

Table E.8—Elastic, Rupture Allowable Stresses and Rupture Exponent (SI Units) for ASTM A213 T5b and ASTM A335 P5b 5Cr-1/2Mo-Si Steels

5Cr-0.5Mo-Si Steel						
Design Metal Temperature, T_d (Centigrade)	Elastic Allowable Stress, σ_{el} (MPa)	Rupture Allowable Stress, σ_r				Rupture Exponent, n
		$t_{DL} = 100,000\text{ h}$ (MPa)	$t_{DL} = 60,000\text{ h}$ (MPa)	$t_{DL} = 40,000\text{ h}$ (MPa)	$t_{DL} = 20,000\text{ h}$ (MPa)	
300	126.2					
310	126.1					
320	126.0					
330	125.8					
340	125.6					
350	125.4					
360	125.1					
370	124.8					
380	124.4					
390	124.0					
400	123.5					
410	122.9					
420	122.3					
430	121.5	151.2	164.0	174.9	195.4	6.3
440	120.7	135.5	147.1	157.1	175.7	6.2
450	119.7	121.4	132.0	141.1	158.0	6.1
460	118.7	108.8	118.4	126.7	142.1	6.0
470	117.5	97.5	106.2	113.8	127.8	5.9
480	116.2	87.4	95.3	102.1	115.0	5.9
490	114.8	78.3	85.5	91.7	103.4	5.8
500	113.3	70.1	76.7	82.4	93.0	5.7
510	111.6	62.9	68.8	74.0	83.6	5.6
520	109.8	56.3	61.7	66.4	75.2	5.6
530	107.8	50.5	55.4	59.6	67.7	5.5
540	105.7	45.2	49.7	53.6	60.8	5.4
550	103.5	40.5	44.6	48.1	54.7	5.4
560	101.1	36.3	40.0	43.2	49.2	5.3
570	98.6	32.5	35.9	38.8	44.3	5.2
580	96.0	29.2	32.2	34.8	39.8	5.2
590	93.2	26.1	28.9	31.3	35.8	5.1
600	90.3	23.4	25.9	28.1	32.2	5.0
610	87.3	21.0	23.2	25.2	29.0	5.0
620	84.2	18.8	20.9	22.6	26.0	4.9
630	81.0	16.9	18.7	20.3	23.4	4.9
640	77.7	15.1	16.8	18.3	21.1	4.8
649	74.6	13.7	15.2	16.6	19.2	4.8

