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Material search results - DETAILED REPORT

GENERAL INFORMATION	MAT_ID 265

RECORD INFORMATION

Material ID (MAT_ID)	265
Contributed by	MATDAT
Entry date	01.06.2011
Source reference	Boller, C., Seeger, T.: Materials data for cyclic loading, Part B, Elsevier, Amsterdam 1987.
Other reference(s)	Boller, C., Heuler, P., Seeger, T., Buxbaum, O., Oppermann, H., Kobler, H.-G., Schütz, D.: Vergleich der Lebensdauervorhersage nach dem Kerbgrundkonzept und dem Nennspannungskonzept, Report FD 5/1983, Fachgebiet Werkstoffmechanik, TH Darmstadt, Fraunhofer

MATERIAL INFORMATION

Material designation	**AISI**	*4140 ; 4140(H)*	**ISO**	*3 ; 42 CrNiMo 4 ; 5 ; C32*
	AFNOR	*42CD4 ; 42 CrMo 4*	**JIS**	*SCM440*
	ASTM		**JUS**	*Č4732*
	BS	*708A42 ; 708M40*	**SAE**	*4140 ; 4140(H)*
	DIN	**42 CrMo 4**	**SS**	*2244*
	EN		**UNS**	*G41400 ; G(H)41400*
	GOST		**W.Nr.**	**1.7225**
	HRN		**Other**	
Designation additional remarks				
Material group	Low-alloy steel			
Steel subgroup				
Typical application	*Static. and dynamic. stressed compon. for vehicles, engines, machines, for parts of larger cross-sections, crankshafts, gears. Hardness as surface hardened is >54HRC.*			

TESTED MATERIAL

Chemical composition, (%)	**C**	**Si**	**Mn**	**P**	**S**	**Cr**
	0,43000	0,28000	0,71000	0,03300	0,02800	1,09000
	Mo	**Ni**	**Cu**	**Al**	**Co**	**Ti**
				0,17000		
	W	**V**	**Nb**	**N**		
	Other					
Semifinished material (source)	shafts, diameter 25 mm					
Heat treatment	quenched & tempered					
Additional remarks						
Microstructure						
Additional remarks						

Hardness	**Value(s)**	**Method**
Brinell		
Vickers		
Rockwell		
Additional remarks:		

MONOTONIC DATA - AXIAL LOADING	MAT_ID 265

TESTING CONDITIONS AND SPECIMEN INFORMATION

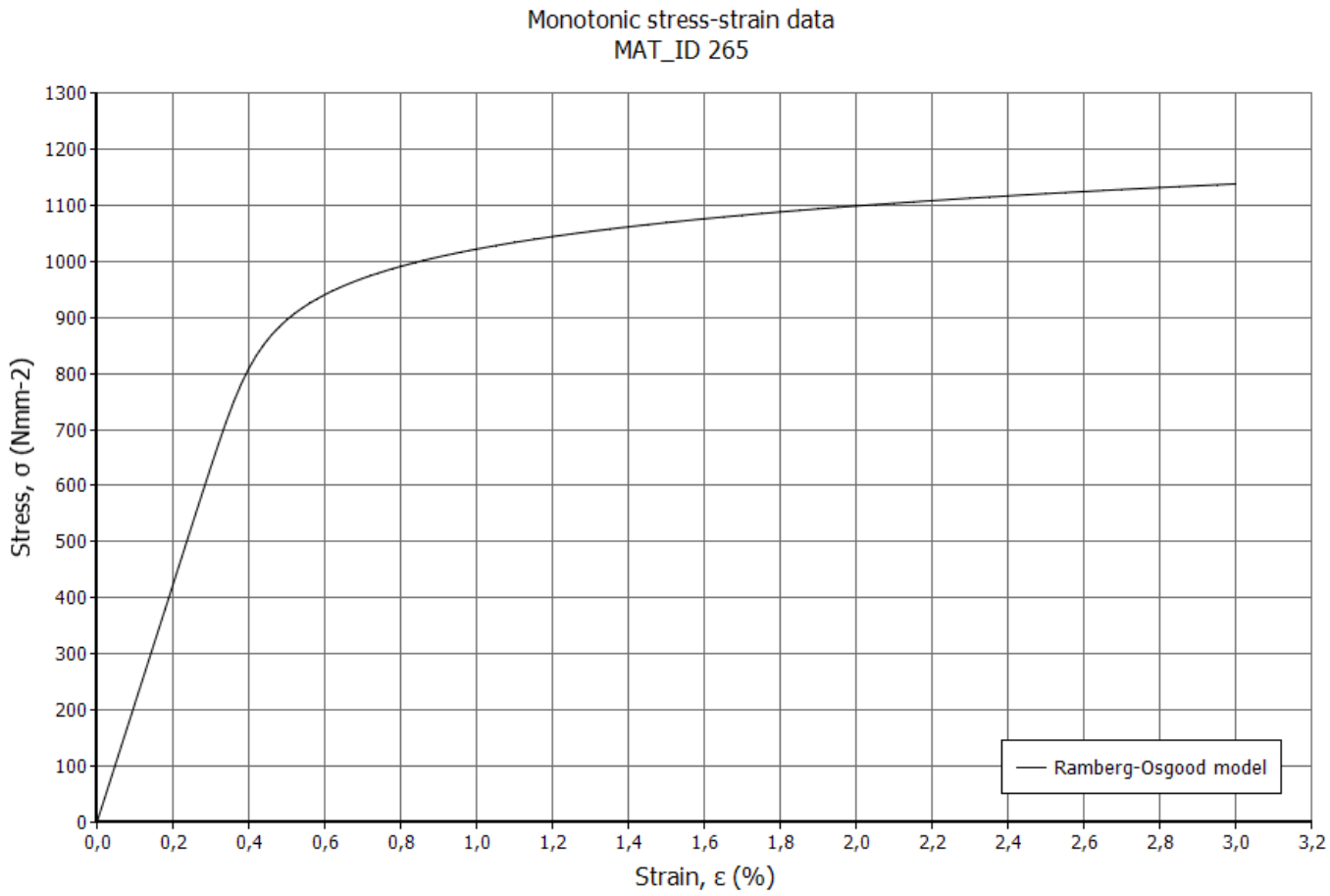
Testing temperature, T (°C)	23
Testing medium	air
Loading type	axial
Loading control	displacement control
Specimen	hourglass shaped, diameter 6 mm ; location/orientation: in rolling direction ; gauge length: diametral
Aditional remarks	testing machine: Schenck, servohydraulic, max. 60 kN ; strain rate: 0,42 %/min

