

Universal™ SureWrap® Spray Nozzles

Customer Product Manual

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Issued 7/11



This document contains important safety information
Be sure to read and follow all safety information in this
document and any other related documentation.



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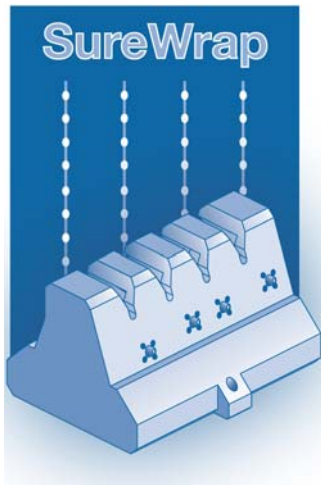
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Universal SureWrap Spray Nozzles



WARNING! Allow only personnel with appropriate training and experience to operate or service the equipment. The use of untrained or inexperienced personnel to operate or service the equipment can result in injury, including death, to themselves and others, and damage to the equipment.

Description

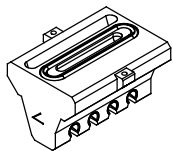


Recommended adhesive pattern of discrete bond points

This manual provides setup, operation, troubleshooting, service, and parts information specific to Universal SureWrap nozzles.

SureWrap nozzles accurately apply hot melt adhesive filaments to form discrete adhesive masses (discrete bond points) on the elastic strands used for elasticized legs, leg cuffs, and waistbands on baby diapers, training pants, and adult incontinence products. The patented SureWrap nozzle uses an integral-strand guide to stabilize the elastic strand and an angular spray trajectory to maintain performance at high production speeds. Four air openings associated with each adhesive opening dispense four radially tangential air streams, causing the adhesive filament to move in a spiral pattern. The spiraling adhesive filament wraps around each strand, forming discrete adhesive masses with no useful adhesive on the strand between adjacent discrete adhesive masses. These discrete adhesive masses optimize adhesive bonding, minimize adhesive usage, and result in uniform elastic retractive forces. For a more detailed explanation of the recommended use of SureWrap nozzles, refer to *Theory of Operation*.

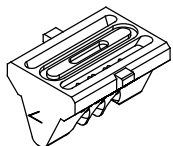
SureWrap nozzles may be made to order for specific elastic configuration requirements. Nozzles are available in standard nickel plated brass construction with steel inserts to resist wear or all steel versions and are compatible with Universal series modules.



Plated brass nozzle with hard steel inserts (standard)

NOTE: Refer to *Parts* for nozzle part numbers. Refer to *Nozzle Identification* for an explanation of nozzle description codes.

NOTE: Refer to the applicator manual for all applicator-related information and procedures.



Steel nozzle

Theory of Operation

For elastic strand applications using a SureWrap nozzle, Nordson Corporation recommends selecting and adjusting the operating conditions such that the dispensed adhesive filament, which is tangentially impacted by high velocity air streams, forms a spiral pattern that encircles the strand and, after contacting it, wraps around the strand to form discrete adhesive masses (discrete bond points). The following explanation of how discrete adhesive masses are formed is provided to facilitate the selection and adjustment of the operating conditions.

The adhesive filament exits the orifice of the SureWrap nozzle at an extrusion speed (melt velocity) that is directly related to the flow rate, viscosity, and orifice size. The velocity of the adhesive filament in the area between the orifice and the elastic strand (the spinning speed) is determined by the melt velocity and the amount of attenuation caused by the high velocity air streams. The spinning speed is directly related to the pre-contact adhesive filament diameter.

Since the adhesive filament is moving in a spiral pattern when it contacts the elastic strand, the filament begins to wrap around the strand at the contact point and then begins to stretch and form a section with a thinner diameter until it contacts the strand at a second contact point. Under preferred conditions, the adhesive filament remains connected to the elastic strand at the two contact points and then begins to wrap around the strand at each contact point as a loop. As the thin filament section is wrapping around the strand, it breaks and each half snaps back towards its respective point of contact to form a discrete adhesive mass (discrete bond point). This breaking of the thin adhesive filament occurs because the distance between the first contact point and the second contact point increases as the strand moves toward the nip point due to elongation of the strand. The post-contact adhesive filament diameter and the elongation of the strand together directly contribute to the formation of discrete adhesive masses (discrete bond points).

Under the recommended operating conditions, there is preferably no adhesive on the elastic strand between any two discrete adhesive masses. However, it is also acceptable if a broken adhesive filament section does not completely snap back to its respective point of contact but instead forms a small tail of adhesive on the elastic strand extending from the discrete adhesive mass. Because this small tail of adhesive does not bond to the substrate, maximum elastic contraction is still achieved.

NOTE: If a SureWrap nozzle is not dispensing the adhesive filament in a spiral pattern or if four discrete adhesive masses (discrete bond points) are not being formed on the elastic strand, the nozzle is not operating as recommended. Refer to *Troubleshooting* for corrective actions.

Application Guidelines

This section provides installation, setup, and operational information specific to applications using SureWrap nozzles.

Parameters

These illustrations depict a horizontal elastic strand application and represent only one possible installation configuration. Other installation configurations, including vertical strand application, are also possible. In all cases, these basic principles should be followed for optimum performance.

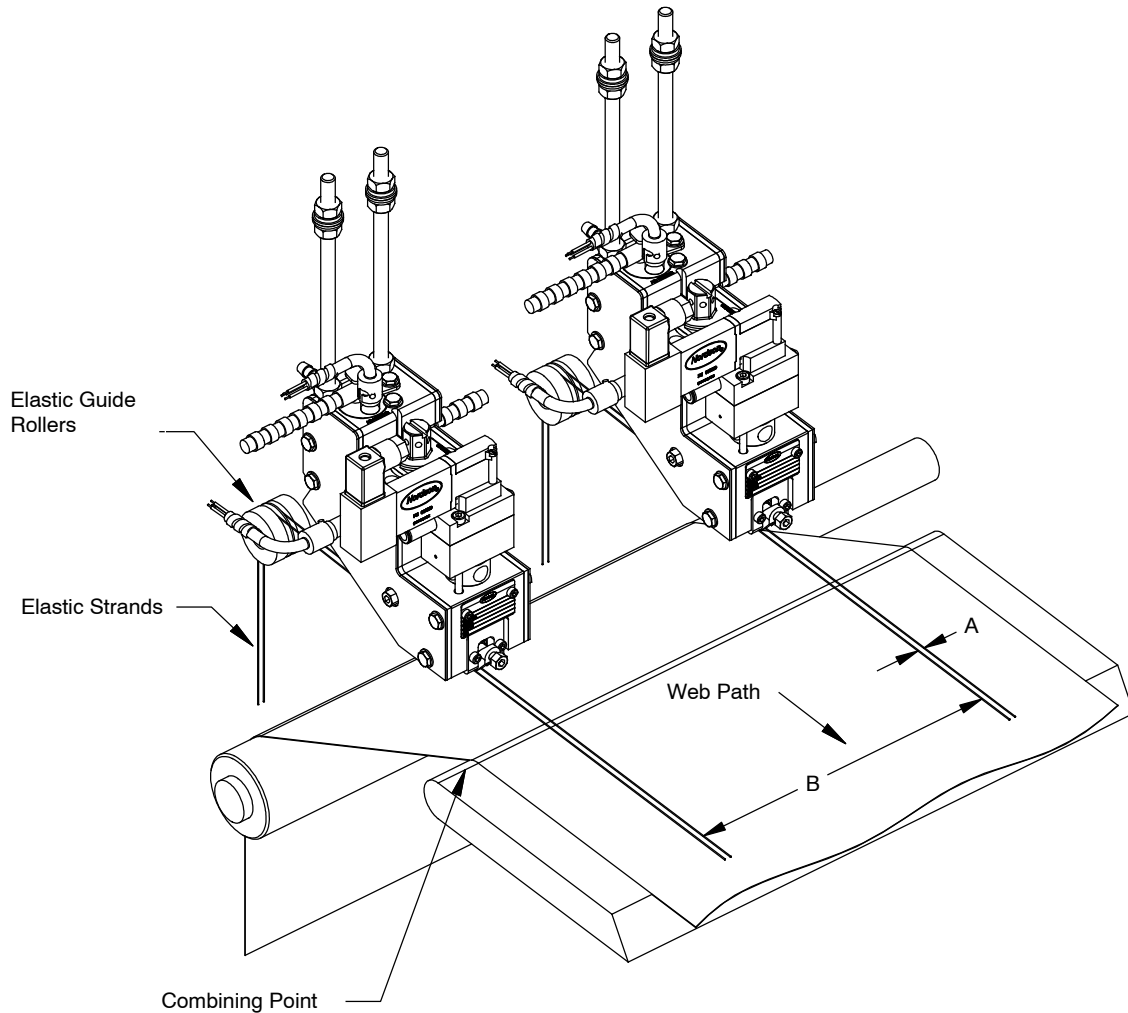


Figure 1 Parameters A-B (isometric view)

