

Düker SML

The formidable drainage pipe system
for building drainage
easy – safe – sustainable!



Cast Iron – the Material with Built-in Acoustics

Cast iron drainage pipes –
unbeaten in acoustic protection!

“Install cast iron and you can be quiet”

Only a few decades ago, acoustic protection on drainage pipes was not an issue – it was simply there. For cast iron was taken for granted. When other materials found their way into the drainage pipe business, there came a rude awakening. The acoustics of drainage pipes can be a real disturbance!

The fact is: sound is absorbed by mass and material structure – but primarily by mass! No other drainage pipe available on the market can compare to cast iron when it comes to mass. Therefore the low noise level coming from the cast iron pipe (airborne sound) is unrivalled.

For comparison:

1 meter Düker SML cast iron pipe DN 100 weighs approx. 8.5 kg. The plastic acoustic drainage pipes available on the market weigh only an average of 2.3 kg per m in DN 100!

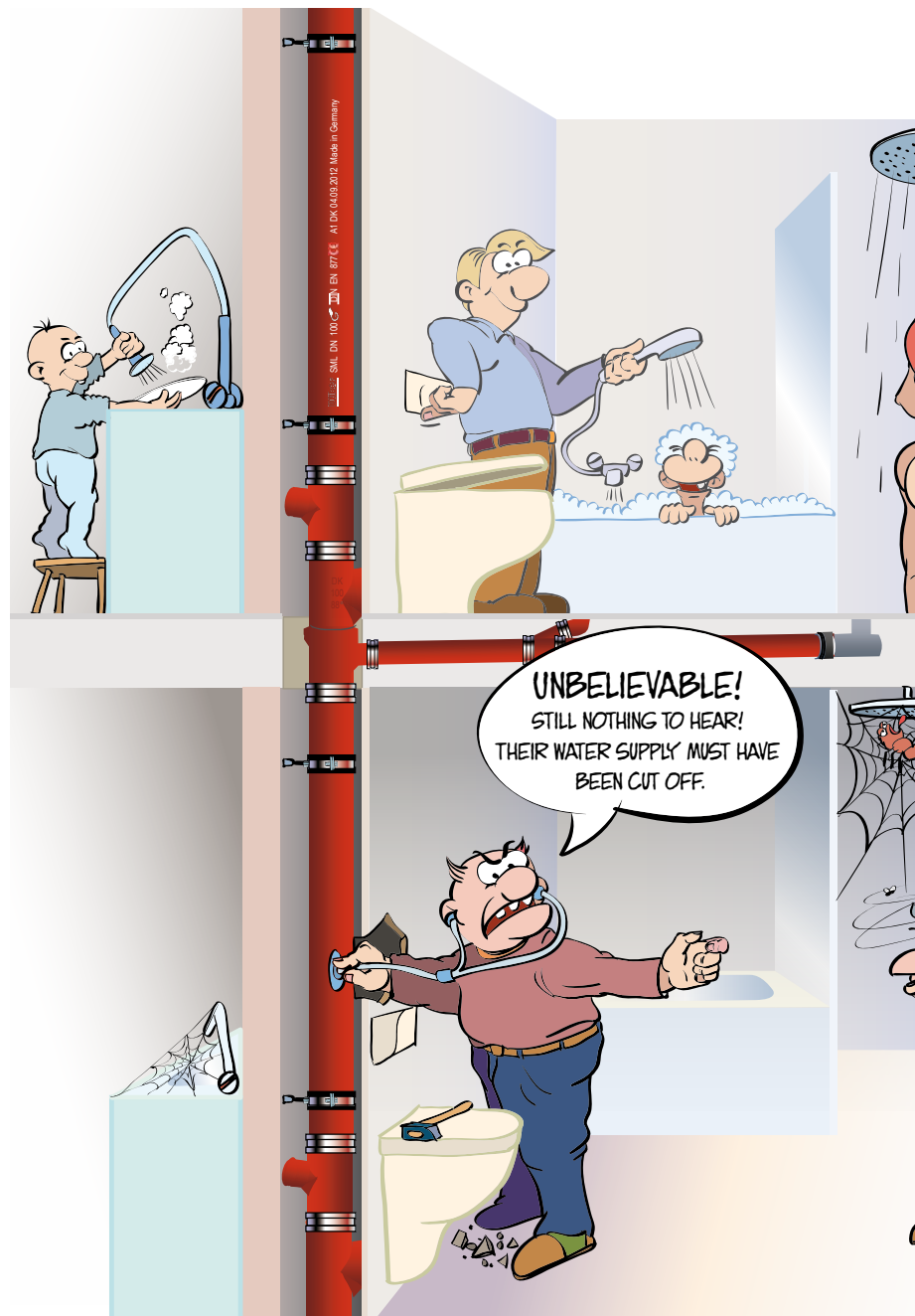


Which drainage pipe system offers what acoustic protection?

In order to be able to compare drainage pipe systems, a specific European Standard was developed for testing: EN 14366. A reputable manufacturer should be able to present a complete test report based on this standard.

But test reports are only a help if you know how to read and interpret them!

A complete report contains two important values: airborne sound pressure level and structure-borne sound characteristic level.



c Protection

The airborne sound pressure level is the ideal benchmark for comparing the sound protection effect of various pipe systems (mass, material structure etc.)
The airborne sound level is not influenced by an other outside factors.

However, as living rooms in a building are separated from the technical installations by a sound insulating wall wherever possible, most professionals will focus on the structure-born sound level, which is measured behind the wall to which the pipes are installed. This is not wrong, as this value is certainly closer to the sound level in the real building.

