Dispensing Guide for 3M™ Scotch-Weld™ Epoxy Adhesive DP420LX Black

Technical Bulletin **September 2026**

Product Description

3M™ Scotch-Weld™ Epoxy Adhesive DP420LX Black is a toughened, two-part epoxy structural adhesive that provides good strength along with high impact and fatigue resistance to help meet demanding bonding challenges. 3M™ Scotch-Weld™ Epoxy Adhesive DP420LX can replace mechanical fasteners, screws, rivets and spot welds in many applications.

Packaging

Volume	Description
50 mL	Mixpac B system
400 mL	Mixpac C system



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Typical Uncured Physical Properties

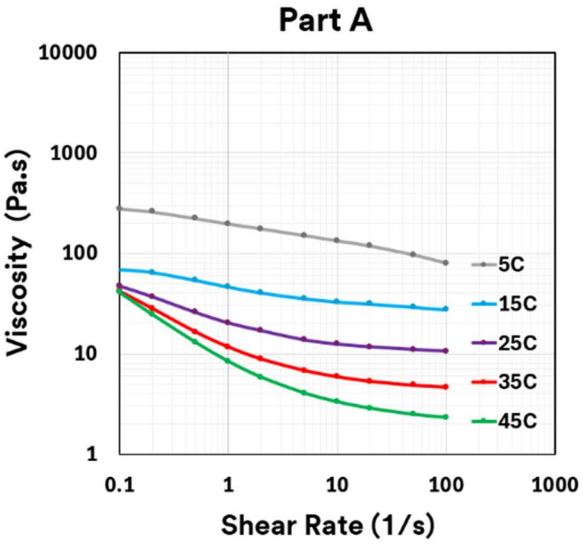
Note: The following technical information and data should be considered representative or typical only and should not be used for specification purposes.

Attribute Name	Value
Mix Ratio by Volume (B:A)	2:1
Mix Ratio by Weight (B:A)	2:0.98
Accelerator Resin	Amine
Base Resin	Epoxy
Accelerator Color	Amber[a]
Base Color	Black
Color	Black
Accelerator Density	1.10 g/cm^3 [b]
Base Density	1.13 g/cm^3 [b]

[a] Colors may vary from nearly white to yellow/amber. Adhesive performance is not affected by color variation.
[b] Measured by Helium gas pycnometer

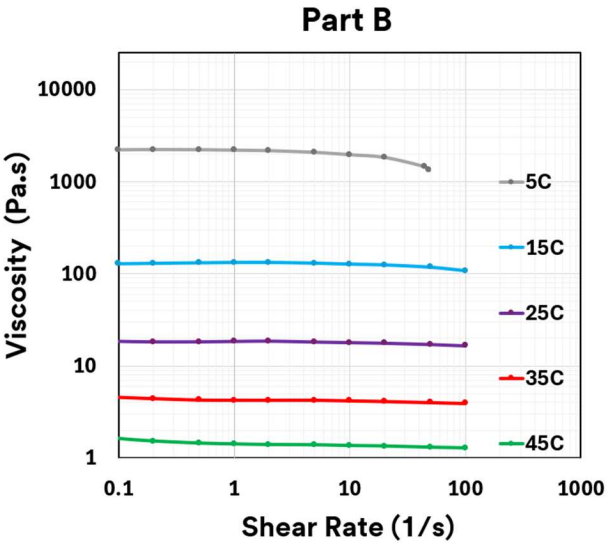
Viscosity

The data below illustrates the dependency of the viscosity of the adhesive on temperature and shear rate. 3M™ Scotch-Weld™ Epoxy Adhesive DP420LX Black is shear-thinning to allow the material to dispense more easily at higher shear rates, while maintaining bead stability at lower shear rates. Uncontrolled variations in ambient temperature can affect the material's viscosity, and therefore its dispensing behavior. This dataset provides a general framework and is intended to illustrate the viscosity trends; it should not be utilized as a substitute for site-specific validation when making process decisions.

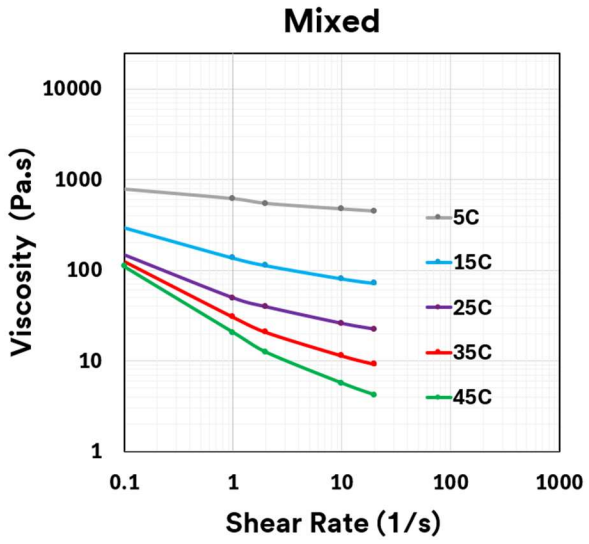


	Part A Viscosity (Pa.s)			
Temp. (°C)	0.1/s	1.0/s	10/s	100/s
5	277	196	133	80
15	69	46	33	27
25	47	20	12	11
35	42	12	6	5
45	42	8	3	2