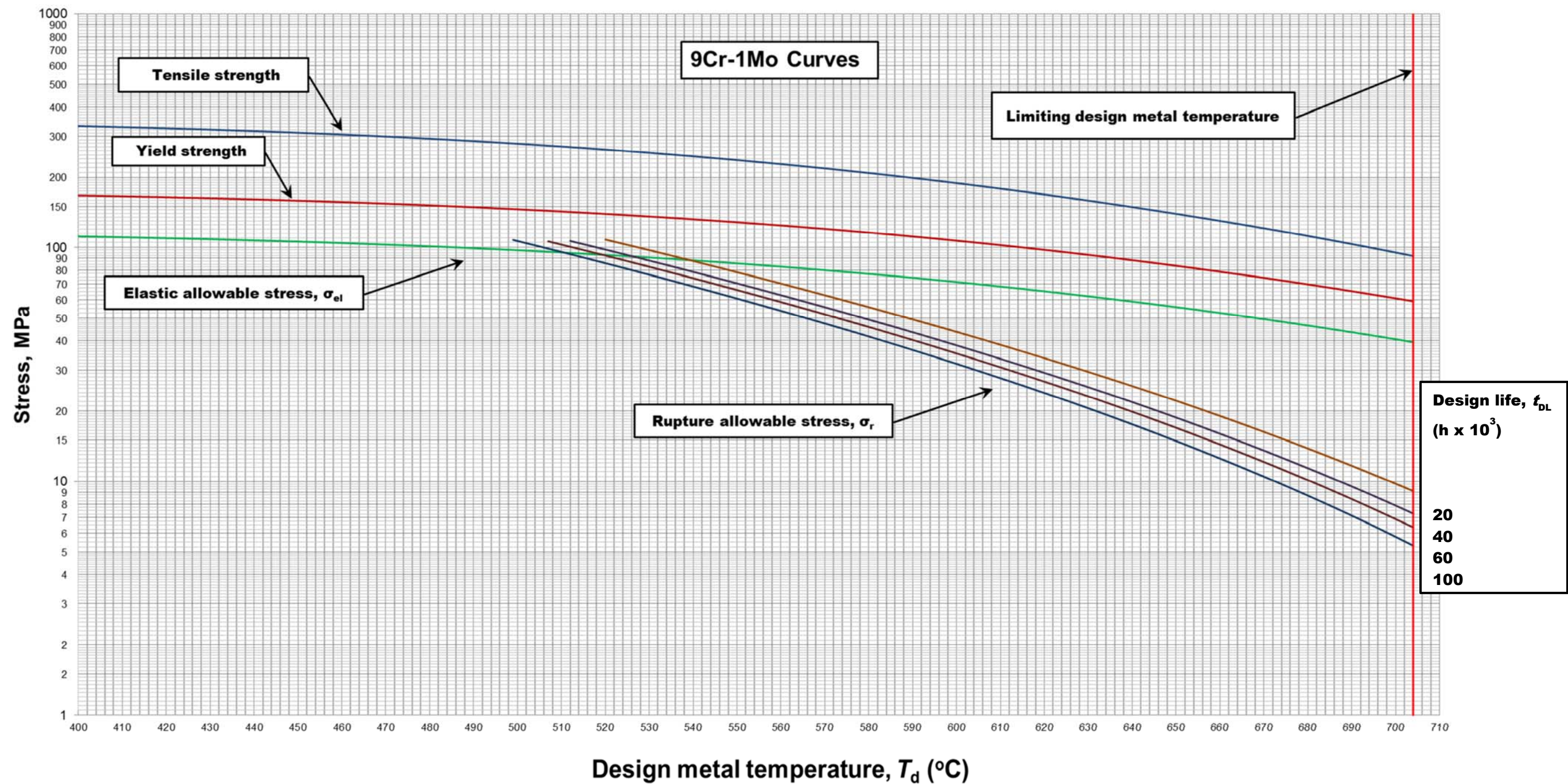


Figure E.25—Stress Curves (SI Units) for ASTM A213 T9 and ASTM A335 P9 9Cr-1Mo Steels

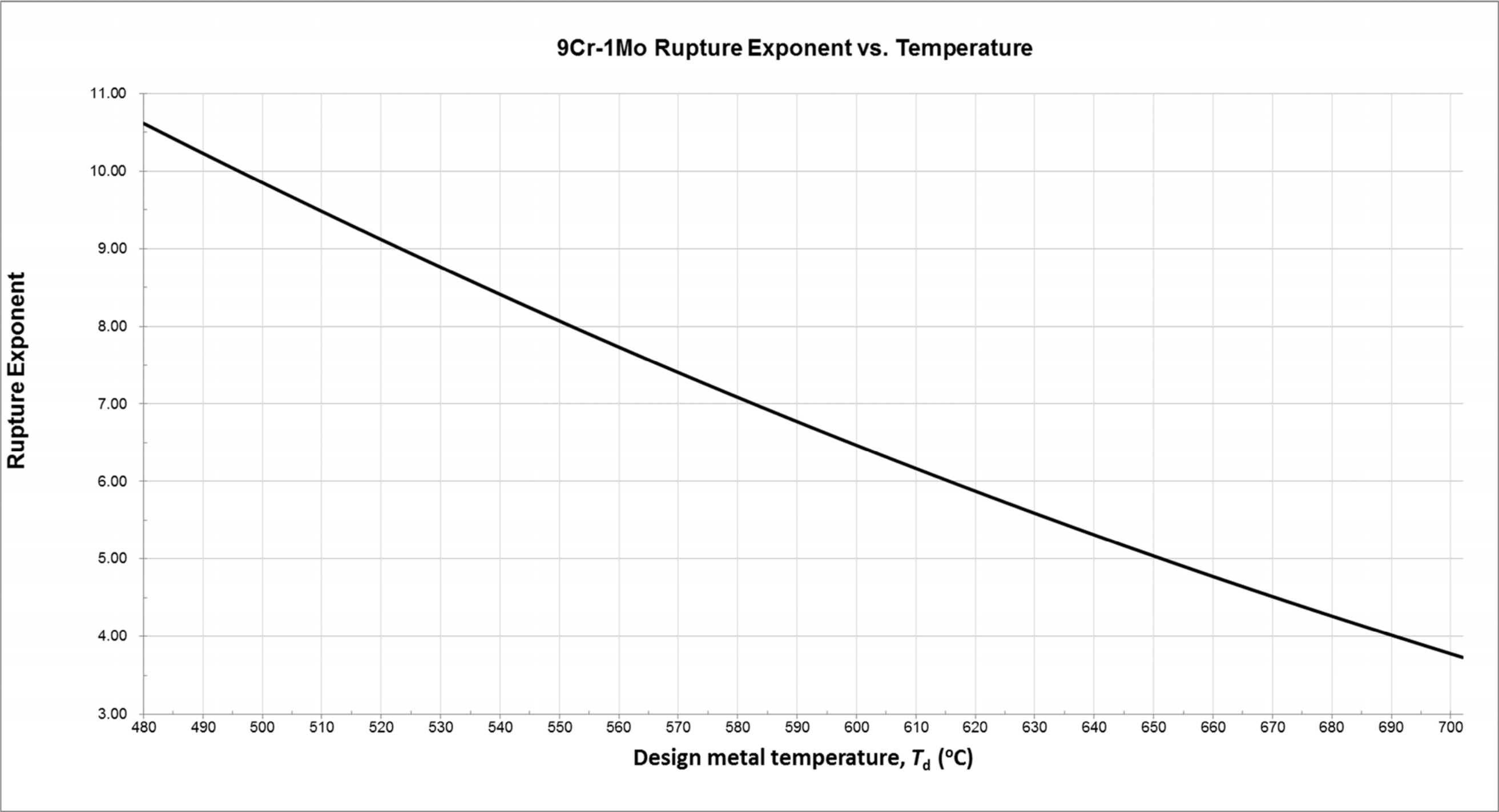


Figure E.26—Rupture Exponent vs. Temperature Curve (SI Units) for ASTM A213 T9 and ASTM A335 P9 9Cr-1Mo Steels

