MATERIAL DATA SHEET

EN AW-5049-O seamless tube hydraulic-bulge hardening fits (CC BY experimental)

Inverse and analytical power-law parameter pairs from multiaxial hydraulic bulging of exact EN AW-5049-O tube.

Field	Value
Material ID	elsevier-en-aw-5049-o-seamless-tube-bulge-hardening
Category	Metal
Condition	fully annealed EN AW-5049-O thin-wall seamless tube | thin-wall seamless round tube
Unit system	Common SI
Unit contract	Material properties stored in SI engineering units.
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Source and Validity

Field	Value
Quality	Experimental screening
Design release allowed	No
Source family	Experimental screening dataset
Confidence	Reference-grade
License	Open
Source note	Exact-grade condition-specific values from a CC BY 4.0 peer-reviewed article.
Citation	Bin Zhang, Benny Endelt, and Karl Brian Nielsen, Characterization of Mechanical Properties for Tubular Materials Based on Hydraulic Bulge Test under Axial Feeding Force, Functional Materials Research 3(4), 592-601 (2022), https://doi.org/10.1016/j.fmre.2022.01.024.
Valid temperature	The hydraulic-bulge test temperature is not explicitly stated.
Valid pressure	Pressure dependence is not represented as a general material function.
Valid phase / condition	fully annealed EN AW-5049-O thin-wall seamless tube
Uncertainty	The inverse and classical analytical parameter pairs are retained as separate method-dependent identifications for the exact fully annealed tube. They are not interchangeable with the tensile fit, an EN minimum or a general material allowable. The paper reports three repeated tube specimens for the selected loading path, but raw data require a request to the corresponding author. The source's one '5409-O' text inconsistency is explicitly documented rather than silently corrected.
Last reviewed	2026-08-03
Reviewer	scripts/import_additional_open_aluminum_public.py
Review status	Checked

Field	Value
Review scope	Checked the article-level CC BY 4.0 grant, DOI and pinned-file hash, exact alloy identity, condition/form/geometry, source value location, and measured or fitted property semantics.
Notes	The inverse and classical analytical parameter pairs are retained as separate method-dependent identifications for the exact fully annealed tube. They are not interchangeable with the tensile fit, an EN minimum or a general material allowable. The paper reports three repeated tube specimens for the selected loading path, but raw data require a request to the corresponding author. The source's one '5409-O' text inconsistency is explicitly documented rather than silently corrected.
License ID	CC-BY-4.0
License URL	https://creativecommons.org/licenses/by/4.0/
Attribution	Bin Zhang, Benny Endelt, and Karl Brian Nielsen

Material Condition

Field	Value
Condition	fully annealed EN AW-5049-O thin-wall seamless tube
Temper	O (fully annealed)
Heat treatment	fully annealed before testing; time, temperature and cooling schedule not stated
Product form	thin-wall seamless round tube
Thickness / diameter range	32.00 mm outside diameter x 1.50 mm nominal wall; 150.00 mm bulge-specimen length
Test direction	multiaxial T-branch tube bulging with axial feeding
Processing route	seamless commercial tube, fully annealed, T-shape hydraulic bulge test
Temperature range	The hydraulic-bulge test temperature is not explicitly stated.
Notes	The inverse and classical analytical parameter pairs are retained as separate method-dependent identifications for the exact fully annealed tube. They are not interchangeable with the tensile fit, an EN minimum or a general material allowable. The paper reports three repeated tube specimens for the selected loading path, but raw data require a request to the corresponding author. The source's one '5409-O' text inconsistency is explicitly documented rather than silently corrected.

Properties

Mechanical

Property	Value	Unit	Type	Applies to
Inverse-scheme power-law strength coefficient	374.6	MPa	Experimental Inverse Identified Constitutive Parameter Screening	fully annealed EN AW-5049-O seamless tube, 32.00 mm outside diameter x 1.50 mm nominal wall x 150.00 mm specimen length; T-shape hydraulic bulge under internal pressure and axial feeding; three tube specimens repeated with the selected loading path
Inverse-scheme power-law hardening exponent	0.32	-	Experimental Inverse Identified Constitutive Parameter Screening	fully annealed EN AW-5049-O seamless tube, 32.00 mm outside diameter x 1.50 mm nominal wall x 150.00 mm specimen length; T-shape hydraulic bulge under internal pressure and axial feeding; three tube specimens repeated with the selected loading path
Analytical bulge power-law strength coefficient	403.06	MPa	Experimental Analytically Identified Constitutive Parameter Screening	fully annealed EN AW-5049-O seamless tube, 32.00 mm outside diameter x 1.50 mm nominal wall x 150.00 mm specimen length; T-shape hydraulic bulge under internal pressure and axial feeding; three tube specimens repeated with the selected loading path
Analytical bulge power-law hardening exponent	0.46	-	Experimental Analytically Identified Constitutive Parameter Screening	fully annealed EN AW-5049-O seamless tube, 32.00 mm outside diameter x 1.50 mm nominal wall x 150.00 mm specimen length; T-shape hydraulic bulge under internal pressure and axial feeding; three tube specimens repeated with the selected loading path

Engineering note: seed solid-material values are reference values only. Verify against the project material specification or supplier data sheet before release.