



Getting Started with Lapol® 108 Bioplasticizer

We appreciate your taking time to evaluate Lapol® 108 bioplasticizer. Lapol® 108 resin is a patented bioplasticizer for PLA and other polymers. Lapol® 108 is designed to act as an internal plasticizer to promote toughness and increased elongation in polylactic acid (PLA) and other polymers. The documentation in the following pages is designed to help users get started using Lapol® and to understand its attributes and processing methods. The package includes:

1. Lapol® 108 processing guideline and data sheet
2. Lapol® 108 Material Safety Data Sheet
3. Nordson® bench top, 5 and 55-gallon drum melter brochures

Lapol® Attributes:

- Biodegradability/Compostability -OWS tested for ASTM D6400 compliance
- Renewability/Sustainability -plant derived raw materials sources
- Compatibility and miscibility -Lactic acid derived, no need for additional compatibilizers (Lapol® 108 is miscible with PLA, hence no die swell out of the compounder)
- Flexibility without sacrificing modulus at low concentrations of 5%-10%
- Good clarity - relatively low haze in PLA
- Processability – maintains melt viscosity with high mineral content compounding

Lapol® 108 Processing Method:

Lapol® 108 is supplied in 5 or 55-gallon open lid drums as a solid viscous resin. Lapol® 108 resin can be added to PLA in line as a molten resin by heating it to 130 °C (266 °F) and then metering it into a compounding extruder. This can be accomplished using a drum melter/pump, such as a [Nordson VersaDrum™ bulk melter](#) unit. After flow calibration, the drum melter's heated hose (130 °C or 266 °F) is fed directly into the compounding extruder in a zone after the feed throat or into a side feeder downstream from the PLA feed section. The PLA should be melted prior to adding Lapol® 108. Lapol® 108 should be added usually in zone two through a vent, depending on the size of the extruder, or through a side feeder/stuffer as shown below.



The Nordson drum melter and pump shown to the left melts the Lapol resin in the 55-gallon drum and accurately meters it through a heated hose to the extruder.

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Prior to compounding, the flow of Lapol® 108 resin from the Nordson drum melter is calibrated to ensure accurate concentration.



The Lapol® 108 resin is metered through the heated black Nordson drum melter hose directly into the extruder vent port (down from the initial resin feed throat) or through a side feeder/stuffer as shown here.

The Lapol® 108 resin is compounded with PLA at a 5%-10% loading and is extruded out the strand die. Note that there is no die swell when compounding PLA and Lapol® 108. The Lapol® 108 resin is fully compatible and miscible with PLA.

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Effective Date: 1/9/14

Material Safety Data Sheet

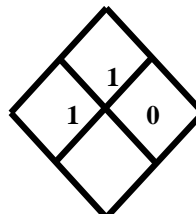
MSDS No: 8129

1. PRODUCT IDENTIFICATION

Trade Name: Lapol® HDT

Product Code: HDT

Chemical Family: Polyester Resin



NFPA RATING

Health:	1
Flammability:	1
Reactivity:	0
Personal Protection:	

HMIS RATING

2. COMPOSITION / INFORMATION ON INGREDIENTS

O S H A	CAS No.	CHEMICAL IDENTITY	EXPOSURE LIMITS				CARCINOGEN STATUS			
			ACGIH		OSHA		MFR.	IARC	NTP	OSHA
			TWA	STEL	PEL	STEL				
	Proprietary Concentration	Polyester Resin 100.00% by wt	NE	NE	NE	NE	NE	NR	NR	NR

NE = Not Established NR = Not Reviewed

Reference Notes: Refer to Section 8, Subheading "Exposure Guidelines", for additional information concerning exposure limits.

3. HAZARDS IDENTIFICATION

Emergency Overview: Appearance: White to Light Yellow Solid, Odorless to sweet

Route(s) of Entry: Skin contact, Eye contact, Ingestion

Acute Exposure: INHALATION: Vapors and/ or aerosols may be formed at elevated temperatures. Inhalation of these may cause irritation to the respiratory tract (nose, throat, and lungs).

SKIN: Repeated or prolonged contact may dry and irritate the skin.

EYES: Direct contact with this material may cause eye irritation including tearing and redness.

INGESTION: Ingestion (swallowing) may irritate the mouth, throat, and stomach. Ingestion is not an anticipated route of exposure for this material in industrial use.

Carcinogenicity: This material does not contain 0.1% or more of any chemical listed by the International Agency for Research on Cancer (IARC), the National Toxicology Program (NTP), or regulated by the Occupational Safety and Health Administration (OSHA) as a carcinogen.

