

**This Guide
Covers the
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Cleaning

Curing

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Environment

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First Aid



USPRAY
100% Solids Sprayable
Coating System

Application Guide 2013

Rev.5.0

NORMACTM

NORMAC ADHESIVE PRODUCTS INC.



USPRAY. 
100% Solids Sprayable
Coating System



NORMAC U-SPRAY

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Application Guide

Revision History			
Rev.#	Date(YMMDD)	Reason/Changes	By
Rev.0	070530	Initial release.	Joe Ceretti
Rev.1	080307	Fix date typo on Rev.0 Revision history.	Joe Ceretti
"	"	Update Section 7 with new procedure.	Joe Ceretti
Rev.2	080326	Section 4 line 7 - "U-Spray" changed to "primer."	Joe Ceretti
"	"	Section 4 line 9 - "NR-MC" changed to "MEK."	Joe Ceretti
"	"	Section 8 line 3 - "(0.12)" changed to "(0.012)."	Joe Ceretti
"	"	Section 10 line 4 - "900R" changed to "NR-9500."	Joe Ceretti
Rev.2.1	081020	Added "Tip Alignment Diagram."	Joe Ceretti
Rev.2.2	110301	Updated "Tip Alignment Diagram."	Joe Ceretti
Rev.3.0	110302	Reviewed and clarified all sections.	Joe Ceretti
Rev 4.0	130523	Added coverage chart and NR-9600.	Joe Ceretti
Rev 5.0	130530	Pictures of new dispenser. New dispenser description. Updated air bleeding pictures. Changed title to add "2013."	Joe Ceretti



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1. Requirements

The following components are required for the **Normac U-Spray Cartridge Application System.** (fig.1, 2, 3)

Cartridge Dispenser
Orifice Restrictor
Normac Primer
Clean/Dry Compressed Air

Double Cartridge
Mixing/Spray Nozzle
Microwave/Oven



U-Spray gun fig. 1



It is very important that correct "Surface Preparation Procedures" are followed. In order to achieve the best possible coating quality and appearance step by step instructions must be observed. Safety and health regulations must be considered.



U-Spray cartridge fig. 2

Cartridge Size and Theoretical Coverage*

Cartridge Size	Contains	Coverage
600ml x 300ml	2.1lbs	8.7ft ² @ 0.040" Thickness
	0.95kg	0.95m ² @ 1mm Thickness
600ml x 600ml	2.8lbs	11.6ft ² @ 0.040" Thickness
	1.26kg	1.26m ² @ 1mm Thickness
750ml x 750ml	3.5lbs	14.5ft ² @ 0.040" Thickness
	1.59kg	1.58m ² @ 1mm Thickness

*Applicator must make allowance for waste and overspray

2. Surface Preparation

Apply Normac U-Spray only on properly prepared, clean, degreased, dry surfaces. Sharp edges or corners must be rounded to a minimum radius of 3mm (1/8").

Metal - Best adhesion is accomplished by grit blasting to a minimum near-white metal finish with a minimum 50 micron



Normac primer fig. 3



(0.002") anchor (cut depth) pattern. See Normac Surface Preparation Guide. Acceptable Specifications for blasting are:

SSPC-SP5
Nace No. 1
SSPC-SP10
Nace No. 2

Swedish SA2.5
British BS4232 2nd Quality

The blasting media must be irregular or sharp-edged such as slag or steel grit. These types of blasting media should give you as much as 75 to 100 microns (0.003" to 0.004") anchor pattern.

Machine tool cleaning such as grinding or sanding can be used as an acceptable surface preparation method on non- critical applications.

Surfaces that were exposed to moisture or are contaminated with oil, salt or other chemical substances should be treated as follows to attain maximum adhesion:

Grit blasting	(preliminary purification)
Steam cleaning	(chloride neutralization)
Flame treatment	(capillary drying process)
Grit blasting	(roughening)
Vacuum cleaning	(dust removal)
Degreasing	(final purification)

Cast steel, Cast Stainless Steel, Cast Iron or Grey Cast Iron - these cast products are porous which typically absorb oils and other contaminants. It is necessary to heat these metals to bring oils and other contaminants to the surface where they are removed by solvent washing. Once this has been done they are grit blasted as per above. If oils and contaminants are still present there will be a darkening of the metal in those areas. Repeat the heating procedure followed by blasting until the prepared surface is uniform in colour.

