

Simulation Model 1:1

Study 1 - Static Stress

Study Properties

Study Type	Static Stress
Last Modification Date	2018-06-09, 11:14:05

Settings

General

Contact Tolerance	0.1 mm
Remove Rigid Body Modes	No

Mesh

Average Element Size (% of model size)	
Solids	10
Scale Mesh Size Per Part	No
Average Element Size (absolute value)	-
Element Order	Parabolic
Create Curved Mesh Elements	Yes
Max. Turn Angle on Curves (Deg.)	60
Max. Adjacent Mesh Size Ratio	1.5
Max. Aspect Ratio	10
Minimum Element Size (% of average size)	20

Adaptive Mesh Refinement

Number of Refinement Steps	0
Results Convergence Tolerance (%)	20
Portion of Elements to Refine (%)	10
Results for Baseline Accuracy	Von Mises Stress

Materials

Component	Material	Safety Factor
Frame:1/Column	Steel, Mild	Yield Strength
Frame:1/Column 2	Steel, Mild	Yield Strength
Frame:1/Rafter	Steel, Mild	Yield Strength
Frame:2/Column	Steel, Mild	Yield Strength
Frame:2/Column 2	Steel, Mild	Yield Strength
Frame:2/Rafter	Steel, Mild	Yield Strength
Purlins:1/Body1	Steel, Mild	Yield Strength
Purlins:1/Body2	Steel, Mild	Yield Strength
Purlins:1/Body3	Steel, Mild	Yield Strength
Purlins:1/Body4	Steel, Mild	Yield Strength

Steel, Mild

Density	7.85E-06 kg / mm ³
Young's Modulus	220000 MPa
Poisson's Ratio	0.275
Yield Strength	207 MPa
Ultimate Tensile Strength	345 MPa
Thermal Conductivity	0.045 W / (mm C)
Thermal Expansion Coefficient	1.2E-05 / C
Specific Heat	480 J / (kg C)

Contacts

Bonded

Name
[S] Bonded1 [Frame:2(Rafter) Purlins:1(Body4)]
[S] Bonded2 [Frame:2(Rafter) Purlins:1(Body3)]
[S] Bonded3 [Frame:2(Rafter) Purlins:1(Body2)]
[S] Bonded4 [Frame:2(Rafter) Purlins:1(Body1)]
[S] Bonded5 [Frame:2(Column 2) Frame:2(Rafter)]
[S] Bonded6 [Frame:2(Column) Frame:2(Rafter)]
[S] Bonded7 [Frame:1(Rafter) Purlins:1(Body4)]
[S] Bonded8 [Frame:1(Rafter) Purlins:1(Body3)]
[S] Bonded9 [Frame:1(Rafter) Purlins:1(Body2)]
[S] Bonded10 [Frame:1(Rafter) Purlins:1(Body1)]
[S] Bonded11 [Frame:1(Column 2) Frame:1(Rafter)]
[S] Bonded12 [Frame:1(Column) Frame:1(Rafter)]

