

SEAL STRENGTH PROFILE & SEAL TOOTH PROFILE TESTING

**Customer
Name
1/1/2023**

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Project Summary

Project Details

Date	January 1, 2023
Customer Name	Customer Name
Address	123 Main St, Anytown OH, 12345
Contact	Customer Contact Info
Lako Technician	Technician Name
Lako Contact	+1 (419) 662-5256 7400 Ponderosa Rd, Perrysburg, OH 43552
Project Number	FT-23-0XX
Lako Estimate Number	12345
Order Number	12345

Supplied Materials

Material	Description	Film Thickness	Package Dimensions
Film 1	Blue Transparent Film, Manufacturer's ID tag	0.003" [0.076 mm]	1" [25.4mm] x 2" [50.8mm] x 3" [76.2mm]

Project Summary (continued)

Supplied Materials (continued)

	
Film 1 – As Received	Package 1 – As Received (for reference)

Supplied Parameters

Material	Film 1
Existing Seal Profile	12P
Product	Sponges
Current Dwell Time	Approximately 300 - 500 ms
Current Seal Temperature	350° F [177° C]
Maximum Acceptable Leak Rate	0.5 mbar·L/s

Project Summary (continued)

Scope of Work

The supplied film is to be tested for hot tack and ultimate seal strength to determine the ideal temperature to use when producing the sealed packages for the Seal Tooth Profile testing. Each of the selected seal tooth profiles will then be used to create packages using the dwell time and temperature as determined using the supplied parameters and seal strength test results.

Test Step	Test Procedure Performed
Preliminary Setup	N/A
Ultimate Seal Strength Profile	ASTM F88-00
Hot-Tack Seal Strength Profile	ASTM F1921-12
Sealed Package Vacuum Decay	ASTM F2338-09

Equipment used:

		
TMI – Hot-Tack Tester and Seal Tester SL-10 75-50	Technopack – MS-405 Impulse Sealer	Inficon – Contura S400

Results

Preliminary Setup Testing

Preliminary Setup Testing Details:

Sample Width	Dwell Time	Pressure
1" [25mm]	500 ms	40 psi

Preliminary Setup Testing Results:

Material	Temperature	Observations
Film 1	200° F [93° C]	Film did not seal fully
	250° F [121° C]	Film sealed with no distortions
	300° F [149° C]	Film melted

Based on observations from the preliminary testing, the recommended temperature range for Seal Strength Profile Testing is **190° F to 280° F**. [88° C to 138° C]

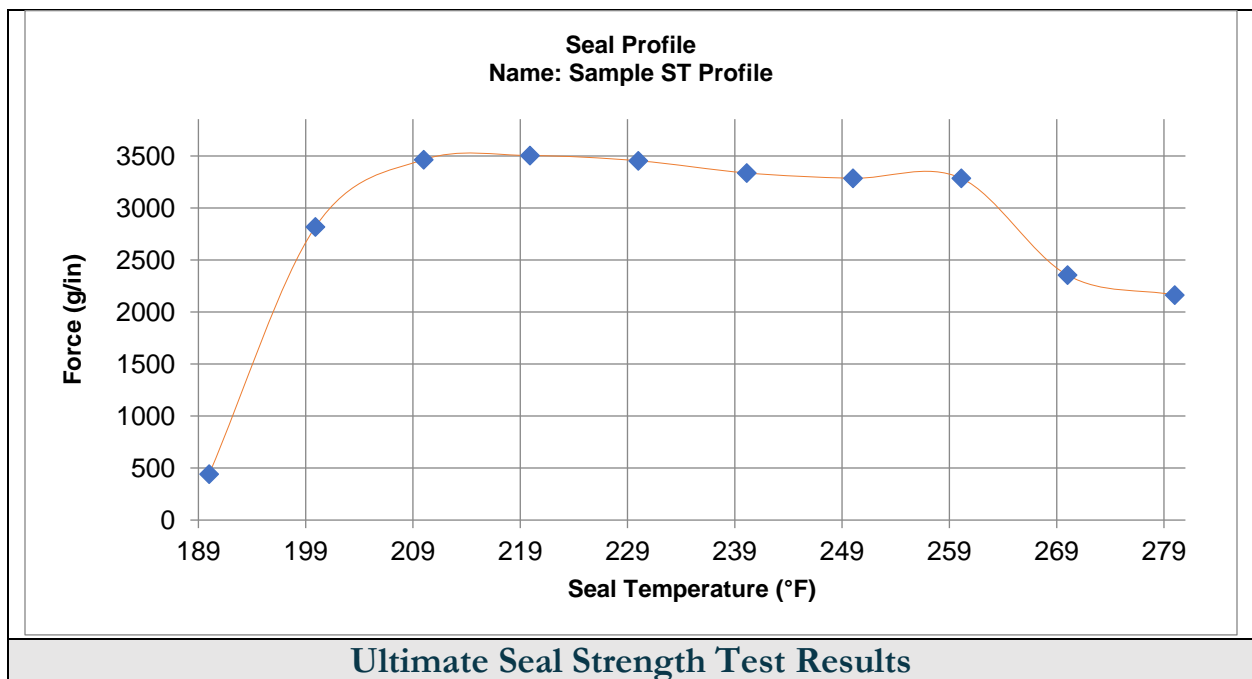


Results (continued)