Rubber/Polyurethane - these materials must be roughened using a slow speed, less than 2000 RPM sander using a 16, 24, 36 or 50 grit aluminum oxide sanding disc. Faster sanding speeds will overheat the rubber/polyurethane which will result in little, if any, adhesion.

Other acceptable methods are using a stiff-bristled wire brush attached to a drill or steel grit sanding discs or drill attachments such as those used by the rubber tire industry for repairing tires.

Existing Concrete - remove paint etc. Absorb residues, oil or grease with an oil binder. Steam clean using water and detergent. Roughen mechanically. Flush thoroughly with clear water to remove detergent residue. The prepped concrete



surface must be allowed to dry to a maximum of 3% residual moisture.

New Concrete - must be allowed a minimum of 28 days to cure. Moisture measurements should be performed to ascertain a maximum moisture level of 3% residual moisture. Remove loose particles and concrete mud. Roughen the surface mechanically and dedust. All laitance must be removed. The minimum coating thickness of U-Spray on concrete should be 1.5mm.

3. Cleaning / Degreasing

Degrease and clean all surfaces with Normac NR-MC or NR-TR Solvent Degreasers where necessary. Other acceptable degreasing solvents must be non-oil based products such as Dichloromethylene, Trichloroethylene, Methyl Ethyl Ketone, or Acetone. Let the substrate dry completely.

The best form of cleaning is by vacuum including sweeping or brushing of the prepared surface. Do not use air as this method only redistributes dust and dirt.

4. Priming

Rigid Surfaces - treat metal, stainless steel, aluminum, GRP, polyester, epoxy, concrete or wood with Normac NR-9500 or in combination with NR-9600. See Normac NR-9500/NR-9600 Data Sheets and use according to the manufacturer's directions. Apply the primer(s) onto the cleaned, prepared surface at a thickness of 25 to 50 microns (0.0005" to 0.002") as per the applicable data sheets. Brush out all runs, drips or sags.



Allow primed surfaces to dry for 1 hour minimum at 21C (70F) to a maximum of 8 hours prior to application of the U-Spray products.

Flexible Surfaces - Flexible surfaces require special considerations before coating with U-Spray. Please contact Normac's technical support department for assistance with primer selection.

Polar Plastics - PE, PP and POM and related plastics need a thermal shock treatment before priming. Please contact Normac's technical support department for assistance with primer selection.

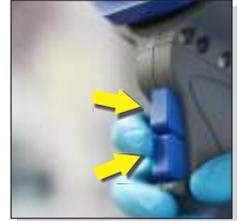
5. Cartridge Dispenser



Safety: The Normac U-Spray Coating System is under high pressure. Wear the appropriate eye, hand and skin protection. See Material Safety data Sheets.



First check all functions of the cartridge dispenser **without** cartridges. Connect compressed air using a quick connect coupler. The recommended minimum air pressure is (40psi), 3 bar and maximum is (90 psi), 6 Bar. The compressed air must be free of oil and water!



Trigger

fig. 4

Lower Trigger - Starts the material delivery. The gun pistons move forward in parallel motion to empty the cartridges (fig. 4).

Upper Trigger - The gun pistons move backward in parallel motion to retract from the cartridges. (fig.4)

Dispensing Piston Regulator - The regulator dial on the back end of the dispensers (fig. 6) adjusts the speed at which the cartridges are emptied. Turning clockwise increases the speed and turning counter-clockwise will decrease the speed. The dispensing regulator dial should always be kept in the fully open, clockwise, position. The speed/volume of material delivery is controlled through the use of the “Pressure Regulator” affixed to the handle of the dispensing gun (fig.7a) (See next section).



Regulator mount

fig. 5

Pressure Regulator - The pressure regulator must be attached (fig. 5) to the dispenser regulator mount according to figure 7. The pressure regulator has two main functions. The first function is to control material flow. Material flow rate is controlled by adjusting the air pressure dial (fig.7a) and observing the pressure on the regulator gauge (fig.7c). Second function, see “Air Flow Regulator.”.



Material Regulator

fig. 6

Air Flow Control Valve - Use the air flow control valve (fig.7b) to regulate the amount of air used for spraying. The air flow control valve adjusts the spray pattern from small to large depending upon what is being coated. It is recommended to find a good balance with the air quantity in order to assure a good fan pattern and dispersion as well as minimal loss of material.

