



SKALNAV

MDC BUCKLING ANALYSIS REPORT

ENGINEERING ASSESSMENT DOCUMENT

Case	Sample Project
Geometry	cylinder
Prepared by	Skalnav
Date	12 July 2026

ASSESSMENT RESULT

Marginal buckling reserve. Current operational envelope is feasible but sits inside the safety band.

Minimum RF= **1.44**

MDC Buckling Analysis Report

cylinder · 4 load cases · Professional tier · 12.7.2026

MARGINAL

1.44

minimum rf

governing: LC-2 Operation — axial peak · axial buckling

MIN RF

1.44

on LC-2 Operation —

GOVERNING

LC-2

axial

FAILURE MODE

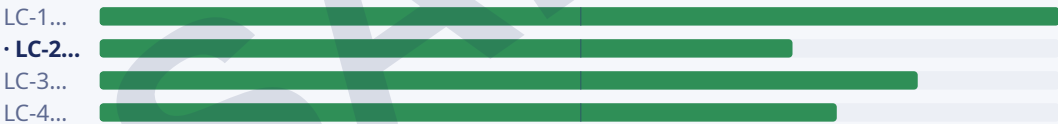
axial

R/T

330

Z = 2891

RF ENVELOPE all 4 at or above RF = 1.0 · gov LC-2 Operation — axial peak



KEY INSIGHTS

- **Governing LC: LC-2 Operation — axial peak**
axial buckling (RF = 1.44)
- **All 4 LCs at or above RF = 1.0**
Mission load envelope sits within the allowable shell capacity.
- **Geometry: R/t = 330, L/R = 3.03**

RECOMMENDATION

No corrective action required

CURRENT

min RF 1.44

LC-2 Operation — axial peak sits comfortably above RF = 1.2. Consider weight-trim opportunities in a follow-up sweep.

Method & assumptions

Method	NASA_SP8007	Bending	laterally constrained bending
Basis	Mean	Imperfection	w/t = 1.00
Imp. type	all	Thickness	plain
Regime mod.	off	Local axial	off

SAMPLE

Engineering Assessment

4 load cases · selected from the envelope by significance

LC-2 Operation — axial peak

— Governing load case

GOVERNING

PARAMETERS

F_axial	3 kN
M_bend	—
P_int	0.00 MPa
RF	1.44

ENGINEERING RATIONALE

Pure axial-compression load case.

NOTES (MISSION PROFILE)

Peak operating compression; governing case of this sample profile.

CONCLUSION

Comfortable margin, no action required.

LC-1 Handling — axial

— Reserve case

RESERVE

PARAMETERS

F_axial	2 kN
M_bend	—
P_int	0.00 MPa
RF	2.08

ENGINEERING RATIONALE

Pure axial-compression load case.

NOTES (MISSION PROFILE)

Bounding axial handling load. MDC mechanistic KDF, measured-imperfection basis.

CONCLUSION

Comfortable margin, no action required.

LC-3 Cross-check — NASA SP-8007 — Reserve case

RESERVE

PARAMETERS

F_axial	2 kN
M_bend	—
P_int	0.00 MPa
RF	1.70

ENGINEERING RATIONALE

Pure axial-compression load case.

NOTES (MISSION PROFILE)

Same load as LC-1 evaluated with the SP-8007 empirical lower bound for comparison.

CONCLUSION

Comfortable margin, no action required.

LC-4 Cross-check — EN 1993-1-6 — Reserve case

RESERVE

PARAMETERS

F_axial	2 kN
M_bend	—
P_int	0.00 MPa
RF	1.54

ENGINEERING RATIONALE

Pure axial-compression load case.

NOTES (MISSION PROFILE)

Same load as LC-1 evaluated per EN 1993-1-6 buckling design rules.

CONCLUSION

Comfortable margin, no action required.