Parameter	Description	Minimum Value	Maximum Value	Typical Value
A	Strand spacing (nozzle)	3 mm (0.12 in.)	Refer to <i>Explanation</i>	Customer-specific
	Explanation: The strand spacing maximum value depends on the nozzle width and is equal to the nozzle width minus 5 mm (0.2 in.).			
B	Strand spacing (overall)	50 mm (2 in.)	No limit	Customer-specific

Parameters (contd)

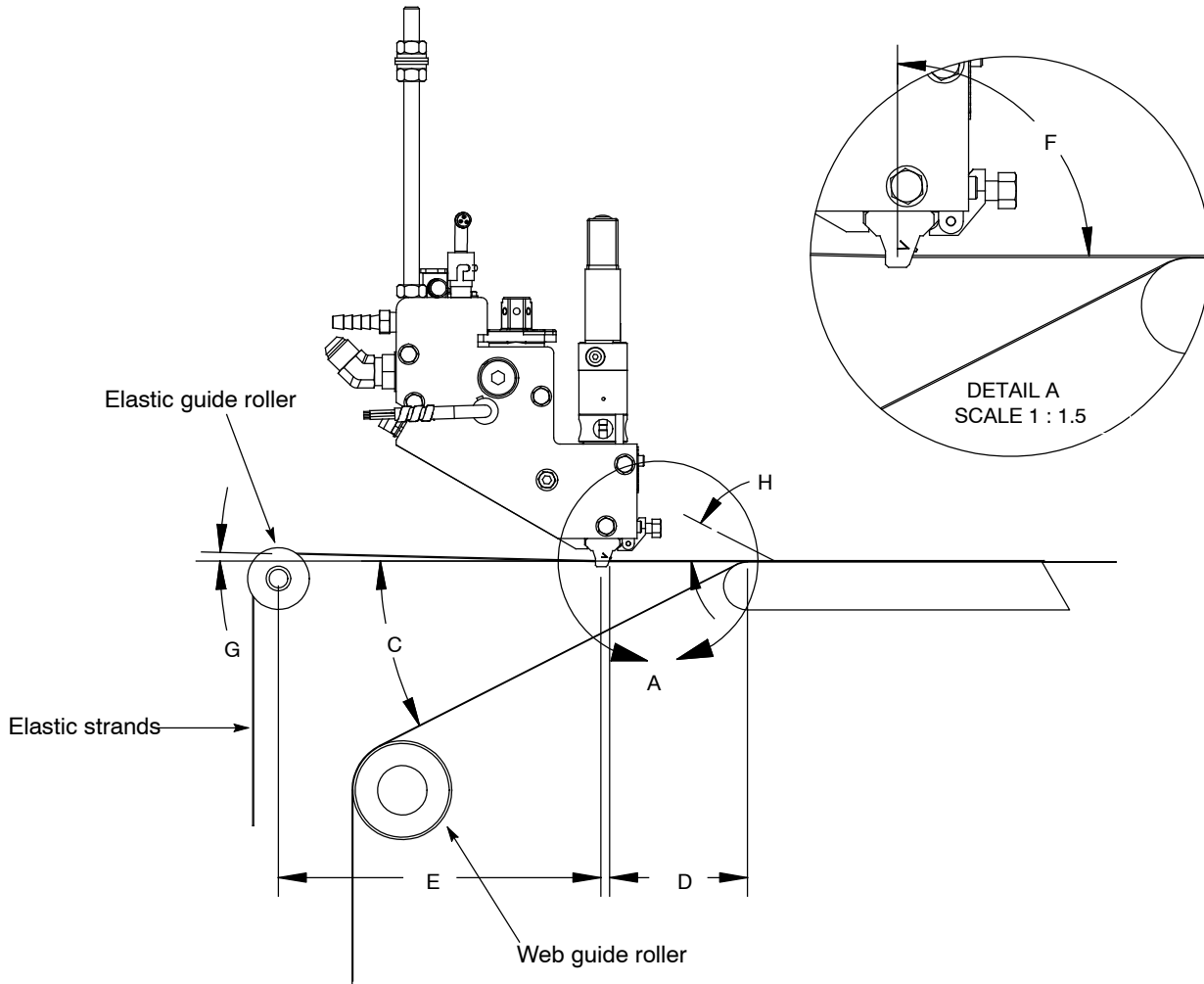


Figure 2 Parameters C-H, part 1 (side view)

Parameter	Description	Minimum Value	Maximum Value	Typical Value
C	Entrance angle of substrate to combining point and/or post-contact surface	20 degrees	70 degrees	30-40 degrees
	Explanation: This angle is to allow room for the pattern air to dissipate without disturbing the spray quality or adhesive containment to the strands. If this area is too small, the pattern air will deflect off the substrate and push back upwards, reducing the adhesive filament's ability to collect on the strand.			
D	Process open time (distance from nozzle to combining point)	75 mm (3 in.)	150 mm (6 in.)	Customer-specific
	Explanation: Optimal open time is dependant on bond strength and the desired pattern. The optimal position will vary based on what adhesive is used, the flow rate, and the type of bond you are trying to create.			
E	Elastic guide roller position in relation to nozzle	~250 mm (~10 in.)	450 mm (18 in.)	Refer to <i>Explanation</i>
	Explanation: The further the guide roller is positioned away from the nozzle, the less affect misalignment has on the nozzle in terms of strand twisting and/or nozzle wear due to increased friction in the nozzle strand guide.			
<i>Continued...</i>				