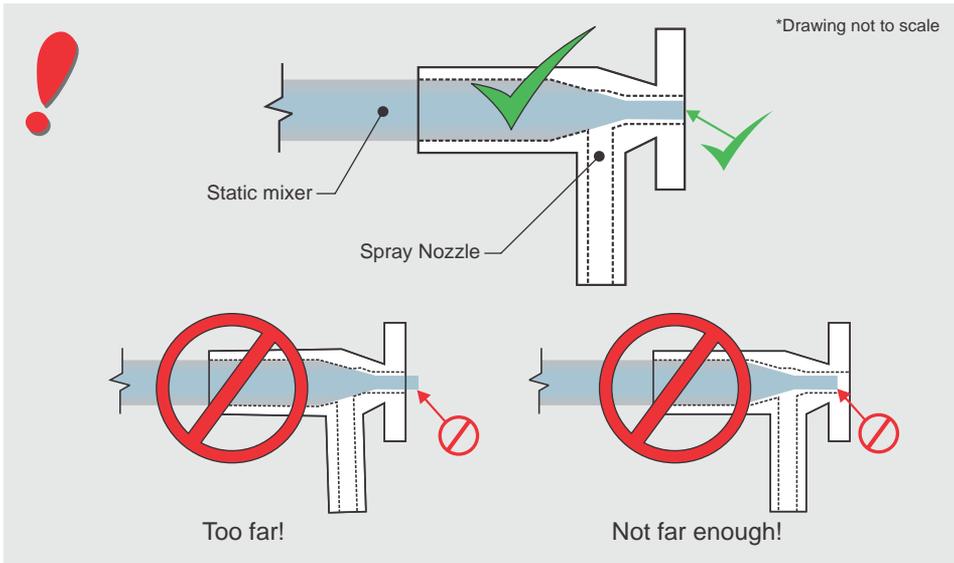
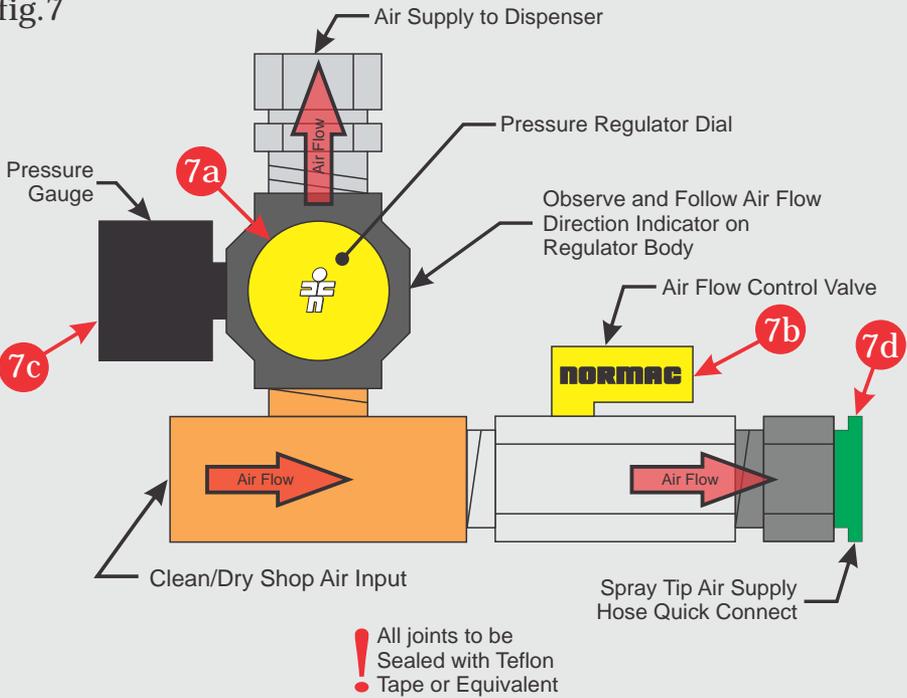
By closing the air flow regulator (fig.7b), the dispenser can be used for casting and/or injecting operations.



