



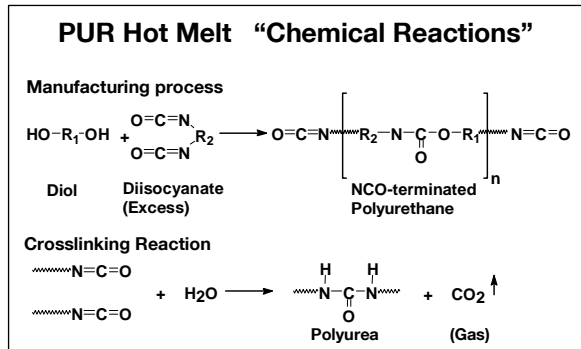
Important information for users of moisture-curing polyurethane hot melt adhesives

- Instructions for processing Jowatherm-Reaktant®
- Instructions for cleaning and maintenance
 - Cartridge units
 - Squeezeout units for bags, premelters for cylinders
 - Bulk melters (tank units)
 - Drum melters
 - Application heads and nozzles
 - Roller coaters (flat surface laminators)
 - Rollers and open reservoirs (edgebanders, wrapping machines)
 - Cleaning of tools, nozzles, filters, and small metal parts
- Instructions for handling, safety and disposal
 - Precautionary measures during change of adhesive
 - Safety measures in the workplace
 - Environmental protection
 - Disposal of residues (adhesive, flushing and cleaning agents)
 - Recycling of packaging material
- Jowat® Flushing Agent and Jowat® Cleaning Agent for PUR hot melt
 - Product compilation flushing and cleaning agents
 - Packaging units

1. Instructions for Processing Jowatherm-Reaktant®

1.1 Properties

One-component polyurethane hot melts are characterised by the fact that after the purely physical setting where the material solidifies, a subsequent reaction with humidity occurs which triggers chemical crosslinking.

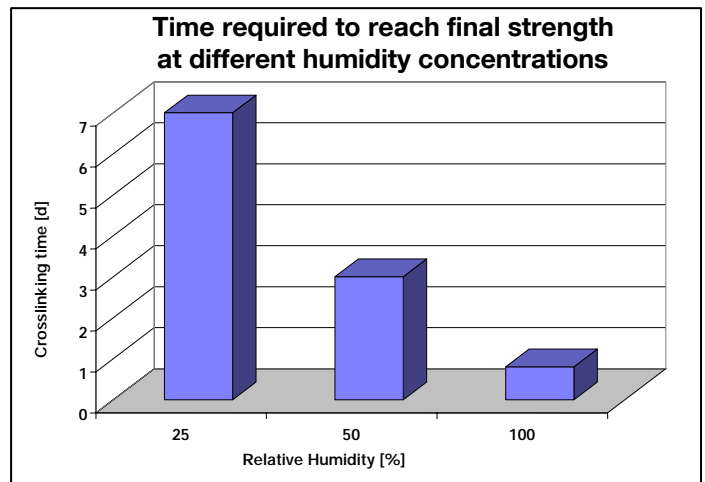


During crosslinking, very minor amounts of CO₂ gas develop which largely evaporate from the adhesive film. This minor amount of CO₂ gas is normally not visible for the human eye at room temperature. If, however, non-porous substrates (for instance profiles or sheet material of PVC or aluminium with relatively thick plastic foils or similar) are bonded, testing at

higher temperatures may result in expansion of these gas inclusions, weakening the adhesive bondline. This phenomenon depends mainly on the application amount/thickness of the adhesive layer which is to be examined and possibly reduced. If this step does not have the desired effect, the adhesive manufacturer should be contacted, since there might be alternative products with less CO₂ gas formation or which allow complete evaporation of the CO₂ gas from the adhesive film.

The crosslinking is caused by humidity in the air, or moisture contained in the materials to be bonded, or moisture on the surface of these. Accordingly, the adhesive has to be protected from any contact with humidity during manufacture, storage and processing, to avoid premature reaction.

The diagram to the right shows the dependency of the crosslinking time on the available relative humidity.