MONOTONIC PROPERTIES

Young's modulus, E (Nmm^{-2})	211400
Poisson's ratio, ν	
Yield strength (conventional), R_e or $R_{p0,2}$ (Nmm^{-2})	998,0
Ultimate tensile strength, R_m (Nmm^{-2})	1111,0
Elongation related to 5x diameter of specimen, A_5 (%)	23,0
Reduction of area at fracture, Z (RA) (%)	60,0
True fracture stress, σ_f (Nmm^{-2})	1525,0
True fracture strain, ε_f	0,4960

MONOTONIC STRESS-STRAIN PARAMETERS AND CURVES - RAMBERG-OSGOOD MODEL

Strength coefficient, K (Nmm^{-2})	1469,0
Strain hardening exponent, n	0,0690



CYCLIC/FATIGUE DATA - AXIAL LOADING, FULLY REVERSED (R=-1)	MAT_ID 265

TESTING CONDITIONS AND SPECIMEN INFORMATION

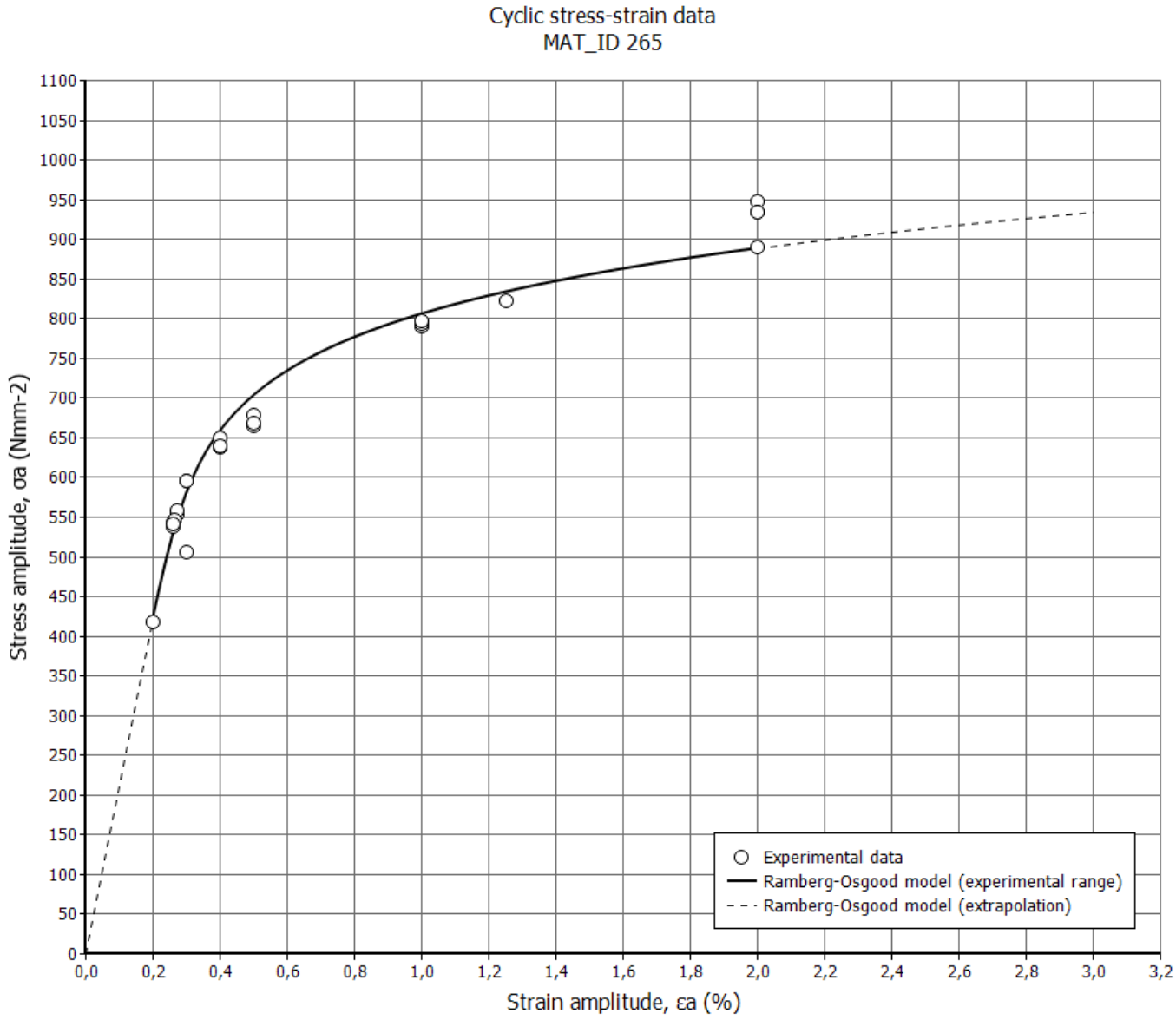
Testing temperature, T (°C)	23
Testing medium	air
Loading type	axial
Loading control	total strain control
Loading ratio	-1
Specimen	hourglass shaped, diameter 6 mm ; surface: mechanically polished ; location/orientation: in rolling direction ; gauge length: 4 mm
Aditional remarks	testing machine: Schenck, servohydraulic, max. 60 kN ; load frequency: 0,1-11 Hz ; strain rate: NA ; waveform: sinusoidal ; failure criterion: crack initiation, crack depth about 0,5 mm

CYCLIC PROPERTIES

Cyclic yield strength, $R'_{p0,2}$ (Nmm^{-2})	716,0

