

Wind Load Analysis analogous to DIN 1055-4

Tree Number 181272
Arbotag 181272

Project

Project Name 20139
Project Number 181334
Test Date 12-1-2024

Site

, Belgium
Altitude a. sea level 0 m

Tree Data

Tree Species Tilia
Stem circumference 159 cm
Stem Diameter 43 cm
in 1m height 53 cm
Bark Thickness 1 cm
Tree Height 14,2 m

Applied Material Properties

as for Tilia cordata
Source Stuttgart
Compressive Strength 20 MPa
Modulus of Elasticity 8300 MPa
Limit of Elasticity 0,24 %
Green Density 0,74 g/cm³

Crown Outline



15 **Load Direction** ZO
14 **Surface Area Analysis**
13 Crown Base 5,7 m
12 Effective Height 10,8 m
11 Total Surface Area 49 m²
10 Crown Eccentricity 0,02 m
9
8 **Applied Structural Parameters**
7 Drag Factor 0,3
6 Natural Frequency 0,34 Hz
5 Damping Decrement 0,65
4 Form Factor for Dead Weight 0,8
3
2 **Applied Site Parameters**
1 Windzone BE 4
0 Speed of Applied
Design Wind Speed 26 m/s
Air Density 1,29 kg/m³
Roughness Category Suburb
Exponent for Wind Profile 0,22
Proximity Factor for Effects
in Near Ground Wind Flow 1
Factor for Crown Exposure 0,90

Results

Wind Load Analysis

Mean Wind Pressure 3,4 kN
Gust Reaction Factor 2,93
Load Centre 9,8 m
Torsion Moment 0 kNm

Tree Static Analysis

Dead Weight Tree 1,4 t
Critical Degree of Hollowness 74 %
Critical Residual Wall Thickness 6 cm
Assuming an Uncompromised Residual Wall

Design Wind Load 98 kNm

Basic Safety Factor 1,7

General

Comments

Calculated Tipping Stability according to Pull Test

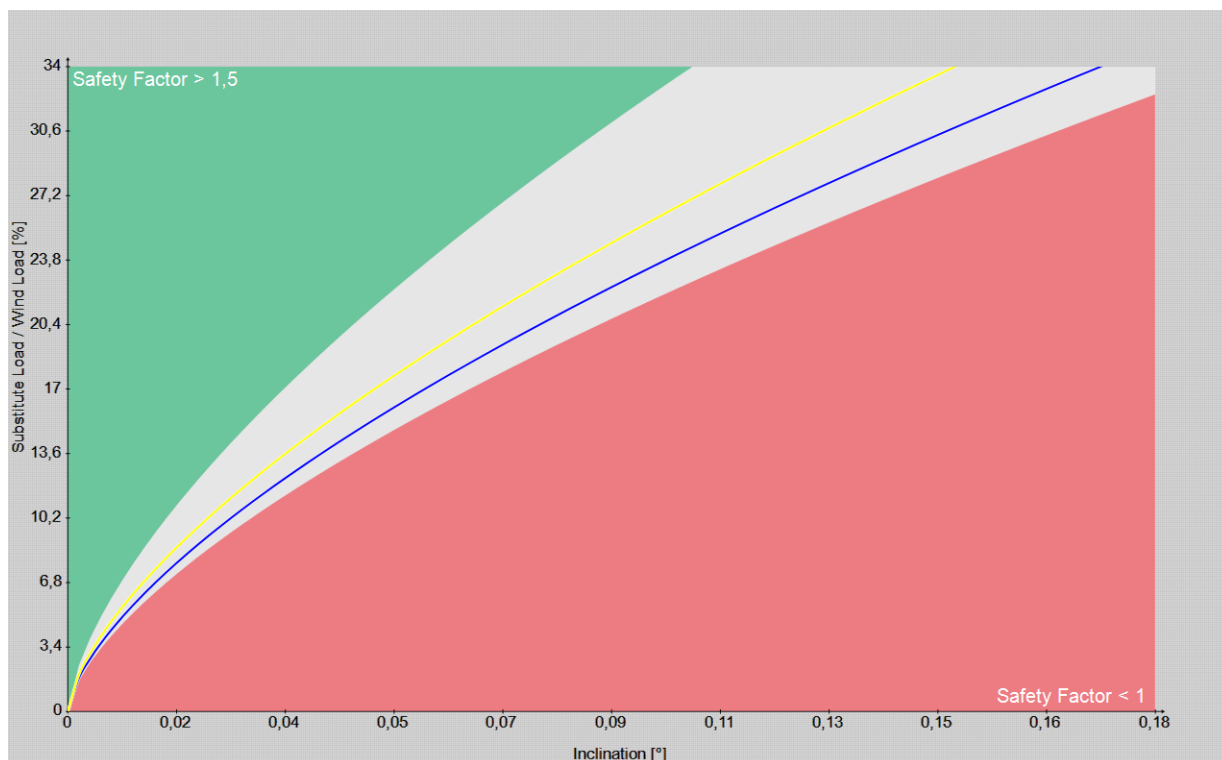
Tree Data

Project	20139	Tree Number	181272
Tree Species	Tillia	Date	12-1-2024

Setup Pulling Test

Height of the Stem Anchor	5,7 m	Measurement No.	1
Rope Angle	11,9 °	Load Direction	ZO

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



Inclinometer Measurement	80	81
Position	90x	270x

Tipping Stability (based on Generalized Tipping Curve)

Safety Factor	1,08	1,19
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Control Value	in		
Standard Deviation	%	1,47	1,39
Substitue Load	%	33,7	33,7
Load Direction at Inclinometer		x-Axis	x-Axis

General for Pull Test

Consultant	Michiel De Temmerman
Witness / Assistant	Gilles Voet
Measurement Comments	

Calculated Fracture Stability according to Pull Test

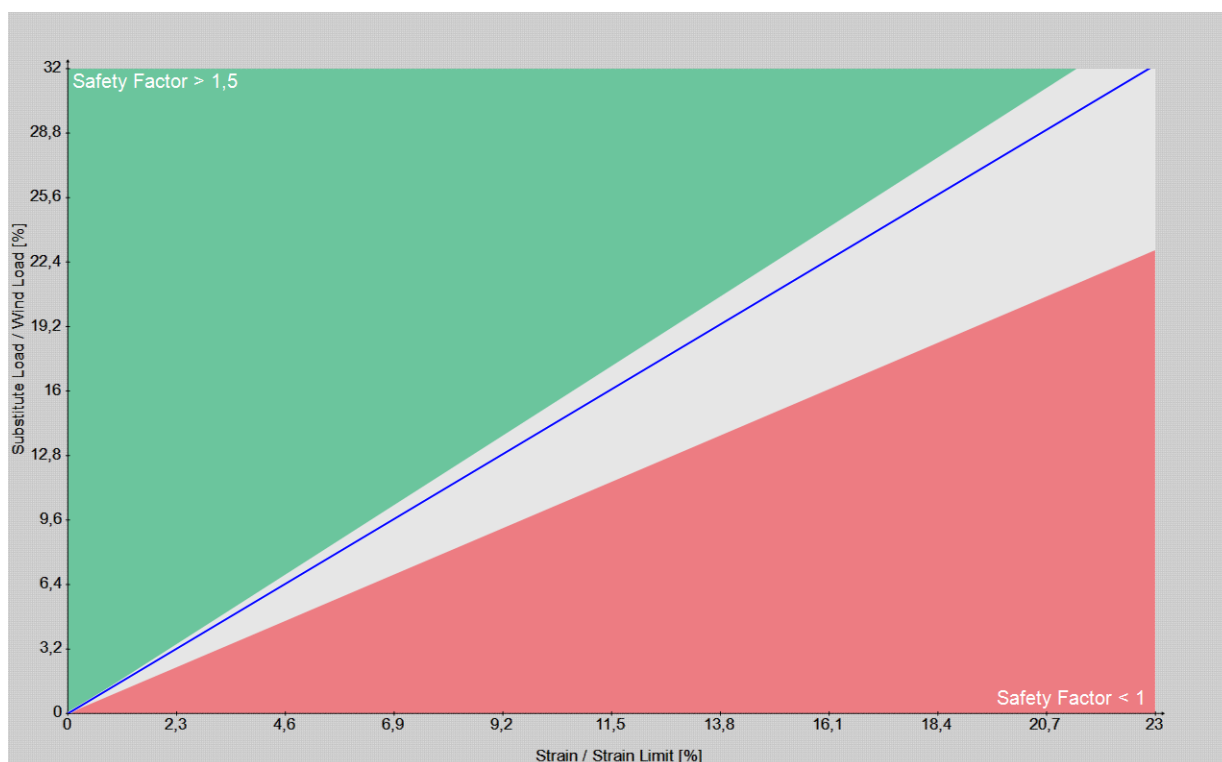
Tree Data

Project	20139	Tree Number	181272
Tree Species	Tillia	Date	12-1-2024

Setup Pulling Test

Height of the Stem Anchor	5,7 m	Measurement No.	1
Rope Angle	11,9 °	Load Direction	ZO

Graphic Display (test data and best linear fit)



Elastometer Measurement in 90

Measurement Height	m	1
Position		T
Stem Diameter 1	cm	43
Stem Diameter 2	cm	53
Bark Thickness	cm	1
Load part	%	100

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

Safety Factor **1,4**

Control Value

Coefficient of Determination R ²	0,9737
Residual Stiffness	% 74,2
Degree of Hollowness	% 63,6
Compression originating from	
Dead Weight	% 0,6
Substitute Load	% 31,6

Wind Load Analysis analogous to DIN 1055-4

Tree Number 181276
Arbotag 181276

Project

Project Name 20139
 Project Number 181334
 Test Date 12-1-2024

Site

, Belgium
 Altitude a. sea level 0 m

Tree Data

Tree Species Tilia
 Stem circumference 165 cm
 Stem Diameter || 54 cm
 in 1m height _|_ 52 cm
 Bark Thickness 1 cm
Tree Height 17 m

Applied Material Properties

as for Tilia cordata
 Source Stuttgart
 Compressive Strength 20 MPa
 Modulus of Elasticity 8300 MPa
 Limit of Elasticity 0,24 %
 Green Density 0,74 g/cm³

Crown Outline



Load Direction NO

Surface Area Analysis

Crown Base 7,1 m
 Effective Height 13 m
 Total Surface Area 96 m²
 Crown Eccentricity 0,37 m

Applied Structural Parameters

Drag Factor 0,3
 Natural Frequency 0,34 Hz
 Damping Decrement 0,75
 Form Factor for Dead Weight 0,8

Applied Site Parameters

Windzone BE 4
 Speed of Applied
 Design Wind Speed 26 m/s
 Air Density 1,29 kg/m³
 Roughness Category Suburb
 Exponent for Wind Profile 0,22
 Proximity Factor for Effects
 in Near Ground Wind Flow 1
 Factor for Crown Exposure 0,70

Results

Wind Load Analysis

Mean Wind Pressure 5,6 kN
 Gust Reaction Factor 2,74
 Load Centre 11,7 m
 Torsion Moment 6 kNm

Tree Static Analysis

Dead Weight Tree 2,1 t
 Critical Degree of Hollowness 66 %
 Critical Residual Wall Thickness 9 cm
 Assuming an Uncompromised Residual Wall

Design Wind Load 179 kNm

Basic Safety Factor 1,4

General

Comments

Calculated Tipping Stability according to Pull Test

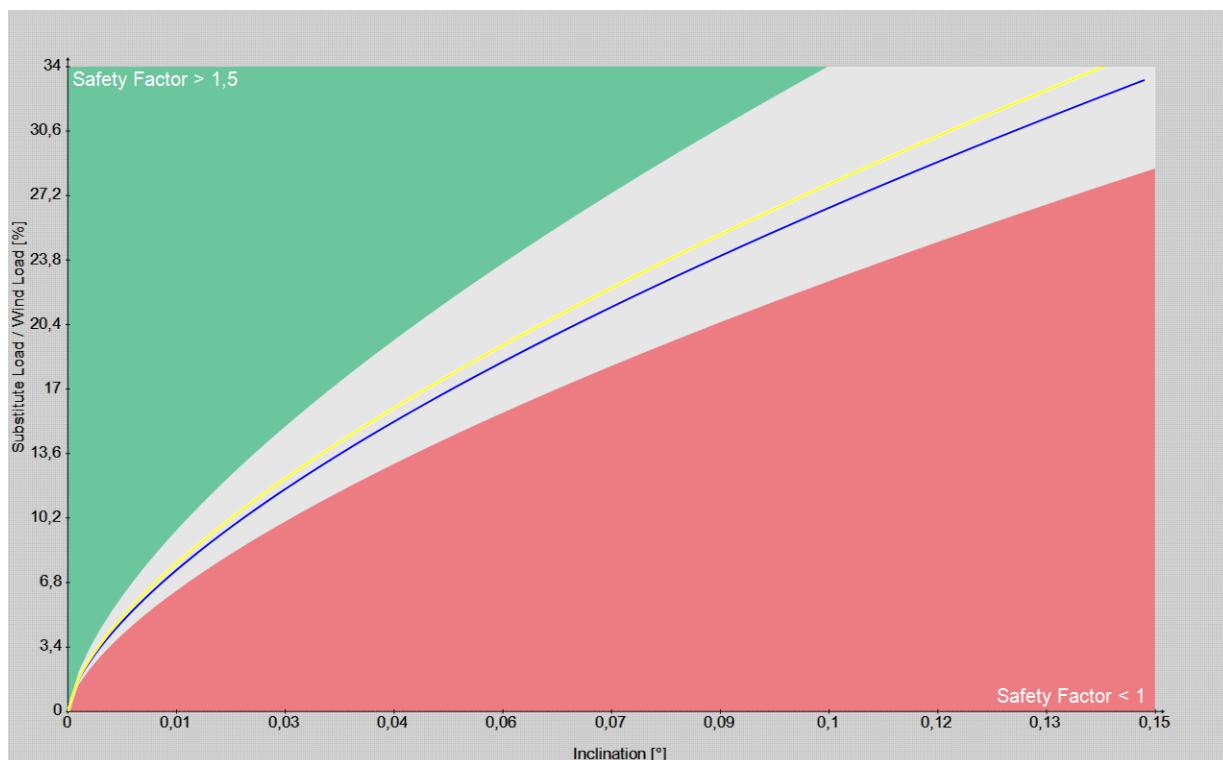
Tree Data

Project	20139	Tree Number	181276
Tree Species	Tillia	Date	12-1-2024

Setup Pulling Test

Height of the Stem Anchor	7,2 m	Measurement No.	1
Rope Angle	1,5 °	Load Direction	NO

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



Inclinometer Measurement	80	81
Position	90x	180x

Tipping Stability (based on Generalized Tipping Curve)

Safety Factor	1,17	1,23
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Control Value	in		
Standard Deviation	%	1,56	1,4
Substitue Load	%	33,4	33,4
Load Direction at Inclinometer		x-Axis	x-Axis

General for Pull Test

Consultant	Michiel De Temmerman
Witness / Assistant	Gilles Voet
Measurement Comments	

Calculated Fracture Stability according to Pull Test

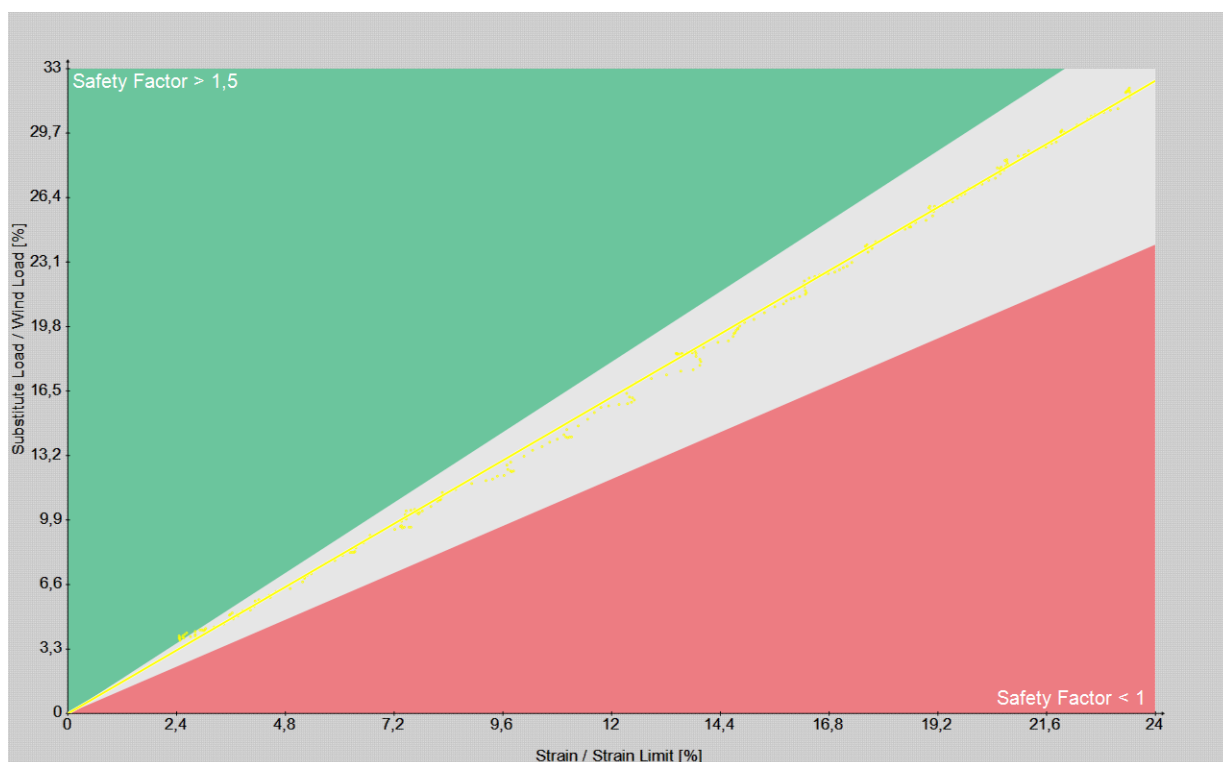
Tree Data

Project	20139	Tree Number	181276
Tree Species	Tillia	Date	12-1-2024

Setup Pulling Test

Height of the Stem Anchor	7,2 m	Measurement No.	1
Rope Angle	1,5 °	Load Direction	NO

Graphic Display (test data and best linear fit)



Elastometer Measurement in 91

Measurement Height	m	1
Position		T
Stem Diameter 1	cm	54
Stem Diameter 2	cm	52
Bark Thickness	cm	1
Load part	%	100

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

Safety Factor **1,35**

Control Value

Coefficient of Determination R ²		0,9987
Residual Stiffness	%	84,1
Degree of Hollowness	%	54,1
Compression originating from		
Dead Weight	%	0,7
Substitute Load	%	32,1

Wind Load Analysis analogous to DIN 1055-4

Tree Number 181279
Arbotag 181279

Project

Project Name 20139
Project Number 181334
Test Date 12-1-2024

Site

, Belgium
Altitude a. sea level 0 m

Tree Data

Tree Species Tilia
Stem circumference 160 cm
Stem Diameter || 50 cm
in 1m height _L 52 cm
Bark Thickness 1 cm
Tree Height 14,5 m

Applied Material Properties

as for Tilia cordata
Source Stuttgart
Compressive Strength 20 MPa
Modulus of Elasticity 8300 MPa
Limit of Elasticity 0,24 %
Green Density 0,74 g/cm³

Crown Outline



Load Direction 0

Surface Area Analysis

Crown Base 5 m
Effective Height 10,7 m
Total Surface Area 131 m²
Crown Eccentricity 1,42 m

Applied Structural Parameters

Drag Factor 0,3
Natural Frequency 0,4 Hz
Damping Decrement 0,65
Form Factor for Dead Weight 0,8

Applied Site Parameters

Windzone BE 4
Speed of Applied
Design Wind Speed 26 m/s
Air Density 1,29 kg/m³
Roughness Category Suburb
Exponent for Wind Profile 0,22
Proximity Factor for Effects
in Near Ground Wind Flow 1
Factor for Crown Exposure 0,90

Results

Wind Load Analysis

Mean Wind Pressure 9,2 kN
Gust Reaction Factor 2,7
Load Centre 9,9 m
Torsion Moment 35 kNm

Tree Static Analysis

Dead Weight Tree 1,6 t
Critical Degree of Hollowness 0 %
Critical Residual Wall Thickness 0 cm
Assuming an Uncompromised Residual Wall

Design Wind Load 246 kNm

Basic Safety Factor 0,9

General

Comments

Calculated Tipping Stability according to Pull Test

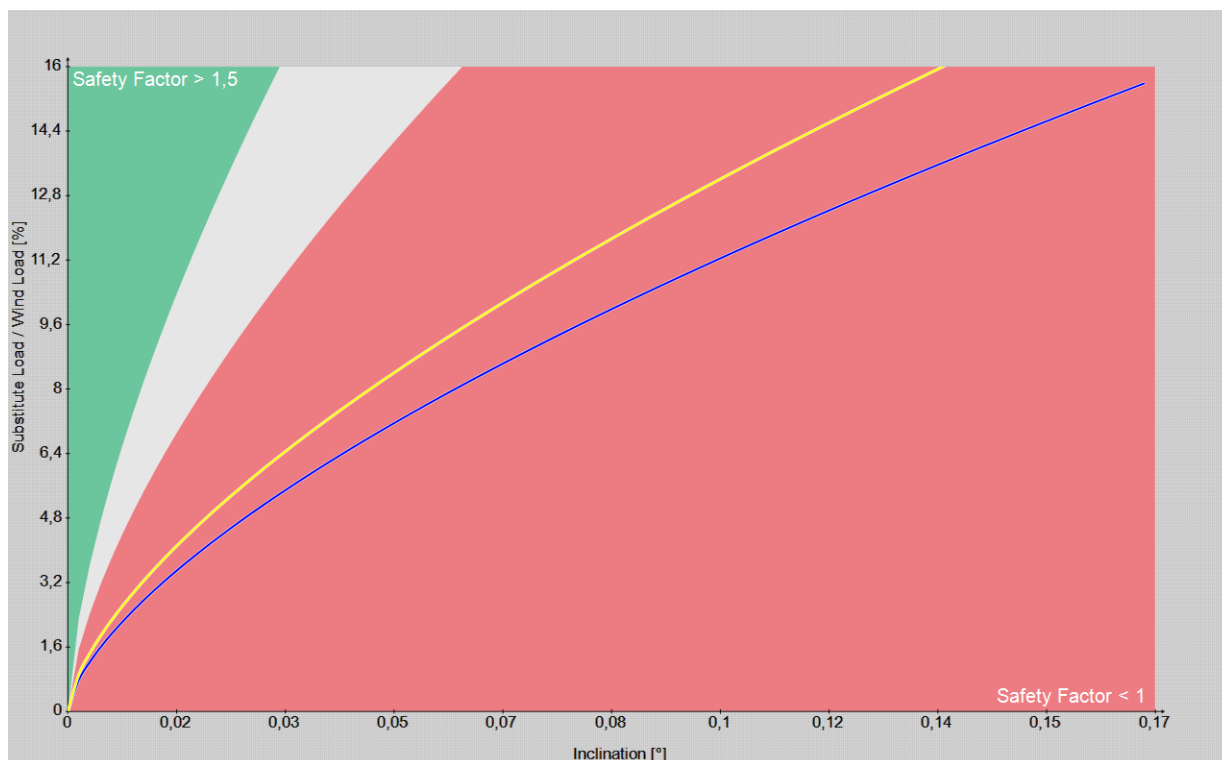
Tree Data

Project	20139	Tree Number	181279
Tree Species	Tilia	Date	12-1-2024

Setup Pulling Test

Height of the Stem Anchor	5 m	Measurement No.	1
Rope Angle	1,7 °	Load Direction	O

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



Inclinometer Measurement	80	81
Position	90x	270x

Tipping Stability (based on Generalized Tipping Curve)

Safety Factor	0,51	0,59
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Control Value	in		
Standard Deviation	%	0,59	0,48
Substitue Load	%	15,7	15,7
Load Direction at Inclinometer		x-Axis	x-Axis

