



PipeLife
PP MASTER
SN16
ONGERT

PP MASTER[®]

Polypropylene sewer pipe system

3-layer solid wall pipe

STARKE LEBENSADERN
FÜR UNSER LAND

PIPELIFE

EIN ROHR BEUGT VOR

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PP MASTER installation instructions

Issue 02.18/05

When using our materials, please observe the Austrian ÖNORM standards, installation regulations and building codes applicable for the respective area of application as well as our factory standards and installation instructions. Subject to technical changes. No responsibility can be taken for the correctness of this information.

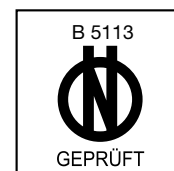
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Graphics: Pipelife

Further information on certification can also be found on the following websites: www.gris.at, www.as-institute.at, www.as-plus.at/certification/zertifikatsdatenbank



DIBt



Österreichischer Arbeitskreis
KUNSTSTOFFROHR RECYCLING



PP MASTER[®]

PP 3-layer sewer system

More than 20 years of experience and development

More than 20 years ago, Pipelife Austria developed the 3-layer polypropylene sewer pipe system **PP MASTER** for public sanitary sewer systems. The philosophy behind it was just as relevant then as it is today: Quality - Reliability - Simplicity.

However, not only quality in Austrian sanitary engineering, but also customer satisfaction is always a concern for us. This is why this high-quality sewer pipe system is subject to continuous further development, always with the wishes of our customers in mind. This continuous development has now resulted in the current generation **PP MASTER**.

The innovations at a glance

The current **PP MASTER** generation is characterised by three essential features:

- improved sealing system
- higher ring stiffness (up to SN16)
- higher longitudinal stiffness

The improved sealing system for pipes

Fortunately, pushing out a sealing ring is not a frequent problem, but it does happen occasionally. If the fault is not noticed straight away, then rectifying the damage can be labour-intensive and expensive. This mishap can no longer happen with the pipes of the new **PP MASTER** generation.

The tried and tested sealing ring is held in the bead by a fixed support ring and can no longer be pushed out. However, the sealing ring can still be removed from the bead for cleaning and reinstalled just as easily.

The **PP MASTER** pipes have a moulded plug-in socket. In contrast to systems with a plugged-on double socket, only one sealing ring is required per connection point.

Higher ring stiffness with SN8

The two stiffness classes SN8 and SN12 have proved very successful in the sewer pipe sector in recent years and are supplemented by the SN16 stiffness class. The SN8 class has been upgraded in the current **PP MASTER** generation. All pipes in this class comply with SN10. This is continuously confirmed by tests and by means of test certificates from an independent, authorised Austrian testing institute.

Quality
Reliability
Simplicity

The red support ring prevents the sealing ring from being pushed out.



SN10
Class SN8 pipes
comply with SN10

PP MASTER has even higher longitudinal stiffness

3-layer technology and high-grade reinforcing materials

structured pipes have low longitudinal stiffness

PP MASTER convinces with quality and safety

Higher longitudinal stiffness

In many projects, the longitudinal gradient of non-pressurised sewage pipes is very low due to the construction prerequisites (e.g. when connecting to an existing line at a shallow depth). Pipes with high longitudinal stiffness prove their worth here. **PP MASTER** has this high longitudinal stiffness.

The high longitudinal stiffness of **PP MASTER** is achieved by two factors:

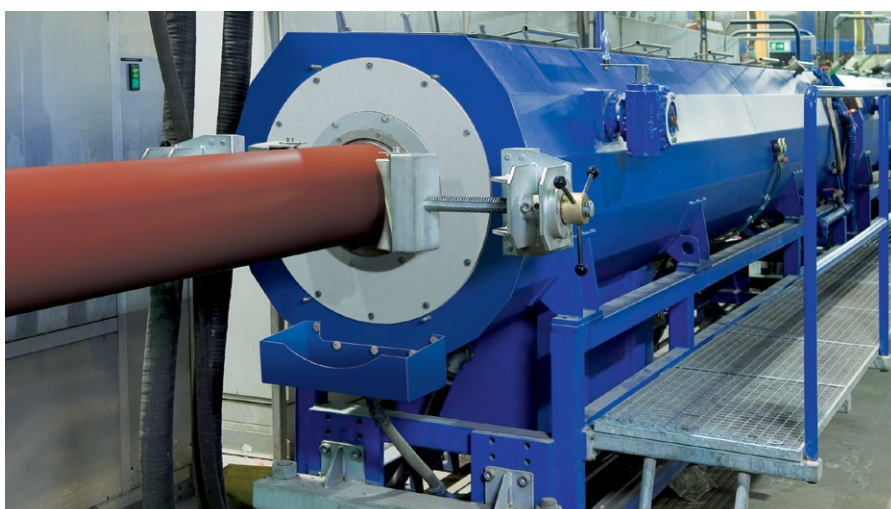
- State-of-the-art 3-layer technology
- Tried and tested PP materials in combination with high-quality reinforcing materials (instead of the cheap fillers usually used)

In contrast to structured pipes (corrugated/ribbed), which have good ring stiffness but only very low longitudinal stiffness due to the system, **PP MASTER** achieves very good values in this point and is therefore also very well suited **for installation with a low longitudinal gradient**.

All in all, **PP MASTER** impresses with two compelling arguments: **Quality and safety**. This benefits planners, installers and customers alike.

3-layer technology

This technology has established itself in the field of non-pressurised sewage pipes as THE quality feature - together with the material polypropylene.



high-quality Solid wall pipe

In contrast to structured pipes, **PP MASTER** belongs to the high-quality range of solid wall pipes. This means that the three layers become a homogeneous pipe wall in the production process.



