APPENDIX C CHARPY V-NOTCH PLOTS FOR EACH CAPSULE INCLUDING BASELINE DATA USING SYMMETRIC HYPERBOLIC TANGENT CURVE-FITTING METHOD

C.1 METHODOLOGY

Contained in Table C-1 are the upper-shelf energy (USE) values that are used as input for the generation of the Charpy V-notch plots using CVGRAPH, Version 6.02. The definition for USE is given in ASTM E185-82 [C-1], Section 4.18, and reads as follows:

> *"upper shelf energy level* – the average energy value for all Charpy specimens (normally three) whose test temperature is above the upper end of the transition region. For specimens tested in sets of three at each test temperature, the set having the highest average may be regarded as defining the upper shelf energy."

Westinghouse reports the average of all Charpy data (≥ 95% shear) as the USE, excluding any values that are deemed outliers using engineering judgment. Hence, the Capsule N USE values reported in Table C-1 were determined by applying this methodology to the Charpy data tabulated in Table 5-1 through Table 5-5 of this report. USE values documented in Table C-1 for the unirradiated material, as well as for Capsules V, T, R, and P, were also determined by applying the methodology described above to the Charpy impact data reported in WCAP-8193 [C-2] and WCAP-14613 [C-3]. The USE values reported in Table C-1 were used in the generation of the Charpy V-notch curves.

The lower-shelf energy values were fixed at 2.2 ft-lb for all cases. The lower-shelf lateral expansion values were fixed at 1.0 mil to be consistent with the previous capsule analysis. Similarly, the upper-shelf energy must also be fixed for curve-fitting the Charpy V-notch (CVN) Energy data using the values reported in Table C-1. However, the upper-shelf lateral expansion is not fixed in CVGRAPH.

Table C-1 Upper-Shelf Energy Values Fixed in CVGRAPH[(1)]

Material	Unirradiated (ft-lb)	Capsule V (ft-lb)	Capsule T (ft-lb)	Capsule R (ft-lb)	Capsule P (ft-lb)	Capsule N (ft-lb)
Lower Shell Forging D (Heat # 22642) (Tangential Orientation)	147.7	163.3	133.0	127.3	128.8	125.0
Lower Shell Forging D (Heat # 22642) (Axial Orientation)	106.2	115.3	92.8	98.5	94.3	89.0
Intermediate Shell to Lower Shell Circumferential Weld - Seam W3 (Heat # 2721)	103.3	97.2	94.8	91.0	98.5	95.0
Heat Affected Zone (HAZ) Material	114.0	122.0	98.7	88.3	96.0	82.0
Correlation Monitor Material (CMM)	120.4	101.8	87.7	77.0	96.0	79.0

Note:

1. These values are calculated as an average of all in-family data points with a shear ≥ 95%, consistent with ASTM E185-82 [C-1], unless otherwise noted.

CVGRAPH, Version 6.02 plots of all surveillance data are provided in this appendix, on the pages following the reference list.

C.2 REFERENCES

C-1 ASTM E185-82, “Standard Practice for Conducting Surveillance Tests for Light-Water Cooled Nuclear Power Reactor Vessels,” American Society for Testing and Materials, 1982.

C-2 Westinghouse Report, WCAP-8193, Rev. 0, “Northern States Power Co. Prairie Island Unit No. 2 Reactor Vessel Radiation Surveillance Program,” September 1973.

C-3 Westinghouse Report, WCAP-14613, Rev. 2, “Analysis of Capsule P from the Northern States Power Company Prairie Island Unit 2 Reactor Vessel Radiation Surveillance Program,” February 1998.

C.3 CVGRAPH VERSION 6.02 INDIVIDUAL PLOTS

Unirradiated Lower Shell Forging D (Tangential)

CVGraph 6.02: Hyperbolic Tangent Curve Printed on 5/24/2022 4:29 PM

A = 74.95 B = 72.75 C = 58.91 T0 = 14.19 D = 0.00

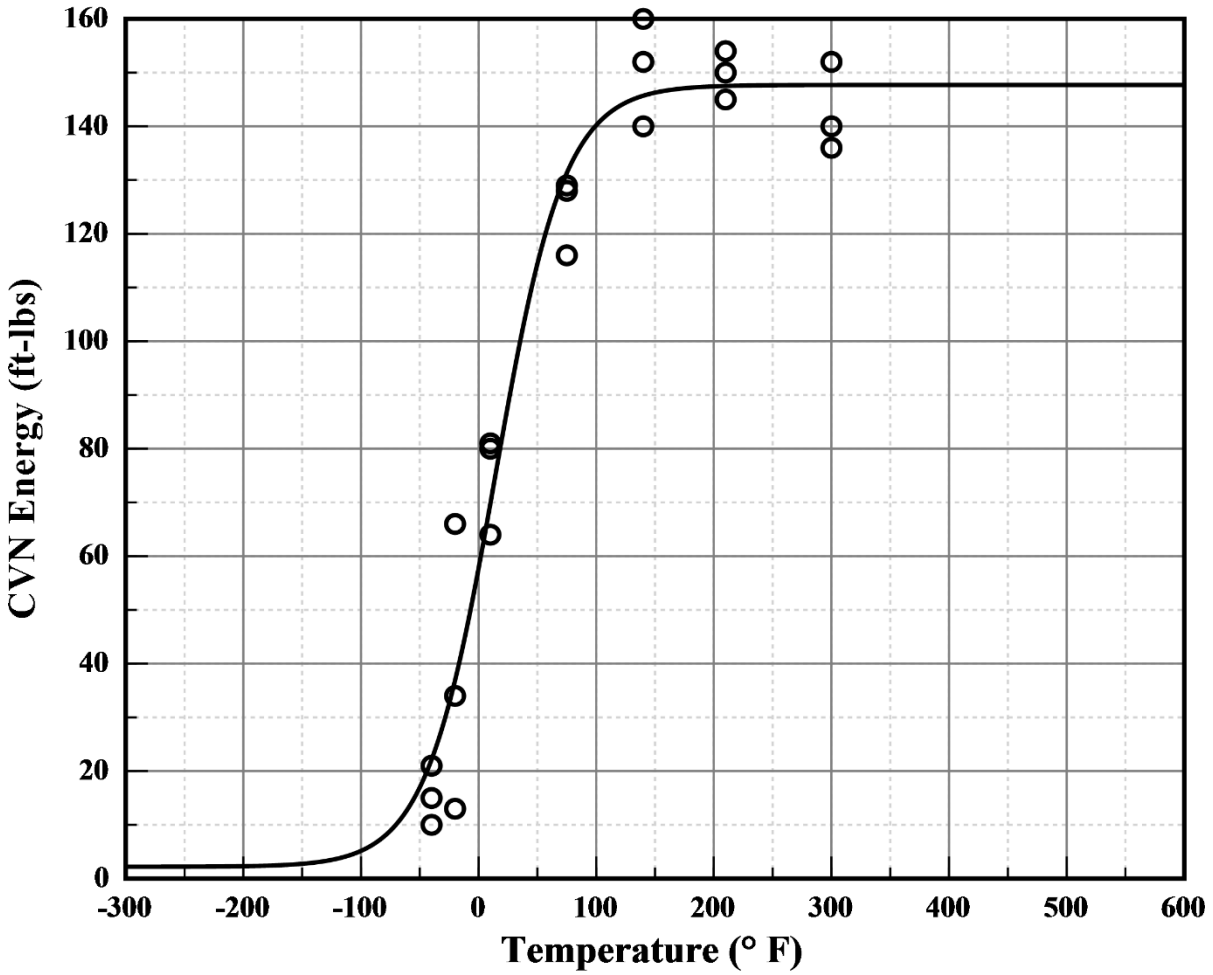
Correlation Coefficient = 0.977

Equation is A + B * [Tanh((T-T0)/(C+DT))]

Upper Shelf Energy = 147.70 (Fixed) Lower Shelf Energy = 2.20 (Fixed)

Temp@30 ft-lbs=-28.30° F Temp@35 ft-lbs=-22.10° F Temp@50 ft-lbs= -6.80° F

Plant: **Prairie Island 2** Material: **SA508CL3** Heat: **22642**
Orientation: **Tangential** Capsule: **Unirrad** Fluence: **0.00E+000 n/cm²**



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Plant: **Prairie Island 2** Material: **SA508CL3** Heat: **22642**
Orientation: **Tangential** Capsule: **Unirrad** Fluence: **0.00E+000 n/cm²**

Unirradiated Lower Shell Forging D (Tangential)

Charpy V-Notch Data

Temperature (° F)	Input CVN	Computed CVN	Differential
-40	15.0	22.1	-7.14
-40	10.0	22.1	-12.14
-40	21.0	22.1	-1.14
-20	13.0	36.9	-23.91
-20	34.0	36.9	-2.91
-20	66.0	36.9	29.09
10	64.0	69.8	-5.79
10	80.0	69.8	10.21
10	81.0	69.8	11.21
75	128.0	131.3	-3.32
75	129.0	131.3	-2.32
75	116.0	131.3	-15.32
140	152.0	145.7	6.30
140	140.0	145.7	-5.70
140	160.0	145.7	14.30
210	154.0	147.5	6.49
210	150.0	147.5	2.49
210	145.0	147.5	-2.51
300	152.0	147.7	4.31
300	136.0	147.7	-11.69
300	140.0	147.7	-7.69

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Capsule V Lower Shell Forging D (Tangential)

CVGraph 6.02: Hyperbolic Tangent Curve Printed on 5/25/2022 7:54 AM

A = 82.75 B = 80.55 C = 69.45 T0 = 59.84 D = 0.00

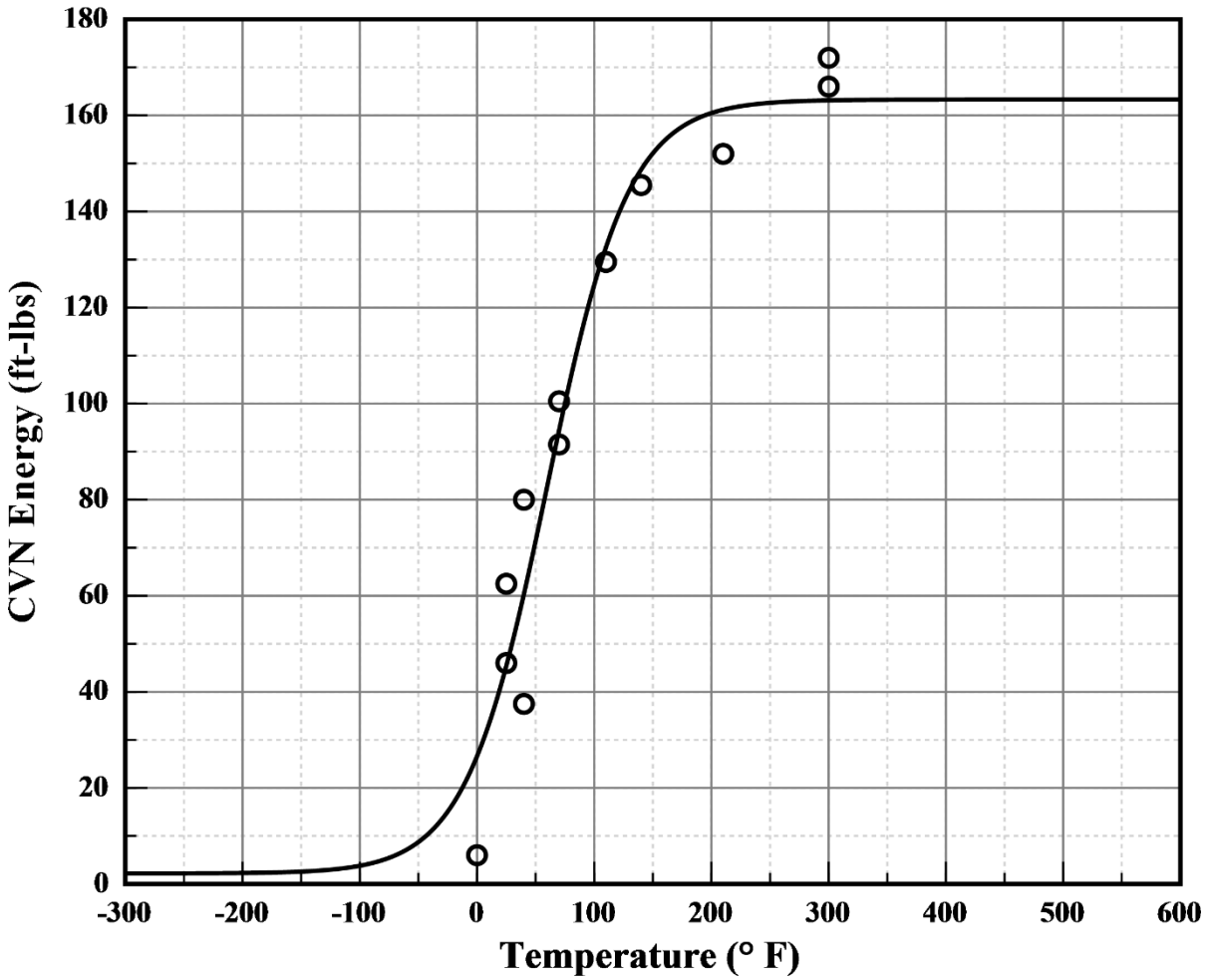
Correlation Coefficient = 0.971

Equation is A + B * [Tanh((T-T0)/(C+DT))]