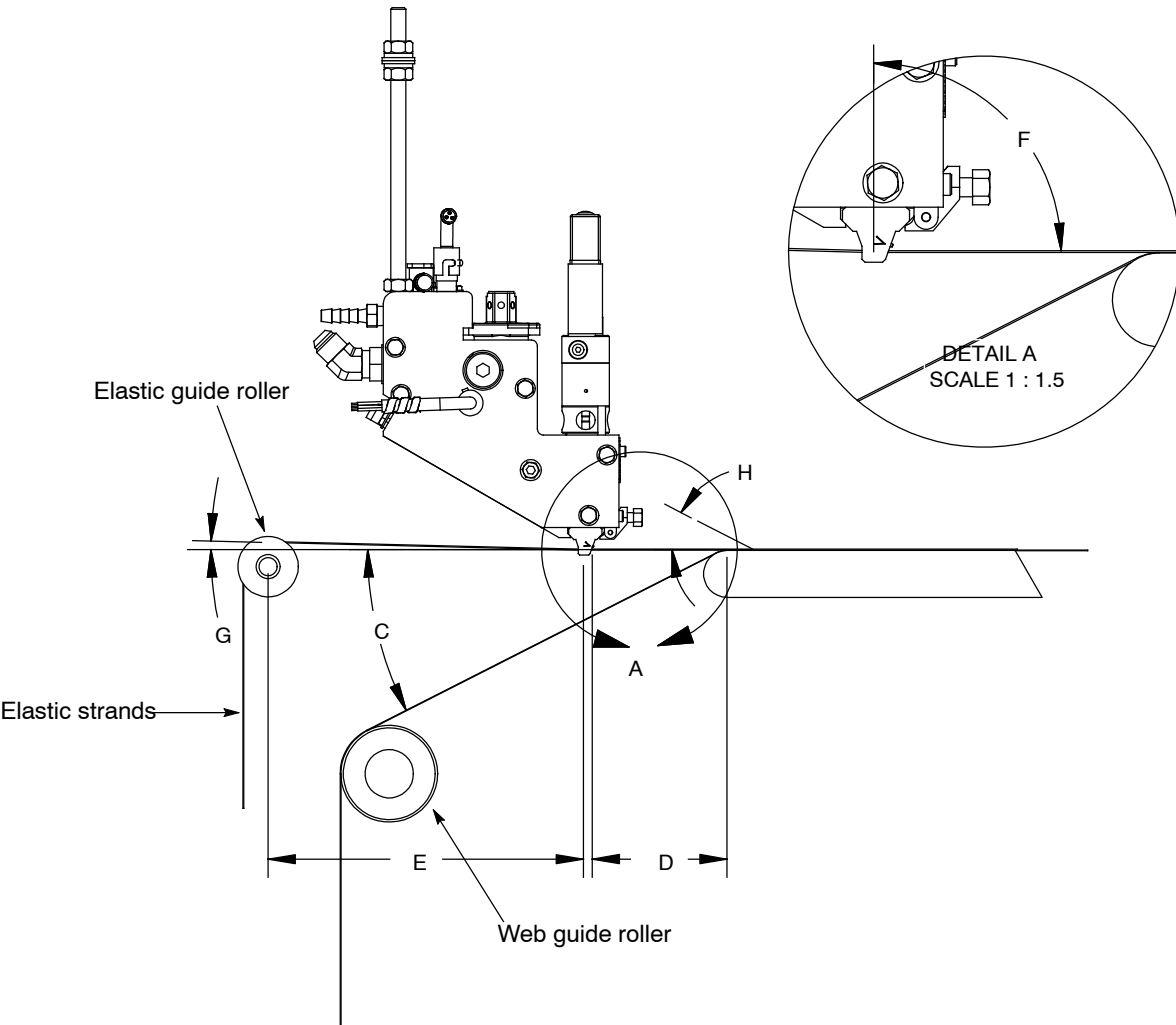


Figure 3 Parameters C-H, part 2 (side view)

Parameter	Description	Minimum Value	Maximum Value	Typical Value
F	Applicator angle to exit strand plane	80 degrees	100 degrees	90 degrees
G	Elastic entrance angle to nozzle guide	1 degree	10 degrees	2 degrees
	Explanation: The entrance angle determines the amount of deflection the nozzle creates on the elastic strands. The best results are achieved by creating all the deflections before the nozzle and having the strands exiting the nozzle perpendicular to the module or applicator. When correctly set up, the strand makes light contact in the center of the guide notch, reducing friction on the strand and nozzle.			
H	Elastic strand merging (parallelism) to combining surface or substrate	Parallel	20 degrees	5 degrees
	Explanation: By reducing the amount of “wrap” around the roller or the amount of contact the elastic strands make with the substrate at the combining point, the side-to-side movement of the strands caused by typical side-to-side web movement can be reduced. This helps eliminate overspray conditions and improves pattern consistency.			

Parameters (contd)

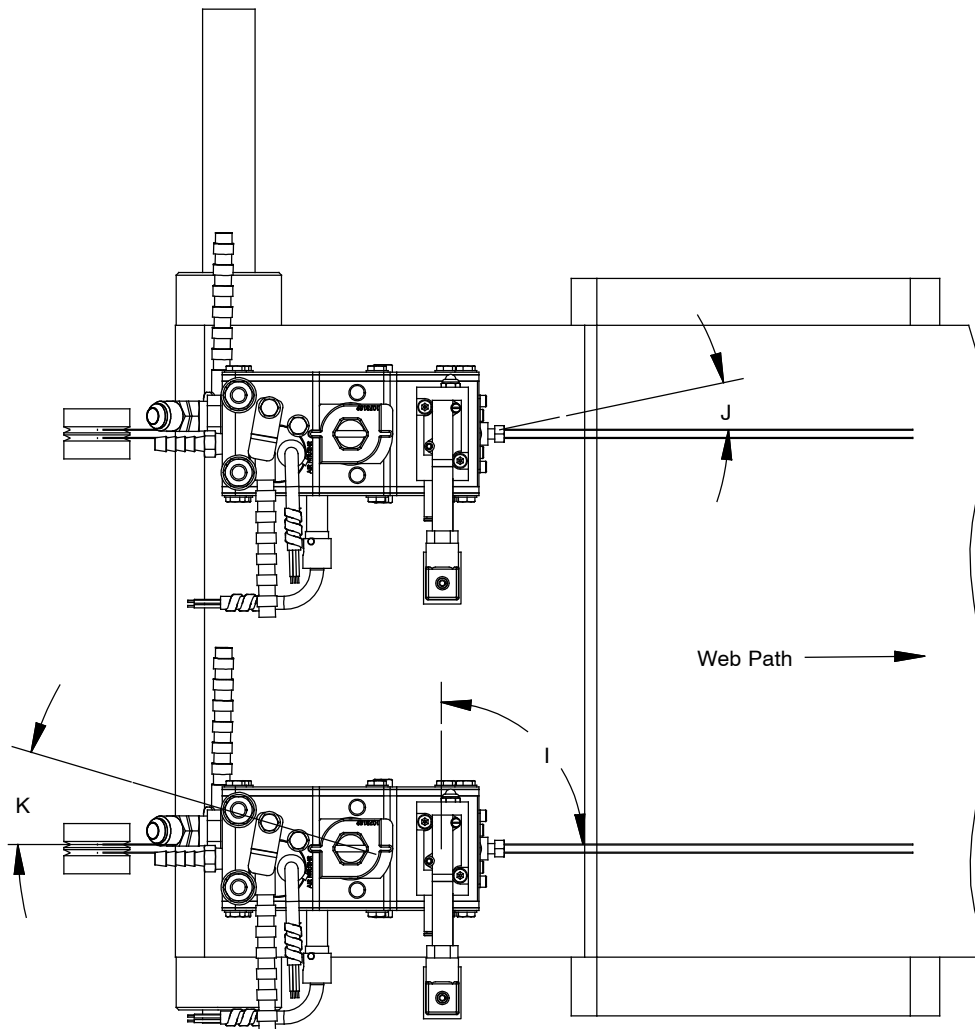


Figure 4 Parameters I-K (top view)

Parameter	Description	Minimum Value	Maximum Value	Typical Value
I	Perpendicularity of applicator to elastic strands	85 degrees	95 degrees	90 degrees
	Explanation: Too much misalignment of the applicator in relation to the strand movement will create adhesive overspray.			
J	Elastic strand movement (side to side)	-5 degrees	5 degrees	0 degrees
	Explanation: The amount of side-to-side movement is relative to (1) the correct setup of parameter H and (2) how well the web movement is controlled. When a guiding apparatus is used to control the placement of the strands, the alignment of the SureWrap nozzle guide with the guiding apparatus is critical.			
K	Side-to-side strand alignment in relation to nozzle	-10 degrees	10 degrees	0 degrees
	Explanation: The side-to-side alignment is important for keeping the strand in the center of the guide notch. When correctly set up, the strand makes light contact only in the center of the guide notch, reducing friction on the strand and nozzle wear.			

Operating Conditions

NOTE: Refer also to the applicator manual and to the Universal SureWrap nozzles product data sheet (NWL-10-3767) for additional specifications and operating information.

