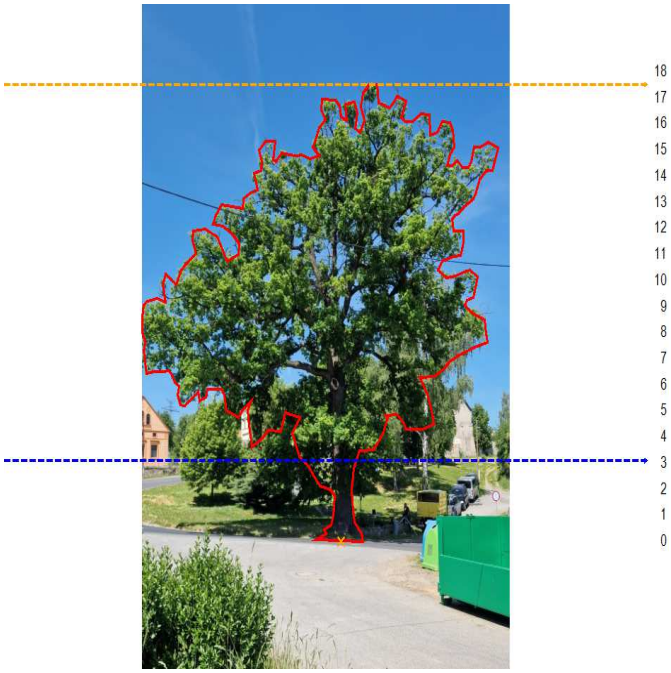
Wind Load Analysis analogous to DIN 1055-4

Project		Site	Tree Number	4
Project Name	Nový Knín	park Starý Knín		
Project Number	1			
		Nový Knín, CZ		
Test Date	31.05.2023	Altitude a. sea level	325	m

Tree Data				Applied Material Properties		
Tree Species		dub letní		as for	Quercus robur	
Stem circumference		0	cm	Source	Stuttgart	
Stem Diameter	||	111	cm	Compressive Strength	28	MPa
in 1m height	_|_	121	cm	Modulus of Elasticity	6900	MPa
Bark Thickness		3	cm	Limit of Elasticity	0,41	%
Tree Height		**17,5**	**m**	Green Density	1,03	g/cm³

Crown Outline



Load Direction	SEVER	
Surface Area Analysis		
Crown Base	3,1	m
Effective Height	11,7	m
Total Surface Area	168	m²
Crown Eccentricity	0,58	m
Applied Structural Parameters		
Drag Factor	0,25	
Natural Frequency	0,84	Hz
Damping Decrement	0,21	
Form Factor for Dead Weight	0,8	
Applied Site Parameters		
Windzone	D 2	
Speed of Applied Design Wind Speed	25	m/s
Air Density	1,24	kg/m³
Roughness Catagory	City	
Exponent for Wind Profile	0,3	
Proximity Factor for Effects in Near Ground Wind Flow	1,3	
Factor for Crown Exposure	1,00	

Results

Wind Load Analysis			Tree Static Analysis		
Mean Wind Pressure	11,3	kN	Dead Weight Tree	13,7	t
Gust Reaction Factor	3,24		Critical Degree of Hollowness	95	%
Load Centre	9,6	m	Critical Residual Wall Thickness	3	cm
Torsion Moment	21	kNm	Assuming an Uncompromised Residual Wall		
Design Wind Load	**350**	**kNm**	**Basic Safety Factor**	**9,9**	

