



## aldur®

### High-strength quenched and tempered fine-grained steels

aldur® steels are water-quenched, high-strength fine-grained steels with high yield strengths and excellent toughness at low temperatures. The steels are used wherever weight savings and operating safety are in demand at low temperatures down to  $-60\text{ °C}$ . Main applications are welded structures subjected to extreme loads, e.g. in crane construction, for mining equipment, pressure vessels and penstocks.

The higher strength of aldur® steels in comparison with conventional constructional steels opens up new possibilities of weight savings, higher useful loads and less expensive designs. Additionally, aldur® steels feature excellent weldability resulting from low C equivalents with high cold cracking resistance in the heat-affected zone, lower pre-heating temperatures and high levels of component safety because of excellent toughness in the welded joint.

#### Series groups

- » Basic series aldur ... Q with guaranteed notch impact toughness at  $-20\text{ °C}$
- » Low temperature series aldur ... QL with guaranteed notch impact toughness at  $-40\text{ °C}$
- » Special low-temperature series aldur ... QL1 with guaranteed notch impact toughness at  $-60\text{ °C}$



Premium quality  
with reduced carbon footprint

aldur®  
greentec steel

## Chemical composition

Heat analysis in mass %

aldur®	C max.	Si max.	Mn max.	P max.	S max.	Al <sub>tot</sub> min.	N max.	Cr max.	Ni max.	Mo max.	Cu max.	V max.	Nb max.	Ti max.	B max.	Zr max.
500 Q, QL, QL1	0.20	0.80	1.70	0.020	0.010	0.018	0.015	1.50	4.00	0.70	0.50	0.12	0.06	0.05	0.0050	0.15
550 Q, QL, QL1	0.20	0.80	1.70	0.020	0.010	0.018	0.015	1.50	4.00	0.70	0.50	0.12	0.06	0.05	0.0050	0.15
620 Q, QL, QL1	0.20	0.80	1.70	0.020	0.010	0.018	0.015	1.50	4.00	0.70	0.50	0.12	0.06	0.05	0.0050	0.15
700 Q, QL, QL1	0.20	0.80	1.70	0.020	0.010	0.018	0.015	1.50	4.00	0.70	0.50	0.12	0.06	0.05	0.0050	0.15
900 Q, QL	0.20	0.80	1.70	0.020	0.010	0.018	0.015	1.50	4.00	0.70	0.50	0.12	0.06	0.05	0.0050	0.15
960 Q, QL	0.20	0.80	1.70	0.020	0.010	0.018	0.015	1.50	4.00	0.70	0.50	0.12	0.06	0.05	0.0050	0.15

## Carbon equivalent

Standard values for carbon content and carbon equivalent

aldur®	Thickness [mm]	CEV <sup>1)</sup> max. acc. EN 10025-6 [%]	CEV <sup>1)</sup> standard value [%]	CET <sup>2)</sup> standard value [%]
500 Q, QL, QL1	≤ 50	0.47	0.43	0.27
	> 50 ≤ 120	0.70	0.46	0.29
550 Q, QL, QL1	≤ 30	0.65	0.43	0.27
	> 30 ≤ 50	0.77	0.46	0.29
	> 50 ≤ 120	0.77	0.46	0.29
620 Q, QL, QL1	≤ 50	0.65	0.46	0.29
	> 50 ≤ 120	0.77	0.52	0.32
	≤ 30	0.65	0.46	0.29
700 Q, QL	> 30 ≤ 50	0.65	0.52	0.32
	> 50 ≤ 100	0.77	0.52	0.32
	> 100 ≤ 120	0.83	0.52	0.32
	> 120 ≤ 200	0.83	0.59	0.34
700 QL1	≤ 30	0.65	0.46	0.29
	> 30 ≤ 50	0.65	0.52	0.32
	> 50 ≤ 100	0.77	0.59	0.34
	> 100 ≤ 120	0.83	0.59	0.34
900 Q, QL	> 120 ≤ 180	0.83	0.59	0.34
	≥ 30 ≤ 50	0.72	0.66	0.39
	> 50 ≤ 100	0.82	0.66	0.39
960 Q, QL	≥ 30 ≤ 50	0.82	0.66	0.39
	> 50 ≤ 100	0.85	0.66	0.39

<sup>1)</sup>CEV = C + Mn/6 + (Cr + Mo + V)/5 + (Ni + Cu)/15, carbon equivalent according to IIW

<sup>2)</sup>CET = C + (Mn + Mo)/10 + (Cr + Cu)/20 + Ni/40, carbon equivalent according to SEW 088