1.2 Packaging units

Jowatherm-Reaktant® is supplied in moisture-proof containers of various sizes as follows:

- Euro cartridge: Contents 310 ml
- Tin can: 140 mm Ø,
- Pullring tin can: 130 mm Ø, with PP formliner or aluminium composite pouch
- Metal bucket: 20 litres, 280 mm Ø, with/without aluminium composite pouch
- Metal drum: 200 litres, 572 mm Ø, with/without aluminium composite pouch

1.3 Processing

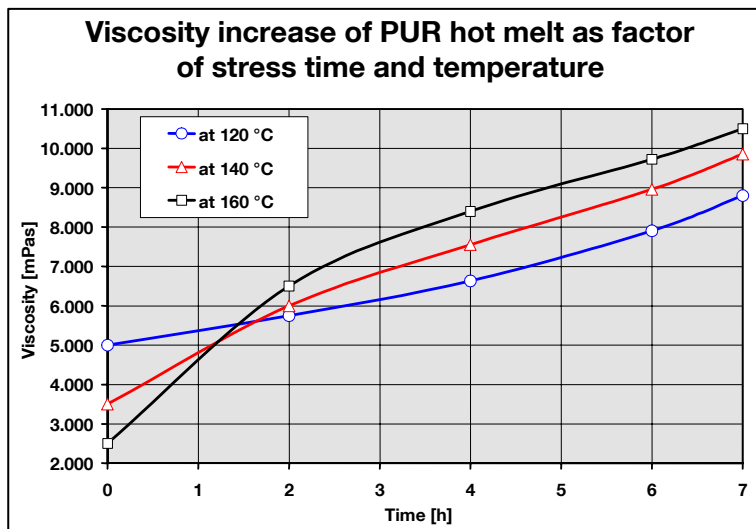
Polyurethane hot melts are applied with roller systems (made of steel or with a rubber coating), nozzles or slot nozzles, spray units or handguns. All parts of the melt and applicator equipment which come in contact with the adhesive should have a non-stick coating in order to prevent catalytic reactions due to metal contact. The non-stick coating facilitates also a much easier cleaning.

In order to avoid unwanted secondary reactions, the melt and applicator units should be equipped with exact temperature controls to avoid local overheating. If the adhesive is heated beyond the recommended processing temperature, the melt viscosity may increase due to a crosslinking reaction within the adhesive (allophanate reaction) - even if no moisture is present - just due to the influence of the high temperature.

Thermal exposure over a longer period of time will also cause this reaction.

Therefore, any amount of molten PUR hot melt in the operational unit should be used up within at least 4 hours. During down times (for instance breaks >30 minutes), the temperature should be sufficiently lowered (by approx. 50 °C to 80 °C below the recommended processing temperature), in

order to prevent the allophanate reaction as far as possible.



The recommended processing temperature may not be exceeded. Please observe the instructions of the respective technical data sheet.

The diagram to the left indicates the viscosity increase of any PUR hot melt. This is caused only by exposure to heat under exclusion of moisture. The viscosity increases much faster at higher processing temperatures.

1.4 Protection with Inert Gas

If reactive hot melts are to be processed from bulk melters (tank units), the melt as well as the adhesive mass contained in the melter when cold (when unit is turned off) should be blanketed with dry inert gas to avoid any unwanted reaction of the hot melt with moisture in the tank unit. The inert gases used are for instance dry nitrogen, dry carbon dioxide, dry argon, or dry air.

The water content of the inert gas may not exceed the value of 5 ppm (by volume, this corresponds to a value of 0.004 g/m³ under normal conditions).

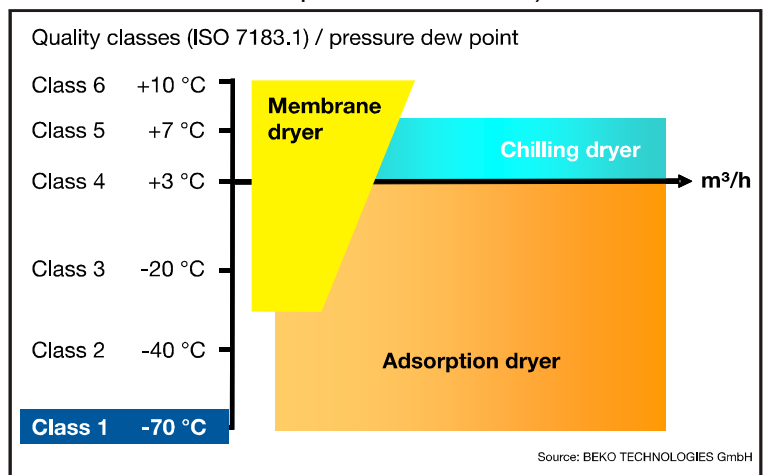
This prerequisite is met by using the following inert gas qualities (common trade names in Germany):

