

X7Ni9 Mechanical Properties and Cryogenic Toughness Reference

This reference sheet organizes public EN-oriented X7Ni9 / 1.5663 data into standard mechanical requirements, representative -196°C impact values used in cryogenic plate literature, and a practical Q&T; property profile for engineering review.

1. Standard mechanical-property requirements published for X7Ni9 / 1.5663 plate

Property basis	Thickness range	Heat treatment / delivery condition	Requirement	Technical reading
Yield strength ReH, min	$t \leq 30$ mm	+QT	585 MPa	Minimum yield for thinner plate in the standard X7Ni9 route.
Yield strength ReH, min	$30 < t \leq 50$ mm	+QT	575 MPa	Yield requirement steps down slightly for thicker plate.
Tensile strength Rm	$t \leq 50$ mm	+QT	680–820 MPa	Published tensile window commonly cited for X7Ni9 / 1.5663.
Elongation A, min	$t \leq 50$ mm	+QT	18%	Minimum elongation under the standard room-temperature plate requirement.
Applicable plate thickness for public EN mechanical-property data	0–50 mm	Normalized and tempered (+NT) or quenched and tempered (+QT), depending on thickness band	Published range depends on producer / standard route	Public plate literature commonly shows X7Ni9 in +NT condition for 0–15 mm and +QT condition for 15–50 mm; EN 10028-4 also notes that for products ≤ 15 mm, delivery in +N plus +NT may be applicable.

2. Representative cryogenic toughness data published for 9% Ni cryogenic plate

Public data for 9% Ni cryogenic plate aligned to EN 10028-4 X7Ni9 (1.5663) commonly publish guaranteed Charpy-V values at **-196°C**. The figures below are useful because they show how specimen size changes the guaranteed absorbed-energy level in cryogenic acceptance practice.

Specimen size / thickness band	Test temperature	Average energy for 3 test specimens	Associated note
10 × 10 mm specimen (plate thickness ≥ 10 mm)	-196°C	100 J min 75 J min per specimen	Main guaranteed cryogenic impact value commonly published for full-size specimens.
10 × 7.5 mm specimen (plate thickness 7.5–9.99 mm)	-196°C	75 J min 56 J min per specimen	Reduced-specimen acceptance value adjusted to thinner plate section.
10 × 5 mm specimen (plate thickness 5.0–7.49 mm)	-196°C	50 J min 38 J min per specimen	Published guarantee for thinner cryogenic plate section.
Additional producer note	-196°C	Drop-weight test may be offered on request for certain thicker plates	Some producer literature states that for thickness 16 mm and above, a drop-weight test to ASTM E208 can also be carried out subject to agreed acceptance criteria.

3. Additional representative material-property profile in Q&T; condition

Materials-property databases for EN 1.5663 (X7Ni9) sometimes publish a representative quenched-and-tempered profile that is useful for engineering context. These values are **not** a substitute for project acceptance criteria, but they help show the general property level associated with the grade.

Representative property	Published value	Engineering meaning
Ultimate tensile strength (UTS)	750 MPa	Representative strength level sitting comfortably inside the 680–820 MPa standard tensile window.
Yield strength (proof)	660 MPa	Illustrates a practical Q&T; strength level well above the minimum standard yield requirement.
Elongation at break	20%	Shows retained ductility in a representative Q&T; profile.
Brinell hardness	230 HB	Useful for general property context and fabrication review.
Charpy V-notch impact strength	120 J	Representative database value; not the same as a guaranteed project minimum at -196°C.
Fatigue strength	450 MPa	Useful for comparative engineering context; not a plate-acceptance property in EN 10028-4.

Source basis: public EN-oriented data for EN 10028-4 X7Ni9 / 1.5663 plate requirements, public 9% Ni cryogenic plate literature, and representative EN 1.5663 materials-property database values. Confirm project acceptance strictly against the governing standard, purchase specification, and agreed inspection documents.