General for Pull Test

Consultant	Michiel De Temmerman
Witness / Assistant	Gilles Voet
Measurement Comments	

Calculated Fracture Stability according to Pull Test

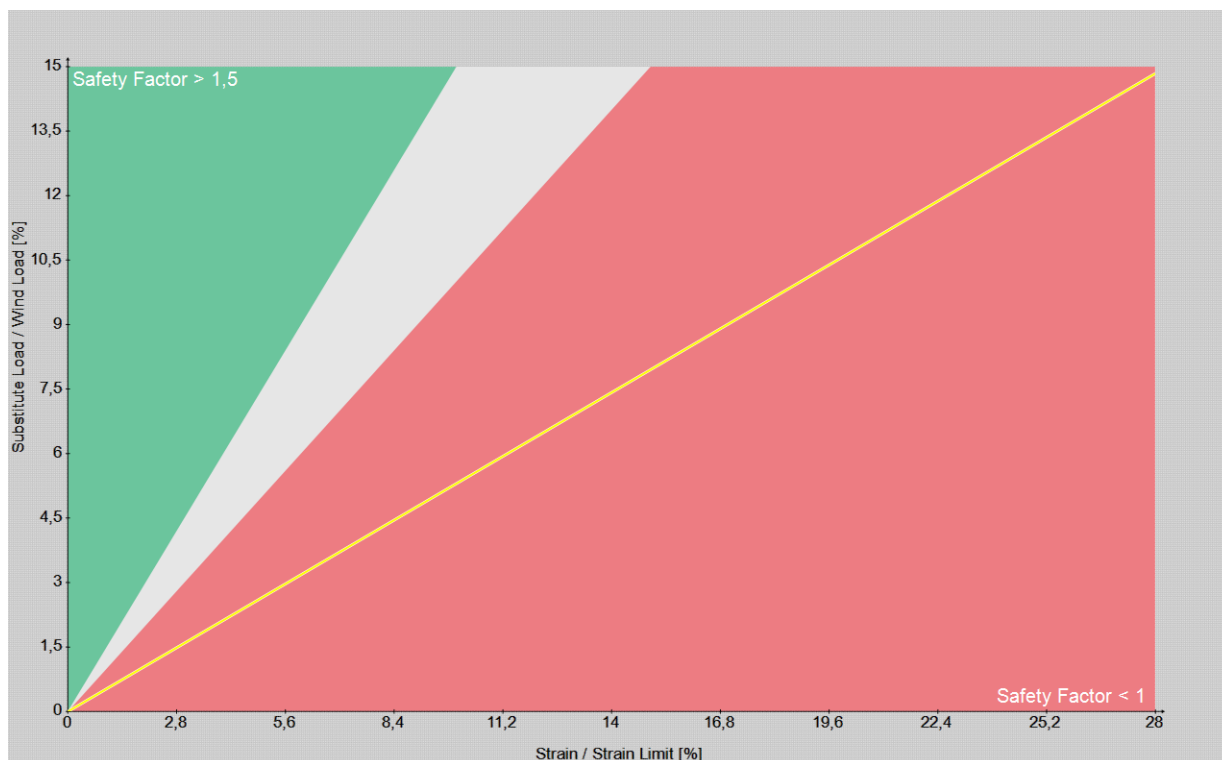
Tree Data

Project	20139	Tree Number	181279
Tree Species	Tilia	Date	12-1-2024

Setup Pulling Test

Height of the Stem Anchor	5 m	Measurement No.	1
Rope Angle	1,7 °	Load Direction	O

Graphic Display (test data and best linear fit)



Elastometer Measurement in 91

Measurement Height	m	1
Position		T
Stem Diameter 1	cm	50
Stem Diameter 2	cm	52
Bark Thickness	cm	1
Load part	%	100

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

Safety Factor **0,53**

Control Value

Coefficient of Determination R ²		0,9942
Residual Stiffness	%	52,7
Degree of Hollowness	%	77,9
Compression originating from		
Dead Weight	%	1
Substitute Load	%	14,2

Wind Load Analysis analogous to DIN 1055-4

Tree Number 181280
Arbotag 181280

Project

Project Name 20139
 Project Number 181334
 Test Date 12-1-2024

Site

, Belgium
 Altitude a. sea level 4 m

Tree Data

Tree Species Tilia
 Stem circumference 159 cm
 Stem Diameter || 52 cm
 in 1m height _|_ 48 cm
 Bark Thickness 1 cm
Tree Height 15 m

Applied Material Properties

as for Tilia cordata
 Source Stuttgart
 Compressive Strength 20 MPa
 Modulus of Elasticity 8300 MPa
 Limit of Elasticity 0,24 %
 Green Density 0,74 g/cm³

Crown Outline



Load Direction O

Surface Area Analysis

Crown Base 7 m
 Effective Height 11,8 m
 Total Surface Area 62 m²
 Crown Eccentricity 0,09 m

Applied Structural Parameters

Drag Factor 0,3
 Natural Frequency 0,34 Hz
 Damping Decrement 0,65
 Form Factor for Dead Weight 0,8

Applied Site Parameters

Windzone BE 4
 Speed of Applied
 Design Wind Speed 26 m/s
 Air Density 1,29 kg/m³
 Roughness Category Suburb
 Exponent for Wind Profile 0,22
 Proximity Factor for Effects
 in Near Ground Wind Flow 1
 Factor for Crown Exposure 0,90

Results

Wind Load Analysis

Mean Wind Pressure 4,4 kN
 Gust Reaction Factor 2,89
 Load Centre 10 m
 Torsion Moment 1 kNm

Tree Static Analysis

Dead Weight Tree 1,6 t
 Critical Degree of Hollowness 74 %
 Critical Residual Wall Thickness 6 cm
 Assuming an Uncompromised Residual Wall

Design Wind Load 126 kNm

Basic Safety Factor 1,7

General

Comments

Calculated Tipping Stability according to Pull Test

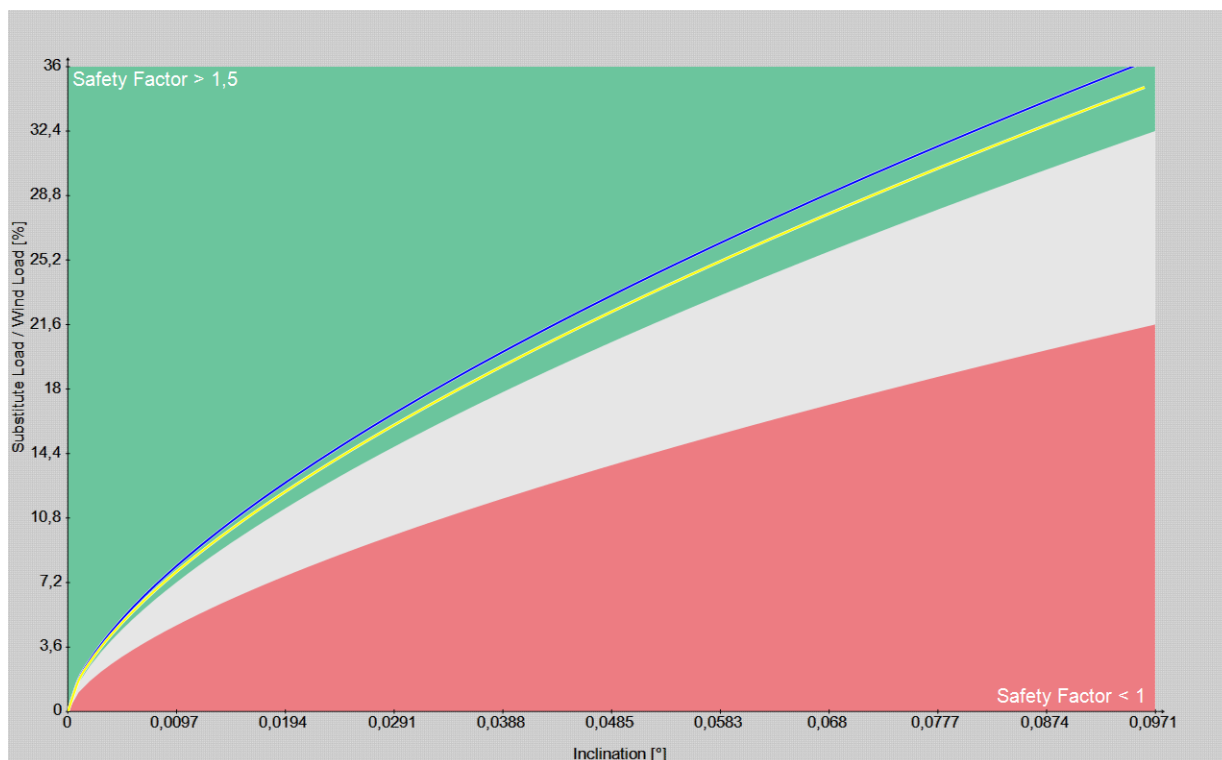
Tree Data

Project	20139	Tree Number	181280
Tree Species	Tilia	Date	12-1-2024

Setup Pulling Test

Height of the Stem Anchor	7,4 m	Measurement No.	1
Rope Angle	14,4 °	Load Direction	O

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



Inclinometer Measurement	80	81
Position	90x	270x

Tipping Stability (based on Generalized Tipping Curve)

Safety Factor	1,69	1,62
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Control Value	in		
Standard Deviation	%	2,06	1,48
Substitue Load	%	35	35
Load Direction at Inclinometer		x-Axis	x-Axis

General for Pull Test

Consultant	Michiel De Temmerman
Witness / Assistant	Gilles Voet
Measurement Comments	

Calculated Fracture Stability according to Pull Test

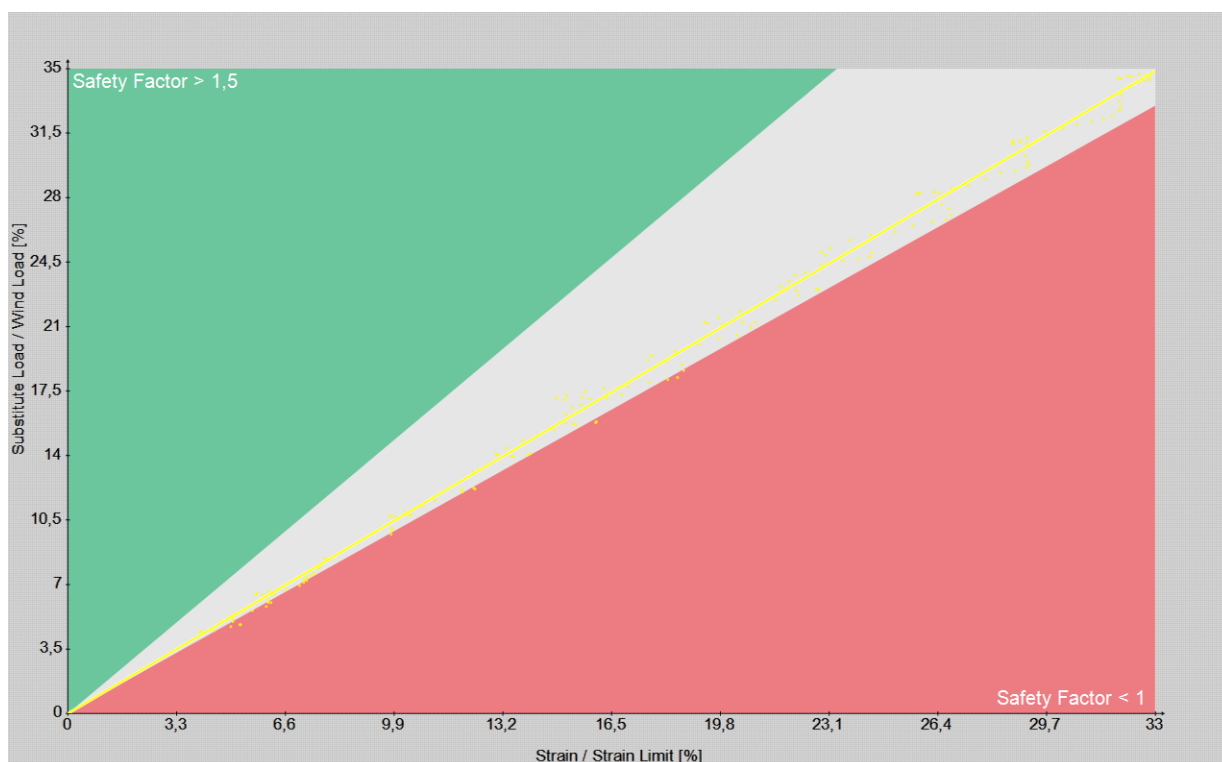
Tree Data

Project	20139	Tree Number	181280
Tree Species	Tilia	Date	12-1-2024

Setup Pulling Test

Height of the Stem Anchor	7,4 m	Measurement No.	1
Rope Angle	14,4 °	Load Direction	O

Graphic Display (test data and best linear fit)



Elastometer Measurement in 91

Measurement Height	m	1
Position		T
Stem Diameter 1	cm	52
Stem Diameter 2	cm	48
Bark Thickness	cm	1
Load part	%	100

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

Safety Factor **1,06**

Control Value

Coefficient of Determination R ²		0,9965
Residual Stiffness	%	54
Degree of Hollowness	%	77,2
Compression originating from		
Dead Weight	%	1
Substitute Load	%	34,8

Wind Load Analysis analogous to DIN 1055-4

Tree Number 181284
Arbotag 181284

Project

Project Name 20139
 Project Number 181334
 Test Date 11-1-2024

Site

, Belgium
 Altitude a. sea level 4 m

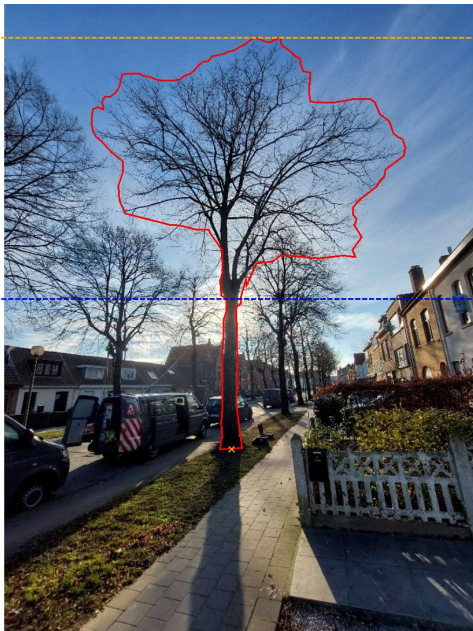
Tree Data

Tree Species Tilia
 Stem circumference 164 cm
 Stem Diameter || 48 cm
 in 1m height _L 46 cm
 Bark Thickness 1 cm
Tree Height 14,8 m

Applied Material Properties

as for Tilia cordata
 Source Stuttgart
 Compressive Strength 20 MPa
 Modulus of Elasticity 8300 MPa
 Limit of Elasticity 0,24 %
 Green Density 0,74 g/cm³

Crown Outline



Load Direction ZO

Surface Area Analysis

Crown Base 5,4 m
 Effective Height 11 m
 Total Surface Area 63 m²
 Crown Eccentricity 0,52 m

Applied Structural Parameters

Drag Factor 0,3
 Natural Frequency 0,34 Hz
 Damping Decrement 0,6
 Form Factor for Dead Weight 0,8

Applied Site Parameters

Windzone BE 4
 Speed of Applied
 Design Wind Speed 26 m/s
 Air Density 1,29 kg/m³
 Roughness Category Suburb
 Exponent for Wind Profile 0,22
 Proximity Factor for Effects
 in Near Ground Wind Flow 1
 Factor for Crown Exposure 0,80

Results

Wind Load Analysis

Mean Wind Pressure 4 kN
 Gust Reaction Factor 2,89
 Load Centre 10,3 m
 Torsion Moment 6 kNm

Tree Static Analysis

Dead Weight Tree 1,4 t
 Critical Degree of Hollowness 69 %
 Critical Residual Wall Thickness 7 cm
 Assuming an Uncompromised Residual Wall

Design Wind Load 119 kNm

Basic Safety Factor 1,5

General

Comments

Calculated Tipping Stability according to Pull Test

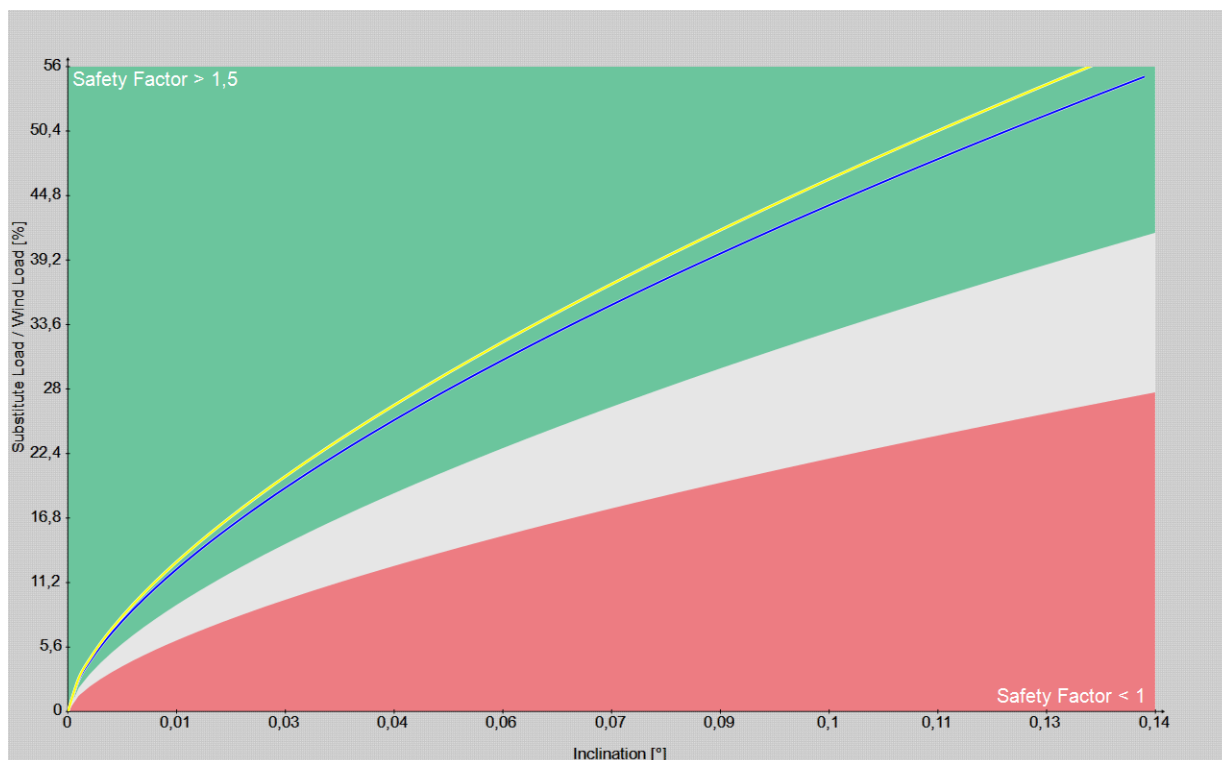
Tree Data

Project	20139	Tree Number	181284
Tree Species	Tillia	Date	11-1-2024

Setup Pulling Test

Height of the Stem Anchor	5,6 m	Measurement No.	2
Rope Angle	6,4 °	Load Direction	ZO

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



Inclinometer Measurement	80	81
Position	0y	180y

Tipping Stability (based on Generalized Tipping Curve)

Safety Factor	2	2,1
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Control Value	in		
Standard Deviation	%	3,32	3,72
Substitue Load	%	55,4	55,4
Load Direction at Inclinometer	y-Axis	y-Axis	

General for Pull Test

Consultant	Michiel De Temmerman
Witness / Assistant	Zeger Deroose
Measurement Comments	Gilles Voet

Calculated Fracture Stability according to Pull Test

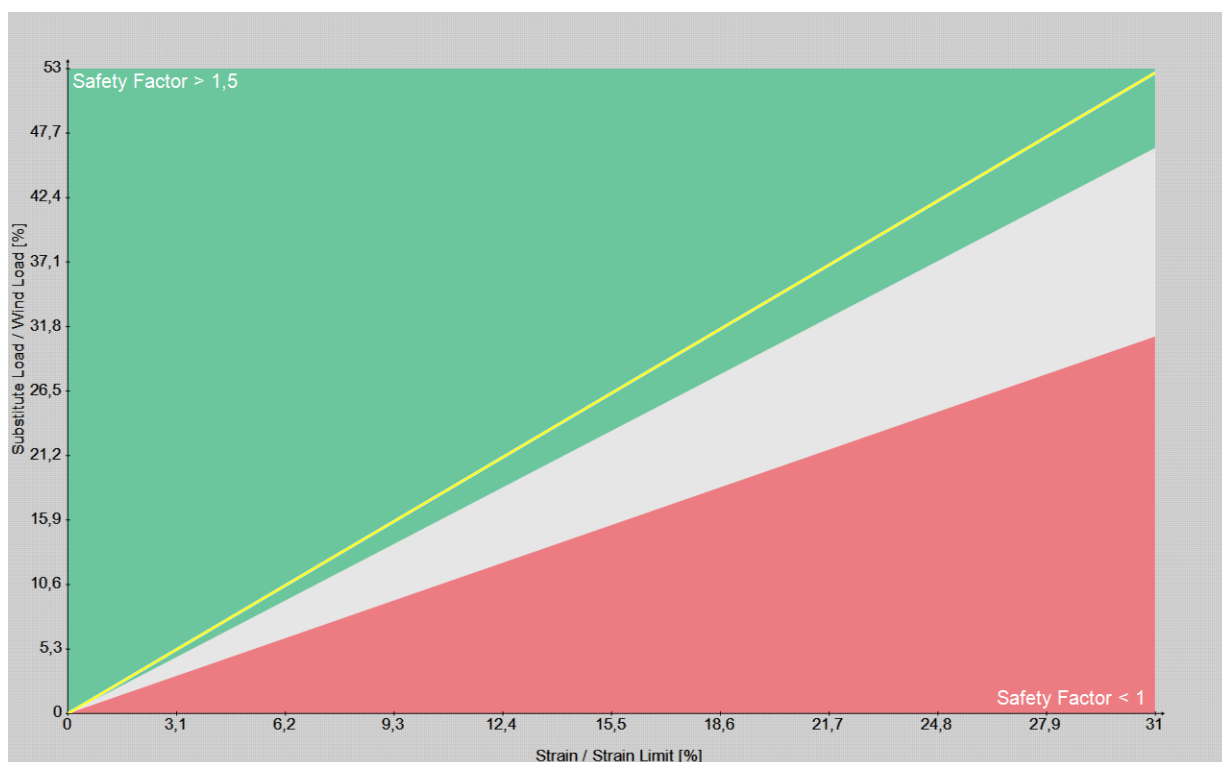
Tree Data

Project	20139	Tree Number	181284
Tree Species	Tillia	Date	11-1-2024

Setup Pulling Test

Height of the Stem Anchor	5,6 m	Measurement No.	2
Rope Angle	6,4 °	Load Direction	ZO

Graphic Display (test data and best linear fit)



Elastometer Measurement in 91

Measurement Height	m	1
Position		T
Stem Diameter 1	cm	48
Stem Diameter 2	cm	46
Bark Thickness	cm	1
Load part	%	100

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

Safety Factor **1,7**

Control Value

Coefficient of Determination R ²		0,9983
Residual Stiffness	%	>100
Degree of Hollowness	%	0
Compression originating from		
Dead Weight	%	0,4
Substitute Load	%	52,5

