

# Stress Analysis Report



Analyzed File:	PE-SANIFOS-610-TANK-V2.ipt
Autodesk Inventor Version:	2012 (Build 160160000, 160)
Creation Date:	24/08/2021, 12:08 PM
Simulation Author:	PE
Summary:	

## Project Info (iProperties)

### Summary

Title	SANIFOS 610
Subject	FEA TESTING TO AS/NZS 1546.1:2008
Author	PE
Manager	Daryl Perusic
Company	Perusic Engineering

### Project

Part Number	PE-SANIFOS-610-TANK-V2
Designer	PE
Cost	\$0.00
Date Created	24/07/2021

### Status

Design Status	WorkInProgress
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### Custom

Translation Standard	STEP AP214IS
FileName	CUV2183564A.STEP
PreProcessor	SolidWorks 2018
PostProcessor	Build: 160, Release: 2012 RTM - Date: Tue 03/01/2011
Sent Units	millimeter
Uncertainty	0.00

### Physical

Material	LLDPE Linear Low Density Polyethylene
Density	0.936 g/cm <sup>3</sup>
Mass	7.91588 kg
Area	2421430 mm <sup>2</sup>
Volume	8457130 mm <sup>3</sup>
Center of Gravity	x=279.221 mm y=278.562 mm z=521.099 mm

Note: Physical values could be different from Physical values used by FEA reported below.

## Simulation: LATERAL LOADS AS/NZS 1546.1:2008 APPENDIX H

### General objective and settings:

Design Objective	Single Point
Simulation Type	Static Analysis
Last Modification Date	24/08/2021, 12:03 PM
Detect and Eliminate Rigid Body Modes	No

**Advanced settings:**

Avg. Element Size (fraction of model diameter)	0.1
Min. Element Size (fraction of avg. size)	0.15
Grading Factor	1.8
Max. Turn Angle	60 deg
Create Curved Mesh Elements	Yes

**Material(s)**

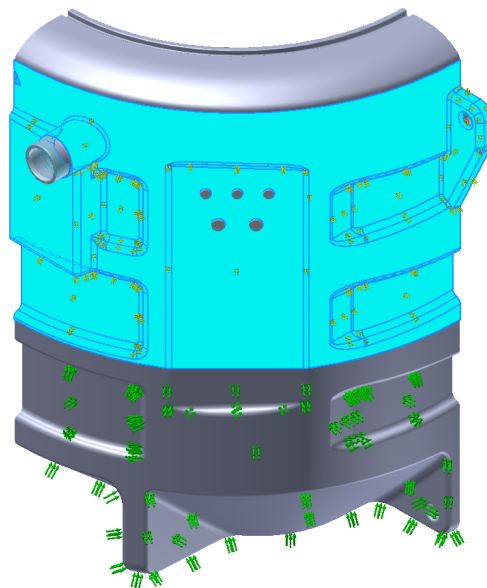
Name	LLDPE Linear Low Density Polyethylene	
General	Mass Density	0.936 g/cm <sup>3</sup>
	Yield Strength	20 MPa
	Ultimate Tensile Strength	32 MPa
Stress	Young's Modulus	0.2 GPa
	Poisson's Ratio	0.41 ul
	Shear Modulus	0.070922 GPa
Stress Thermal	Expansion Coefficient	0.00018 ul/c
	Thermal Conductivity	0.225 W/( m K )
	Specific Heat	3182 J/( kg c )
Part Name(s)	PE-SANIFOS-610-TANK-V2.ipt	