By the way, please do not forget when comparing noise levels: a value which is higher by 3 dB(A) corresponds approximately to a double sound intensity!

Excerpt from the test report P-BA 214/2010 (test as per EN 14366):

Düker SML	with standard fixing	with special fixing
	steel pipe clamps with elastomer inlay	steel pipe clamps without elastomer inlay and with acoustic decoupler
flow rate		2,0 l/s*
Airborne sound pressure level $L_{a,A}$		45 dB(A)
Structure-Born sound characteristic level $L_{sc,A}$	19 dB(A)	<10 dB(A)
* corresponds approximately to a toilet flush		

Even with cost-effective and practical standard clamping, Düker SML drainage pipes observe all common acoustic protection requirements even for superior protection levels!

Just imagine:

What if the pipe was not fixed to the wall at all? A wall with 220 kg/m² has a sound reduction index R'_w (dB) of approx. 45 to 50 and would absorb the approx. 50 dB(A) from the neighbouring room without any problem. It is the pipe fixing which causes the transmittal of drainage noises!

Therefore it is logical that the test values measured behind the wall are mainly influenced by the type and execution of the pipe fixing!

How much acoustic protection is required?

In most countries, national or regional building codes will define a noise level which may not be surpassed. For noises coming from installations in neighbouring apartments, this value might be around 30 dB(A).

However, constructors often have a justified interest to lay down a lower noise level in the contracts. The building codes may even give examples of lower levels e.g. 25 or 22 dB(A).

In Germany, even if the noise level was not defined in the contract, in case of a law suit often one of those lower noise levels will be considered a "generally accepted code of practice" which should have been observed.

In order to reach low values for the structure-born sound level, most tests were made with special fixings or various tricks, which are often too expensive or not in accordance with common practice in a real building. Therefore it is important to check what kind of fixing and bracketry was used to obtain the structure-born sound level. If you intend to use standard fixing, good values obtained with special fixing cannot be reached in reality!