Operating Condition	Minimum Value	Maximum Value	Typical Value
Adhesive viscosity	8,000 cps	15,000 cps	10,000 cps
Flow rate (add-on) range	25 mg/strand/meter	100 mg/strand/meter	Adhesive-specific
Module-actuating air pressure	4.5 bar (65 psi)	6.2 bar (90 psi)	5.5 bar (80 psi)
Pattern air temperature	Same as adhesive	+10 °C (+18 °F)	+5 °C (+9 °F)
Pattern air pressure	0.3 bar (5 psi)	1.5 bar (21.8 psi)	0.8 bar (11.6 psi)

Operational Capability

SureWrap nozzles are available in a variety of orifice sizes, including a standard size (0.020 in.) and a high flow size (0.024 in.). Standard nozzles provide adequate performance in the majority of applications and are the default nozzle selection. Larger orifice nozzles are less susceptible to clogging and provide higher flow at lower pressure.

Most production environments require a range of flow rates at a fixed material viscosity. Application requirements will determine the selection of nozzles. To aid in nozzle selection, some nozzle capabilities are shown graphically in Figures 5 and 6.

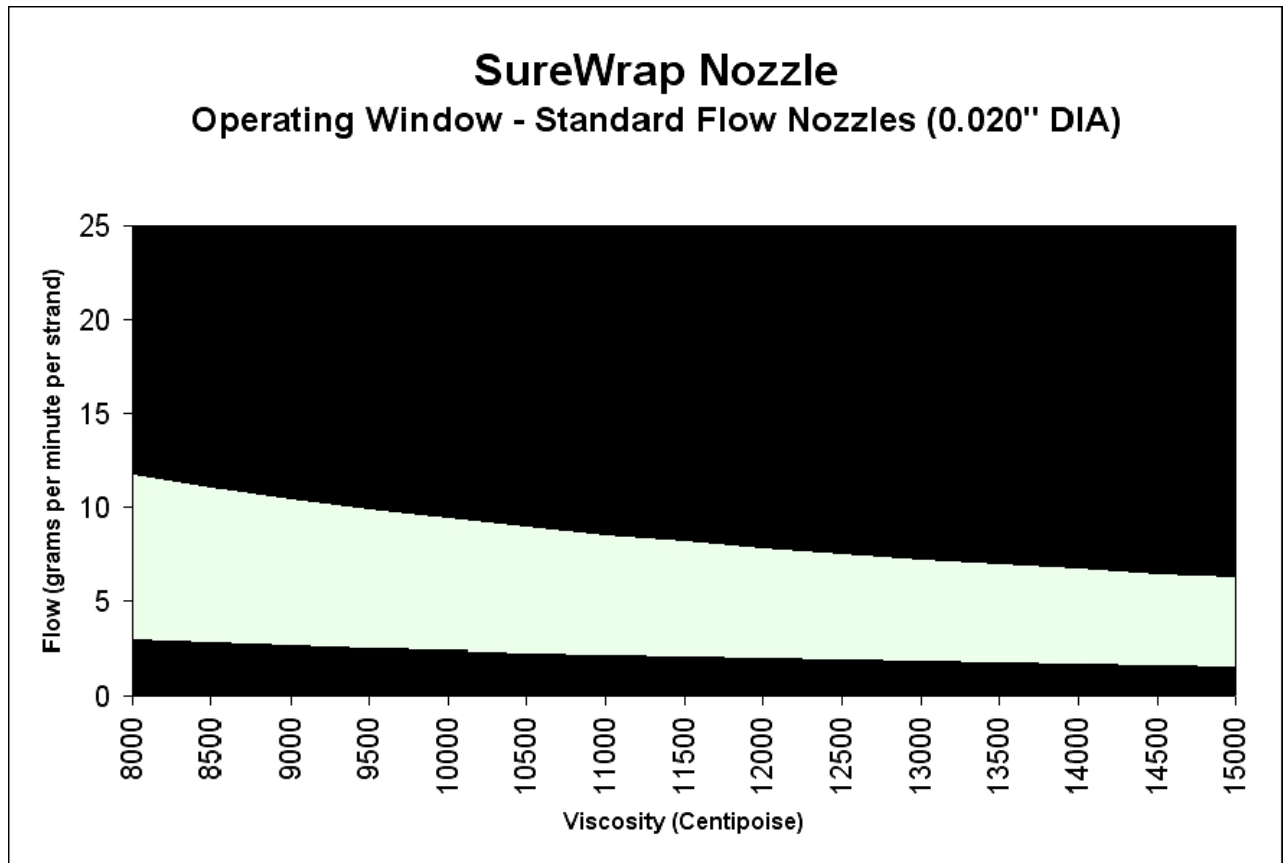


Figure 5 0.020-in. SureWrap nozzle operating window capability

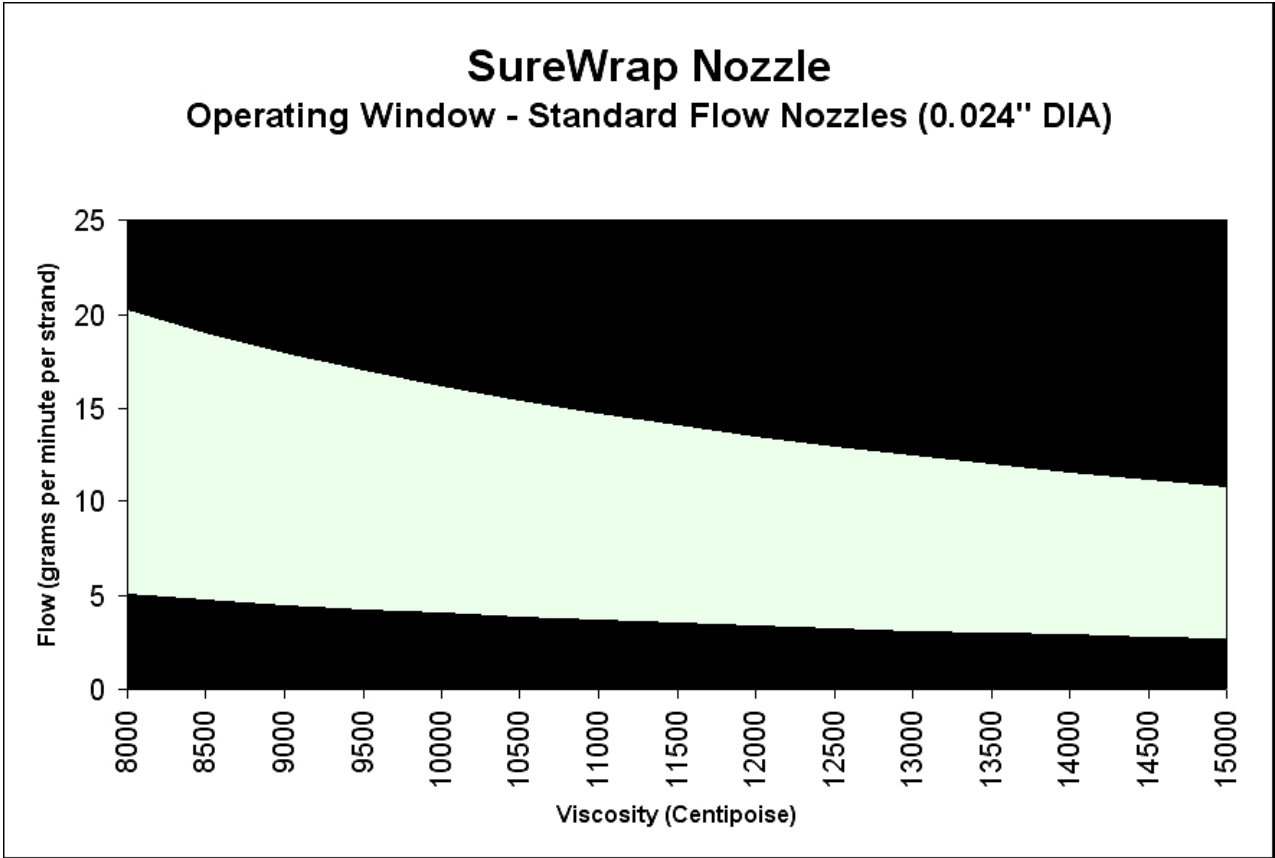


Figure 6 0.024-in. SureWrap nozzle operating window capability

Nozzle Selection

Elastic Material Type

SureWrap nozzles accommodate a wide of elastic thread sizes.

