

Material Selection Guide

Eleven material grades for wedge wire screens — properties, limits, and typical applications, drawn from the engineering database behind our material wizard.



INTRODUCTION

Selecting a material means matching four operating realities.

Wedge wire screens run in water treatment plants, mineral processing lines, food-grade vessels, chemical reactors, and architectural facades. Each environment loads the screen material differently. Every grade in this guide is scored against four axes — use them to narrow the choice before reading the detailed pages that follow.

Chloride exposure

Chloride ions break through the passive oxide film on stainless steel and start pit corrosion or stress corrosion cracking. The **Pitting Resistance Equivalent Number** ($PREN = \%Cr + 3.3 \cdot \%Mo + 16 \cdot \%N$) predicts how well a grade resists chloride attack. PREN 18 tolerates around 200 ppm Cl^- at ambient; PREN 24 handles 1000 ppm; duplex and super duplex clear 3 600 to 50 000 ppm.

Abrasive load

Solids moving across the screen face wear the wedge wire. Austenitic stainless rates 1 on our four-point abrasion scale. Duplex rates 2. For heavy abrasion — mining fines, aggregate — **S700** or **Hardox 450/500** delivers three to four times the service life, accepting the trade-off of zero corrosion resistance.

Operating temperature

High temperatures trigger three failure modes: carbide precipitation at weld zones (sensitization), reduced chloride resistance, and creep. Above 400 °C the titanium-stabilised grades (**SS 316Ti**, **SS 321**) prevent sensitization. Duplex alloys are capped at 300 °C — the 475 °C embrittlement region degrades the ferrite phase beyond that.

Cost & fabrication

Cost is expressed as an index relative to SS 304 (1.00). SS 316L sits at **1.30**. Super Duplex 2507 is near 2×. Structural steels run 0.35–0.55, Hardox around 0.70. Fabrication complexity layers on top: duplex and super duplex require qualified welding procedures, which tend to drive lead time more than the raw material premium does.

AT A GLANCE

All eleven grades on one page.

Properties collected from the materials database. Chloride limits are for ambient-temperature service; halve them for hot chloride exposure. Cost index uses SS 304 = 1.00 as the baseline.

GRADE	DESIGNATION	MAX TEMP	PREN	CL ⁻ LIMIT	COST IDX	WELD	BEST FOR
AUSTENITIC STAINLESS STEELS							
SS 304	1.4301 · S30400	800 °C	18.0	200 ppm	1.00	Good	General freshwater filtration, controlled environments
SS 304L	1.4307 · S30403	800 °C	18.0	200 ppm	1.00	Excellent	Welded wedge wire assemblies, standard duty
SS 316	1.4401 · S31600	800 °C	24.2	1 000 ppm	1.30	Good	Chlorinated water, mild acid, marine atmosphere
SS 316L	1.4404 · S31603	800 °C	24.2	1 000 ppm	1.30	Excellent	Industry standard · FDA, 3-A, EHEDG compliant
SS 316Ti	1.4571 · S31635	900 °C	24.2	1 000 ppm	1.35	Good	Hot chloride service, petrochemical streams
SS 321	1.4541 · S32100	900 °C	18.0	200 ppm	1.10	Good	Hot non-chloride (exhaust, kiln, furnace)
DUPLEX AND SUPER DUPLEX							
Duplex 2205	1.4462 · S32205	300 °C	35.0	3 600 ppm	1.22	Moderate	Brackish water, offshore, chloride > 1 000 ppm
Super Duplex 2507	1.4410 · S32750	300 °C	42.5	50 000 ppm	1.96	Moderate	Full seawater immersion, desalination
STRUCTURAL & WEAR-RESISTANT							
S355	EN 10025-2	400 °C	—	—	0.35	Excellent	Coated structural frames, dry indoor screens
S700	EN 10149-2	300 °C	—	—	0.55	Moderate	Heavy-load mining screens, vibrating decks
Hardox 450/500	SSAB proprietary	250 °C	—	—	0.70	Limited	Extreme abrasion, dry mineral processing

Chloride limits. Ambient readings shown; hot chloride service reduces the limit by a factor of roughly four (SS 316L drops from 1 000 to 250 ppm at elevated temperatures). For combined heat and chloride service above 60 °C, step up to SS 316Ti or duplex grades.

The 304 and 316 families.

SS 304

1.4301 · S30400

General-purpose austenitic

PREN	CL ⁻	MAX TEMP	COST IDX
18.0	200 ppm	800 °C	1.00

The most cost-effective stainless steel. Reliable in freshwater and sheltered environments. Loses corrosion resistance quickly in chlorinated or brackish service.

STRENGTHS

Lowest-cost stainless
Good formability
Broad profile availability

LIMITS

Pitting above 200 ppm Cl⁻
Not for welded assemblies (prefer 304L)

SS 304L

1.4307 · S30403

Low-carbon 304 for welded assemblies

PREN	CL ⁻	MAX TEMP	COST IDX
18.0	200 ppm	800 °C	1.00

The preferred grade for resistance-welded wedge wire. Low carbon content prevents chromium carbide precipitation at weld zones, keeping full corrosion resistance along every joint.