Mesh

Type	Nodes	Elements
Solids	407427	190705

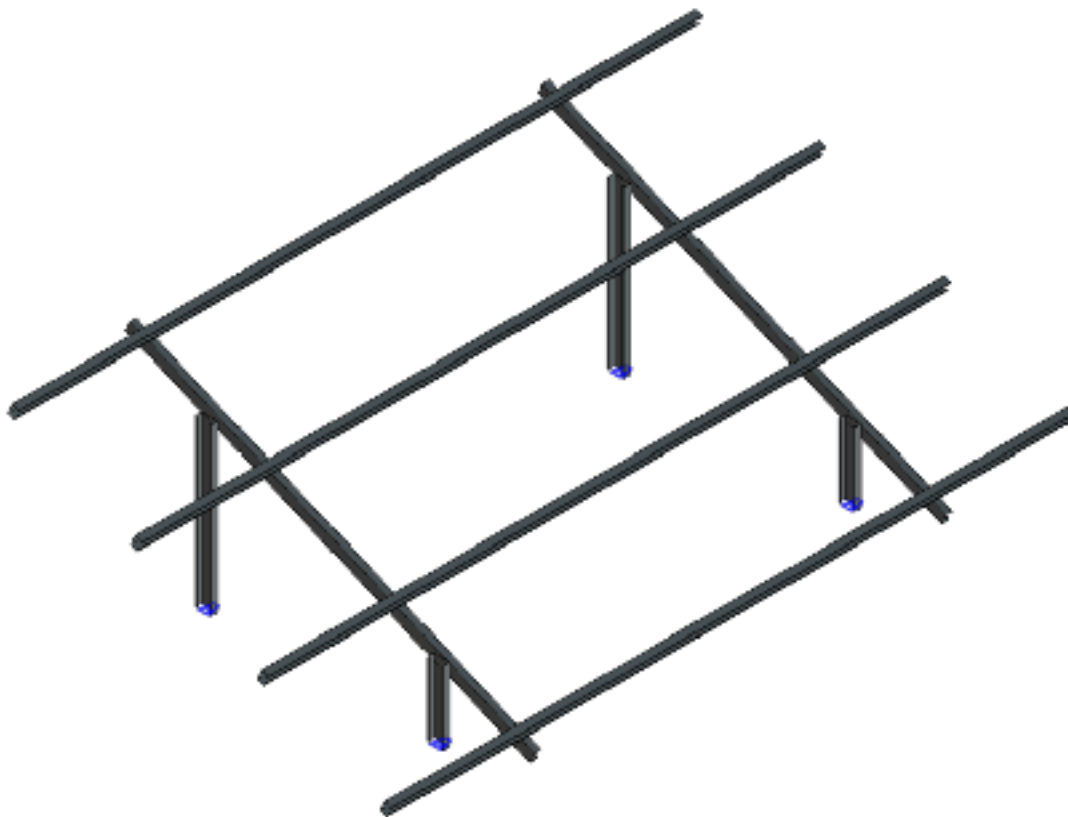
Load Case1

Constraints

Fixed1

Type	Fixed
Ux	Yes
Uy	Yes
Uz	Yes

Selected Entities

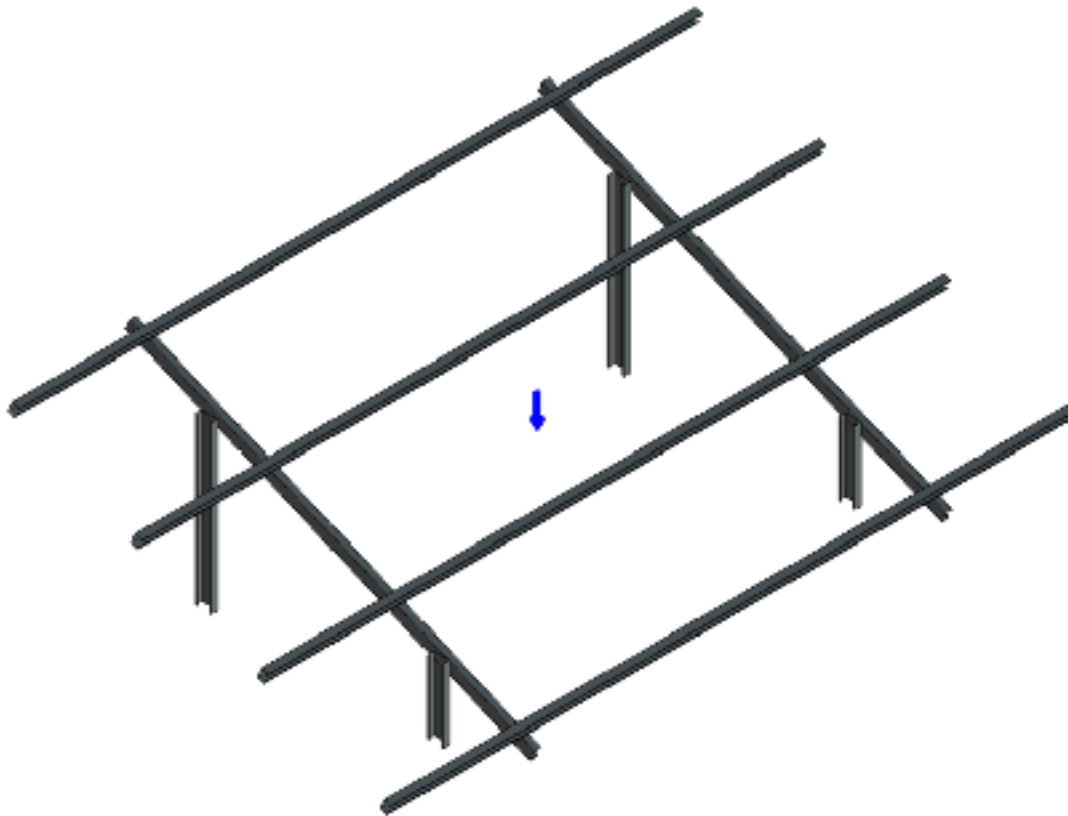


Loads

Gravity

Type	Gravity
