

Bonded system - Parallel branches with foam pads

calculations according to Design Manual chapter 5

Version: 1.0.4

25/4-2024

Conditions

Flow temperature, T_f	130	°C
Installation temperature, T_{ins}	10	°C
Soil cover main, H_h	0.8	m
Soil cover branch, H_a	0.6	m
Insulation class	Series 2	

Steel material properties

Expansion coefficient, α	0.0000124	°K ⁻¹
Modulus of elasticity, E	206,571	Mpa

Soil parameters

Soil density, ρ	19	kN/m ³
Soil friction angle, φ	32.5	°
Friction coefficient, μ	0.40	

Limitations

The calculations apply for branches under the following conditions:

Temperature

$$T_f \leq 110^\circ\text{C}$$

$$\Delta T \leq 100^\circ\text{C}$$

Soil cover:

$$\text{Main pipe: } 0.6 \leq H \leq 1.0 \text{ m}$$

$$\text{Branch: } H \geq 0.5 \text{ m}$$

Important

For preheated systems the expansion shall be calculated for the full temperature rise from installation to max operation.

i.e.

$$T_{ins} = \text{installation temperature before preheating}$$

$$T_f = \text{max operating temperature}$$

Example

Main pipe

Nominal size	DN 80
Steel pipe diameter, d_1	88.9 mm
Wall thickness, s_1	3.2 mm
Casing diameter, D_1	180 mm

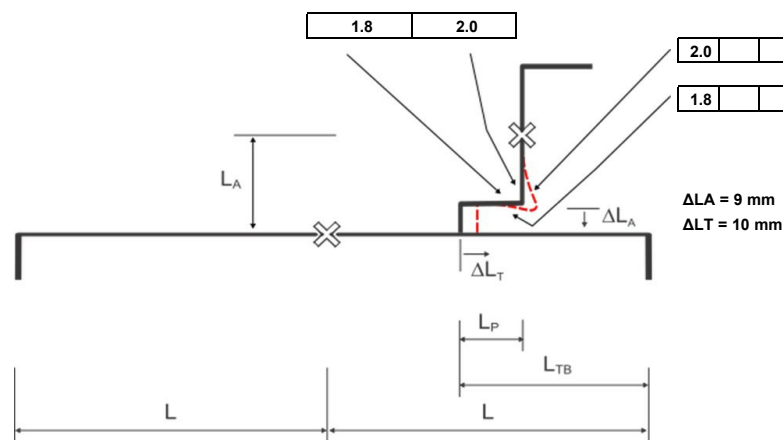
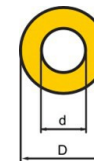
Pipe length, L	23 m
Dist. branch to bend, L_{TB}	15 m

Axial stress at branch, σ_{aT} 46 Mpa

Branch pipe

Nominal size	DN 50
Steel pipe diameter, d_2	60.3 mm
Wall thickness, s_2	2.9 mm
Casing diameter, D_2	140 mm

Parallel length, L_p	1.8 m
Branch length, L_A	6 m



Multiple calculations

Input

Output

Node no.			Branch length LA m	Parallel length Lp m	Nominal size		Main pipe		Branch pipe		Expansion			Foam pads for ΔLT				Foam pads for ΔLA			Warnings
	L m	LTB m			Main	Branch	d1 mm	D1 mm	d2 mm	D2 mm	ΔLT mm	ΔLA mm	ΔLr mm								
			1	2										3	1	2	3				
1	100	25	20	2	DN 80	DN 50	88.9	180	60.3	140	42	27	50	2.5	1.5			2.0	1.0		
2	100	25	20	2	DN 80	DN 50	88.9	180	60.3	140	42	27	50	2.5	1.5			2.0	1.0		
3	100	25	20	2	DN 80	DN 50	88.9	180	60.3	140	42	27	50	2.5	1.5			2.0	1.0		
4	100	25	20	2	DN 80	DN 50	88.9	180	60.3	140	42	27	50	2.5	1.5			2.0	1.0		
5	100	25	20	2	DN 80	DN 50	88.9	180	60.3	140	42	27	50	2.5	1.5			2.0	1.0		
6	100	25	20	2	DN 80	DN 50	88.9	180	60.3	140	42	27	50	2.5	1.5			2.0	1.0		
7	100	25	20	2	DN 80	DN 50	88.9	180	60.3	140	42	27	50	2.5	1.5			2.0	1.0		
8	100	25	20	2	DN 80	DN 50	88.9	180	60.3	140	42	27	50	2.5	1.5			2.0	1.0		
9	100	25	20	2	DN 80	DN 50	88.9	180	60.3	140	42	27	50	2.5	1.5			2.0	1.0		
10	100	25	20	2	DN 80	DN 50	88.9	180	60.3	140	42	27	50	2.5	1.5			2.0	1.0		

See LOGSTOR Design Manual:

<https://www.logstor.com/documentation>