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	Part B Viscosity (Pa.s)			
Temp. (°C)	0.1/s	1.0/s	10/s	100/s
5	2216	2198	1965	-
15	129	133	127	108
25	19	18	18	17
35	5	4	4	4
45	2	1	1	1



	Mixed Viscosity (Pa.s)			
Temp. (°C)	0.1/s	1.0/s	10/s	100/s
5	777	610	470	-
15	293	136	80	-
25	146	49	26	-
35	125	30	11	-
45	109	20	6	-

***Note**: viscosity measurements were performed using a shear-rate sweep from 0.01/s to 100/s with a 40mm 2° cone-and-plate rheometer at a 0.5 mm gap. For individual components A and B, the temperatures were tested consecutively (all temperatures were tested in one test, starting with 5° C), and a preshear was applied at 20.0/s for 15 seconds between each sweep once the system was equilibrated to the set temperature. For the mixed viscosity, the shear-rate range was reduced, and temperatures were tested separately to avoid any influence from curing. The viscosity values shown here are based on a one-time measurement and are subject to more variation. The results may differ from the technical data sheet due to normal batch-to batch variation.

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Cartridge Setup

To ensure proper mix ratio with 3M™ Scotch-Weld™ Duo-Pak Adhesives, the following steps are recommended:

1) Store cartridges nozzle end up (pistons down) – do not leave them lying on their sides. This will allow any air bubbles to migrate toward the tip of the cartridge, which can then be purged during Step 4. If the cartridge is not in the proper orientation, correct it and wait at least 30 minutes before dispensing.
2) Remove and discard the cap from the cartridge by twisting or prying it off, depending on the cartridge design.
3) Load the cartridge into the applicator. Ensure the A and B components are on the correct sides.
4) Engage the plungers and purge material; visually ensure that adhesive is flowing from both sides of the cartridge. This will remove any air bubbles that may be present in the cartridge and equalize the pistons if they were not precisely level.
5) Once material is flowing from both sides of the cartridge, attach the mix nozzle securely to the cartridge by twisting or threading it on, depending on the cartridge design.
6) Purge a small bead (approximately the volume of the mixing nozzle) through the mixer to ensure the adhesive is fully mixed and flowing uniformly.
7) Begin applying the adhesive to the part to be bonded.

There are several options for static mixing nozzles that vary in: number of mixing elements, inner diameter, length and volume. See static mixing nozzle options below:

50 mL		400 mL		
Helical Mix Elements: 16 Length (mm): 74 Volume (mL): 0.49 Inner Diameter (mm): 3.2	**Quadro** Mix Elements: 16 Length (mm): 85 Volume (mL): 1.88 Inner Diameter (mm): 5.3	**Helical** Mix Elements: 24 Length (mm): 185 Volume (mL): 4.20 Inner Diameter (mm): 6.0	**Quad** Mix Elements: 20 Length (mm): 126.9 Volume (mL): 5.40 Inner Diameter (mm): 8.76	**Helical** Mix Elements: 24 Length (mm): 277 Volume (mL): 14.6 Inner Diameter (mm): 10.0
				
	SKU: 7100148765	SKU: 7000046633	SKU: 7000028616	SKU: 7000043674

Purge Recommendations

3M™ Scotch-Weld™ Epoxy Adhesive DP420LX Black is a two-part system. Once the static mixer is attached and dispensing has begun, it is necessary to prevent mixed material from curing inside the static mixer when dispensing. There are multiple options for handling this mixed material, and the choice depends on factors such as: adhesive type, cost-effectiveness and length of downtime. This section serves as a general guideline for these options. Every application is different and requires a tailor-made recommendation for the process.

Option 1) Purge a small amount of mixed material between dispense cycles

Periodically purging mixed material within its working time ensures fresh material is always in the mixer. This is best for periods of short downtime, such as between shifts or during breaks. Most automated dispensing equipment can be set to automatically purge a specific volume at specified intervals. As a general guideline, approximately 1.5x the volume of the static mixer should be purged within the adhesive's working time, but this can depend on the specific material and application. 3M™ Scotch-Weld™ Epoxy Adhesive DP420LX Black has a working time of 20 minutes at 23° C. Temperature control of the mixed material to < 23° C can be implemented to reduce the purge frequency.