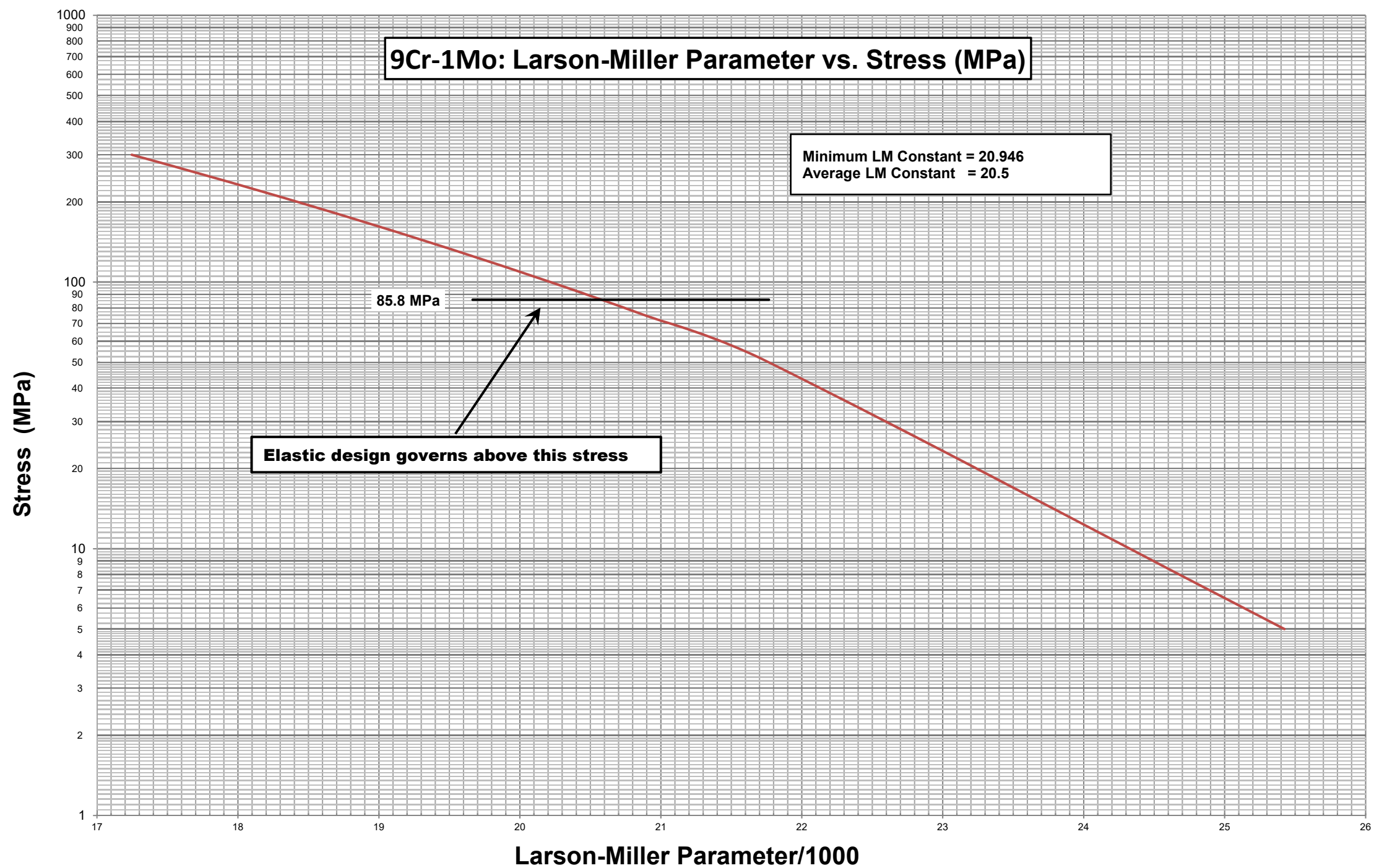


Figure E.27—Larson-Miller Parameter vs. Stress Curve (SI Units) for ASTM A213 T9 and ASTM A335 P9 9Cr-1Mo Steels

Table E.9—Elastic, Rupture Allowable Stresses and Rupture Exponent (SI Units) for ASTM A213 T9 and ASTM A335 P9 9Cr-1Mo Steels

