



CRAFT BREWERS CONFERENCE[®] & BrewExpo America[®]

Overlap: The Most Critical Measurement in Seam Formation

Pneumatic Scale | Angelus Sponsored Session
April 21, 2026: 9:15-10:15, Room 203-AB



#CraftBrewersCon



GRANT SMITH

Field Service Technician

PNEUMATIC SCALE | ANGELUS

Objectives



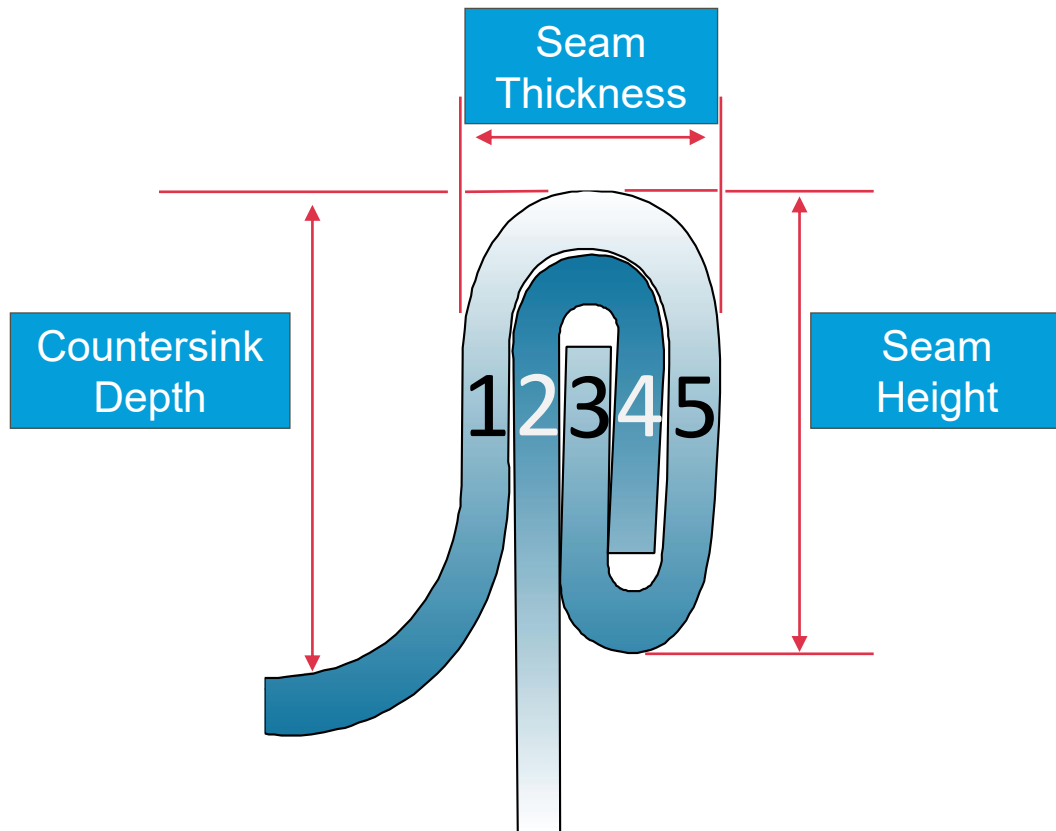
- Definitions and seam components
- What is an overlap, and why is it important?
- What are the risks of a weak overlap?
- Seam formation overview
- Where do the specifications come from?
- How is the overlap measured?
- What are the overlap components and how are they manipulated?