Wind Load Analysis analogous to DIN 1055-4

Tree Number 181319
Arbotag 181319

Project

Project Name 20139
 Project Number 181334
 Test Date 11-1-2024

Site

Koolkerksesteenweg
 8000 Brugge, Belgium
 Altitude a. sea level 4 m

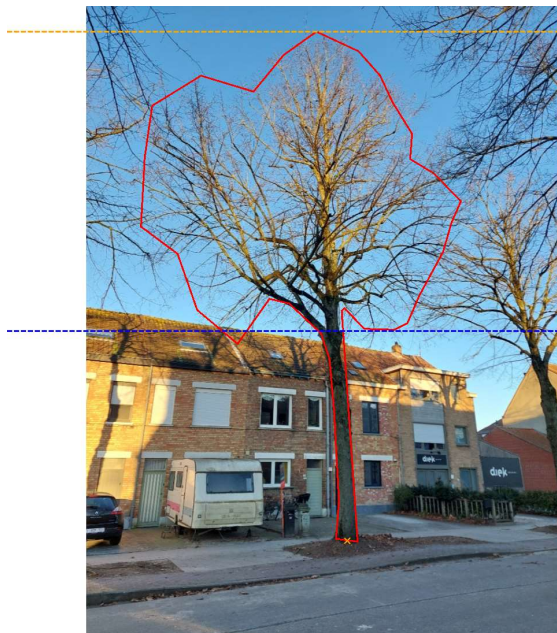
Tree Data

Tree Species Tilia
 Stem circumference 160 cm
 Stem Diameter || 52 cm
 in 1m height _|_ 45 cm
 Bark Thickness 1 cm
Tree Height 17 m

Applied Material Properties

as for Tilia cordata
 Source Stuttgart
 Compressive Strength 20 MPa
 Modulus of Elasticity 8300 MPa
 Limit of Elasticity 0,24 %
 Green Density 0,74 g/cm³

Crown Outline



Load Direction Oost

Surface Area Analysis

Crown Base 7 m
 Effective Height 13 m
 Total Surface Area 78 m²
 Crown Eccentricity 1,7 m

Applied Structural Parameters

Drag Factor 0,3
 Natural Frequency 0,34 Hz
 Damping Decrement 0,6
 Form Factor for Dead Weight 0,8

Applied Site Parameters

Windzone BE 4
 Speed of Applied
 Design Wind Speed 26 m/s
 Air Density 1,29 kg/m³
 Roughness Category Suburb
 Exponent for Wind Profile 0,22
 Proximity Factor for Effects
 in Near Ground Wind Flow 1
 Factor for Crown Exposure 0,80

Results

Wind Load Analysis

Mean Wind Pressure 5,3 kN
 Gust Reaction Factor 2,83
 Load Centre 11,5 m
 Torsion Moment 25 kNm

Tree Static Analysis

Dead Weight Tree 1,7 t
 Critical Degree of Hollowness 55 %
 Critical Residual Wall Thickness 10 cm
 Assuming an Uncompromised Residual Wall

Design Wind Load 171 kNm

Basic Safety Factor 1,2

General

Comments

Calculated Tipping Stability according to Pull Test

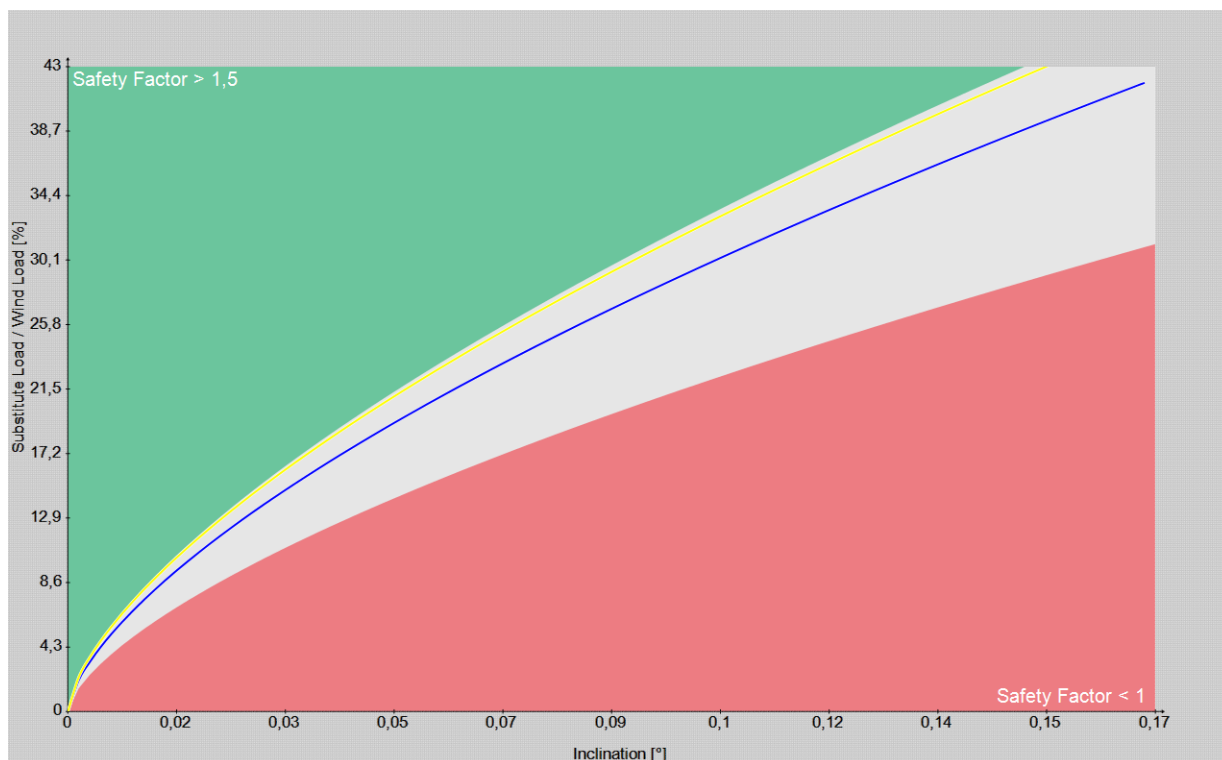
Tree Data

Project	20139	Tree Number	181319
Tree Species	Tilia	Date	11-1-2024

Setup Pulling Test

Height of the Stem Anchor	7,5 m	Measurement No.	1
Rope Angle	6,8 °	Load Direction	Oost

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



Inclinometer Measurement	80	81
Position	90x	270x

Tipping Stability (based on Generalized Tipping Curve)

Safety Factor	1,35	1,48
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Control Value	in		
Standard Deviation	%	1,28	1,27
Substitue Load	%	42,6	42,6
Load Direction at Inclinometer		x-Axis	x-Axis

General for Pull Test

Consultant	Michiel De Temmerman
Witness / Assistant	Zeger Deroose
Measurement Comments	Gilles Voet

Calculated Fracture Stability according to Pull Test

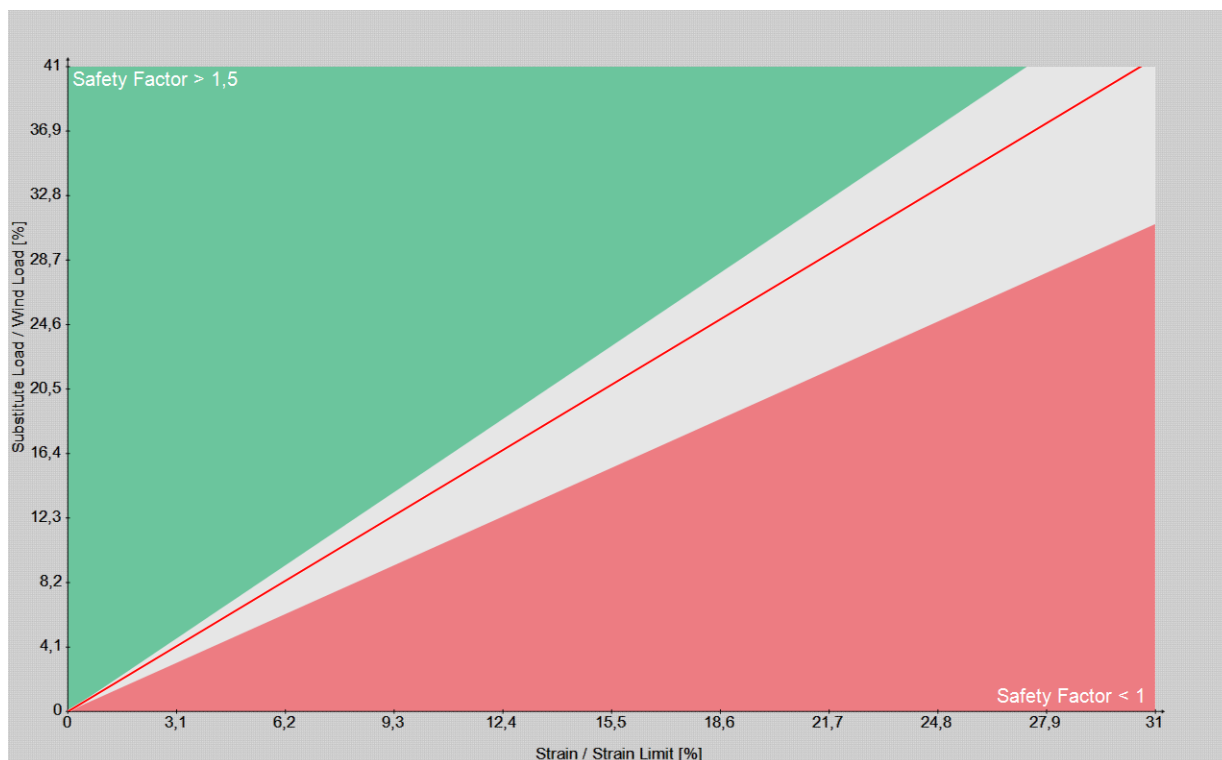
Tree Data

Project	20139	Tree Number	181319
Tree Species	Tilia	Date	11-1-2024

Setup Pulling Test

Height of the Stem Anchor	7,5 m	Measurement No.	1
Rope Angle	6,8 °	Load Direction	Oost

Graphic Display (test data and best linear fit)



Elastometer Measurement in 91

Measurement Height	m	1
Position		T
Stem Diameter 1	cm	52
Stem Diameter 2	cm	45
Bark Thickness	cm	1
Load part	%	100

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

Safety Factor **1,34**

Control Value

Coefficient of Determination R ²		0,9992
Residual Stiffness	%	99,9
Degree of Hollowness	%	8,7
Compression originating from		
Dead Weight	%	0,5
Substitute Load	%	40,8

Wind Load Analysis analogous to DIN 1055-4

Tree Number 181320
Arbotag 181320

Project

Project Name 20139
 Project Number 181334
 Test Date 9-1-2024

Site

, Belgium
 Altitude a. sea level 4 m

Tree Data

Tree Species Tilia
 Stem circumference 165 cm
 Stem Diameter || 55 cm
 in 1m height _| 49 cm
 Bark Thickness 1 cm
Tree Height 15 m

Applied Material Properties

as for Tilia cordata
 Source Stuttgart
 Compressive Strength 20 MPa
 Modulus of Elasticity 8300 MPa
 Limit of Elasticity 0,24 %
 Green Density 0,74 g/cm³

Crown Outline



15 **Load Direction** ZO
 14 **Surface Area Analysis**
 13 Crown Base 6,3 m
 12 Effective Height 11,5 m
 11 Total Surface Area 63 m²
 10 Crown Eccentricity 0,7 m
 9 **Applied Structural Parameters**
 8 Drag Factor 0,25
 7 Natural Frequency 0,34 Hz
 6 Damping Decrement 0,6
 5 Form Factor for Dead Weight 0,8
 4 **Applied Site Parameters**
 3 Windzone BE 4
 2 Speed of Applied
 1 Design Wind Speed 26 m/s
 0 Air Density 1,29 kg/m³
 Roughness Category Suburb
 Exponent for Wind Profile 0,22
 Proximity Factor for Effects
 in Near Ground Wind Flow 1
 Factor for Crown Exposure 0,80

Results

Wind Load Analysis
 Mean Wind Pressure 3,3 kN
 Gust Reaction Factor 2,91
 Load Centre 10,2 m
 Torsion Moment 7 kNm

Tree Static Analysis
 Dead Weight Tree 1,7 t
 Critical Degree of Hollowness 85 %
 Critical Residual Wall Thickness 4 cm
 Assuming an Uncompromised Residual Wall

Design Wind Load 97 kNm **Basic Safety Factor** 2,6

General

Comments

Calculated Tipping Stability according to Pull Test

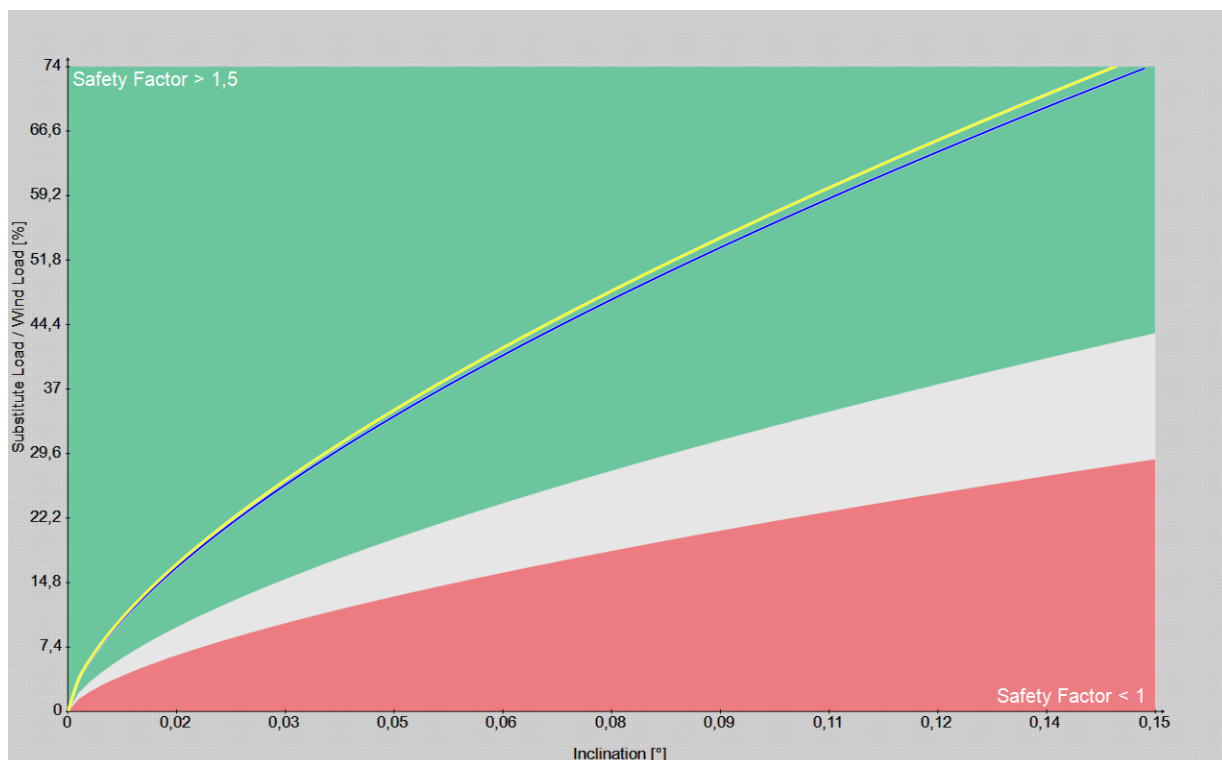
Tree Data

Project	20139	Tree Number	181320
Tree Species	Tilia	Date	9-1-2024

Setup Pulling Test

Height of the Stem Anchor	6 m	Measurement No.	1
Rope Angle	1,1 °	Load Direction	ZO

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



Inclinometer Measurement	80	81
Position	90x	270x

Tipping Stability (based on Generalized Tipping Curve)		
Safety Factor	2,57	2,62

Control Value	in		
Standard Deviation	%	2,76	2,66
Substitue Load	%	74	74
Load Direction at Inclinometer		x-Axis	x-Axis

General for Pull Test		
Consultant	Michiel De Temmerman	
Witness / Assistant	Zeger Deroose	
	Gilles Voet	
Measurement Comments		

Calculated Fracture Stability according to Pull Test

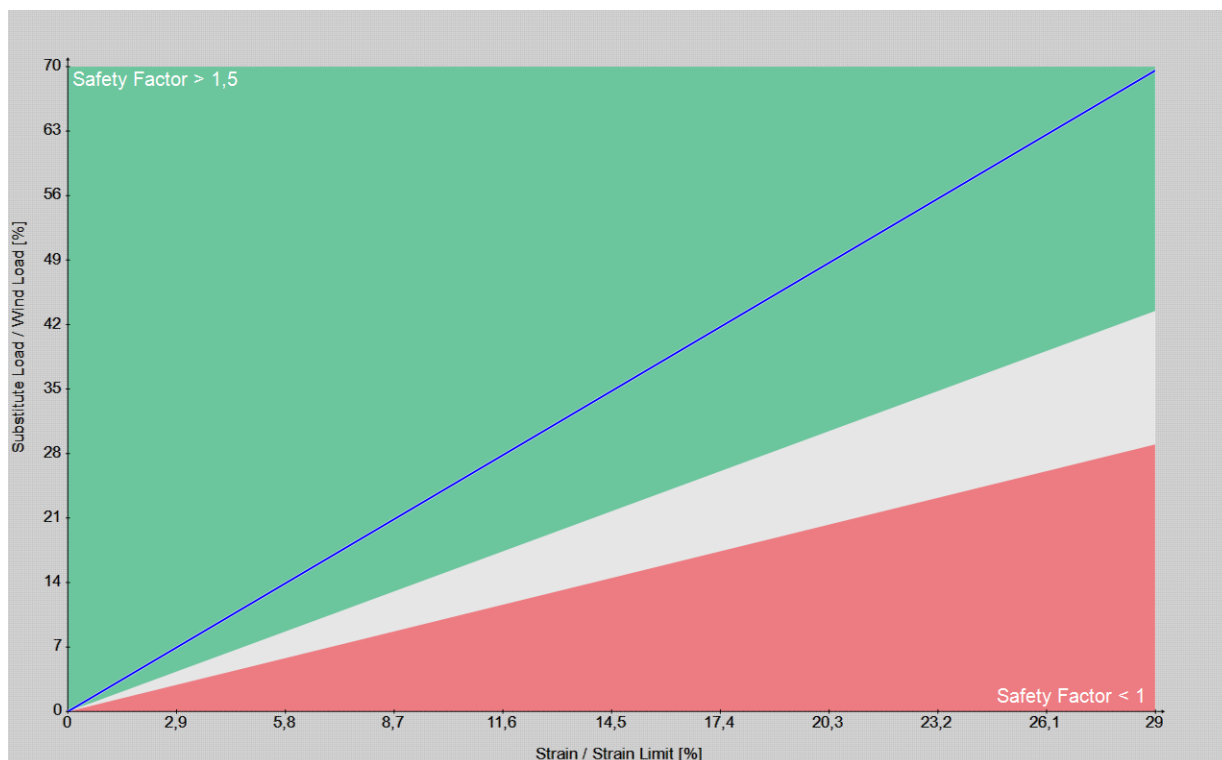
Tree Data

Project	20139	Tree Number	181320
Tree Species	Tilia	Date	9-1-2024

Setup Pulling Test

Height of the Stem Anchor	6 m	Measurement No.	1
Rope Angle	1,1 °	Load Direction	ZO

Graphic Display (test data and best linear fit)



Elastometer Measurement in 90

Measurement Height	m	1
Position		T
Stem Diameter 1	cm	55
Stem Diameter 2	cm	49
Bark Thickness	cm	1
Load part	%	100

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

Safety Factor **2,4**

Control Value

Coefficient of Determination R ²		0,9981
Residual Stiffness	%	81,7
Degree of Hollowness	%	56,8
Compression originating from		
Dead Weight	%	0,6
Substitute Load	%	69,1

Wind Load Analysis analogous to DIN 1055-4

Tree Number 181323
Arbotag 181323

Project

Project Name 20139
 Project Number 181334
 Test Date 9-1-2024

Site

, Belgium
 Altitude a. sea level 4 m

Tree Data

Tree Species Tilia
 Stem circumference 131 cm
 Stem Diameter || 39 cm
 in 1m height _|_ 43 cm
 Bark Thickness 1 cm
Tree Height 15 m

Applied Material Properties

as for Tilia cordata
 Source Stuttgart
 Compressive Strength 20 MPa
 Modulus of Elasticity 8300 MPa
 Limit of Elasticity 0,24 %
 Green Density 0,74 g/cm³

Crown Outline



Load Direction Oost

Surface Area Analysis

Crown Base 6,7 m
 Effective Height 11,7 m
 Total Surface Area 66 m²
 Crown Eccentricity 0,25 m

Applied Structural Parameters

Drag Factor 0,25
 Natural Frequency 0,34 Hz
 Damping Decrement 0,6
 Form Factor for Dead Weight 0,8

Applied Site Parameters

Windzone BE 4
 Speed of Applied
 Design Wind Speed 26 m/s
 Air Density 1,29 kg/m³
 Roughness Category Suburb
 Exponent for Wind Profile 0,22
 Proximity Factor for Effects in Near Ground Wind Flow 1
 Factor for Crown Exposure 0,90

Results

Wind Load Analysis

Mean Wind Pressure 3,8 kN
 Gust Reaction Factor 2,89
 Load Centre 10 m
 Torsion Moment 3 kNm

Tree Static Analysis

Dead Weight Tree 1,1 t
 Critical Degree of Hollowness 0 %
 Critical Residual Wall Thickness 20 cm
 Assuming an Uncompromised Residual Wall

Design Wind Load 110 kNm

Basic Safety Factor 1

General

Comments

Calculated Tipping Stability according to Pull Test

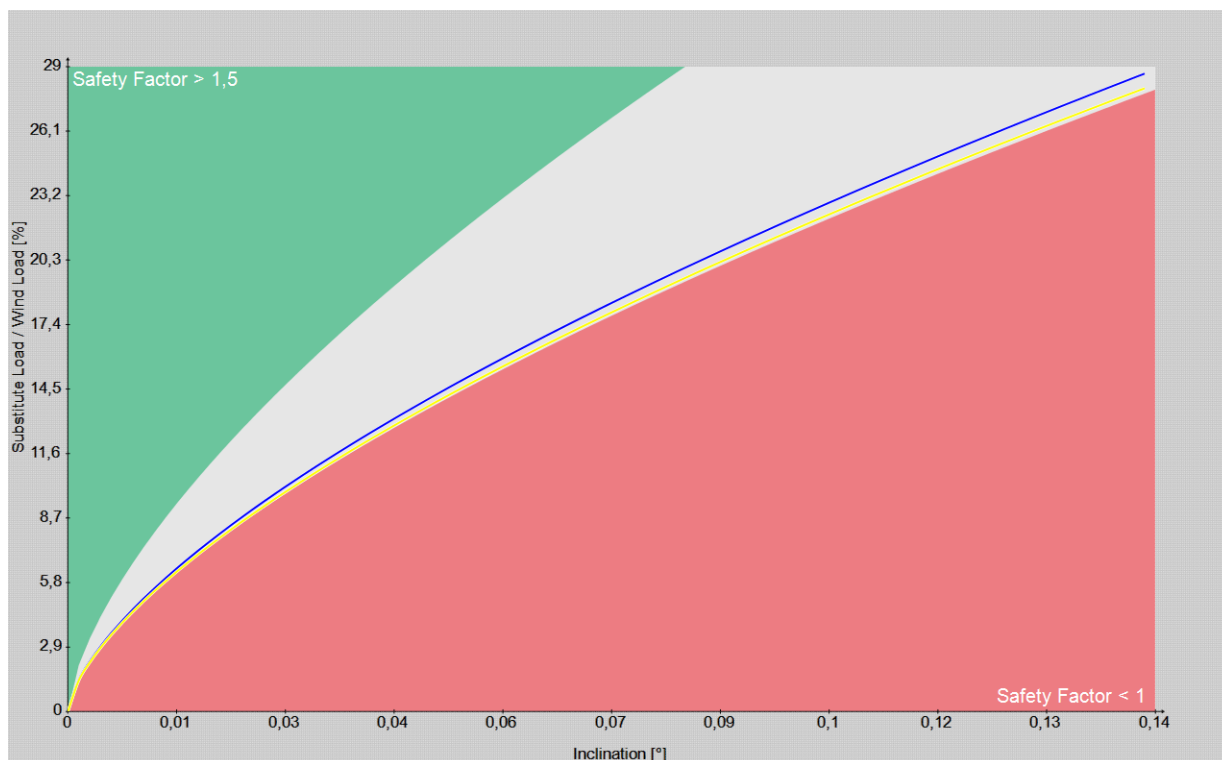
Tree Data

Project	20139	Tree Number	181323
Tree Species	Tillia	Date	9-1-2024

Setup Pulling Test

Height of the Stem Anchor	6 m	Measurement No.	1
Rope Angle	0,9 °	Load Direction	Oost

