MANAURITE XTM

PHYSICAL PROPERTIES

- Specific gravity 8.02 kg/dm^3 (0.29 lb/inch^3)
- Thermal conductivity at 20°C 10.5 W/m.°C (68°F) (6 Btu/h.ft.°F) at 1036°C 31 W/m.°C (1897°F)(18 Btu/h.ft.°F)

Modulus of elasticity

Temperature		kg/mm²	MPa	ksi
°C	°F			
20	68	18.630	182.800	26.500
100	212	18.350	180.000	26.100
200	392	17.930	175.900	25.510
300	572	17.390	170.600	24.710
400	752	16.930	166.100	24.080
500	932	16.340	160.300	23.240
600	1112	15.740	154.400	22.390
700	1292	14.850	145.700	21.120
800	1472	14.420	141.500	20.510
900	1652	13.540	132.800	19.260
1000	1832	12.500	122.600	17.780
1100	2012	11.100	108.900	15.790

Coefficient of expansion

20°C	to	500°C (932°F)	15.1 x 10^{-6} mm/mm°C
20°C	to	600°C (1112°F)	15.7
20°C	to	700°C (1292°F)	16.3
20°C	to	800°C (1472°F)	16.7
20°C	to	900°C (1652°F)	17.0
20°C	to	1000°C (1832°F)	17.3
20°C	to	1100°C (2012°F)	17.6
20°C	to	1200°C (2192°F)	18.2

MECHANICAL PROPERTIES

1. At room temperature

(minimum values)

Ultimate tensile strength	: 448 Mpa	65 000 psi
Yield strength	: 245 Mpa	35 000 psi
Elongation (on 4d)	: 3 %	

2. At room temperature after ageing

Tensile properties at room temperature after ageing at 1100°C – 1000hrs

Tensile strength	: 570 Mpa	82.6 ksi
Yield strength	: 345 Mpa	50 ksi
Elongation (on 4d)	: 12 %	

MANAURITE XTM

3. At high temperature on cast material – long time tests

Temperature		Y.S., at 0.2 %		U.T.S		E	Reduction of area
°C	°F	MPa	ksi	MPa	ksi	%	%
750	1382	156	22.6	312	45.3	25	27.8
850	1562	121	17.5	205	29.8	27.5	28.3
900	1652	106	15.4	155	22.5	43.7	51.0
1000	1832	64	9.1	87	12.7	43.7	64
1050	1922	55	8.0	61	8.8	36.2	64

(typical values)