Cast Iron Pipe Goes Through Fire and Water

Cast iron pipes don't burn

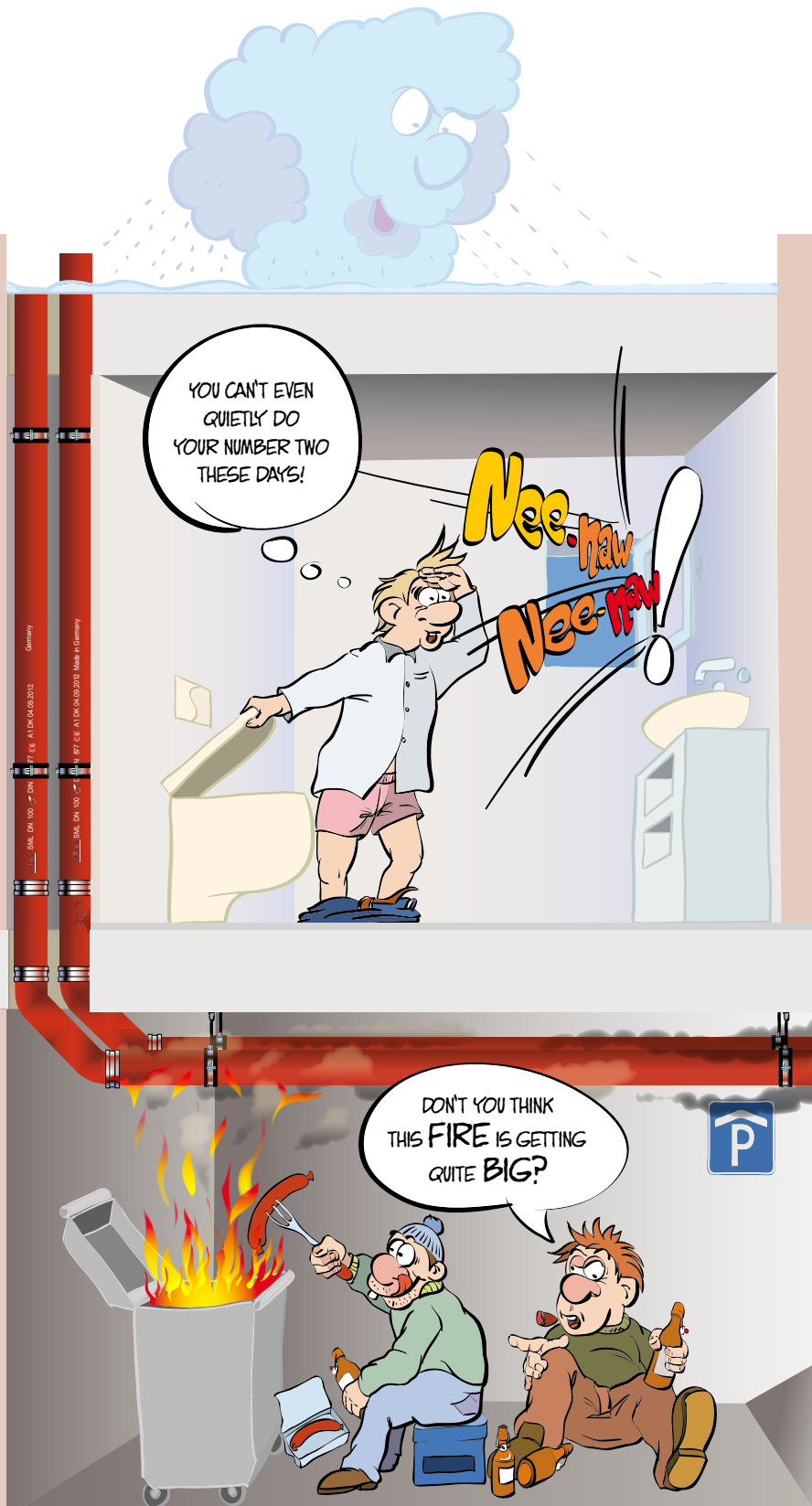
Düker SML corresponds to the European fire reaction class A1 non-combustible as per EN 13501-1. This is the best and safest class of 40 possible classifications – you might say 1st rank!

Pure PE-HD or PP, frequent major components of plastic drainage pipe systems, corresponds to the reaction to fire E. This is rank 38 out of 40!

