MATERIAL DATA SHEET

EN AW-5049-O seamless tube tensile population (CC BY experimental)

Room-temperature longitudinal tensile values at four positions around an exact EN AW-5049-O tube.

Field	Value
Material ID	elsevier-en-aw-5049-o-seamless-tube-tensile
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	20 ... 20 degC (The paper states room-temperature tensile testing; 20 degC is a catalog nominal, not a reported chamber setpoint.)
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 exact EN AW-5049-O seamless tube geometry, four circumferential-position observations and the source mean values are retained. The paper's Tested Material paragraph contains one apparent '5409-O' typographical inconsistency; the title/abstract, figures, tables and conclusions identify 5049-O. Values are measurements and fitted tensile power-law parameters, not EN minima or allowables.
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 exact EN AW-5049-O seamless tube geometry, four circumferential-position observations and the source mean values are retained. The paper's Tested Material paragraph contains one apparent '5409-O' typographical inconsistency; the title/abstract, figures, tables and conclusions identify 5049-O. Values are measurements and fitted tensile power-law parameters, not EN minima or allowables.
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	longitudinal tension; four specimen locations around the tube circumference
Processing route	seamless commercial tube, fully annealed, specimens from one tube batch
Temperature range	20 ... 20 degC
Notes	The exact EN AW-5049-O seamless tube geometry, four circumferential-position observations and the source mean values are retained. The paper's Tested Material paragraph contains one apparent '5409-O' typographical inconsistency; the title/abstract, figures, tables and conclusions identify 5049-O. Values are measurements and fitted tensile power-law parameters, not EN minima or allowables.

Properties

Mechanical

Property	Value	Unit	Type	Applies to
Tensile yield strength	71.69	MPa	Experimental Measured Screening	fully annealed EN AW-5049-O seamless tube, 32.00 mm outside diameter, 1.50 mm nominal wall, same tube batch; longitudinal ASTM E8 tensile specimens cut at 0, 90, 180 and 270 deg positions; Instron test at room temperature and reported machine velocity 1.4 mm/min
Ultimate tensile strength	225.5	MPa	Experimental Measured Screening	fully annealed EN AW-5049-O seamless tube, 32.00 mm outside diameter, 1.50 mm nominal wall, same tube batch; longitudinal ASTM E8 tensile specimens cut at 0, 90, 180 and 270 deg positions; Instron test at room temperature and reported machine velocity 1.4 mm/min
Elongation	13.11	%	Experimental Measured Screening	fully annealed EN AW-5049-O seamless tube, 32.00 mm outside diameter, 1.50 mm nominal wall, same tube batch; longitudinal ASTM E8 tensile specimens cut at 0, 90, 180 and 270 deg positions; Instron test at room temperature and reported machine velocity 1.4 mm/min
Power-law strength coefficient	432.12	MPa	Experimental Fitted Constitutive Parameter Screening	fully annealed EN AW-5049-O seamless tube, 32.00 mm outside diameter, 1.50 mm nominal wall, same tube batch; longitudinal ASTM E8 tensile specimens cut at 0, 90, 180 and 270 deg positions; Instron test at room temperature and reported machine velocity 1.4 mm/min
Power-law hardening exponent	0.323	-	Experimental Fitted Constitutive Parameter Screening	fully annealed EN AW-5049-O seamless tube, 32.00 mm outside diameter, 1.50 mm nominal wall, same tube batch; longitudinal ASTM E8 tensile specimens cut at 0, 90, 180 and 270 deg positions; Instron test at room temperature and reported machine velocity 1.4 mm/min