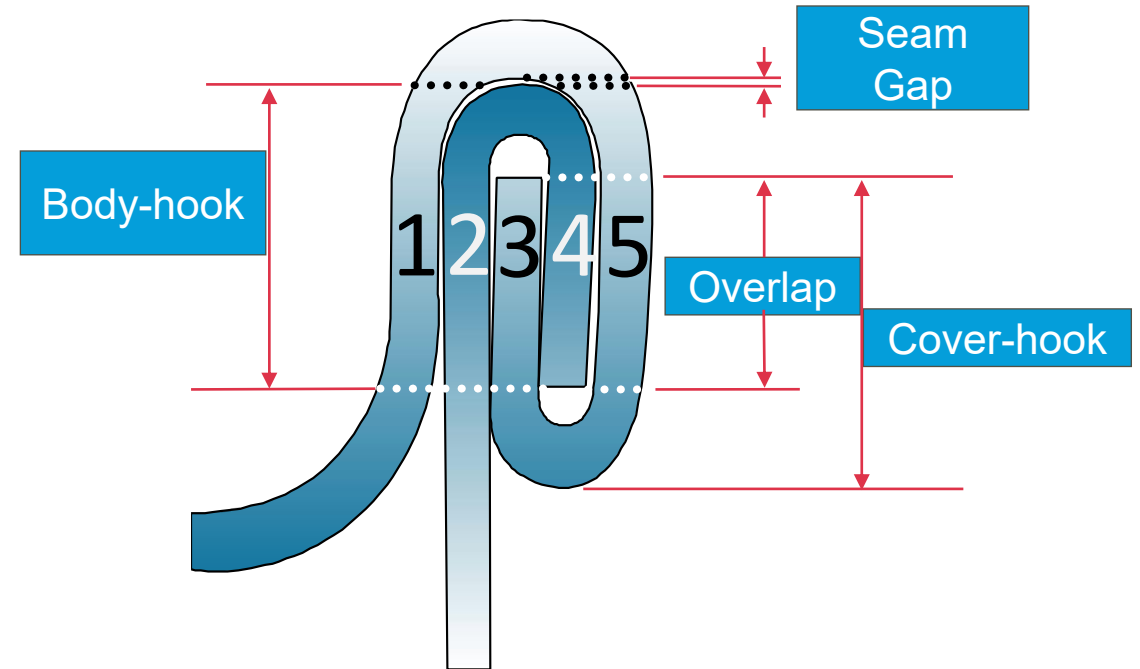
Parts of A Seam



Definitions and Components

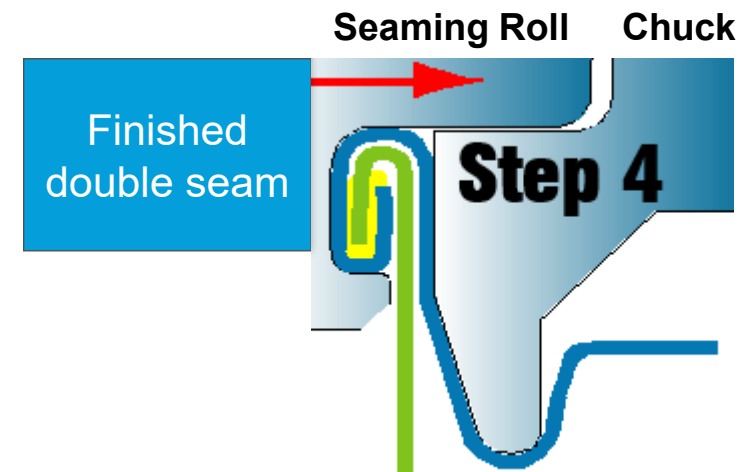
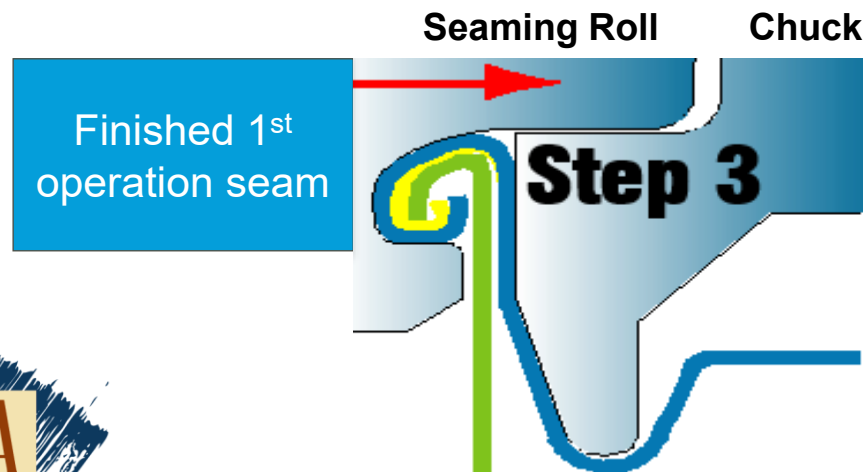
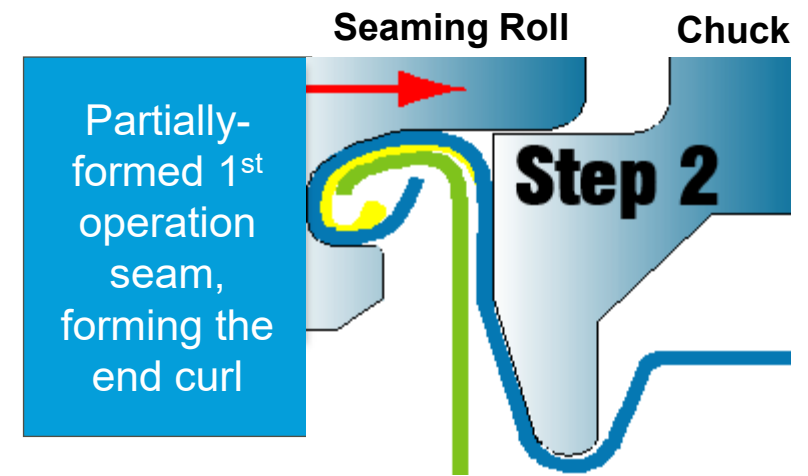
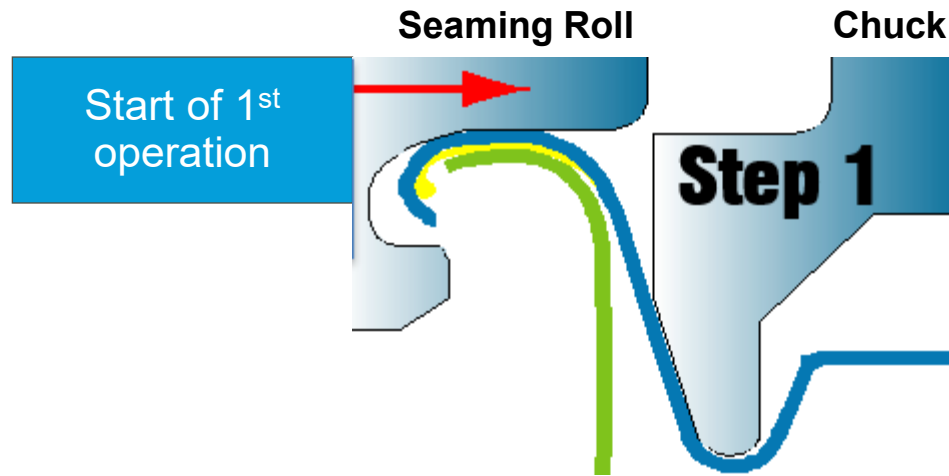


