

Technical Value

Proven on countless job sites around the world, each pipe system has been designed and manufactured by our experts to deliver performance and reliability tailored to your specific needs.



What's in it for you? We offer several production methods and insulation properties that meet the sector requirements. Our documented processes are your quality insurance.

TECHNICAL VALUE AS AN INVALUABLE BENEFIT

Fulfilling the quality demands is a precaution for our business, and we contentiously describe and document all the processes from delivery of raw material and into operation of the pipe system.

Several production methods currently exist to produce pre-insulated pipes. The various production methods will be described below, with special emphasis on the foam quality and heat loss properties achieved. LOGSTOR uses cyclopentane foam in all products.

Axial conti process

Pipes run axially through the production process. Foaming takes place inside a film in a caterpillar mould.

This process makes it possible to produce the pipes with an aluminium diffusion barrier between the foam and outer casing, thus ensuring that the good insulation properties are maintained over time (the pipe does not age).

The average lambda value is 0.023 W/mK for straight pipes and 0.022 W/mK for flexible pipes in coils. The pipe is free of cavities and spacers, and the foam density and cell structure are uniform for the full length of the pipe. The pipe is monitored in real-time using X-ray equipment, so that density, centering and alarm wire placement can be documented.

LOGSTOR has been producing axial conti pipe at this production facility since 1991, and continuous improvements have been made to the process during this time. We have been producing single pipe with diffusion barriers since 2000, and TwinPipe with diffusion barriers since 2008. We therefore have extensive experience with the production of pipes with diffusion barriers.

LOGSTOR uses this production method for pipes with a PE casing diameter of 315 mm or less.

Spiral conti process

The spiral conti process is a production method where PUR material is sprayed onto the carrier pipe while it rotates on its own axis as it passes through the production facility. The HDPE casing is then extruded onto this in bands in a spiral process, while the pipe continues to rotate.

LOGSTOR uses this method to produce single pipes with PE casing larger than 315 mm. The pipe is free of cavities and spacers, and the foam density and cell structure are uniform for the full length of the pipe.

The average lambda value for this production method is 0.025 W/Mk.

The minimum order for spiral conti pipes is around 70 lengths with the same dimensions, unless agreed otherwise.

Spiral conti pipes are normally produced without an aluminium diffusion barrier. But they can be produced with an aluminium diffusion barrier by agreement.

Opti process

The opti process is a production method where the PUR material is filled around the steel pipe in a mould at six locations along the length of the pipe. The HDPE casing is then extruded onto this in bands in a spiral process, while the pipe rotates on its axis.

LOGSTOR uses this method for the production of single pipes with PE casing larger than 500 mm and steel pipe dimensions larger than $\varnothing 355$ mm, and TwinPipe in large sizes. The pipe is free of cavities and spacers, and the foam density and cell structure are uniform for the full length of the pipe.

The average lambda value for this production method is 0.025 W/mK.

Opti process pipes are normally produced without a diffusion barrier but can be produced with a diffusion barrier by agreement.

Traditional process

Pipes are produced one at a time. Foam liquid is injected at one end, and the foam has to wander along the entire length of the pipe. Foam density and cell structure are not uniform along the length of the pipe. Foam density and cell structure vary over the length of the pipe, and cavities and heat loss at spacers cannot be ruled out. The lambda value therefore varies depending on where on the pipe it is measured.

All manufacturers use this method to some extent. The method can be used for both TwinPipe and single pipes in large sizes.

LOGSTOR can use this production method for pipe, single pipe and TwinPipe in all sizes.

The average lambda value for this production method is 0.027 W/mK

Lambda values

As described below, LOGSTOR performs many internal tests of lambda values, supplemented by external tests for all our production lines. The testing is so extensive that it is relevant to talk about average values.

The average mean values will thus represent the lambda values for the projects delivered, and the calculated heat loss will be equivalent to the actual heat loss experienced when the system is put into operation.

In contrast, calculations can be made using certificate lambda values. For such calculations, the best external certificate (lowest lambda value) is typically used for the given pipe type. These calculations do not reflect the actual heat loss the customer will experience when the delivered project is put into operation.

LOGSTOR therefore recommends that the heat loss for projects be calculated using the average lambda values, as this will reflect reality.

The average and certificate lambda values are specified below as λ_{50} (W/mK).

Pipe type	Lambda Mean value	Lambda Certificate value	Comment
Axial conti process	0.023	0.0216	With diffusion barrier
Spiral process/opti process	0.025	0.0216	With/without diffusion barrier
Traditional process	0.027	0.0252	Without diffusion barrier
FlextraPipe	0.022	0.0201	With diffusion barrier
FlexPipe (smooth casing)	0.022	0.0195	With diffusion barrier
Fittings	0.027		Without diffusion barrier
Machine foam/foam pack	0.027		Without diffusion barrier
Insulation half shells	0.036		Does not age

For foam pack, machine foam and foam in fittings, a lambda value has been calculated in the same way as for traditionally produced pipes.

An overview of lambda values for the various pipe types can be found on our website (www.logstor.com), together with our online calculation program - LOGSTOR Calculator. This program includes an ageing curve for each pipe type and size from LOGSTOR and can calculate heat losses from all LOGSTOR pipe systems.

For products that age, the aging process is calculated using a model developed by Chalmers University in Sweden and the Danish Technological Institute, which considers the gas composition of the foam cells, the thickness of the insulation and the casing on the pre-insulated pipe. Longitudinal diffusion at free pipe ends has not been taken into consideration.

Overview of LOGSTOR products for district cooling (DC) – new values at 15°C

The lambda value of PUR is normally specified for 50°C, defined as λ_{50} . The lambda value is temperature dependent. It is significantly lower for PUR at lower temperatures. When calculating the energy loss from cooling pipes, a lambda value tested at 15°C can therefore be used, in line with the EN17415-1 standard for district cooling pipes.

For LOGSTOR products used for cooling systems, the following DC values can be used:

Axial conti process $\lambda_{15} = 0.020 \text{ W/mK}$

Traditional process $\lambda_{15} = 0.022 \text{ W/mK}$

Lambda tests

Test results for lambda values from external institutes are attached.

A foam sample is taken every day on each shift on our production lines, and density, compressive strength and water absorption are measured.

In addition to external testing of lambda values from our various production lines, LOGSTOR regularly tests lambda values from all production lines throughout the year. These tests are performed using our own measuring rigs, which are equivalent to measuring rigs used at external

institutes in their design and use. The aim of these internal measurements is to ensure that we constantly deliver what we have promised in terms of lambda value. A single external measurement each year does not provide the same assurance. LOGSTOR conducts around 40 internal lambda value tests each year.

Casing diameters

For heat loss calculations, LOGSTOR normally uses an average value between the min. and max. casing diameters in line with our material specification, which lies within the tolerances in EN253.

Consultants and customers must be careful to check casing diameters against what has been promised, both on certificates and compared to what is delivered, as the casing diameter has a big impact on the heat loss calculation.

Monitoring external casing diameters

LOGSTOR regularly checks casing diameters on each production line. The aim is to ensure a continuous high quality.

The scope of these checks is as follows:

Axial conti pipe	once per hour
Spiral conti pipe	once per hour
Traditionally produced pipe	once per shift for each size and machine
Outer casing and every two hours)	Continuously (the result is noted at the start

Option of producing fittings with a diffusion barrier

LOGSTOR is able to supply pre-insulated fittings with diffusion barriers, up to a PE casing diameter of 315 mm.

The extra cost and conditions for supplying fittings with a diffusion barrier must be agreed.