By using suitable polypropylene types and the latest production technology, this unit also remains indissoluble

- for deformations
- for impact stress
- for cutting to length and bevelling
- for outdoor storage
- for aggressive waste water

Each of the three PP MASTER layers has been designed to meet specific requirements.

three layers form an indissoluble bond

The outer layer

The outer layer of polypropylene with reinforcing materials has a high modulus of elasticity and a high surface hardness. This makes it resistant to the penetration of foreign bodies into the pipe wall (e.g. stones). Through suitable modification of the PP, very high longitudinal stiffness and uniform temperature distribution are achieved. There is also a high level of UV protection, which guarantees outdoor storage.

hard & resistant

good UV protection

Identification colour

The core layer

This PP layer with mineral reinforcement, together with the outer layer, guarantees the high longitudinal stiffness and the high ring stiffness (SN8 to SN16). Nevertheless, the great advantage of pipes made of thermoplastics - flexibility - remains fully intact.

high longitudinal stiffness and high ring stiffness with flexibility at the same time

The inner layer

It is made of an advanced type of polypropylene and ensures high chemical and thermal resistance as well as perfect abrasion resistance. The smooth surface guarantees good drainage performance and prevents incrustation. The light colour makes inspection by camera much easier.

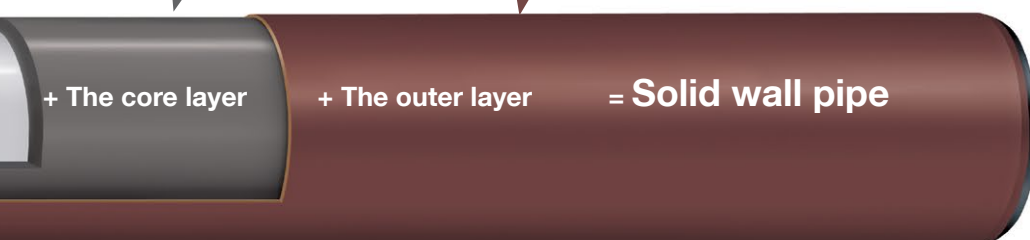
**chemically resistant
abrasion-resistant
ideal for camera driving**

The 3-layer technology in combination with the high-quality, modified and reinforced polypropylene types enables, in addition to all other advantages, above all a low wall thickness. The inner diameter can be kept as large as possible while maintaining the necessary minimum wall thicknesses for sewer pipes. This means that the best possible drainage capacity is always guaranteed per dimension.

wall thickness as low as possible

largest possible internal diameter

best drainage performance



Polypropylene - PP

tried and tested over decades

A plastic that has been tried and tested for decades is finding more and more applications in recent times.

new PP types

High demand led to the development of new PP grades whose properties have been adapted to the respective application.



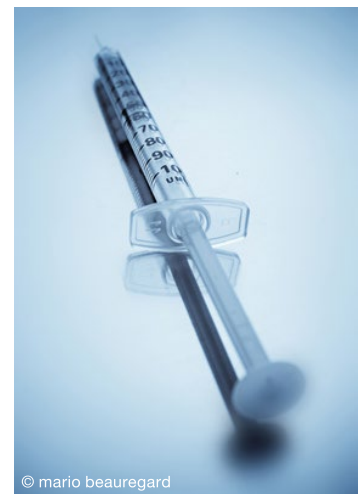
diverse applications

Polypropylene is used in medical technology, automotive engineering, mechanical engineering and in many areas of daily life.

mineral reinforcements

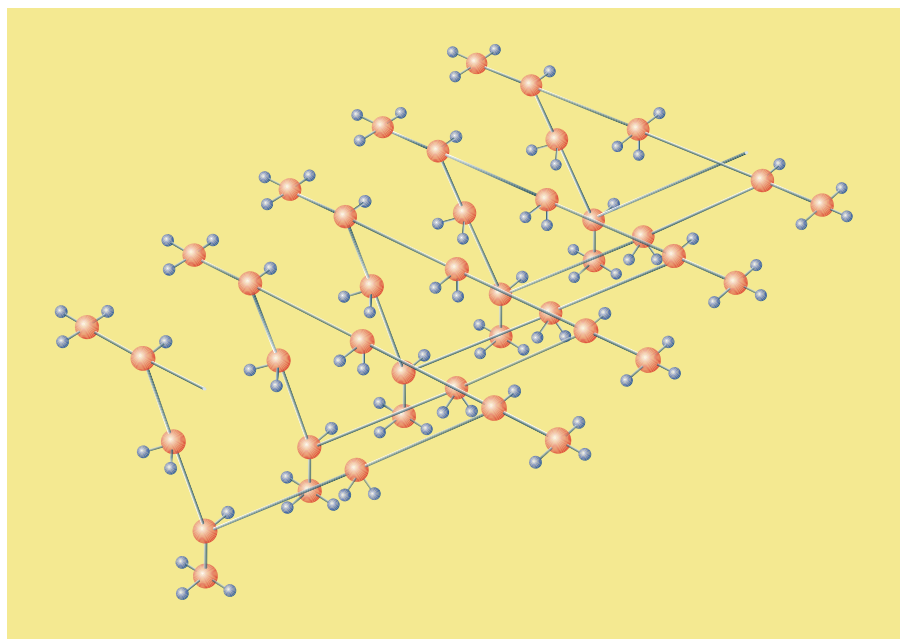
PP can be mixed with mineral reinforcing materials. This significantly expands the range of properties, especially the mechanical ones.

These expansion possibilities, together with the modifications of the various polypropylene types, also make PP so interesting to use in the pipe sector.



Molecular structure

PP is free from halogens and heavy metals



Molecular structure of polypropylene, hydrogen and carbon atoms

Polypropylene as a pipe material



Use of PP in domestic drainage: MASTER 3, the PP 3-layer drainage system for domestic, residential and industrial buildings

In pipeline construction, this material is mainly found in the industrial sector, in domestic drainage technology and in the chemical industry. Its resistance to chemicals and high temperatures as well as its corrosion resistance are of particular benefit.