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



Inclinometer Measurement	80	81
Position	90x	270x

Tipping Stability (based on Generalized Tipping Curve)

Safety Factor	1,03	1,01
---------------	------	------

Control Value	in		
Standard Deviation	%	1,13	1,18
Substitue Load	%	28,6	28,6
Load Direction at Inclinometer		x-Axis	x-Axis

General for Pull Test

Consultant	Michiel De Temmerman
Witness / Assistant	Zeger Deroose
Measurement Comments	Gilles Voet

Calculated Fracture Stability according to Pull Test

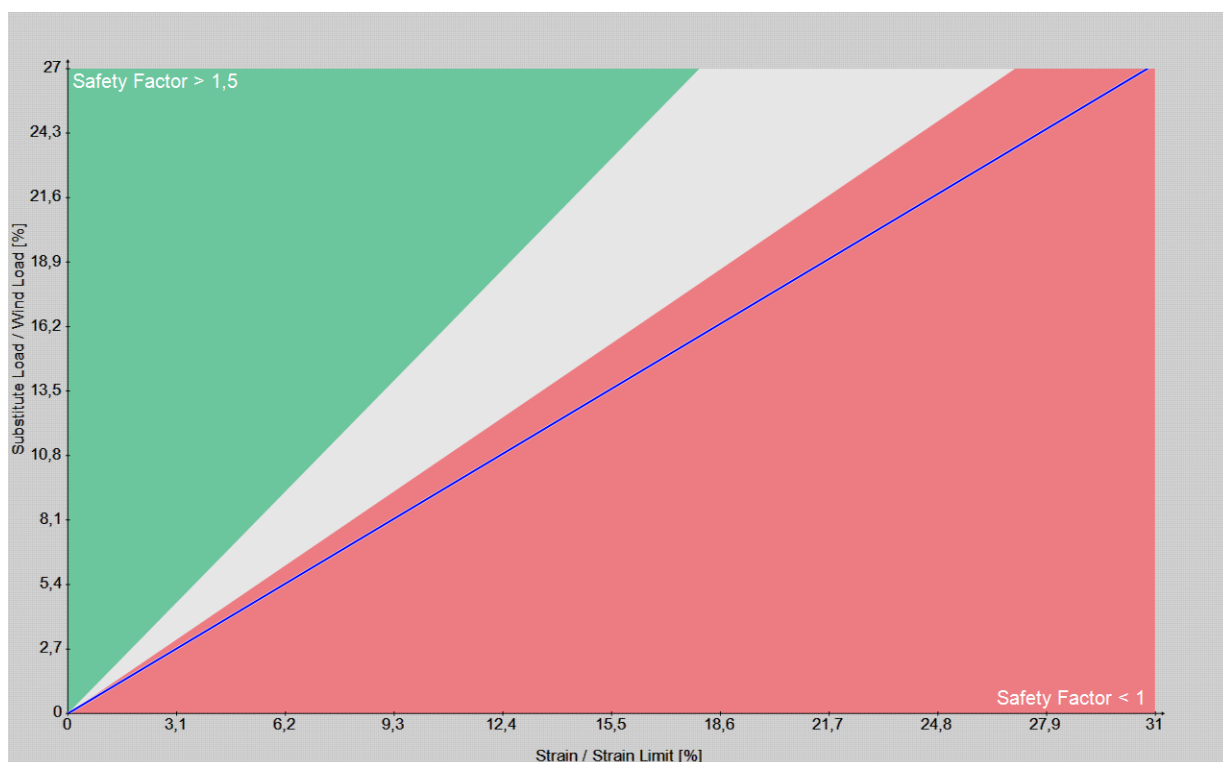
Tree Data

Project	20139	Tree Number	181323
Tree Species	Tillia	Date	9-1-2024

Setup Pulling Test

Height of the Stem Anchor	6 m	Measurement No.	1
Rope Angle	0,9 °	Load Direction	Oost

Graphic Display (test data and best linear fit)



Elastometer Measurement in 90

Measurement Height	m	1
Position		T
Stem Diameter 1	cm	39
Stem Diameter 2	cm	43
Bark Thickness	cm	1
Load part	%	100

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

Safety Factor **0,88**

Control Value

Coefficient of Determination R ²		0,9964
Residual Stiffness	%	79,7
Degree of Hollowness	%	58,8
Compression originating from		
Dead Weight	%	0,6
Substitute Load	%	26,9

Wind Load Analysis analogous to DIN 1055-4

Tree Number 181330
Arbotag 181330

Project		Site	
Project Name	20139	, Belgium	
Project Number	181334	Altitude a. sea level	4 m
Test Date	9-1-2024		

Tree Data		Applied Material Properties	
Tree Species	Tilia	as for	Tilia cordata
Stem circumference	136 cm	Source	Stuttgart
Stem Diameter	40 cm	Compressive Strength	20 MPa
in 1m height	45 cm	Modulus of Elasticity	8300 MPa
Bark Thickness	1 cm	Limit of Elasticity	0,24 %
Tree Height	11,7 m	Green Density	0,74 g/cm ³

Crown Outline



Load Direction	W
Surface Area Analysis	
Crown Base	6,1 m
Effective Height	9,5 m
Total Surface Area	34 m ²
Crown Eccentricity	0,27 m
Applied Structural Parameters	
Drag Factor	0,3
Natural Frequency	0,4 Hz
Damping Decrement	0,6
Form Factor for Dead Weight	0,8
Applied Site Parameters	
Windzone	BE 4
Speed of Applied	
Design Wind Speed	26 m/s
Air Density	1,29 kg/m ³
Roughness Category	Suburb
Exponent for Wind Profile	0,22
Proximity Factor for Effects in Near Ground Wind Flow	1
Factor for Crown Exposure	0,90

Results

Wind Load Analysis		Tree Static Analysis	
Mean Wind Pressure	2,2 kN	Dead Weight Tree	0,9 t
Gust Reaction Factor	3,05	Critical Degree of Hollowness	82 %
Load Centre	8,1 m	Critical Residual Wall Thickness	4 cm
Torsion Moment	2 kNm	Assuming an Uncompromised Residual Wall	
Design Wind Load	55 kNm	Basic Safety Factor	2,2

General

Comments

Calculated Tipping Stability according to Pull Test

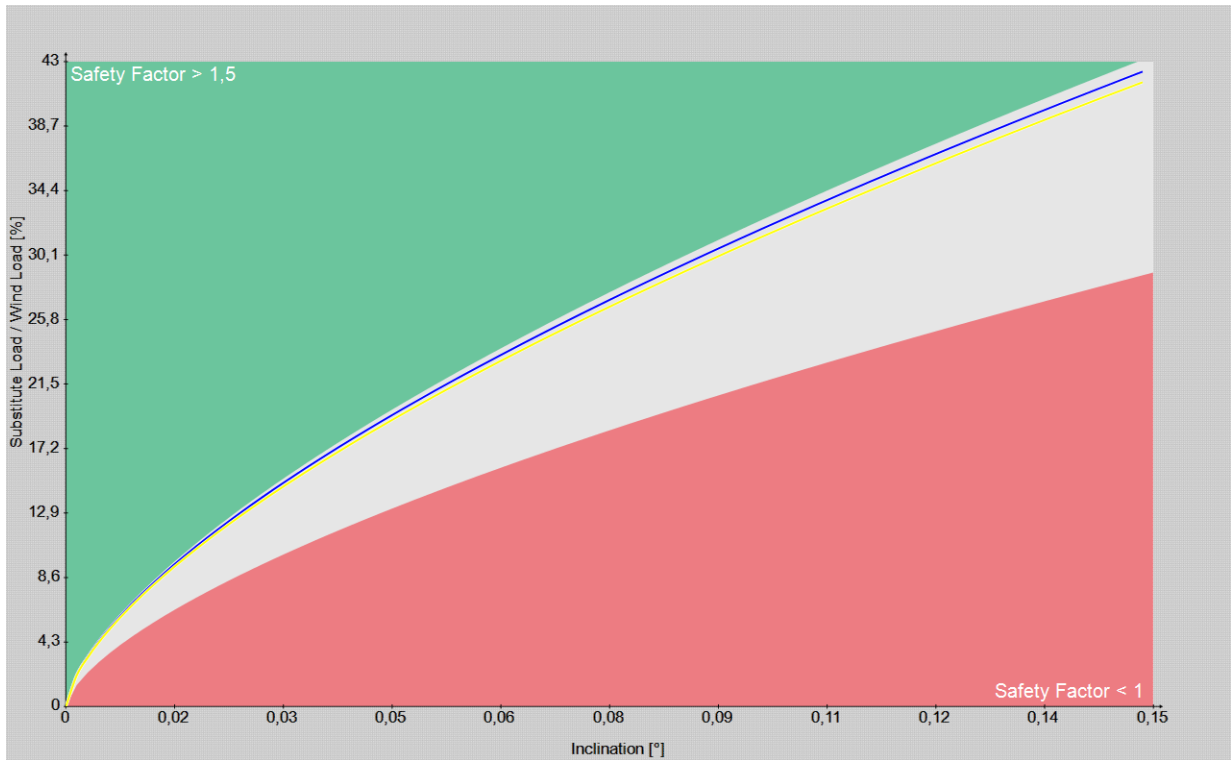
Tree Data

Project	20139	Tree Number	181330
Tree Species	Tilia	Date	9-1-2024

Setup Pulling Test

Height of the Stem Anchor	5,8 m	Measurement No.	2
Rope Angle	1,1 °	Load Direction	W

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



Inclinometer Measurement	80	81
Position	0y	180y

Tipping Stability (based on Generalized Tipping Curve)

Safety Factor	1,47	1,45
---------------	------	------

Control Value	in		
Standard Deviation	%	2,16	2,35
Substitue Load	%	42	42
Load Direction at Inclinometer		y-Axis	y-Axis

General for Pull Test

Consultant	Michiel De Temmerman
Witness / Assistant	Zeger Deroose
	Gilles Voet
Measurement Comments	

Calculated Fracture Stability according to Pull Test

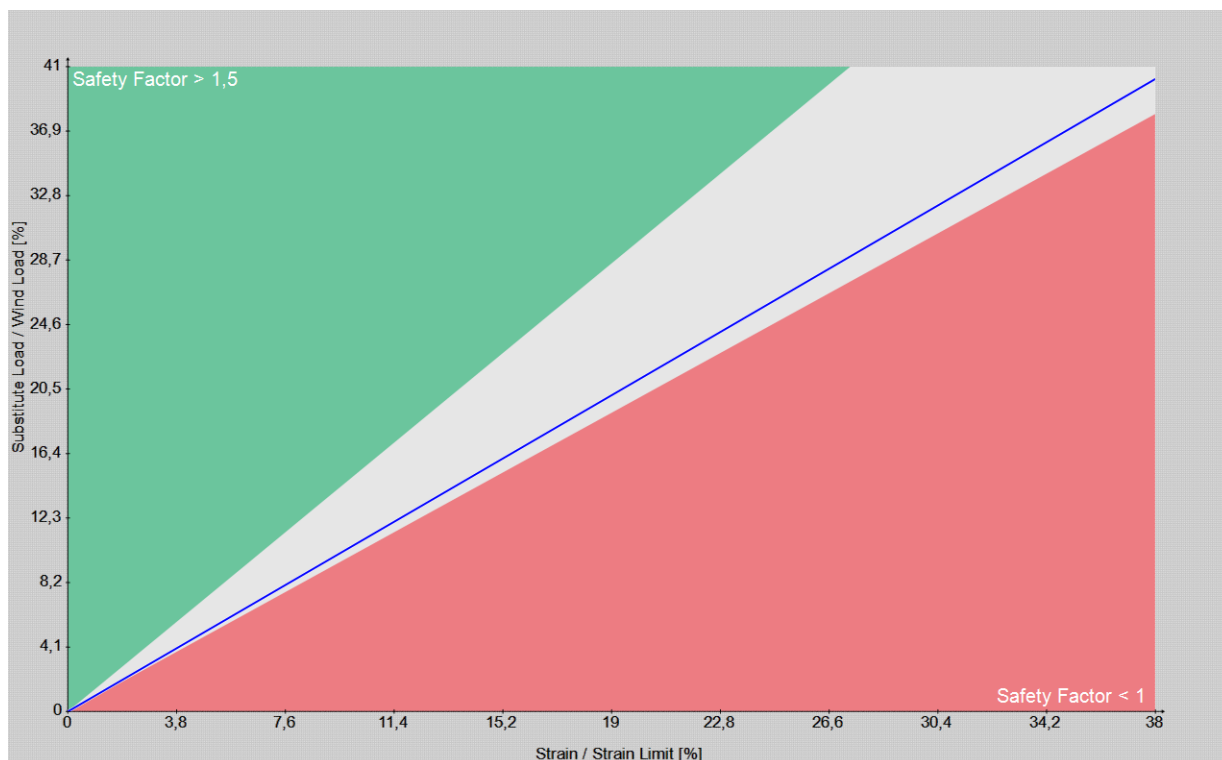
Tree Data

Project	20139	Tree Number	181330
Tree Species	Tilia	Date	9-1-2024

Setup Pulling Test

Height of the Stem Anchor	5,8 m	Measurement No.	2
Rope Angle	1,1 °	Load Direction	W

Graphic Display (test data and best linear fit)



Elastometer Measurement in 90

Measurement Height	m	1
Position		T
Stem Diameter 1	cm	40
Stem Diameter 2	cm	45
Bark Thickness	cm	1
Load part	%	100

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

Safety Factor **1,06**

Control Value

Coefficient of Determination R ²		0,9931
Residual Stiffness	%	42,3
Degree of Hollowness	%	83,3
Compression originating from		
Dead Weight	%	1
Substitute Load	%	40,7

Wind Load Analysis analogous to DIN 1055-4

Tree Number 181332
Arbotag 181332

Project

Project Name 20139
 Project Number 181334
 Test Date 11-1-2024

Site

, Belgium
 Altitude a. sea level 4 m

Tree Data

Tree Species Tilia
 Stem circumference 144 cm
 Stem Diameter || 46 cm
 in 1m height _|_ 45 cm
 Bark Thickness 0 cm
Tree Height 13,1 m

Applied Material Properties

as for Tilia cordata
 Source Stuttgart
 Compressive Strength 20 MPa
 Modulus of Elasticity 8300 MPa
 Limit of Elasticity 0,24 %
 Green Density 0,74 g/cm³

Crown Outline



14 **Load Direction** NW
 13 **Surface Area Analysis**
 12 Crown Base 6,6 m
 11 Effective Height 10,5 m
 10 Total Surface Area 39 m²
 9 Crown Eccentricity 0,29 m
 8 **Applied Structural Parameters**
 7 Drag Factor 0,3
 6 Natural Frequency 0,4 Hz
 5 Damping Decrement 0,6
 4 Form Factor for Dead Weight 0,8
 3 **Applied Site Parameters**
 2 Windzone BE 4
 1 Speed of Applied
 0 Design Wind Speed 26 m/s
 Air Density 1,29 kg/m³
 Roughness Category Suburb
 Exponent for Wind Profile 0,22
 Proximity Factor for Effects
 in Near Ground Wind Flow 1
 Factor for Crown Exposure 0,80

Results

Wind Load Analysis
 Mean Wind Pressure 2,4 kN
 Gust Reaction Factor 3
 Load Centre 8,9 m
 Torsion Moment 2 kNm

Tree Static Analysis
 Dead Weight Tree 1,3 t
 Critical Degree of Hollowness 87 %
 Critical Residual Wall Thickness 3 cm
 Assuming an Uncompromised Residual Wall

Design Wind Load 64 kNm **Basic Safety Factor** 2,9

General

Comments

Calculated Tipping Stability according to Pull Test

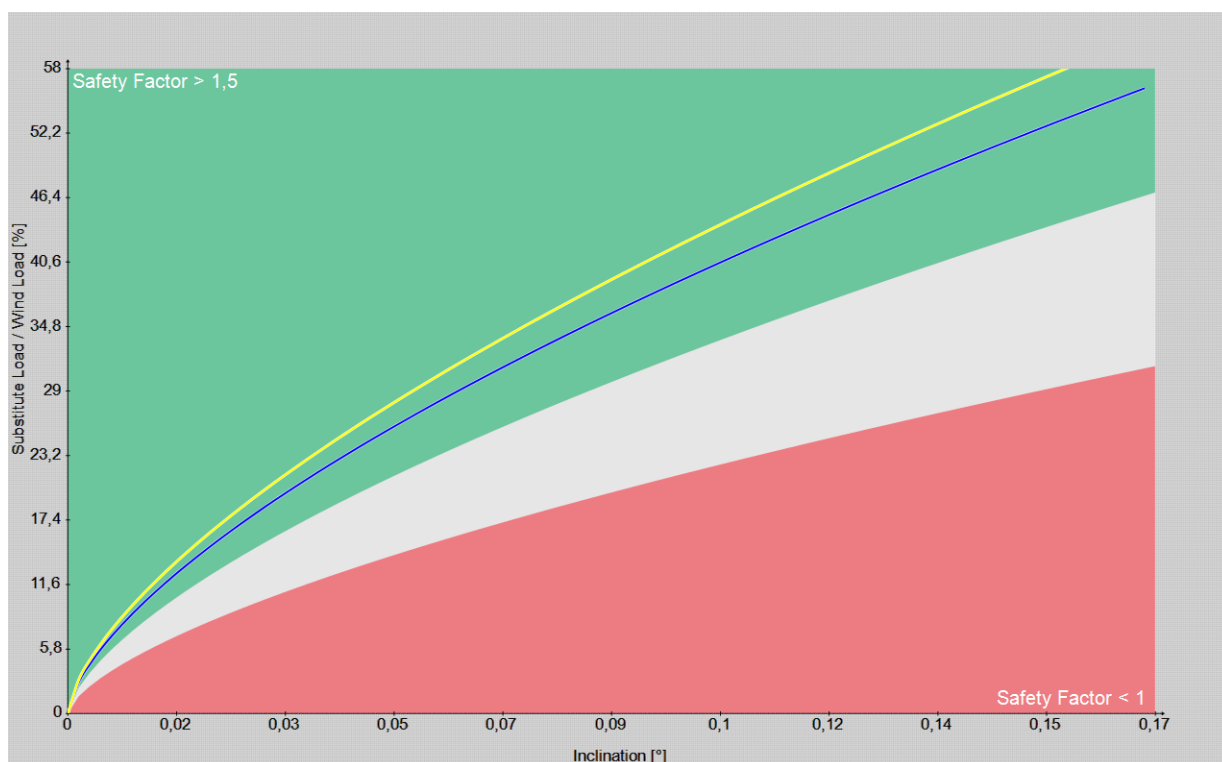
Tree Data

Project	20139	Tree Number	181332
Tree Species	Tillia	Date	11-1-2024

Setup Pulling Test

Height of the Stem Anchor	7,2 m	Measurement No.	1
Rope Angle	9 °	Load Direction	NW

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



Inclinometer Measurement	80	81
Position	90x	270y

Tipping Stability (based on Generalized Tipping Curve)

Safety Factor	1,81	1,96
---------------	------	------

Control Value

	in		
Standard Deviation	%	1,59	1,42
Substitue Load	%	57,1	57,1
Load Direction at Inclinometer		x-Axis	x-Axis

General for Pull Test

Consultant	Michiel De Temmerman
Witness / Assistant	Zeger Deroose
Measurement Comments	Gilles Voet

Calculated Fracture Stability according to Pull Test

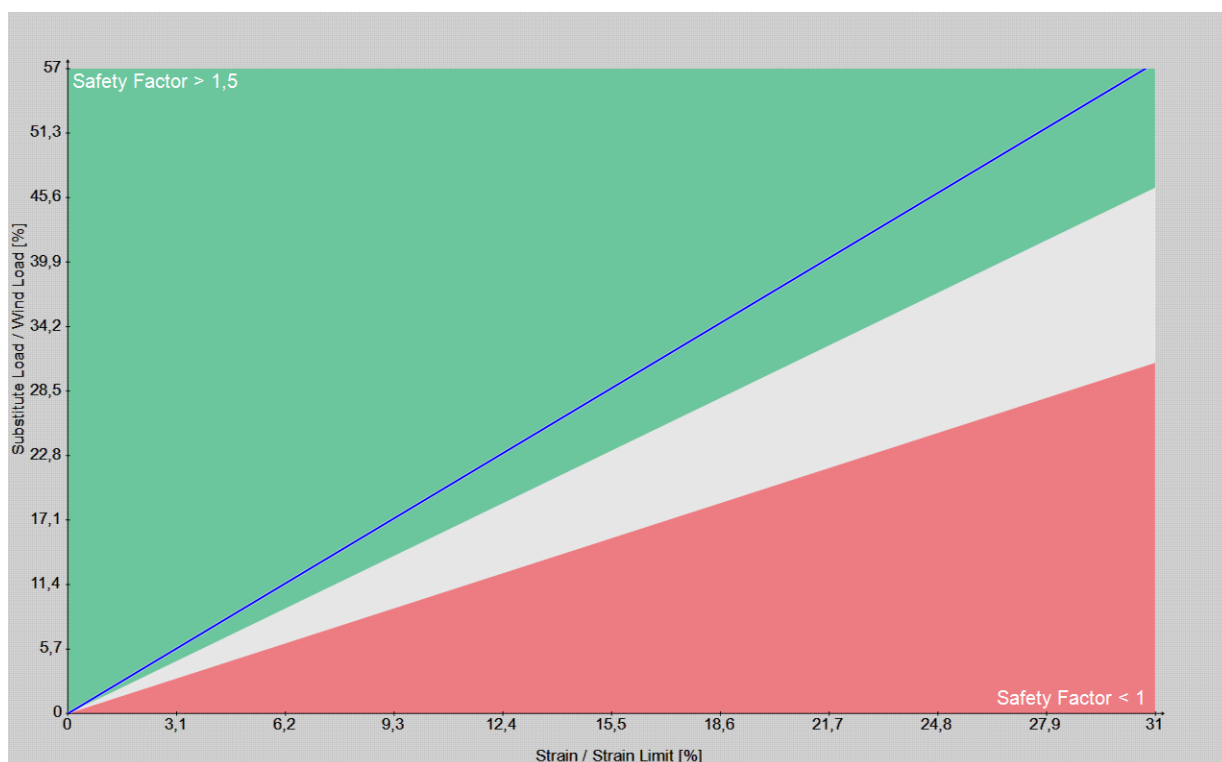
Tree Data

Project	20139	Tree Number	181332
Tree Species	Tillia	Date	11-1-2024

Setup Pulling Test

Height of the Stem Anchor	7,2 m	Measurement No.	1
Rope Angle	9 °	Load Direction	NW

Graphic Display (test data and best linear fit)



Elastometer Measurement in 90

Measurement Height	m	1
Position		T
Stem Diameter 1	cm	46
Stem Diameter 2	cm	46
Bark Thickness	cm	1
Load part	%	100

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

Safety Factor **1,86**

Control Value

Coefficient of Determination R ²		0,9956
Residual Stiffness	%	63,4
Degree of Hollowness	%	71,6
Compression originating from		
Dead Weight	%	0,8
Substitute Load	%	56,6