Property	Value	Unit	Type	Applies to
Tensile yield strength at 0 deg circumferential position	73.36	MPa	Experimental Measured Screening	fully annealed EN AW-5049-O seamless tube, 32.00 mm outside diameter, 1.50 mm nominal wall, same tube batch; longitudinal ASTM E8 tensile specimens cut at 0, 90, 180 and 270 deg positions; Instron test at room temperature and reported machine velocity 1.4 mm/min; specimen cut at 0 deg circumferential position
Ultimate tensile strength at 0 deg circumferential position	226.47	MPa	Experimental Measured Screening	fully annealed EN AW-5049-O seamless tube, 32.00 mm outside diameter, 1.50 mm nominal wall, same tube batch; longitudinal ASTM E8 tensile specimens cut at 0, 90, 180 and 270 deg positions; Instron test at room temperature and reported machine velocity 1.4 mm/min; specimen cut at 0 deg circumferential position
Elongation at 0 deg circumferential position	12.94	%	Experimental Measured Screening	fully annealed EN AW-5049-O seamless tube, 32.00 mm outside diameter, 1.50 mm nominal wall, same tube batch; longitudinal ASTM E8 tensile specimens cut at 0, 90, 180 and 270 deg positions; Instron test at room temperature and reported machine velocity 1.4 mm/min; specimen cut at 0 deg circumferential position
Power-law strength coefficient at 0 deg circumferential position	431.52	MPa	Experimental Fitted Constitutive Parameter Screening	fully annealed EN AW-5049-O seamless tube, 32.00 mm outside diameter, 1.50 mm nominal wall, same tube batch; longitudinal ASTM E8 tensile specimens cut at 0, 90, 180 and 270 deg positions; Instron test at room temperature and reported machine velocity 1.4 mm/min; specimen cut at 0 deg circumferential position

Property	Value	Unit	Type	Applies to
Power-law hardening exponent at 0 deg circumferential position	0.323	-	Experimental Fitted Constitutive Parameter Screening	fully annealed EN AW-5049-O seamless tube, 32.00 mm outside diameter, 1.50 mm nominal wall, same tube batch; longitudinal ASTM E8 tensile specimens cut at 0, 90, 180 and 270 deg positions; Instron test at room temperature and reported machine velocity 1.4 mm/min; specimen cut at 0 deg circumferential position
Tensile yield strength at 90 deg circumferential position	73.69	MPa	Experimental Measured Screening	fully annealed EN AW-5049-O seamless tube, 32.00 mm outside diameter, 1.50 mm nominal wall, same tube batch; longitudinal ASTM E8 tensile specimens cut at 0, 90, 180 and 270 deg positions; Instron test at room temperature and reported machine velocity 1.4 mm/min; specimen cut at 90 deg circumferential position
Ultimate tensile strength at 90 deg circumferential position	227.7	MPa	Experimental Measured Screening	fully annealed EN AW-5049-O seamless tube, 32.00 mm outside diameter, 1.50 mm nominal wall, same tube batch; longitudinal ASTM E8 tensile specimens cut at 0, 90, 180 and 270 deg positions; Instron test at room temperature and reported machine velocity 1.4 mm/min; specimen cut at 90 deg circumferential position
Elongation at 90 deg circumferential position	13.04	%	Experimental Measured Screening	fully annealed EN AW-5049-O seamless tube, 32.00 mm outside diameter, 1.50 mm nominal wall, same tube batch; longitudinal ASTM E8 tensile specimens cut at 0, 90, 180 and 270 deg positions; Instron test at room temperature and reported machine velocity 1.4 mm/min; specimen cut at 90 deg circumferential position

Property	Value	Unit	Type	Applies to
Power-law strength coefficient at 90 deg circumferential position	433.21	MPa	Experimental Fitted Constitutive Parameter Screening	fully annealed EN AW-5049-O seamless tube, 32.00 mm outside diameter, 1.50 mm nominal wall, same tube batch; longitudinal ASTM E8 tensile specimens cut at 0, 90, 180 and 270 deg positions; Instron test at room temperature and reported machine velocity 1.4 mm/min; specimen cut at 90 deg circumferential position
Power-law hardening exponent at 90 deg circumferential position	0.324	-	Experimental Fitted Constitutive Parameter Screening	fully annealed EN AW-5049-O seamless tube, 32.00 mm outside diameter, 1.50 mm nominal wall, same tube batch; longitudinal ASTM E8 tensile specimens cut at 0, 90, 180 and 270 deg positions; Instron test at room temperature and reported machine velocity 1.4 mm/min; specimen cut at 90 deg circumferential position
Tensile yield strength at 180 deg circumferential position	69.22	MPa	Experimental Measured Screening	fully annealed EN AW-5049-O seamless tube, 32.00 mm outside diameter, 1.50 mm nominal wall, same tube batch; longitudinal ASTM E8 tensile specimens cut at 0, 90, 180 and 270 deg positions; Instron test at room temperature and reported machine velocity 1.4 mm/min; specimen cut at 180 deg circumferential position
Ultimate tensile strength at 180 deg circumferential position	224.61	MPa	Experimental Measured Screening	fully annealed EN AW-5049-O seamless tube, 32.00 mm outside diameter, 1.50 mm nominal wall, same tube batch; longitudinal ASTM E8 tensile specimens cut at 0, 90, 180 and 270 deg positions; Instron test at room temperature and reported machine velocity 1.4 mm/min; specimen cut at 180 deg circumferential position