Therefore cast iron pipes are suitable even for installation in escape routes, without any cladding or insulation, as long as they are installed with metal plugs.

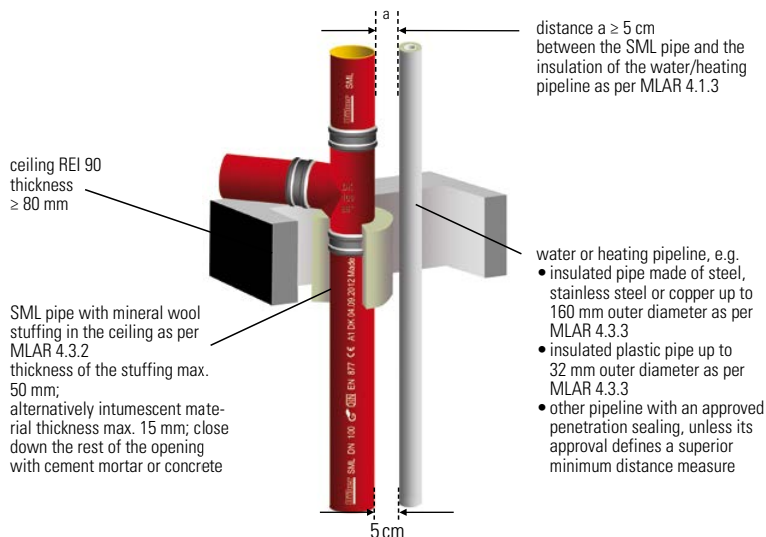
For the same reason, cast iron pipes are also first choice in underground car parks!

A side effect: cast iron pipes remain completely functional even during a fire. Just think of rainwater drainage. A downpipe which burns away or which closes down in case of a fire would make the rainwater drainage unusable even in case of only a small fire. In case of a simultaneous downpour, or in combination with firefighting water, there might be devastating consequences e.g. for a flat roof!



for You

An example of simple fire protection measures allowed as per the German building codes (MLAR)



Then why penetration seals on cast iron pipes?

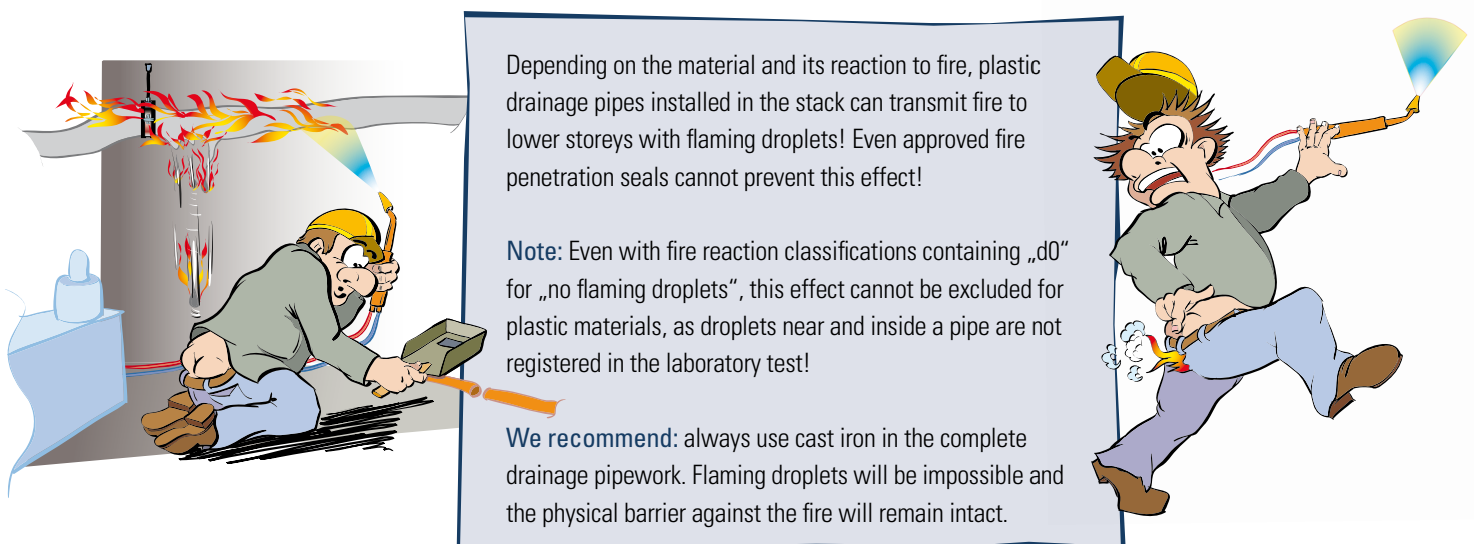
EI 90 ceiling penetration seals must prevent the transmittal of fire for at least 90 minutes. Practical application has been proving for many years that cast iron drainage pipes offer optimum safety in case of a fire. Fire is not transmitted along the pipeline, neither upwards nor downwards, and the physical barrier between the storeys will remain intact. On top, Düker cast iron pipe systems do not emit any poisonous gases or fumes to the rooms; an important asset, as it is well-known that smoke is the major cause of death in a fire.

