MATERIAL DATA SHEET

# Matbench steel composition 042 (experimental screening)

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

| Field | Value |
|---|---|
| Material ID | matbench-steel-042 |
| 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 23:19 |

## 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 42, 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 | 2157.3 | 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 | Fe0.671C0.00047 0Mn0.000514Si0.00100Cr0.000109Ni0.141Mo0.00882V0.000111Nb0.0000607Co0.147Al0.0159Ti0.0137 | - | 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.