Magnitude	9.807 m / s ²
X Value	0 m / s ²
Y Value	0 m / s ²
Z Value	-9.807 m / s ²

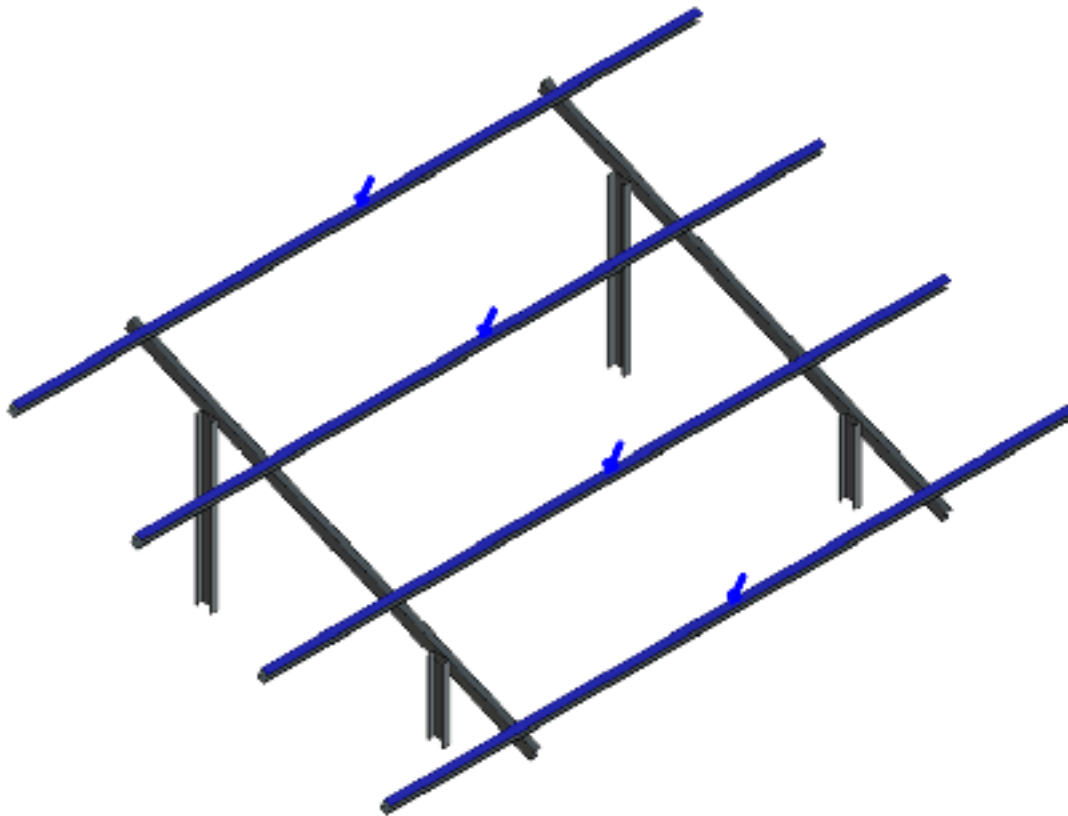
Selected Entities



Force1

Type	Force
Magnitude	2450 N
X Value	-957.3 N
Y Value	2.791E-13 N
Z Value	-2255 N
Force Per Entity	No