Ultimate Seal Strength Profile Test

Machine Details:

Title:	Sample Test	Name:	Est 12345 FT-01-023 Sample Test
Machine S/N:	SL10S131102	Date:	01/01/2023 12:00:00 AM
Laboratory Temp:	74°F [23.3°C]	Operator:	XXX
Laboratory Humidity:	45%	Material:	Clear Film 0.003"
Upper Starting Temp:	190.0 °F [88° C]	Lower Starting Temp:	190.0 °F [88° C]
Upper Ending Temp:	280.0 °F [138° C]	Lower Ending Temp:	280.0 °F [138° C]
Seal Length:	1.000 in	Pressure Request:	40.0 PSI
Seal Width:	0.375 in	Jaw Pattern:	Steel Upper/ Steel Lower
Dwell Time:	0.500 sec	Peel Velocity:	0.20 in/sec
Cool Delay:	20.00 sec	Selection Method:	Peak

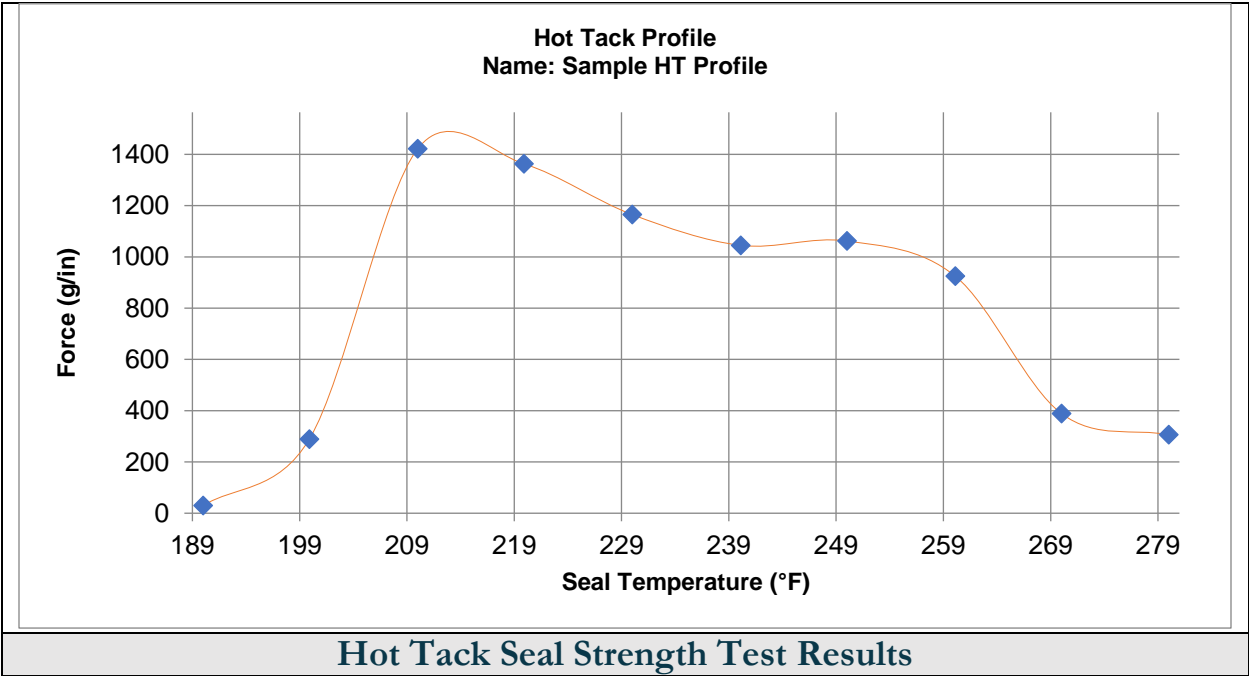


Results (continued)