4. FIRST AID MEASURES

Eye Contact: Immediately flush eyes with large quantities of clean water for at least 15 minutes. Get immediate medical attention.

Skin Contact: Wash skin with soap and water. Remove contaminated clothing. Get medical attention if irritation develops or persists. Wash contaminated clothing before reuse.

Ingestion: Give the victim one or two glasses of water or milk to drink. Never give anything by mouth to an unconscious person. IMMEDIATELY SEEK MEDICAL ATTENTION.

Inhalation: Remove affected individual(s) to fresh air. Seek medical attention if breathing difficulty develops.

5. FIRE FIGHTING MEASURES

Flash Point:	Not applicable
Flash Point Method Used:	Not applicable
Flammable Limits in Air (Lower):	Not applicable
Flammable Limits in Air (Upper):	Not applicable
Autoignition:	Not available

General Hazards: None Known.

Fire Fighting Extinguishing Media: Use carbon dioxide, foam, dry chemical or water fog to extinguish fire.

Fire Fighting Equipment: Wear self-contained breathing apparatus (SCBA) and full fire-fighting protective clothing. Thoroughly decontaminate all protective equipment after use.

Fire Fighting Instructions: Evacuate all persons from the fire area to a safe location. Move non-burning material, as feasible, to a safe location as soon as possible. Fire fighters should be protected from potential explosion hazard while extinguishing the blaze. Use water spray to cool fire-exposed containers.

Fire and Explosion Hazards: No special fire and explosion hazards are associated with this material.

Hazardous Combustion Products: Combustion may produce carbon monoxide, carbon dioxide and irritating or toxic vapors and gases.

6. ACCIDENTAL RELEASE MEASURES

Accidental Release Measures: Collect material and place in a closed container.

7. HANDLING AND STORAGE

Signal Word: C A U T I O N

Handling Information: Avoid inhalation and contact with eyes, skin, and clothing. Wash hands thoroughly after handling and before eating or drinking. Use with adequate ventilation.

Storage Information: Keep container closed when not in use. Store in original containers. Store in a dry area.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure Guidelines: There are no Occupational Safety and Health (OSHA) Permissible Exposure Limits (PEL) or American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLV) or Short Term Exposure Limits (STEL) established for the component(s) of this product.

Engineering Controls: Good general ventilation should be sufficient to control airborne levels of irritating vapors.

Eye Protection: Wear safety glasses with side shields or goggles. Facilities storing or utilizing this material should be equipped with an eyewash station and safety shower.

Skin Protection: As required to prevent prolonged or repeated skin contact.

Respiratory Protection: If material generates fumes when heated, a NIOSH/MSHA approved air-purifying respirator with organic vapor cartridge or canister may be used to minimize exposure.

9. PHYSICAL AND CHEMICAL PROPERTIES

Color:	White to Light Yellow
Odor:	Odorless
Odor Threshold:	Not available
Physical State:	solid
Solubility in Water:	Insoluble
Vapor Pressure:	Not applicable
Specific Gravity:	1.25 g/cc (Water = 1) at 25° C (77° F)
Boiling Point:	Not applicable
Melting Point:	170°-190° C
Decomposition Temp:	250° C
Vapor Density:	Not applicable
pH:	Not applicable

10. STABILITY AND REACTIVITY

Stability: This material is stable during storage and during its intended use.

Incompatibility: No incompatibilities have been identified.

Hazardous Decomposition Products: Thermal decomposition may form at excessive temperatures: carbon monoxide, carbon dioxide, and various hydrocarbons.

Hazardous Polymerization: Hazardous polymerization will not occur.

Conditions to Avoid: None known.

11. TOXICOLOGICAL INFORMATION

Acute Eye Toxicity: No information is available.

Acute Skin Toxicity: No information is available.

Acute Inhalation Toxicity: No information is available.

Acute Oral Toxicity: No information is available.

Chronic/Carcinogenicity: This material does not contain 0.1% or more of any chemical listed by the International Agency for Research on Cancer (IARC), the National Toxicology Program (NTP), or regulated by the United States Occupational Safety and Health Administration (OSHA) as a carcinogen.

Additional Information: No toxicological data is available for this product. Based on properties and similar polymers, the polyester resin is not hazardous.

12. ECOLOGICAL INFORMATION

Ecotoxicity: No information is available.

Environmental Fate: No information is available.