Selected Entities



Results


Result Summary

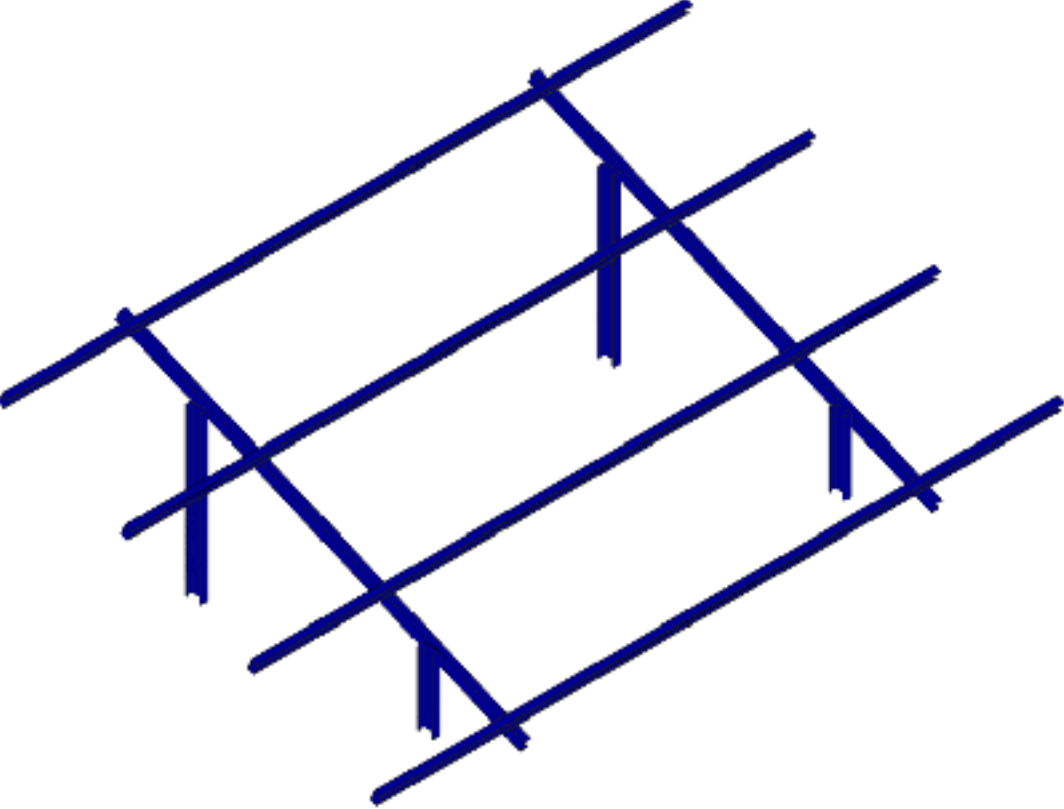
Name	Minimum	Maximum
Safety Factor		
Safety Factor (Per Body)	2.62	15
Stress		
Von Mises	0.005141 MPa	79 MPa
1st Principal	-13.63 MPa	79.67 MPa
3rd Principal	-50.51 MPa	10.47 MPa
Normal XX	-43.25 MPa	22.54 MPa
Normal YY	-34.5 MPa	79.6 MPa
Normal ZZ	-47.3 MPa	38.62 MPa
Shear XY	-14.32 MPa	15.51 MPa
Shear YZ	-21.82 MPa	14.5 MPa
Shear ZX	-13.52 MPa	16.43 MPa
Displacement		
Total	0 mm	4.4 mm
X	-2.357 mm	1.242 mm
Y	-0.3248 mm	0.2942 mm
Z	-4.376 mm	0.5038 mm
Reaction Force		
Total	0 N	109.3 N
X	-33.47 N	57.44 N
Y	-54.3 N	46.61 N
Z	-84.47 N	104.6 N

Strain		
Equivalent	3.208E-08	3.358E-04
1st Principal	-4.083E-06	3.616E-04
3rd Principal	-3.537E-04	4.698E-06
Normal XX	-1.781E-04	9.558E-05
Normal YY	-1.626E-04	3.601E-04
Normal ZZ	-1.726E-04	1.705E-04
Shear XY	-1.66E-04	1.798E-04
Shear YZ	-2.53E-04	1.681E-04
Shear ZX	-1.567E-04	1.904E-04
Contact Pressure		
Total	0 MPa	36.99 MPa
X	-11.72 MPa	14.32 MPa
Y	-13.46 MPa	12.95 MPa
Z	-35.63 MPa	27.34 MPa

Safety Factor

Safety Factor (Per Body)