9Cr-1Mo Steel						
Design Metal Temperature, T_d (Centigrade)	Elastic Allowable Stress, σ_{el} (MPa)	Rupture Allowable Stress, σ_r				Rupture Exponent, n
		$t_{DL} = 100,000\text{ h}$ (MPa)	$t_{DL} = 60,000\text{ h}$ (MPa)	$t_{DL} = 40,000\text{ h}$ (MPa)	$t_{DL} = 20,000\text{ h}$ (MPa)	
300	117.0					
310	116.7					
320	116.3					
330	115.9					
340	115.4					
350	115.0					
360	114.4					
370	113.8					
380	113.2					
390	112.4					
400	111.6					
410	110.7					
420	109.7					
430	108.5					
440	107.3					
450	106.0					
460	104.5					
470	102.9					
480	101.2					
490	99.3	118.4	126.7	133.5	145.9	10.3
500	97.4	106.6	114.3	120.7	132.3	9.9
510	95.3	95.7	102.9	108.9	119.8	9.6
520	93.0	85.8	92.4	98.0	108.2	9.2
530	90.7	76.6	82.8	88.0	97.5	8.8
540	88.2	68.3	74.0	78.8	87.6	8.5
550	85.6	60.7	66.0	70.4	78.6	8.1
560	82.9	53.7	58.6	62.7	70.3	7.8
570	80.2	47.4	51.9	55.7	62.7	7.5
580	77.3	41.7	45.8	49.3	55.7	7.1
590	74.3	36.5	40.3	43.5	49.4	6.8
600	71.3	31.9	35.3	38.2	43.6	6.5
610	68.3	27.7	30.8	33.4	38.4	6.2
620	65.2	23.9	26.7	29.2	33.7	5.9
630	62.0	20.5	23.1	25.3	29.4	5.6
640	58.9	17.5	19.8	21.8	25.6	5.4
650	55.7	14.9	17.0	18.7	22.1	5.1
660	52.6	12.6	14.4	16.0	19.0	4.8
670	49.5	10.5	12.1	13.6	16.3	4.6
680	46.5	8.7	10.1	11.4	13.8	4.3
690	43.5	7.1	8.4	9.5	11.7	4.1
700	40.6	5.8	6.9	7.9	9.8	3.8
704	39.4	5.3	6.4	7.3	9.1	3.7