Wind Load Analysis analogous to DIN 1055-4

Tree Number 181334
Arbotag 181334

Project

Project Name 20139
 Project Number 181334
 Test Date 9-1-2024

Site

Koolkerksesteenweg
 8000 Brugge, Belgium
 Altitude a. sea level 4 m

Tree Data

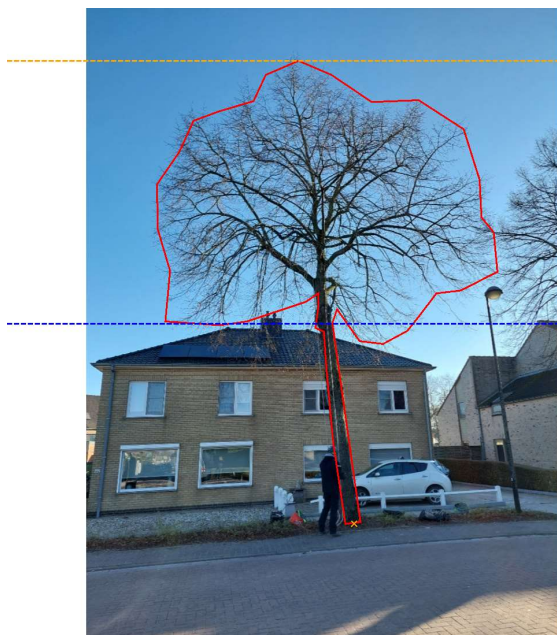
Tree Species Tilia
 Stem circumference 152 cm
 Stem Diameter 49 cm
 in 1m height 43 cm
 Bark Thickness 1 cm
Tree Height 13,2 m



Applied Material Properties

as for Tilia cordata
 Source Stuttgart
 Compressive Strength 20 MPa
 Modulus of Elasticity 8300 MPa
 Limit of Elasticity 0,24 %
 Green Density 0,74 g/cm³

Crown Outline



14 **Load Direction** NW
 13 **Surface Area Analysis**
 12 Crown Base 5,7 m
 11 Effective Height 10,2 m
 10 Total Surface Area 58 m²
 9 Crown Eccentricity 0,92 m
 8 **Applied Structural Parameters**
 7 Drag Factor 0,3
 6 Natural Frequency 0,4 Hz
 5 Damping Decrement 0,6
 4 Form Factor for Dead Weight 0,8
 3 **Applied Site Parameters**
 2 Windzone BE 4
 1 Speed of Applied
 0 Design Wind Speed 26 m/s
 Air Density 1,29 kg/m³
 Roughness Category Suburb
 Exponent for Wind Profile 0,22
 Proximity Factor for Effects
 in Near Ground Wind Flow 1
 Factor for Crown Exposure 0,90

Results

Wind Load Analysis

Mean Wind Pressure 4 kN
 Gust Reaction Factor 2,93
 Load Centre 8,9 m
 Torsion Moment 11 kNm

Tree Static Analysis

Dead Weight Tree 1,2 t
 Critical Degree of Hollowness 74 %
 Critical Residual Wall Thickness 6 cm
 Assuming an Uncompromised Residual Wall

Design Wind Load 104 kNm

Basic Safety Factor 1,7

General

Comments hercontrole

Calculated Tipping Stability according to Pull Test

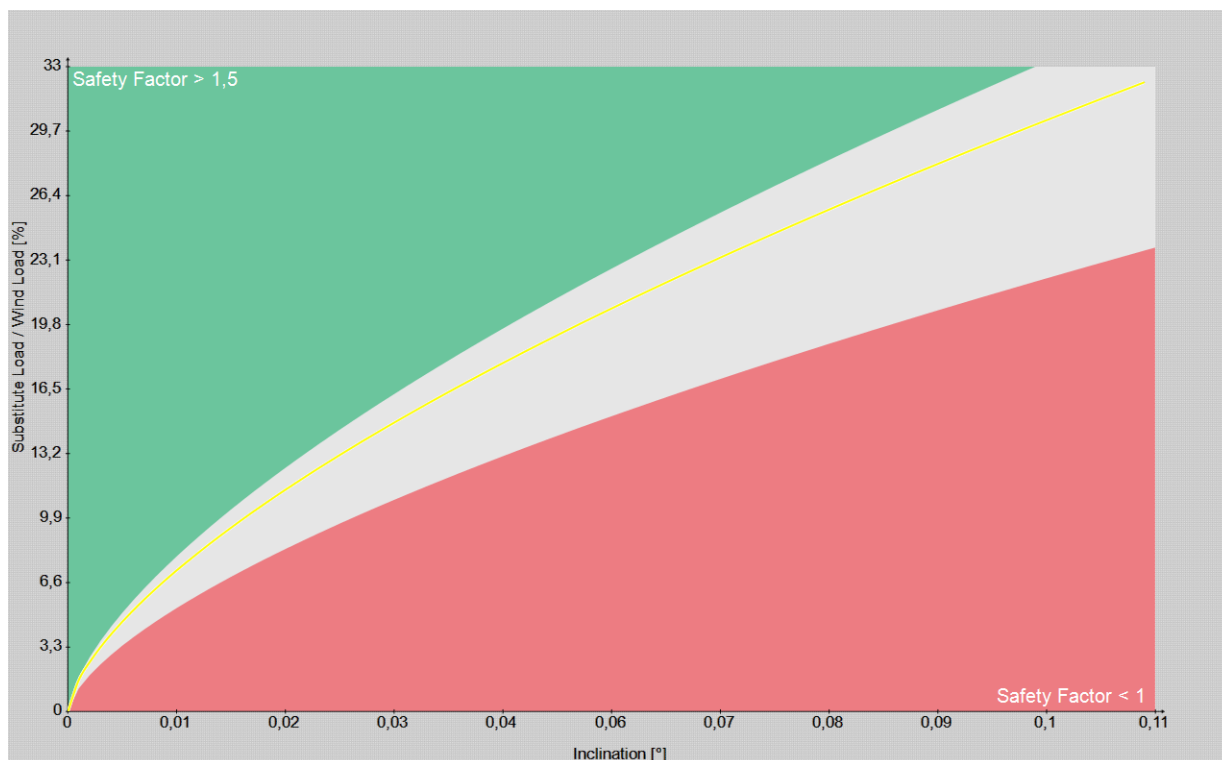
Tree Data

Project	20139	Tree Number	181334
Tree Species	Tilia	Date	9-1-2024

Setup Pulling Test

Height of the Stem Anchor	6,3 m	Measurement No.	1813341
Rope Angle	12,5 °	Load Direction	NW

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



Inclinometer Measurement	80	81
Position	90x	270x

Tipping Stability (based on Generalized Tipping Curve)

Safety Factor	1,37	1,37
---------------	------	------

Control Value	in		
Standard Deviation	%	2,62	2,51
Substitue Load	%	32,6	32,6
Load Direction at Inclinometer		x-Axis	x-Axis

General for Pull Test

Consultant	Michiel De Temmerman
Witness / Assistant	Zeger Derosé
Measurement Comments	

Calculated Fracture Stability according to Pull Test

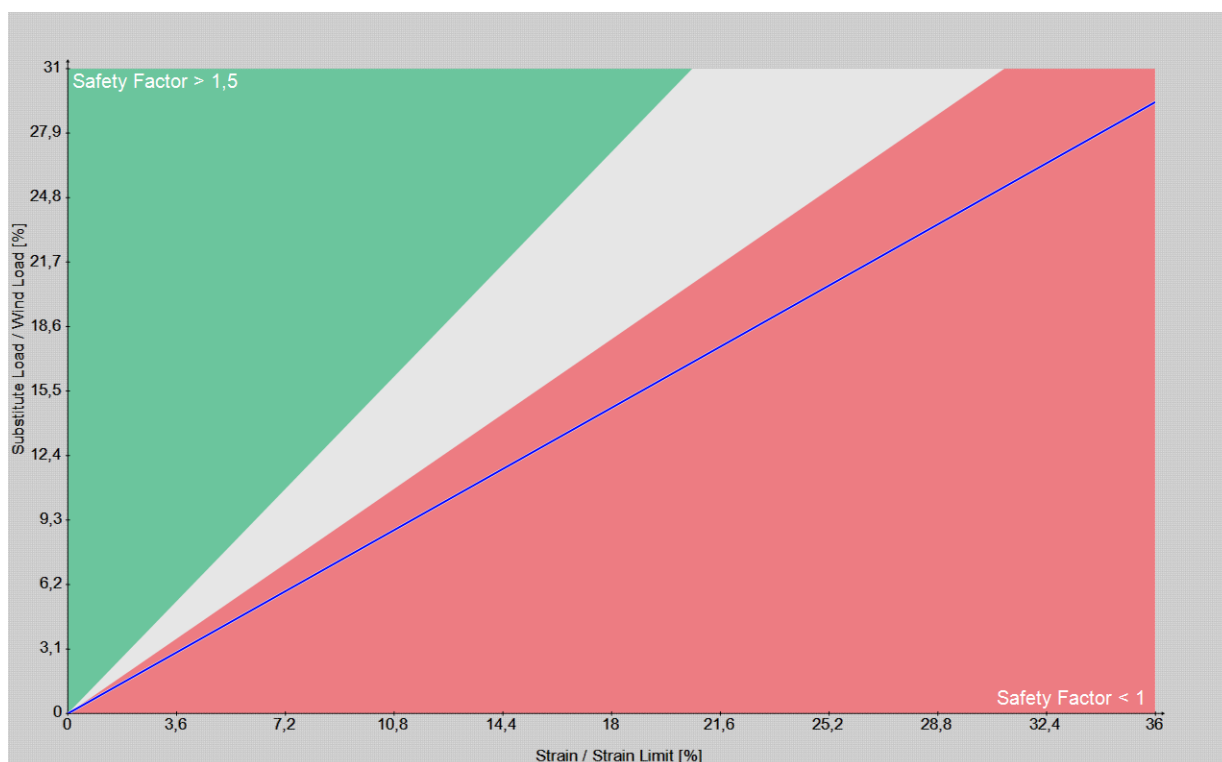
Tree Data

Project	20139	Tree Number	181334
Tree Species	Tilia	Date	9-1-2024

Setup Pulling Test

Height of the Stem Anchor	6,3 m	Measurement No.	1813341
Rope Angle	12,5 °	Load Direction	NW

Graphic Display (test data and best linear fit)



Elastometer Measurement in 90

Measurement Height	m	1
Position		
Stem Diameter 1	cm	49
Stem Diameter 2	cm	43
Bark Thickness	cm	1
Load part	%	100

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

Safety Factor **0,82**

Control Value

Coefficient of Determination R ²	0,983
Residual Stiffness	% 43
Degree of Hollowness	% 82,9
Compression originating from	
Dead Weight	% 1,1
Substitute Load	% 30,9

Wind Load Analysis analogous to DIN 1055-4

Tree Number 181335
Arbotag 181335

Project

Project Name 20139
 Project Number 181334
 Test Date 11-1-2024

Site

Koolkerksesteenweg
 8000 Brugge, Belgium
 Altitude a. sea level 4 m

Tree Data

Tree Species Tilia
 Stem circumference 165 cm
 Stem Diameter || 49 cm
 in 1m height ⊥ 47 cm
 Bark Thickness 1 cm
Tree Height 13,1 m

Applied Material Properties

as for Tilia cordata
 Source Stuttgart
 Compressive Strength 20 MPa
 Modulus of Elasticity 8300 MPa
 Limit of Elasticity 0,24 %
 Green Density 0,74 g/cm³

Crown Outline



Load Direction w

Surface Area Analysis

Crown Base 5,4 m
 Effective Height 10 m
 Total Surface Area 62 m²
 Crown Eccentricity 0,44 m

Applied Structural Parameters

Drag Factor 0,3
 Natural Frequency 0,4 Hz
 Damping Decrement 0,6
 Form Factor for Dead Weight 0,8

Applied Site Parameters

Windzone BE 4
 Speed of Applied
 Design Wind Speed 26 m/s
 Air Density 1,29 kg/m³
 Roughness Category Suburb
 Exponent for Wind Profile 0,22
 Proximity Factor for Effects in Near Ground Wind Flow 1
 Factor for Crown Exposure 0,90

Results

Wind Load Analysis

Mean Wind Pressure 4,2 kN
 Gust Reaction Factor 2,93
 Load Centre 8,6 m
 Torsion Moment 5 kNm

Tree Static Analysis

Dead Weight Tree 1,3 t
 Critical Degree of Hollowness 76 %
 Critical Residual Wall Thickness 6 cm
 Assuming an Uncompromised Residual Wall

Design Wind Load 106 kNm

Basic Safety Factor 1,8

General

Comments

Calculated Tipping Stability according to Pull Test

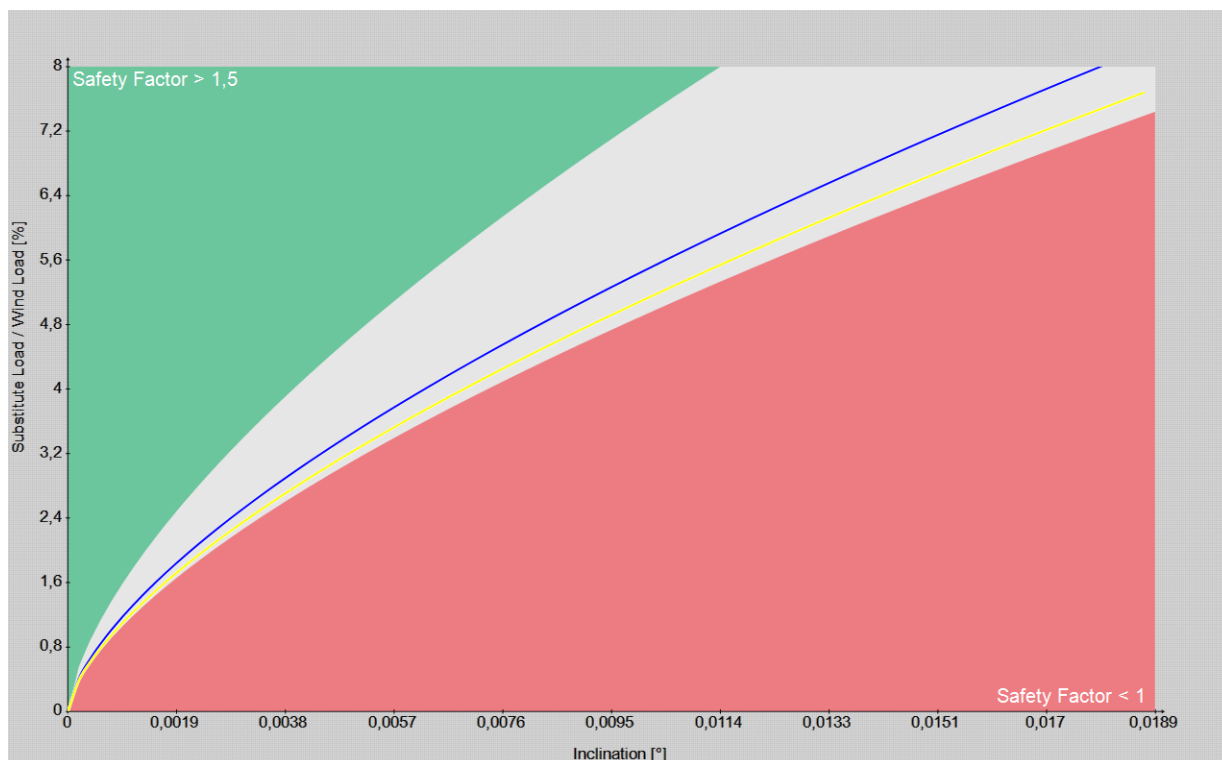
Tree Data

Project	20139	Tree Number	181335
Tree Species	Tilia	Date	11-1-2024

Setup Pulling Test

Height of the Stem Anchor	5,7 m	Measurement No.	1
Rope Angle	0,3 °	Load Direction	w

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



Inclinometer Measurement	80	81
Position	90x	270x

Tipping Stability (based on Generalized Tipping Curve)

Safety Factor	1,11	1,04
---------------	------	------

Control Value	in		
Standard Deviation	%	1,27	1,64
Substitue Load	%	7,2	7,2
Load Direction at Inclinometer		x-Axis	x-Axis

General for Pull Test

Consultant	Michiel De Temmerman
Witness / Assistant	Zeger Deroose
Measurement Comments	Gilles voet

Calculated Fracture Stability according to Pull Test

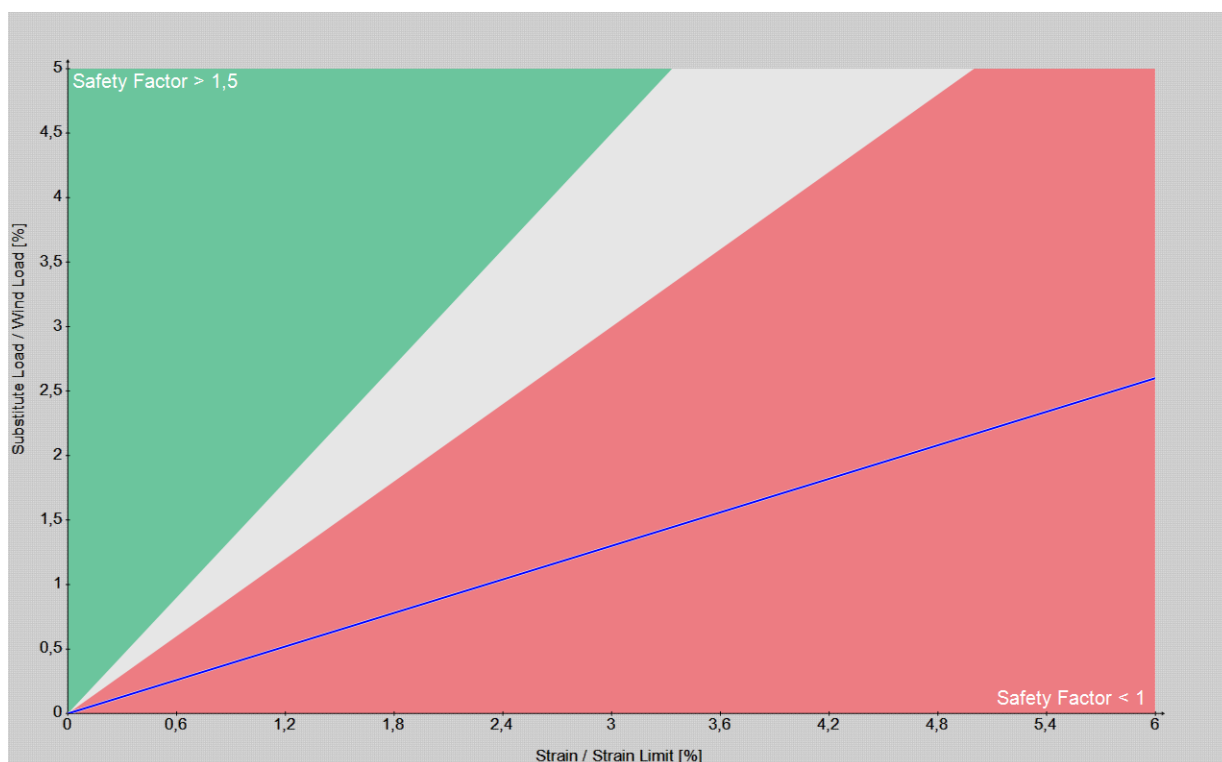
Tree Data

Project	20139	Tree Number	181335
Tree Species	Tilia	Date	11-1-2024

Setup Pulling Test

Height of the Stem Anchor	5,7 m	Measurement No.	1
Rope Angle	0,3 °	Load Direction	w

Graphic Display (test data and best linear fit)



Elastometer Measurement in 90

Measurement Height	m	1
Position		T
Stem Diameter 1	cm	43
Stem Diameter 2	cm	47
Bark Thickness	cm	1
Load part	%	100

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

Safety Factor	0,43
---------------	------

Control Value

Coefficient of Determination R ²	0,1636
Residual Stiffness	% 28
Degree of Hollowness	% 89,6
Compression originating from	
Dead Weight	% 2
Substitute Load	% 4,3

Wind Load Analysis analogous to DIN 1055-4

Tree Number 181337
Arbotag 181337

Project

Project Name 20139
 Project Number 181334
 Test Date 9-1-2024

Site

, Belgium
 Altitude a. sea level 4 m

Tree Data

Tree Species Tilia
 Stem circumference 84 cm
 Stem Diameter || 26 cm
 in 1m height _|_ 23 cm
 Bark Thickness 1 cm
Tree Height 10,1 m

Applied Material Properties

as for Tilia cordata
 Source Stuttgart
 Compressive Strength 20 MPa
 Modulus of Elasticity 8300 MPa
 Limit of Elasticity 0,24 %
 Green Density 0,74 g/cm³

Crown Outline



Load Direction NW

Surface Area Analysis

Crown Base 4,9 m
 Effective Height 8 m
 Total Surface Area 23 m²
 Crown Eccentricity 0,55 m

Applied Structural Parameters

Drag Factor 0,25
 Natural Frequency 0,34 Hz
 Damping Decrement 0,65
 Form Factor for Dead Weight 0,8

Applied Site Parameters

Windzone BE 4
 Speed of Applied
 Design Wind Speed 26 m/s
 Air Density 1,29 kg/m³
 Roughness Category Suburb
 Exponent for Wind Profile 0,22
 Proximity Factor for Effects in Near Ground Wind Flow 1
 Factor for Crown Exposure 0,80

Results

Wind Load Analysis

Mean Wind Pressure 1,1 kN
 Gust Reaction Factor 3,2
 Load Centre 7,2 m
 Torsion Moment 2 kNm

Tree Static Analysis

Dead Weight Tree 0,2 t
 Critical Degree of Hollowness 0 %
 Critical Residual Wall Thickness 0 cm
 Assuming an Uncompromised Residual Wall

Design Wind Load 25 kNm

Basic Safety Factor 0,9

General

Comments

Calculated Tipping Stability according to Pull Test

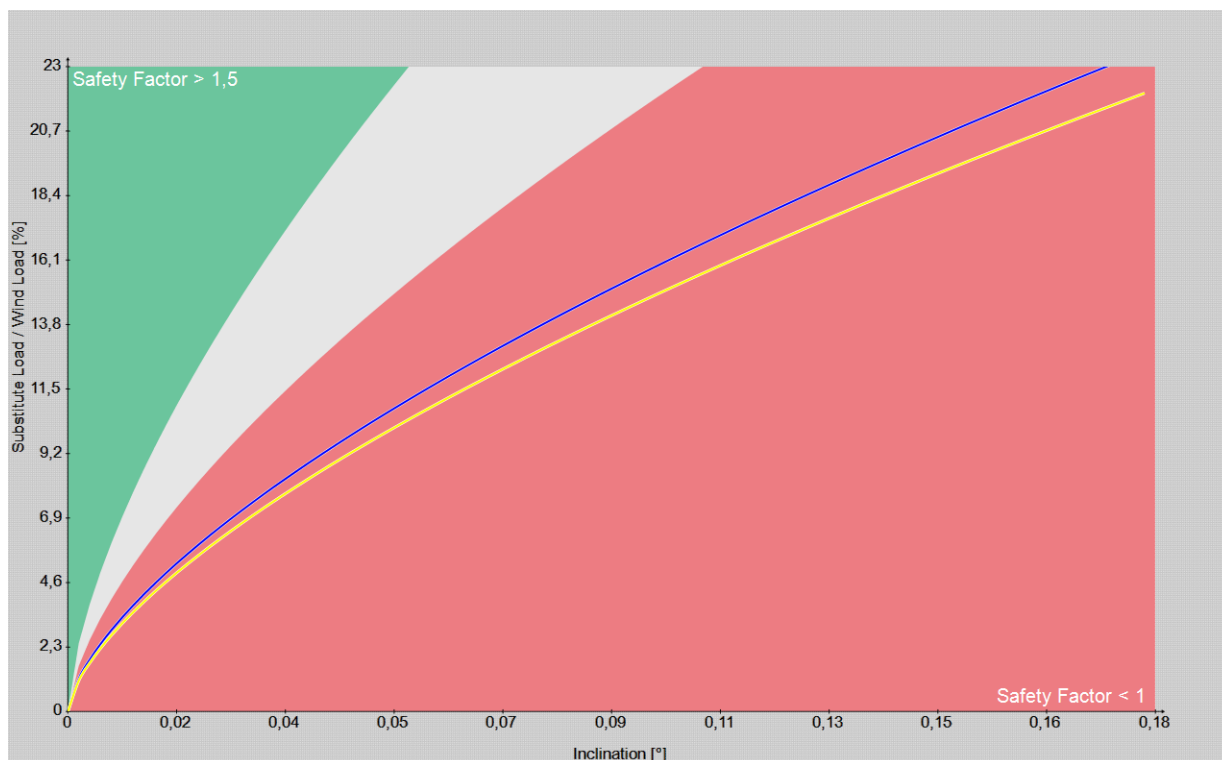
Tree Data

Project	20139	Tree Number	181337
Tree Species	Tilia	Date	9-1-2024

Setup Pulling Test

Height of the Stem Anchor	4,9 m	Measurement No.	2
Rope Angle	6,2 °	Load Direction	NW