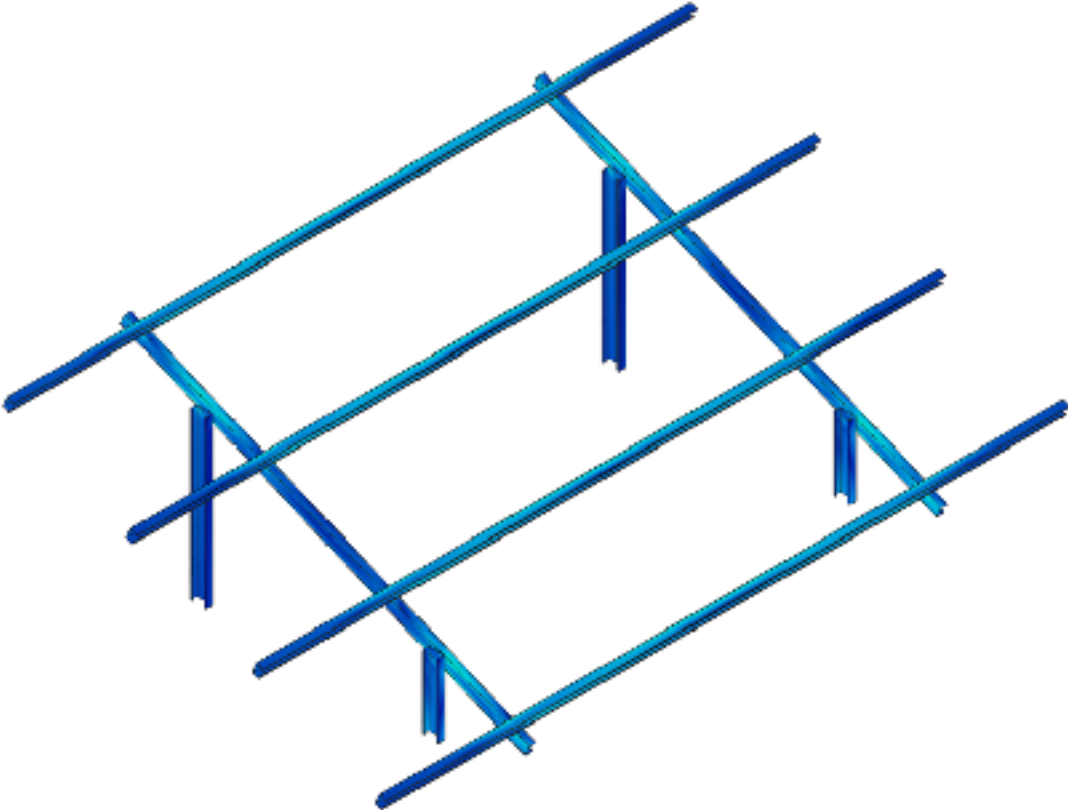
0  8



Stress

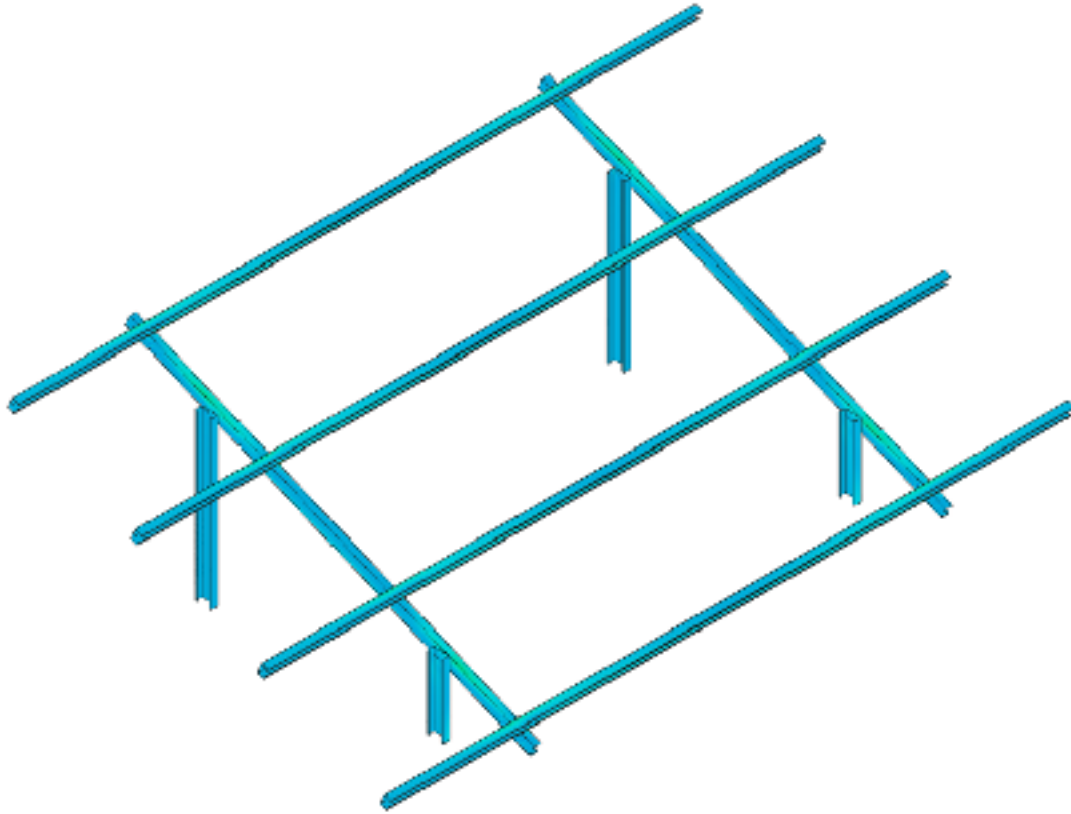
Von Mises

[MPa] 0.01  79