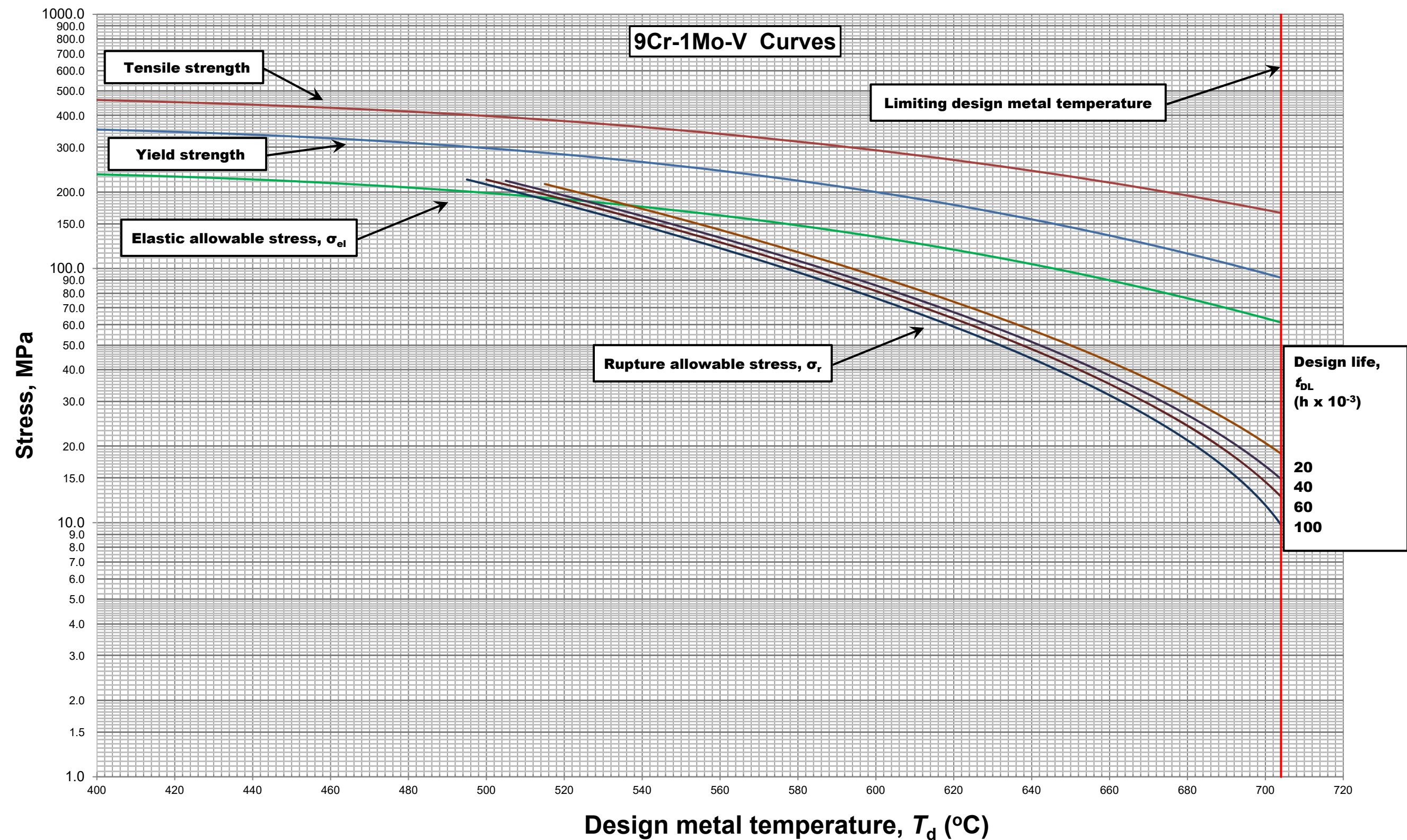


Figure E.28—Stress Curves (SI Units) for ASTM A213 T91 and ASTM A335 P91 9Cr-1Mo-V Steels

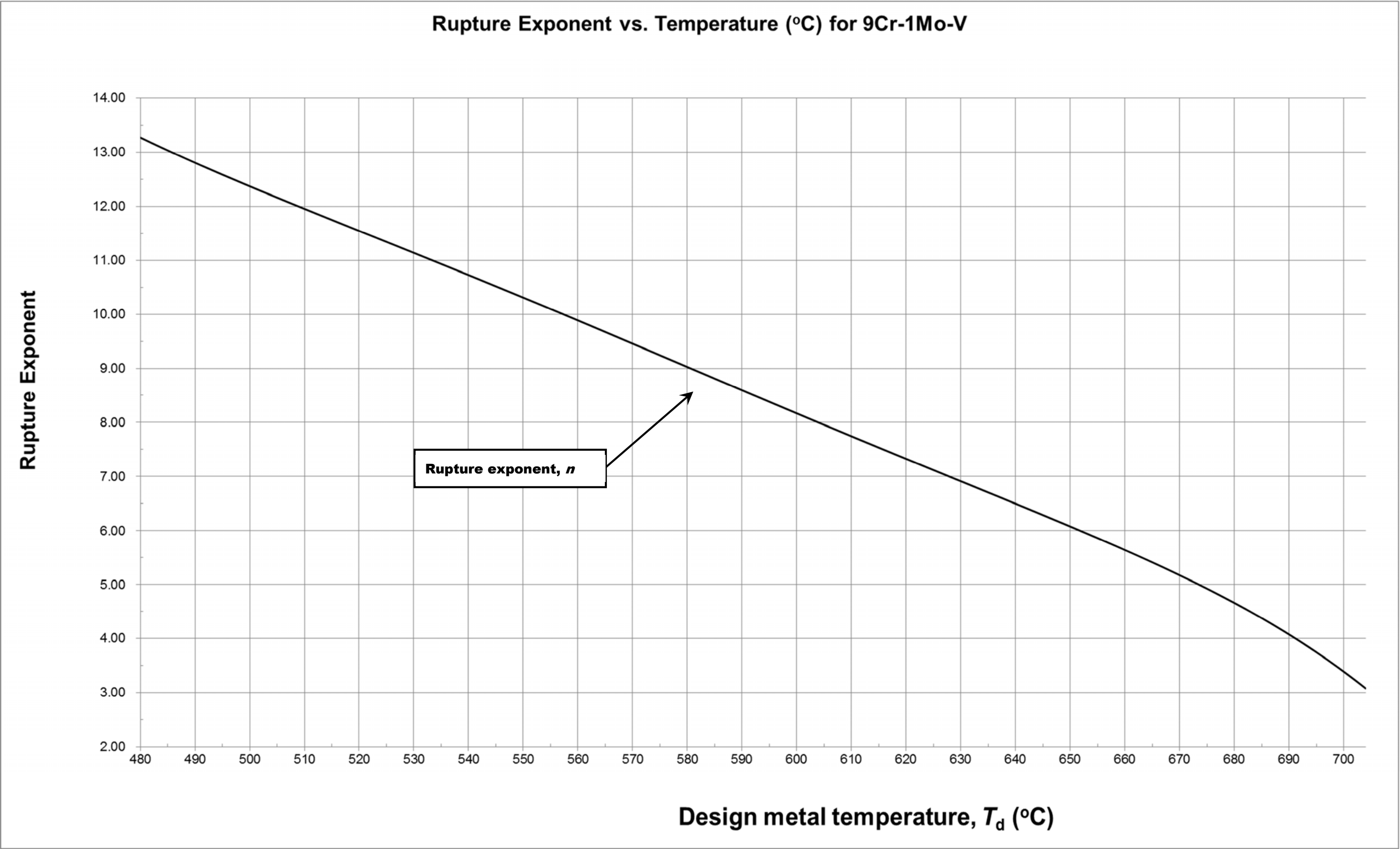


Figure E.29—Rupture Exponent vs. Temperature Curve (SI Units) for ASTM A213 T91 and ASTM A335 P91 9Cr-1Mo-V Steels