4 At high temperature on cast material – long time tests

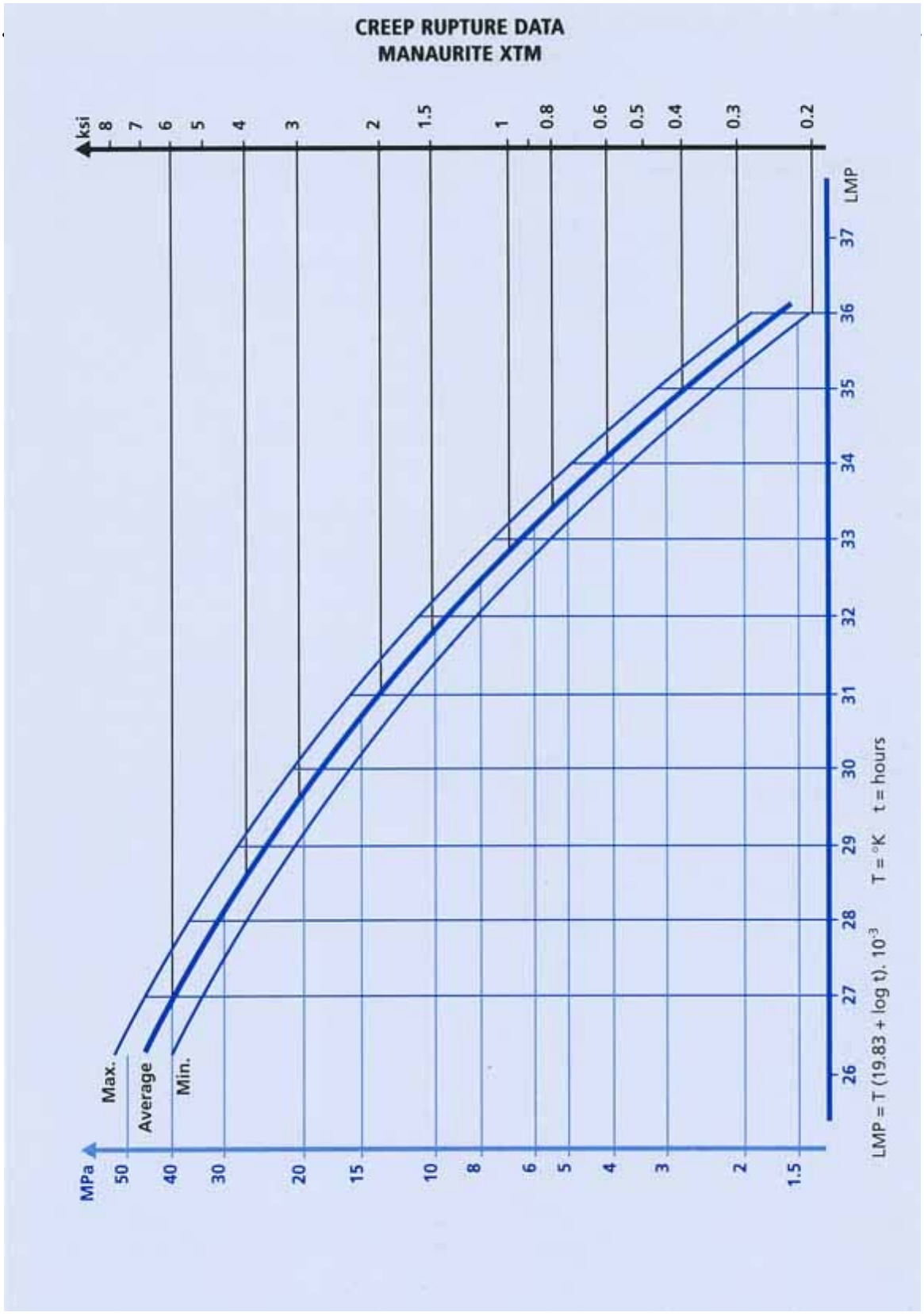
See Larson & Miller curve overleaf

Creep rupture 10.000 hours

Temperature		Average stresses		Minimum stresses	
°C	°F	MPa	ksi	MPa	ksi
800	1472	51.20	7.40	43.50	6.30
825	1517	46.50	6.70	39.50	5.70
850	1562	41.40	6.00	35.20	5.10
875	1607	36.50	5.30	31.00	4.50
900	1652	32.00	4.60	27.20	3.95
925	1697	27.70	4.00	23.50	3.40
950	1742	23.60	3.40	20.10	2.90
975	1787	19.90	2.90	16.90	2.45
1000	1832	16.60	2.40	14.10	2.04
1025	1877	13.70	1.98	11.60	1.69
1050	1922	11.18	1.62	9.50	1.38
1075	1967	9.00	1.30	7.60	1.10
1100	2012	7.20	1.04	6.08	0.88
1125	2057	5.60	0.81	4.80	0.69
1150	2102	4.40	0.63	3.70	0.54
1175	2147	3.30	0.49	2.85	0.41

Creep rupture 10.000 hours

Temperature		Average stresses		Minimum stresses	
°C	°F	MPa	ksi	MPa	ksi
800	1472	42.40	6.15	36.00	5.20
825	1517	37.40	5.40	31.80	4.60
850	1562	32.50	4.70	27.60	4.00
875	1607	28.00	4.05	23.80	3.45
900	1652	23.70	3.40	20.20	2.90
925	1697	19.90	2.90	16.90	2.44
950	1742	16.40	2.40	14.00	2.03
975	1787	13.40	1.95	11.40	1.66
1000	1832	10.80	1.57	9.20	1.34
1025	1877	8.60	1.25	7.30	1.06
1050	1922	6.80	0.99	5.80	0.84
1075	1967	5.30	0.77	4.50	0.65
1100	2012	4.04	0.59	3.40	0.50
1125	2057	3.06	0.44	2.60	0.38
1150	2102	2.28	0.33	1.94	0.28
1175	2147	1.69	0.24	1.43	0.21