The material polypropylene has excellent properties:

- high stiffness
- high resilience
- high resistance to stress cracking
- high service temperature
- high chemical resistance
- physiological harmlessness

outstanding properties

The polypropylene types used for **PP MASTER** have been specially modified for the sewer application area in order to meet the specific requirements of each individual layer.

The material has also been upgraded with mineral reinforcing materials. This significantly improves properties such as ring and longitudinal stiffness and impact resistance. However, it is important to use high-quality reinforcing materials instead of the cheap fillers that are sometimes common in Europe. The **PP MASTER** polypropylene sewer pipe system from Pipelife has now

specially modified PP grades

**mineral reinforcing materials improve the pipe properties
NO cheap fillers**



been proving its worth in the field of residential water/sewer construction for 20 years. Continuous development of both the pipe material and the **PP MASTER** pipe itself secures safety for planners, customers and installers alike.

The use of polypropylene guarantees the durability of Pipelife PP MASTER.

Safety further development

Ring stiffness

three stiffness classes
SN16, SN12 and SN8

SN8/SN10
Class SN8 pipes
comply with SN10

Total wall thickness also
relatively moderate for SN16

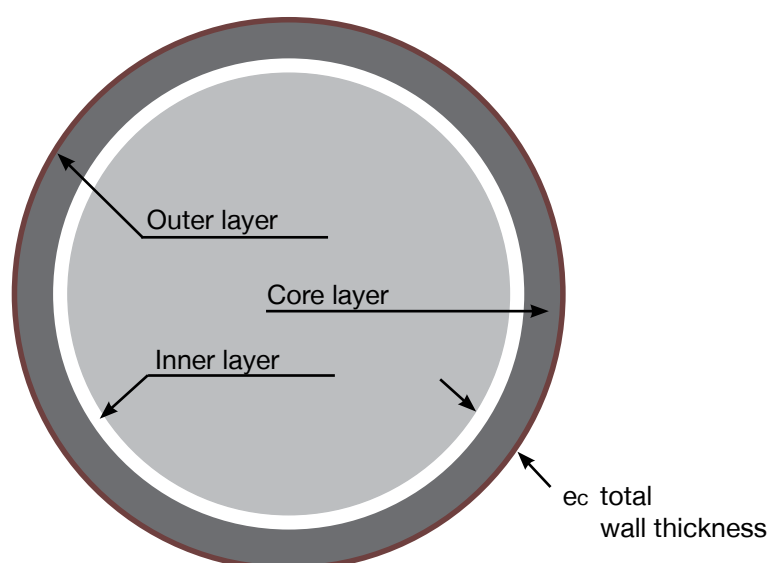
Pipelife **PP MASTER** is available in the stiffness classes SN16 ($\geq 16 \text{ kN/m}^2$), SN12 ($\geq 12 \text{ kN/m}^2$) and SN8 ($\geq 8 \text{ kN/m}^2$). The stiffness is classified according to ÖNORM EN ISO 9969 and is confirmed by an expert opinion from an independent Austrian testing institute.

The SN8 class has been upgraded in the new **PP MASTER** generation. All pipes in this class comply with the tested ring stiffness $\geq 10 \text{ kN/m}^2$. This is confirmed by continuous testing and by means of test certificates from an independent, authorised Austrian testing institute.

Despite these high stiffnesses, the PP sewer pipe system is flexible enough to be able to relieve any stresses that occur through deformation.

The stiffness is achieved on the one hand by the 3-layer structure and the design of the wall thickness, and on the other hand by the targeted use of modified polypropylene.

Thanks to these modified - predominantly mineral-reinforced - polypropylene types in connection with the modern 3-layer technology, the overall wall thickness can be dimensioned relatively moderately despite the high stiffness class SN16. The inner diameter is thus kept large and the good drainage capacity is maintained even with SN16.



Flexibility + stiffness = safety

**Ideal even for difficult
installation situations**

low overhead clearance

PP MASTER uniquely combines the positive properties of flexibility and rigidity. As a result, a sewer system with new standards is available to public sanitary engineering.

Almost all conceivable installation situations for buried sewer pipes, such as the influence of groundwater, insufficient compaction or difficult soil conditions, can be handled by the SN12 and SN16 class with sufficient safety reserves.

Especially in the road sector, ever lower covering heights are required. With the high stiffness classes SN12 and SN16, these requirements can be optimally fulfilled. Even the lowest covering heights of up to 0.50 m can be realised.

Longitudinal stiffness

In many projects, the longitudinal gradient of non-pressurised sewage pipes is very low due to the construction prerequisites (e.g. when connecting to an existing line at a shallow depth). Pipes with high longitudinal stiffness prove their worth here. These low slopes can be produced without height deviations with **PP MASTER** pipes.

The **PP MASTER** pipes are also characterised by a higher longitudinal stiffness and thus differ significantly from structured pipes (corrugated/ribbed pipes).

The high longitudinal stiffness of **PP MASTER** is achieved through:

- a state-of-the-art 3-layer technology
- Tried and tested PP materials in combination with high-quality reinforcing materials (instead of the cheap fillers usually used)

3-layer technology and high-grade reinforcing materials ensure greater longitudinal stiffness in PP MASTER



In contrast to structured pipes, which have good ring stiffness but only low longitudinal stiffness due to the system, the new **PP MASTER** generation achieves very good values in this respect and is therefore also very well suited for installation with a low longitudinal gradient.

structured pipes have low longitudinal stiffness



PP MASTER, a solid wall pipe with three layers, offers the highest possible safety in sewer construction due to its high ring stiffness and excellent longitudinal stiffness.

PP MASTER convinces with quality and safety

Regardless of whether the pipes are installed in poorly suited soils or the pipe zone has not been optimally compacted, the quality of the sewer structure can always be kept high thanks to these securities of the PP 3-layer system. Nevertheless, all pipes, even those with the highest quality of the **PP MASTER** system, must be installed and embedded according to standards.

standardised installation and bedding

New socket technology for pipes

Further development of a socket system that has proven itself millions of times over

Sealing ring can no longer be pushed out

Red support ring is inserted at the factory

Do not remove the support ring!