Hot Tack Seal Strength Profile Test

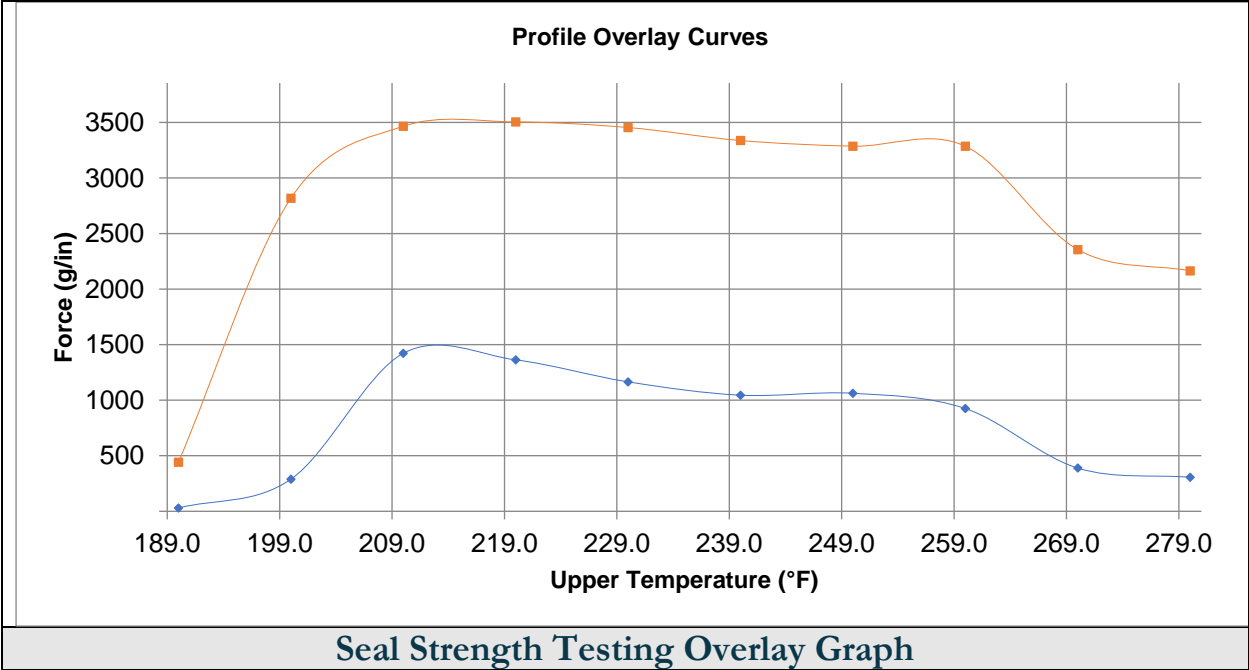
Machine Details:

Title:	Sample Test	Name:	Est 12345 FT-01-023 Sample Test
Machine S/N:	SL10S131102	Date:	01/01/2023 12:00:00 AM
Laboratory Temp:	74°F [23.3°C]	Operator:	XXX
Laboratory Humidity:	45%	Material:	Clear Film 0.003"
Upper Starting Temp:	190.0 °F [88° C]	Lower Starting Temp:	190.0 °F [88° C]
Upper Ending Temp:	280.0 °F [138° C]	Lower Ending Temp:	280.0 °F [138° C]
Seal Length:	1.000 in	Pressure Request:	40.0 PSI
Seal Width:	0.375 in	Jaw Pattern:	Steel Upper/ Steel Lower
Dwell Time:	0.500 sec	Peel Velocity:	0.20 in/sec
Cool Delay:	Immediate	Selection Method:	Peak



Results (continued)

