MATERIAL DATA SHEET

AA2011 wire rod, 6.00/6.35 mm, tensile and Voce calibration (CC BY experimental)

Measured composition, tensile response and fitted Voce hardening parameters for exact 2011 aluminium wire rods.

Field	Value
Material ID	mdpi-aa2011-wire-6-00-6-35mm-tensile-voce
Category	Metal
Condition	2011 aluminium wire rods as supplied for tensile and drawing experiments | wire rod
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	Condition-specific base-material values from a CC BY 4.0 peer-reviewed article.
Citation	Alvaro Gonzalez, Marcela Cruchaga, Diego Celentano, and Jean-Philippe Ponthot, Damage Prediction in the Wire Drawing Process, Metals 2024, 14, 1174, https://doi.org/10.3390/met14101174.
Valid temperature	Tensile-test temperature is not reported.
Valid pressure	Pressure dependence is not represented.
Valid phase / condition	2011 aluminium wire rods as supplied for tensile and drawing experiments
Uncertainty	Exact 2011 alloy identity, measured optical-emission composition, wire geometry, tensile method and fitted Voce semantics are retained. Temper, prior processing, test temperature and replicate statistics are not reported. No UTS or standard elongation is inferred; not a product minimum or design allowable.
Last reviewed	2026-08-03
Reviewer	scripts/import_mdpi_open_aluminum_public.py
Review status	Checked
Review scope	Checked article CC BY notice, DOI and PDF hash, exact alloy/temper, source geometry, table values, and reported or measured rather than specified-minimum semantics.

Field	Value
Notes	Exact 2011 alloy identity, measured optical-emission composition, wire geometry, tensile method and fitted Voce semantics are retained. Temper, prior processing, test temperature and replicate statistics are not reported. No UTS or standard elongation is inferred; not a product minimum or design allowable.
License ID	CC-BY-4.0
License URL	https://creativecommons.org/licenses/by/4.0/
Attribution	Alvaro Gonzalez

Material Condition

Field	Value
Condition	2011 aluminium wire rods as supplied for tensile and drawing experiments
Temper	not stated; do not infer T3 or T8
Heat treatment	not stated
Product form	wire rod
Thickness / diameter range	6.00 and 6.35 mm initial diameters; 220 mm tensile-specimen length
Test direction	longitudinal wire direction
Processing route	commercial wire rods; prior processing history not stated
Temperature range	Tensile-test temperature is not reported.
Notes	Exact 2011 alloy identity, measured optical-emission composition, wire geometry, tensile method and fitted Voce semantics are retained. Temper, prior processing, test temperature and replicate statistics are not reported. No UTS or standard elongation is inferred; not a product minimum or design allowable.

Properties

Mechanical

Property	Value	Unit	Type	Applies to
Young's modulus	68.2	GPa	Experimental Measured Screening	2011 aluminium commercial wire rods, initial diameters 6.00 and 6.35 mm and length 220 mm; uniaxial tensile test at 5 mm/min with 50 mm DIC gauge length; temper and test temperature not stated
Tensile yield strength	318.0	MPa	Experimental Measured Screening	2011 aluminium commercial wire rods, initial diameters 6.00 and 6.35 mm and length 220 mm; uniaxial tensile test at 5 mm/min with 50 mm DIC gauge length; temper and test temperature not stated
Fracture strain	24.8	%	Experimental Measured Screening	2011 aluminium commercial wire rods, initial diameters 6.00 and 6.35 mm and length 220 mm; uniaxial tensile test at 5 mm/min with 50 mm DIC gauge length; temper and test temperature not stated
Voce hardening increment Q, uncoupled	155.0	MPa	Experimental Fitted Constitutive Parameter Screening	2011 aluminium commercial wire rods, initial diameters 6.00 and 6.35 mm and length 220 mm; uniaxial tensile test at 5 mm/min with 50 mm DIC gauge length; temper and test temperature not stated
Voce hardening rate b, uncoupled	23.0	-	Experimental Fitted Constitutive Parameter Screening	2011 aluminium commercial wire rods, initial diameters 6.00 and 6.35 mm and length 220 mm; uniaxial tensile test at 5 mm/min with 50 mm DIC gauge length; temper and test temperature not stated
Voce hardening increment Q, coupled	170.5	MPa	Experimental Fitted Constitutive Parameter Screening	2011 aluminium commercial wire rods, initial diameters 6.00 and 6.35 mm and length 220 mm; uniaxial tensile test at 5 mm/min with 50 mm DIC gauge length; temper and test temperature not stated
Voce hardening rate b, coupled	23.4	-	Experimental Fitted Constitutive Parameter Screening	2011 aluminium commercial wire rods, initial diameters 6.00 and 6.35 mm and length 220 mm; uniaxial tensile test at 5 mm/min with 50 mm DIC gauge length; temper and test temperature not stated

