Grade E Ship Plate

OMEGA STEEL CO.
Istanbul · Dilovası plant

Grade E is the −40 °C grade of the normal-strength hull steels: 235 MPa yield, 400–520 MPa tensile, killed, fine-grain treated and always normalised (or TM-rolled under approval) so that 27 J is guaranteed at −40 °C through the thickness. The class rules assign it to the most critical members of a mild-steel hull above about 30 mm, to ice-belt plating of ice-class ships and to hulls trading in Arctic and sub-Arctic waters; it is also used for cold-climate harbour structures, dredgers and fishing vessels. Supplied 10–60 mm from class-approved mills, stamped, certified, optionally primed and UT-tested, cut at Dilovası.

Yield ≥ 235 MPa | 27 J at −40 °C | Normalised | Ice class / Arctic | 10–60 mm

Grade E is the last line in the mild-steel table: the plate that must not fracture at −40 °C at the corner of the hull girder, in the ice belt, on the deck of an Arctic supply ship.

CHEMICAL COMPOSITION

Element	C	Si	Mn	P	S	Al
max. % (ladle)	≤ 0.21	0.10–0.35	≥ 0.60	≤ 0.035	≤ 0.035	≥ 0.015 (total)

Fully killed, fine-grain treated (Al total ≥ 0.015 % or equivalent). C + Mn/6 ≤ 0.40 %. Normalised (TM only under specific mill approval). Mills typically run C 0.10–0.15 %, S ≤ 0.010 % for Grade E.

MECHANICAL PROPERTIES

Property	Requirement	Typical value	Note
Yield strength ReH	≥ 235 MPa	255–300 MPa	
Tensile strength Rm	400–520 MPa	420–470 MPa	
Elongation A5	≥ 22 %	28–34 %	
Charpy V, longitudinal	≥ 27 J at −40 °C	50–110 J	t ≤ 50 mm; 20 J transverse
Charpy V, t 50–70 mm	≥ 34 J at −40 °C	—	
Bend test	180°, 3 t	passes	

EQUIVALENT GRADES

System	Grade	Note
ASTM A131	Grade E	identical
LR	Grade E	
DNV	NV E	
BV	Grade E	
ABS	Grade E	
GL (legacy)	GL-E	
EN 10025-3 (approx.)	S275NL	normalised, −50 °C; no class certificate
GOST 5521 (approx.)	E	CIS shipbuilding steel

ICE CLASS AND DESIGN TEMPERATURE

Situation	Members	Grade required	Note
Open-water hull, special members	sheer strake, stringer, bilge strake, coamings > 30 mm	E	D below 30 mm
Open-water hull, primary members	strength deck, bottom shell > 40–50 mm	E	
Ice class 1A / 1A Super (Baltic)	ice-belt shell plating	D to 20–25 mm, E above	plus frames and stringers in the ice belt
Polar class PC5–PC7	ice belt, bow and stern areas	E (or EH grades)	design temperature −30 to −40 °C
Design temperature below −20 °C (any notation)	all exposed plating	E	Arctic, Sakhalin, Northern Norway winter
Offshore / quayside at −40 °C	primary structure	E with Z35 and UT	or EH32 / EH36 for higher strength

STANDARDS

IACS UR W11 · LR / BV / DNV / ABS / RINA / TL rules · ASTM A131 Grade E · EN 10164 Z35 on request · Society certificate (3.2 equivalent)