

Material

SolidWorks Materials

- Steel
  - 1023 Carbon Steel Sheet (SS)
  - 201 Annealed Stainless Steel (SS)
  - A286 Iron Base Superalloy
  - AISI 1010 Steel, hot rolled bar
  - AISI 1015 Steel, Cold Drawn (SS)
  - AISI 1020
  - AISI 1020 Steel, Cold Rolled
  - AISI 1035 Steel (SS)
  - AISI 1045 Steel, cold drawn
  - AISI 304
  - AISI 316 Annealed Stainless Steel Bar (S)
  - AISI 316 Stainless Steel Sheet (SS)
  - AISI 321 Annealed Stainless Steel (SS)
  - AISI 347 Annealed Stainless Steel (SS)
  - AISI 4130 Steel, annealed at 865C
  - AISI 4130 Steel, normalized at 870C
  - AISI 4340 Steel, annealed
  - AISI 4340 Steel, normalized
  - AISI Type 316L stainless steel**
  - AISI Type A2 Tool Steel
  - Alloy Steel
  - Alloy Steel (SS)
  - ASTM A36 Steel
  - Cast Alloy Steel
  - Cast Carbon Steel
  - Cast Stainless Steel
  - Chrome Stainless Steel
  - Galvanized Steel

Properties | Tables & Curves | Appearance | CrossHatch | Custom | Application Dal

Material properties  
Materials in the default library can not be edited. You must first copy the material to a custom library to edit it.

Model Type: Linear Elastic Isotropic

Units: SI - N/m<sup>2</sup> (Pa)