CYCLIC STRESS-STRAIN PARAMETERS AND CURVES - RAMBERG-OSGOOD MODEL

Cyclic strength coefficient, K' (Nmm^{-2})	1367,0
Cyclic strain hardening exponent, n'	0,1040



CYCLIC/FATIGUE DATA - AXIAL LOADING, FULLY REVERSED (R=-1)	MAT_ID 265

FATIGUE PROPERTIES	
Transition life (number of cycles determined for $\varepsilon_{a,e} = \varepsilon_{a,p}$), N_T	13285
Number of cycles corresponding to the endurance/fatigue limit, N_E (alternatively, value of $2 \cdot 10^6$ cycles)	
Stress amplitude at the number of cycles N_E (stress amplitude endurance/fatigue limit) for 50% survival probability, σ_E (Nmm^{-2})	
Strain amplitude at the number of cycles N_E (strain amplitude endurance/fatigue limit) for 50% survival probability, ε_E	
10/90 scatter band of stress amplitudes for 10% and 90% survival probability ($\sigma_{a,10\%}$ / $\sigma_{a,90\%}$), T_σ	1,199
10/90 scatter band of plastic strain amplitudes for 10% and 90% survival probability ($\varepsilon_{a,p,10\%}$ / $\varepsilon_{a,p,90\%}$), $T_{\varepsilon p}$	1,952
Exponent of *S-N* curve	

FATIGUE STRAIN-LIFE PARAMETERS AND CURVES - COFFIN-MANSON-BASQUIN MODEL	
Fatigue strength coefficient, σ'_f (Nmm^{-2})	1454,0
Fatigue strength exponent, b	-0,0750
Fatigue ductility coefficient, ε'_f	1,5080
Fatigue ductility exponent, c	-0,7160