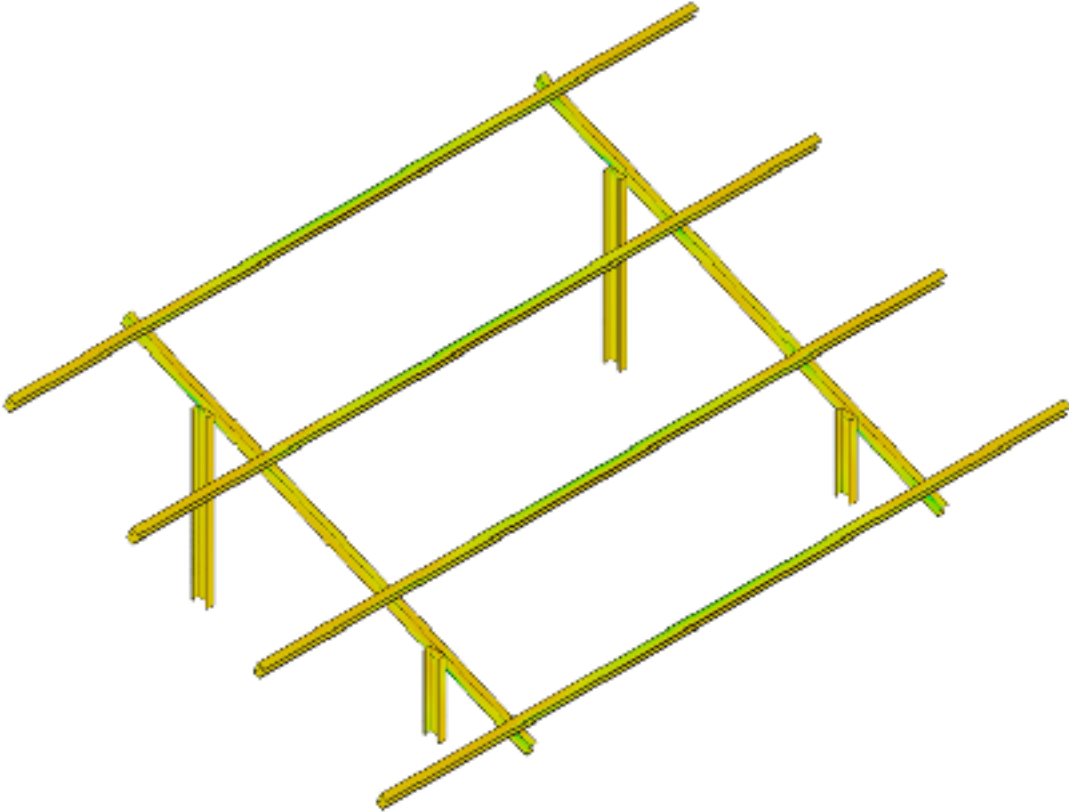
1st Principal

[MPa] -13.63  79.67



3rd Principal

[MPa] -50.51 10.47



Displacement

Total

[mm] 0  4.4