Category: Steel

Name: AISI Type 316L stainless steel

Default failure criterion: Max von Mises Stress

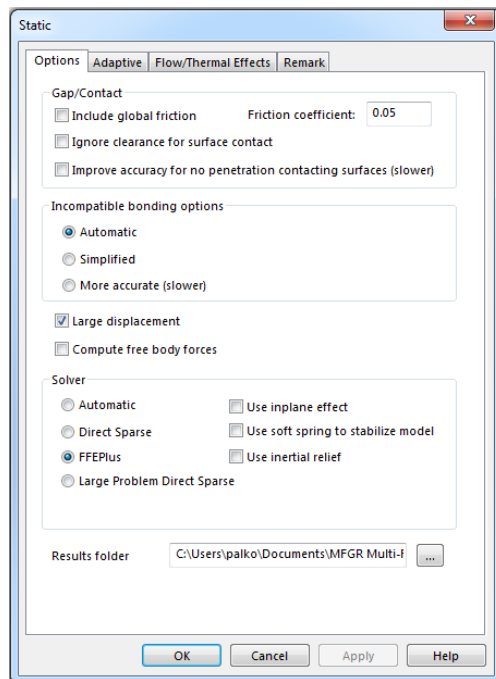
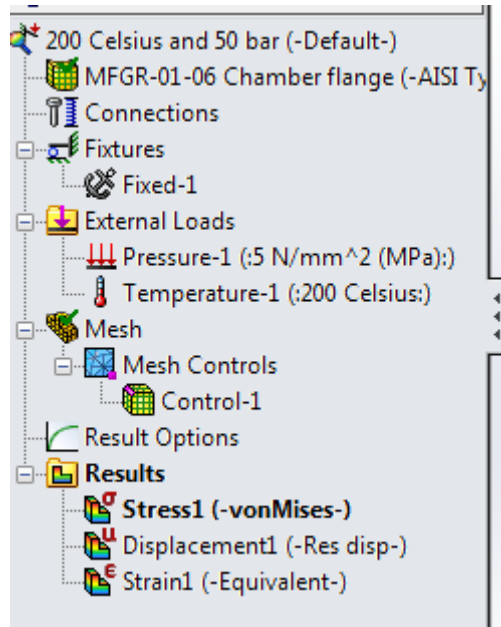
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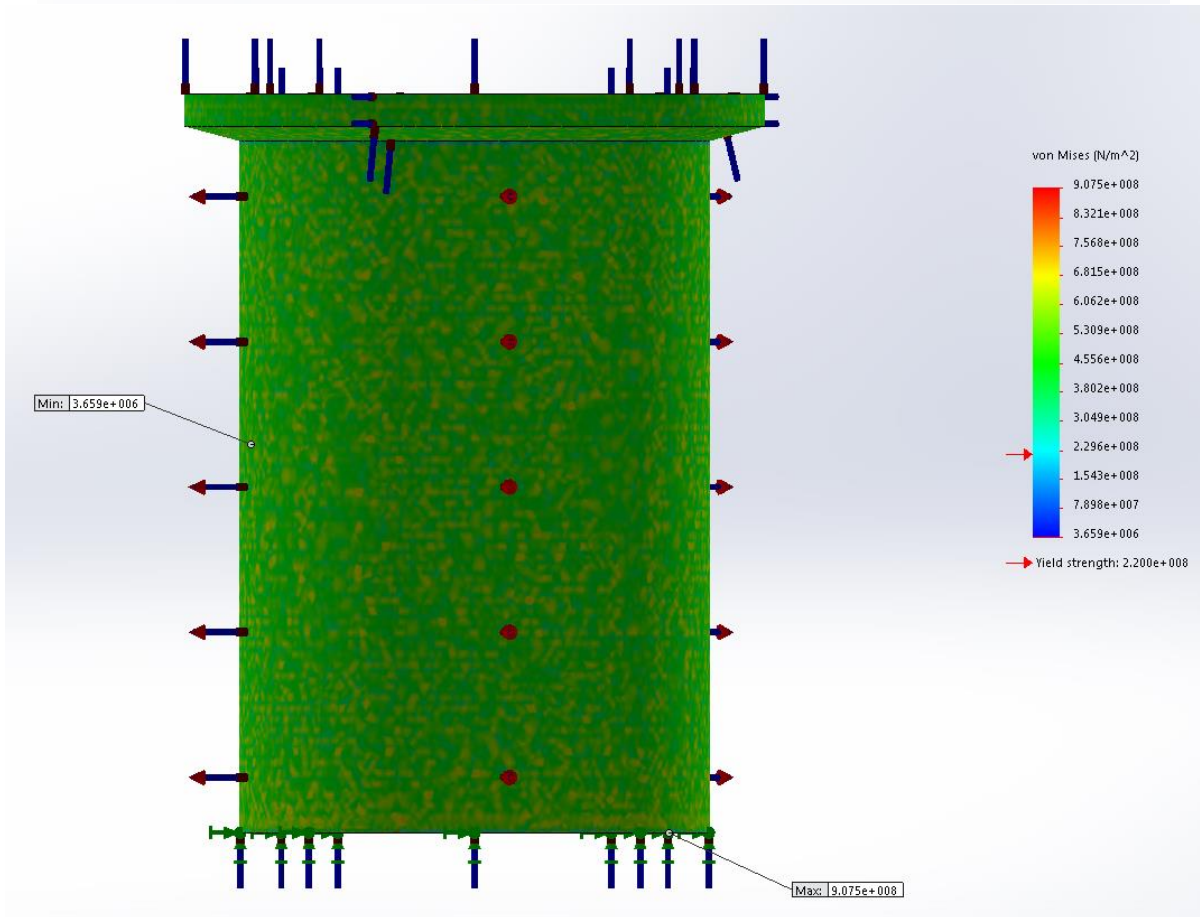
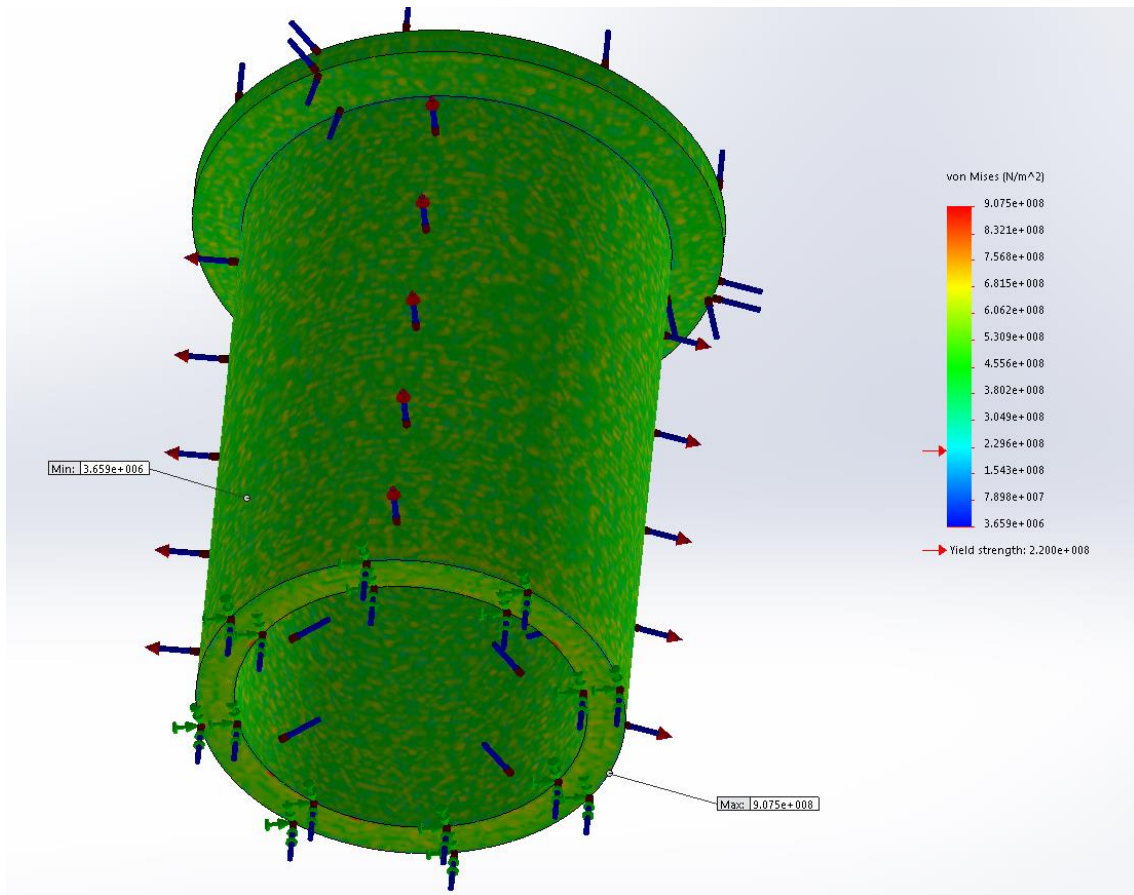
Source:

Sustainability: Defined

Property	Value	Units
Elastic Modulus	2e+011	N/m <sup>2</sup>
Poisson's Ratio	0.265	N/A
Shear Modulus	8.2e+010	N/m <sup>2</sup>
Mass Density	8027	kg/m <sup>3</sup>
Tensile Strength	485000000	N/m <sup>2</sup>
Compressive Strength		N/m <sup>2</sup>
Yield Strength	170000000	N/m <sup>2</sup>
Thermal Expansion Coefficient	1.65e-005	/K
Thermal Conductivity	14.6	W/(m-K)
Specific Heat	450	J/(kg-K)
Material Damping Ratio		N/A

Apply Close Save Config... Help





SolidWorks Static Simulation Stress von Mises resulte: at edge 9.075e+008. At the edge I can cancel the stress result but the whole flange is beyond the yield strength that i can't accept.

Calculation (not with SolidWorks) result: 4 mm wall thickness is OK for 200 Celsius and 50 bar!  
 This is the result that I can agree.

Type of shell		Cylinder	
Design pressure	P	5	N/mm <sup>2</sup> (= 1 MPa = 10 Bar)
Design temperature	T	200	°C
Material description	-	316L	
Select yield stress and specific gravity from material database			
Yield stress, design temp. R <sub>p0.2/t</sub>		170	N/mm <sup>2</sup>
Specific gravity	ρ	8027	kg/m <sup>3</sup>
Outside diameter	D <sub>e</sub>	44.5	mm
Length tangent to tangent	L	70	mm (If not a sphere)
Nominal wall thickness	e <sub>n</sub>	4	mm
Corrosion allowance	Ca	1	mm
Tolerance	tol	1.03	mm
Weld joint efficiency	z	1	-
Semi angle at apex cone	α	0	degree (For cone only)
Design Code	-	Euronorm (PE)	(ASME, Dutch R., PED)
<input type="button" value="Calculate"/>			

Note: Without warranty and for estimating purposes only. Results should be checked and approved by qualified engineer.

#### Wall thickness calculation of Cylinder according Euronorm (PED)

Allowable stress	$f = \frac{R_{p0.2/t}}{1.5} =$	$\frac{170}{1.5} =$	113.33 N/mm <sup>2</sup>
Analysis thickness	$e_a = e_n - Ca - tol =$	$4 - 1 - 1.03 =$	1.97 mm
<b>Cylinder:</b>			
Mean Diameter	$D_m = \frac{D_e + (D_e - 2 * e_a)}{2} =$	$\frac{44.5 + (44.5 - 2 * 1.97)}{2} =$	42.53 mm
Required wall thickness	$e_{min} = \frac{P * D_e}{(2 * z * f + P)} =$	$\frac{5 * 44.5}{(2 * 1 * 113.333 + 5)} =$	0.96 mm
Nominal required thickness	$e_{min,n} = e_{min} + Ca + tol =$	$0.960 + 1 + 1.03 =$	2.99 mm
Max. Allowable Working Press.	$MWAP = \frac{2 * f * z * e_a}{D_m} =$	$\frac{2 * 113.333 * 1 * 1.97}{42.53} =$	10.50 N/mm <sup>2</sup>
Thickness analysis, e <sub>n</sub> > e <sub>min,n</sub> ?	e <sub>n</sub> = 4 mm is OK		
Weight			0.29 kg
Enclosed volume			0.000 m <sup>3</sup>

What is wrong in the SW Simulation settings?