External Seam Components



Internal Seam Components

Double Seam Formation



Double Seam Formation

ANGELUS® SEAMING ANIMATION

**pneumatic
SCALE ANGELUS®**
A BARRY-WEHMILLER COMPANY

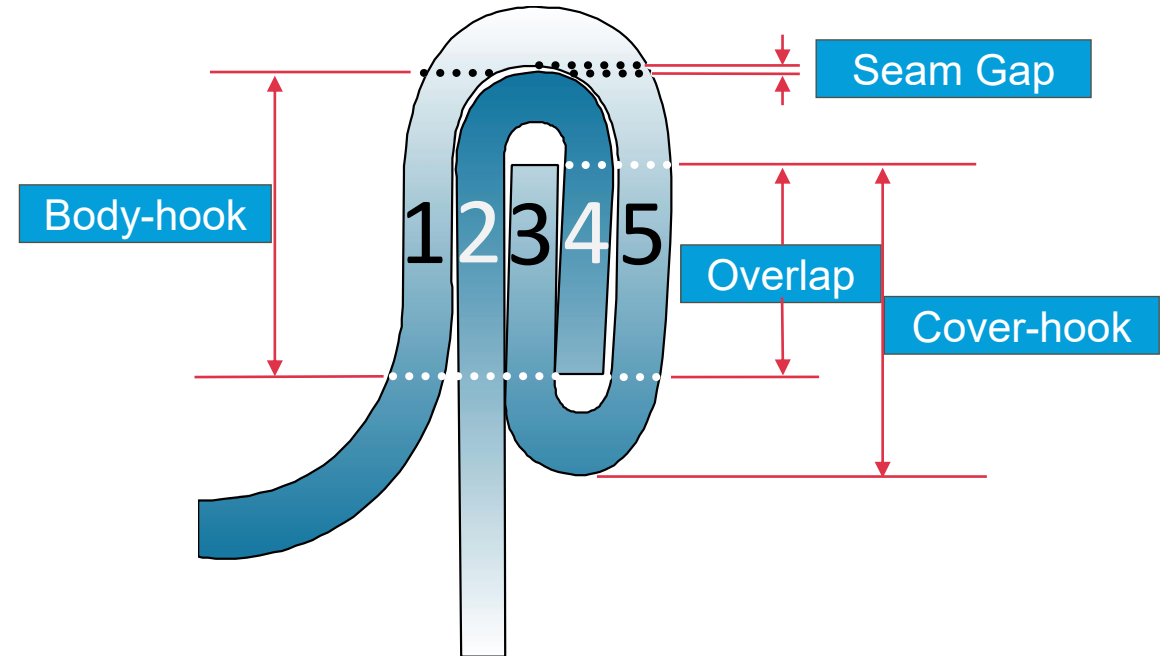


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What is the Overlap, and Why is it Important?

- The overlap is where the cover-hook and the body-hook intersect.
- It's important because it involves almost every part of the seam.
- If the overlap is too short, the sealing compound won't fill in the gaps and liquid will be allowed to escape the can.
- If the overlap is too long, the sealing compound effectiveness could be compromised.

Internal Seam Components



Risks of Weak Overlap



Risks Of Weak Overlap



- Leaking Seams
- Loss of Carbonation
- Ingress of Oxygen and Spoiling Agents
- Ingress of possibly harmful bacteria
- Wasted Time, Product, Materials, Money
- Recalled Product



Seam Specifications

**202 MINI SEAM
RECOMMENDED DOUBLE SEAM SPECIFICATIONS**

SEAMING CHUCK
FIRST OPERATION ROLL
SECOND OPERATION

ANGELUS
718L636 (or equiv.)
267L641-R-90 (or equiv.)
298L641-S-147 or 298L641-S-141 (or their equiv.)