Property	Value	Unit	Type	Applies to
Elongation at 180 deg circumferential position	13.37	%	Experimental Measured Screening	fully annealed EN AW-5049-O seamless tube, 32.00 mm outside diameter, 1.50 mm nominal wall, same tube batch; longitudinal ASTM E8 tensile specimens cut at 0, 90, 180 and 270 deg positions; Instron test at room temperature and reported machine velocity 1.4 mm/min; specimen cut at 180 deg circumferential position
Power-law strength coefficient at 180 deg circumferential position	431.38	MPa	Experimental Fitted Constitutive Parameter Screening	fully annealed EN AW-5049-O seamless tube, 32.00 mm outside diameter, 1.50 mm nominal wall, same tube batch; longitudinal ASTM E8 tensile specimens cut at 0, 90, 180 and 270 deg positions; Instron test at room temperature and reported machine velocity 1.4 mm/min; specimen cut at 180 deg circumferential position
Power-law hardening exponent at 180 deg circumferential position	0.325	-	Experimental Fitted Constitutive Parameter Screening	fully annealed EN AW-5049-O seamless tube, 32.00 mm outside diameter, 1.50 mm nominal wall, same tube batch; longitudinal ASTM E8 tensile specimens cut at 0, 90, 180 and 270 deg positions; Instron test at room temperature and reported machine velocity 1.4 mm/min; specimen cut at 180 deg circumferential position
Tensile yield strength at 270 deg circumferential position	70.5	MPa	Experimental Measured Screening	fully annealed EN AW-5049-O seamless tube, 32.00 mm outside diameter, 1.50 mm nominal wall, same tube batch; longitudinal ASTM E8 tensile specimens cut at 0, 90, 180 and 270 deg positions; Instron test at room temperature and reported machine velocity 1.4 mm/min; specimen cut at 270 deg circumferential position

Property	Value	Unit	Type	Applies to
Ultimate tensile strength at 270 deg circumferential position	223.2	MPa	Experimental Measured Screening	fully annealed EN AW-5049-O seamless tube, 32.00 mm outside diameter, 1.50 mm nominal wall, same tube batch; longitudinal ASTM E8 tensile specimens cut at 0, 90, 180 and 270 deg positions; Instron test at room temperature and reported machine velocity 1.4 mm/min; specimen cut at 270 deg circumferential position
Elongation at 270 deg circumferential position	13.1	%	Experimental Measured Screening	fully annealed EN AW-5049-O seamless tube, 32.00 mm outside diameter, 1.50 mm nominal wall, same tube batch; longitudinal ASTM E8 tensile specimens cut at 0, 90, 180 and 270 deg positions; Instron test at room temperature and reported machine velocity 1.4 mm/min; specimen cut at 270 deg circumferential position
Power-law strength coefficient at 270 deg circumferential position	432.36	MPa	Experimental Fitted Constitutive Parameter Screening	fully annealed EN AW-5049-O seamless tube, 32.00 mm outside diameter, 1.50 mm nominal wall, same tube batch; longitudinal ASTM E8 tensile specimens cut at 0, 90, 180 and 270 deg positions; Instron test at room temperature and reported machine velocity 1.4 mm/min; specimen cut at 270 deg circumferential position
Power-law hardening exponent at 270 deg circumferential position	0.321	-	Experimental Fitted Constitutive Parameter Screening	fully annealed EN AW-5049-O seamless tube, 32.00 mm outside diameter, 1.50 mm nominal wall, same tube batch; longitudinal ASTM E8 tensile specimens cut at 0, 90, 180 and 270 deg positions; Instron test at room temperature and reported machine velocity 1.4 mm/min; specimen cut at 270 deg circumferential position

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