**Operating conditions**

**Pressure:0.5m 5.5kPa**

Load Type	Pressure
Magnitude	0.798 psi

**Selected Face(s)**

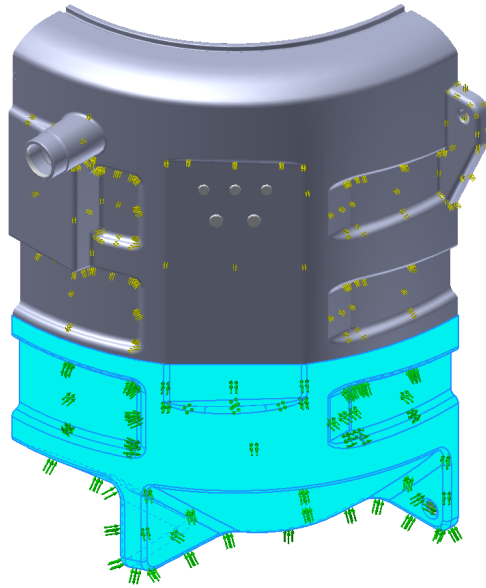


**Pressure:1.0m 11kPa**

Load Type	Pressure
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Magnitude 0.011 MPa

Selected Face(s)



Fixed Constraint: PIN

Constraint Type Fixed Constraint

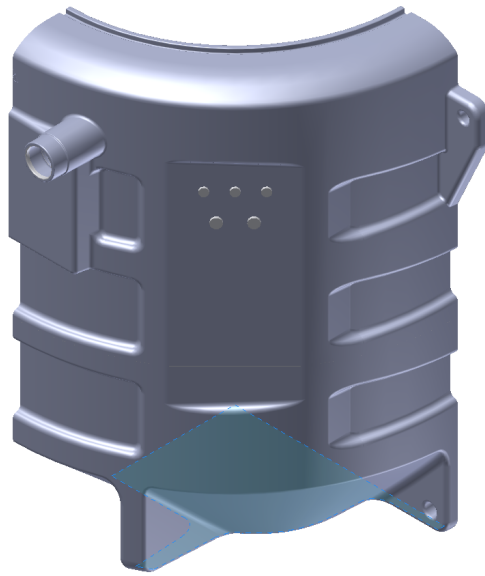
Selected Face(s)



**Frictionless Constraint: BASE**

Constraint Type Frictionless Constraint

**Selected Face(s)**



**Frictionless Constraint: QUADRANT**

Constraint Type Frictionless Constraint

**Selected Face(s)**



## Results

### Reaction Force and Moment on Constraints

Constraint Name	Reaction Force		Reaction Moment	
	Magnitude	Component (X,Y,Z)	Magnitude	Component (X,Y,Z)
Fixed Constraint: PIN	427.383 N	-14.4631 N	4.83668 N m	-3.58088 N m
		139.722 N		3.04444 N m
		-403.639 N		1.14115 N m
Frictionless Constraint: BASE	750.086 N	62.8097 N	240.471 N m	-40.522 N m
		16.4309 N		237.005 N m
		-747.271 N		-3.60094 N m
Frictionless Constraint: QUADRANT	4902.02 N	3637.07 N	399.079 N m	214.258 N m
		3286.57 N		-312.39 N m
		6.7364 N		125.58 N m

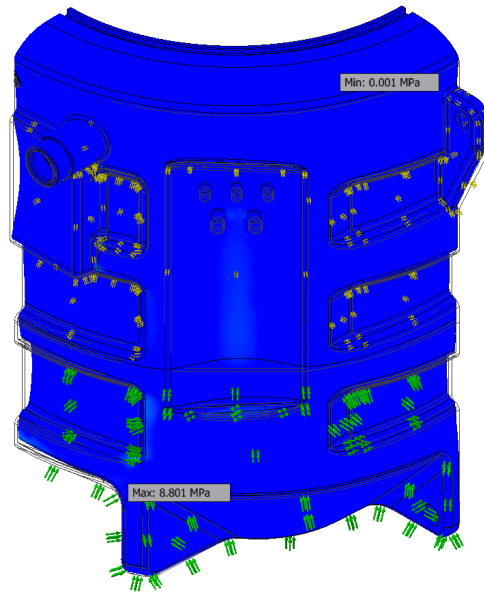
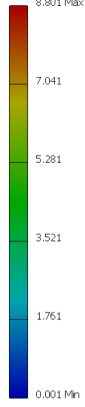
### Result Summary