MACHINE SET UP SPECIFICATIONS (NOTE 1)

PIN HEIGHT

CAN SIZE	DESCRIPTION	INCHES	METRIC
202/211 X 307	8 oz SQUAT	3.125 ± .003	79.38 ± 0.08
202/211 X 310	8 oz SUPER SQUAT	3.305 ± .003	83.95 ± 0.08
202/211 X 406	333ml	4.250 ± .003	107.95 ± 0.08
202/211 X 413	12 oz	4.500 ± .003	114.30 ± 0.08
202/211 X 503	16 oz	5.860 ± .003	149.35 ± 0.08
202/204 X 402	7.5 oz (204) SLEEK	3.775 ± .003	99.89 ± 0.08
202/207 X 400	8 oz (207.5) SLEEK	3.675 ± .003	93.35 ± 0.08
202/207.5 X 403	8 oz (207.5) SUPER SLEEK RETORT	3.675 ± .003	98.43 ± 0.08
202 X 207.5 X 413	10 oz (207.5) SLEEK	4.500 ± .003	114.30 ± 0.08
202/207.5 X 510	12 oz (207.5) SLEEK	5.375 ± .003	136.00 ± 0.08
202/211 X 707	588ml (590ml BRE END)	7.061 ± .003	180.11 ± 0.08

BASE PLATE LOAD (LBS)

COLD FILL	100 lbs ± 5 lbs	45.36 ± 2.27
HOT FILL	130 lbs ± 20 lbs	58.97 ± 9.07

**PRODUCT SPECIFICATIONS
DIMENSIONS AND PARAMETERS**

	SET UP SPECIFICATION (IN) (METRIC)	OPERATING SPECIFICATION (IN) (METRIC)
FIRST OPERATION SEAM THICKNESS	.075 ± .002	1.95 ± 0.05
FIRST OPERATION COUNTERSINK DEPTH	.270 ± .003	6.88 ± 0.08
SECOND OPERATION SEAM THICKNESS	.044 ± .001	1.118 ± 0.025
SECOND OPERATION COUNTERSINK DEPTH	.045 ± .001	1.143 ± 0.025
SEAM HEIGHT	.070 ± .002	2.489 ± 0.03
BODY HOOK LENGTH	.086 ± .005	1.85 ± 0.13
COVER HOOK LENGTH	.086 ± .005	1.85 ± 0.13
TIGHTNESS RATING	100%	80% min
ACTUAL OVERLAP	.035 min	0.65 min

NOTE 1 Machine set up specifications are for initial setting only. Adjustments from these settings should be made as needed to achieve product specification requirements

NOTE 2 Double seam quality is the responsibility of the customer.

Date 10/1/09	Approved Trapanaghi	Product Approved 202 R-54 END C085" x C088" GAUGE	 MINI BEVERAGE CONTAINER OPERATIONS 3000 W. 108TH CIRCLE MILWAUKEE, WI 53011-3682 P.O. BOX 990, BRIDGEVIEW, IL 60056-0990 THE BALL BEVERAGE CONTAINER GROUP HAS BEEN INCORPORATED INTO THE BALL BEVERAGE GROUP ALL RIGHTS ARE RESERVED AND NO PART OF THIS DOCUMENT MAY BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPYING, RECORDING, OR BY ANY INFORMATION STORAGE AND RETRIEVAL SYSTEM, WITHOUT PERMISSION IN WRITING FROM BALL BEVERAGE CONTAINER GROUP. RECEIPT OF THIS DOCUMENT SHALL BE DEEMED TO BE AN ACCEPTED "SIGNATURE" OF THE CUSTOMER UNLESS OTHERWISE NOTED.
Drawn N Zaratelli	Approved	ANGELUS S-141 & S-147 SECOND OPERATION DOUBLE SEAM ALUMINUM CAN	PRODUCT STANDARD SEAM - 231
Checked R McCauley	Approved		REV F
Approved R McCauley	Approved		

NOTE 1: Machine set-up specifications are for initial setting only. Adjustments from these settings should be made as needed to achieve product specification requirements.

NOTE 2: Double seam quality is the responsibility of the customer.

Date	10/19/09	Approved	Trappagen	PRODUCT STANDARD	202 R-90 END 0085" & .0085" GAUGE	
Drawn	N Zaretski	Approved				
Checked	R McCauley	Approved			ANGELUS S-141 & S-147 SECOND OPERATION DOUBLE SEAM ALUMINUM CAN	
Approved	R McCauley	Approved				



METAL CONTAINER CORPORATION CUSTOMER CLOSING MACHINE SET-UP SPECIFICATIONS AND GUIDELINES TOOLING AND DOUBLE SEAM SPECIFICATIONS for ANGELUS 120L/121L SEAMERS. For Ferrum see note # 10 below 202/211 x 413 (12 OZ.) CANS and 202/211 x 307 (8 OZ.) cans (16 OZ) 202/211x503 Cans -- .0104" Gauge .0085" Gauge Ends

Customer:	Location:
Seaming Chuck Lip Height: 270"	Seaming Chuck Part Numbers
Pin Gauge Height: 12OZ. 4.500" ± .003"	Flame Plated
8 OZ. 3.125" ± .003"	Stoody Titanium
16 OZ. 5.877" ± .003"	718L636/CB7
Can Holding Chuck Force: 115# ± 5# @ .022" deflection	771L636/CB7 (Dimpled)