Strand Spacing Guidelines

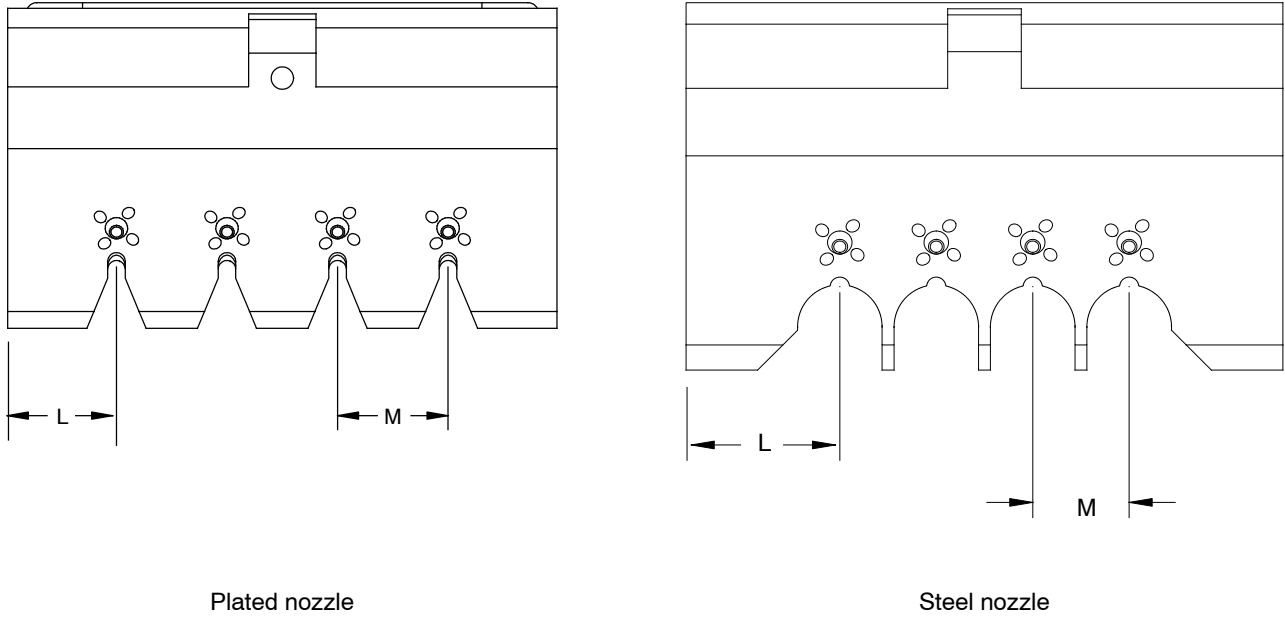
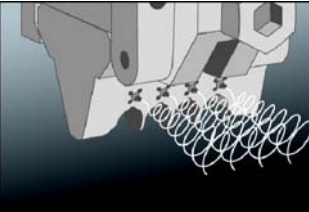
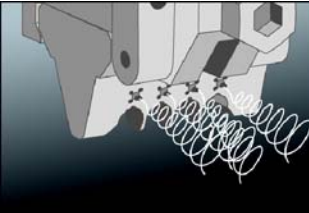
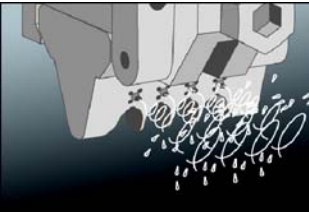
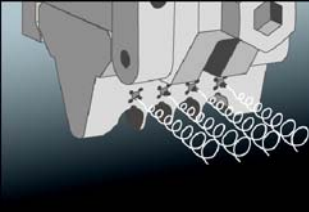
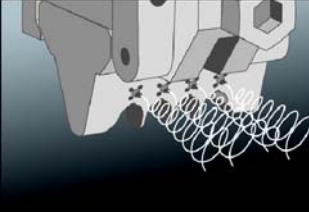


Figure 7 Parameters L-M [front view of a SureWrap plated (left) and steel (right) nozzle]

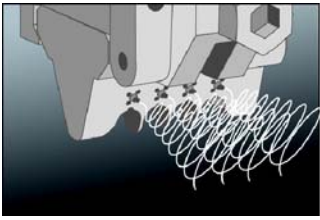
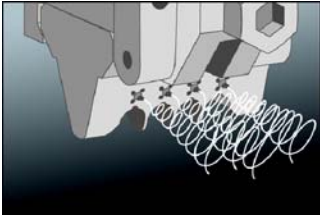
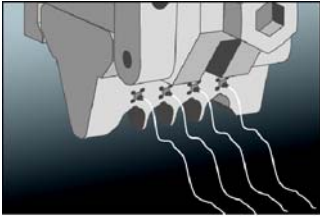
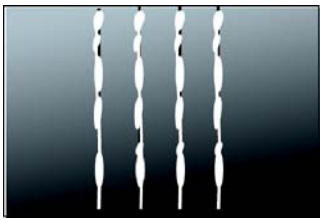
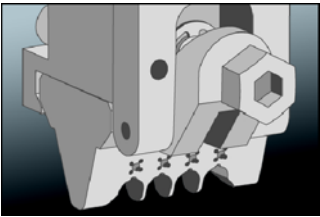
Parameter	Description	Minimum Value	Maximum Value	Typical Value
L	Strand distance from nozzle side	2.5 mm (0.1 in.)	—	Customer-specific
M	Strand-to-strand spacing	3 mm (0.12 in.)	—	Customer-specific

Troubleshooting

Problem	Possible Cause	Corrective Action	Example
<p>1. Good spiral pattern (for reference only)</p>	<p>Not applicable</p>	<p>Not applicable</p>	
<p>2. Spiral pattern off-center (skewed) or missing strand</p>	<p>Blocked air passage(s)</p> <p>Blocked adhesive passage(s)</p> <p>Unbalanced air flow at the applicator</p>	<p>Remove the nozzle and use a pin-type probe to clean the blocked air passage(s).</p> <p>Remove the nozzle and use a pin-type probe to clean the blocked adhesive passage(s).</p> <p>Eliminate the air current or add a module that provides only pattern air next to the end module.</p>	
<p>3. Spiral pattern breaking up</p>	<p>Adhesive and/or pattern air temperature too hot or pattern air pressure too high</p>	<p>Adjust the applicator temperature and pattern air pressure settings to the last good run settings; then check the adhesive output.</p>	
<p>4. All spiral patterns too narrow</p>	<p>Adhesive and/or pattern air temperature too cool, pattern air pressure too low, or applicator mounted too close to substrate</p>	<p>Adjust the adhesive or air temperature and air pressure settings to the last good run settings and/or check the applicator mounting height; then check the adhesive output.</p>	
<p>5. One spiral pattern too narrow or missing</p>	<p>Incorrect or damaged nozzle; possible restriction in heated air manifold or pattern air input on module; or clogged orifice</p>	<p>Verify that the nozzle part number is correct. Check the nozzle for damage and clean or replace if needed. Remove the module and check for blockage in the pattern air path.</p>	

Continued...