Name	Minimum	Maximum
Volume	8457400 mm <sup>3</sup>	
Mass	7.91612 kg	
Von Mises Stress	0.000672327 MPa	8.80054 MPa
Displacement	0 mm	19.5374 mm
Safety Factor	2.80755 ul	15 ul
Equivalent Strain	0.00000316002 ul	0.042043 ul

## Figures

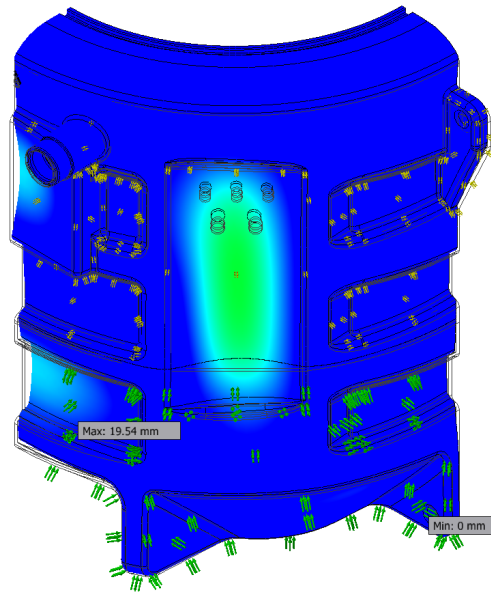
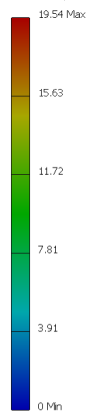
### Von Mises Stress

Type: Von Mises Stress  
Unit: MPa  
24/08/2021, 12:08:07 PM  
8.801 Max



☐ Displacement

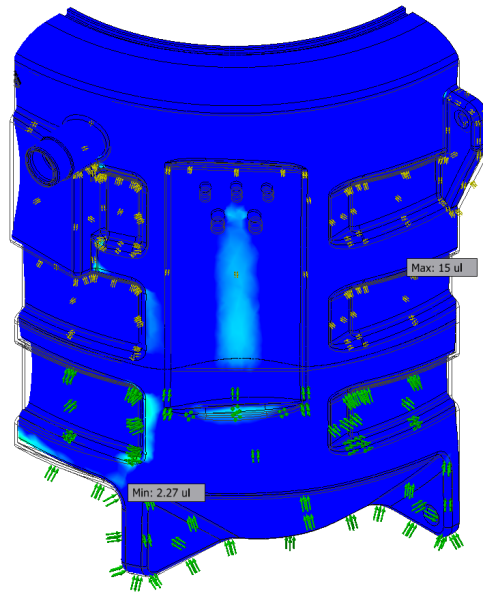
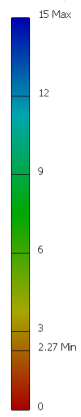
Type: Displacement  
Unit: mm  
24/08/2021, 12:08:29 PM



☐ **Safety Factor**

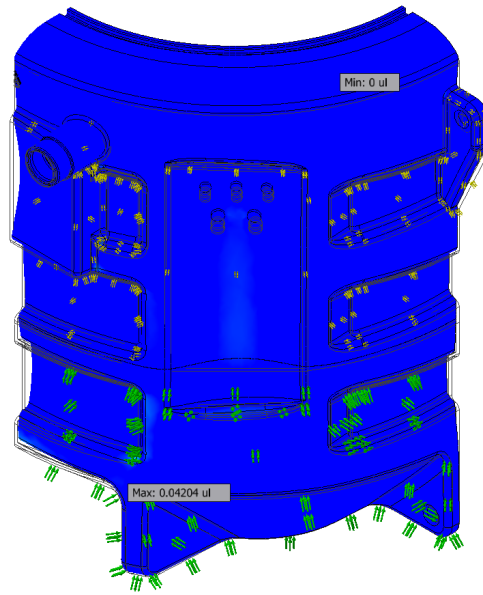
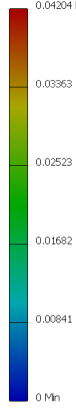