CREEP RUPTURE DATA
MANAURITE XTM
ksi
8
7
6
5
4
3
2
1.5
1
0.8
0.6
0.5
0.4
0.3
0.2
MPa
50
40
30
20
15
10
8
6
5
4
3
2
1.5
Max.
Average
Min.
26
27
28
29
30
31
32
33
34
35
36
37
LMP
LMP = T (19.83 + log t). 10-3
T = °K
t = hours

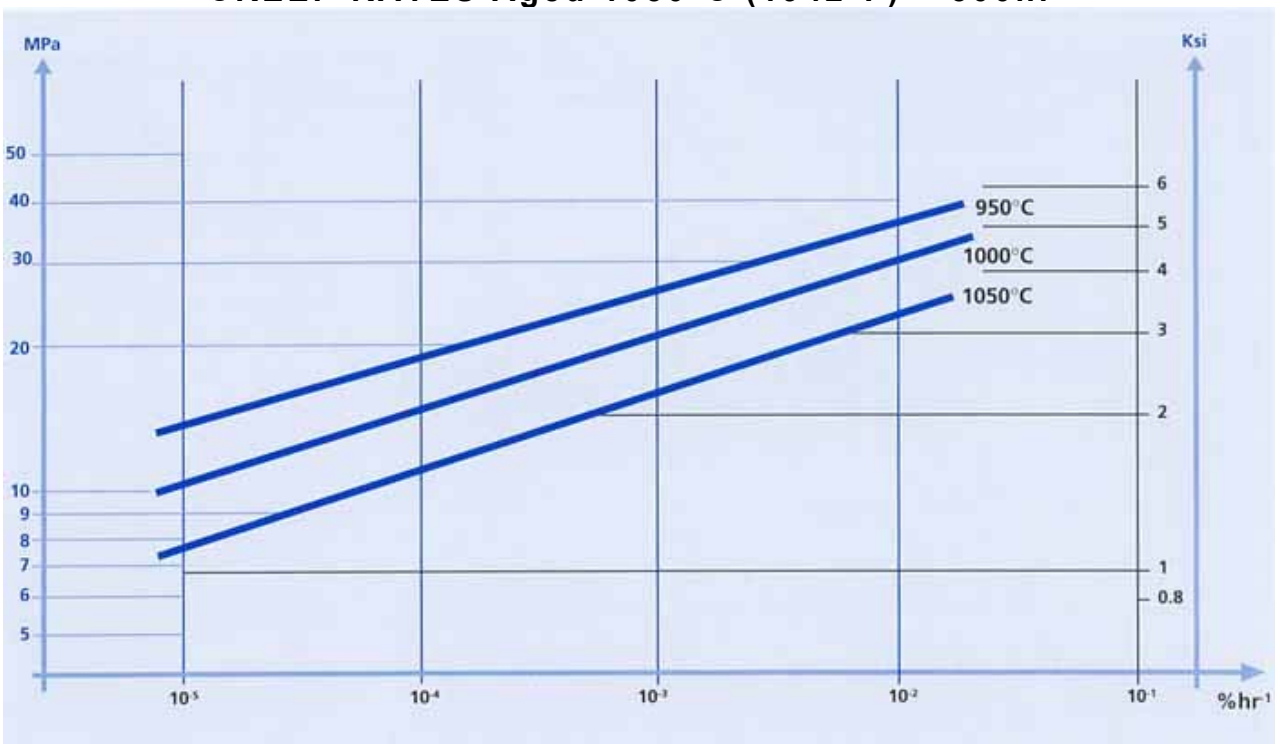
MANAURITE XTM

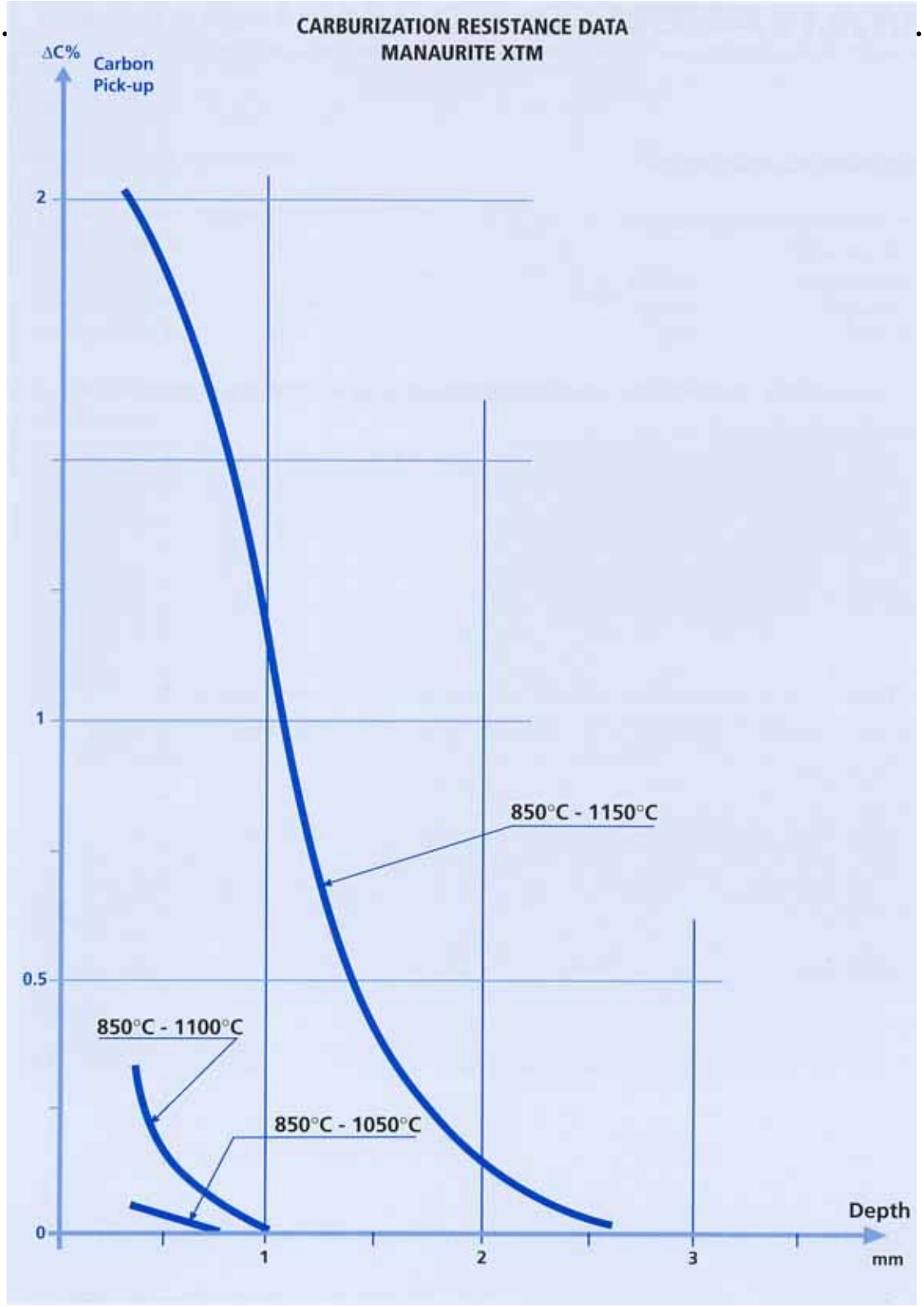
5. Creep rate

Material stabilized 1050oC (1942oF) – 500hr

Creep rates (% x hr^{-1})	Stresses in MPa 950°C	1000°C	1050°C
10^{-2}	35	29	22.2
10^{-3}	25.6	20.6	15.5
10^{-4}	18.8	14.6	10.9
10^{-5}	13.8	10.3	7.6

CREEP RATES Aged 1050°C (1942°F) – 500hr




CARBURIZATION RESISTANCE DATA
MANAURITE XTM
ΔC%
Carbon
Pick-up
2
1
0.5
0
850°C - 1150°C
850°C - 1100°C
850°C - 1050°C
Depth
1
2
3
mm