Upper Shelf Energy = 163.30 (Fixed) Lower Shelf Energy = 2.20 (Fixed)

Temp@30 ft-lbs= 5.50° F Temp@35 ft-lbs= 12.50° F Temp@50 ft-lbs= 29.90° F

Plant: **Prairie Island 2** Material: **SA508CL3** Heat: **22642**
Orientation: **Tangential** Capsule: **V** Fluence: **5.98E+018 n/cm²**



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Plant: **Prairie Island 2** Material: **SA508CL3** Heat: **22642**
Orientation: **Tangential** Capsule: **V** Fluence: **5.98E+018 n/cm²**

Capsule V Lower Shell Forging D (Tangential)

Charpy V-Notch Data

Temperature (° F)	Input CVN	Computed CVN	Differential
0	6.0	26.6	-20.60
25	62.5	45.4	17.08
25	46.0	45.4	0.58
40	37.5	60.3	-22.84
40	80.0	60.3	19.66
70	100.5	94.4	6.05
70	91.5	94.4	-2.95
110	129.5	132.5	-3.05
140	145.5	148.7	-3.23
210	152.0	161.2	-9.19
300	166.0	163.1	2.86
300	172.0	163.1	8.86

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Capsule T Lower Shell Forging D (Tangential)

CVGraph 6.02: Hyperbolic Tangent Curve Printed on 5/25/2022 9:04 AM

A = 67.60 B = 65.40 C = 91.90 T0 = 86.27 D = 0.00

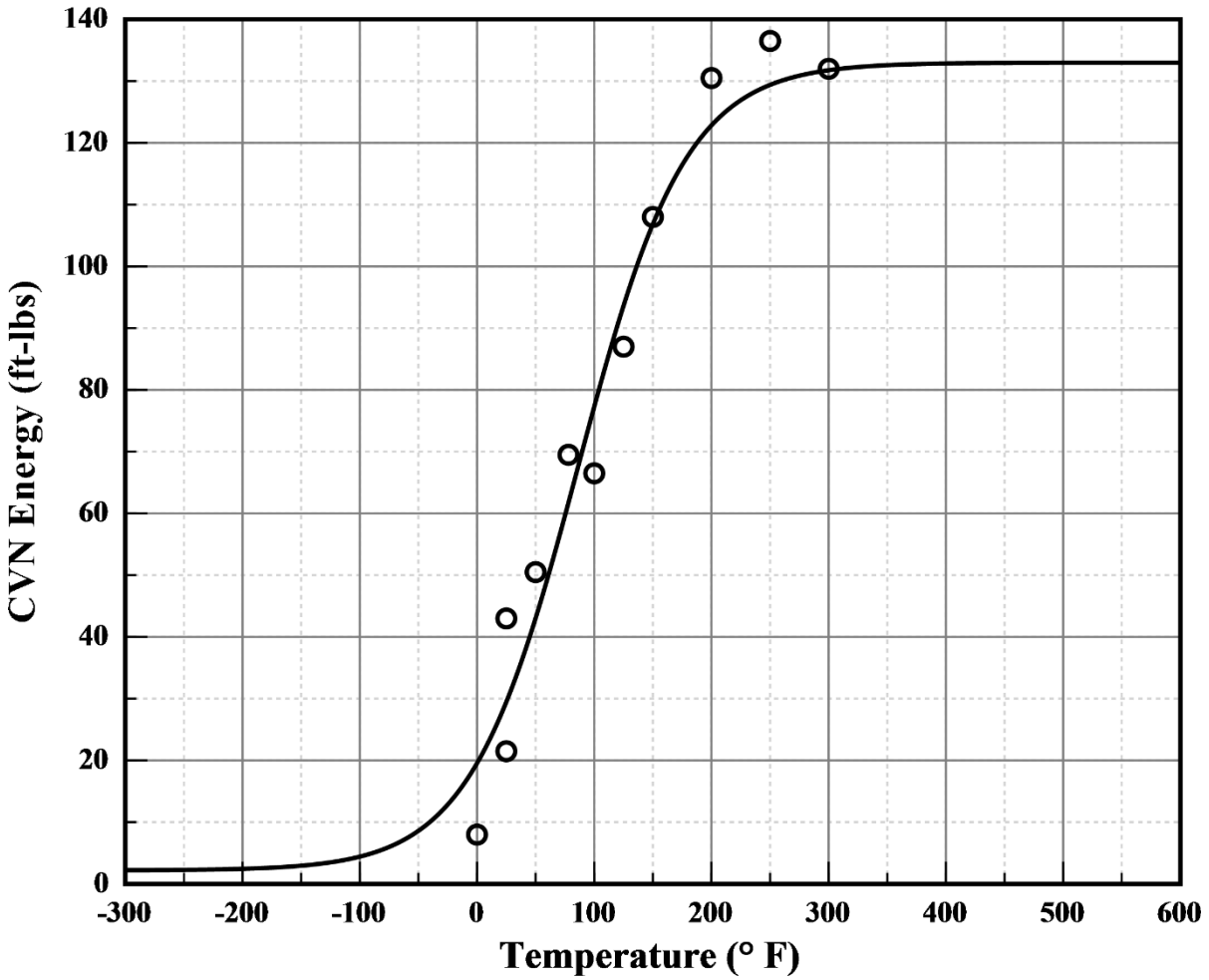
Correlation Coefficient = 0.982

Equation is A + B * [Tanh((T-T0)/(C+DT))]

Upper Shelf Energy = 133.00 (Fixed) Lower Shelf Energy = 2.20 (Fixed)

Temp@30 ft-lbs= 26.10° F Temp@35 ft-lbs= 36.00° F Temp@50 ft-lbs= 61.00° F

Plant: **Prairie Island 2** Material: **SA508CL3** Heat: **22642**
Orientation: **Tangential** Capsule: **T** Fluence: **1.10E+019 n/cm²**



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Plant: **Prairie Island 2** Material: **SA508CL3** Heat: **22642**
Orientation: **Tangential** Capsule: **T** Fluence: **1.10E+019 n/cm²**

Capsule T Lower Shell Forging D (Tangential)

Charpy V-Notch Data

Temperature (° F)	Input CVN	Computed CVN	Differential
0	8.0	19.6	-11.55
25	21.5	29.5	-7.98
25	43.0	29.5	13.52
50	50.5	43.0	7.45
78	69.5	61.7	7.77
100	66.5	77.3	-10.80
125	87.0	93.6	-6.64
150	108.0	106.9	1.15
200	130.5	122.8	7.65
250	136.5	129.4	7.11
300	132.0	131.8	0.24

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Capsule R Lower Shell Forging D (Tangential)

CVGraph 6.02: Hyperbolic Tangent Curve Printed on 5/25/2022 11:46 AM

A = 64.75 B = 62.55 C = 104.83 T0 = 126.92 D = 0.00

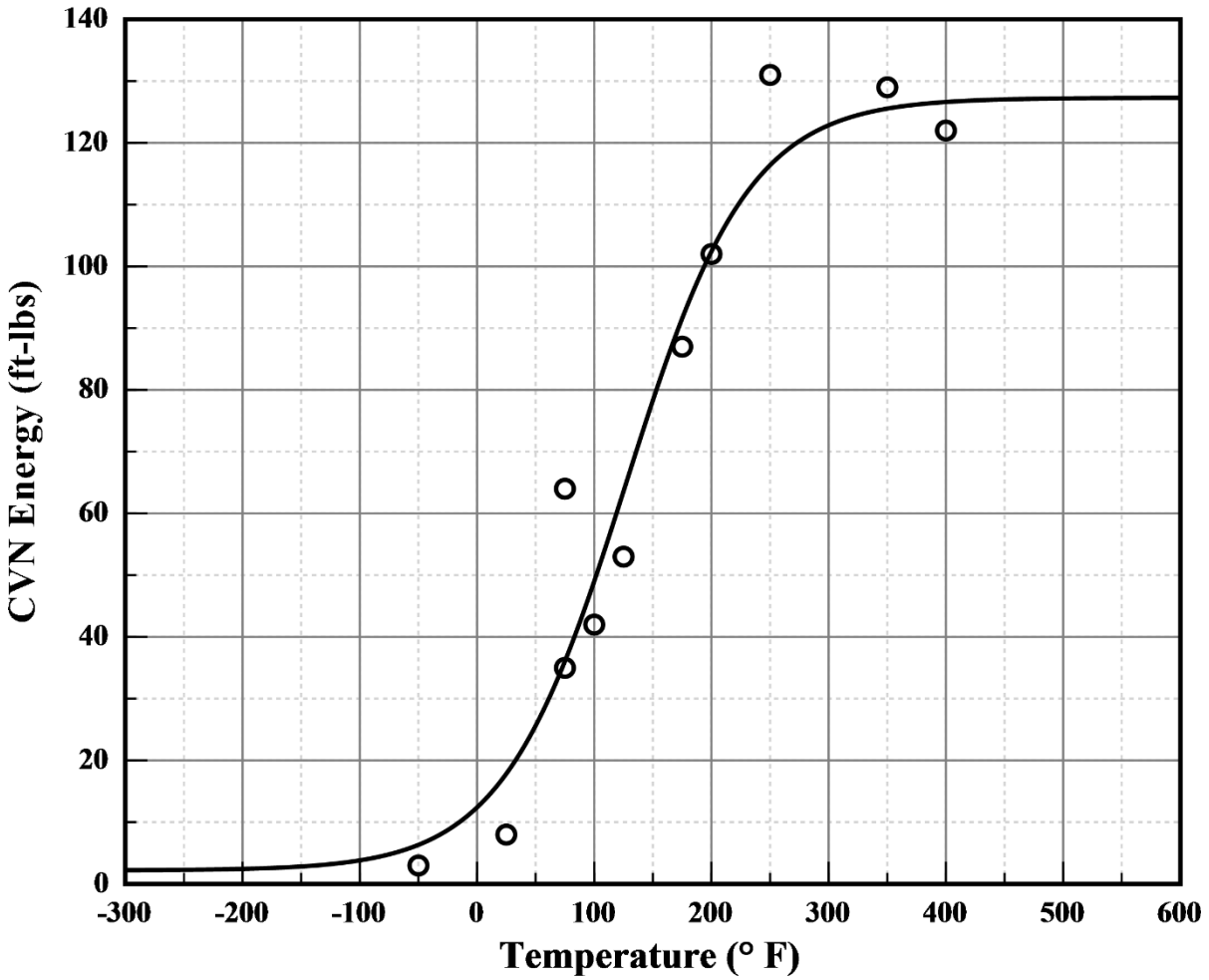
Correlation Coefficient = 0.970

Equation is A + B * [Tanh((T-T0)/(C+DT))]