PP MASTER can be installed quickly and easily thanks to its low weight and plug-in technology. In order to further increase safety during installation and eliminate even the slightest risks, the sleeve connection, which has been tried and tested millions of times, has been revised.

The new socket prevents the sealing ring from being pushed out of the socket bead unintentionally - and unnoticed.

The bead width has been increased to make room for an additional support ring in addition to the proven sealing ring. This support ring in the signal colour red is already permanently inserted into the moulded socket of the pipes at the factory and should not be disassembled on the construction site.

The sealing ring, which is also inserted, rests on the support ring at the front and can therefore no longer be pushed out.



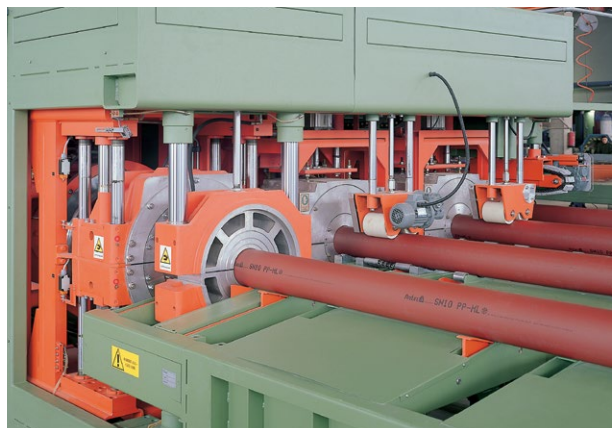
Seal ring removable

only one sealing ring per connection

The sealing ring can still be dismantled to ensure cleaning of the bead and the sealing ring.

In contrast to systems with a plugged-on double socket, there is only one sealing ring per connection point.

Automatic socket for PP MASTER pipes



Internal signature

The light colour of the inner layer makes inspection by camera inspection much easier. The required quality inspection after laying the sewer pipe system is thus simplified.

In order to guarantee the planner and the customer complete documentation on the pipe material tendered and used, Pipelife has introduced an innovation in the field of sewer pipe systems: **PP MASTER** pipes are provided with an internal coating at the factory.

easier quality inspection by means of camera inspection

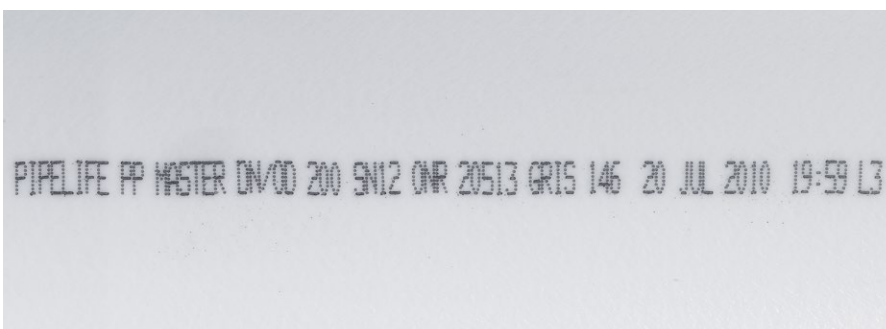
PP MASTER pipes with internal signature



Socket and inner marking

This marking is located - also visible from the outside - directly behind the socket of the pipe.

Due to this signature, each pipe can be traced back to the day of production. This is ensured by the following text:



Example for the signature text of the inner signature

Flexibility

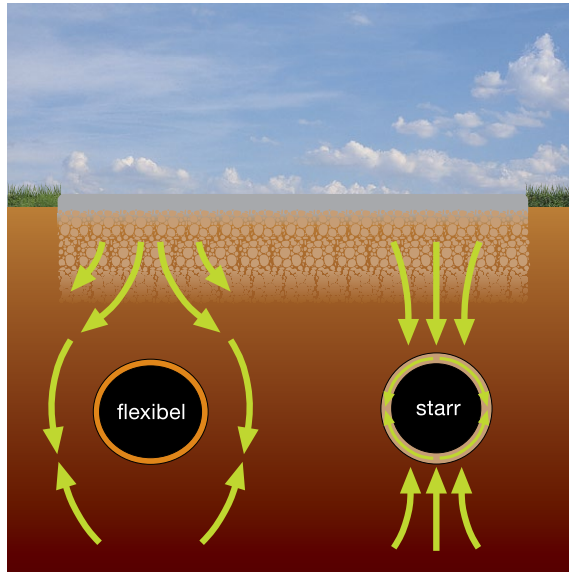
Flexibility is one of the biggest benefits of thermoplastic sewer pipes.

As per the proverb “The wiser gives in”, the sewer pipe may deform. The loads that occur (resulting from surface loads, traffic loads, earth loads, etc.) are not absorbed by the pipe itself, but are passed on to the surrounding soil.

Loads

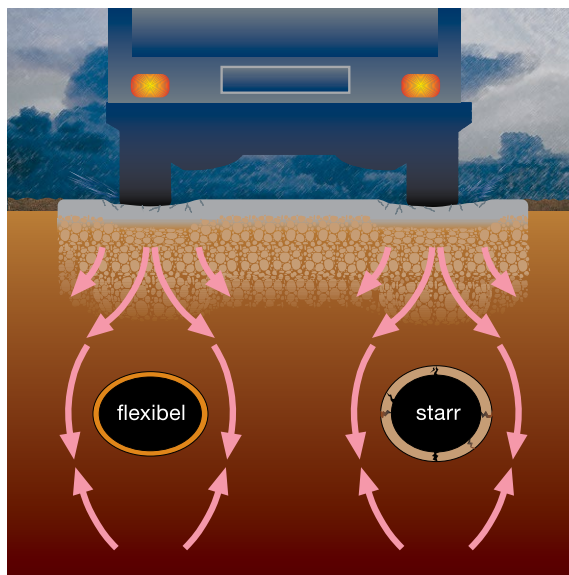
Settlements

Stresses



The deformation is mainly caused by settlement of the soil. Experience shows that the expected settlements and the associated earth movements are completed after about two years.