Type: Safety Factor  
Unit: ul  
24/08/2021, 12:08:14 PM



☐ **Equivalent Strain**

Type: Equivalent Strain  
 Unit: ul  
 24/08/2021, 12:08:32 PM  
 0.04204 Max



## Simulation: HYDROSTATIC UPLIFT LOADS AS/NZS:1546.1:2008

### General objective and settings:

Design Objective	Single Point
Simulation Type	Static Analysis
Last Modification Date	24/08/2021, 11:11 AM
Detect and Eliminate Rigid Body Modes	No

### Advanced settings:

Avg. Element Size (fraction of model diameter)	0.1
Min. Element Size (fraction of avg. size)	0.15
Grading Factor	1.8
Max. Turn Angle	60 deg
Create Curved Mesh Elements	Yes

### Material(s)

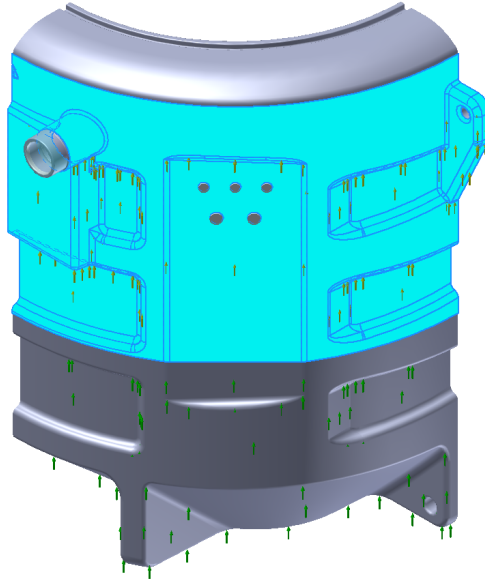
Name	LLDPE Linear Low Density Polyethylene	
General	Mass Density	0.936 g/cm <sup>3</sup>
	Yield Strength	20 MPa
	Ultimate Tensile Strength	32 MPa
Stress	Young's Modulus	0.2 GPa
	Poisson's Ratio	0.41 ul
	Shear Modulus	0.070922 GPa
Stress Thermal	Expansion Coefficient	0.00018 ul/c
	Thermal Conductivity	0.225 W/( m K )
	Specific Heat	3182 J/( kg c )
Part Name(s)	PE-SANIFOS-610-TANK-V2.ipt	

### Operating conditions

☐ **Force:0.5m 4.905 kPa**

Load Type	Force
Magnitude	956.475 N
Vector X	0.000 N
Vector Y	0.000 N
Vector Z	956.475 N

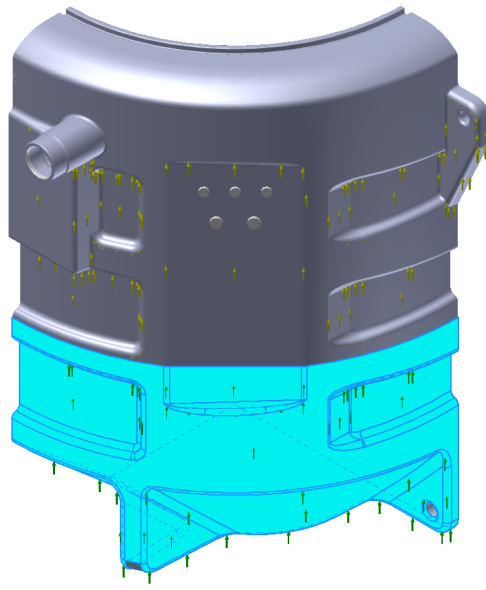
☐ **Selected Face(s)**



☐ **Force:1.0m 9.810 kPa**

Load Type	Force
Magnitude	1912.950 N
Vector X	0.000 N
Vector Y	0.000 N
Vector Z	1912.950 N