Upper Shelf Energy = 127.30 (Fixed) Lower Shelf Energy = 2.20 (Fixed)

Temp@30 ft-lbs= 61.30° F Temp@35 ft-lbs= 72.70° F Temp@50 ft-lbs=101.80° F

Plant: **Prairie Island 2** Material: **SA508CL3** Heat: **22642**
Orientation: **Tangential** Capsule: **R** Fluence: **4.11E+019 n/cm²**



CVGraph 6.02 05/25/2022 Page 1/2

Plant: **Prairie Island 2** Material: **SA508CL3** Heat: **22642**
Orientation: **Tangential** Capsule: **R** Fluence: **4.11E+019 n/cm²**

Capsule R Lower Shell Forging D (Tangential)

Charpy V-Notch Data

Temperature (° F)	Input CVN	Computed CVN	Differential
-50	3.0	6.3	-3.34
25	8.0	17.9	-9.86
75	35.0	36.1	-1.08
75	64.0	36.1	27.92
100	42.0	49.0	-7.03
125	53.0	63.6	-10.60
175	87.0	91.6	-4.58
200	102.0	102.4	-0.44
250	131.0	116.4	14.61
350	129.0	125.6	3.45
400	122.0	126.6	-4.62

CVGraph 6.02 05/25/2022 Page 2/2

Capsule P Lower Shell Forging D (Tangential)

CVGraph 6.02: Hyperbolic Tangent Curve Printed on 5/31/2022 9:58 AM

A = 65.50 B = 63.30 C = 90.62 T0 = 128.72 D = 0.00

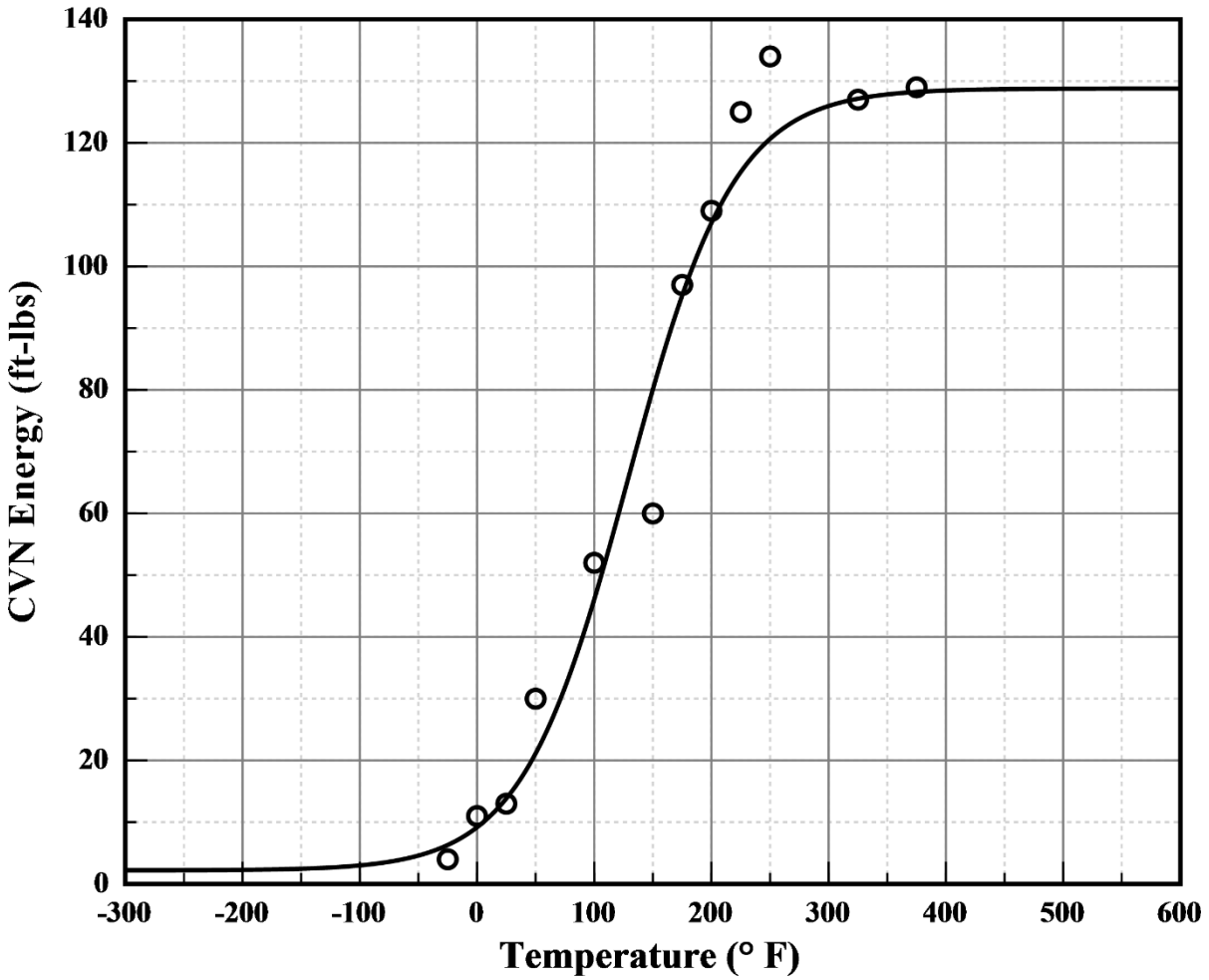
Correlation Coefficient = 0.987

Equation is A + B * [Tanh((T-T0)/(C+DT))]

Upper Shelf Energy = 128.80 (Fixed) Lower Shelf Energy = 2.20 (Fixed)

Temp@30 ft-lbs= 71.30° F Temp@35 ft-lbs= 81.20° F Temp@50 ft-lbs=106.10° F

Plant: **Prairie Island 2** Material: **SA508CL3** Heat: **22642**
Orientation: **Tangential** Capsule: **P** Fluence: **4.27E+019 n/cm²**



CVGraph 6.02 05/31/2022 Page 1/2

Plant: **Prairie Island 2** Material: **SA508CL3** Heat: **22642**
Orientation: **Tangential** Capsule: **P** Fluence: **4.27E+019 n/cm²**

Capsule P Lower Shell Forging D (Tangential)

Charpy V-Notch Data

Temperature (° F)	Input CVN	Computed CVN	Differential
-25	4.0	6.3	-2.32
0	11.0	9.2	1.82
25	13.0	13.9	-0.85
50	30.0	21.1	8.85
100	52.0	46.1	5.92
150	60.0	80.1	-20.10
175	97.0	95.3	1.72
200	109.0	107.1	1.94
225	125.0	115.3	9.71
250	134.0	120.7	13.35
325	127.0	127.2	-0.16
375	129.0	128.3	0.75

CVGraph 6.02 05/31/2022 Page 2/2

Capsule N Lower Shell Forging D (Tangential)

CVGraph 6.02: Hyperbolic Tangent Curve Printed on 7/12/2022 7:20 AM

A = 63.60 B = 61.40 C = 57.92 T0 = 183.71 D = 0.00

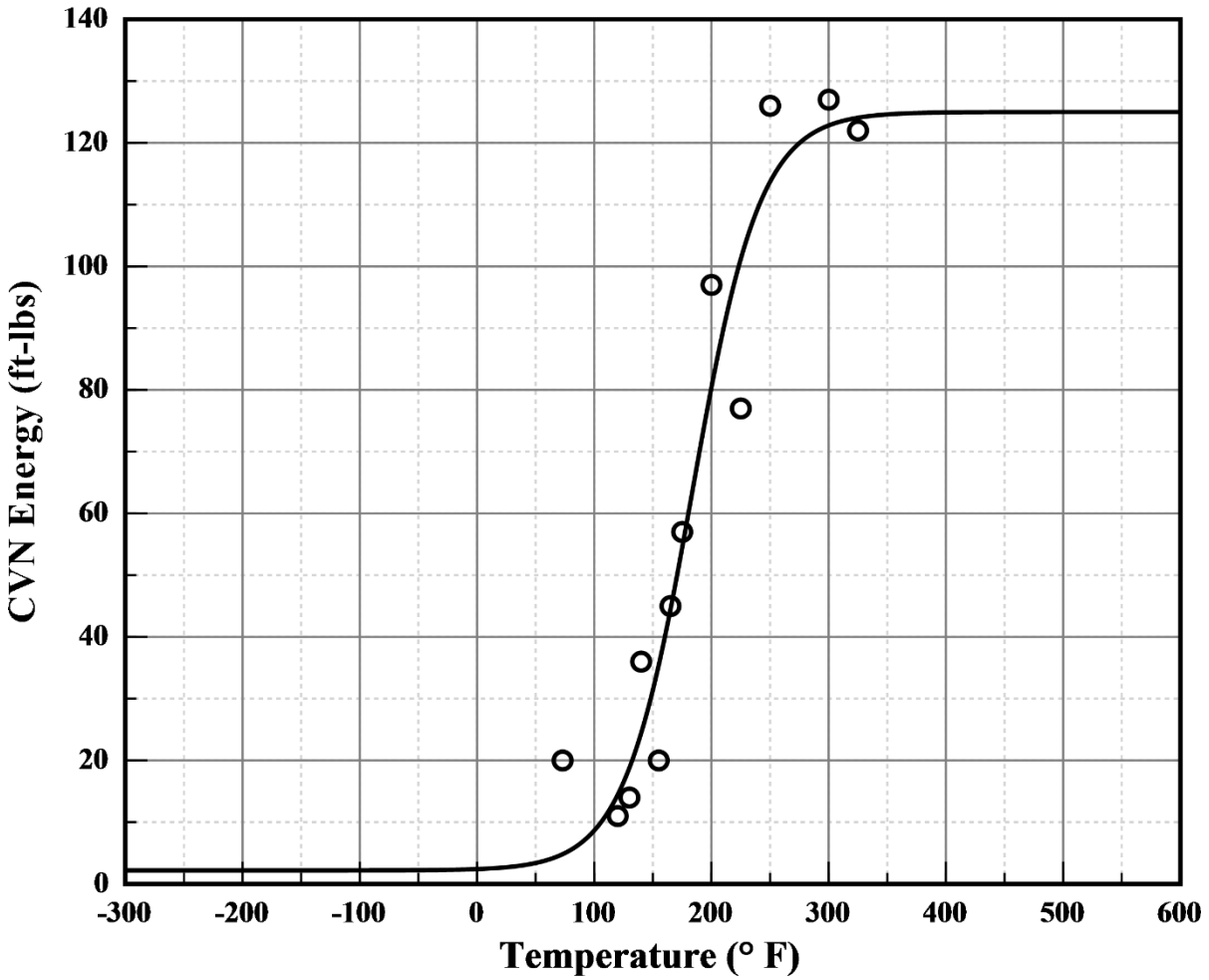
Correlation Coefficient = 0.963

Equation is A + B * [Tanh((T-T0)/(C+DT))]

Upper Shelf Energy = 125.00 (Fixed) Lower Shelf Energy = 2.20 (Fixed)

Temp@30 ft-lbs=148.20° F Temp@35 ft-lbs=154.50° F Temp@50 ft-lbs=170.70° F

Plant: **Prairie Island 2** Material: **SA508CL3** Heat: **22642**
Orientation: **Tangential** Capsule: **N** Fluence: **8.41E+019 n/cm²**



CVGraph 6.02 07/12/2022 Page 1/2

Plant: **Prairie Island 2** Material: **SA508CL3** Heat: **22642**
Orientation: **Tangential** Capsule: **N** Fluence: **8.41E+019 n/cm²**

Capsule N Lower Shell Forging D (Tangential)