After long periods of storage the color may settle. Specifically heat the Part B cartridge to warm and somewhat liquefy the contents. Shake well to re-disperse the color.



fig.7





6. Cartridge Preparation

Normac U-Spray cartridges must be heated to be properly applied. The temperature depends upon the product being sprayed. Typically the LVHS series of coatings are heated to reduce viscosity resulting in a smoother finish whereas the GL series are applied at slightly above room temperature because their initial viscosity is much lower. Recommended heating devices are microwave oven or warming oven. The LVHS series of coatings are heated between 2½ and 3 minutes depending upon the microwave wattage. It is important to shorten the warm up time of partially expended cartridges to prevent over heating. You may use a warming oven at 55°C to 65°C (131°F to 149°F). **Material and cartridge not to exceed 85°C (185°F).**



RISK OF SKIN BURNS!!

Do not overheat the U-Spray cartridge. Overheating may cause the plastic cartridge to melt and leak extremely hot material. Do not handle overheated cartridges. Always allow overheated cartridges sufficient time to cool.

Recommended Spraying Temperatures for Normac U-Spray Cartridges

Product	Room Temperature	Elevated Temperature
NR-55GL	Must be heated to be sprayed	Preheat to 95°F (35°C) to 113°F (45°C) for smooth finish
NR-80/90GL	Must be heated to be sprayed	Preheat to 95°F (35°C) to 113°F (45°C) for smooth finish
NR-45LVHS	Lumpy/Orange peel finish?	Preheat to 131°F (55°C) to 149°F (65°C) for smooth finish
NR-60LVHS	Lumpy/Orange peel finish?	Preheat to 131°F (55°C) to 149°F (65°C) for smooth finish
NR-70LVHS	Lumpy/Orange peel finish?	Preheat to 131°F (55°C) to 149°F (65°C) for smooth finish
NR-80LVHS	Lumpy/Orange peel finish?	Preheat to 131°F (55°C) to 149°F (65°C) for smooth finish
NR-95LVHS	Lumpy/Orange peel finish?	Preheat to 131°F (55°C) to 149°F (65°C) for smooth finish
NR-95HT	Lumpy/Orange peel finish?	Preheat to 95°F (35°C) to 113°F (45°C) for smooth finish
NR-6521	Orange peel finish?	Preheat to 95°F (35°C) to 113°F (45°C) for smooth finish

* Suggested heating methods are microwave and oven.

? Difficult to spray.

There is a visible air bubble in the larger cartridge. Use this bubble to check for the required "syrup like liquefaction" on the basis of bubble flow rate. Observe that the air bubble travels fluidly up and down the cartridge as you turn over the cartridge.

Turn over the cartridge to check for fluid-flow and to ensure a homogeneous dispersion of the heated material. Pull the protective orange cap off of the cartridge (fig. 8). Place a

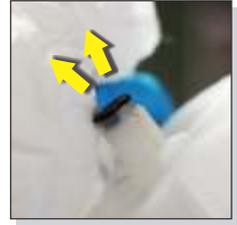


Shipping cap

fig. 8



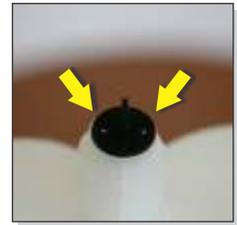
protective cloth over the top of the cartridge to prevent splash and/or spill. Remove the two half-moon shaped sealing caps. (fig. 9)



Sealing caps fig. 9

At this point always keep the cartridge in the upright position so that material crossover does not occur.

Install the orifice restrictor in such a way that the two openings are aligned correctly with the openings on each individual cartridge (fig. 10). Put the mixing/spray-nozzle onto the cartridge and tighten the cap nut snugly using pliers (fig. 11). The cap nut must be sufficiently tightened to prevent the possibility of leakage. Do not over-tighten the cap nut.



Flow restrictor fig. 10

When tightening, pay attention that no material has been released into the mixing/spray nozzle. Any material entering the nozzle at this point will react and solidify within a very short time, causing blockage of the nozzle.

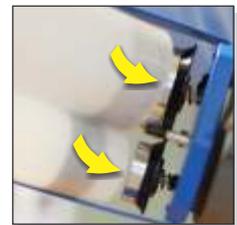
7. Processing

Assembly - Reverse the gun pistons fully. Keeping the dispenser in an upright position, lay the cartridges into the gun immediately after warming up. Carefully insert the cartridge onto the pistons so that the cartridge seals glide onto the pistons (fig. 12) without pressing the cartridge seals into the cartridge. The bigger cartridge onto the bigger piston and the smaller cartridge onto the smaller piston. Attach the air hose from the connector on the air flow regulator (fig. 7d) onto the tip of the mixing/spray nozzle (fig. 14, 15). Adjust the pressure regulator dial for the material flow required and adjust air flow control valve to a minimum air flow position.