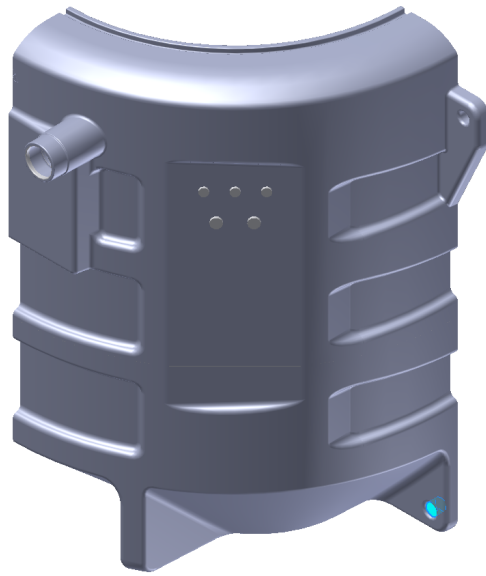
☐ **Selected Face(s)**



☐ **Fixed Constraint: PIN**

Constraint Type Fixed Constraint

☐ **Selected Face(s)**



**Frictionless Constraint: QUADRANT**

Constraint Type Frictionless Constraint

**Selected Face(s)**



☐ **Frictionless Constraint: CONCRETE**

Constraint Type Frictionless Constraint

☐ **Selected Face(s)**



## Results

### Reaction Force and Moment on Constraints

Constraint Name	Reaction Force		Reaction Moment	
	Magnitude	Component (X,Y,Z)	Magnitude	Component (X,Y,Z)
Fixed Constraint: PIN	440.477 N	-1.13343 N	11.7074 N m	11.1573 N m
		-283.44 N		2.62074 N m
		-337.165 N		-2.38964 N m
Frictionless Constraint: QUADRANT	267.063 N	131.994 N	197.509 N m	178.243 N m
		232.123 N		-78.1011 N m
		-4.35276 N		-33.7565 N m
Frictionless Constraint: CONCRETE	2532.63 N	-130.944 N	101.094 N m	0 N m
		51.8725 N		97.5105 N m
		-2528.71 N		-26.6767 N m

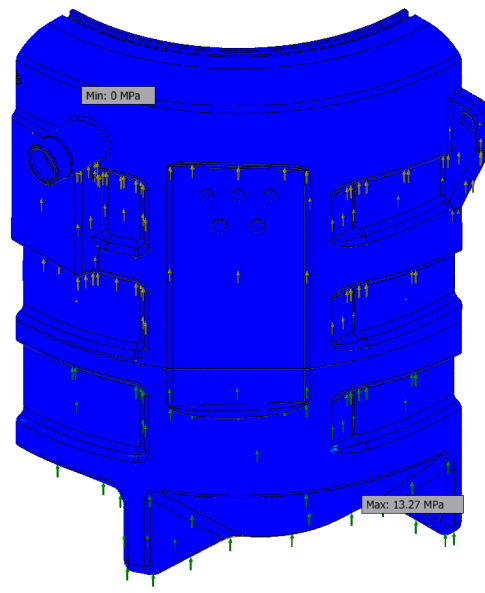
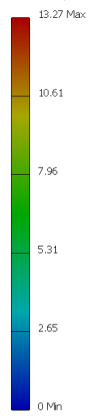
### Result Summary

Name	Minimum	Maximum
Volume	8457400 mm <sup>3</sup>	
Mass	7.91612 kg	
Von Mises Stress	0.0000509244 MPa	13.2679 MPa
Displacement	0 mm	118.354 mm
Safety Factor	1.72699 ul	15 ul
Equivalent Strain	0.000000239502 ul	0.0637143 ul

