MATERIAL DATA SHEET

EN AW-1080A extruded-rod Hensel-Spittel model (CC BY experimental)

Full fitted Hensel-Spittel coefficient set for the article's extruded EN AW-1080A state.

Field	Value
Material ID	frontiers-en-aw-1080a-extruded-hensel-spittel
Category	Metal
Condition	extruded EN AW-1080A coefficient row; source billet described as extruded and annealed rod | extruded rod used as a copper-clad-aluminum billet core
Unit system	Common SI
Unit contract	Material properties stored in SI engineering units.
Generated	2026-11-15 23:02

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	Stefan Kuhnke, Vidal Sanabria, Felix Gensch, Rene Nitschke, and Soeren Mueller, Numerical Investigations on Material Flow During Indirect Extrusion of Copper-Clad Aluminum Rods, Frontiers in Materials 7, 157 (2020), https://doi.org/10.3389/fmats.2020.00157.
Valid temperature	The complete calibration-temperature grid for the additional extruded-state tests is not restated.
Valid pressure	Pressure dependence is not represented as a general material function.
Valid phase / condition	extruded EN AW-1080A coefficient row; source billet described as extruded and annealed rod
Uncertainty	The coefficient row is labelled EN AW-1080A (extruded). The extrusion-trial material is described as an extruded and annealed rod, but the annealing schedule and the full grid for the additional extruded-aluminum compression tests are not restated. The source's condition wording is therefore preserved without assigning a registered temper or copying the cast grid. The fitted model is a forming/simulation reference, not a tensile minimum or design allowable.
Last reviewed	2026-08-03
Reviewer	scripts/import_additional_open_aluminum_public.py

Field	Value
Review status	Checked
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 coefficient row is labelled EN AW-1080A (extruded). The extrusion-trial material is described as an extruded and annealed rod, but the annealing schedule and the full grid for the additional extruded-aluminum compression tests are not restated. The source's condition wording is therefore preserved without assigning a registered temper or copying the cast grid. The fitted model is a forming/simulation reference, not a tensile minimum or design allowable.
License ID	CC-BY-4.0
License URL	https://creativecommons.org/licenses/by/4.0/
Attribution	Stefan Kuhnke et al.

Material Condition

Field	Value
Condition	extruded EN AW-1080A coefficient row; source billet described as extruded and annealed rod
Temper	extruded and annealed source state; registered temper and annealing schedule not stated
Heat treatment	annealed, schedule not stated
Product form	extruded rod used as a copper-clad-aluminum billet core
Thickness / diameter range	source core turned to 26 mm diameter x 100 mm; compression-specimen geometry not restated
Test direction	compression direction relative to extrusion direction not stated
Processing route	commercial extruded and annealed rod; additional hot-compression tests; fitted for extrusion FEM
Temperature range	The complete calibration-temperature grid for the additional extruded-state tests is not restated.
Notes	The coefficient row is labelled EN AW-1080A (extruded). The extrusion-trial material is described as an extruded and annealed rod, but the annealing schedule and the full grid for the additional extruded-aluminum compression tests are not restated. The source's condition wording is therefore preserved without assigning a registered temper or copying the cast grid. The fitted model is a forming/simulation reference, not a tensile minimum or design allowable.

Properties

Mechanical

Property	Value	Unit	Type	Applies to
Hensel-Spittel coefficient A	890.0	MPa	Experimental Fitted Constitutive Parameter Screening	extruded EN AW-1080A used for the aluminum core; the source billet was an extruded and annealed rod turned to 26 mm diameter x 100 mm; additional hot-compression tests were fitted, but their complete specimen and calibration grid is not restated
Hensel-Spittel coefficient a1	-0.002	-	Experimental Fitted Constitutive Parameter Screening	extruded EN AW-1080A used for the aluminum core; the source billet was an extruded and annealed rod turned to 26 mm diameter x 100 mm; additional hot-compression tests were fitted, but their complete specimen and calibration grid is not restated
Hensel-Spittel coefficient a2	0.17	-	Experimental Fitted Constitutive Parameter Screening	extruded EN AW-1080A used for the aluminum core; the source billet was an extruded and annealed rod turned to 26 mm diameter x 100 mm; additional hot-compression tests were fitted, but their complete specimen and calibration grid is not restated
Hensel-Spittel coefficient a3	0.04	-	Experimental Fitted Constitutive Parameter Screening	extruded EN AW-1080A used for the aluminum core; the source billet was an extruded and annealed rod turned to 26 mm diameter x 100 mm; additional hot-compression tests were fitted, but their complete specimen and calibration grid is not restated
Hensel-Spittel coefficient a4	0.0	-	Experimental Fitted Constitutive Parameter Screening	extruded EN AW-1080A used for the aluminum core; the source billet was an extruded and annealed rod turned to 26 mm diameter x 100 mm; additional hot-compression tests were fitted, but their complete specimen and calibration grid is not restated

Property	Value	Unit	Type	Applies to
Hensel-Spittel coefficient a5	0.0	-	Experimental Fitted Constitutive Parameter Screening	extruded EN AW-1080A used for the aluminum core; the source billet was an extruded and annealed rod turned to 26 mm diameter x 100 mm; additional hot-compression tests were fitted, but their complete specimen and calibration grid is not restated
Hensel-Spittel coefficient a6	-0.2	-	Experimental Fitted Constitutive Parameter Screening	extruded EN AW-1080A used for the aluminum core; the source billet was an extruded and annealed rod turned to 26 mm diameter x 100 mm; additional hot-compression tests were fitted, but their complete specimen and calibration grid is not restated
Hensel-Spittel coefficient a7	0.0	-	Experimental Fitted Constitutive Parameter Screening	extruded EN AW-1080A used for the aluminum core; the source billet was an extruded and annealed rod turned to 26 mm diameter x 100 mm; additional hot-compression tests were fitted, but their complete specimen and calibration grid is not restated
Hensel-Spittel coefficient a8	0.0	-	Experimental Fitted Constitutive Parameter Screening	extruded EN AW-1080A used for the aluminum core; the source billet was an extruded and annealed rod turned to 26 mm diameter x 100 mm; additional hot-compression tests were fitted, but their complete specimen and calibration grid is not restated

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