Troubleshooting *(contd)*

Problem	Possible Cause	Corrective Action	Example
6. All spiral patterns too wide (overspray)	Adhesive and/or pattern air temperature too warm, pattern air pressure too high, or applicator mounted too far from substrate	Adjust the adhesive or air temperature and air pressure settings to the last good run settings and/or check the applicator mounting height; then check the adhesive output.	
7. One spiral pattern too wide (overspray)	Incorrect or damaged nozzle; partially blocked adhesive or air passage(s) in nozzle	Verify that the nozzle part number is correct. Use a pin-type probe to clean the nozzle or check the nozzle for damage and replace if needed.	
8. Spiral pattern not being formed	Pattern air pressure too low; adhesive temperature too high	Adjust the adhesive temperature and pattern air pressure settings to the last good run settings; then check the adhesive output.	
9. Discrete adhesive masses not being formed	Adhesive viscosity too high; percentage of elastic strand elongation too low	Adjust the adhesive temperature and strand elongation settings to the last good run settings; then check the adhesive output.	
10. Irregular spiral pattern or adhesive leakage on one module	Nozzle O-ring missing or nozzle too loose (under-tightened)	Install a new nozzle O-ring, replace the nozzle, or tighten the nozzle clamp screw.	

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Nozzle Service

Removing or Installing a Nozzle

You will need the following items:

- Appropriate tools, including a torque wrench
- Drain pans and disposable rags
- O-ring lubricant (for lubricating nozzle O-rings)



WARNING! System pressurized! Relieve system hydraulic pressure before breaking any hydraulic connection or seal. Failure to relieve the system hydraulic pressure can result in the uncontrolled release of hot melt or cold adhesive, causing personal injury.



WARNING! Molten material! Wear eye or face protection, clothing that protects exposed skin, and heat-protective gloves when servicing equipment that contains molten hot melt. Even when solidified, hot melt can still cause burns. Failure to wear appropriate personal protective equipment can result in personal injury.

Remove a Nozzle

1. Heat the system to application temperature.
2. Relieve system pressure. Refer to the applicator manual as needed.
3. Trigger the applicator solenoid valves to relieve any remaining pressure.
4. Shut off the module-actuating air.
5. Decrease the pattern air pressure. Leave just enough air pressure to prevent adhesive from entering the pattern air outlet on the module.

See Figure 8.

6. Back the nozzle-retaining clamp screw all the way out until it stops (1).
7. Push up (2) on the nozzle-retaining clamp screw to eject the nozzle.

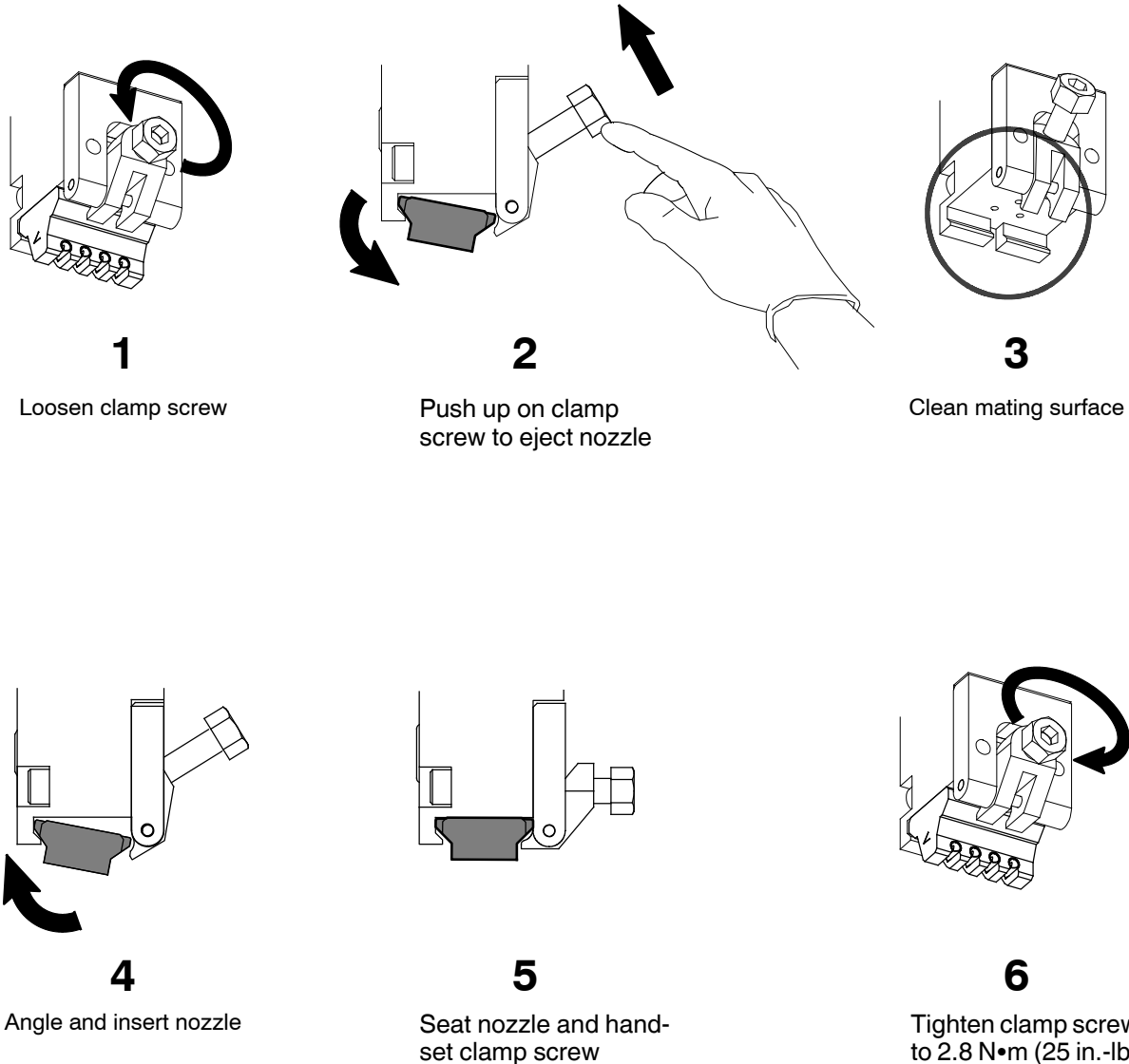


Figure 8 Nozzle removal or installation (shaded nozzle is a generic shape)

- 1. Loosen clamp screw
- 2. Push up on clamp screw to eject nozzle
- 3. Clean mating surface
- 4. Angle and insert nozzle
- 5. Seat nozzle and hand-set clamp screw
- 6. Tighten clamp screw to 2.8 N•m (25 in.-lb)

Install a Nozzle

See Figure 8.

1. Clean (3) the mating surface where the nozzle will be seated.
2. Inspect the nozzle seal, replace if necessary, and ensure that the seal is lubricated and properly positioned in the seal bore.
3. Carefully angle and insert the nozzle in the module seat (4, 5).

CAUTION! Overtightening a nozzle-retaining clamp screw can damage the module.

4. Tighten (6) the nozzle-retaining clamp screw to 2.8 N•m (25 in.-lb).

Cleaning Nozzles

You will need the following items:

- Appropriate tools, including a torque wrench
 - Nozzle cleaning kits (refer to *Parts*)
 - Cleaning supplies (refer to Table 1)
 - Drain pans and disposable rags
 - O-ring lubricant (for lubricating nozzle O-rings)
1. Remove the nozzles. Refer to *Remove a Nozzle* earlier in this section.
 2. Clean the nozzles using one of the Nordson-recommended methods shown in Table 1. Use only cleaning agents recommended by the adhesive supplier.



WARNING! System pressurized! Relieve system hydraulic pressure before breaking any hydraulic connection or seal. Failure to relieve the system hydraulic pressure can result in the uncontrolled release of hot melt or cold adhesive, causing personal injury.



WARNING! Molten material! Wear eye or face protection, clothing that protects exposed skin, and heat-protective gloves when servicing equipment that contains molten hot melt. Even when solidified, hot melt can still cause burns. Failure to wear appropriate personal protective equipment can result in personal injury.



WARNING! Risk of explosion or fire. Follow the safety guidance and heating recommendations on the Material Safety Data Sheets (MSDSs) for your adhesives and nozzle-cleaning solutions.



WARNING! Risk of explosion or fire. Use a controlled heating device, such as a thermostatically controlled hot plate, to heat cleaning fluid, including Nordson Type-R fluid.






