MATERIAL DATA SHEET

Matbench steel composition 251 (experimental screening)

Open experimental steel screening observation containing the upstream composition string and yield-strength target.

Field	Value
Material ID	matbench-steel-251
Category	Metal
Condition	experimental benchmark row; condition not retained | not supplied
Unit system	Common SI
Unit contract	Material properties stored in SI engineering units.
Generated	2026-11-15 23:01

Source and Validity

Field	Value
Quality	Experimental screening
Design release allowed	No
Source family	Experimental screening dataset
Confidence	Engineering estimate
License	Open
Source note	CC BY 4.0 experimental screening row from a pinned Matbench snapshot.
Citation	Matbench Steels v1.1, row 251, DOI 10.18126/524Z-VD6M; 312 steel compositions with experimental yield strength, CC BY 4.0; https://acdc.alcf.anl.gov/mdf/detail/steel_strength_v1.1/
Valid temperature	Test temperature is not supplied by the Matbench benchmark.
Valid pressure	Test pressure is not supplied; pressure dependence is not represented.
Valid phase / condition	Experimental steel observation in the Matbench benchmark. The benchmark does not retain grade, product form, heat treatment, test temperature, test direction, specimen geometry, or test method for this row.
Uncertainty	The benchmark provides only a composition string and measured yield-strength target. It cannot establish an alloy grade or allowable without the omitted processing, product-form, and test context.
Last reviewed	2026-08-01
Reviewer	scripts/import_matbench_public_steels.py
Review status	Checked
Review scope	Checked the pinned hash, record count, CC BY 4.0 attribution, upstream units, and deterministic row mapping; original test reports were not reconstructed.

Field	Value
Notes	Composition-level observation only; not a named grade or design allowable.
License ID	CC-BY-4.0
License URL	https://creativecommons.org/licenses/by/4.0/
Attribution	Matbench Steels dataset via the Materials Data Facility

Material Condition

Field	Value
Condition	experimental benchmark row; condition not retained
Temper	not supplied
Heat treatment	not supplied
Product form	not supplied
Thickness / diameter range	not supplied
Test direction	not supplied
Processing route	not supplied
Temperature range	Test temperature is not supplied by the Matbench benchmark.
Notes	The benchmark provides only a composition string and measured yield-strength target. It cannot establish an alloy grade or allowable without the omitted processing, product-form, and test context.

Properties

Mechanical

Property	Value	Unit	Type	Applies to
Yield strength	1730.2	MPa	Experimental Value	Experimental steel observation in the Matbench benchmark. The benchmark does not retain grade, product form, heat treatment, test temperature, test direction, specimen geometry, or test method for this row.

Identity

Property	Value	Unit	Type	Applies to
Composition string	Fe0.781C0.00141Mn0.000103Si0.000201Cr0.000109Ni0.167Mo0.000118V0.0200Nb0.0152Co0.0000960Al0.00210Ti0.0126	-	Source Identifier	Exact composition notation supplied by the benchmark; no fraction basis is inferred.

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