Angelus Seaming Rolls Profiles	Angelus Seaming Roll Part Numbers
1 st Operation Seaming Rolls #R-90E	297L641ALWW3
2 nd Operation Seaming Rolls #S-141	298L641ASOW4
Optional 1 st Operation Roll #R-90	297L641ALVW4
Optional 2 nd Operation Roll #S-147	298L641ATCW5

Seam Dimensions	Set-Up	Operating
1 st Operation Seam Thickness	.078" ± .002"	
1 st Operation Seam Height	.078" Maximum .083 Ferrum	
1 st Operation Countersink Depth	.273" Maximum	
2 nd Operation Seam Thickness	.043" ± .001"	.043" ± .002"
2 nd Operation Seam Height #S-141	.098" ± .002"	.098" ± .003"
2 nd Operation Seam Height #S-147	.100" ± .002"	.100" ± .004 - .003"
2 nd Operation Countersink Depth	.270" ± .003"	.270" ± .005"
Body Hook Length	.065" ± .005"	.065" ± .010"
Cover Hook Length	.060" ± .010" -.005"	.053" Minimum
Cover Hook Tightness Rating	100%	95% - 100%
Overlap, Actual Optical Only	.040" Minimum	.035" Minimum
Pressure Ridge	VISIBLE & CONTINUOUS AROUND ENTIRE CIRCUMFERENCE	

These seam dimensions are specific for the roll profiles listed.

Note #1: At set up, seam 3 cans per seaming station. Take 3 readings per can, approximately 120 degrees apart. Average readings to establish median value. Verify weekly and adjust as required. Before adjusting machine for an apparent out-of-specification condition, check 3 additional samples from that seaming station to confirm that adjustment is necessary.

Note #2: Can Holding Chuck Force and 1st Operation Thickness are Set-Up Guides only and may be varied to produce Specification Body Hooks and Overlaps. 1st Operation Seams should be examined in a projector to ensure good seam formation.

Note #3: Seam thickness is indicative of tightness when seaming aluminum ends and may be used as a guide in interpreting Tightness Rating. The Operating Seam Thickness should not exceed the Maximum Set-Up Guide.

Stations running at upper range for seam thickness should be adjusted at first available opportunity.

Note #4: Release internal pressure prior to measuring countersink.

Note #5: Overlap must be measured in a seam projector.

Note #6: 1st Operation roll height setting: .003" to .005" over lip of chuck.

Note #7: 2nd Operation roll height setting: .005" to .007" over lip of chuck.

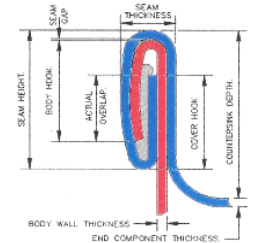
Note #8: Weekly PM of seaming roll play both radial and vertical not to exceed .001".

Note #9: Ferrum should include 1st operation seam check.

Note #10: Ferrum uses a wider groove roll profile for 1st op rolls. Therefore the seam height will be higher than Angelus 1st op Seaming roll.

SuperEnd 211 Diameter Seam Specifications 5/11/2014

Type of Can	Aluminum Beverage Can with SuperEnd
Type of End	0.0080" SuperEnd
Pin Gauge	6"Pin, 63H, 12L, 12" L, 140S, 180S
CCC Seamer Models	450, 2150, 2150, 2220
Ferrum Seamer Models	F400-500-700 Series, F412, F512, F512, F518
Chuck Number	CMB 2002 23
1st Op Roll	CMB 13116
2nd Op Roll	CMB 13181
Contact CMB	Contact CMB
Pin Height Target Settings	80Z 202/211 x 307 3.125" ± 0.010" - 0.005"
READ NOTE 1	12OZ 202/211 x 413 4.500" ± 0.010" - 0.005"
	16OZ 202/211 x 503 5.885" ± 0.010" - 0.005"
Spring Pressure	115LBS ± 10LBS Read Note 2
Knockout Pad Setting	0.375" ± 0.002
Seaming Roll Grease	Grade C Read Note 3



ITEM	SET UP RANGE	OPERATING RANGE
1st Op Seam Thickness	0.078" ± 0.003"	N/A
1st Op Seam Height	0.098" ± 0.002"	N/A
1st Op Seam Countersink	0.270" ± 0.008"	N/A
2nd Op Seam Thickness	0.043" ± 0.002"	Guide only see Note 4
2nd Op Seam Height	0.098" ± 0.003"	0.098" ± 0.008" See Note 5
2nd Op Seam Countersink	0.270" ± 0.008"	0.272" ± 0.008" See Note 6
Bodyhook	0.060" ± 0.005"	0.061" ± 0.008" See Note 6
Coverhook	0.060" ± 0.005"	0.060" ± 0.008"
Tightness Rating	100%	85-100%
Overlap (measured)	0.035 min	0.030 min See Note 7
Seam Gap	0.002" ± 0.001"	0.004" Max
Bodyhook Runup	90-100%	70-100%
Pressure Ridge	Visible & Continuous	Visible & Continuous

- All dimensions in inches unless otherwise noted.
- Pin height should be set to manage a proper bodyhook. Variance between stations should not be more than 0.003". If you have grooved lifter plates start 0.010" lower than specification.
 - No more than 20lb difference between stations should be observed.
 - Avoid over greasing of rolls. Over lubricated seaming rolls can become tight and harder to turn and may lead to deadheads or skidders. Use "O" grade grease or Kluber Food NH1 54-422 for Ultra-seal Bearing.
 - Use in combination with seam height, tightness and pressure ridge to assess the quality of the seams. Thickness variation around the seam should not exceed 0.003".
 - Measure countersinks either side of the lbs with cam specified Adjustments not necessary unless consistently at top of specification range.
 - Occasional bodyhook lengths of 0.072" may be observed. Adjustment only necessary if consistently above 0.070".
 - In frequent readings as low as 0.025" may be observed. Re-sample readings below 0.030" by cutting and evaluating at 50 degrees to the original cut.