Any stresses that occur are relieved by deformation of the pipe. This restores the equilibrium between the soil and the pipe.



The pipe itself then lies in the ground in an almost stress-free state and is thus not exposed to any additional loads. Rigid pipes have to absorb stresses or they break in extreme cases.

Deformations

The successful combination of flexibility and stiffness prevents not permitted high deformations in the most difficult installation situations.

Tightness, safety

The most important criterion for sewer pipe systems is tightness. The sum of the product properties of **PP MASTER** guarantees the function and tightness of the sewer pipe system under the highest loads and over the entire service life.

Toughness

Another feature of the **PP MASTER** system is the high toughness of the PP types used in combination with the 3-layer technology.

In combination with the high impact strength (see page 13), this has a very positive effect on the behaviour under point loads.

Stresses caused by point loads (e.g. sharp stones), can thus be relieved in the pipe wall.

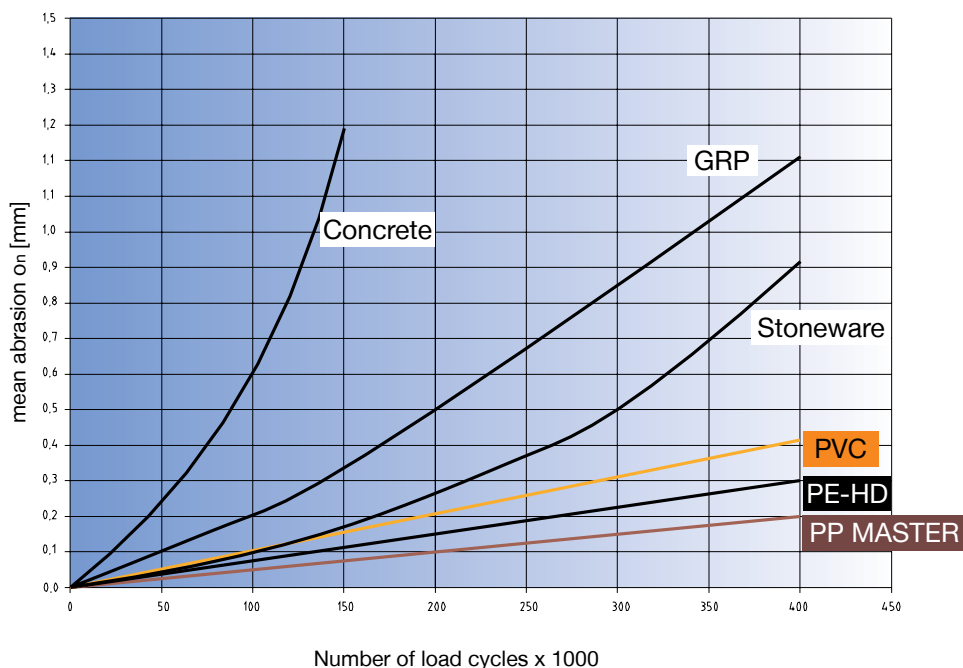
intermittent stress

Abrasion resistance and high pressure cleaning

The targeted use of high-tech polypropylene in the inner layer makes **PP MASTER** not only highly resistant to chemicals, but also particularly abrasion-resistant.

The required service life of sewer pipes is thus guaranteed even with sand loads or grit, at high flow velocities and with high-pressure cleaning (see test parameters page 13).

**Sand freights
Grit
High-pressure cleaning**



Abrasion according to the “Darmstadt method” of various pipe materials Concrete, GRP, stoneware and PE-HD: from the trade magazine 3R International (2/3-97)

PVC and **PP MASTER** data (test in accordance with DIN 19565/1): from Österreichisches Kunststoffinstitut (Austrian Plastics Institute) test report, expert opinion no. 43.029.

“Darmstadt Procedure”

The above diagram clearly shows the perfect result for Pipelife **PP MASTER** in the abrasion test according to the Darmstadt method.

Chemical resistance

aggressive waste water



The recent past shows that increasingly aggressive media are entering sewer pipe systems.

Sewer pipe systems have to withstand aggressive wastewater over their entire service life.

In order to protect the environment, it is necessary to install systems that can withstand aggressive media and are tight over their entire service life.



The pipe material polypropylene (PP) in particular has above-average chemical resistance.

Temperature

In pipeline construction, this material is mainly found in the industrial sector, in domestic drainage technology and in the chemical industry. Its resistance to chemicals and high temperatures is of particular benefit.

modified PP

Even with very aggressive sewage, the modified PP inner layer offers the highest safety reserves in chemical resistance.

**Solvent
Greases, acids, alkalis**

Polypropylene is resistant to almost all organic solvents and greases as well as most acids and alkalis.

pH range

The resistance of the **PP MASTER** pipes is basically in the pH range of 2-13.*

* In case of extremely aggressive sewage, please consult our civil engineering department in Wiener Neudorf before using **PP MASTER**.

Functional reliability

Sewer pipe systems can be subjected to extreme external loads, which cause point loads and high stresses on the sewer pipe.

PP MASTER offers the greatest possible functional reliability even with

- difficult soil conditions
- Influence of groundwater
- coarse-grained bases and resulting uneven compaction
- insufficient compaction

The **PP MASTER** system thus provides the highest possible level of security for customers, planners and installers.

external stresses
Point load
Stresses

Safety for customers, planners, installers

Impact resistance

Before and during installation, a sewer pipe is exposed to impact stresses and thus possible damage during transport, storage and manipulation. The extremely high impact resistance of **PP MASTER**, even at low temperatures, prevents such preliminary damage.

This good material property is maintained over the entire service life. This ensures that inspection work (e.g. high-pressure cleaning) can be carried out without affecting the pipe material.