STRENGTHS

No weld sensitization
Same price as SS 304
Best cost-performance for general service

LIMITS

Same chloride ceiling as 304
Slightly lower yield strength

SS 316

1.4401 · S31600

Molybdenum-bearing, chloride-capable

PREN	CL ⁻	MAX TEMP	COST IDX
24.2	1 000 ppm	800 °C	1.30

Adding 2–3 % molybdenum lifts PREN from 18 to 24. Suited to chlorinated process water, coastal atmospheres, and mild chemical streams.

STRENGTHS

Significant chloride tolerance
Good acid resistance
Marine-atmosphere capable

LIMITS

Weld sensitization risk
Use 316L for welded assemblies

SS 316L

1.4404 · S31603

Industry standard for wedge wire

PREN	CL ⁻	MAX TEMP	COST IDX
24.2	1 000 ppm	800 °C	1.30

The default grade for most wedge wire screens. Combines low-carbon weldability with molybdenum chloride resistance, and meets FDA, 3-A, and EHEDG requirements for food and pharmaceutical service.

STRENGTHS

FDA / 3-A / EHEDG compliant
Excellent weldability
Electropolishable for hygiene

LIMITS

Not for long-term seawater immersion

High-temperature austenitic, plus the duplex family.

SS 316Ti

1.4571 · S31635

High-temperature chloride service

PREN	CL ⁻	MAX TEMP	COST IDX
24.2	1 000 ppm	900 °C	1.35

Titanium stabilisation prevents carbide precipitation above 400 °C, maintaining chloride resistance at elevated temperature. Specified for petrochemical streams and flue-gas treatment where heat and chloride coincide.

STRENGTHS

Sustained 900 °C service
Chloride resistance maintained hot
Good creep properties

LIMITS

More expensive than 316L
Limited profile availability

SS 321

1.4541 · S32100

High-temperature, non-chloride

PREN	CL ⁻	MAX TEMP	COST IDX
18.0	200 ppm	900 °C	1.10

Titanium-stabilised grade for hot environments without chloride. Common in exhaust-gas screens and kiln or furnace applications. Cheaper than 316Ti but no molybdenum — pits in chloride service.

STRENGTHS

900 °C capable
Lower cost than 316Ti
Good oxidation resistance

LIMITS

No Mo — unsuitable for chloride

Duplex 2205

1.4462 · S32205

Seawater-capable, twice the yield of 316L

PREN	CL ⁻	MAX TEMP	COST IDX
35.0	3 600 ppm	300 °C	1.22

Dual-phase austenite-plus-ferrite microstructure delivering 450 MPa yield and PREN 35. Thinner sections possible, reducing both weight and cost. Temperature capped at 300 °C by the 475 °C embrittlement region.

STRENGTHS

2× yield strength of 316L
Stress-corrosion-cracking resistant
Seawater capable

LIMITS

Hard cap at 300 °C
Qualified welding procedures required

Super Duplex 2507

1.4410 · S32750

Maximum corrosion resistance

PREN	CL ⁻	MAX TEMP	COST IDX
42.5	50 000 ppm	300 °C	1.96

The grade for full seawater immersion and aggressive chloride service. PREN 42.5 and 550 MPa yield strength allow service where no austenitic grade survives — desalination intakes, offshore platforms.

STRENGTHS

Highest pitting resistance
550 MPa yield
25+ year design life in seawater

LIMITS

Highest material cost
Complex welding

STRUCTURAL & WEAR-RESISTANT

Carbon and alloy steels for load, not corrosion.

None of the three grades below resist corrosion on their own. Specified where mechanical load or abrasion dominates and the screen will be coated, bolted-on as replaceable wear plate, or run in dry service.

S355

EN 10025-2

Coated structural carbon steel

YIELD	MAX TEMP	ABRASION	COST IDX
355 MPa	400 °C	1 / 4	0.35

Carbon steel to EN 10025-2. No inherent corrosion resistance — requires paint, galvanising, or plastic coating. Used for dry indoor screens, structural frames, and short-service dewatering where replacement is acceptable.

STRENGTHS

Lowest material cost
Excellent weldability
Widely stocked

LIMITS

Must be coated
Rusts in any wet service

S700

EN 10149-2

Ultra-high-strength structural

YIELD	MAX TEMP	ABRASION	COST IDX
700 MPa	300 °C	2 / 4	0.55

700 MPa yield EN 10149-2 grade. Used where mechanical load drives the design — heavy-duty mining screen decks and vibrating screen frames. Enables thinner sections but adds weldability complexity.