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



Inclinometer Measurement	80	81
Position	90x	270X

Tipping Stability (based on Generalized Tipping Curve)

Safety Factor	0,73	0,68
---------------	------	------

Control Value	in		
Standard Deviation	%	1,19	1,52
Substitue Load	%	22,1	22,1
Load Direction at Inclinometer		x-Axis	x-Axis

General for Pull Test

Consultant	Michiel De Temmerman
Witness / Assistant	Zeger Deroose
Measurement Comments	Gilles Voet

Calculated Fracture Stability according to Pull Test

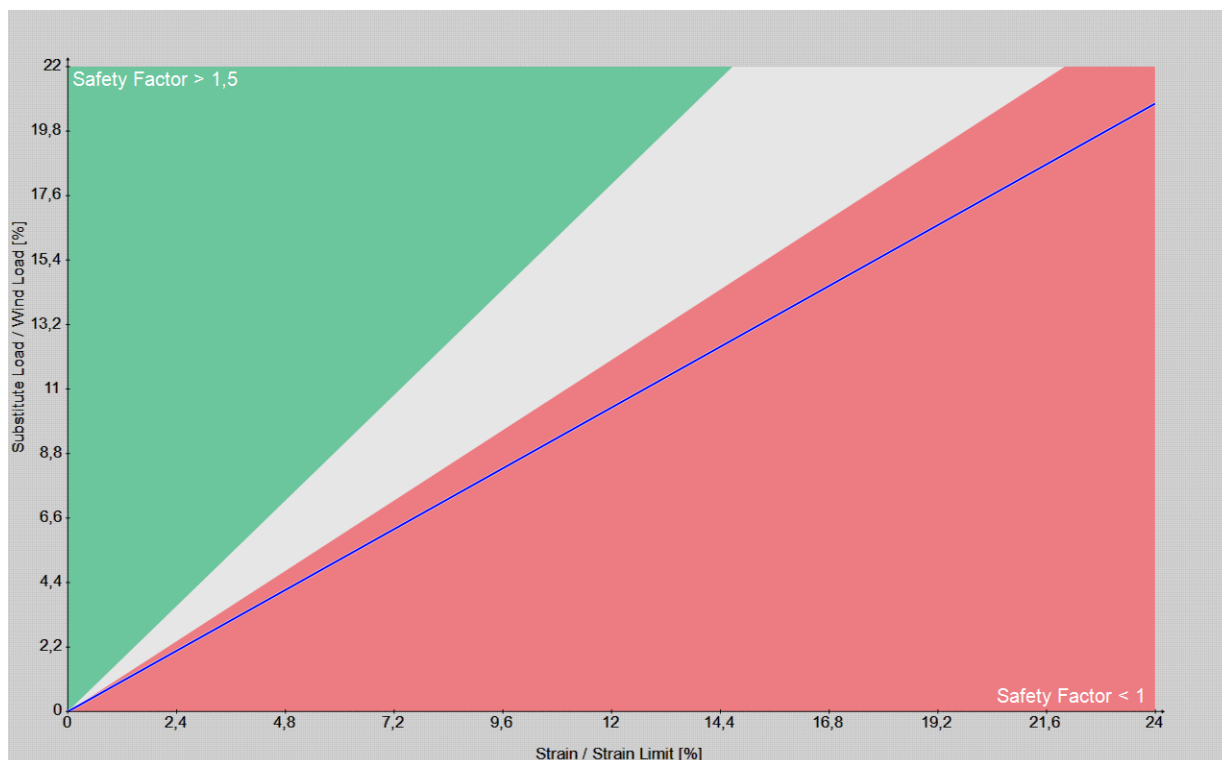
Tree Data

Project	20139	Tree Number	181337
Tree Species	Tilia	Date	9-1-2024

Setup Pulling Test

Height of the Stem Anchor	4,9 m	Measurement No.	2
Rope Angle	6,2 °	Load Direction	NW

Graphic Display (test data and best linear fit)



Elastometer Measurement in 90

Measurement Height	m	1
Position		T
Stem Diameter 1	cm	26
Stem Diameter 2	cm	23
Bark Thickness	cm	1
Load part	%	100

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

Safety Factor **0,86**

Control Value

Coefficient of Determination R ²		0,9878
Residual Stiffness	%	80
Degree of Hollowness	%	58,5
Compression originating from		
Dead Weight	%	0,4
Substitute Load	%	21,5

Wind Load Analysis analogous to DIN 1055-4

Tree Number 181351
Arbotag 181351

Project

Project Name 20139
 Project Number 181334
 Test Date 11-1-2024

Site

, Belgium
 Altitude a. sea level 4 m

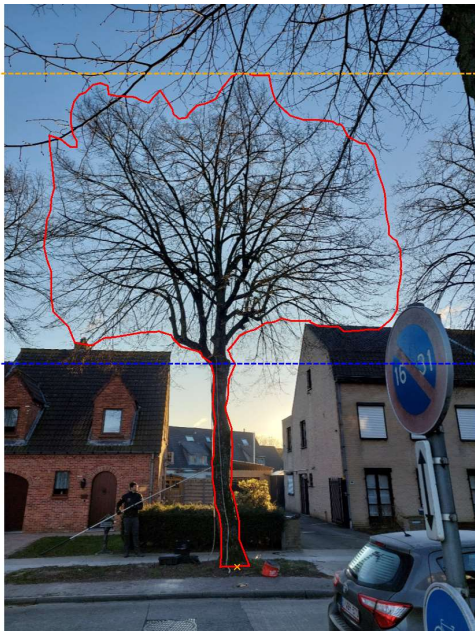
Tree Data

Tree Species Tilia
 Stem circumference 153 cm
 Stem Diameter || 52 cm
 in 1m height _|_ 46 cm
 Bark Thickness 1 cm
Tree Height 13,6 m

Applied Material Properties

as for Tilia cordata
 Source Stuttgart
 Compressive Strength 20 MPa
 Modulus of Elasticity 8300 MPa
 Limit of Elasticity 0,24 %
 Green Density 0,74 g/cm³

Crown Outline



Load Direction NW

Surface Area Analysis

Crown Base 5,6 m
 Effective Height 10,4 m
 Total Surface Area 61 m²
 Crown Eccentricity 0,62 m

Applied Structural Parameters

Drag Factor 0,3
 Natural Frequency 0,4 Hz
 Damping Decrement 0,6
 Form Factor for Dead Weight 0,8

Applied Site Parameters

Windzone BE 4
 Speed of Applied
 Design Wind Speed 26 m/s
 Air Density 1,29 kg/m³
 Roughness Category Suburb
 Exponent for Wind Profile 0,22
 Proximity Factor for Effects in Near Ground Wind Flow 1
 Factor for Crown Exposure 0,80

Results

Wind Load Analysis

Mean Wind Pressure 3,7 kN
 Gust Reaction Factor 2,91
 Load Centre 9,4 m
 Torsion Moment 7 kNm

Tree Static Analysis

Dead Weight Tree 1,4 t
 Critical Degree of Hollowness 81 %
 Critical Residual Wall Thickness 5 cm
 Assuming an Uncompromised Residual Wall

Design Wind Load 102 kNm

Basic Safety Factor 2,1

General

Comments

Calculated Tipping Stability according to Pull Test

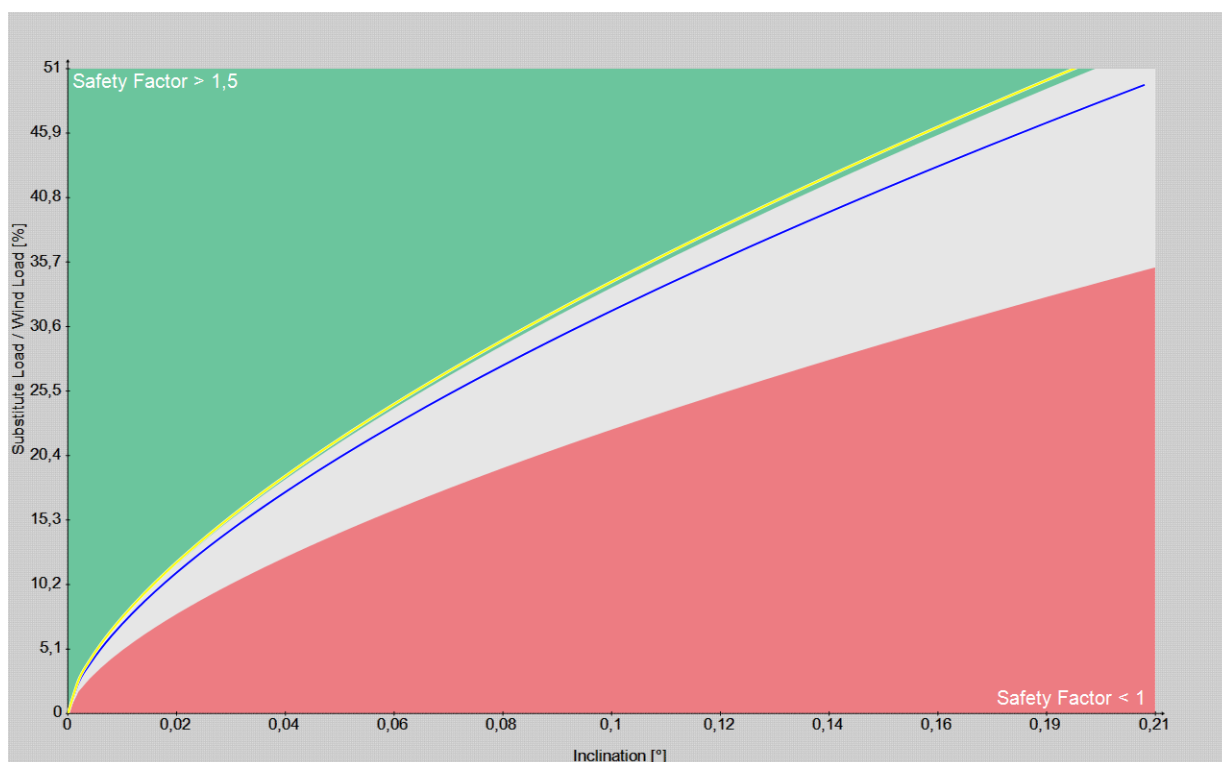
Tree Data

Project	20139	Tree Number	181351
Tree Species	Tilia	Date	11-1-2024

Setup Pulling Test

Height of the Stem Anchor	5 m	Measurement No.	2
Rope Angle	1,6 °	Load Direction	NW

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



Inclinometer Measurement	80	81
Position	0y	180y

Tipping Stability (based on Generalized Tipping Curve)

Safety Factor	1,42	1,52
---------------	------	------

Control Value	in		
Standard Deviation	%	2,64	2,71
Substitue Load	%	50,1	50,1
Load Direction at Inclinometer		y-Axis	y-Axis

General for Pull Test

Consultant	Michiel De Temmerman
Witness / Assistant	Zeger Deroose
Measurement Comments	Gilles Voet

Calculated Fracture Stability according to Pull Test

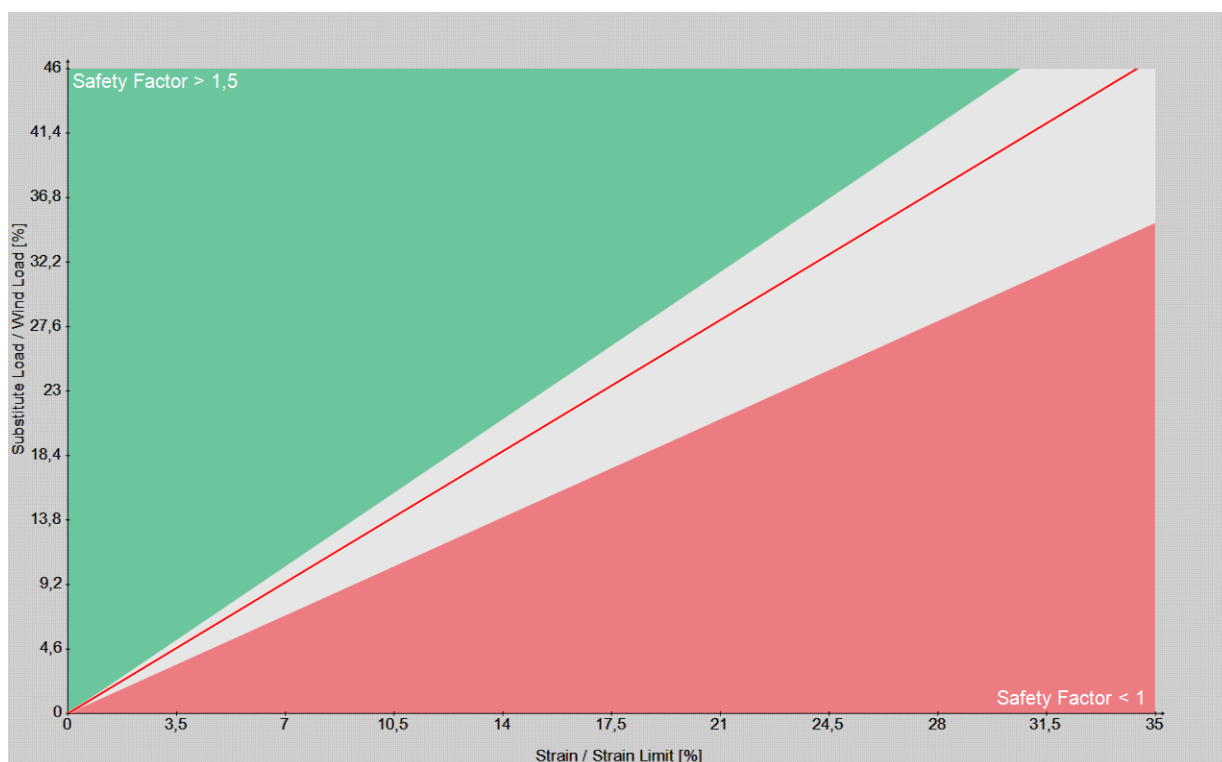
Tree Data

Project	20139	Tree Number	181351
Tree Species	Tilia	Date	11-1-2024

Setup Pulling Test

Height of the Stem Anchor	5 m	Measurement No.	2
Rope Angle	1,6 °	Load Direction	NW

Graphic Display (test data and best linear fit)



Elastometer Measurement in 91

Measurement Height	m	1
Position		
Stem Diameter 1	cm	52
Stem Diameter 2	cm	46
Bark Thickness	cm	1
Load part	%	100

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

Safety Factor **1,34**

Control Value

Coefficient of Determination R ²	0,9968
Residual Stiffness	% 57,1
Degree of Hollowness	% 75,4
Compression originating from	
Dead Weight	% 0,8
Substitute Load	% 45,7

Wind Load Analysis analogous to DIN 1055-4

Tree Number 181354
Arbotag 181354

Project

Project Name 20139
 Project Number 181334
 Test Date 11-1-2024

Site

, Belgium
 Altitude a. sea level 4 m

Tree Data

Tree Species Tilia
 Stem circumference 140 cm
 Stem Diameter || 45 cm
 in 1m height _|_ 41 cm
 Bark Thickness 1 cm
Tree Height 14,5 m

Applied Material Properties

as for Tilia cordata
 Source Stuttgart
 Compressive Strength 20 MPa
 Modulus of Elasticity 8300 MPa
 Limit of Elasticity 0,24 %
 Green Density 0,74 g/cm³

Crown Outline



15 **Load Direction** NW
 14 **Surface Area Analysis**
 13 Crown Base 7,2 m
 12 Effective Height 11,6 m
 11 Total Surface Area 54 m²
 10 Crown Eccentricity 0,66 m
 9 **Applied Structural Parameters**
 8 Drag Factor 0,3
 7 Natural Frequency 0,3 Hz
 6 Damping Decrement 0,6
 5 Form Factor for Dead Weight 0,8
 4 **Applied Site Parameters**
 3 Windzone BE 4
 2 Speed of Applied
 1 Design Wind Speed 26 m/s
 0 Air Density 1,29 kg/m³
 Roughness Category Suburb
 Exponent for Wind Profile 0,22
 Proximity Factor for Effects
 in Near Ground Wind Flow 1
 Factor for Crown Exposure 0,80

Results

Wind Load Analysis
 Mean Wind Pressure 3,5 kN
 Gust Reaction Factor 3
 Load Centre 10,4 m
 Torsion Moment 7 kNm

Tree Static Analysis
 Dead Weight Tree 1,1 t
 Critical Degree of Hollowness 61 %
 Critical Residual Wall Thickness 8 cm
 Assuming an Uncompromised Residual Wall

Design Wind Load 108 kNm **Basic Safety Factor** 1,3

General

Comments

Calculated Tipping Stability according to Pull Test

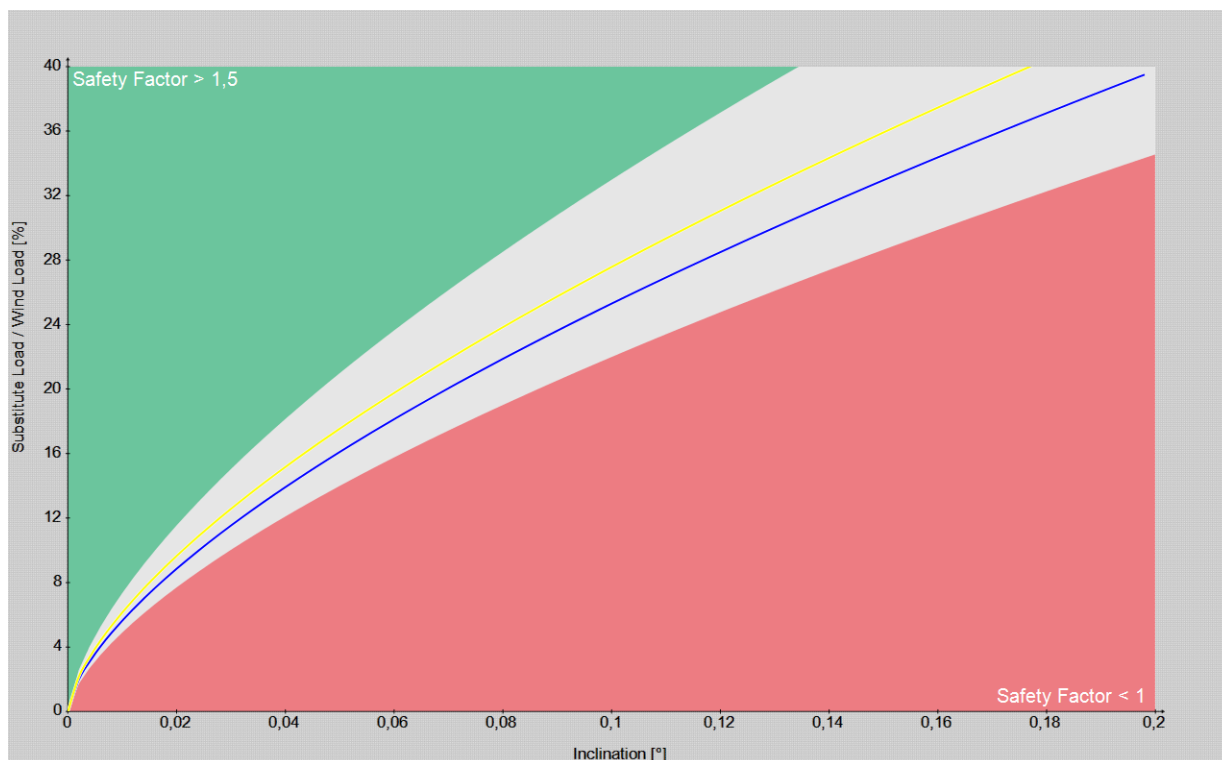
Tree Data

Project	20139	Tree Number	181354
Tree Species	Tilia	Date	11-1-2024

Setup Pulling Test

Height of the Stem Anchor	6,7 m	Measurement No.	1
Rope Angle	2 °	Load Direction	NW

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



Inclinometer Measurement	80	81
Position	90x	270x

Tipping Stability (based on Generalized Tipping Curve)

Safety Factor	1,15	1,25
---------------	------	------

Control Value	in		
Standard Deviation	%	1,42	1,17
Substitue Load	%	39,5	39,5
Load Direction at Inclinometer		x-Axis	x-Axis

General for Pull Test

Consultant	Michiel De Temmerman
Witness / Assistant	Zeger Deroose
Measurement Comments	Gilles Voet

Calculated Fracture Stability according to Pull Test

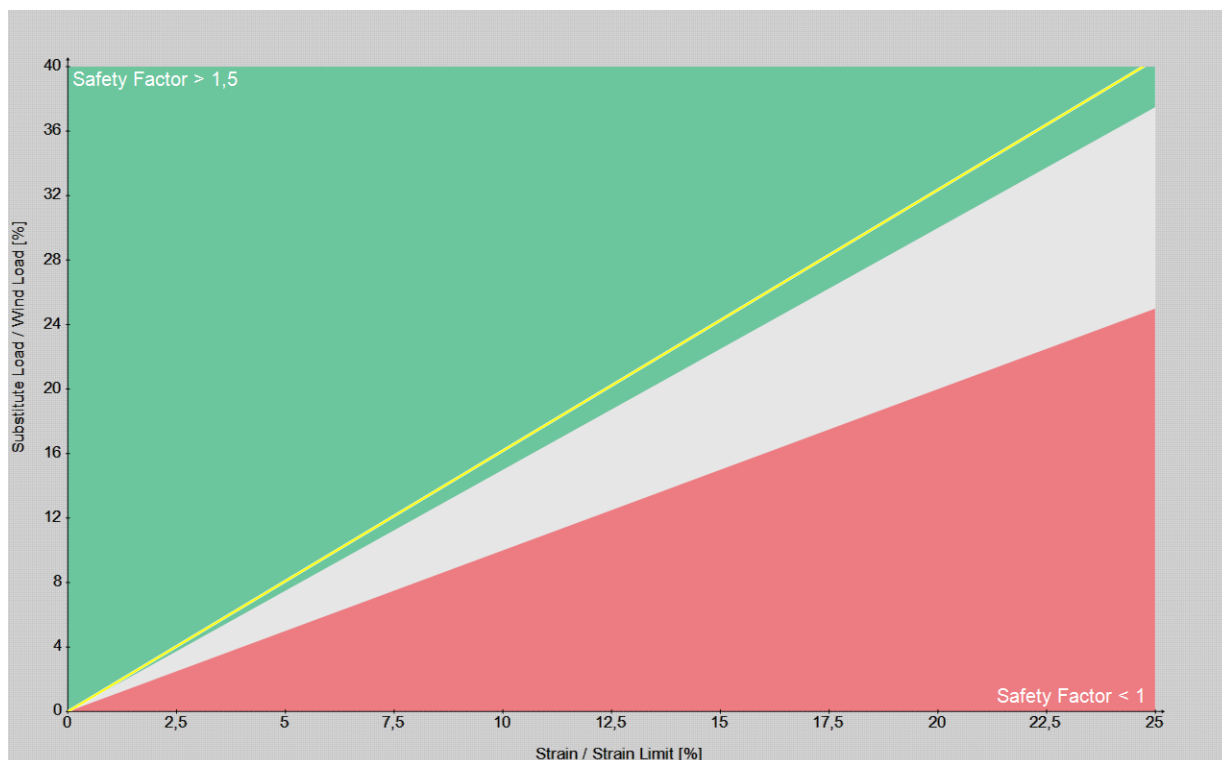
Tree Data

Project	20139	Tree Number	181354
Tree Species	Tilia	Date	11-1-2024

Setup Pulling Test

Height of the Stem Anchor	6,7 m	Measurement No.	1
Rope Angle	2 °	Load Direction	NW