CAUTION! Risk of equipment damage. Do not use a wire brush (or a brush with bristles harder than the nozzle) to clean nozzles.

Cleaning Nozzles *(contd)*

Table 1 Nozzle Cleaning Methods

Cleaning Method	Procedure
Citrus-based solution and ultrasonic tank NOTE: This is the most thorough method.	<ol style="list-style-type: none"> a. Place the nozzles in citrus-based solvent/degreasing solution and soak them overnight or for approximately 4 hours. This dissolves and loosens the adhesive and char buildup. b. Remove the nozzles from the citrus-based solvent/degreasing solution and place them in an alkaline solution heated to the appropriate temperature (refer to the MSDS) in an ultrasonic tank. Soak the nozzles for approximately 10 minutes. This will remove adhesive and char from the orifices. c. Scrub the nozzles with a soft, non-metallic brush to remove debris. d. Gently blow air through the nozzle orifices from the mounting side of the nozzle.
Nordson Type-R fluid	<ol style="list-style-type: none"> a. Place the nozzles in a controlled heating device containing Nordson Type-R fluid and heat it above the melting point of the adhesive (refer to the MSDS). b. Scrub the nozzles with a soft, non-metallic brush to remove debris.
Electric heat gun	<ol style="list-style-type: none"> a. Heat the nozzles with a flameless electric heat gun. b. Scrub the nozzles with a soft, non-metallic brush to remove debris.
Ultrasonic tank	<ol style="list-style-type: none"> a. Place the nozzles in an alkaline solution heated to the appropriate temperature (refer to the MSDS) in an ultrasonic tank. Soak the nozzles for approximately 10 minutes. b. Scrub the nozzles with a soft, non-metallic brush to remove debris. c. Gently blow air through the nozzle orifices from the mounting side of the nozzle.
<i>Continued...</i>	

Table 1 Nozzle Cleaning Methods (contd)

Cleaning Method	Procedure
Oven (all-steel nozzles only)	<div style="display: flex; align-items: flex-start;"> <div style="margin-right: 10px;">  </div> <div> <p>WARNING: Risk of explosion, fire, or toxic vapor release. Depending on the type of adhesive and/or organic solvent used with the nozzles, heating them in an oven can cause a hazardous event. Before using an oven to clean nozzles, consult with the oven manufacturer about the viability of this method and the safety risks. Follow the manufacturer's recommendations.</p> </div> </div> <div style="display: flex; align-items: flex-start; margin-top: 10px;"> <div style="margin-right: 10px;">  </div> <div> <p>WARNING: Use the oven heating controls to keep the oven at the desired temperature. Do not use an oven that does not have heating controls.</p> </div> </div> <div style="display: flex; align-items: flex-start; margin-top: 10px;"> <div style="margin-right: 10px;">  </div> <div> <p>WARNING: The heating temperature and time may need to be adjusted based on the oven type, the adhesive type, and the amount of char buildup on the nozzles. Nordson Corporation recommends testing this procedure on discarded nozzles prior to using it on good nozzles.</p> </div> </div> <div style="margin-top: 10px;"> <p>CAUTION: Risk of equipment damage. Remove O-rings before cleaning nozzles in an oven. Failure to do so can cause a chemical reaction that will permanently damage the nozzles.</p> </div> <div style="margin-top: 10px;"> <p>a. Ensuring that O-rings have been removed from the nozzles, place them in an electric oven heated to approximately 385 °C (725 °F). Allow the nozzles to bake for approximately 3-4 hours.</p> <p>b. Turn off the oven and allow the nozzles to cool; then remove the nozzles.</p> </div> <div style="display: flex; align-items: flex-start; margin-top: 10px;"> <div style="margin-right: 10px;">  </div> <div> <p>WARNING: Risk of fire. Use a heat-proof cloth to clean nozzles. Even cotton can burn in high-temperature conditions.</p> </div> </div> <div style="display: flex; align-items: flex-start; margin-top: 10px;"> <div style="margin-right: 10px;">  </div> <div> <p>WARNING: Risk of equipment damage. Handle nozzles carefully to avoid denting the orifices, which can degrade the adhesive pattern.</p> </div> </div> <div style="margin-top: 10px;"> <p>c. Wipe the nozzles with a soft cloth and then gently blow air through the nozzle orifices from the mounting side of the nozzle.</p> </div>

Cleaning Nozzles *(contd)*

3. If there is any remaining char buildup on the nozzles, gently scrape the char from the nozzles.

CAUTION! Risk of equipment damage. Use of an open torch, drill, or broach can damage a nozzle. Use only a pin-type probe to clean nozzle orifices and do not twist the probe inside the nozzle.

4. If cleaning of the nozzle orifices is necessary, use a pin-type probe that is one size smaller than the orifice size: insert the probe in the direction opposite the adhesive flow, wipe the probe, and then remove the probe without twisting it, as shown in Figure 9.

NOTE: For available nozzle cleaning kits, which contain a holder and several probe sizes, refer to *Parts*.

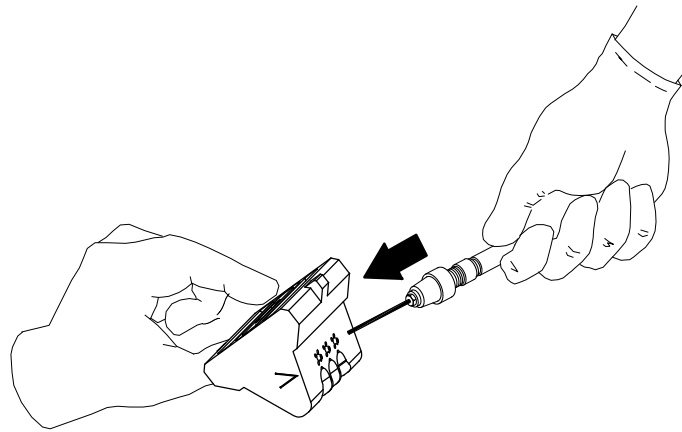


Figure 9 Correct direction to insert a pin-type probe into a nozzle

5. Reinstall the nozzles. Refer to *Install a Nozzle* earlier in this section.
6. Restore the system to normal operation.

Parts

25-mm SureWrap Nozzles

Number of Streams	Elastic Strand Spacing (mm)	Plated Nozzle Part Number	Steel Nozzle Part Number
1	Not applicable	1092330	1085563
2	3	1092337	1060603
	4	1090528	1060604
	5	1092308	1069921
3	3	1092348	1054753
	4	1090529	1069920
	5	1092309	1090368
4	3	1092400	1080828
	4	1092345	1054752
	5	1092404	1077926

NOTE: All nozzles include O-ring part 1022028.

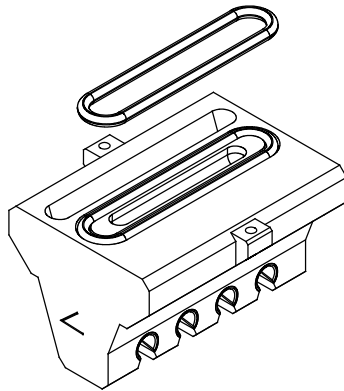


Figure 10 Plated 25-mm SureWrap nozzle and O-ring

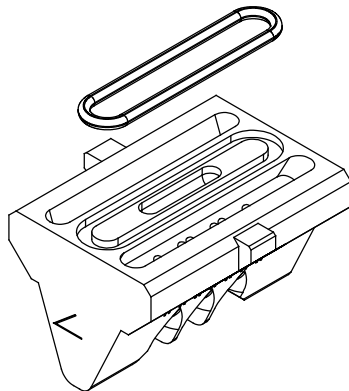


Figure 11 Steel 25-mm SureWrap nozzle and O-ring

22-mm SureWrap Nozzles

Number of Streams	Elastic Strand Spacing (mm)	Plated Nozzle Part Number	Steel Nozzle Part Number
1	Not applicable	1092336	1094438
2	3	1092402	1098940
	4	1092349	1094437
	5	1092339	1094436
3	3	1092344	1098943
	4	1092405	1060251
	5	1092341	1094435
4	3	1092403	1060435
	4	1092406	1060252
	5	1092401	1088841

NOTE: All nozzles include O-ring part 1043328.