STRENGTHS

700 MPa yield
Thinner sections, less weight
Impact-rated

LIMITS

No corrosion resistance
Preheat needed for welding

Hardox 450/500

SSAB proprietary

Extreme abrasion resistance

HARDNESS	MAX TEMP	ABRASION	COST IDX
425–500 HBW	250 °C	4 / 4	0.70

SSAB-proprietary wear-resistant plate, 425–500 HBW surface hardness. Three to four times the service life of standard steel in aggressive abrasion — coal, aggregate, mineral processing. Sourcing is specific to SSAB.

STRENGTHS

3–4× wear life vs. standard steel
425–500 HBW surface hardness
Impact-resistant despite hardness

LIMITS

No corrosion resistance
Weldable only by SSAB procedures

FABRICATION

Most wedge wire is resistance-welded. The grade decides what happens next.

Resistance welding fuses the V-wire to support rods at each intersection, making every screen a lattice of thousands of small weld zones. Each weld sees a brief thermal cycle into the sensitization temperature band. The grade — and how its carbon or titanium is handled — determines whether the chromium oxide layer survives.

Why the L-grades exist

The two most common wedge wire materials are **SS 304L** and **SS 316L**, both capped at 0.03 % carbon. The low carbon prevents chromium-carbide precipitation at grain boundaries during the weld thermal cycle. Without that, chromium is stripped from the matrix near the weld and intergranular corrosion follows.

Titanium stabilisation

SS 316Ti and **SS 321** carry a small titanium addition that binds carbon as TiC. Grain boundaries stay clean under prolonged heat, so these grades hold corrosion resistance above 400 °C where L-grades would not.

Specify L-grades for every welded assembly

SS 304L and SS 316L carry a negligible cost premium over their standard counterparts and eliminate weld sensitization. For resistance-welded wedge wire, this is not optional.

Match the heat to duplex structure

Duplex 2205 relies on a 50 / 50 austenite-ferrite balance set at the mill. Too little heat input favours ferrite; too much forms brittle sigma phase. Follow qualified welding procedures (WPS / PQR) — duplex is not a grade to improvise on.

Follow SSAB protocol for super duplex

Super Duplex 2507 requires still tighter process control: root protection with inert gas, capped interpass temperature, controlled heat input. The penalty for cutting corners is a sigma-embrittled joint that fails after commissioning.

Preheat S700 to avoid hydrogen cracking

High-strength structural grades are vulnerable to hydrogen-assisted cracking when welded cold. A 100–150 °C preheat and low-hydrogen electrodes control the cooling rate and prevent weld-line cracking.

Treat Hardox as a bolt-on wear plate

Welding reduces hardness in the heat-affected zone. SSAB publishes grade-specific procedures — minimise heat input, low-hydrogen consumables, no full-penetration joints in the wear face. Hardox is best installed as a replaceable panel bolted to an S355 or S700 frame.

DECISION MATRIX

Match the environment, then refine on cost and fabrication.

Starting point for specifying the material grade against the dominant stressor. For compound environments (hot chloride, corrosive abrasion), pick the worst case and cross-check against the other axes.

By water quality

Freshwater (Cl⁻ < 200 ppm) **SS 304L · SS 316L**

Brackish (200–3 000 ppm) **SS 316L**

High chloride (> 3 000 ppm) **Duplex 2205**

Seawater / brine **Super Duplex 2507**

Desalination intake **Super Duplex 2507**

By temperature

Ambient to 150 °C **Any austenitic grade**

150–400 °C, chloride present **SS 316Ti**

400–900 °C, no chloride **SS 321**

400–900 °C, chloride present **SS 316Ti**

Cryogenic (< -50 °C) **SS 304L · SS 316L**

By abrasion load

Light (process water, food) **SS 304 / 316 series**

Moderate, wet & corrosive **Duplex 2205**

Heavy, dry (mining fines) **S700 · Hardox 450/500**

Heavy, wet & corrosive **Super Duplex 2507**

Vibrating deck frames **S355 · S700**

By regulatory regime

FDA, 3-A, EHEDG food contact **SS 316L**

Pharmaceutical high-purity **SS 316L electropolished**

NACE sour service **Duplex 2205 · 2507**

Oil & gas sand control **Super Duplex · Inconel 625/825**

US CWA 316(b) intake **SS 316L · Super Duplex**

CE-marked structure **S355 · S700**

Beyond the eleven grades — sand control & sour service. For oil & gas sand control screens in sour wells, where chloride, H₂S, and temperature exceed super duplex limits, nickel alloys **Inconel 625** and **Inconel 825** are specified on request — manufactured to API 15LE / ISO 17824 and NACE MRO175.

NEXT STEP

Map your operating environment to a grade specification.

The interactive wizard on our website scores all eleven grades against your process parameters — chloride, temperature, pH, abrasive load — and returns a ranked short list with full comparison data. For application-specific guidance, reach the engineering team directly.

WEB TOOL

Material Selection Wizard

adenwedgewire.com/material-selection-wizard

Interactive scoring across 25+ material properties.

ENGINEERING CONTACT

Technical consultation on custom grades and combined-stressor environments.

info@adenwedgewire.com

Response within one business day.