Charpy V-Notch Data

Temperature (° F)	Input CVN	Computed CVN	Differential
73	20.0	4.8	15.17
120	11.0	14.4	-3.45
130	14.0	18.8	-4.82
140	36.0	24.4	11.57
155	20.0	35.4	-15.43
165	45.0	44.4	0.57
175	57.0	54.4	2.56
200	97.0	80.4	16.57
225	77.0	101.2	-24.21
250	126.0	113.7	12.30
300	127.0	122.8	4.17
325	122.0	124.1	-2.07

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Unirradiated Lower Shell Forging D (Tangential)

CVGraph 6.02: Hyperbolic Tangent Curve Printed on 5/24/2022 4:33 PM

A = 39.55 B = 38.55 C = 36.86 T0 = -5.70 D = 0.00

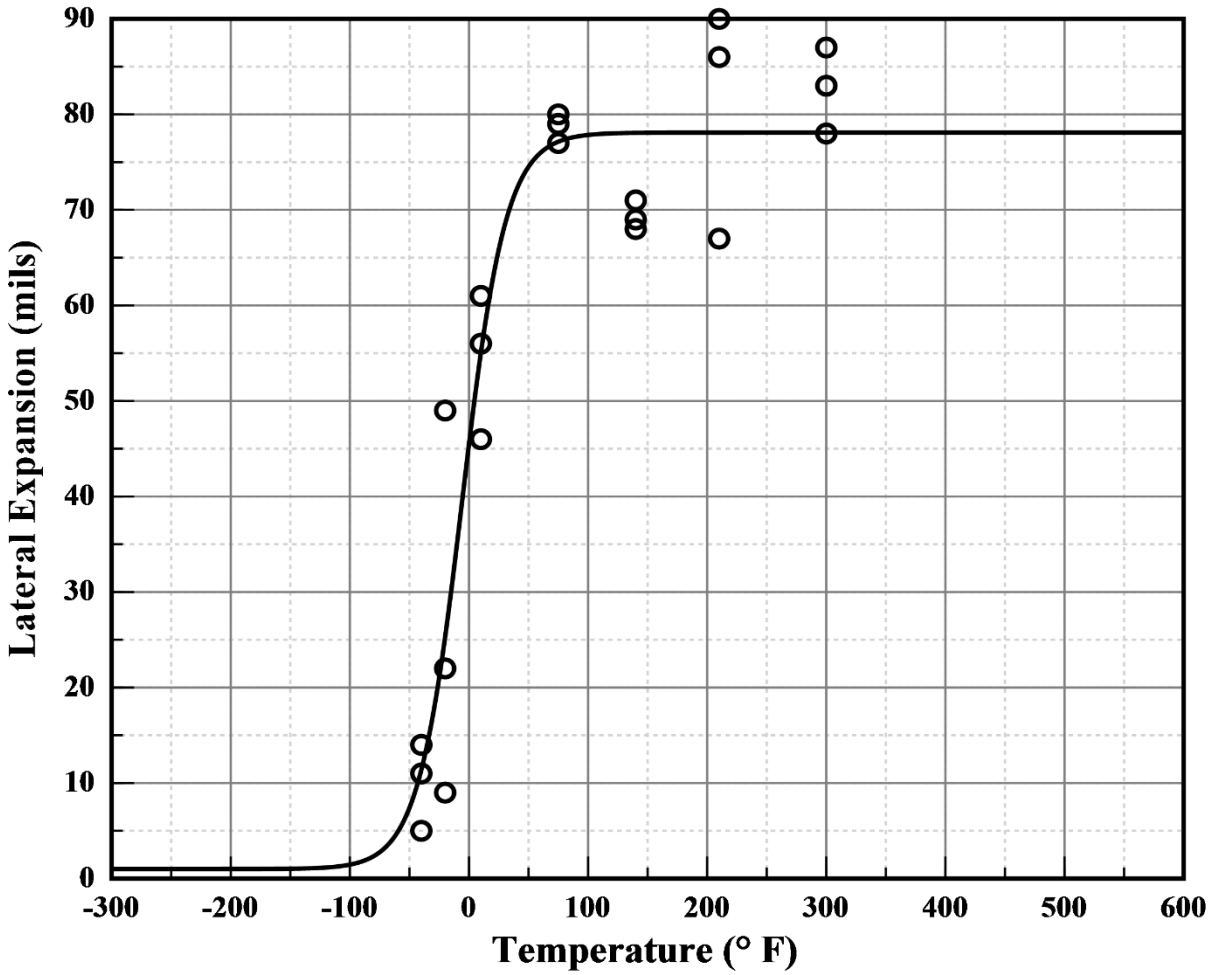
Correlation Coefficient = 0.947

Equation is A + B * [Tanh((T-T0)/(C+DT))]

Upper Shelf L.E. = 78.10 Lower Shelf L.E. = 1.00 (Fixed)

Temp@35 mils=-10.00° F

Plant: **Prairie Island 2** Material: **SA508CL3** Heat: **22642**
Orientation: **Tangential** Capsule: **Unirrad** Fluence: **0.00E+000 n/cm²**



CVGraph 6.02 05/24/2022 Page 1/2

Plant: **Prairie Island 2** Material: **SA508CL3** Heat: **22642**
Orientation: **Tangential** Capsule: **Unirrad** Fluence: **0.00E+000 n/cm²**

Unirradiated Lower Shell Forging D (Tangential)

Charpy V-Notch Data

Temperature (° F)	Input L. E.	Computed L. E.	Differential
-40	11.0	11.4	-0.38
-40	5.0	11.4	-6.38
-40	14.0	11.4	2.62
-20	9.0	25.3	-16.30
-20	22.0	25.3	-3.30
-20	49.0	25.3	23.70
10	46.0	55.0	-9.04
10	56.0	55.0	0.96
10	61.0	55.0	5.96
75	79.0	77.1	1.86
75	77.0	77.1	-0.14
75	80.0	77.1	2.86
140	69.0	78.1	-9.07
140	71.0	78.1	-7.07
140	68.0	78.1	-10.07
210	67.0	78.1	-11.09
210	90.0	78.1	11.91
210	86.0	78.1	7.91
300	87.0	78.1	8.91
300	78.0	78.1	-0.09
300	83.0	78.1	4.91

CVGraph 6.02 05/24/2022 Page 2/2

Capsule V Lower Shell Forging D (Tangential)

CVGraph 6.02: Hyperbolic Tangent Curve Printed on 6/28/2022 8:11 AM

A = 42.95 B = 41.95 C = 50.82 T0 = 35.38 D = 0.00

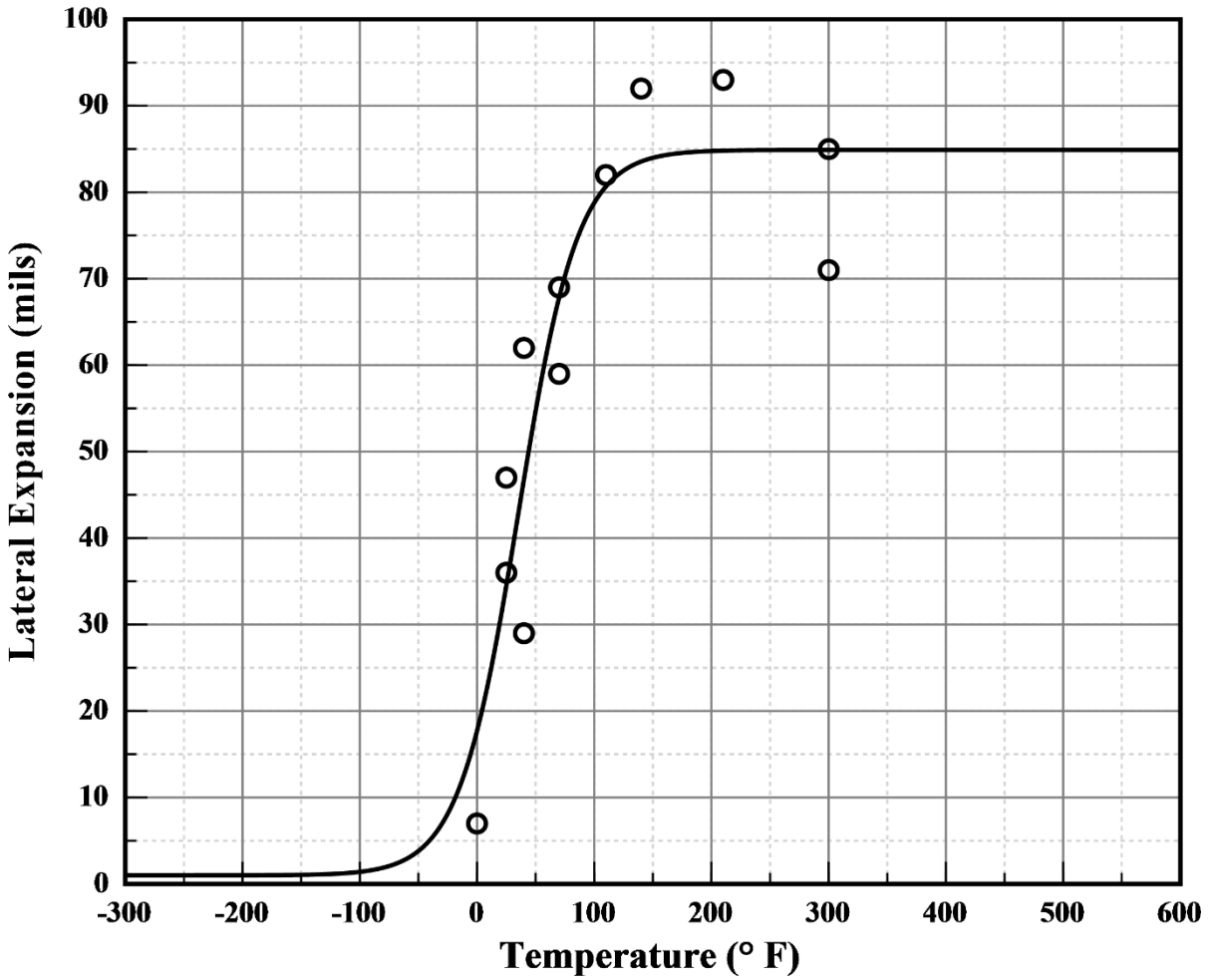
Correlation Coefficient = 0.919

Equation is A + B * [Tanh((T-T0)/(C+DT))]

Upper Shelf L.E. = 84.90 Lower Shelf L.E. = 1.00 (Fixed)

Temp@35 mils= 25.70° F

Plant: **Prairie Island 2** Material: **SA508CL3** Heat: **22642**
Orientation: **Tangential** Capsule: **V** Fluence: **5.98E+018 n/cm²**



CVGraph 6.02 06/28/2022 Page 1/2

Plant: **Prairie Island 2** Material: **SA508CL3** Heat: **22642**
Orientation: **Tangential** Capsule: **V** Fluence: **5.98E+018 n/cm²**

Capsule V Lower Shell Forging D (Tangential)

Charpy V-Notch Data

Temperature (° F)	Input L. E.	Computed L. E.	Differential
0	7.0	17.7	-10.70
25	47.0	34.5	12.50
25	36.0	34.5	1.50
40	29.0	46.8	-17.76
40	62.0	46.8	15.24
70	69.0	67.8	1.20
70	59.0	67.8	-8.80
110	82.0	80.7	1.33
140	92.0	83.6	8.45
210	93.0	84.8	8.19
300	85.0	84.9	0.10
300	71.0	84.9	-13.90

CVGraph 6.02 06/28/2022 Page 2/2

Capsule T Lower Shell Forging D (Tangential)