13. DISPOSAL CONSIDERATIONS

Waste Disposal Method: Not a RCRA hazardous waste. Disposal of this material is not regulated under RCRA. Consult federal, state and local regulations to ensure that this material and its containers, if discarded, is disposed of in compliance with all regulatory requirements.

RCRA Hazard Class: NOT A RCRA HAZARDOUS WASTE: When discarded in its purchased form, this material would not be regulated as a RCRA Hazardous waste under 40 CFR 261.

14. TRANSPORT INFORMATION

DOT / IATA / IMDG / TDG: Bulk and Non-Bulk

Proper Shipping Name:

NOT REGULATED

15. REGULATORY INFORMATION

Occupational Safety and Health Act (OSHA): This material is not classified as hazardous under the criteria of the US Occupational Safety and Health Administration (OSHA) Hazard Communication Standard, 29 CFR 1910.1200.

SARA Title III: Section 302 - Extremely Hazardous Substances (EHS): This product does not contain any chemicals regulated under Section 302 (40 CFR 355) as extremely hazardous substances.

SARA Title III: Section 304 - CERCLA: Reportable Quantities have not been established for any of this material's components.

SARA Title III: Section 311/312 - Hazard Communication Standard (HCS): This product is not regulated under Section 311-312 (40 CFR 370).

SARA Title III: Section 313 Toxic Chemical List (TCL): This product does not contain any chemicals for routine annual toxic chemical release reporting under Section 313 (40 CFR 372).

TSCA Section 8(b) - Inventory Status: All components of this material are listed on or are exempt from the US Toxic Substances Control Act (TSCA) inventory.

TSCA Section 12(b) - Export Notification: This material does not contain any components that are subject to the US Toxic Substances Control Act (TSCA) Section 12(b) Export Notification requirements.

Canadian Inventory Status: This material contains components that are NOT listed on the Canadian Domestic Substances List (DSL) or the Canadian Non-Domestic Substances List (NDSL).

Canadian WHMIS: This material is not classified as a controlled product under the Canadian Workplace Hazardous Material Information System.

Additional Canadian Regulatory Information: This product does not contain a substance present on the WHMIS Ingredient Disclosure List (IDL) which is at or above the specified concentration limit.

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all the information required by the Controlled Products Regulations.

16. OTHER INFORMATION

MSDS No:	8129
Reason Issued:	New
Prepared By:	Product Safety & Compliance Department
Supersedes Date:	NA

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VersaPail™ Bulk Melters

20-liter or 5-gallon pail melters

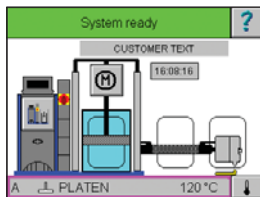
Nordson® VersaPail bulk melters are designed for precise demanding hot melt adhesive application from 20-liter or 5-gallon pails. With a variety of pump types and sizes, VersaPail melters are customizable to accommodate a wide variety of adhesives and meet specific manufacturing requirements. A powerful industrial PC provides full control of the adhesive system via a touch-screen interface and displays messages and indicators for each operator activity and every machine status condition.

VersaPail bulk melters only melt the top surface of adhesive allowing the remaining material in the pail to stay solid to reduce thermal stress and protect bonding characteristics. Particularly well-suited for reactive adhesives, such as moisture-cure polyurethanes, the hydraulic passages are designed to eliminate dead spaces where undesired curing could result.

For applications that require continuous operation, Nordson's automatic changeover system links two bulk melters together to eliminate the downtime associated with pail changes.

VersaPail melters:

- Simplify installation and set-up
- Provide easy day-to-day operation
- Offer production flexibility
- Protect adhesive integrity



Graphical, touch-screen control system provides visibility and monitoring of all operations and status conditions