Resistance to external impact is tested according to ÖNORM EN ISO 3127 and ÖNORM EN ISO 11173. **PP MASTER** exceeds the requirements of ÖNORM B 5113 and the increased requirements of GRIS. This is continuously confirmed by test reports prepared by an independent Austrian testing institute.

Impact stress tests

The suitability for high-pressure cleaning of the pipe including the socket joint is verified with the following test requirements (in extracts) of the dynamic flushing resistance (special quality regulation GV 15 of GRIS) based on CEN/TR 14920:

High-pressure cleaning

Test pressure at the nozzle: (120 ± 5) bar
Number of cycles (rinses): 25 (50)
Nozzle position (jet angle nozzle): 30°
Nozzle distance from inner pipe wall: 10 mm
Flushing water quantity: ≥80 l/min
subsequent tests with these test samples: Tightness, ring stiffness, ball drop, creep internal pressure, visual inspection

Test parameters

On the pipe itself one can recognise by the “ice crystal sign” that this system is also suitable for installation at temperatures below -10° C.

Ice crystal sign



Tightness

A basic requirement for sewer pipe systems is absolute tightness.

Factors responsible for the tightness

PP MASTER meets this high requirement, among other things, through the combination of

- Flexibility
- high stiffness ($\geq$ SN8, $\geq$ SN12 and $\geq$ SN16)
- 3-layer polypropylene structure
- modified socket shape
- modern production technology

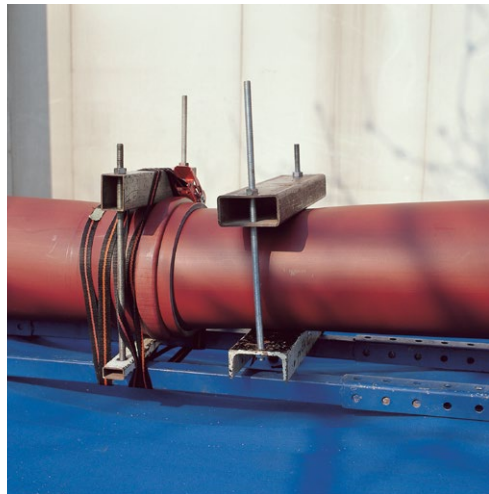
Tight under difficult conditions

Even under more difficult installation conditions such as

- uneven compaction
- poor bedding
- high surface load
- low installation height

and in the event of any deformations, **PP MASTER** remains tight.

Nevertheless, all pipes, even those with the highest quality of the **PP MASTER** system, must be installed and bedded according to standards.



Tight with a simultaneous deformation of

Tip end: 10%

Socket: 5%

and an angulation of 2.5°

Test: Austrian standard
EN 1277

(constit. 4b+c) (in future
ÖNORM EN ISO 13259)
with stricter GRIS requirements,
continuously confirmed by test
reports

max. permissible deformations

Excerpt from ÖNORM B 5113

The expected average change of the outer diameter is less than 6% under usual installation and stress conditions when PP-ML pipes (Polypropylene MultiLayer) with a nominal ring stiffness $\geq$ SN8 (according to ÖNORM B 5113) are installed.

In case of improper installation (contrary to the rules of ÖNORM B 2503, ÖNORM EN 1610 and ONR CEN/TR 1046) and in special cases, pipe deformations > 8% may occur.

Experience has shown that deformations of up to 15%, caused for example by settlement properties of the soil, do not have a negative influence on the serviceability of the pipe system."

Groundwater

But **PP MASTER** can also show its advantages to the full when exposed to groundwater. Groundwater causes

- increased loads due to buoyancy
- additional requirements for tightness against water ingress from the outside.

Quick and easy pipe installation

Pipelife **PP MASTER** is equipped with a moulded socket, a fixed support ring and a sealing ring that has been tried and tested millions of times.

Due to this socket technology, a quick and problem-free connection is guaranteed.

Despite the high stiffnesses of up to SN16, **PP MASTER** pipes have a low weight. This guarantees a low workload during installation.

The installer benefits from the low weight and high rigidity

- for manipulation
- during installation and
- for pipe bedding

Experience shows that increasingly no replacement material is used for the pipe bedding and pipe installation, but the existing material is used for this. This procedure requires pipe materials with high safety reserves. These are given by the **PP MASTER** sewer pipe system.

For further details regarding installation, please refer to our “**PP MASTER** Installation instructions/work standard”.

moulded plug-in socket with fixed support ring

low weight = low workload during installation

Installation instructions/factory standard

Environment and recycling

Pipelife **PP MASTER** is the right choice for protecting our environment.

The choice of polypropylene as the pipe material takes environmental considerations into account.

Both the entire production process and the processing of **PP MASTER** are ecologically harmless. **PP MASTER** pipes are fully recyclable.

Polypropylene is free of halogens and heavy metals.



Recycling and disposal are ecologically harmless. The plastic pipe industry's good collection and recycling system ensures the reuse of this valuable raw material.

PP MASTER – Environmental compatibility to the highest degree

Production, processing

Halogens, heavy metals

Austrian Working Group “Plastic Pipe Recycling”



Useful life

Economic efficiency

In addition to impermeability, the expected service life and thus economic efficiency is a decisive criterion for a sewer system in urban water engineering.

LAWA guidelines

It goes without saying that the LAWA* guidelines for “Benefit-Cost Studies in Water Management” are to be applied to Pipelife **PP MASTER**. In these guidelines for carrying out cost comparison calculations, a useful life of “up to 100 years” is assumed.

Expected service life 100 years and more

This service life can also be expected from **PP MASTER** and is documented by a large number of tests.



PP MASTER at 15% deformation



PP MASTER at 30% deformation

The left picture shows the maximum permitted deformation according to ÖNORM B 5113 of 15%. In the picture on the right, it can be seen that despite much higher test loads and deformations of 30%, there is no damage to the pipe.