CVGraph 6.02: Hyperbolic Tangent Curve Printed on 5/25/2022 9:06 AM

A = 44.84 B = 43.84 C = 83.92 T0 = 62.46 D = 0.00

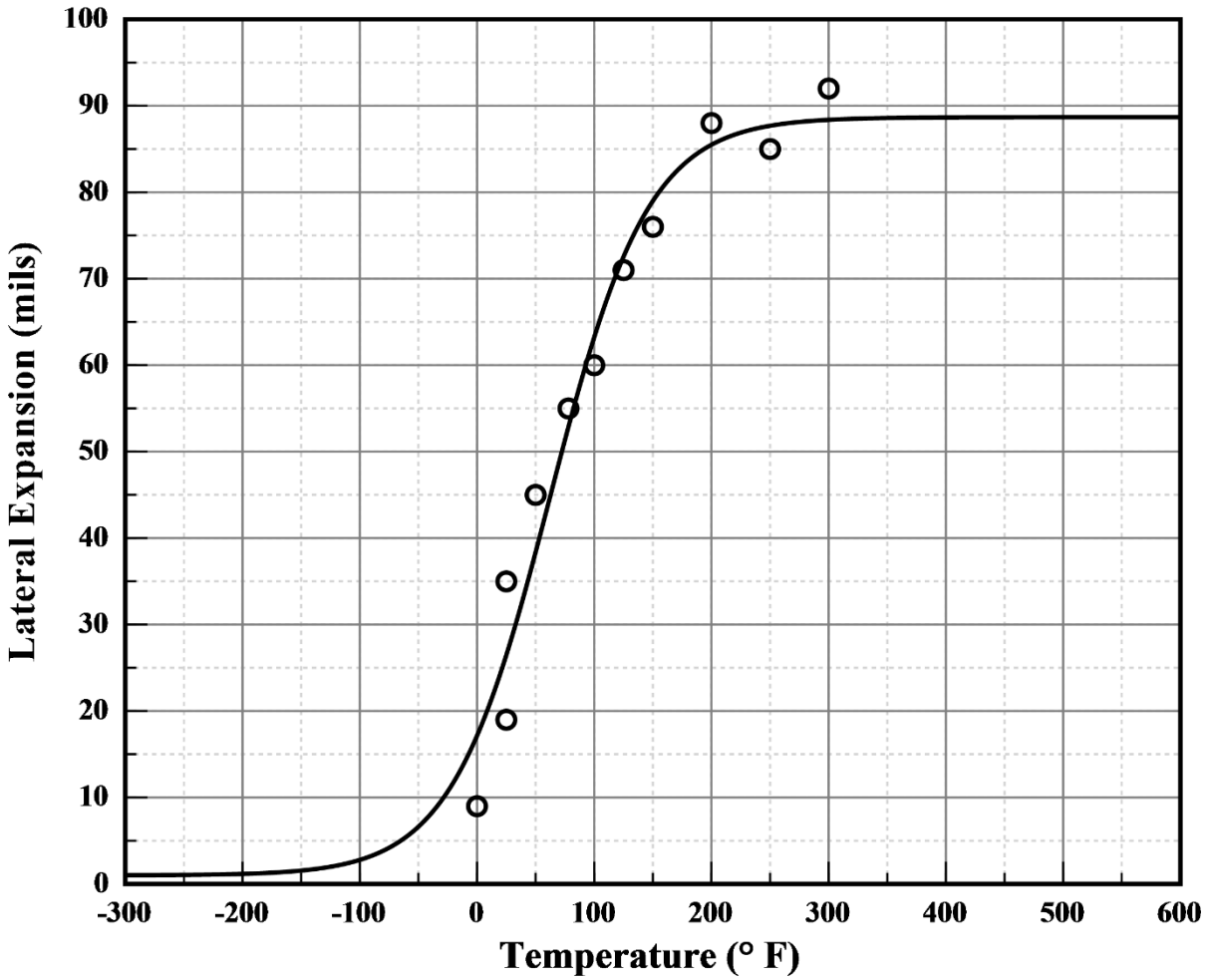
Correlation Coefficient = 0.982

Equation is A + B * [Tanh((T-T0)/(C+DT))]

Upper Shelf L.E. = 88.69 Lower Shelf L.E. = 1.00 (Fixed)

Temp@35 mils= 43.30° F

Plant: **Prairie Island 2** Material: **SA508CL3** Heat: **22642**
Orientation: **Tangential** Capsule: **T** Fluence: **1.10E+019 n/cm²**



CVGraph 6.02 05/25/2022 Page 1/2

Plant: **Prairie Island 2** Material: **SA508CL3** Heat: **22642**
Orientation: **Tangential** Capsule: **T** Fluence: **1.10E+019 n/cm²**

Capsule T Lower Shell Forging D (Tangential)

Charpy V-Notch Data

Temperature (° F)	Input L. E.	Computed L. E.	Differential
0	9.0	17.1	-8.15
25	19.0	26.5	-7.48
25	35.0	26.5	8.52
50	45.0	38.4	6.62
78	55.0	52.9	2.13
100	60.0	63.2	-3.24
125	71.0	72.6	-1.56
150	76.0	79.0	-3.00
200	88.0	85.5	2.50
250	85.0	87.7	-2.69
300	92.0	88.4	3.62

CVGraph 6.02 05/25/2022 Page 2/2

Capsule R Lower Shell Forging D (Tangential)

CVGraph 6.02: Hyperbolic Tangent Curve Printed on 5/25/2022 12:01 PM

A = 44.34 B = 43.34 C = 116.45 T0 = 113.45 D = 0.00

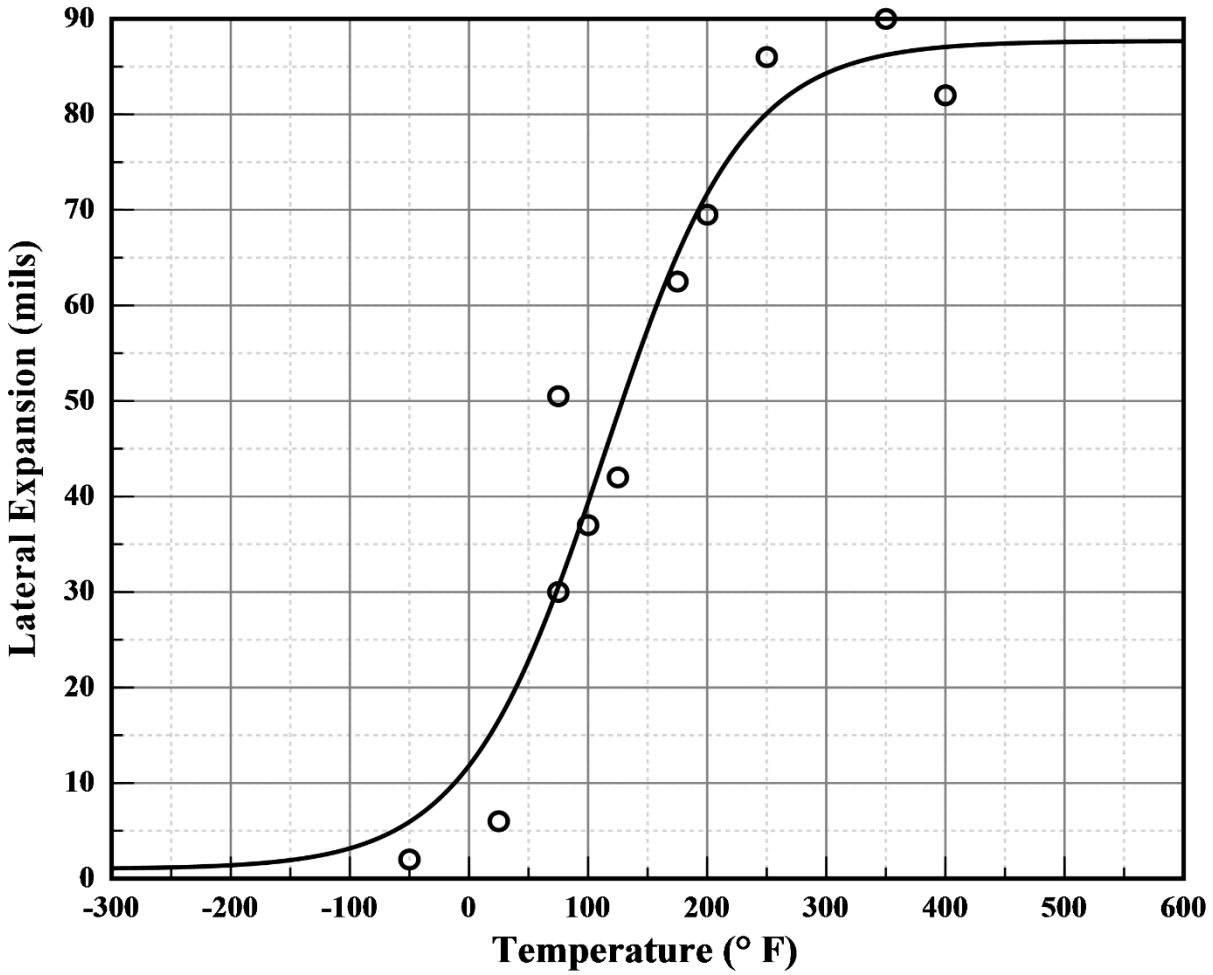
Correlation Coefficient = 0.964

Equation is A + B * [Tanh((T-T0)/(C+DT))]

Upper Shelf L.E. = 87.68 Lower Shelf L.E. = 1.00 (Fixed)

Temp@35 mils= 88.00° F

Plant: **Prairie Island 2** Material: **SA508CL3** Heat: **22642**
Orientation: **Tangential** Capsule: **R** Fluence: **4.11E+019 n/cm²**



CVGraph 6.02 05/25/2022 Page 1/2

Plant: **Prairie Island 2** Material: **SA508CL3** Heat: **22642**
Orientation: **Tangential** Capsule: **R** Fluence: **4.11E+019 n/cm²**

Capsule R Lower Shell Forging D (Tangential)

Charpy V-Notch Data

Temperature (° F)	Input L. E.	Computed L. E.	Differential
-50	2.0	5.9	-3.94
25	6.0	16.6	-10.57
75	30.0	30.5	-0.53
75	50.5	30.5	19.97
100	37.0	39.4	-2.36
125	42.0	48.6	-6.63
175	62.5	65.3	-2.83
200	69.5	71.7	-2.20
250	86.0	80.1	5.90
350	90.0	86.2	3.78
400	82.0	87.1	-5.06

CVGraph 6.02 05/25/2022 Page 2/2

Capsule P Lower Shell Forging D (Tangential)