Single-side access for controls and pail changes

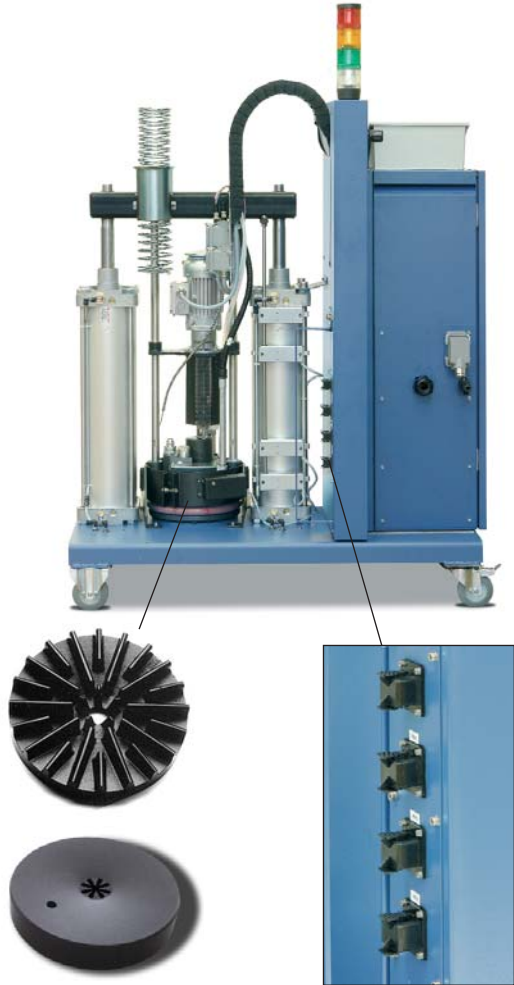


Automatic or manual aeration systems

Variable speed motors and precision gear pumps with optional dual-stream and hardened versions

Pressure control valve for accurate, adjustable pressure, and optional automatic pressure control systems

Pail centering and clamping for accurate pail positioning and control



Modular, non-stick axial and smooth melt platens for quick change and easy clean-up

Four additional temperature channels for control of spray guns, heaters, etc.

Specifications

Type of System	Gear pumps with variable speed AC motors
Pail Diameter	280 or 286 mm (11 or 11.3 in)
Maximum Pump Rate¹	92 kg/hr (203 lb/hr)
Number of Hoses/Guns	2 standard (hydraulic & electrical) up to 4 additional (electrical only)
Maximum Working Hydraulic Pressure	100 bar (1500 psi)
Operating Temperature Range	40 to 230°C (100 to 450°F)
Ambient Temperature Range	-5 to 40°C (23 to 100°F)
Temperature Control Stability	±1°C (2°F)
Temperature Sensor	Ni 120 (or PT-100 optional)
Electrical Service²	200 VAC 3 phase delta 50/60 Hz 240 VAC 3 phase delta 50/60 Hz 400 VAC 3 phase Y 50/60 Hz 400 VAC 3 phase delta 50/60 Hz 480 VAC 3 phase delta 50/60 Hz
Maximum System Power Capacity	21000 watts
Weight (empty)³	332 kg (732 lb)
Input/Output Capability Standard	6 Inputs 6 Outputs
Melter Dimensions (W x H x D)	1190 x 1920 x 540 mm (46.9 x 75.6 x 21.3 in)
Installation (service) Dimensions	1570 x 1920 x 903 mm (61.8 x 75.6 x 35.6 in)
Protection	IP54

¹ Actual rates will vary depending on adhesive type, application parameters and input voltage.
² Permitted deviation from rated line voltage is ±10%.
³ Weight depends on melter configuration.



For more information, talk with your Nordson representative.



When you expect more.®

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VersaDrum™ Bulk Melters

200-liter or 55-gallon drum melters

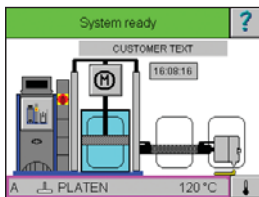
Nordson® VersaDrum bulk melters are designed for precise demanding hot melt adhesive application from 200-liter or 55-gallon drums. With a variety of pump types and sizes, VersaDrum melters are customizable to accommodate a wide variety of adhesives and meet specific manufacturing requirements. A powerful industrial PC provides full control of the adhesive system via a touch-screen interface and displays messages, warnings, and indicators for every operator activity and machine status condition.

VersaDrum bulk melters only melt the top surface of adhesive allowing the remaining material in the drum to stay solid to reduce thermal stress and protect bonding characteristics. Particularly well-suited for reactive adhesives, such as moisture-cure polyurethanes, the hydraulic passages are designed to eliminate dead spaces where undesired curing could result.

For applications that require continuous operation, Nordson's automatic changeover system links two bulk melters together to eliminate the downtime associated with drum changes.