Tests according to ÖNORM B 5113

Excerpt from tests according to ÖNORM B 5113:

- Strength requirement by means of creep internal pressure behaviour
- Determination of layer adhesion by means of tensile peel test
- Determination of the creep factor
- Resistance to external impact stresses
- Ring stiffness
- Ring flexibility
- Impact strength at low temperatures
- Leak testing
- Physical properties after heat treatment

Initial inspection Third-party/own monitoring

The quality of pipes and fittings as per ÖNORM B 5113 must be proven by an initial test, ongoing self-monitoring and periodic external monitoring. These initial and external tests shall be carried out by a testing institute accredited for the testing of plastic pipes. For self-monitoring, a quality management system of the manufacturer must be proven as per ÖNORM EN ISO 9001.

We will be happy to send you the Pipelife **PP MASTER** certificates if required.

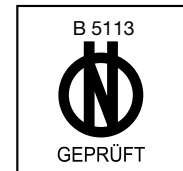
* LAWA ... Länderarbeitsgemeinschaft Wasser (Working Group of the Federal States on Water/Wastewater, Germany)

GRIS standards and quality regulations

The complete system
PP MASTER manufactured
and tested in accordance with
Austrian standard B 5113



Standards



The tests were carried out by an authorised and accredited Austrian testing institute, the Austrian Research Institute for Chemistry and Technology, or "ÖFI". We will be happy to provide you with the certificates if required.

Tests

Of course, **PP MASTER** also meets the special requirements of **GRIS** (Güteschutzverband Rohre im Siedlungswasserbau" or "Quality Protection Association for Pipes in Sanitary Sewer Systems").
Special quality regulation GV 15
Our quality mark: **GRIS 146**



GRIS



Subsidies

According to the funding contract, the recipient is obliged to pay attention to the durability and quality of the dimensions and products used. Corresponding quality requirements are to be determined in the tender, whereby applicable standards and regulations (e.g. **GRIS**, **ÖVGW** ...) are to be cited. In this respect, the **GRIS** requirements and the **GRIS** quality mark are of great importance for Austrian sanitary engineering (see also additional text modules for tender texts, page 21).

Pipeline Austria's quality management is certified according to **ÖNORM EN ISO 9001**. This guarantees a consistently high quality standard.

ISO 9001



PP MASTER's high quality standard is recognised in many European countries.



Complete system

System provider

Pipelife Austria is the market leader in the field of plastic pipe systems and has decades of experience in the sewage sector.

All parts from our range are coordinated with each other and complement each other to form a long-lasting sewer pipe system of the highest quality. The **PP MASTER** system includes pipes in three stiffness classes, in eight nominal diameters and a large number of fittings.

Pipe

Pipe range

Nominal widths: DN/OD 110*, 125*, 160, 200, 250, 315, 400 and 500

Structural lengths: 1.0 m, 3.0 m, 6.0 m Short lengths: 1.0 m without socket

The short length is used for direct connection to shafts.

Any settlements of the shaft can thus be absorbed more easily.

Colour:

Colour

Outer layer	auburn	similar to RAL 8012
Core layer	graphite black	similar to RAL 9011
Inner layer	light grey	similar to RAL 9003

* DN/OD 110 and 125: only available in SN8, without support ring, without inner marking

SN8 / SN10

Stiffness class: SN8 (tested ring stiffness $\geq 10 \text{ kN/m}^2$)

SN12

SN12 (tested ring stiffness $\geq 12 \text{ kN/m}^2$)

SN16

SN16 (tested ring stiffness $\geq 16 \text{ kN/m}^2$)

Fittings

Fitting range

Nominal widths: DN/OD 110, 125, 160, 200, 250, 315, 400 and 500

Stiffness classes: SN12 and SN16

Branch 45° equal and reduced

Bends 7.5°, 15°, 30°, 45° and 87.5°, other angles on request

Slide-on sockets

Fall-off splitter

Reductions

Special fittings

Cleaning pieces

Fittings from other systems made of thermoplastic materials

Fittings from our PVC sewer pipe system can also be used, as all standardised outside diameters are matched to each other. All connections are made by means of a moulded plug-in socket with an inserted lip sealing ring.

More details

For more details, please refer to the **PP MASTER** installation instructions/work standard.



PP MASTER installation instructions

Pipe systems in comparison

Structured sewer pipe systems

— not suitable for GRIS

Structured pipe systems (corrugated outside, smooth inside) are not suitable for the high requirements of GRIS. There are no special quality regulations for such products - a corresponding certification is therefore also not possible.

— low longitudinal stiffness

Structured pipes (corrugated/ribbed) have good ring stiffness, but only low longitudinal stiffness due to the system. They are therefore poorly suited for installation at low longitudinal gradients.

— short service life due to extremely thin wall thickness

The biggest disadvantage is the thin wall thickness. The required minimum service life of 50 years must be questioned for these systems. In particular, due to high-pressure cleaning and mixed loads with gravel/chippings, the thin inner layer is often unable to meet the high long-term requirements of a sewer pipe system. During installation, the use of higher grain sizes creates cavities between the ribs/corrugations and the stiffness is negatively affected.

— thin-walled socket area

Structured pipes (especially "corrugated systems") are thin-walled in the socket area. This is a major disadvantage, especially in the area where tightness is to be ensured for the entire system.

— low minimum wall thickness for structured pipes according to ÖNORM EN 13476

DN/ID	Minimum wall thickness $e_{5, min}$
150	1.0 mm
250	1.5 mm
500	3.0 mm

— Connection options

Standard connections to the pipeline and to standard shafts are only possible with special fittings.

PP MASTER

+ GRIS-approved quality

PP MASTER naturally meets the special requirements of GRIS. The system is manufactured and tested according to the special quality regulation GRIS GV 15.

+ high longitudinal stiffness

The reinforcing materials enable higher longitudinal stiffness as well as faster and more even heat distribution. The **PP MASTER** is therefore secured for installation with a very low longitudinal gradient.