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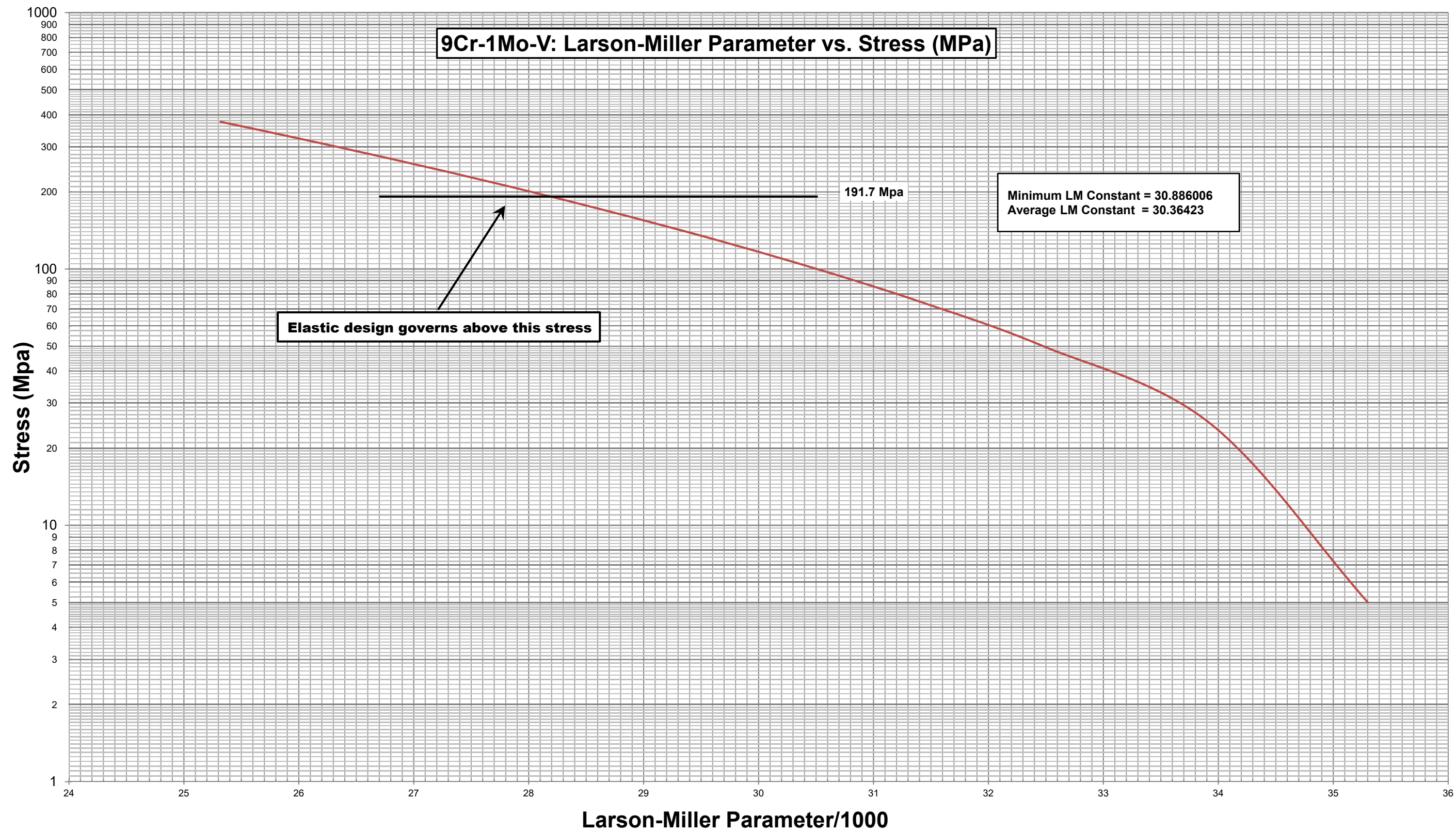


Figure E.30—Larson-Miller Parameter vs. Stress Curve (SI Units) for ASTM A213 T91 and ASTM A335 P91 9Cr-1Mo-V Steels

Table E.10—Elastic, Rupture Allowable Stresses and Rupture Exponent (SI Units) ASTM A213 T91 and ASTM A335 P91 9Cr-1Mo-V Steels