CVGraph 6.02: Hyperbolic Tangent Curve Printed on 5/31/2022 10:01 AM

A = 44.56 B = 43.56 C = 101.71 T0 = 119.37 D = 0.00

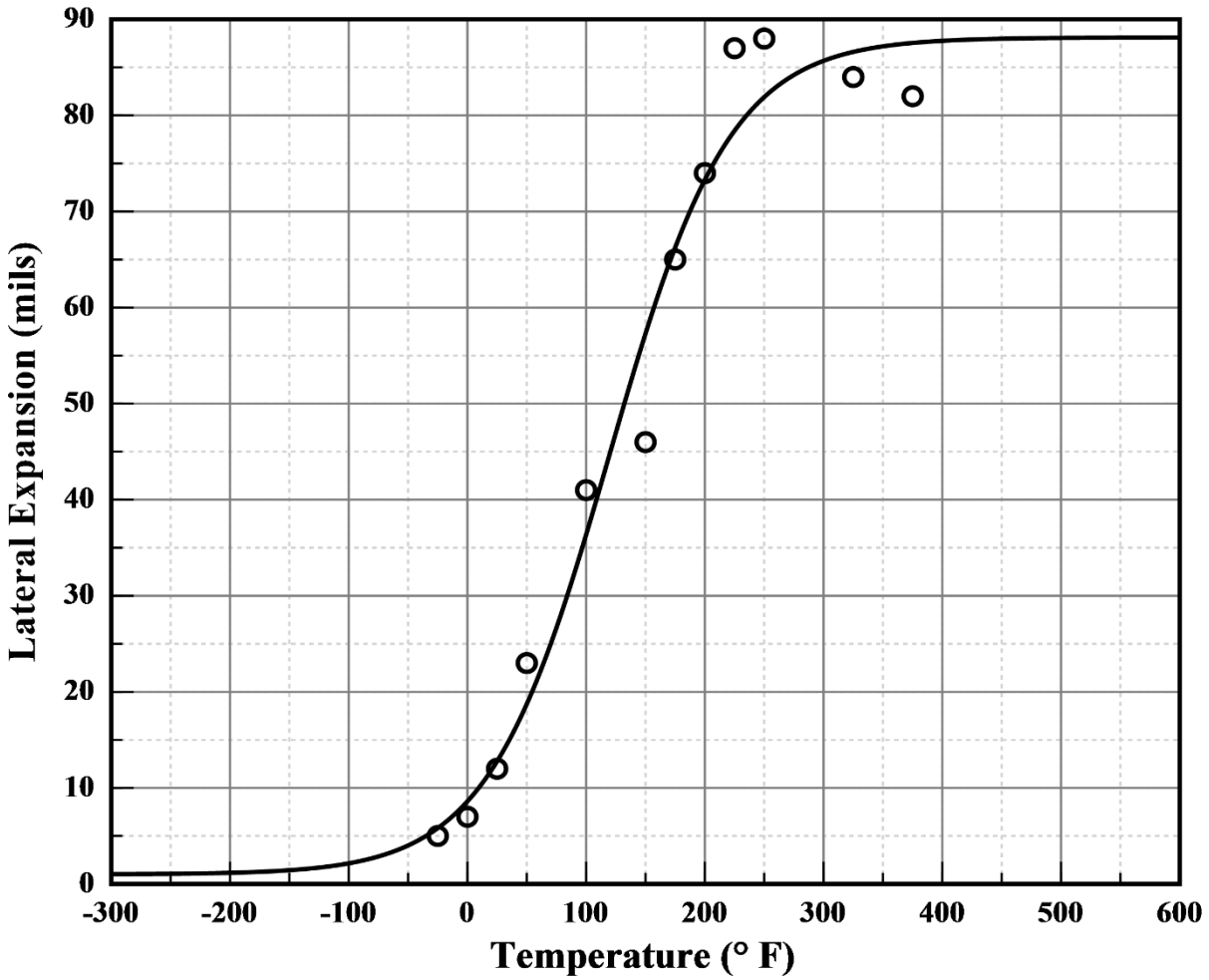
Correlation Coefficient = 0.986

Equation is A + B * [Tanh((T-T0)/(C+DT))]

Upper Shelf L.E. = 88.11 Lower Shelf L.E. = 1.00 (Fixed)

Temp@35 mils= 96.70° F

Plant: **Prairie Island 2** Material: **SA508CL3** Heat: **22642**
Orientation: **Tangential** Capsule: **P** Fluence: **4.27E+019 n/cm²**



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Plant: **Prairie Island 2** Material: **SA508CL3** Heat: **22642**
Orientation: **Tangential** Capsule: **P** Fluence: **4.27E+019 n/cm²**

Capsule P Lower Shell Forging D (Tangential)

Charpy V-Notch Data

Temperature (° F)	Input L. E.	Computed L. E.	Differential
-25	5.0	5.8	-0.81
0	7.0	8.6	-1.60
25	12.0	12.8	-0.78
50	23.0	18.7	4.26
100	41.0	36.4	4.64
150	46.0	57.3	-11.29
175	65.0	66.3	-1.26
200	74.0	73.3	0.70
225	87.0	78.4	8.58
250	88.0	81.9	6.09
325	84.0	86.6	-2.61
375	82.0	87.5	-5.55

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Capsule N Lower Shell Forging D (Tangential)

CVGraph 6.02: Hyperbolic Tangent Curve Printed on 7/12/2022 6:49 AM

A = 42.96 B = 41.96 C = 75.27 T0 = 183.62 D = 0.00

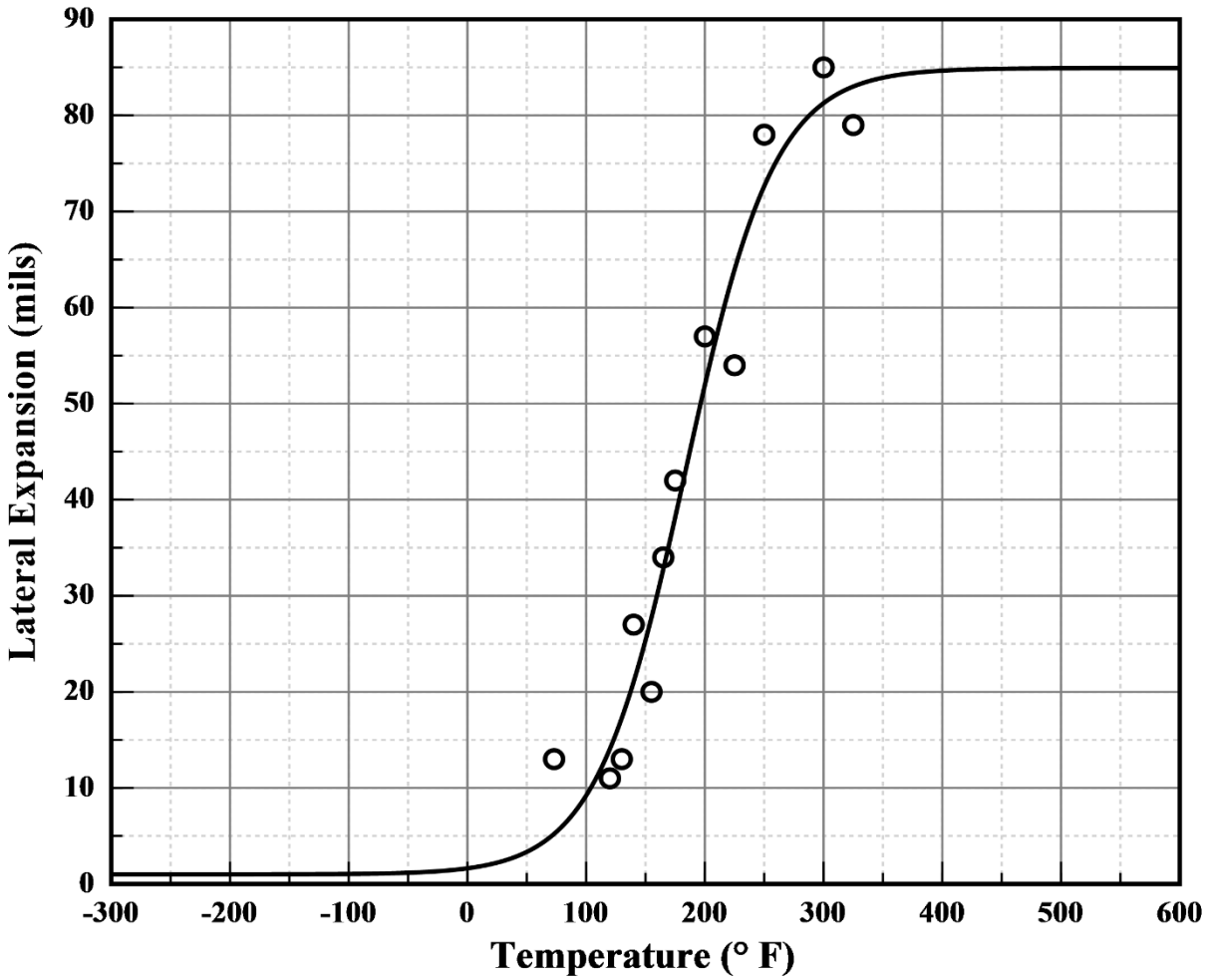
Correlation Coefficient = 0.977

Equation is A + B * [Tanh((T-T0)/(C+DT))]

Upper Shelf L.E. = 84.93 Lower Shelf L.E. = 1.00 (Fixed)

Temp@35 mils=169.20° F

Plant: **Prairie Island 2** Material: **SA508CL3** Heat: **22642**
Orientation: **Tangential** Capsule: **N** Fluence: **8.41E+019 n/cm²**



CVGraph 6.02 07/12/2022 Page 1/2

Plant: **Prairie Island 2** Material: **SA508CL3** Heat: **22642**
Orientation: **Tangential** Capsule: **N** Fluence: **8.41E+019 n/cm²**

Capsule N Lower Shell Forging D (Tangential)

Charpy V-Notch Data

Temperature (° F)	Input L. E.	Computed L. E.	Differential
73	13.0	5.2	7.78
120	11.0	14.1	-3.07
130	13.0	17.3	-4.28
140	27.0	21.0	5.95
155	20.0	27.7	-7.73
165	34.0	32.8	1.21
175	42.0	38.2	3.82
200	57.0	52.0	5.05
225	54.0	64.0	-9.96
250	78.0	72.6	5.35
300	85.0	81.3	3.72
325	79.0	83.0	-4.01

CVGraph 6.02 07/12/2022 Page 2/2

Unirradiated Lower Shell Forging D (Tangential)

CVGraph 6.02: Hyperbolic Tangent Curve Printed on 5/24/2022 4:31 PM

A = 50.00 B = 50.00 C = 69.80 T0 = 31.32 D = 0.00

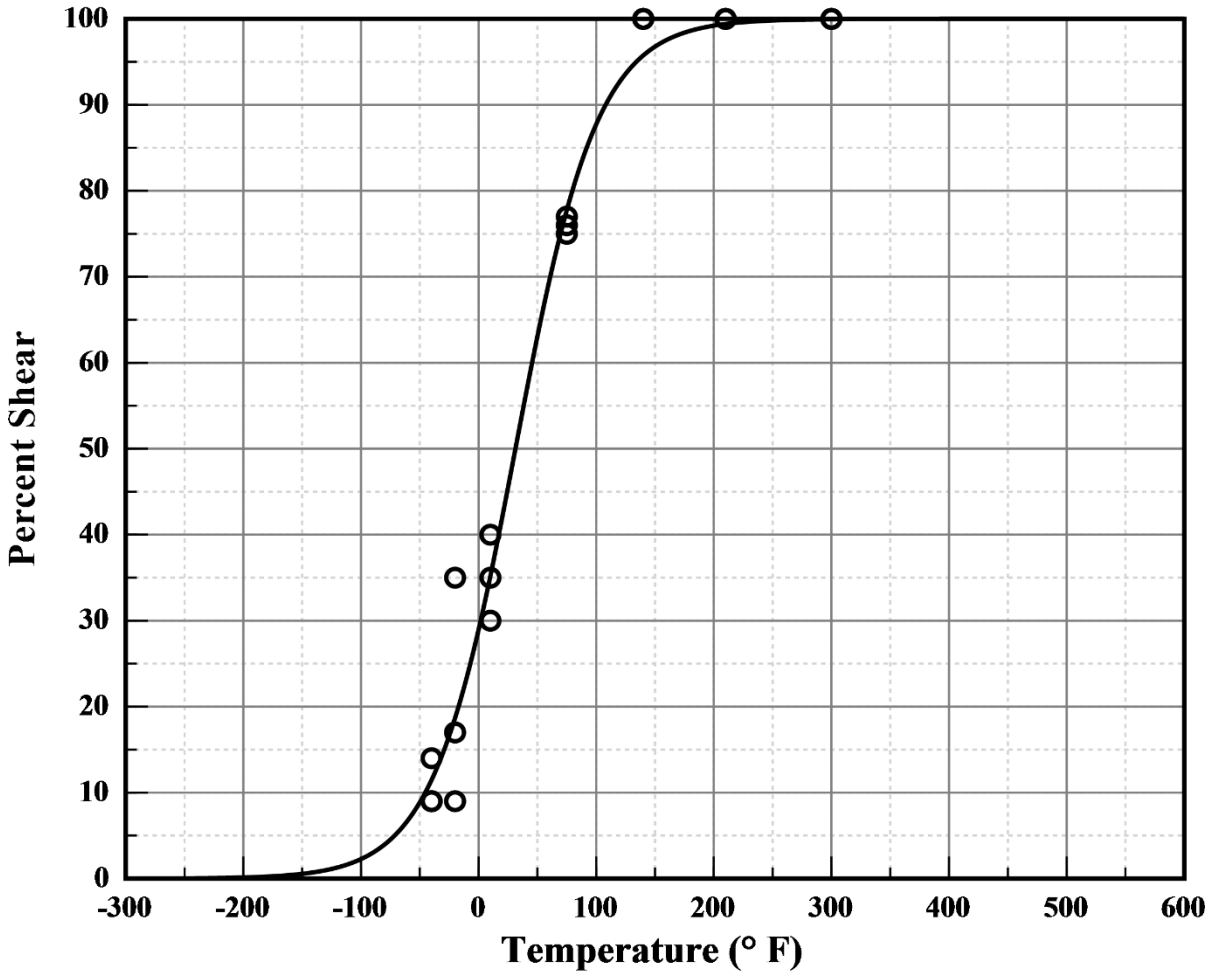
Correlation Coefficient = 0.992

Equation is A + B * [Tanh((T-T0)/(C+DT))]