However, cast iron can transmit one aspect of a fire – the heat. This heat transmittal does not have any dangerous influence on the (normally incombustible) building structure.

In fire tests it has now been proven that e.g. in case of a pre-wall installation with only one 9.5 mm plasterboard panel in front of the cast iron pipe, the temperatures on the outside of the panel never surpass the permitted values over the test period of 90 minutes.

Based on the long-term positive experiences, many building codes such as the German “MLAR” allow the installation of cast iron pipes even without any cladding or penetration seals, partly defining minimum distances to other installations.

In the installation shaft or in ceiling penetrations, there are sometimes other, combustible pipelines right next to the cast iron pipe, or these pipes are even connected directly to the cast iron pipeline. This is no problem either. For both cases, you will find many practical penetration seal solutions on the market, which have been tested and approved by the authorities.



Installation is What Counts – Easy and Fail-S



Thrust-resistant connecting and fixing – it's so easy

Modern "Rapid" couplings such as Dükorapid® combine the advantages of push-in connection and screw connection – just push it on and lock it thrust-resistant with only one bolt.

Fixing and bracketing of SML pipelines is also as simple as can be: two standard pipe brackets per 3m pipe, independent of the nominal diameter or the alignment. With this, all requirements are observed: superior acoustic protection, compensation of thermal length expansion, pressure resistance (see the following page) or resistance to negative pressure, stability even in case of a fire.

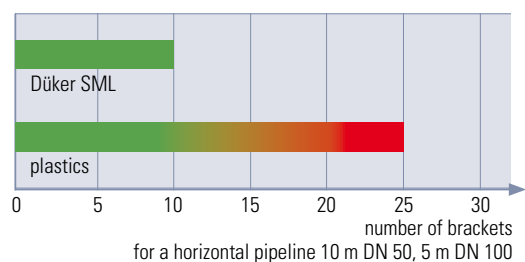
Deflection legs, expansion sockets, anchor and guiding brackets – not required with cast iron pipe! Special bracketry for acoustic protection – possible, but normally unnecessary! Both a monetary and a time advantage for the plumber. Further to normal pipe brackets, the weight of a downpipe need only be held with a down pipe support and console, normally above the basement ceiling and once every five storeys.

By the way, in a siphonic roof drainage system the same simple bracketing rules apply! No special bracketry, no suspended rail system!



Considerable bracketry and fixing expenditure on a plastic pipeline

Number of brackets for a horizontal pipeline



Got the wrong pipe material?

