same results.
- Consecutive structural calculation runs can be automatically numbered for documentation purposes.

Since May 10, 2019 we deliver the 'Manhole' calculation module for IngSoft EasyPipe98.
System Requirements for EasySchacht98

Operating systems with support included
Windows XP, Windows Vista, Windows 7, Windows 8
EasySchacht98 also runs on Windows 95/98/ME, Windows NT and Windows 2000, but IngSoft does not offer support for problems with running EasySchacht98 on these old versions of Windows.

Required screen resolution
Minimum 800 x 600 pixels

User Requirements
To run EasySchacht98 the user needs to start it first time as an admin. Afterwards, the software is started normally.

Availability
The software can be downloaded from the internet.
The customer has the option to integrate his own logo in the outprints. Therefore builds IngSoft an individual customer modul, sent via, for example, e-mail. The activation is connected with the customer module.

EasySchacht98 Price List
Prices do not include value added tax, which will be added as required.
In addition to the standard items listed here, special extensions and customizing are available upon request.

Single-user licenses
The software will be delivered via download. The name or logo of the licensee will be displayed on every printout.

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<table>
<thead>
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<tbody>
<tr>
<td>Single-user license</td>
<td>3,500 €</td>
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<tr>
<td>Additional fee for the English version</td>
<td>150 €</td>
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</table>

Multi-user licenses
For further installations within one company an extended license is necessary. If all installations have the same function volume and work with the same name and logo of the licensee, the following prices apply:

<table>
<thead>
<tr>
<th>Installations</th>
<th>Price per Installation</th>
<th>Of the single-user license</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 – 4</td>
<td>50 %</td>
<td></td>
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<tr>
<td>5 – 9</td>
<td>30 %</td>
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</tr>
<tr>
<td>10 - ∞</td>
<td>25 %</td>
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</tbody>
</table>

The full price applies for the first installation.

Rental licenses
Instead of the purchase of an indefinite license, the use of the software can be rented for a specified period of time.

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<tbody>
<tr>
<td>Rental fee per month</td>
<td>500 €</td>
</tr>
<tr>
<td>Additional fee for the English version</td>
<td>55 €</td>
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</tbody>
</table>

It is only possible to rent the software for full months (i.e. 30 days, 60 days, 90 days and so on).

Software maintenance
With the software maintenance fee updates via internet are available and questions are answered. Maintenance for the first twelve months is included in the license fee. After that a maintenance agreement will be arranged.

There are two different levels of support available:
• Standard support answers questions sent via e-mail at the latest on the next workday.
• Premium support offers assistance within 4 hours and is also available via phone.

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<tr>
<th>Service level</th>
<th>Maintenance fee as percentage of the license fee</th>
</tr>
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<tbody>
<tr>
<td>Standard support</td>
<td>15 % p. a.</td>
</tr>
<tr>
<td>Premium support</td>
<td>20 % p. a.</td>
</tr>
</tbody>
</table>

The maintenance fee is to be paid one year in advance.

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Training
Although the use of the software is self-explanatory, special training is advisable if the user has basic knowledge of structural analysis but no broader experience in the structural calculation of manholes.

<table>
<thead>
<tr>
<th>Course</th>
<th>Training in Nuremberg</th>
<th>690 €</th>
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<tr>
<td>approx. 4 hours</td>
<td>On-site training (Germany, Austria or Switzerland)</td>
<td>1,290 €</td>
</tr>
<tr>
<td></td>
<td>On-site training in other countries</td>
<td>on request</td>
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</tbody>
</table>

Travel and accommodation costs will be charged additionally.

If the training exceeds the above referenced duration, every further hour will be compensated with 100.- €.

Further software utilizations
Beside the software for structural calculation of manholes, IngSoft offers also the software for structural calculation of buried pipes. The program is called IngSoft EasyPipe. Detailed information are available on IngSoft EasyPipe product brochure.

About IngSoft GmbH
Since 1997 IngSoft successfully develops applications in the field of structural analysis. As one of the market leaders we are internationally firmly established in this specific area.

The focus is on the software IngSoft EasyPipe for structural analysis of buried pipes and manholes according to current standards. Besides that IngSoft offers technical support, individual software solutions, custom-made adjustments and further engineering performances such as FEM calculations.

IngSoft is a DWA (German association for water, wastewater and waste) partner. Under the designation „Statik-Expert” the DWA standards ATV-DVWK-A 127 and DWA-A 161 are developed by IngSoft.

National and international reputable pipe and manhole manufacturers, municipalities, universities and engineering bureaus are our customers.
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