Graphic Display (test data and best linear fit)



Elastometer Measurement in 91

Measurement Height	m	1
Position		T
Stem Diameter 1	cm	45
Stem Diameter 2	cm	41
Bark Thickness	cm	1
Load part	%	100

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

Safety Factor **1,62**

Control Value

Coefficient of Determination R ²		0,9932
Residual Stiffness	%	>100
Degree of Hollowness	%	0
Compression originating from		
Dead Weight	%	0,4
Substitute Load	%	39,2

Wind Load Analysis analogous to DIN 1055-4

Tree Number 181356
Arbotag 181356

Project

Project Name 20139
Project Number 181334
Test Date 11-1-2024

Site

, Belgium
Altitude a. sea level 4 m

Tree Data

Tree Species Tilia
Stem circumference 140 cm
Stem Diameter 46 cm
in 1m height 42 cm
Bark Thickness 1 cm
Tree Height 14 m

Applied Material Properties

as for Tilia cordata
Source Stuttgart
Compressive Strength 20 MPa
Modulus of Elasticity 8300 MPa
Limit of Elasticity 0,24 %
Green Density 0,74 g/cm³

Crown Outline



Load Direction NW

Surface Area Analysis

Crown Base 5 m
Effective Height 10,4 m
Total Surface Area 77 m²
Crown Eccentricity 0,34 m

Applied Structural Parameters

Drag Factor 0,3
Natural Frequency 0,34 Hz
Damping Decrement 0,65
Form Factor for Dead Weight 0,8

Applied Site Parameters

Windzone BE 4
Speed of Applied
Design Wind Speed 26 m/s
Air Density 1,29 kg/m³
Roughness Category Suburb
Exponent for Wind Profile 0,22
Proximity Factor for Effects in Near Ground Wind Flow 1
Factor for Crown Exposure 0,80

Results

Wind Load Analysis

Mean Wind Pressure 4,7 kN
Gust Reaction Factor 2,88
Load Centre 9,2 m
Torsion Moment 5 kNm

Tree Static Analysis

Dead Weight Tree 1,1 t
Critical Degree of Hollowness 55 %
Critical Residual Wall Thickness 10 cm
Assuming an Uncompromised Residual Wall

Design Wind Load 125 kNm

Basic Safety Factor 1,2

General

Comments

Calculated Tipping Stability according to Pull Test

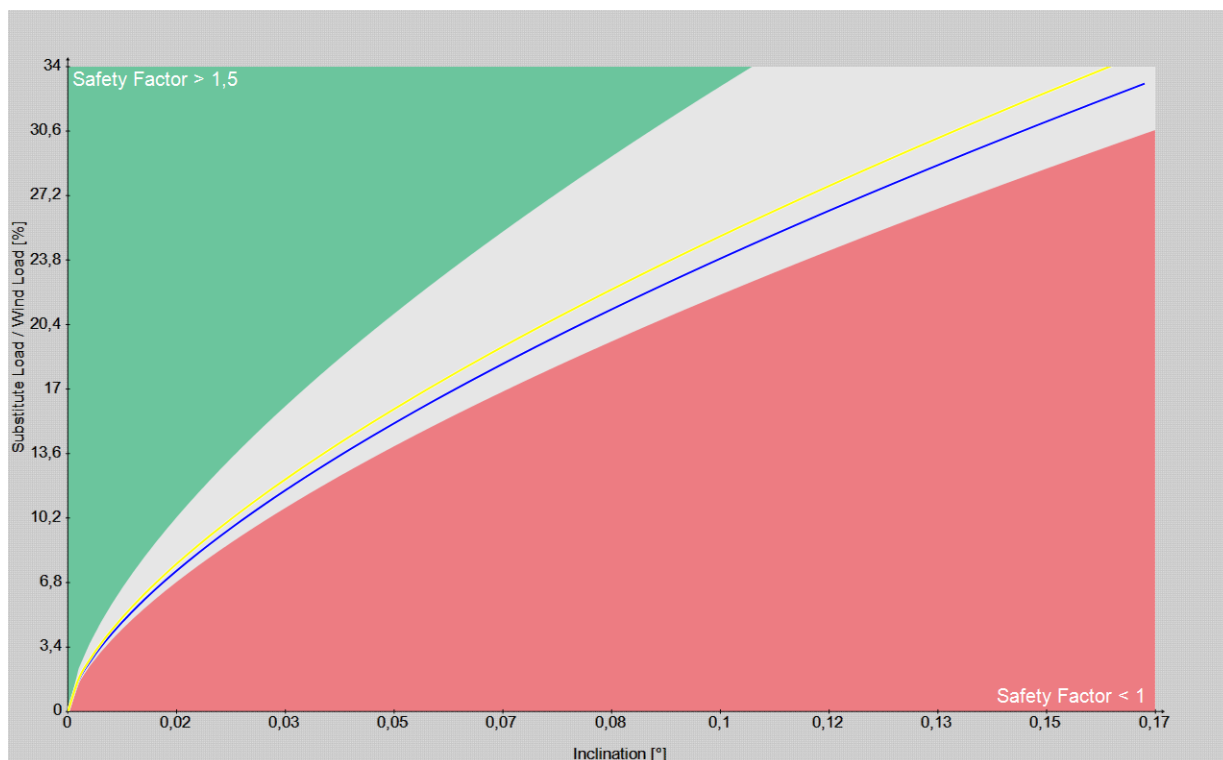
Tree Data

Project	20139	Tree Number	181356
Tree Species	Tilia	Date	11-1-2024

Setup Pulling Test

Height of the Stem Anchor	5,3 m	Measurement No.	1
Rope Angle	5,6 °	Load Direction	NW

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



Inclinometer Measurement	80	81
Position	90x	270x

Tipping Stability (based on Generalized Tipping Curve)

Safety Factor	1,09	1,14
---------------	------	------

Control Value	in		
Standard Deviation	%	0,91	0,83
Substitue Load	%	33,2	33,2
Load Direction at Inclinometer		x-Axis	x-Axis

General for Pull Test

Consultant	Zeger Deroose
Witness / Assistant	Michiel De Temmerman
Measurement Comments	Gilles Voet

Calculated Fracture Stability according to Pull Test

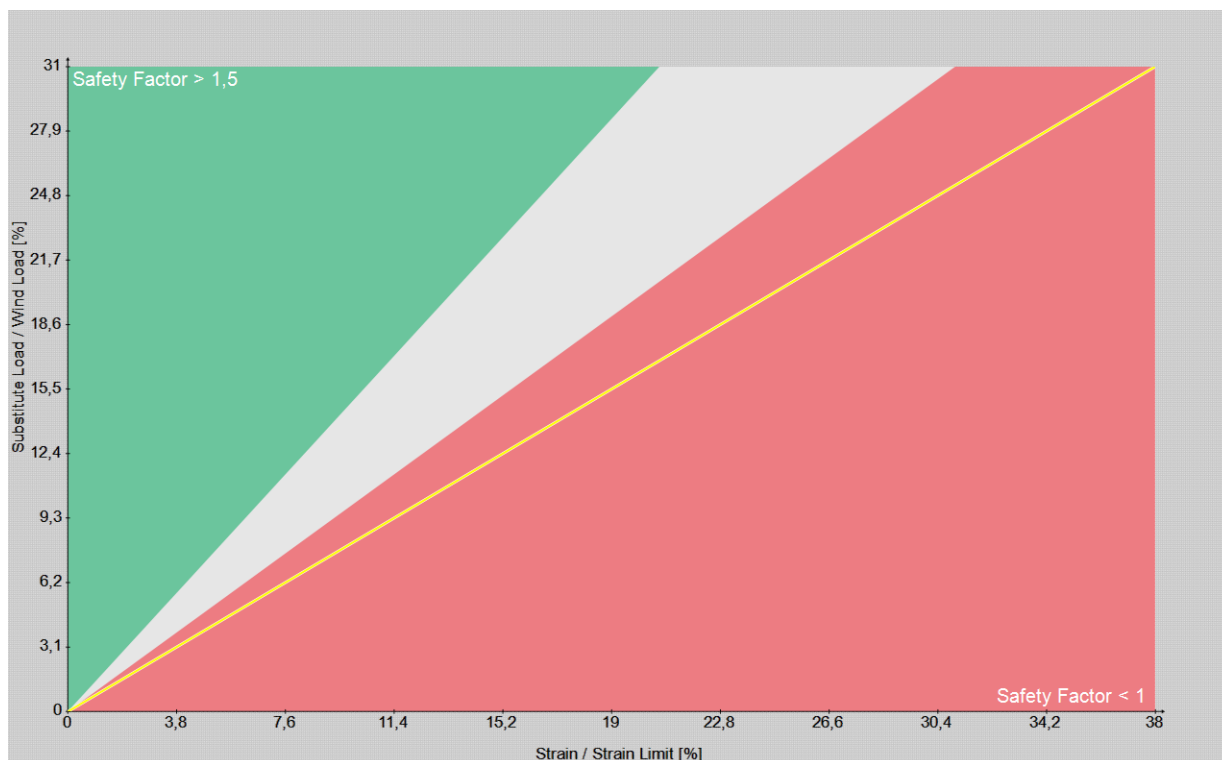
Tree Data

Project	20139	Tree Number	181356
Tree Species	Tilia	Date	11-1-2024

Setup Pulling Test

Height of the Stem Anchor	5,3 m	Measurement No.	1
Rope Angle	5,6 °	Load Direction	NW

Graphic Display (test data and best linear fit)



Elastometer Measurement in 91

Measurement Height	m	1
Position		T
Stem Diameter 1	cm	46
Stem Diameter 2	cm	42
Bark Thickness	cm	1
Load part	%	100

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

Safety Factor **0,82**

Control Value

Coefficient of Determination R ²		0,998
Residual Stiffness	%	60,5
Degree of Hollowness	%	73,3
Compression originating from		
Dead Weight	%	0,8
Substitute Load	%	30,7

Wind Load Analysis analogous to DIN 1055-4

Tree Number 181370
Arbotag 181370

Project

Project Name 20139
 Project Number 181334
 Test Date 10-1-2024

Site

, Belgium
 Altitude a. sea level 4 m

Tree Data

Tree Species Tilia
 Stem circumference 160 cm
 Stem Diameter || 55 cm
 in 1m height _|_ 47 cm
 Bark Thickness 1 cm
Tree Height 13,7 m

Applied Material Properties

as for Tilia cordata
 Source Stuttgart
 Compressive Strength 20 MPa
 Modulus of Elasticity 8300 MPa
 Limit of Elasticity 0,24 %
 Green Density 0,74 g/cm³

Crown Outline



14 **Load Direction** NW
 13 **Surface Area Analysis**
 12 Crown Base 5,1 m
 11 Effective Height 10,3 m
 10 Total Surface Area 73 m²
 9 Crown Eccentricity 0,1 m
 8 **Applied Structural Parameters**
 7 Drag Factor 0,3
 6 Natural Frequency 0,34 Hz
 5 Damping Decrement 0,65
 4 Form Factor for Dead Weight 0,8
 3 **Applied Site Parameters**
 2 Windzone BE 4
 1 Speed of Applied
 0 Design Wind Speed 26 m/s
 Air Density 1,29 kg/m³
 Roughness Category Suburb
 Exponent for Wind Profile 0,22
 Proximity Factor for Effects
 in Near Ground Wind Flow 1
 Factor for Crown Exposure 0,80

Results

Wind Load Analysis
 Mean Wind Pressure 4,4 kN
 Gust Reaction Factor 2,92
 Load Centre 8,9 m
 Torsion Moment 1 kNm

Tree Static Analysis
 Dead Weight Tree 1,5 t
 Critical Degree of Hollowness 81 %
 Critical Residual Wall Thickness 5 cm
 Assuming an Uncompromised Residual Wall

Design Wind Load 115 kNm **Basic Safety Factor 2,1**

General

Comments

Calculated Tipping Stability according to Pull Test

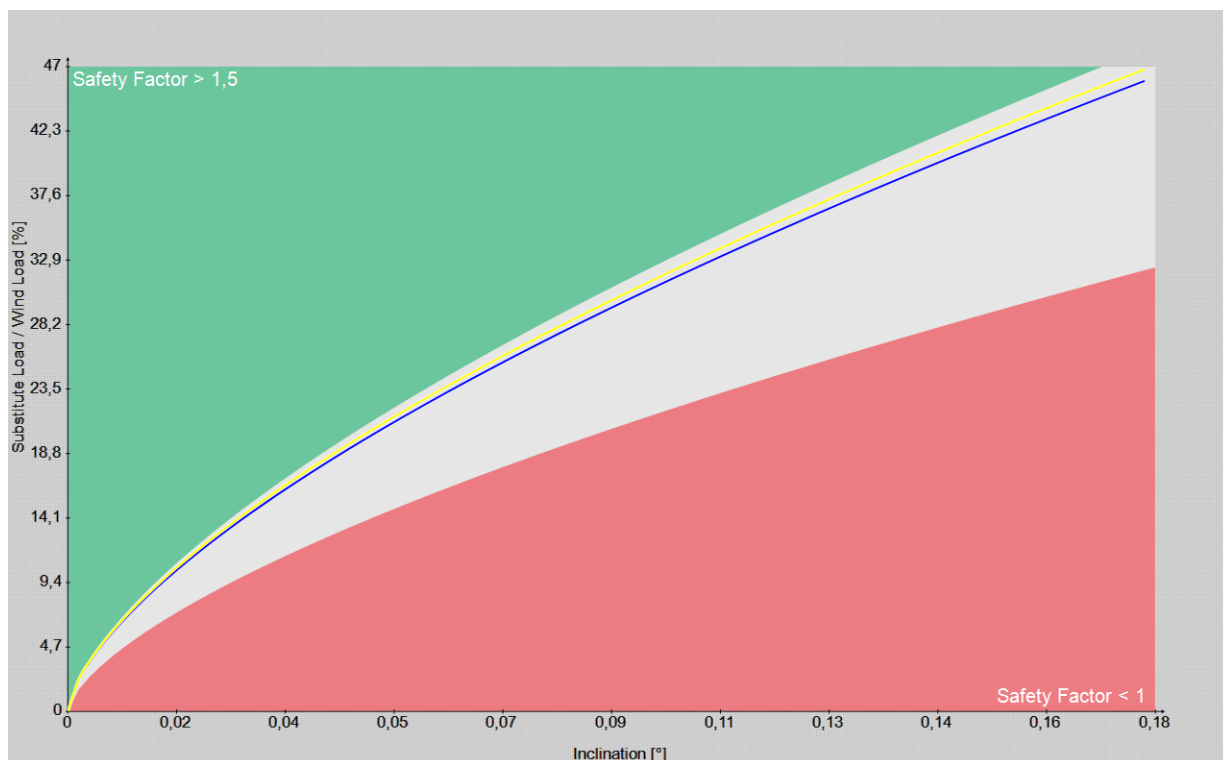
Tree Data

Project	20139	Tree Number	181370
Tree Species	Tilia	Date	10-1-2024

Setup Pulling Test

Height of the Stem Anchor	5 m	Measurement No.	1
Rope Angle	5 °	Load Direction	NW

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



Inclinometer Measurement	80	81
Position	90x	270x

Tipping Stability (based on Generalized Tipping Curve)

Safety Factor	1,43	1,46
---------------	------	------

Control Value	in		
Standard Deviation	%	0,86	1,09
Substitue Load	%	46,2	46,2
Load Direction at Inclinometer		x-Axis	x-Axis

General for Pull Test

Consultant	Zeger Deroose
Witness / Assistant	Michiel De Temmerman
Measurement Comments	Gilles Voet

Calculated Fracture Stability according to Pull Test

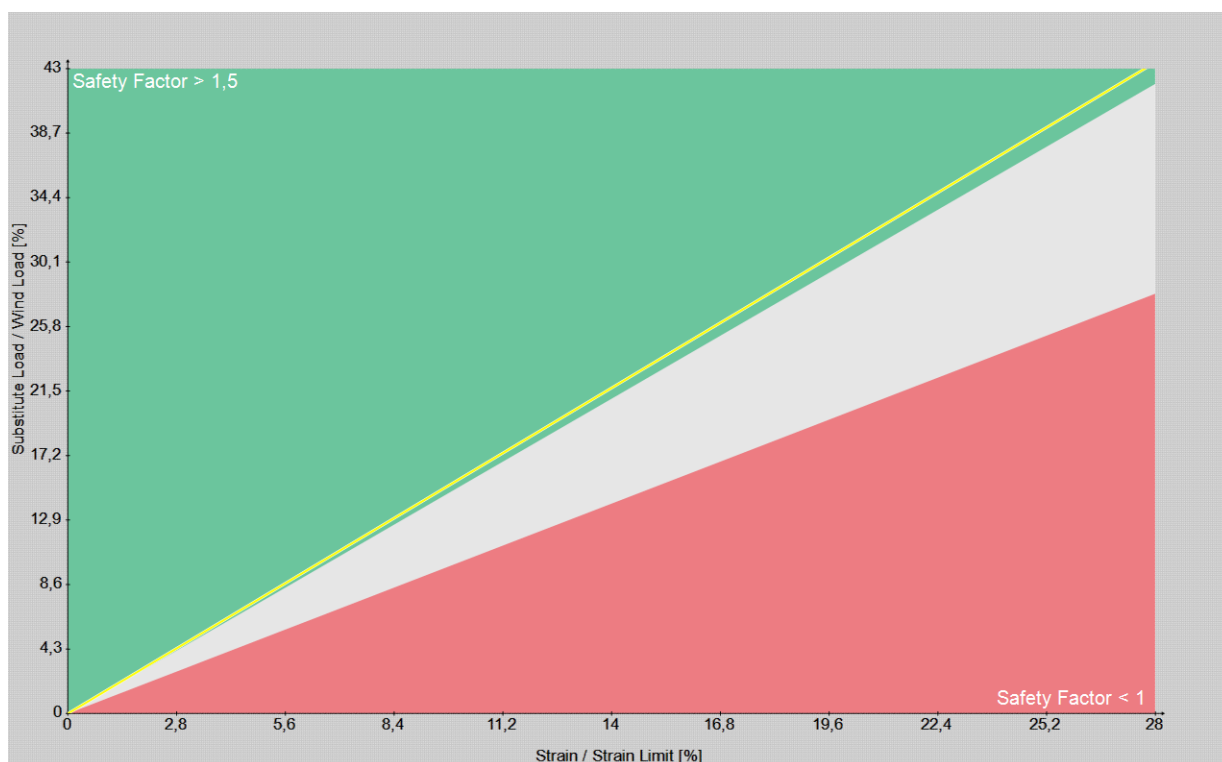
Tree Data

Project	20139	Tree Number	181370
Tree Species	Tilia	Date	10-1-2024

Setup Pulling Test

Height of the Stem Anchor	5 m	Measurement No.	1
Rope Angle	5 °	Load Direction	NW

Graphic Display (test data and best linear fit)



Elastometer Measurement in 91

Measurement Height	m	1
Position		T
Stem Diameter 1	cm	55
Stem Diameter 2	cm	47
Bark Thickness	cm	1
Load part	%	100

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

Safety Factor **1,55**

Control Value

Coefficient of Determination R ²		0,9988
Residual Stiffness	%	64,4
Degree of Hollowness	%	70,9
Compression originating from		
Dead Weight	%	0,7
Substitute Load	%	42,6

Wind Load Analysis analogous to DIN 1055-4

Tree Number 181372
Arbotag 181372

Project

Project Name 20139
Project Number 181334
Test Date 10-1-2024

Site

, Belgium
Altitude a. sea level 4 m

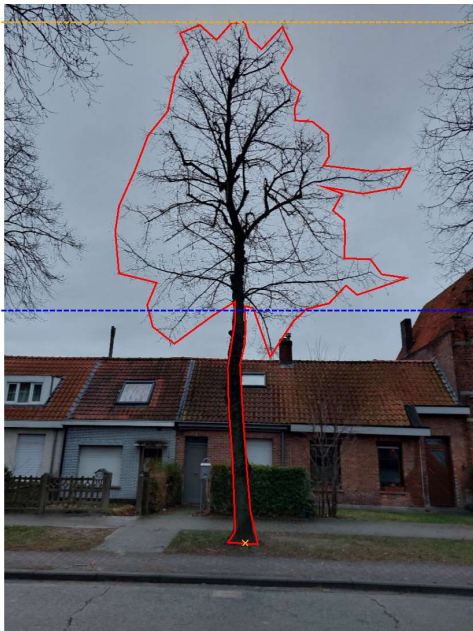
Tree Data

Tree Species Tilia
Stem circumference 113 cm
Stem Diameter || 35 cm
in 1m height _|_ 33 cm
Bark Thickness 1 cm
Tree Height 13 m

Applied Material Properties

as for Tilia cordata
Source Stuttgart
Compressive Strength 20 MPa
Modulus of Elasticity 8300 MPa
Limit of Elasticity 0,24 %
Green Density 0,74 g/cm³

Crown Outline



Load Direction W

Surface Area Analysis

Crown Base 5,8 m
Effective Height 10,1 m
Total Surface Area 36 m²
Crown Eccentricity 0,14 m

Applied Structural Parameters

Drag Factor 0,3
Natural Frequency 0,3 Hz
Damping Decrement 0,6
Form Factor for Dead Weight 0,8

Applied Site Parameters

Windzone BE 4
Speed of Applied
Design Wind Speed 26 m/s
Air Density 1,29 kg/m³
Roughness Category Suburb
Exponent for Wind Profile 0,22
Proximity Factor for Effects in Near Ground Wind Flow 1
Factor for Crown Exposure 0,90

Results

Wind Load Analysis

Mean Wind Pressure 2,4 kN
Gust Reaction Factor 3,1
Load Centre 8,4 m
Torsion Moment 1 kNm

Tree Static Analysis

Dead Weight Tree 0,6 t
Critical Degree of Hollowness 0 %
Critical Residual Wall Thickness 16 cm
Assuming an Uncompromised Residual Wall

Design Wind Load 62 kNm

Basic Safety Factor 1

General

Comments

Calculated Tipping Stability according to Pull Test

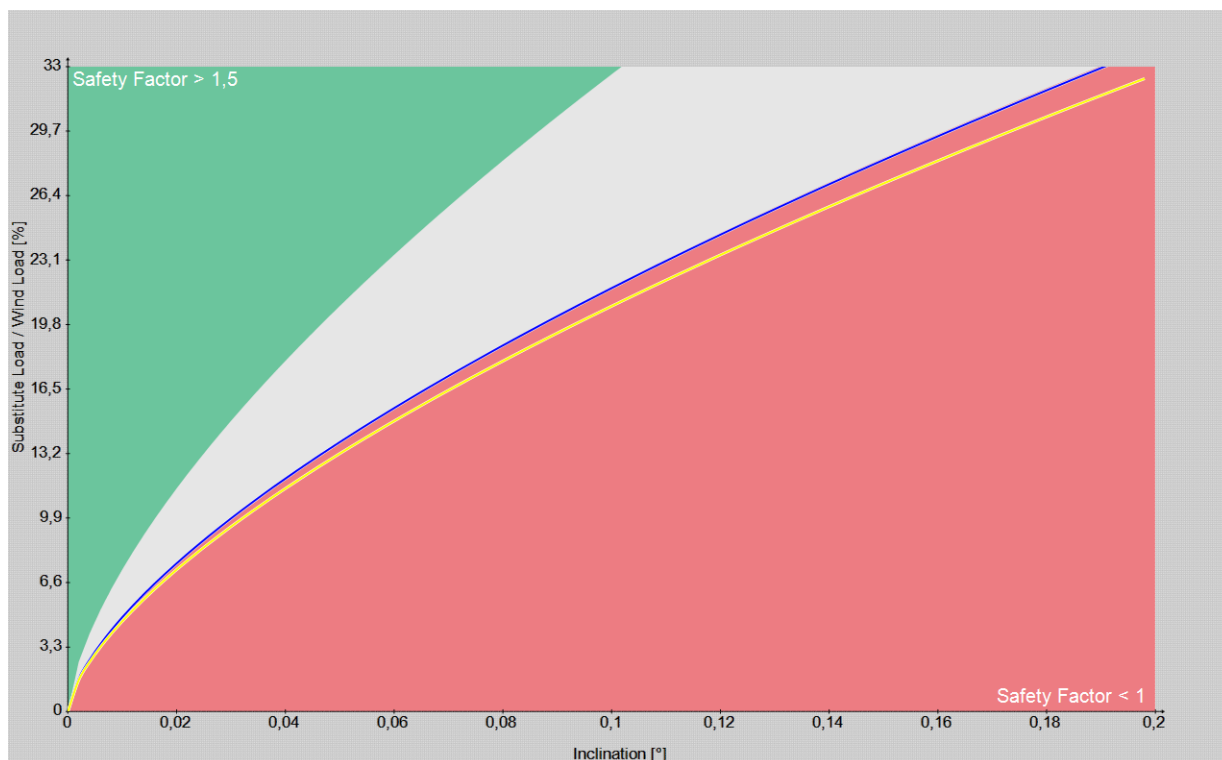
Tree Data

Project	20139	Tree Number	181372
Tree Species	Tillia	Date	10-1-2024

Setup Pulling Test

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

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



Inclinometer Measurement	80	81
Position	90x	270x

Tipping Stability (based on Generalized Tipping Curve)