General

Comments

Calculated Tipping Stability according to Pull Test

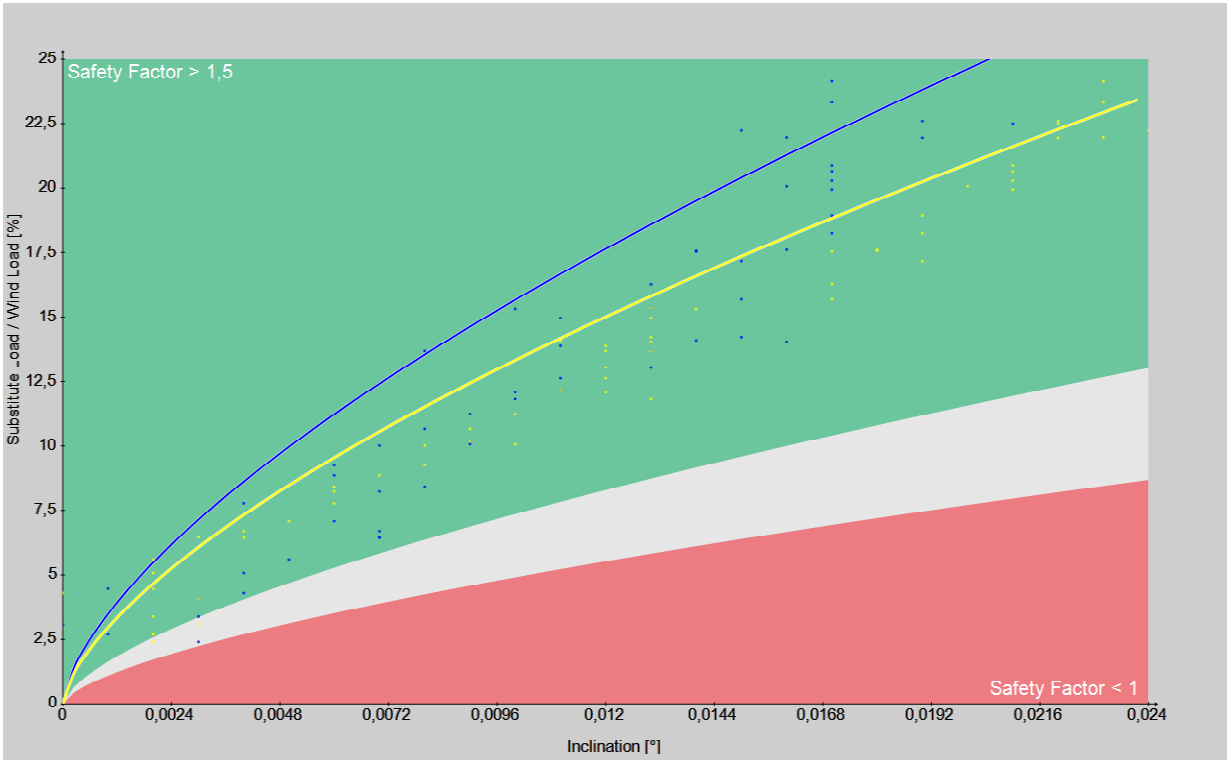
Tree Data

Project	Nový Knín	**Tree Number**	**4**
Tree Species	dub letní	Date	31.05.2023

Setup Pulling Test

Height of the Stem Anchor	5 m	**Measurement No.**	**1**
Rope Angle	4,5 °	Load Direction	SEVER

Graphic Display (test data and best fit to tipping curve)



Inclinometer Measurement	80	81
Position	90°	280°

Tipping Stability (based on Generalized Tipping Curve)

Safety Factor	**3,19**	**2,71**

Control Value	in		
Standard Deviation	%	3,51	1,79
Substitute Load	%	24,2	24,2
Load Direction at Inclinometer		x-Axis	x-Axis

General for Pull Test

Consultant	Bažant
Witness / Assistant	Janeček

Measurement Comments

Calculated Fracture Stability according to Pull Test

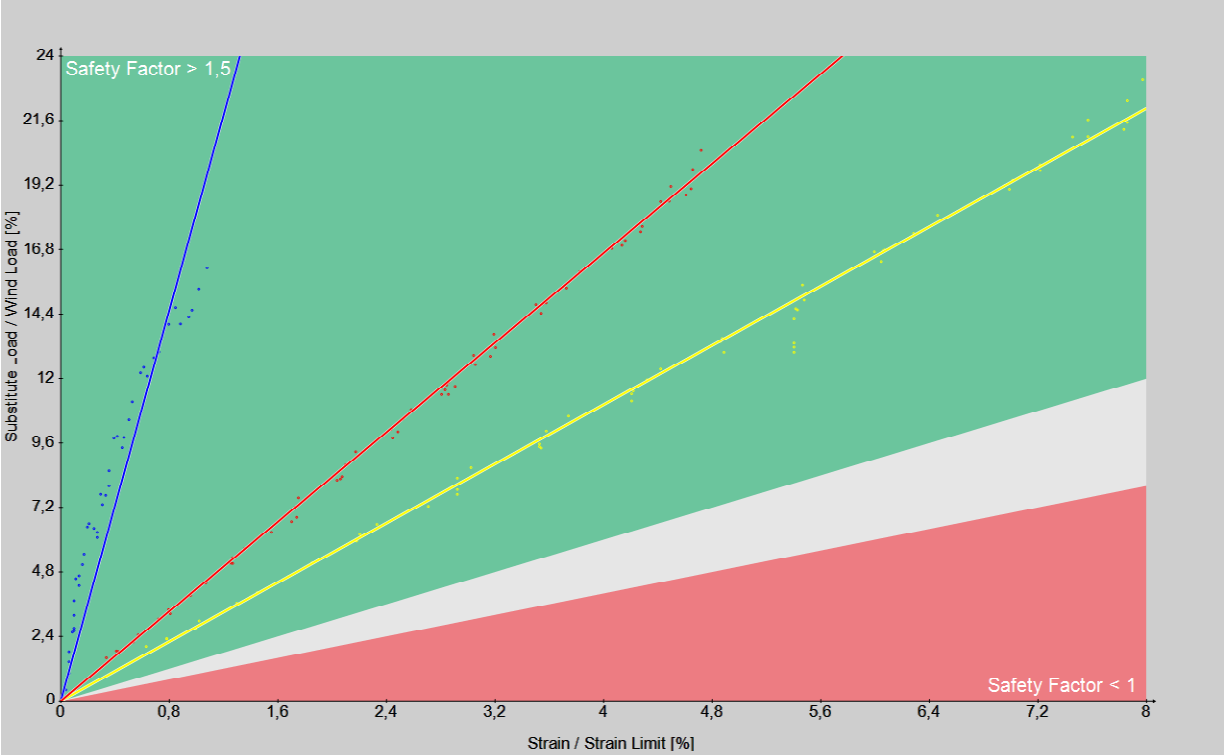
Tree Data

Project	Nový Knín	**Tree Number**	**4**
Tree Species	dub letní	Date	31.05.2023

Setup Pulling Test

Height of the Stem Anchor	5 m	**Measurement No.**	**1**
Rope Angle	4,5 °	Load Direction	SEVER

Graphic Display (test data and best linear fit)



Elastometer Measurement	in	90	91	92
Measurement Height	**m**	**0,4**	**0,3**	**1,2**
Position		TLAK	TAH	TLAK
Stem Diameter 1	cm	127	132	111
Stem Diameter 2	cm	117	135	121
Bark Thickness	cm	3	3	3
Load part	%	100	100	100

Breaking Stability (derived from the gradient of the best linear fit)

Safety Factor	**18,18**	**2,76**	**4,17**

Control Value

Coefficient of Determination R^2		0,8671	0,9934	0,9979
Residual Stiffness	%	>100	17	36,9
Degree of Hollowness	%	0	94	85,8
Compression originating from				
Dead Weight	%	0,4	3,2	1,8
Substitute Load	%	16,2	23,2	20,6