The most reliable method for assuring the quality of the double seam is persistent inspections, frequent physical testing and equipment maintenance. Crown is not continuously in the customer's facility, has limited ability to perform testing at customer's facility and does not continuously maintain customer's equipment. The quality of the double seam is the responsibility of the filling customer. The seam should be assessed by trained personnel using a combination of optical and teardown methods. Seams should be judged in their entirety and not by dimensions alone.

Signature Title



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Seam Specifications

SECOND OPERATION

298L641-S-147 or 298L641-S-141 (or their equiv)

MACHINE SET UP SPECIFICATIONS (NOTE 1)

PIN HEIGHT

CAN SIZE	DESCRIPTION	INCHES	METRIC
202/211 X 307	8 oz SQUAT	3.125 ± .003	79,38 ± 0,08
202/211 X 310	8 oz SUPER SQUAT	3.305 ± .003	83,95 ± 0,08
202/211 X 409	333ml	4.250 ± .003	107,95 ± 0,08
202/211 X 413	12 oz	4.500 ± .003	114,30 ± 0,08
202/211 X 603	16 oz	5.880 ± .003	149,35 ± 0,08
202/204 X 402	7.5 oz (204) SLEEK	3.775 ± .003	98,89 ± 0,08
202/207.7 X 400	8 oz (207.5) SLEEK	3.675 ± .003	93,35 ± 0,08
202/207.5 X 403	8 oz (207.5) SUPER SLEEK RETORT	3.875 ± .003	98,43 ± 0,08
202 X 207.5 X 413	10 oz (207.5) SLEEK	4.500 ± .003	114,30 ± 0,08
202/207.5 X 510	12 oz (207.5) SLEEK	5.315 ± .003	135,00 ± 0,08
202/211 X 707	568ml (550ml BRE END)	7.091 ± .003	180,11 ± 0,08

BASE PLATE LOAD (LBS)

COLD FILL
HOT FILL

100 lbs ± 5 lbs
130 lbs ± 20 lbs

45.36 ± 2.27
58.97 ± 9.07



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Seam Specifications

<u>BASE PLATE LOAD (LBS)</u>		COLD FILL	100 lbs ± 5 lbs	45.36 ± 2.27	
		HOT FILL	130 lbs ± 20 lbs	58.97 ± 9.07	
PRODUCT SPECIFICATIONS		SET UP SPECIFICATION		OPERATING SPECIFICATION	
<u>DIMENSIONS AND PARAMETERS</u>		(IN)	(METRIC)	(IN)	(METRIC)
FIRST OPERATION SEAM THICKNESS		.076 ± .002	1,93 ± 0,05		
FIRST OPERATION COUNTERSINK DEPTH		.270 ± .003	6,86 ± 0,08		
SECOND OPERATION SEAM THICKNESS	.0085 GAUGE	.044 ± .001	1,118 ± 0,025	.042 - .046	1,07 - 1,17
	.0088 GAUGE	.045 ± .001	1,143 ± 0,025	.043 - .047	1,09 - 1,19
SECOND OPERATION COUNTERSINK DEPTH		.270 ± .003	6,86 ± 0,08	.270 ± .005	6,86 ± 0,13
SEAM HEIGHT	S-141	0.098 ± 0.002	2,489 ± 0,05	0.098 ± 0.003	2,489 ± 0,08
	S-147	0.100 ± 0.002	2,540 ± 0,05	0.100 ± 0.003	2,540 ± 0,08
BODY HOOK LENGTH		.065 ± .005	1,65 ± 0,13	.065 ± .010	1,65 ± 0,25
COVER HOOK LENGTH		.060 ± .005	1,52 ± 0,13	.053 min	1,35 min
TIGHTNESS RATING		100%	100%	90% min	90% min
ACTUAL OVERLAP		.035 min	0,89 min	.025 min	0,64 min
NOTE 1: Machine set up specifications are for initial setting only. Adjustments from these settings should be made as needed to achieve product specification requirements					

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Set Up VS Operating Specifications