Cap nut fig. 11

Air Bubble Purge - It is important that **each side, part A and part B is purged of air separately**. Due to the shape of the cartridge, if the air is not purged separately from each side, some air will remain trapped in one or both sides of the cartridge. If this trapped air is not purged it will result in off ratio material being sprayed as the trapped air passes through the mixer tip. Hold the gun pointing up and away from the coating surface. Tilt either the part A or part B to one side and spray out material to allow all air bubbles to escape (fig. 17). While keeping the gun and cartridge pointed upwards tilt the gun to the other side and spray out trapped air



The "glide" fig. 12



(fig. 18). Once the trapped air is completely removed from both sides of the cartridge continue spraying to ensure that all trapped air is removed from the tip and a homogeneous spray pattern has been achieved.



Air nozzle fig. 14



Air hose fig. 15

Spray Pattern Adjustment - adjust the air flow control valve as well as the material flow regulator to attain the required spray rate and finish quality. Once the spray pattern adjustments are set, immediately begin spraying onto the surface you wish to coat. If required, a pause of 5 - 10 seconds maximum is acceptable without material curing in the spray nozzle.

Coating - it is important that any interruptions in the coating process are maintained within the maximum parameters set above. If the coating process is stopped for more than the time specified above, the material in the mixer/spray nozzle will react and a new mixer and flow restrictor must be installed. Any material applied with a partially clogged mixing tube could cause mixing failures/blistering and potentially, cartridge seal failure.

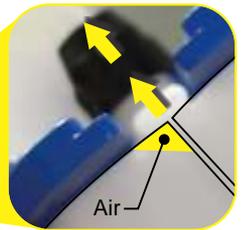


Tip alignment fig. 16

End of work - Once the cartridges are within 3mm (1/8") of being depleted, spray the remainder of the material into a waste container. Once emptied, depress the reverse button, reverse the pistons. Remove the cartridge from the dispenser carriage. Remove the air line from the spray tip. Dispose of depleted cartridges according to local, state, provincial and/or government regulations.



Air bleeding fig. 17



IMPORTANT: Repeat air bleed for both Parts A and B.

8. Spraying Technique

Spray each pass on top of the previous until the desired coating thickness is reached. Coating thickness can be measured, however the coating must cure for a minimum of 10 minutes before an accurate measurement can be taken. The Normac U-Spray System materials are designed to be applied at 1mm (0.04") thickness over 1m² every 1 - 2 minutes. The material will react within 30 - 40 seconds, after this time there will be no further flow and successive coats can be applied. Pay careful attention to angles and corners so that you obtain sufficient and even coverage throughout the piece being coated. Do not wait longer than 2 hours between coats. See Section "10. Overcoating."



9. Troubleshooting

Symptom	Potential Cause	Possible Solution
Lack of material delivery.	Closed material flow regulator. Cartridge plugged at outlet. Flow restrictor / nozzle plugged.	Open material flow regulator. Clean cartridge outlet. Replace restrictor / nozzle.
Uneven surface.	Temperature too low. Air flow regulator too low.	Warm up the cartridges longer. Wait less time between warming and commencing spray job. Open up air flow regulator more.
Drops / small unsolidified bubbles.	Cap not tight enough. Leakage from around threaded area causing material dripping from cartridge outlet area.	Correctly and carefully tighten the cap nut when assembling the cartridge.
Runs / sags.	Excessive thickness being applied per pass.	Spray each pass thinner and wait at least 1 minute between overcoat passes.
Blistering.	Incomplete air bubble removal. Stopping and restarting spraying process.	See section 7. Processing - "Air bubble removal". Stopping and starting without being turned away from the work surface will cause material softness, lack of adhesion, stickiness, blistering and delaminating. See section 7. Processing - "Coating".
Lack of angle / edge coverage.	Inexperience with product or rushing the coating job.	Take special care to ensure the material has been sufficiently applied evenly to all surfaces. Pay attention to the material flow behaviour.
Inclusions of dirt in coating.	Partly plugged restrictor / mixing-nozzle. Spraying at too slow a rate or stopping and starting.	Replace restrictor / mixing-nozzle. Increase the material flow regulator.
Delamination.	Exceeding the maximum overcoating time.	Adhere carefully to the maximum overcoating time of 10 minutes.



