

Global Standards & Steel Grades Comparison Guide

Technical Reference for ERW & LSAW Straight Seam Welded Pipes

1. Introduction & Overview

In global piping projects, sourcing straight seam welded steel pipes (including High-Frequency ERW and Longitudinal Submerged Arc Welded LSAW) requires strict adherence to regional engineering codes. Project managers and engineers frequently encounter challenges when correlating international standards such as American (API/ASTM), European (EN), German (DIN), and Chinese (GB).

This technical guide provides a cross-reference matrix of equivalent steel grades, mechanical properties, and pressure design rules to streamline the procurement, bidding, and compliance processes.

2. International Steel Grade Cross-Reference Matrix

The following cross-reference table highlights commercial equivalents based on chemical composition and yield/tensile thresholds. While these grades can often be interchanged in structural or fluid conveyance layouts, strict project-specific design verification is recommended for extreme high-pressure boundaries.

Application Type	American Standard (API / ASTM)	European Standard (EN 10219 / 10217)	German Standard (DIN)	Chinese Standard (GB/T 3091 / 9711)
Low Pressure Fluid Conveyance & Structural	ASTM A53 Grade A	EN 10219 S235JRH	DIN 1626 St 37.0	GB/T 3091 Q235B
	ASTM A53 Grade B	EN 10219 S275J0H	DIN 1626 St 44.0	GB/T 3091 Q275B
High-Strength Structural & Piling	ASTM A500 Grade B	EN 10219 S355J2H	DIN 17120 St 52-3	GB/T 3091 Q355B / Q355C
	ASTM A500 Grade C	EN 10219 S420MH	—	GB/T 3091 Q420B
Oil & Gas Pipeline Systems	API 5L Grade B (PSL1/PSL2)	EN 10217-1 P235TR1/TR2	DIN 1629 St 37.4	GB/T 9711 L245 / L245N
	API 5L X42 (PSL1/PSL2)	EN 10217-3 P275NL1	DIN 1629 St 44.4	GB/T 9711 L290 / L290N
	API 5L X52 (PSL1/PSL2)	EN 10217-3 P355N	DIN 1629 St 52.4	GB/T 9711 L360 / L360M
	API 5L X60 / X65	EN 10217-3 P460NH	—	GB/T 9711 L415M / L450M

3. Mechanical Properties & Testing Benchmarks

To fulfill demanding inspection schedules (such as 100% Non-Destructive Testing - NDT), the minimum mechanical criteria must be strictly evaluated. The baseline yield and tensile specifications for the primary global pipeline classes are specified below:

Steel Grade	Min. Yield Strength (MPa)	Tensile Strength (MPa)	Min. Elongation (%)	Mandatory Inspection Options
ASTM A53 Gr. B	≥ 240	≥ 415	Standard formula base	Hydrostatic, Eddy Current, UT Seam Scan
EN 10219 S355J2H	≥ 355	470 – 630	≥ 22	Charpy V-Notch Impact Test (-20°C), Visual
API 5L X52 (PSL2)	245 – 450	435 – 760	Calculated per area	100% Ultrasonic Seam Test, Flattening Test
GB/T 9711 L360M	360 – 530	460 – 760	Custom per gauge	Hydrostatic Test, X-Ray Weld Examination

 **Important Notice on Wall Thickness Tolerances**

American standards (such as ASTM A53) generally allow a under-tolerance of -12.5% on the nominal wall thickness. Conversely, European and Chinese API-aligned standards enforce much narrower boundaries (often varying from -5% to -10% depending on outer diameter scales). Always verify the mill actual tolerances during your initial bidding phase.

4. Reference Equation for Internal Hydrostatic Pressure Design

For liquid and fluid conveyance pipelines, design engineers utilize Barlow's Formula to cross-verify the maximum allowable mill test pressure against operational conditions:

$$P = (2 \times S \times t) / D$$

Where:

- **P** = Hydrostatic Test Pressure (psi or MPa)
- **S** = Fiber Stress, typically taken as 60% to 85% of specified minimum yield strength (SMYS)
- **t** = Nominal Wall Thickness (inch or mm)
- **D** = Specified Outer Diameter (inch or mm)

Need Custom Sizes, Mill Test Certificates (MTC EN 10204 3.1), or Third-Party Inspection Reports?

We offer API 5L, ASTM A53, and EN10219 compliant ERW and LSAW straight seam welded steel pipes with custom anti-corrosion finishes.

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