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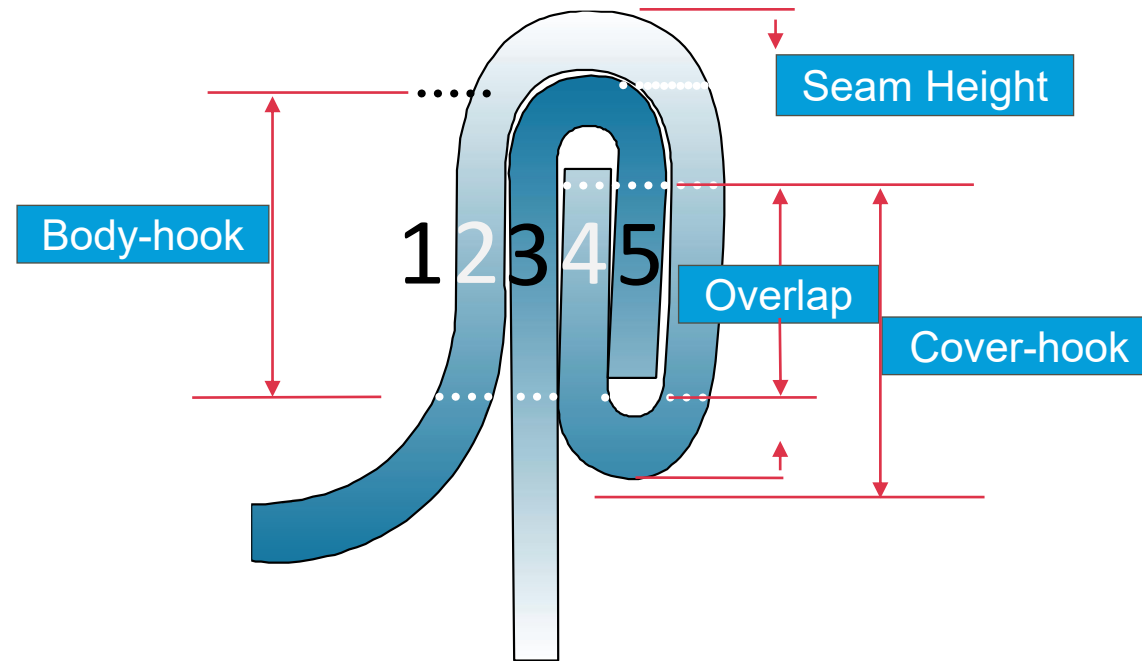
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Overlap Component Specifications

Overlap Seam Components

- Seam Height
 - Set Up .096" - .100"
 - Operating .095" - .101"
- Body Hook
 - Set Up .060" - .070"
 - Operating .055" - .075"



- Cover Hook
 - Set Up .055" - .065"
 - Operating .053 Minimum
- Overlap
 - Set Up .035" Minimum
 - Operating .025" Minimum

Measuring Overlap



Measuring Overlap: $(CH + BH + .010'') - SH$



Seam Height



Measuring Overlap: $(CH + BH + .010'') - SH$



Measuring Overlap: $(CH + BH + .010'') - SH$



Cover Hook



Measuring Overlap: $(CH + BH + .010'') - SH$

.064"



Measuring Overlap: $(CH + BH + .010'') - SH$



Body Hook

Measuring Overlap: $(CH + BH + .010'') - SH$



Measuring Overlap: (CH + BH + .010") - SH



+



+ .010" -



**= .038
Overlap**



Trouble-shooting



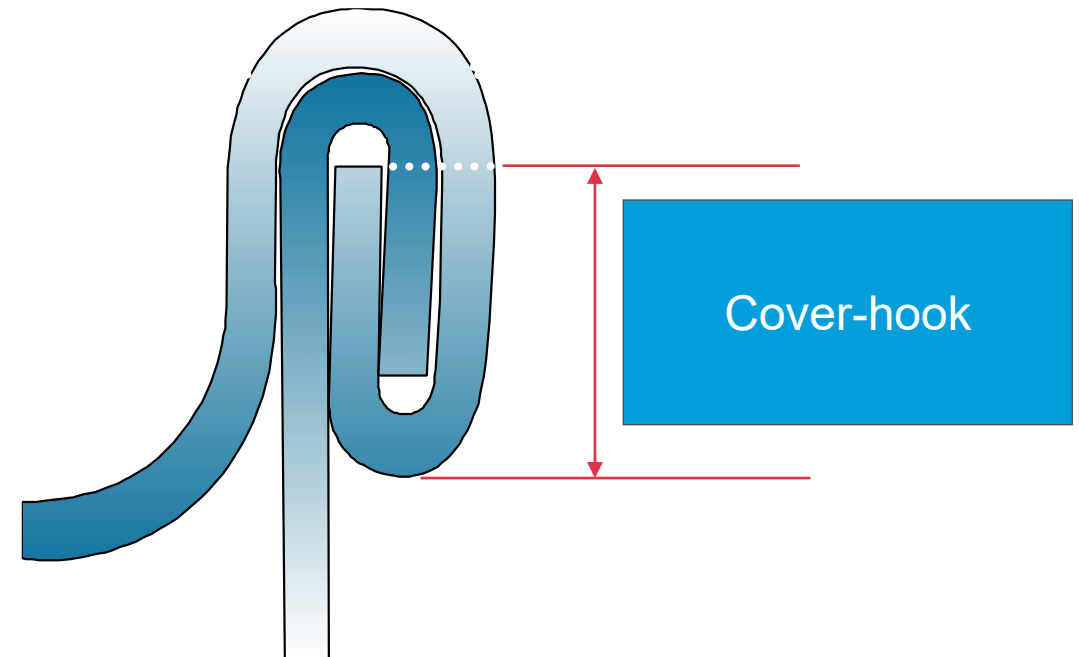
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Out Of Spec Cover-Hook