Option 2) Purge using only one component for moderate downtime

In some adhesive systems, it is possible to purge just one component to wash out the mixed material and prevent curing in the static mixer. This is best for mid-range downtime where it is desirable to save on the cost of static mixers but would lead to too much material waste if following the 2K purge. If the flush is incomplete, there is a risk of residual mixed material curing in the static mixer. It is recommended to validate this option for the specific application.

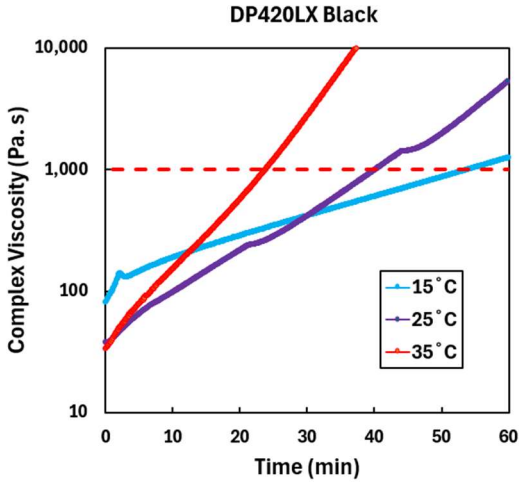
Option 3) Remove the static mixing nozzle and any downstream wetted components

During periods of extended downtime, such as weekend shutdown or long-term storage, it makes sense to replace the static mixer. Using this option, it is recommended to allow material remaining in the static mixer to cure, and leave the static mixer attached with the cured material during downtime. This minimizes potential contact with air or moisture and prevents cross-contamination that could occur when attempting to put the original cap on. Before restarting operations, remove and discard the cured static mixer, and install a fresh static mixer. This option can be used for any downtime if replacement of the static mixer is more cost-effective.

Cure Kinetics

The temperature of the adhesive plays a major role in purging considerations and other operations. Note that the lower the temperature of the adhesive, the slower it cures. However, the base complex viscosity is considerably higher. These temperature-dependent viscosity and cure kinetics changes must be considered to ensure the material is purged before reaching a viscosity level that can no longer be effectively purged. This data provides a general guideline for understanding how temperature influences viscosity growth and the available purging window but purging recommendations must be evaluated for each specific application. Actual purge timing will depend on factors such as processing temperature, equipment configuration and mixing nozzle design. The selected dispense temperatures represent typical operating conditions and potential plant variations. The low-temperature condition was included to simulate chilling the static mixer as a method to slow cure and extend working time. Room temperature was chosen as the standard baseline condition, while the elevated-temperature condition represents slightly warm or less controlled plant environments.

In general, for 2K adhesives the working time will fall between the point where the complex viscosity doubles and the point where it reaches approximately 1000 Pa.s. The latter has been denoted by the dotted red line to signify the adhesive will not flow well under standard operating conditions above this viscosity.



	Mixed Viscosity (Pa.s)			
Temp. (°C)	Time to Double Complex Viscosity (min.)	Time to 1,000 Pa.s Complex Viscosity (min.)	Time to 0.1 MPa Storage Modulus (min.)	Time to 1.0 MPa Storage Modulus (min.)
15	7	54	148	195
25	6.6	40	81	107
35	4.0	24	44	60

***Note:** Cure tests were performed on a DHR-3 rheometer at a 0.5mm gap and the set temperature.

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Lab-Scale Dispensing

3M™ Scotch-Weld™ Epoxy Adhesive DP420LX Black can be hand-dispensed using the applicator below. It is not recommended for high-volume dispensing but is useful for lab-scale trials. The following table can be used as a guide for which Nordson SmoothFlow Tapered Tips can be used for the adhesive when using this method. Reproducible results can be expected for similar tips.



Gauge	Color	Inner Diameter	Capability to hand-dispense
14G		1.60 mm (0.063 in)	Can be hand-dispensed
16G		1.19 mm (0.047 in)	
18G		0.84 mm (0.033 in)	
20G		0.58 mm (0.023 in)	
22G		0.41 mm (0.016 in)	Feasible with effort
23G		0.33 mm (0.013 in)	Not recommended
25G		0.25 mm (0.010 in)	