9Cr-1Mo-V Steel						
Design Metal Temperature, T_d (Centigrade)	Elastic Allowable Stress, σ_{el} (MPa)	Rupture Allowable Stress, σ_r				Rupture Exponent, n
		$t_{DL} = 100,000\text{ h}$ (MPa)	$t_{DL} = 60,000\text{ h}$ (MPa)	$t_{DL} = 40,000\text{ h}$ (MPa)	$t_{DL} = 20,000\text{ h}$ (MPa)	
400	234.8					
410	232.6					
420	230.1					
430	227.3					
440	224.2					
450	220.7					
460	216.9					
470	212.8					
480	208.3					
490	203.6	234.0	243.7	251.7	265.7	12.8
500	198.4	214.3	223.6	231.1	244.5	12.4
510	193.0	195.9	204.6	211.8	224.5	12.0
520	187.3	178.6	186.9	193.7	205.8	11.5
530	181.3	162.4	170.3	176.8	188.2	11.1
540	175.0	147.4	154.8	160.9	171.7	10.7
550	168.5	133.3	140.3	146.1	156.3	10.3
560	161.8	120.2	126.8	132.3	141.9	9.9
570	154.9	108.0	114.2	119.4	128.5	9.5
580	147.8	96.7	102.5	107.4	116.0	9.0
590	140.6	86.1	91.7	96.2	104.3	8.6
600	133.3	76.4	81.6	85.8	93.4	8.2
610	126.0	67.4	72.2	76.2	83.3	7.7
620	118.7	59.0	63.6	67.3	74.0	7.3
630	111.3	51.3	55.6	59.0	65.3	6.9
640	104.1	44.3	48.2	51.4	57.3	6.5
650	96.9	37.7	41.4	44.4	49.9	6.1
660	89.9	31.7	35.1	37.9	43.0	5.6
670	83.0	26.2	29.4	32.0	36.7	5.2
676	79.0	23.1	26.1	28.6	33.2	4.9
680	76.4	21.1	24.1	26.5	30.9	4.7
690	69.9	16.3	19.1	21.4	25.5	4.1
700	63.7	11.7	14.5	16.7	20.6	3.4
702	62.5	10.8	13.6	15.8	19.6	3.2
704	61.3	9.8	12.7	14.9	18.7	3.1

