Q345E GB/T 1591-2008 (China)

Standards

GB/T 1591-2008 High strength low alloy structural steels

Chemical composition

C	< 0.18	**Si**	< 0.5	**Mn**	< 1.7	**P**	< 0.025
S	< 0.02	**Cr**	< 0.3	**Mo**	< 0.1	**Ni**	< 0.5
V	< 0.15	**Nb**	< 0.07	**Ti**	< 0.2	**Al**	> 0.015
Cu	< 0.3	**N**	< 0.012	**Fe**	Rest	**Pcm**	< 0.2
CE	< 0.48						

CE = C + Mn/6 + (Cr + Mo + V)/5 + (Ni + Cu)/15
Pcm = C + Si/30 + Mn/20 + Cu/20 + Ni/60 + Cr/20 +Mo/15 + V/10 +5B
Pcm: Thermomechanical rolling or Thermomechanical rolling + Tempering State, C < 0.12
Hot-rolling, controlled-rolling:
t < 63mm: CE < 0.44
t > 63mm: CE < 0.47
Normalizing, normalizin rolling or normalizing + tempering:
t < 63mm: CE < 0.44
t > 63mm: CE < 0.48
Thermomechanical rolling or thermomechanical rolling + tempering:
t < 63mm: CE < 0.44
t > 63mm: CE < 0.48
Nb + V + Ti < 0.22
Mo + Cr < 0.30

Properties

By GB/T 1591-2008

Diameter or thickness: < 16 mm ;

Yield Strength: > 345 MPa
Tensile Strength: 470 - 630 MPa
Elongation: > 21 %

Diameter or thickness: 16 - 40 mm ;

Yield Strength: > 335 MPa
Tensile Strength: 470 - 630 MPa
Elongation: > 21 %

Diameter or thickness: 40 - 63 mm ;

Yield Strength: > 325 MPa

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Tensile Strength: 470 - 630 MPa
Elongation: > 20 %

Diameter or thickness: 63 - 80 mm ;
Yield Strength: > 315 MPa
Tensile Strength: 470 - 630 MPa
Elongation: > 20 %

Diameter or thickness: 80 - 100 mm ;
Yield Strength: > 305 MPa
Tensile Strength: 470 - 630 MPa
Elongation: > 20 %

Diameter or thickness: 100 - 150 mm ;
Yield Strength: > 285 MPa
Tensile Strength: 450 - 600 MPa
Elongation: > 19 %

Diameter or thickness: 150 - 200 mm ;
Yield Strength: > 275 MPa
Tensile Strength: 450 - 600 MPa
Elongation: > 18 %

Diameter or thickness: 200 - 250 mm ;
Yield Strength: > 265 MPa
Tensile Strength: 450 - 600 MPa
Elongation: > 18 %

Diameter or thickness: 250 - 400 mm ;
Yield Strength: > 265 MPa
Tensile Strength: 450 - 600 MPa
Elongation: > 17 %

Bending test

Diameter or thickness: < 16 mm ;
Return Bend: d=2a

Diameter or thickness: 16 - 100 mm ;
Return Bend: d=3a

Impact test

Diameter or thickness: 12 - 150 mm ;
Impact energy KV -40°C [-40°F]: > 34 J

Diameter or thickness: 150 - 400 mm ;
Impact energy KV -40°C [-40°F]: > 27 J