

# Design - Guidelines

## STANDARD REQUIREMENTS

The standard EN 13941+A1 provides regulations for the calculation and design of pre-insulated pipes, laid in trenches and covered by soil.

The standard is not harmonized with Pressure Equipment Directive (PED) and may only be used for buried district heating pipes.

The standard requires the calculation of the pipes in three aspects:

1. Stresses due to internal pressure (force controlled action), limitations are listed in the "Limit State A".
2. Stresses resulting from repeated loads, "Fatigue." The restriction is specified in the "Limit State B".

## THIS APPLIES TO:

Distribution lines shall be capable of 250 cycles. Service pipes shall be capable of 1000 cycles. Each cycle is based on a change of temperature of 110°C.

2. Stresses which may lead to instability or deformation

The limitations are specified in the "Limit-state C". The pipelines are divided into three project classes:

Project class A (secondary plant)  
Project class B (primary plant with DN < 300)  
Project class C (primary plant with DN > 300)

Project class	Weld Inspection at installation	Safety factor fatigue	Documentation
A	≥ 5%	5	Generalized
B	≥ 10%	6.67	Generalized
C	≥ 20%	10	Specific

The generalized documentation can be business standards or manufacturer manuals. The specific documentation shall include:

- Calculated pressure and temperature and the number of expected cycles including estimates related to "Limit State A-C."
- Pipe line information such as drawings, dimensions, material specifications, installation terms and conditions, related drawings.
- Quality assurance.

## biosteel a/s

Algade 35, Grønbjerg · DK-6971 Spjald, Denmark  
+45 4027 8099 · info@biosteel.dk · [www.biosteel.dk](http://www.biosteel.dk)