From the material point of view, this is practically impossible with cast iron pipes. They can be used for almost any drainage application:

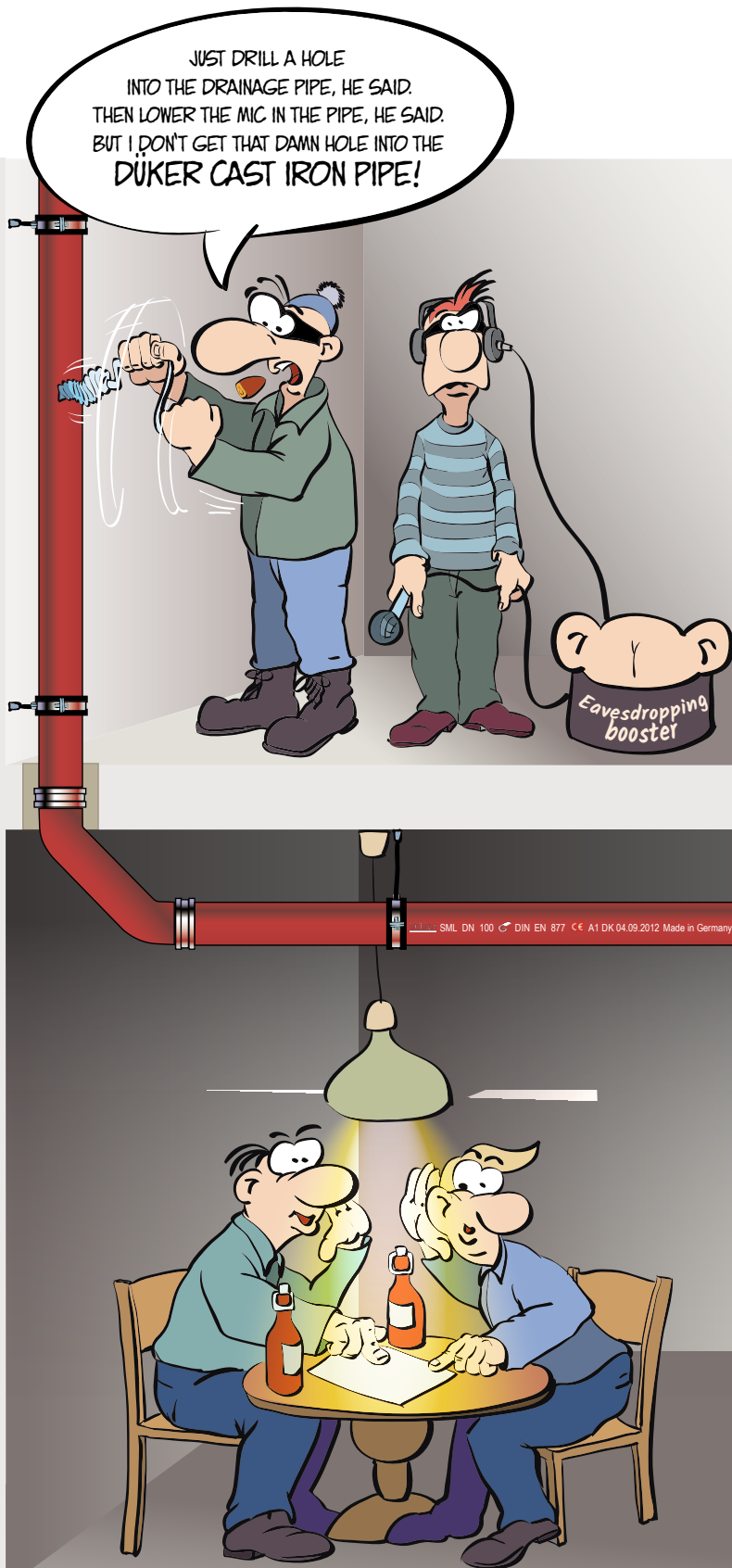
- for sewage (domestic waste water)
- for rain water
- for aggressive domestic waste water (e.g. grease line, version MLK-protect)
- for condensate (in case of systematic dilution with other waste water)
- in case of danger of inside pressure charges
- in siphonic drainage systems
- within buildings
- laid in concrete – without measures for corrosion protection or length expansion compensation!
- outside of buildings – no embrittlement by UV rays, see rainwater standpipes!
- laid underground – zinc-coated versions such as TML or MLK-protect
- in case of multiple charges: e.g. hot waste water with simultaneous inside pressure. No problem with reciprocal effects!

