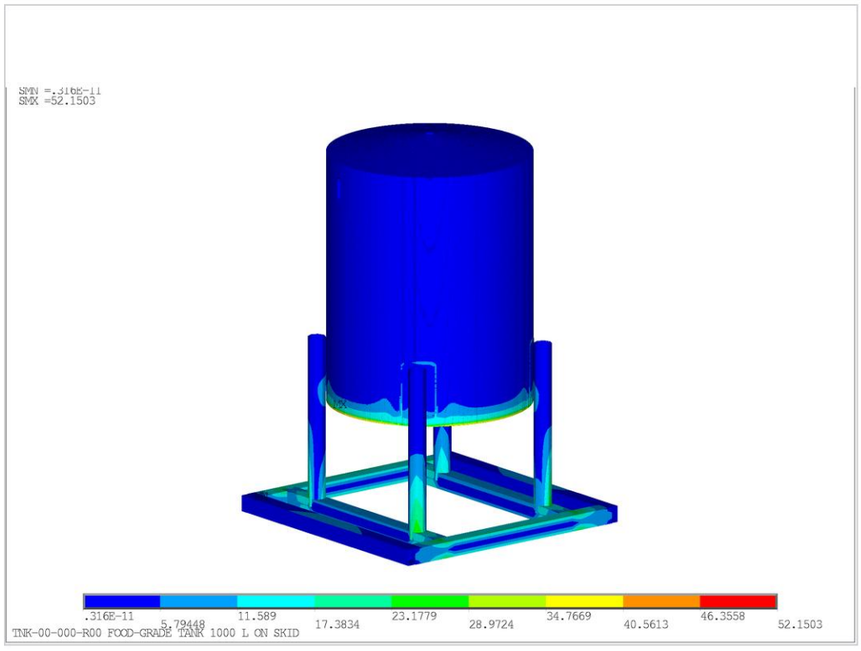
Food-grade stainless steel tank, 1,000 L on skid

Concept design · parametric 3D CAD · structural verification



Design data

Capacity	1,017 L gross, atmospheric
Vessel	ID 1000 x 1250 mm, 3 mm sheet, AISI 304 (1.4301)
Bottom	15° cone, full drain, DN50 outlet with butterfly valve
Top	10° cone, DN400 manway, CIP / inlet / vent nozzles with clamp ferrules
Supports	4 legs 88.9 x 3 on a 1300 x 1300 skid, SHS 80 x 80 x 4
Overall size	1460 x 1320 x 2100 mm
Empty mass	258 kg (22 parts, 4 sub-assemblies)



FEA results (von Mises)

Load case 1: full of liquid at 1,200 kg/m³

Cone-to-shell junction	52 MPa
Conical bottom	10 MPa
Shell at leg pads	14 MPa
Legs, axial + bending	40 MPa
Skid beams	29 MPa
Max. displacement	0.7 mm

Load case 2: lifting empty, factor 1.5

Shell at lifting lugs	23 MPa

Allowable stress

Rp0.2 / 1.5	140 MPa
Minimum margin	2.7

Method

Shell-and-beam model with 93,000 elements. Mesh convergence checked on two densities. Support reactions match the total weight within 0.3%. Hand checks in MATLAB agree with the FEA on the cone membrane stress (9.5 vs 9.8 MPa) and on the skid bending stress (27 vs 29 MPa).