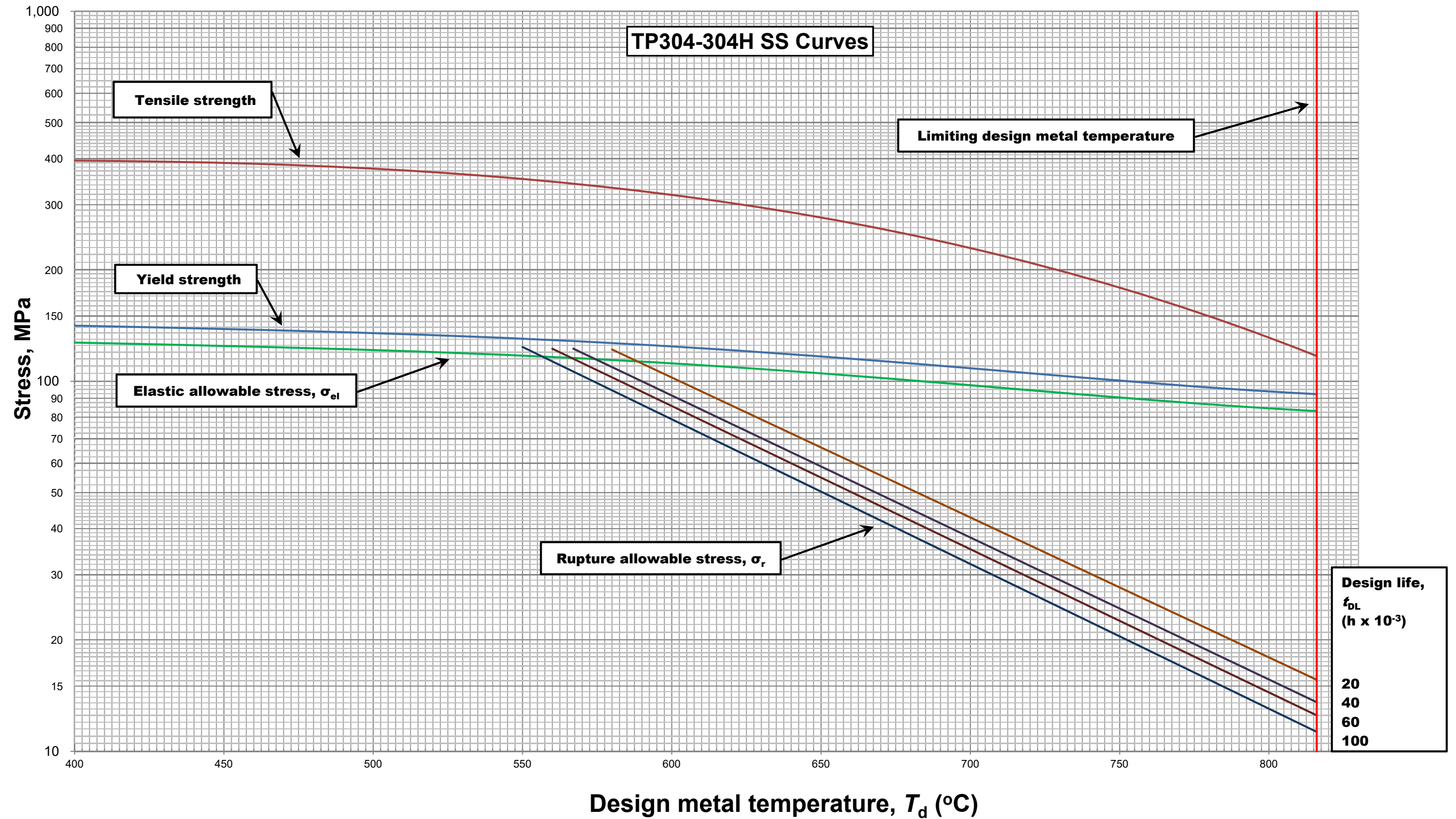


Figure E.31—Stress Curves (SI Units) for ASTM A213, ASTM A312, and ASTM 376 TP 304 and 304H (18Cr-8Ni) Stainless Steels

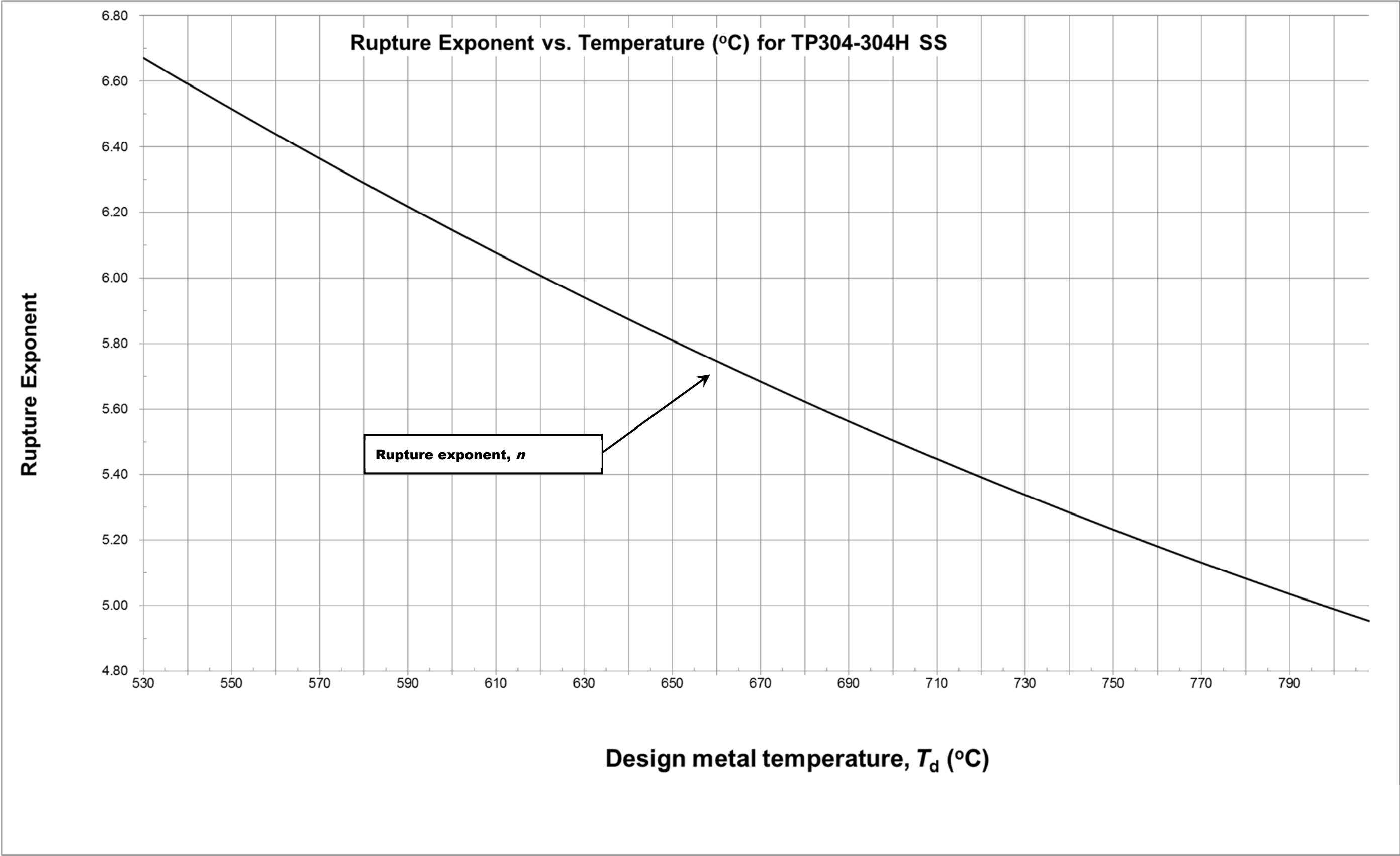


Figure E.32—Rupture Exponent vs. Temperature Curve (SI Units) for ASTM A213, ASTM A312, and ASTM 376 TP 304 and 304H (18Cr-8Ni) Stainless Steels

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