Safety Factor	1	0,95
---------------	---	------

Control Value	in		
Standard Deviation	%	1,26	1,19
Substitue Load	%	32,8	32,8
Load Direction at Inclinometer		x-Axis	x-Axis

General for Pull Test

Consultant	Zeger Derosé
Witness / Assistant	Michiel De Temmerman
Measurement Comments	Gilles Voet

Calculated Fracture Stability according to Pull Test

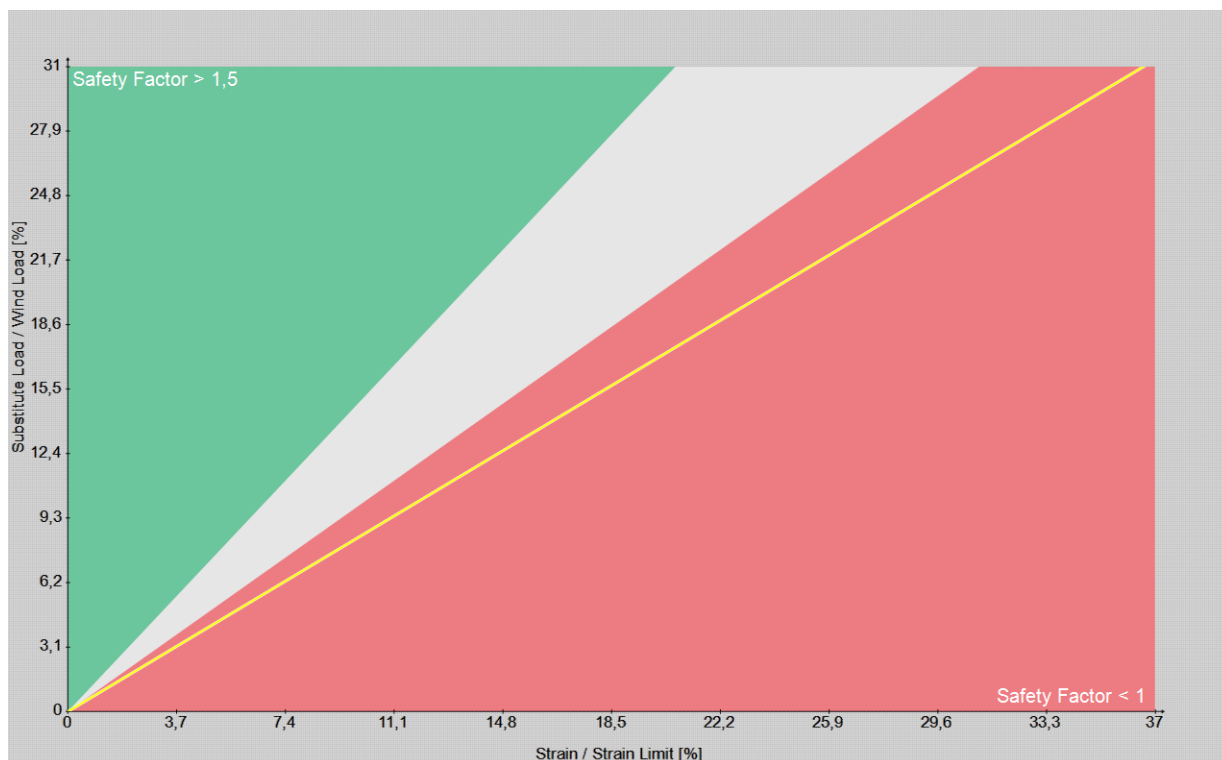
Tree Data

Project	20139	Tree Number	181372
Tree Species	Tillia	Date	10-1-2024

Setup Pulling Test

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

Graphic Display (test data and best linear fit)



Elastometer Measurement in 91

Measurement Height	m	1
Position		T
Stem Diameter 1	cm	35
Stem Diameter 2	cm	33
Bark Thickness	cm	1
Load part	%	100

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

Safety Factor	0,85
---------------	------

Control Value

Coefficient of Determination R ²	0,9959
Residual Stiffness	% 71,1
Degree of Hollowness	% 66,1
Compression originating from	
Dead Weight	% 0,6
Substitute Load	% 30,7

Wind Load Analysis analogous to DIN 1055-4

Tree Number 181373
Arbotag 181373

Project

Project Name 20139
 Project Number 181334
 Test Date 10-1-2024

Site

, Belgium
 Altitude a. sea level 4 m

Tree Data

Tree Species Tilia
 Stem circumference 174 cm
 Stem Diameter || 56 cm
 in 1m height _|_ 55 cm
 Bark Thickness 1 cm
Tree Height 16,5 m

Applied Material Properties

as for Tilia cordata
 Source Stuttgart
 Compressive Strength 20 MPa
 Modulus of Elasticity 8300 MPa
 Limit of Elasticity 0,24 %
 Green Density 0,74 g/cm³

Crown Outline



Load Direction NW

Surface Area Analysis

17
 16 Crown Base 6,4 m
 15 Effective Height 12,5 m
 14 Total Surface Area 84 m²
 13 Crown Eccentricity 1,26 m
 12

Applied Structural Parameters

10 Drag Factor 0,3
 9 Natural Frequency 0,34 Hz
 8 Damping Decrement 0,65
 7 Form Factor for Dead Weight 0,8
 6

Applied Site Parameters

4 Windzone BE 4
 3 Speed of Applied
 2 Design Wind Speed 26 m/s
 1 Air Density 1,29 kg/m³
 0 Roughness Category Suburb
 Exponent for Wind Profile 0,22
 Proximity Factor for Effects
 in Near Ground Wind Flow 1
 Factor for Crown Exposure 0,80

Results

Wind Load Analysis

Mean Wind Pressure 5,5 kN
 Gust Reaction Factor 2,8
 Load Centre 11,1 m
 Torsion Moment 19 kNm

Tree Static Analysis

Dead Weight Tree 2,2 t
 Critical Degree of Hollowness 74 %
 Critical Residual Wall Thickness 7 cm
 Assuming an Uncompromised Residual Wall

Design Wind Load 169 kNm

Basic Safety Factor 1,7

General

Comments

Calculated Tipping Stability according to Pull Test

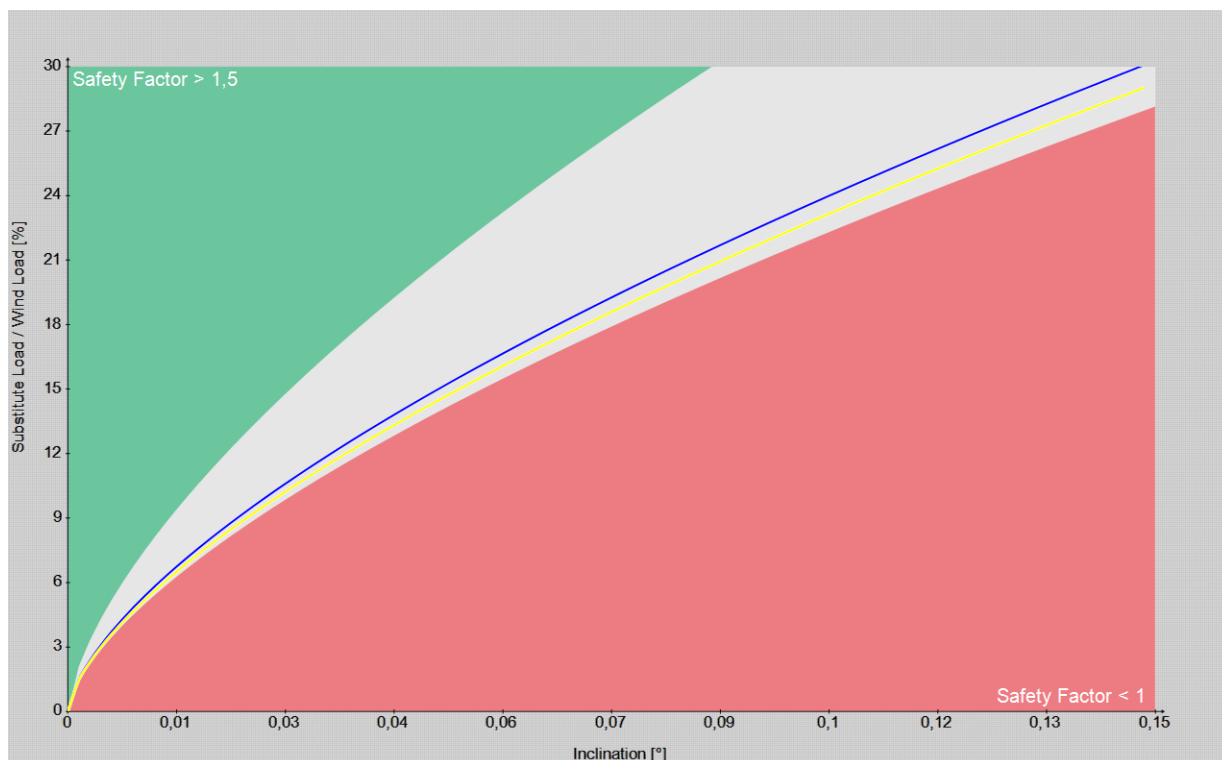
Tree Data

Project	20139	Tree Number	181373
Tree Species	Tillia	Date	10-1-2024

Setup Pulling Test

Height of the Stem Anchor	5,5 m	Measurement No.	2
Rope Angle	0,2 °	Load Direction	NW

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



Inclinometer Measurement	80	81
Position	0y	180y

Tipping Stability (based on Generalized Tipping Curve)

Safety Factor	1,08	1,04
---------------	------	------

Control Value	in		
Standard Deviation	%	1,42	1,48
Substitue Load	%	29,5	29,5
Load Direction at Inclinometer		y-Axis	y-Axis

General for Pull Test

Consultant	Zeger Deroose
Witness / Assistant	Michiel De Temmerman
Measurement Comments	Gilles Voet

Calculated Fracture Stability according to Pull Test

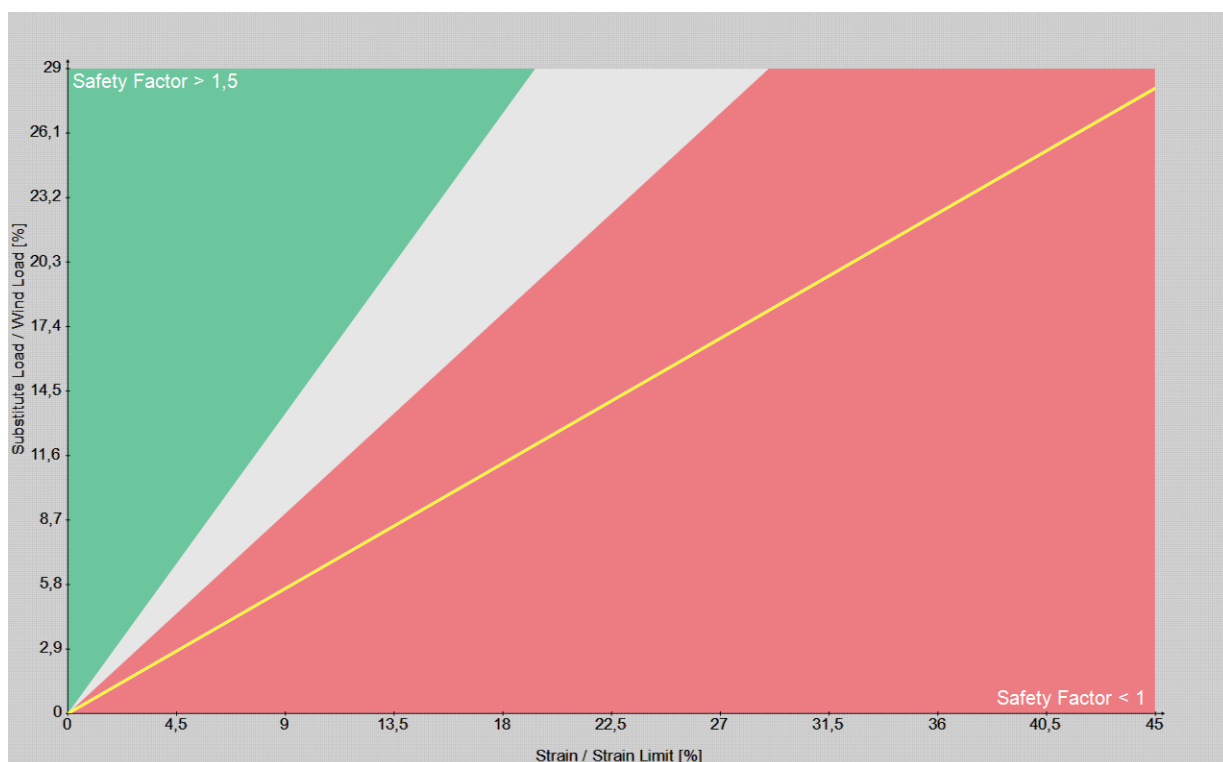
Tree Data

Project	20139	Tree Number	181373
Tree Species	Tillia	Date	10-1-2024

Setup Pulling Test

Height of the Stem Anchor	5,5 m	Measurement No.	2
Rope Angle	0,2 °	Load Direction	NW

Graphic Display (test data and best linear fit)



Elastometer Measurement in 91

Measurement Height	m	1
Position		T
Stem Diameter 1	cm	56
Stem Diameter 2	cm	55
Bark Thickness	cm	1
Load part	%	100

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

Safety Factor **0,63**

Control Value

Coefficient of Determination R ²		0,9957
Residual Stiffness	%	32,5
Degree of Hollowness	%	87,7
Compression originating from		
Dead Weight	%	2
Substitute Load	%	28,3

Wind Load Analysis analogous to DIN 1055-4

Tree Number 181374
Arbotag 181373

Project		Site	
Project Name	20139	, Belgium	
Project Number	181334	Altitude a. sea level	4 m
Test Date	10-1-2024		

Tree Data		Applied Material Properties	
Tree Species	Tilia	as for	Tilia cordata
Stem circumference	170 cm	Source	Stuttgart
Stem Diameter	53 cm	Compressive Strength	20 MPa
in 1m height	└┘ 51 cm	Modulus of Elasticity	8300 MPa
Bark Thickness	└┘ 1 cm	Limit of Elasticity	0,24 %
Tree Height	15 m	Green Density	0,74 g/cm ³

Crown Outline



Load Direction	W
Surface Area Analysis	
Crown Base	5 m
Effective Height	11 m
Total Surface Area	67 m ²
Crown Eccentricity	1,64 m
Applied Structural Parameters	
Drag Factor	0,3
Natural Frequency	0,34 Hz
Damping Decrement	65
Form Factor for Dead Weight	0,8
Applied Site Parameters	
Windzone	BE 4
Speed of Applied	
Design Wind Speed	26 m/s
Air Density	1,29 kg/m ³
Roughness Category	Suburb
Exponent for Wind Profile	0,22
Proximity Factor for Effects in Near Ground Wind Flow	1
Factor for Crown Exposure	0,80

Results

Wind Load Analysis		Tree Static Analysis	
Mean Wind Pressure	4,2 kN	Dead Weight Tree	1,7 t
Gust Reaction Factor	2,55	Critical Degree of Hollowness	82 %
Load Centre	10,3 m	Critical Residual Wall Thickness	5 cm
Torsion Moment	18 kNm	Assuming an Uncompromised Residual Wall	
Design Wind Load	111 kNm	Basic Safety Factor	2,2

General

Comments

Calculated Tipping Stability according to Pull Test

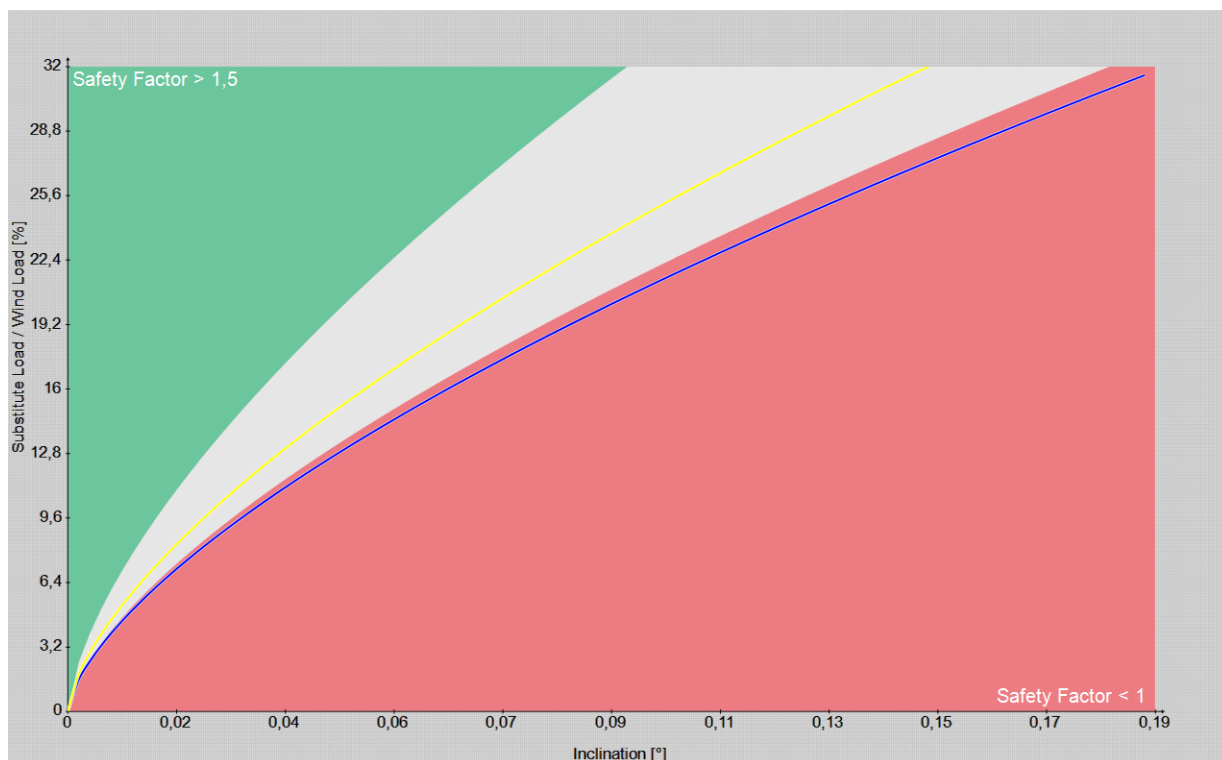
Tree Data

Project	20139	Tree Number	181374
Tree Species	Tillia	Date	10-1-2024

Setup Pulling Test

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

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



Inclinometer Measurement	80	81
Position	90x	270x

Tipping Stability (based on Generalized Tipping Curve)		
Safety Factor	0,97	1,13

Control Value	in		
Standard Deviation	%	1,23	2,61
Substitue Load	%	31,7	31,7
Load Direction at Inclinometer		x-Axis	x-Axis

General for Pull Test		
Consultant	Zeger Deroose	
Witness / Assistant	Michiel De Temmerman	
Measurement Comments	Gilles Voet	

Calculated Fracture Stability according to Pull Test

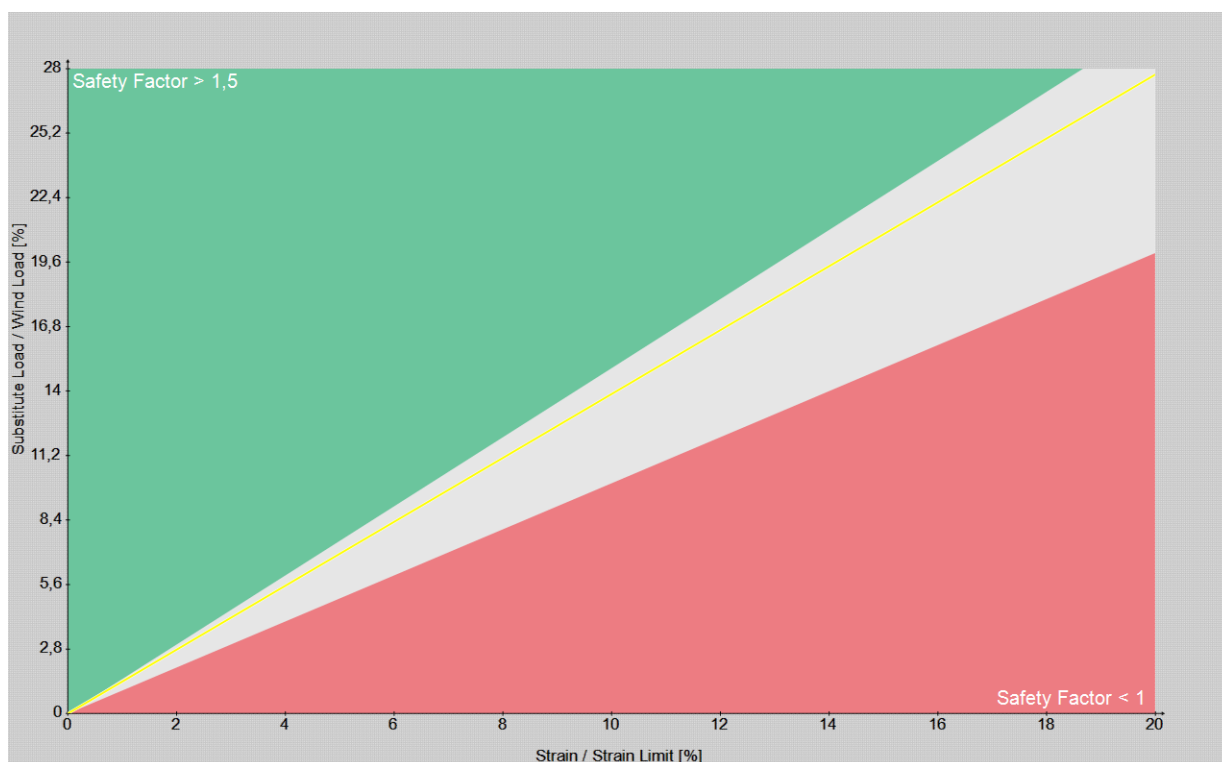
Tree Data

Project	20139	Tree Number	181374
Tree Species	Tillia	Date	10-1-2024

Setup Pulling Test

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

Graphic Display (test data and best linear fit)



Elastometer Measurement in 91

Measurement Height	m	1
Position		T
Stem Diameter 1	cm	53
Stem Diameter 2	cm	51
Bark Thickness	cm	1
Load part	%	100

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

Safety Factor **1,39**

Control Value

Coefficient of Determination R ²		0,9732
Residual Stiffness	%	56,1
Degree of Hollowness	%	76
Compression originating from		
Dead Weight	%	1
Substitute Load	%	27,9