I have used various pipe systems – how do I get the connection right?

On cast iron drainage pipes, all coating versions as well as all brands are seamlessly compatible without any problems. No differing connection systems, no need for adapters. No messing around, which would get you in trouble with the constructor's authorised expert.

For the connection of other pipe materials to cast iron, there are both proven as well as innovative approved connection systems available on the market!

Safe and Stable in All Circumstances



Install cast iron pipework - you'll appreciate it!

Cast iron is stable – or for what reason are cast iron pipes often used on building facades? There will be no dents caused by slight parking collisions, no vandalism with kicks or the pocketknife. Ideal not only for prisons, but also garages, warehouses, accessible delivery areas etc.

Installation outside is not a problem either – cast iron is 100% UV-resistant and does not become brittle. Superficial rusting does not influence functionality – and can be prevented durably with a protective cover coat.

Severe frost or heat records – no problem for cast iron. The thermal length expansion is so slight that it is compensated for by the rubber profiles in the couplings. No warping, no withdrawing from the connection. And very important: the thermal length expansion is so similar to that of concrete that compensators are not required and SML can even be laid directly in concrete! Not for nothing are cast iron pipes often used for the drainage of road bridges.

Large diameters?

Larger diameters with danger of interior pressure?

Danger of interior pressure at high medium temperatures and/or low environmental temperatures?

... there is practically no getting around cast iron!

Proven performance under pressure

Cast iron drainage pipes are unbeaten under inside pressure, be it in the backwater area below street level, in the pressure line of a wastewater lifting plant, or in the rainwater down pipe.

Pressure charges up to 10 bar can easily be provided for in the system. The pipe material in itself is pressure-resistant anyway! Only the connection needs to be secured depending on the situation.

In horizontal lines, at changes of direction or on the backflow loop in the pressure line of the lifting plant, the required thrust resistance can be obtained e.g. with grip collars.



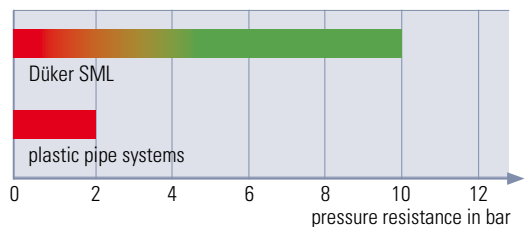
Problems with thermal length expansion: plastic pipes warped by heat below a hall roof – with Düker cast iron pipes that would not have happened!

In a purely vertical stack, e.g. the vertical part of a rainwater down pipe, not even that is required! Even in case of a blockage, the water column cannot exert any axial forces. In this case it must only be ensured that the pipes cannot move out of the axis, through a correct and rigid fixing.

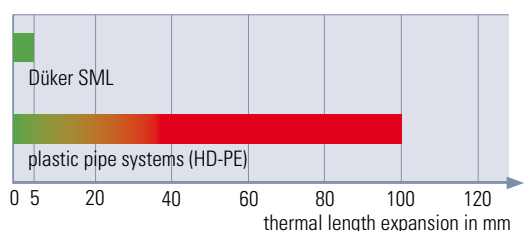


In siphonic drainage systems, cast iron pipes are first choice! Plastic materials are often even more susceptible to negative than to positive inside pressure. In case of negative pressure, such pipes can contract. As siphonic systems must be designed precisely, plastic pipes in siphonic drainage are often planned with larger diameters than e.g. cast iron systems – with correspondingly higher expenditures in space requirements and bracketry.