- **Too Long**
 - Tight First Operation
 - First Operation Roll Too Low
 - Damaged or Worn Chuck
- **Too Short**
 - First Operation too Loose
 - Second Operation too Loose
 - Worn First Operation Profile
 - Worn First Operation Bearings
- **High Variation**
 - Usually an Uneven Curl or Can Flange
 - Tight First Operation

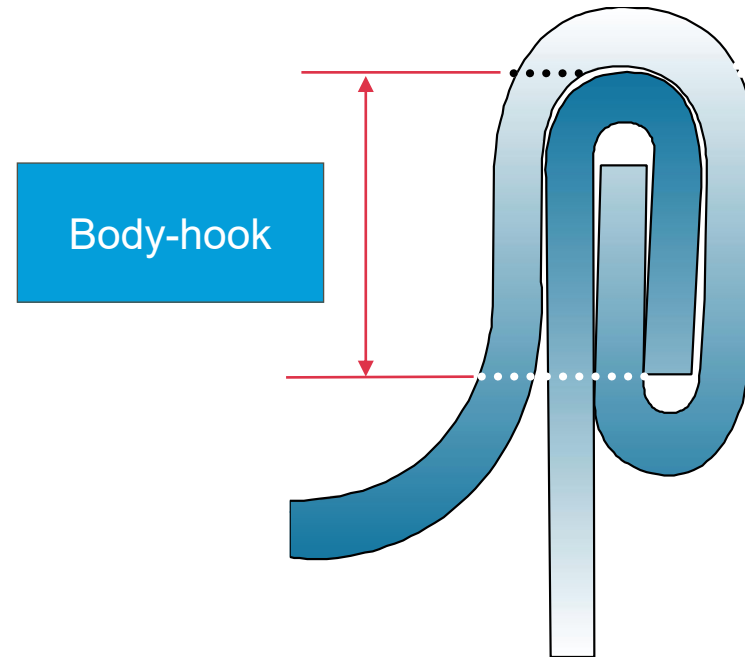
Internal Seam Components



Out Of Spec Body-Hook

- **Too Long**
 - High Spring Pressure
 - Tight Second Operation
 - Loose First Operation
- **Too Short**
 - Weak Spring Pressure
 - Tight First Operation
 - First Operation Roll Too High
 - Second Operation Roll Too High

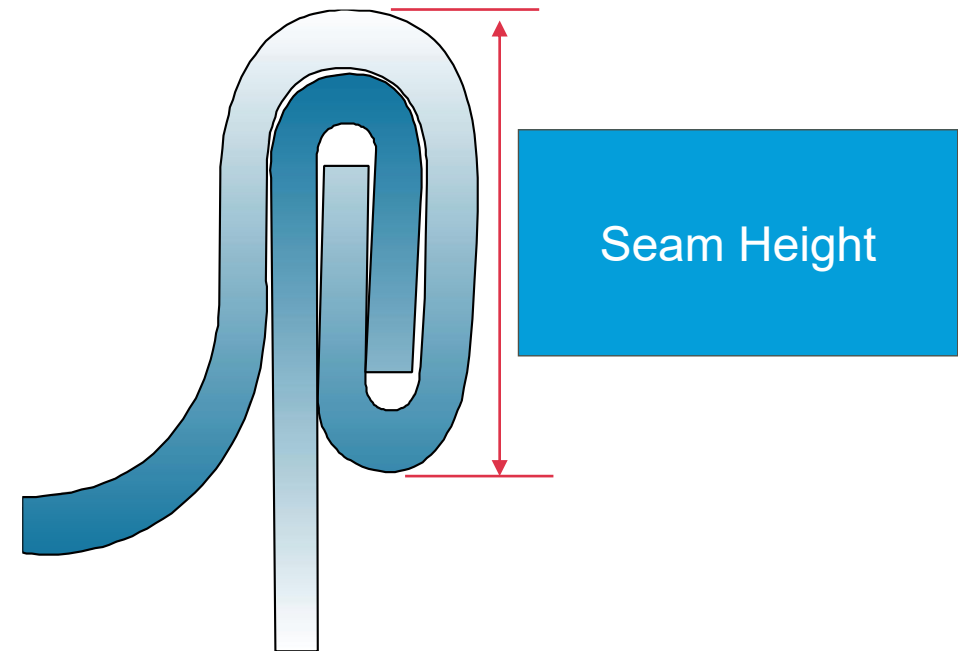
Internal Seam Components



Out Of Spec Seam Height

- **Too Long**
 - Tight Second Operation
 - Loose First Operation
 - Worn Bearings or Roll Profiles
- **Too Short**
 - Tight First Operation
 - Loose Second Operation
 - Roll Profile too Narrow
 - Weak Spring Pressure

External Seam Components



Thank You!

Grant Smith | Grant.Smith@BWPackaging.com