Upper Shelf %Shear = 100.00 (Fixed) Lower Shelf %Shear = 0.00 (Fixed)

Temperature at 50% Shear = 31.40

Plant: **Prairie Island 2** Material: **SA508CL3** Heat: **22642**
Orientation: **Tangential** Capsule: **Unirrad** Fluence: **0.00E+000 n/cm²**



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Plant: **Prairie Island 2** Material: **SA508CL3** Heat: **22642**
Orientation: **Tangential** Capsule: **Unirrad** Fluence: **0.00E+000 n/cm²**

Unirradiated Lower Shell Forging D (Tangential)

Charpy V-Notch Data

Temperature (° F)	Input %Shear	Computed %Shear	Differential
-40	9.0	11.5	-2.47
-40	9.0	11.5	-2.47
-40	14.0	11.5	2.53
-20	9.0	18.7	-9.68
-20	17.0	18.7	-1.68
-20	35.0	18.7	16.32
10	30.0	35.2	-5.18
10	35.0	35.2	-0.18
10	40.0	35.2	4.82
75	76.0	77.8	-1.76
75	75.0	77.8	-2.76
75	77.0	77.8	-0.76
140	100.0	95.7	4.25
140	100.0	95.7	4.25
140	100.0	95.7	4.25
210	100.0	99.4	0.59
210	100.0	99.4	0.59
210	100.0	99.4	0.59
300	100.0	100.0	0.05
300	100.0	100.0	0.05
300	100.0	100.0	0.05

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Capsule V Lower Shell Forging D (Tangential)

CVGraph 6.02: Hyperbolic Tangent Curve Printed on 5/25/2022 7:56 AM

A = 50.00 B = 50.00 C = 75.28 T0 = 77.38 D = 0.00

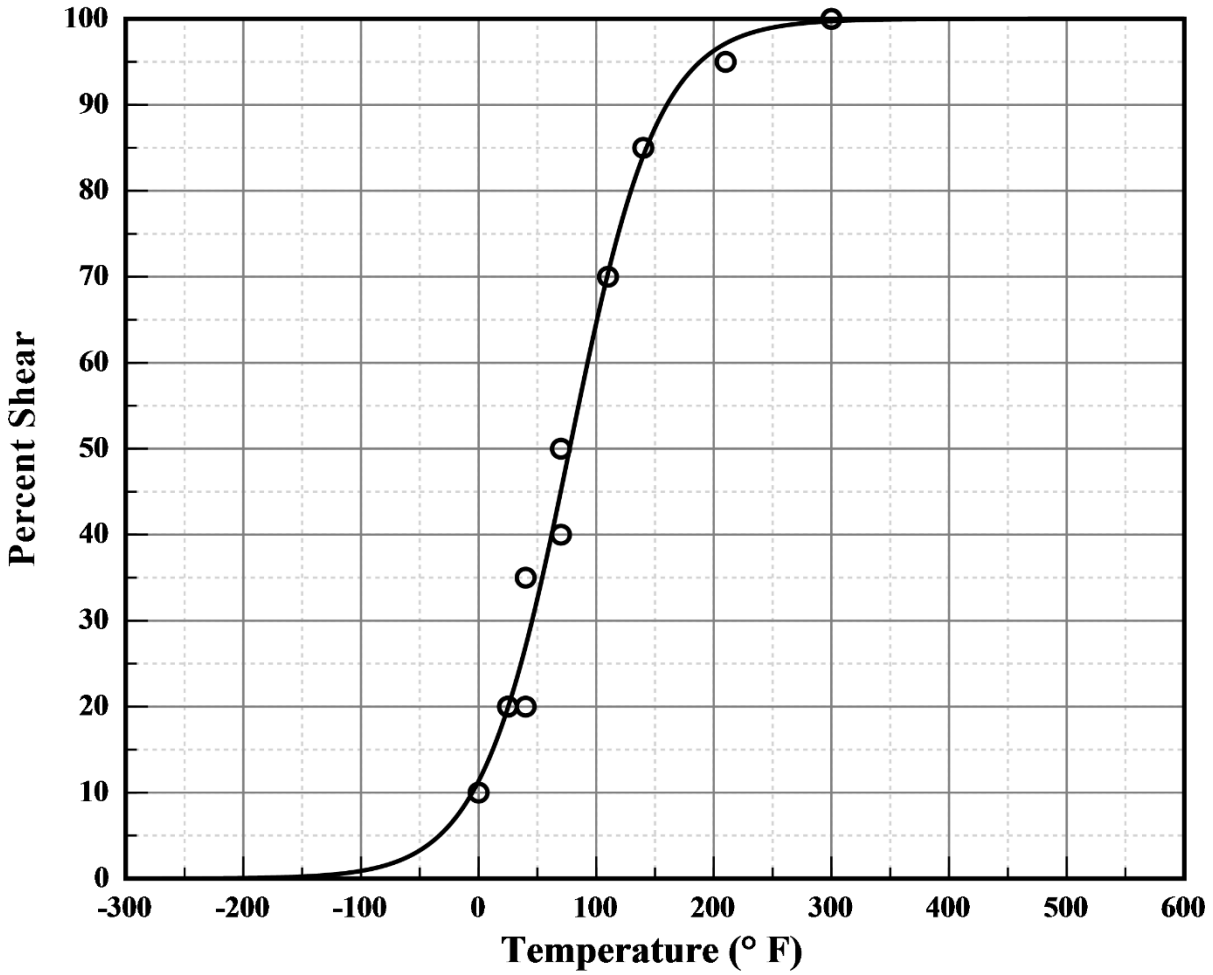
Correlation Coefficient = 0.993

Equation is A + B * [Tanh((T-T0)/(C+DT))]

Upper Shelf %Shear = 100.00 (Fixed) Lower Shelf %Shear = 0.00 (Fixed)

Temperature at 50% Shear = 77.40

Plant: **Prairie Island 2** Material: **SA508CL3** Heat: **22642**
Orientation: **Tangential** Capsule: **V** Fluence: **5.98E+018 n/cm²**



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Plant: **Prairie Island 2** Material: **SA508CL3** Heat: **22642**
Orientation: **Tangential** Capsule: **V** Fluence: **5.98E+018 n/cm²**

Capsule V Lower Shell Forging D (Tangential)

Charpy V-Notch Data

Temperature (° F)	Input %Shear	Computed %Shear	Differential
0	10.0	11.3	-1.35
25	20.0	19.9	0.08
25	20.0	19.9	0.08
40	20.0	27.0	-7.03
40	35.0	27.0	7.97
70	50.0	45.1	4.88
70	40.0	45.1	-5.12
110	70.0	70.4	-0.41
140	85.0	84.1	0.92
210	95.0	97.1	-2.14
300	100.0	99.7	0.27
300	100.0	99.7	0.27

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Capsule T Lower Shell Forging D (Tangential)

CVGraph 6.02: Hyperbolic Tangent Curve Printed on 5/25/2022 9:05 AM

A = 50.00 B = 50.00 C = 74.34 T0 = 98.51 D = 0.00

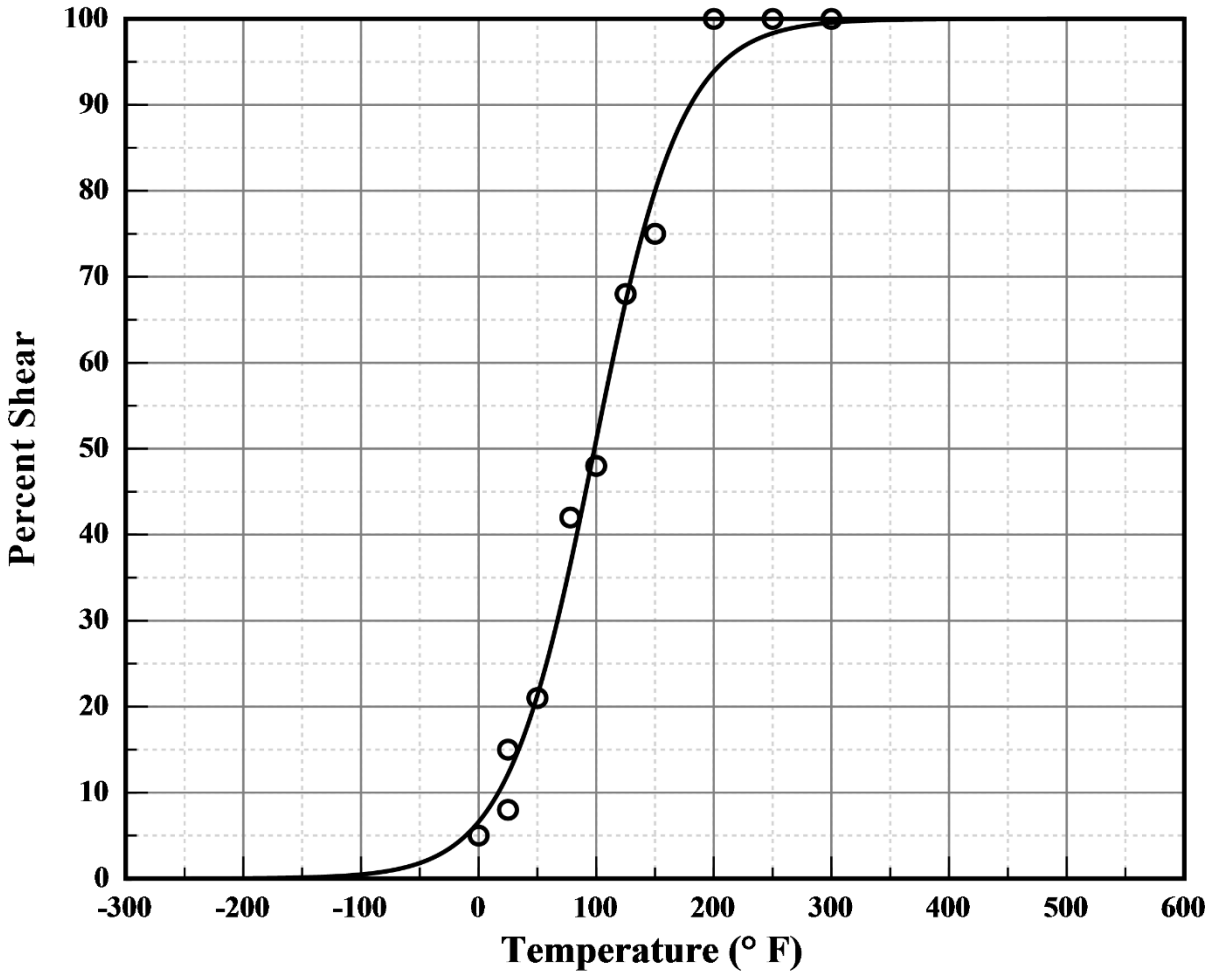
Correlation Coefficient = 0.996

Equation is A + B * [Tanh((T-T0)/(C+DT))]