+ long service life due to compliance with a reasonable minimum wall thickness

Thanks to the best possible design of the wall thickness, the 3-layer solid wall system **PP MASTER** can be expected to have a service life of 100 years and more. The system withstands high-pressure cleaning and entrained loads without any problems over its service life. Similarly, all soil types or grain sizes specified in the relevant installation standards can be used without adverse effect.

+ solid wall thickness in the socket area

PP MASTER has the same wall thickness over the entire socket area and is therefore less deformable and permanently tight.

+ high wall thickness for PP MASTER according to ÖNORM B 5113

DN/OD	Total wall thickness e_c	Inner wall layer thickness $e_{4, min}$
160	5.5 mm	1.1 mm
250	8.6 mm	1.7 mm
500	17.0 mm	3.3 mm

+ Connection options

Connections to the pipeline and shaft connections are always simple and can be carried out directly.

Pipelife PP MASTER tender documents

The following tender documents are based on “**FSV-VI, Version 005, 20171121, LG10 Pipelines, gutters, wastewater drainage and non-pressurised. sewage systems ULG1021 Pipes made of polypropylene (PP)**”. The relevant tenderer/bidder gaps have already been replaced with corresponding information.

1021	Polypropylene (PP) pipes Permanent preliminary remarks 1. General Place polypropylene (PP) sewer pipes and fittings in the pipe trench and install them according to the pipe manufacturer's conditions and in accordance with ÖNORM. The service also includes: - the required connections (coupler, slide-on socket, etc.) incl. sealing ring and lubricant. 2. Reference to Technical Conditions of Contract For those items to which Austrian quality regulations, standards or directives apply, proof must be provided that the products to be used comply at least with the regulations and provisions applicable in Austria with regard to the quality of testing and monitoring, including those of the relevant ÖNORMEN and those of the quality regulations of relevant associations (e.g. ÖVGW, Güteschutzverband Rohre im Siedlungswasserbau - GRIS, the Austrian Quality Protection Association for Pipes in Sanitary Sewer Systems), which have been authorised to award quality marks. If several quality marks are relevant for a product, the quality mark which sets the highest requirements in its quality regulations shall apply. The requirements of the following regulations must be complied with: - Austrian standard B 5113 - GRIS GV 15 3. Standards and directives cited ÖNORM B 5113 “Plastic pipe systems for underground non-pressurised sewers and pipelines - Polypropylene solid wall pipe systems with multi-layer wall construction (PP-ML) - Requirements for pipes, fittings and the pipeline system” GRIS GV 15 “Special Quality Specification for Sewer Pipes and Fittings made of Reinforced Polypropylene Compound / Blend with Multilayer Wall Construction (PP-ML) and Fittings made of Polypropylene for Sanitary Sewer Systems”	
102110	Supply and install multi-layer solid wall pipes made of PP SNx, DN/OD x. Valid are: - Austrian standard B 5113 - GRIS GV 15	
102110A - H	Multi-layer Solid water pipe PP SN8, DN/OD 110 up to 500 Three-layer. mineral-reinforced PP-ML solid wall pipe, with internal coating (DN/OD 160 to 500), moulded plug-in socket incl. support ring (DN/OD 150 to 500) and sealing ring e.g. Pipelife PP MASTER or equivalent	m

102110I - N	Multi-layer Solid water pipe PP SN12, DN/OD 160 up to 500 Three-layer. mineral-reinforced PP-ML solid wall pipe, with internal marking (DN/OD 160 to 500), moulded socket incl. support ring and sealing ring e.g. Pipelife PP MASTER or equivalent	m
102110O - T	Multi-layer Solid water pipe PP SN16, DN/OD 160 up to 500 Three-layer. mineral-reinforced PP-ML solid wall pipe, with internal marking (DN/OD 160 to 500), moulded socket incl. support ring and sealing ring e.g. Pipelife PP MASTER or equivalent	m
102115	Additional charge for supplying and installing fittings and accessories for multi-layer solid wall pipes made of PP independently. The service also includes: • increased expenses for the installation of the fittings, • the transport of the fittings to the point of use. Charged are: • based on units of account (UoA). The invoiced quantity corresponds to the invoice amount (RB) spent by the contractor for the delivery of building materials free place of use in EUR (excluding VAT) or to the price list (PL) of a manufacturer specified by the customer valid on the day of the submission of the offer, whereby one invoiced unit corresponds to EUR 1.00 (excluding VAT) in the price list. The invoice amount (RB) must be proven by balanced invoices and must take into account any discounts granted. Discounts (reductions for earlier payment terms) or interest for late payments shall not be taken into account. When charging according to the price list (PL), any surcharge or discount must be included. Any parts list enclosed with the contract is for information purposes only and does not form part of the contract • the calculated pipeline.	
102115A Addit. charge. Fittings RB multilayer solid wall pipe PP	e.g. Pipelife PP MASTER or equivalent	VE
102115B Addit. charge. Fittings PL multilayer solid wall pipe PP	e.g. Pipelife PP MASTER or equivalent	VE

Additional text modules for tender documents for the detailed description of the polypropylene sewer pipe Pipelife PP MASTER:

Solid-wall, three-layer polypropylene (PP) sewer pipe with mineral reinforcement, lead-free and halogen-free.

With moulded plug-in socket including fixed support ring (DN/OD 160 to 500) and factory-fitted, removable and cleanable lip sealing ring.

With light-coloured inner layer and inner marking (DN/OD 160 to 500).

Manufactured, tested and monitored in accordance with ÖNORM B 5113 and GRIS (special quality regulation GV 15).

Dimension range:	DN/OD 110 to 500
Structural lengths:	1, 3 and 6 m 1 m without socket for shaft connections
Stiffness class:	SN8 (tested ring stiffness $\geq 10 \text{ kN/m}^2$) SN12 (tested ring stiffness $\geq 12 \text{ kN/m}^2$) SN16 (tested ring stiffness $\geq 16 \text{ kN/m}^2$)

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