## Figures

### Von Mises Stress

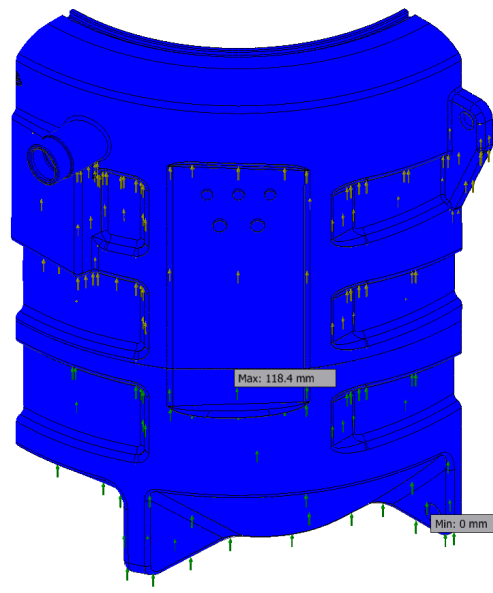
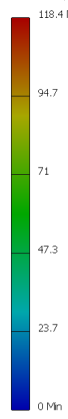
Type: Von Mises Stress  
Unit: MPa  
24/08/2021, 12:08:47 PM



☐ **Displacement**

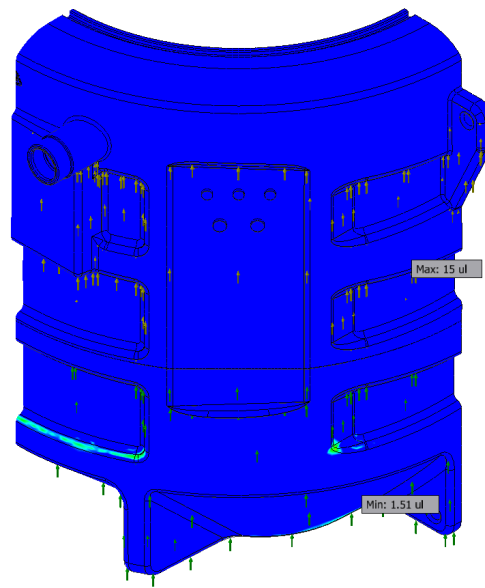
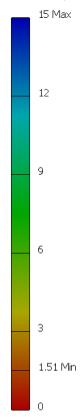


Type: Displacement  
Unit: mm  
24/08/2021, 12:09:05 PM



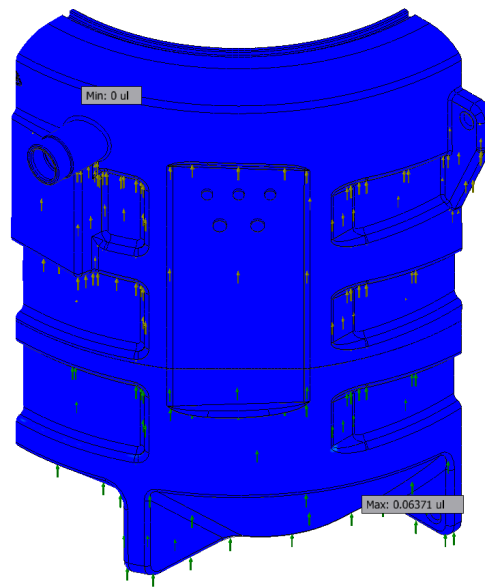
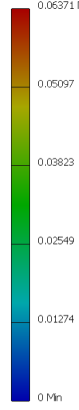
☐ **Safety Factor**

Type: Safety Factor  
Unit: ul  
24/08/2021, 12:08:56 PM



☐ **Equivalent Strain**

Type: Equivalent Strain  
Unit: ul  
24/08/2021, 12:09:13 PM  
0.06371 Max



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