Upper Shelf %Shear = 100.00 (Fixed) Lower Shelf %Shear = 0.00 (Fixed)

Temperature at 50% Shear = 98.60

Plant: **Prairie Island 2** Material: **SA508CL3** Heat: **22642**
Orientation: **Tangential** Capsule: **T** Fluence: **1.10E+019 n/cm²**



CVGraph 6.02 05/25/2022 Page 1/2

Plant: **Prairie Island 2** Material: **SA508CL3** Heat: **22642**
Orientation: **Tangential** Capsule: **T** Fluence: **1.10E+019 n/cm²**

Capsule T Lower Shell Forging D (Tangential)

Charpy V-Notch Data

Temperature (° F)	Input %Shear	Computed %Shear	Differential
0	5.0	6.6	-1.60
25	8.0	12.2	-4.16
25	15.0	12.2	2.84
50	21.0	21.3	-0.33
78	42.0	36.5	5.45
100	48.0	51.0	-3.01
125	68.0	67.1	0.90
150	75.0	80.0	-4.99
200	100.0	93.9	6.12
250	100.0	98.3	1.67
300	100.0	99.6	0.44

CVGraph 6.02 05/25/2022 Page 2/2

Capsule R Lower Shell Forging D (Tangential)

CVGraph 6.02: Hyperbolic Tangent Curve Printed on 5/25/2022 11:48 AM

A = 50.00 B = 50.00 C = 93.96 T0 = 130.14 D = 0.00

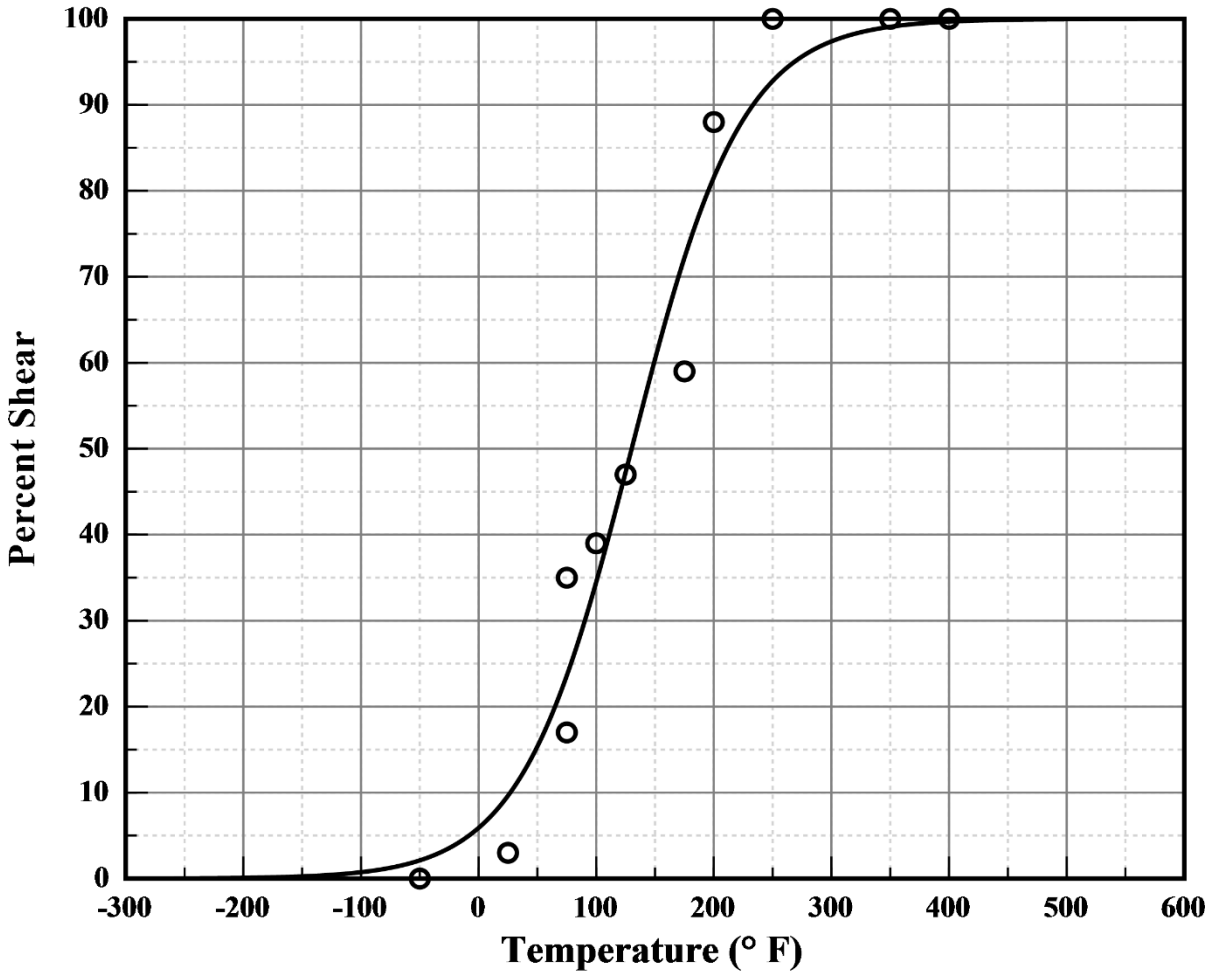
Correlation Coefficient = 0.983

Equation is A + B * [Tanh((T-T0)/(C+DT))]

Upper Shelf %Shear = 100.00 (Fixed) Lower Shelf %Shear = 0.00 (Fixed)

Temperature at 50% Shear = 130.20

Plant: **Prairie Island 2** Material: **SA508CL3** Heat: **22642**
Orientation: **Tangential** Capsule: **R** Fluence: **4.11E+019 n/cm²**



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Plant: **Prairie Island 2** Material: **SA508CL3** Heat: **22642**
Orientation: **Tangential** Capsule: **R** Fluence: **4.11E+019 n/cm²**

Capsule R Lower Shell Forging D (Tangential)

Charpy V-Notch Data

Temperature (° F)	Input %Shear	Computed %Shear	Differential
-50	0.0	2.1	-2.12
25	3.0	9.6	-6.64
75	17.0	23.6	-6.62
75	35.0	23.6	11.38
100	39.0	34.5	4.51
125	47.0	47.3	-0.27
175	59.0	72.2	-13.21
200	88.0	81.6	6.44
250	100.0	92.8	7.23
350	100.0	99.1	0.92
400	100.0	99.7	0.32

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Capsule P Lower Shell Forging D (Tangential)

CVGraph 6.02: Hyperbolic Tangent Curve Printed on 5/31/2022 10:00 AM

A = 50.00 B = 50.00 C = 49.76 T0 = 173.04 D = 0.00

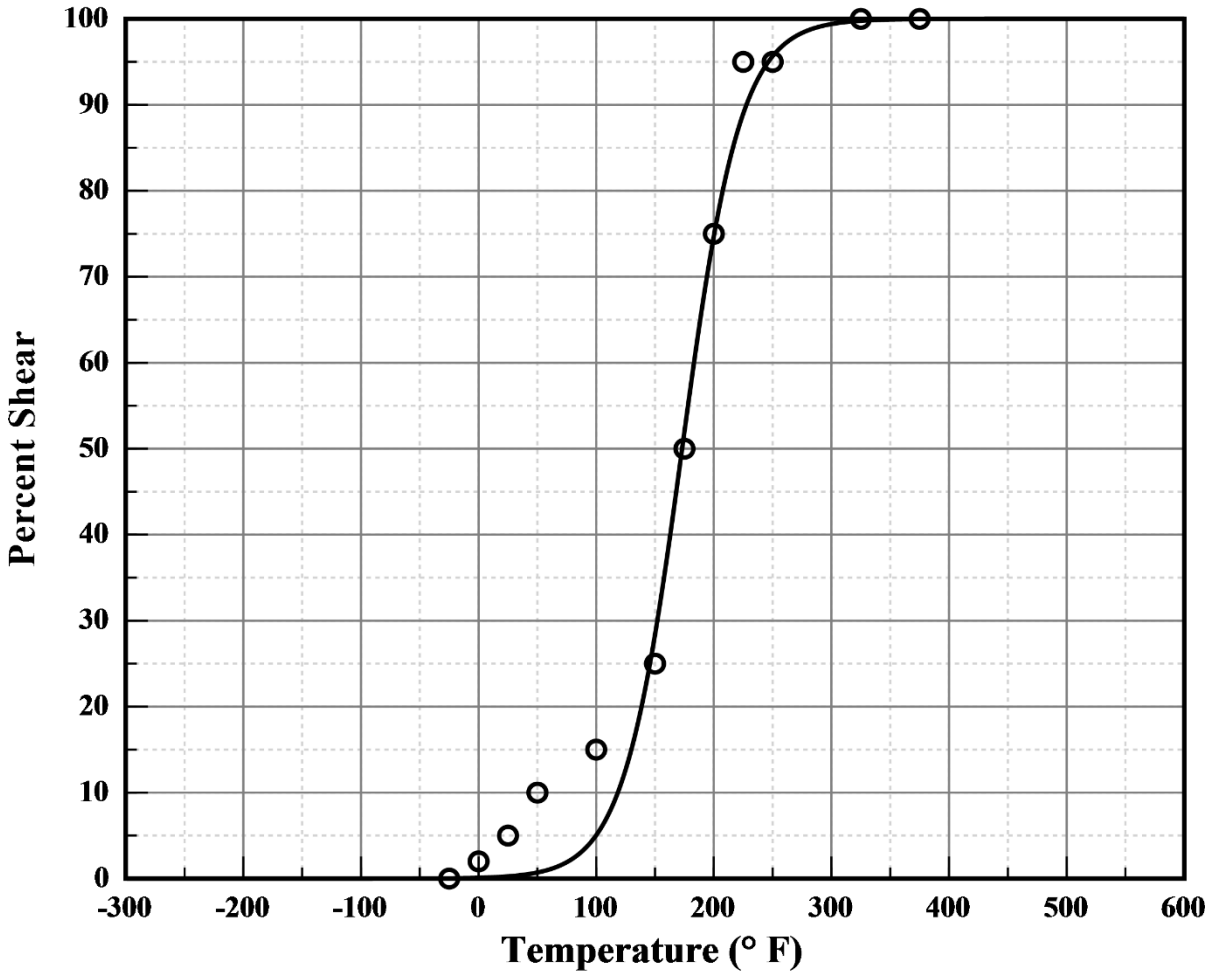
Correlation Coefficient = 0.996

Equation is A + B * [Tanh((T-T0)/(C+DT))]

Upper Shelf %Shear = 100.00 (Fixed) Lower Shelf %Shear = 0.00 (Fixed)

Temperature at 50% Shear = 173.10

Plant: **Prairie Island 2** Material: **SA508CL3** Heat: **22642**
Orientation: **Tangential** Capsule: **P** Fluence: **4.27E+019 n/cm²**



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Plant: **Prairie Island 2** Material: **SA508CL3** Heat: **22642**
Orientation: **Tangential** Capsule: **P** Fluence: **4.27E+019 n/cm²**

Capsule P Lower Shell Forging D (Tangential)

Charpy V-Notch Data

Temperature (° F)	Input %Shear	Computed %Shear	Differential
-25	0.0	0.0	-0.03
0	2.0	0.1	1.90
25	5.0	0.3	4.74
50	10.0	0.7	9.29
100	15.0	5.0	9.96
150	25.0	28.4	-3.37
175	50.0	52.0	-1.97
200	75.0	74.7	0.28
225	95.0	89.0	6.02
250	95.0	95.7	-0.66
325	100.0	99.8	0.22
375	100.0	100.0	0.03

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