Pressure Resistance



Thermal Length Expansion on 10 m Pipe with 50 °C Temperature Difference



Sustainable and Made in Germany

Cast iron – recycling material over 3000 years

When people in the Eastern Mediterranean area started extracting iron from iron ore, approx. 1000 BC, they understood rapidly – it is easier to re-use old metal items than to mine new metal. Recycling was born!

Düker manufactures their drainage pipes and fittings exclusively from recycled metal. This material is supplied by local recycling companies. For Düker drainage pipe systems, for decades no iron ore has been mined and transported over long distances!

Cast iron waste parts which come up during manufacture – so-called circulating material – are of course re-used.

The same way, waste pieces that might come up on the building site as well as used cast iron pipes after the dismantling of an installation can be recycled locally – without costs, or even for reimbursement for corresponding quantities. This guarantees a high recycling rate worldwide.

With plastic materials, on the contrary, waste pieces are normally not recycled, but used energetically – i.e. they are burnt with further CO₂ emissions. Compound materials or the use of flame retardants etc. make recycling so difficult that it is economically unattractive. The worldwide recycling rate is negligible.





Düker cast iron drainage pipes and fittings have been manufactured exclusively from recycling metal for decades

No dangerous contents

Green Building Systems such as LEED or DGNB examine certain contents in building products, e.g. volatile organic compounds (VOC), halogens or heavy metals – for a good reason, as all these substances have been the cause of bad experiences in buildings in the past.

The good news: no worries with Düker cast iron drainage pipe systems! During installation on site and during the operation of the building, the contents of cast iron, coating systems and couplings present no harm to humans and the environment.

And energy consumption?

Of course, melting down cast iron at approx. 1.500 °C requires energy. In the new hot blast cupola furnace of the Düker Karlstadt works, inaugurated in 2014, the main energy sources are natural gas, electricity and coke. Compared to the older melting furnace, the new plant was able to reduce the CO₂ emissions by 25%.

The highly efficient pipe manufacture in the hot mould centrifugal casting procedure also contributes a lot to energy and CO₂ saving. In comparison with conventional casting procedures, the production of circular material is reduced by 90% – again energy savings of approx. 26%.



BBA and Kitemark Quality seals for Düker SML DN 100-300



Singapore Green Building Product Certificate with the rating "Good" for Düker SML and Düker MLK-protec

And all the stuff around it!

When comparing the environmental impacts of pipe installations, not only the pipe material itself must be considered, but also the corresponding expenditures such as bracketry or measures for acoustic protection and fire protection. For cast iron pipe systems, there is very little expenditure for these aspects compared to plastic pipe systems!

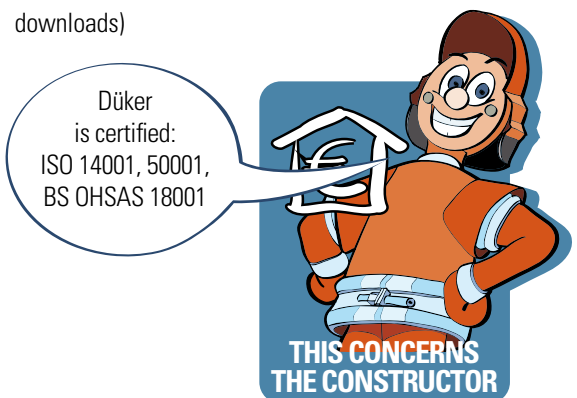
What counts in the end is facts and reliable documentation

Establishing, interpreting and comparing ecobalances is practically impossible for non-experts – and normally neither manufacturers nor constructors, planners or plumbers are experts in this area.

Therefore, when drainage pipe systems are to be installed in a building which strives to obtain a certification in a Green Building System (e.g. LEED or DGNB), what is required is the right documentation. Düker has what you need!

For Düker SML pipes, you can download an eco-balance in the Sustainability Factsheet for Düker SML pipes from the Düker website. The factsheet was established by the renowned institute Thinkstep (formerly PE International).

(www.dueker-germany.com > drainage technology > downloads)



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