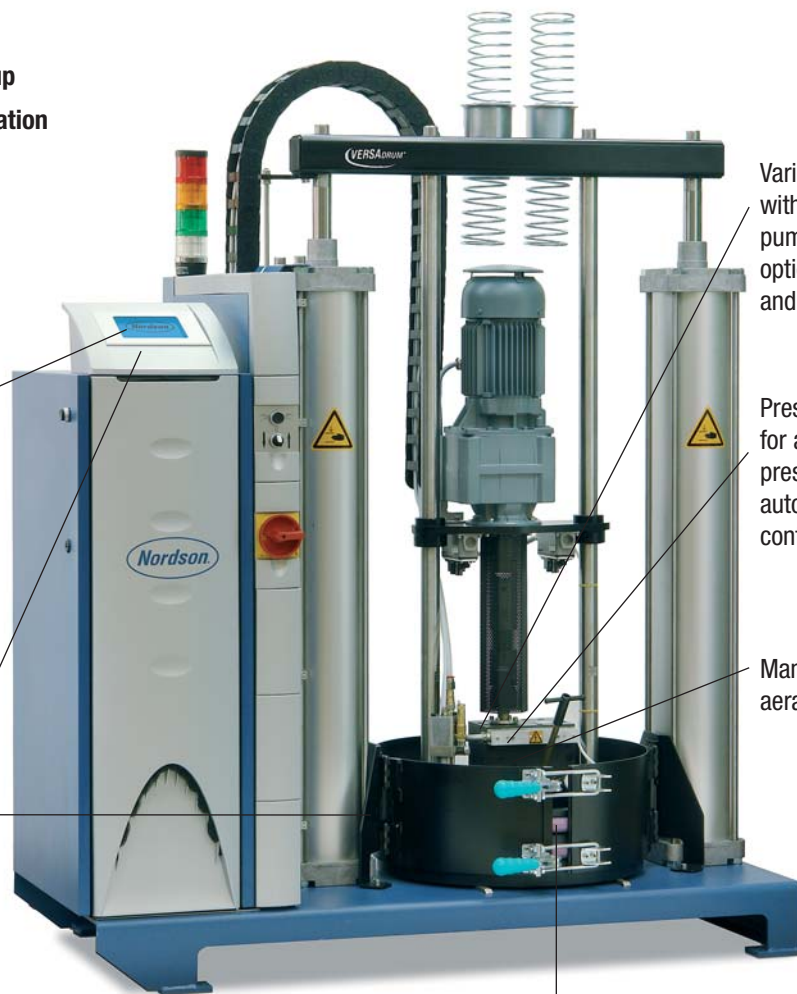
VersaDrum melters:

- Simplify installation and set-up
- Provide easy day-to-day operation
- Offer production flexibility
- Protect adhesive integrity



Graphical, touch-screen control system provides visibility and monitoring of all operations and status conditions

Single-side access for controls and drum changes



Variable speed motors with precision gear pumps including optional dual-stream and hardened versions

Pressure control valve for accurate, adjustable pressure and optional automatic pressure control systems

Manual or automatic aeration systems

Adjustable drum clamp for accurate positioning of metal or fiber drums



Modular, non-stick axial, finned and smooth melt platens for quick change and easy clean-up



Six additional temperature channels for control of spray guns, heaters, etc.

Specifications

Type of System	Gear pumps with variable speed AC motors
Drum Diameter	571 mm (22.5 in) or 567 mm (22.3 in)
Maximum Pump Rate¹	270 kg/hr (595 lb/hr)
Number of Hoses/Guns	2 standard (hydraulic & electrical) up to 6 additional (electrical only)
Maximum Working Hydraulic Pressure	100 bar (1500 psi)
Operating Temperature Range	40 to 230°C (100 to 450°F)
Ambient Temperature Range	-5 to 40°C (23 to 100°F)
Temperature Control Stability	±1°C (2°F)
Temperature Sensor	Ni 120 (or PT-100 optional)
Electrical Service²	200 VAC 3 phase delta 50/60 Hz 240 VAC 3 phase delta 50/60 Hz 400 VAC 3 phase Y 50/60 Hz 400 VAC 3 phase delta 50/60 Hz 480 VAC 3 phase delta 50/60 Hz 575 VAC 3 phase delta 50/60 Hz
Maximum System Power Capacity	39000 watts
Weight (empty)³	672 kg (1,482 lb)
Input/Output Capability Standard	6 Inputs 6 Outputs
Melter Dimensions (W x H x D)	1520 x 3010 x 740 mm (59.9 x 118.5 x 29.2 in)
Installation (service) Dimensions	2100 x 3010 x 1103 mm (82.7 x 118.5 x 43.5 in)
Protection	IP54

¹ Actual rates will vary depending on adhesive type, application parameters and input voltage.
² Permitted deviation from rated line voltage is ±10%.
³ Weight depends on melter configuration.



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