

Bonded system - Perpendicular branches with foam pads

calculations according to Design Manual chapter 5

LOGSTOR

Version: 1.0.4

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Conditions

Flow temperature, T_f	120	°C
Installation temperature, T_{ins}	10	°C
Soil cover, H	0.9	m

Insulation class **Series 1**

Steel material properties

Expansion coefficient, α	0.0000123	°K ⁻¹
Modulus of elasticity, E	207,143	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:

Main pipe:	$0.6 \leq H \leq 1.0$ m
Branch:	$H \geq 0.5$ m

Important

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

i.e.

T_{ins}	= installation temperature before preheating
T_f	= max operating temperature

Example

Main pipe

Nominal size	DN 65
Steel pipe diameter, d_1	76.1 mm
Wall thickness, s_1	2.9 mm
Casing diameter, D_1	140 mm

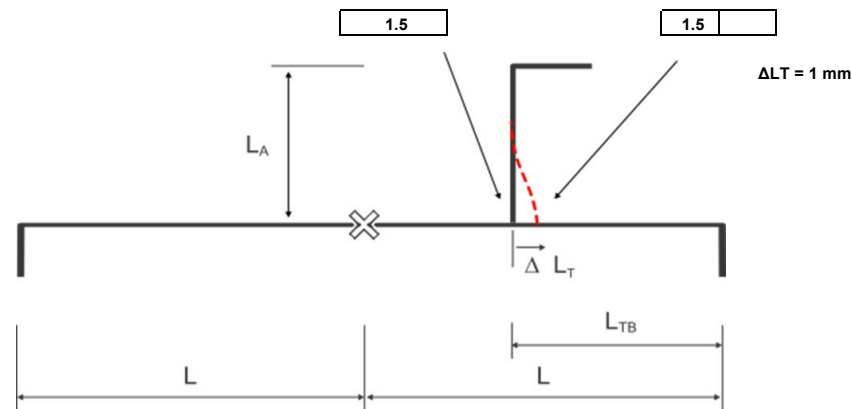
Pipe length, L	18 m
Dist. branch to bend, L_{TB}	17 m

Axial stress at branch, σ_{aT} 58 Mpa

Branch pipe

Nominal size	DN 40
Steel pipe diameter, d_2	48.3 mm
Wall thickness, s_2	2.6 mm
Casing diameter, D_2	110 mm

$L_{A,max}$	20 m
Branch length, L_A	3 m



Multiple calculations

Input

Output

Node no.	L		Branch length	Nominal size		Main pipe		Branch pipe		Main pipe stress at Tee σ_{aT} Mpa	$\Delta L T$ mm	F_{min} m	Foam pads for $\Delta L T$		Max branch length $L_{a,max}$ m	Warnings	
	m	m		Main	Branch	d_1 mm	D_1 mm	d_2 mm	D_2 mm				1	2		Main	Branch
C1	87	67	5	DN 250	DN 65	273	400	76.1	140	112	15	2.3	2.5		12		
C4	18	17	3	DN 65	DN 40	76.1	140	48.3	110	58	1	1.1	1.5		20		
C4.3	9	8	3	DN 40	DN 32	48.3	110	42.4	110	38	1	1.0	1.0		20		
C4.7	4	3	10	DN 40	DN 25	48.3	110	33.7	90	14	1	1.0	1.0		20		
C7	10	3	2	DN 32	DN 25	42.4	110	33.7	90	16	8	1.4	1.5		20		
C10	10	4	7	DN 32	DN 25	42.4	110	33.7	90	22	7	1.4	1.5		20		
C13	7	4	6	DN 25	DN 25	33.7	90	33.7	90	23	4	1.2	1.5		20		
C16	11	7	7	DN 125	DN 32	139.7	225	42.4	110	17	5	1.4	1.5		20		
C18	11	10	7	DN 125	DN 25	139.7	225	33.7	90	24	1	1.0	1.0		20		
C20 i C22	22	7	4	DN 80	DN 25	88.9	160	33.7	90	21	17	1.6	2.0		20		