10. Overcoating

If more than 2 hours will elapse between coats of U-Spray then the surface must either be primed or roughened to insure good intercoat adhesion.

For bonding new urethane to older urethane use Normac NR-9500 Parts A & B. Prime according to section "4. Priming".

11. Cleaning/Disposal

Remove the cartridges from the gun. Clean tools with Normac NR-MC or other suitable, approved cleaning solvent after use. Cartridges which have only been partially used can be stored and reused at a later time. Discard the nozzle and flow restrictor. Clean the cartridge openings and reinstall the sealing caps (fig. 8).

Cured waste can be disposed of in accordance with local, state or provincial and federal laws. The completely expended cartridges consist of polypropylene and can be recycled where recycling programs exist.

12. Curing

Different Normac U-Spray Coatings require different minimum dry times prior to handling to prevent coating damage. Generally, higher hardness material such as Normac NR-95LVHS require less cure time prior to handling (8 - 10 minutes). Whereas softer material such as Normac NR-45LVHS require more cure time prior to handling (40-50 minutes). Twenty four (24) hours cure at 21°C (70°F) is required to achieve sufficient "green" strength (approximately 75% of full cure) for light mechanical load and/or shipping. The remaining 25% of cure occurs over the next 7 - 15 days depending on environmental conditions, specifically temperature.

Higher temperatures will shorten the complete cure time significantly. Temperature variations of $\pm 5^{\circ}\text{C}$ (10°F) halves/doubles the cure time as a general rule.

Curing can be accelerated with the use of heat. For example, curing at 65°C (150°F) for 16 hours results in a fully cured coating ready for service.

13. Mechanical Finishing

Normac U-Spray with a hardness above 85 Shore A is machineable. Normac U-Spray with a hardness below 85 Shore A can be finished by grinding or sanding. If mechanical finishing is required insure that enough thickness has been provided to allow for machining or sanding. Processing to 0.1mm (0.004") is possible after full cure has been reached. No significantly lower dimensional tolerances are possible due to the elastic displacement and/or lateral yielding behaviour of the material.



Machining, grinding and sanding generally results in a rougher surface structure than in metallic materials, as well as greater tolerances. Basically the machining process is similar to that of machining a medium-soft rubber. Standard machining parameters for medium-soft rubber are applicable in this case.

Sharp-edged hard metal tools are recommended for milling processes. The gear feed should be between 0.05mm (0.002") and 0.15mm (0.006"). Insufficient feed results in a rough surface finish; larger feeds lead to a grooved surface profiling. The speed may vary between 800 and 1,500m/min.

14. Working Conditions

It is preferable not process at environmental temperatures below 10°C (50°F) or above 40°C (104°F), more than 75% humidity or near the dew point. During application protect against direct sunlight wherever possible (ultraviolet exposure can lead to yellowing).



Check the surface and air temperature (dew-point) to avoid condensation during the coating process.

15. Storage Conditions

Store all materials in cool, dry areas at 20°C (68°F) out of direct sunlight. Keep away from open sources of flame and moisture. Normac U-Spray cartridges should be stored in a horizontal position.

The shelf life is approximately 24+ months stored properly and in unopened containers.



16. Health Information

Part A: Normac U-Spray Part A is the resin side which contains isocyanate. Normac uses “stripped isocyanate” technology which results in the removal of 99% of the free monomer during the manufacturing stage. Less than 0.1% free monomer or isocyanate is available for human and environmental contamination during use and application.

Part B: The Normac U-Spray Part B contains the curative side. All of the ingredients used are considered non-dangerous.

Normac makes every effort to provide the safest possible materials to ensure worker health and reduce environmental impact.

Read all Normac Material Safety Data Sheets and Application Data Sheets before use.

17. First Aid Measures

Skin Contact - Wash with plenty of fresh water and soap. Change out of contaminated clothing.

Eye Contact - Rinse immediately and continuously with fresh water for 15 minutes (fig. 19). Seek medical attention.

Inhalation - Remove person to fresh air. Seek medical attention.

Ingestion - If swallowed seek medical attention. Drink water to dilute.

Fire - Use CO₂ foam or dry powder. Firefight only with protective clothing and independent respiration system.

Read all Normac Material Safety Data Sheets and Application Data Sheets before use.



Eye wash station fig. 19



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Notes:



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