

Product group

Open-die forged pinions for offshore industries

Application

Component for jacking systems for oil rigs and assembly vessels



MATERIALS

Case hardening steel

18CrNiMo7-6 DIN 1.6587
AISI 4320S mod

Quenched and tempered steels

AISI 4330mod, AISI 4340

PRODUCTION PROCESSES

Case hardening steel

Electric arc furnace (EAF) → ladle furnace (LF) → vacuum degassing (VD) → ingot casting → forging process with special tools → preliminary heat treatment → pre-machining → first ultrasonic testing → teeth machining → carburising process → oil quenching and tempering → mechanical properties testing → ultrasonic testing → final machining → surface testing

Quenched and tempered steels

Electric arc furnace (EAF) → ladle furnace (LF) → vacuum degassing (VD) → ingot casting → forging process with special tools → pre-machining → quality heat treatment (oil quenched and tempered) → mechanical properties testing → ultrasonic testing → final machining → surface testing

CERTIFICATES

Classification societies
ABS or DNV or Lloyds

Case hardening steel 18CrNiMo7-6 DIN 1.6587 comparable with AISI 4320S mod

TYPICAL PINION MODULE M90, M100, M105

Standard	DIN EN 10084, ISO 643-3							
	Comparable with AISI 4320S mod							
Chem. composition*	C	Si	Mn	P	S	Cr	Mo	Ni
	0.15-0.21	0.10-0.40	0.50-0.90	≤ 0.020	≤ 0.010	1.50-1.80	0.25-0.35	1.40-1.70
Properties*	METRIC UNITS				US UNITS			
		Specification	SWG Reference	Specification	SWG Reference			
	Yield strength	≥ 700 MPa	≥ 850 MPa	≥ 103 ksi	≥ 125 ksi			
	Tensile strength	≥ 900 MPa	≥ 1100 MPa	≥ 130 ksi	≥ 160 ksi			
	Elongation	≥ 10 %	≥ 12 %	≥ 10 %	≥ 12 %			
	Reduction of area	≥ 40 %	≥ 45 %	≥ 40 %	≥ 45 %			
	Charpy-V	≥ 25 J @-20°C	≥ 30 J @-20°C	≥ 18 ftlbf @-29°F	≥ 22 ftlbf @-29°F			
	Hardness		Teeth ≥ 50 HRC		Teeth ≥ 50 HRC			
	Case depth	≥ 5 mm	≥ 5.2 mm	≥ 0.2 inch	≥ 0.205 inch			

Quenched and tempered steels

AISI 4330V mod, AISI 4340

TYPICAL PINION MODULE M90, M100

Standard	AISI 4330V mod, AISI 4340							
	C	Si	Mn	P	S	Cr	Mo	Ni
Chem. composition*	AISI 4330V mod							
	0.28-0.33	0.20-0.35	0.75-1.00	≤ 0.020	≤ 0.010	0.70-0.90	0.35-0.50	1.65-3.00
Chem. composition*	AISI 4340							
	0.38-0.43	0.15-0.35	0.60-0.80	≤ 0.020	≤ 0.010	0.70-0.90	0.20-0.30	1.65-2.00
Properties*	METRIC UNITS				US UNITS			
		Specification	SWG Reference	Specification	SWG Reference			
	Yield strength	≥ 900 MPa	≥ 950 MPa	≥ 130 ksi	≥ 138 ksi			
	Tensile strength	≥ 1100 MPa	≥ 1150 MPa	≥ 160 ksi	≥ 167 ksi			
	Elongation	≥ 12 %	≥ 12 %	≥ 10 %	≥ 12 %			
	Reduction of area	≥ 45 %	≥ 45 %	≥ 40 %	≥ 45 %			
	Charpy-V	≥ 25 J @-20°C	≥ 30 J @-20°C	≥ 18 ftlbf @-29°F	≥ 22 ftlbf @-29°F			
	Surface Hardness	≥ 346 HB	≥ 350 HB	≥ 33.6 HRC	≥ 34 HRC			

*or according to customer requirements

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