



TECHNICAL GUIDE
ELEVATED TEMPERATURE

PERFORMANCE AT ELEVATED TEMPERATURE

High performance BISALLOY® steel grades perform favourably against other types of structural steels at elevated temperature.

This can be seen below in Table 1, where the performance of BISALLOY® Structural 80 steel is superior when compared with other well-known structural grades at an elevated temperature of 600°C.

GRADE	0.2% Proof Stress @ 600°C
BISALLOY® 80 steel	300 MPa
AS3678-250	127 MPa
AS3678-350	140 MPa

Fig 1:

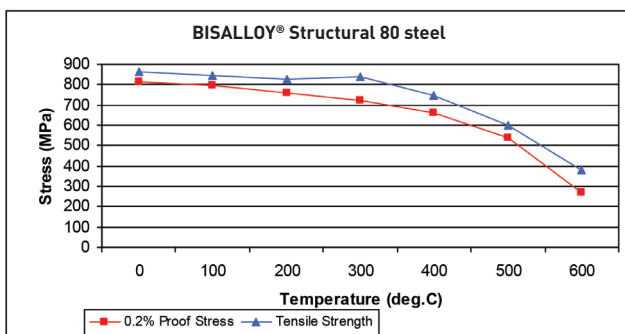


Fig 2:

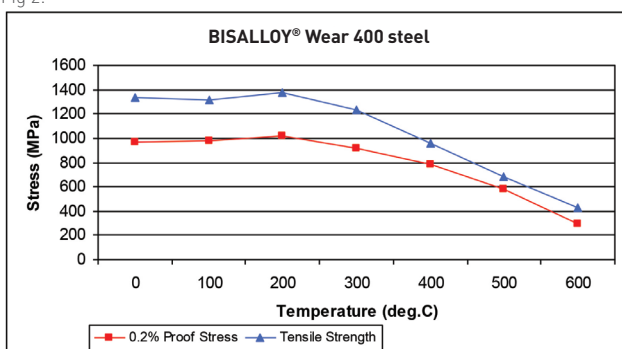


Table 1: 0.2% Proof Stress at elevated temperature of 600°C.

However, the use of BISALLOY® steel at elevated temperatures should be undertaken with caution. Prolonged exposure to excessive heat will lead to loss of mechanical properties including strength and hardness. This is primarily due to a microstructural change of the plate due to over-tempering.

Any proposal for the use of BISALLOY® steel at temperatures above 150°C should be referred to Bisalloy Steels for technical advice.

The following graphs show the results of high temperature tests performed on BISALLOY® Structural 80 steel and BISALLOY® Wear 400 steel. Please note that these graphs depict instantaneous tensile measurements only and are not indicative of results when BISALLOY® steel is exposed to excessive heat for a prolonged period of time.

The results of this project indicate the processed BISALLOY® steel grades perform comparably or favourably with other types of structural steel in terms of the temperature at which the strength of the material is half that of its room temperature strength. This temperature was identified as being between 500°C and 600°C for processed grades.

This temperature for greenfeed grades was seen to be beyond 600°C. There was no significant difference in 0.2% Proof Stress at 600°C between the processed and greenfeed samples, all values being in the vicinity of 300MPa.

This compares with 127MPa and 140MPa for AS3678-250 grade and AS3678-350 grade respectively at 600°C. The results confirm the suitability of BISALLOY® steel for use in structural and elevated temperature applications.

Table 1: Results summary for all samples

SAMPLE NUMBER/GRADE	Temp. (deg.C)	Reduction in area	0.2%P.S.	U.T.S. (MPa)	Elongation (%)	Yield/tensile
PX441/ BISALLOY® Structural 80 steel, 20mm (Not quenched and tempered)	20	45%	504	706	16%	0.71
	200	64%	475	637	15%	0.75
	300	58%	530	697	5%	0.76
	400	71%	486	650	19%	0.75
	500	83%	434	520	23%	0.83
	600	89%	327	393	19%	0.83
PX461/ BISALLOY® Structural 80 steel, 12mm (Not quenched and tempered)	20	62%	496	659	20%	0.75%
	100	67%	483	620	16%	0.78%
	200	57%	476	618	16%	0.77%
	300	58%	679	705	21%	0.96%
	400	85%	515	596	25%	0.86%
	500	79%	401	481	20%	0.83%
71815/ BISALLOY® Wear 400 steel, 12mm	20	56%	971	1338	4%	0.73
	100	44%	976	1318	9%	0.74
	200	48%	1017	1374	4%	0.74
	300	70%	922	1234	12%	0.75
	400	84%	789	962	4%	0.82
	500	82%	580	679	15%	0.85
71831/ BISALLOY® Wear 400 steel, 20mm	20	52%	1020	1416	11%	0.72
	100	5%	1024	1328	10%	0.77
	200	42%	989	1462	11%	0.68
	300	68%	955	1340	14%	0.71
	400	77%	757	986	14%	0.77
	500	79%	582	674	14%	0.86
RF464A1/ BISALLOY® Structural 80 steel, 100mm	20	65%	560	752	17%	0.74
	100	71%	572	663	16%	0.86
	200	62%	561	709	12%	0.79
	300	64%	550	737	15%	0.75
	400	71%	501	717	16%	0.70
	500	79%	464	593	16%	0.78
77873, BISALLOY® Structural 80 steel, 100mm	20	72%	713	773	16%	0.92
	100	70%	638	704	15%	0.91
	200	70%	527	617	16%	0.85
	300	68%	512	673	7%	0.76
	400	78%	490	559	19%	0.82
	500	86%	460	522	17%	0.88
71974/ BISALLOY® Structural 80 steel, 12mm	20	-	815	862	13%	0.95
	100	62%	795	843	13%	0.94
	200	61%	759	829	11%	0.91
	300	55%	720	837	11%	0.86
	400	80%	664	748	17%	0.89
	500	79%	538	600	15%	0.90
72005/ BISALLOY® Structural 80 steel, 20mm	20	63%	816	876	17%	0.93
	100	58%	800	859	13%	0.93
	200	58%	746	833	11%	0.90
	300	61%	741	846	15%	0.88
	400	75%	635	736	15%	0.86
	500	82%	553	633	15%	0.87
	600	91%	290	413	24%	0.70

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