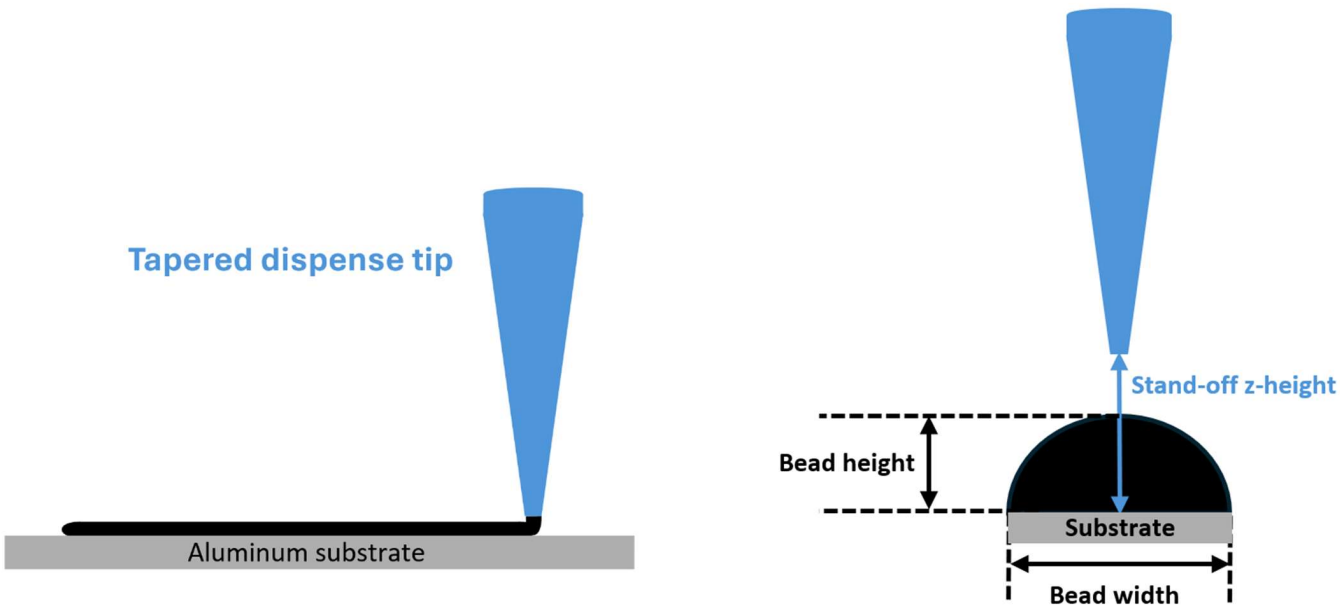
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Automated Dispensing

For high-volume production, it is recommended to use automated dispensing equipment. The table below provides representative starting parameters used to target specific bead widths during automated dispensing. Dispense parameters were generated on a PVA Delta 8 robotic cell with a PVA VPX-450 progressive cavity pump and plastic tapered tips. Adhesive beads were extruded onto aluminum at room temperature. These parameters should be considered directional and recommended for initial evaluation, as parameters can vary.

Progressive Cavity Pump (Volumetric Metering)	Target Bead Width (mm)															
	1.00				1.20				1.40				1.60			
Bead Height	0.16	0.10	0.11	0.10	0.20	0.16	0.15	0.15	0.12	0.21	0.24	0.21	0.25	0.25	0.30	0.25
Tip Speed (mm/s)	25	75	100	150	50	50	100	100	150	75	100	100	50	75	100	150
Flow Rate	0.25	0.5	0.75	1.0	0.5	0.5	1	1	1.5	1	1.5	1.5	0.75	2.0	2.0	3.0
Tip Inner Diameter (mm)	0.41	0.41	0.41	0.41	0.58	0.41	0.41	0.41	0.41	0.41	0.58	0.41	0.58	0.41	0.84	0.41
Stand-off z-Height (mm)	0.4				0.4				0.4				0.4	0.4	0.6	0.4

The diagrams below illustrate the dispensing setup and defines the bead geometry dimensions described in the table above. These schematics are provided for reference only to clarify parameter definitions and relative positioning of the dispense tip and bead; they are not drawn to scale. Your results may vary.



Troubleshooting Dispense Parameters

- Incomplete curing – almost invariably caused by highly off-ratio dispensing
  - Check that the steps in the “Cartridge Startup” section were followed
  - Confirm the recommended cure time and temperature for the material
  - FITR can be used to scan for the presence of excess amine or excess epoxy
- Adhesive is difficult to dispense
  - Remove and replace mix nozzle. Do not try to force gelled material through the mix nozzle, or the cartridge and/or applicator can become damaged
  - Increase purge volume or frequency
- If the dispense speed for a desired bead width is too fast for the application: reduce adhesive flow rate by:
  - Reducing air pressure
  - Reducing target flow rate of equipment (e.g. when using volumetric metering)
  - Utilize a tip with a smaller inner diameter

Cleaning and Preventative Maintenance

Excess uncured adhesive can be cleaned with a paper towel and solvent, either methyl ethyl ketone (MEK) or isopropyl alcohol (IPA). Follow equipment manufacturing procedures for cleaning of the equipment. No abrasive fillers are used in this material. Consult with equipment vendor for preventative maintenance schedule.

Note: Carefully read and follow the manufacturer’s precautions and directions for use when working with solvents.

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