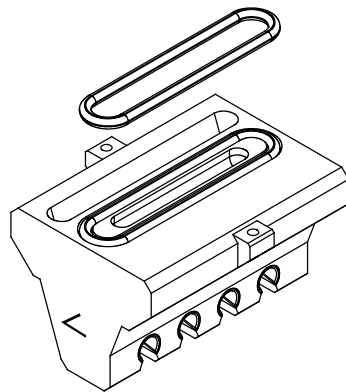


Figure 12 Plated 22-mm SureWrap nozzle and O-ring

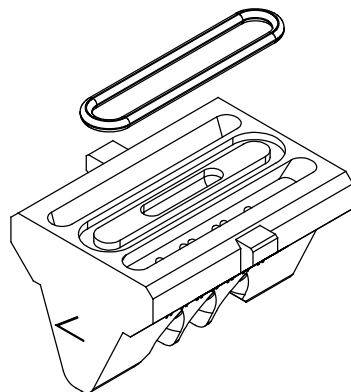


Figure 13 Steel 22-mm SureWrap nozzle and O-ring

Blank Nozzles

A blank nozzle has no air or adhesive openings. Blank nozzles, in combination with active and partial nozzles, aid in achieving a desired adhesive pattern.

Item	Part	Description	Quantity	Note
1	1062137	NOZZLE,BLANK,UNIVERSAL,25MM	AR	
2	1022028	• O-RING,75 VT, .578ID X .040	1	
3	1045216	NOZZLE,BLANK,UNIVERSAL,UM22/UM25	AR	
4	1019706	• O-RING,VITON, .146ID X .031W,BROWN	1	

AR: As Required

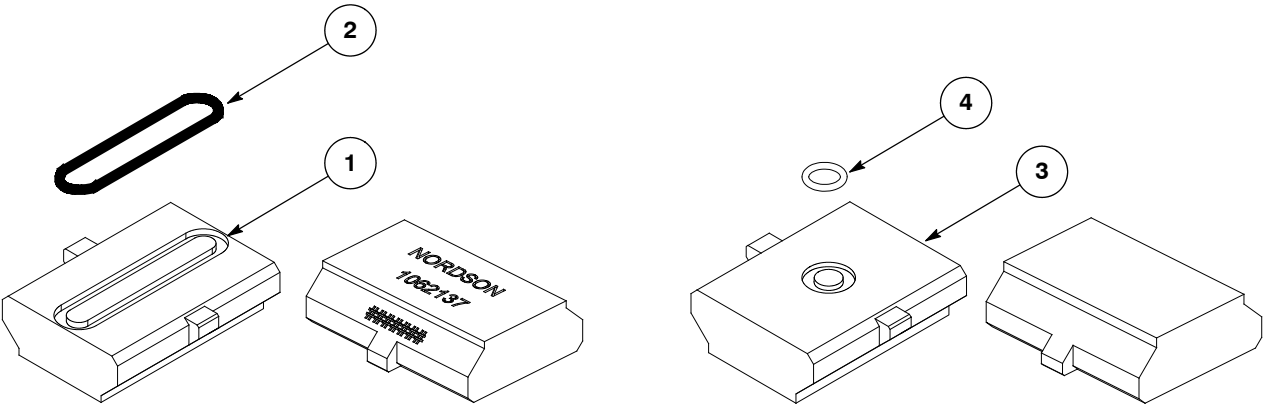


Figure 14 Blank nozzles

Nozzle Cleaning Kits

Item	Part	Description	Quantity	Note
—	901915	Kit, nozzle cleaning, small orifice	—	
1	901916	• Vise, pin	1	
2	901922	• Vial, probes, 0.007 in. (includes 25 probes)	1	
3	901923	• Vial, probes, 0.011 in. (includes 25 probes)	1	
4	901924	• Vial, probes, 0.014 in. (includes 25 probes)	1	
5	901925	• Box, tool (wooden)	1	
—	231100	Kit, nozzle cleaning, large orifice	—	
1	901916	• Vise, pin	1	
2	231101	• Vial, probes, 0.018 in. (includes 16 probes)	1	
3	231102	• Vial, probes, 0.026 in. (includes 12 probes)	1	
4	231103	• Vial, probes, 0.038 in. (includes 8 probes)	1	
5	901925	• Box, tool (wooden)	1	

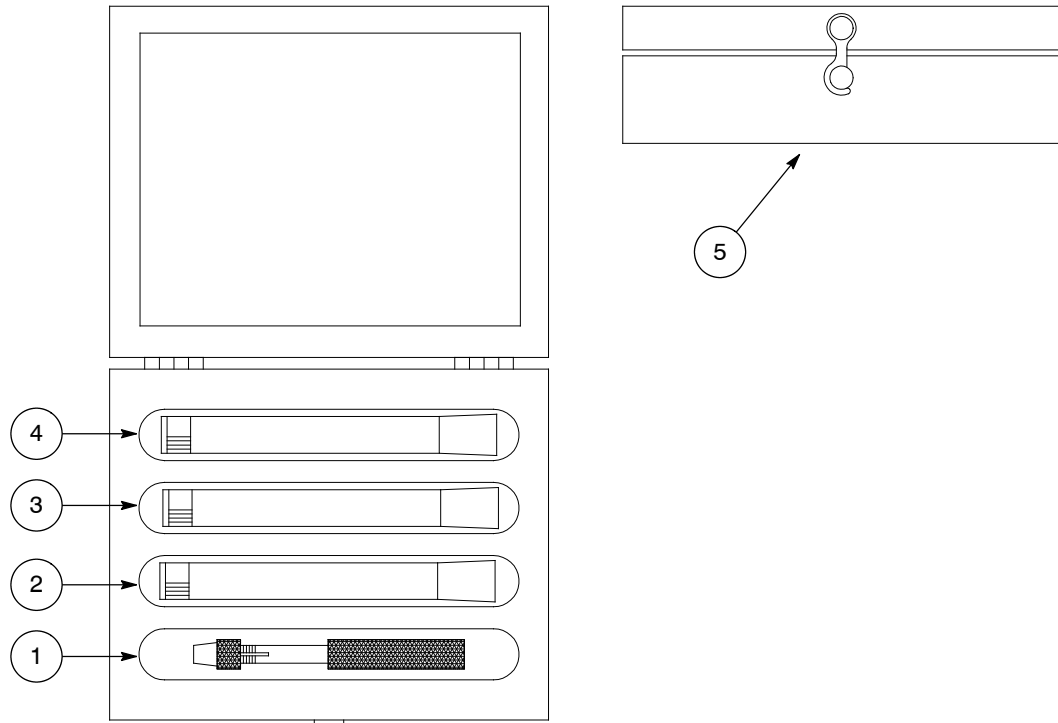


Figure 15 Nozzle cleaning kit parts

Recommended Spare Parts and Supplies

Part	Description	Note
1022028	O-ring, 75 Viton, 0.578 ID x 0.040 in (25-mm SureWrap nozzles)	
1043328	O-ring, Viton, 0.500 OD x 0.580 ID x 0.040 W in. (22-mm SureWrap nozzles)	
901915	Kit, nozzle cleaning, small orifice	
231100	Kit, nozzle cleaning, large orifice	
901905	Brush, nozzle	
900223	Lubricant, O-ring, Parker, 4 oz (for O-rings)	
900344	Lubricant, Never-Seez, 8 oz can (for screw threads)	

Technical Data

Torque Specifications

These torque specifications are also stated within the appropriate procedures.

Item	Torque Specification
Nozzle-retaining clamp screw	2.8 N•m (25 in.-lb)

