1.4906, X12CrMoWVNbN10-1-1, T505SC - Steels of Blade for Steam and Gas Turbine Datasheet

1.4906, X12CrMoWVNbN10-1-1 - Alloy special steel for elevated temperatures for larger forgings, acc to SEW 555:2001-01 and Siemens MAT238053 and TLV925812 This TLV is valid for steel bars with a 0.2% proof strength of 750 N/mm' minimum. Referenced Documents EN 10083-1, EN 10308, EN 10204, DIN EN ISO 6892-1, DIN EN ISO 148-1

Manufacturing - General

Electric slag remelted (ESR) steel has to be usedThe use of any other steel secondary treatment is tobe agreed in advance with the purchaser.Cast ingot is to be used as initial material for produc.tion of the bars.

The bars can either be rolled or forged provided thatthe requested mechanical properties are fulfilled.Bars shall be delivered in quenched and temperedcondition,A martensitic microstructure shall be ob.tained over the entire cross-section of the bar.

Chemical Composition

Grade	Chemical composition WT %													
	C	Si	Mn	P	S	Cr	Ni	Mo	W	V	Nb	N	Al	As
1.4906, X12CrMoWVNbN10-1-1 acc. to MAT238053	0.10-0.14	max. 0.10	0.40-0.60	max. 0.015	max. 0.007	10.00-11.00	0.60-0.80	1.00-1.20	0.95-1.10	0.15-0.25	0.04-0.06	0.04-0.06	max. 0.012	max. 0.012
	B	Cu	Sb	Sn	Ti									
	10 ppm				max. 0.01									
1.4906, X12CrMoWVNbN10-1-1 acc. to TLV 925812	0.11-0.13	max. 0.12	0.40-0.50	max. 0.010	max. 0.005	10.2-10.8	0.7-0.8	1.0-1.1	0.95-1.05	0.15-0.25	0.04-0.06	0.045-0.06	max. 0.01	-

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Mechanical Properties

1.4906 Mechanical properties acc. to MAT238053 - Thickness* max. 1500mm

* Diameter for shafts and hub thickness for discs.

- Tensile strength R_m MPa: Min 800-950
- Proof strength $R_{p0.2}$ MPa: Min 700(A 50 MPa lower value applies for the core zones.)
- Elongation after fracture A %: T/Q min. 15/13(($L_0 = 5.65\sqrt{S_0}$)
- Red of area A%: T/Q min. 45/40

- KV J (+20ºC): T/Q min. 30/25
- Hardness HB: ca 280

1.4906 Mechanical properties acc. to TLV 9258 12 - Dia.* max. 100mm

* The values for the smallest side length (a) shall be reached

- Tensile strength R_m MPa: max 1000
- Proof strength $R_{p0.2}$ MPa: 750-830
- Elongation after fracture A %: L min. 14 / T -LHSS
- Red of area A%: L min. 50 / T -LHSS
- KV J (+20ºC): L min. 40 / T -LHSS(Minimum value from 3 Charpy V-notch specimens wechat:specialsteel)
- Hardness HB30: 265-310

1.4906 Mechanical properties acc. to TLV 9258 12 - Dia.* min. 100mm

* The values for the smallest side length (a) shall be reached

- Tensile strength R_m MPa: max 1000
- Proof strength $R_{p0.2}$ MPa: 750-830
- Elongation after fracture A %: T min. 13 / L -LHSS
- Red of area A%: T min. 40 / L -LHSS
- KV J (+20ºC): T min. 24 / L -LHSS(Minimum value from 3 Charpy V-notch specimens wechat:specialsteel)
- Hardness HB30: 265-310

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Physical Properties

Heat Treatment

1.4906, X12CrMoWVNbN10-1-1 Hardening acc. to MAT238053

- 1050ºC ±10ºC for at least 12 h. Cooling in oil.
- Tempering I: 570ºC ±10ºC, furnace cooling to 400ºC, thereafter cooling in air.
- Tempering II: 690ºC ±10ºC, furnace cooling to 400ºC, thereafter cooling in air.

The duration of tempering I must be same as the duration of the immediately following tempering II (± 1 h)

1.4906, X12CrMoWVNbN10-1-1 Hardening acc. to TLV 9258 12 - wechat:specialsteel

The hardening temperature has to be between 1050ºC and 1100°C (air or liquid quenching) After hardening the forging must be cooled down to atemperature max. 100ºC in the center to guaranteecomplete transformation into martensite throughoutin the whole section.

A two-step tempering treatment must be performedconsidering the following: The first tempering stepmust be carried outbetween 570°and 680°C.The temperature for the second tempering stepmust be between 680 and 720°C If bars need to be straightened after the heat treat.ment, a stress relieving treatment shall be performedafter completion of the entire

straightening process.Stress relieving is to be carried out at 20-50K below the tempering temperature with a subsequentslow cooling rate.wechat:specialsteel

Welding Properties

Machining Properties

Similar or Equivalents Steel Grade

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