Composition

Property	Value	Unit	Type	Applies to
Aluminium mass fraction	92.12	wt.%	Experimental Measured Composition Reference	2011 aluminium commercial wire rods, initial diameters 6.00 and 6.35 mm and length 220 mm; uniaxial tensile test at 5 mm/min with 50 mm DIC gauge length; temper and test temperature not stated
Copper mass fraction	5.97	wt.%	Experimental Measured Composition Reference	2011 aluminium commercial wire rods, initial diameters 6.00 and 6.35 mm and length 220 mm; uniaxial tensile test at 5 mm/min with 50 mm DIC gauge length; temper and test temperature not stated
Silicon mass fraction	0.36	wt.%	Experimental Measured Composition Reference	2011 aluminium commercial wire rods, initial diameters 6.00 and 6.35 mm and length 220 mm; uniaxial tensile test at 5 mm/min with 50 mm DIC gauge length; temper and test temperature not stated
Iron mass fraction	0.52	wt.%	Experimental Measured Composition Reference	2011 aluminium commercial wire rods, initial diameters 6.00 and 6.35 mm and length 220 mm; uniaxial tensile test at 5 mm/min with 50 mm DIC gauge length; temper and test temperature not stated
Manganese mass fraction	0.008	wt.%	Experimental Measured Composition Reference	2011 aluminium commercial wire rods, initial diameters 6.00 and 6.35 mm and length 220 mm; uniaxial tensile test at 5 mm/min with 50 mm DIC gauge length; temper and test temperature not stated
Magnesium mass fraction	0.004	wt.%	Experimental Measured Composition Reference	2011 aluminium commercial wire rods, initial diameters 6.00 and 6.35 mm and length 220 mm; uniaxial tensile test at 5 mm/min with 50 mm DIC gauge length; temper and test temperature not stated
Chromium mass fraction	0.004	wt.%	Experimental Measured Composition Reference	2011 aluminium commercial wire rods, initial diameters 6.00 and 6.35 mm and length 220 mm; uniaxial tensile test at 5 mm/min with 50 mm DIC gauge length; temper and test temperature not stated

Property	Value	Unit	Type	Applies to
Zinc mass fraction	0.004	wt.%	Experimental Measured Composition Reference	2011 aluminium commercial wire rods, initial diameters 6.00 and 6.35 mm and length 220 mm; uniaxial tensile test at 5 mm/min with 50 mm DIC gauge length; temper and test temperature not stated
Titanium mass fraction	0.008	wt.%	Experimental Measured Composition Reference	2011 aluminium commercial wire rods, initial diameters 6.00 and 6.35 mm and length 220 mm; uniaxial tensile test at 5 mm/min with 50 mm DIC gauge length; temper and test temperature not stated
Bismuth mass fraction	0.49	wt.%	Experimental Measured Composition Reference	2011 aluminium commercial wire rods, initial diameters 6.00 and 6.35 mm and length 220 mm; uniaxial tensile test at 5 mm/min with 50 mm DIC gauge length; temper and test temperature not stated
Tin mass fraction	0.004	wt.%	Experimental Measured Composition Reference	2011 aluminium commercial wire rods, initial diameters 6.00 and 6.35 mm and length 220 mm; uniaxial tensile test at 5 mm/min with 50 mm DIC gauge length; temper and test temperature not stated
Lead mass fraction	0.49	wt.%	Experimental Measured Composition Reference	2011 aluminium commercial wire rods, initial diameters 6.00 and 6.35 mm and length 220 mm; uniaxial tensile test at 5 mm/min with 50 mm DIC gauge length; temper and test temperature not stated

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