Seal Strength Testing Overlay Graph and Sample Photos



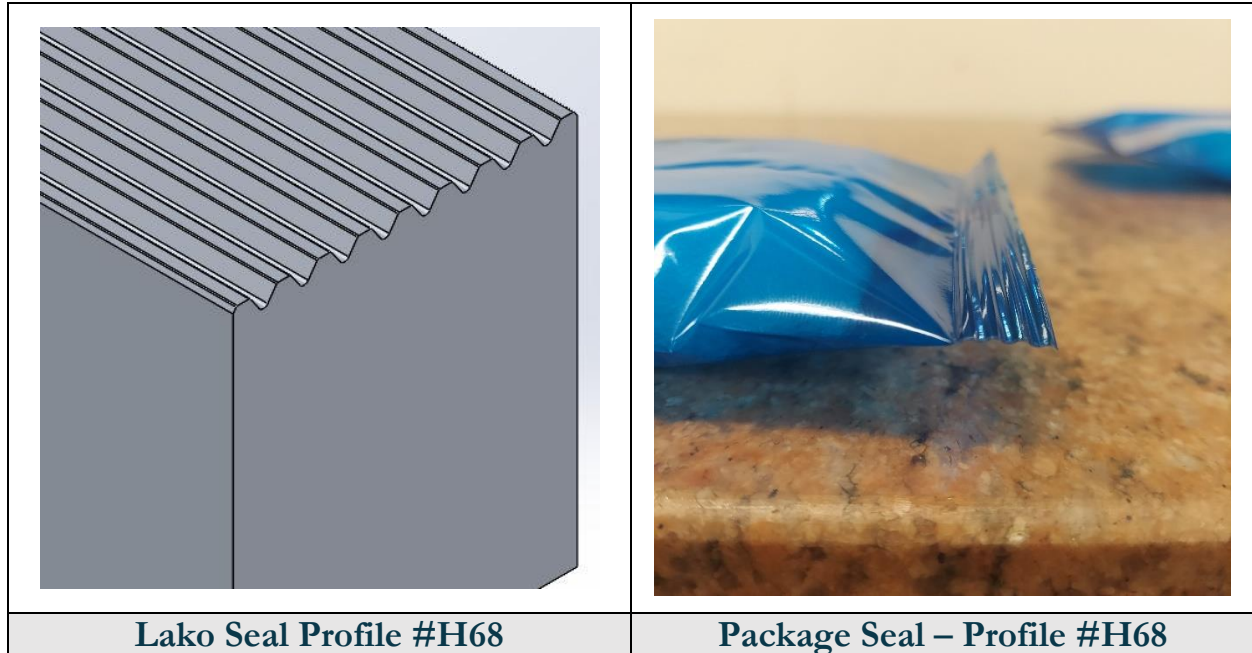
Tested Ultimate Seal Strength Samples



Tested Hot Tack Seal Strength Samples

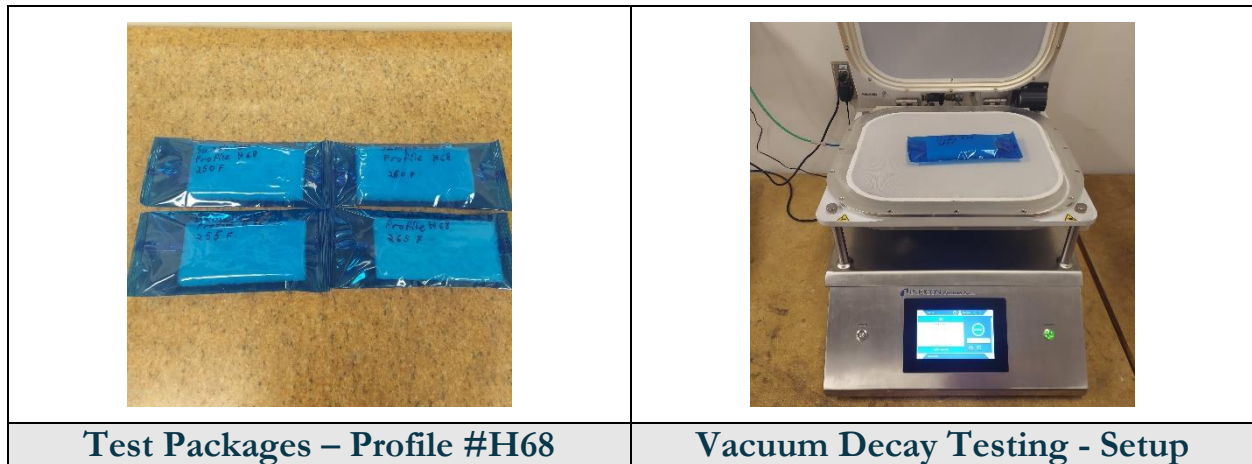
Results (continued)

Seal Tooth Profile Examples



Vacuum Decay Testing

Material	Profile #	Temp °F	mbar·l/s	Notes
Film #1	H68	210 °F [99° C]	0.467	None
		215 °F [102° C]	0.009	None
		220 °F [104° C]	0.010	None
		225 °F [107° C]	0.628	None



Conclusion

Ultimate Seal Strength Profile Test

The tested film had the highest strength around 220° F [104° C]. The drop-off in strength was very large as the sealing temperature was reduced below 210° F [99° C], but the strength didn't seem to drop-off much as the temperature increased until reaching 260° F [127° C].

Hot Tack Seal Strength Profile Test

The tested film had the highest strength around 210° F [99° C]. The drop-off in strength was very large as the sealing temperature was reduced below 210° F [99° C]. While a noticeable reduction in seal strength as sealing temperature was increased, it was not a major reduction until the seal temperature reached 260° F [127° C].

Recommended seal temperatures for vacuum decay testing are between 210° F [99° C] and 225° F [107° C].

Seal Tooth Profile Vacuum Decay Testing

While the package sealed at 210° F [99° C] did pass, it had a leak rate that was just barely under the limit of 0.500 mbar-l/s, and the package sealed at 225° F [107° C] had a leak rate exceeding the limit. With profile #H68, the recommended seal temperature is between 215° F [102° C] and 220° F [104° C].

All testing was completed at Lako Tool. Equipment and operating conditions vary greatly between the Lako Lab and the client's facility and can be expected to account for some variation in the results achieved at Lako.