**Mechanical properties: Tensile test at ambient temperature**

aldur®	Plate thickness [mm]	Yield strength $R_{eH}$ <sup>3)</sup> [MPa] min.	Tensile strength $R_m$ <sup>4)</sup> [MPa]	Fracture elongation $A_5$ [%] min.
	≤ 50	500	590 - 770	17
500 Q, QL, QL1	> 50 ≤ 100	480	590 - 770	17
	> 100 ≤ 200	440	540 - 720	17
550 Q, QL, QL1	≤ 50	550	640 - 820	16
	> 50 ≤ 100	530	640 - 820	16
	> 100 ≤ 200	490	590 - 770	16
620 Q, QL, QL1	≤ 50	620	700 - 890	15
	> 50 ≤ 100	580	700 - 890	15
	> 100 ≤ 200	560	650 - 830	15
700 Q, QL, QL1	≤ 50	700	770 - 940	14
	> 50 ≤ 110	650	760 - 930	14
	> 110 ≤ 200	630	710 - 900	14
900 Q, QL	≤ 50	890	940 - 1,100	11
	> 50 ≤ 100	830	880 - 1,100	11
960 Q, QL	≤ 50	960	980 - 1,150	10
	> 50 ≤ 100	850	900 - 1,000	10

<sup>3)</sup> Where there is no distinct yield strength, the 0.2 %-proof stress ( $R_{p,0.2}$ ) is established.

<sup>4)</sup> Tensile test in accordance with EN ISO 6892-1 on transverse samples.

**Mechanical properties: Notch impact energy**

valid for Charpy V-notch samples

aldur®	Sample direction	Notch impact energy $A_v$ <sup>5)</sup> J, min. testing temperature in °C			
		-60	-40	-20	±0
500 Q, 550 Q, 620 Q, 700 Q, 900 Q, 960 Q	longitudinal	-	-	30	40
	transversal	-	-	27	30
500 QL, 550 QL, 620 QL, 700 QL, 900 QL, 960 QL	longitudinal	-	30	40	50
	transversal	-	27	30	35
500 QL1, 550 QL1, 620 QL1, 700 QL1	longitudinal	30	40	50	60
	transversal	27	30	35	40

<sup>5)</sup> Notch impact test according to EN ISO 148-1 at longitudinal samples. Mean value from 3 individual samples must reach the specified requirements. No individual value may be below 70 % of the guaranteed mean value. Testing temperature is -20 °C for the basic series aldur Q, -40 °C for the low-temperature series aldur QL and -60 °C for the special low-temperature series aldur QL1.

**Mechanical properties: Minimum bending radii**

aldur®	Bending radius		
	Bending line transverse	Bending line parallel	Bending line to the rolling direction
500 Q, QL, QL1; 550 Q, QL, QL1; 620 Q, QL, QL1; 700 Q, QL, QL1	≥ 3	≥ 4	x plate thickness
900 Q, QL; 960 Q, QL	≥ 4	≥ 5	

The recommended minimum bending radius is only valid on condition that cut edges have been removed and that the bending process is done professional.

**Available dimensions**

Maximum width per thickness; minimum width 1,500 mm

aldur®	Plate thickness [mm]	Max. width [mm]	Max. length [mm]	As-delivered condition <sup>6)</sup>
500 Q, QL, QL1	12 ≤ 120	3,800	13,200	QT
550 Q, QL, QL1	12 ≤ 120	3,800	13,200	QT
620 Q, QL, QL1	12 ≤ 20	3,000	13,200	QT
	> 20 ≤ 120	3,800	13,200	QT
700 Q, QL, QL1	12 ≤ 20	3,000	16,000 <sup>7)</sup>	QT
	> 20 ≤ 30	3,800	16,000 <sup>7)</sup>	QT
	> 30 ≤ 180	3,800	13,200	QT
700 Q, QL	> 30 ≤ 200	3,800	13,200	QT
900 Q, QL	≥ 30 ≤ 100	2,500	13,200	QT
960 Q, QL	≥ 30 ≤ 100	2,500	13,200	QT

<sup>6)</sup> QT... quenched and tempered

<sup>7)</sup> 18,000 mm upon request

Weight per plate is max. 15 t.

Additional dimensions upon request.

# OUR PATH TO A GREENER FUTURE

## Premium products in the greentec steel Edition

With greentec steel, voestalpine is pursuing an ambitious step-by-step plan in the long-term decarbonization of steel production. The declared objective is to achieve carbon-neutral production by 2050, and the initial steps have already been taken. Process-optimized production operations already prevent up to 10% of the direct CO<sub>2</sub> emissions at the Linz site. The material and processing properties of the steel are not affected in any way in this production route. Each voestalpine heavy plate product is available in premium quality in the greentec steel Edition with a reduced carbon footprint and unique benefits.



Premium quality with reduced carbon footprint

aldur®  
greentec steel

Heavy plates (excl. heads and clad plates) – greentec steel Edition

Max. carbon footprint 2.21 kg CO<sub>2</sub>e per kg of steel <sup>1)</sup>

<sup>1)</sup> per EN 15804+A2 (EPD methodology) cradle to gate

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