- Nitrogen: Spplly type 5.0; 5.3; 5.6; 6.0
- Carbon dioxide: Supply type 4.5; 4.8; 5.3
- Argon: Supply type 4.6; 4.8; 5.0
- Dry air: Dew point ≤ -65 °C at atmospheric pressure.

These conditions are not met when carbon dioxide type 2.5, and 2.7 are used, commercially available under carbonic acid, or if carbon dioxide type 3.0 is used

When adsorption dryers (for the production of dry air) are used, it has to be ensured that the feed conditions for compressed air (inlet pressure ≥ 8 bar absolute, temperature $\leq +36$ °C) are maintained, otherwise the dry air will still contain too much water (Please also observe the operating instructions of the adsorption dryer, especially after extended down times).

To our knowledge, the somewhat less expensive chilling and membrane dryers are not suitable for producing dry air in the required quality. The water content of the dry air produced by these units is far above the level of 5 ppm, and leads to problems in practical use.



Manufacturers of bulk melters can supply further information on the installation of suitable inert gas blanketing units.

2. Instructions for cleaning and maintenance

2.1 Cartridge units

In case of longer down times, "flush out" (squeeze out the PUR hot melt) unit completely with one half cartridge of Jowat® Flushing Agent for PUR hot melt. Turn off the unit and allow to cool. When starting up again, drain the remnants of the Flushing Agent, insert a new PUR hot melt cartridge, and make sure the PUR hot melt extrudes all remnants of the Flushing Agent. Please observe also all recommendations of the equipment manufacturer.

2.2 Squeezeout units for bags, premelters for cylinders

In case of longer down times (holidays, periodic operation shutdowns), the system needs to be emptied, then flushed out with Jowat® Flushing Agent for PUR hot melt until all adhesive remnants are removed.

When starting up again, drain the remnants of the Flushing Agent, fill in PUR hot melt adhesive, and make sure the PUR hot melt extrudes all remnants of the Flushing Agent. Please observe also all recommendations of the equipment manufacturer.

2.3 Bulk melters (tank units)

Basically, the tank unit should be constantly blanketed with inert gas to avoid any reaction of the PUR hot melt adhesive with moisture. The inert gas unit has to be checked daily to see if it works properly.

If the melting units are not emptied and flushed at the end of the day and remain filled with PUR hot melt overnight, continuous blanking with inert gas is absolutely necessary to avoid any contact of the cold adhesive mass with moisture.

In case of longer down times (weekends, holidays, periodic operation shutdowns etc.), drain the unit completely, flush out with Jowat® Flushing Agent until PUR hot melt is entirely removed from the system. Remnants of Flushing Agent remain in the unit; the tank melter should be continuously supplied with inert gas.

When starting up again, drain the remaining Flushing Agent, fill in new PUR adhesive, and make sure the PUR hot melt extrudes all remnants of the Flushing Agent.

In case of units with bypass plates, clean bypass regularly (for instance weekly) by opening and internal circulation of the PUR through the bypass.

If a filter is installed, examine filter for clogging at least once a week (depending on throughput) by removing it and possible mechanical cleaning or with Jowat® Cleaner 930.60, or replace with a new filter cartridge.

Please observe also all recommendations of the equipment manufacturer.

2.4 Drum melters

Avoid any contamination during change of drums. The heating plate is to be cleaned and remnants around the sealing ring or sealing rings are to be removed. Greasing the sealing rings with a suitable water-free and acid-free grease (e.g. rolling bearing grease Petamo GY 193 supplied by Klueber Lubrication, Munich) facilitates easier cleaning and shortens the down time during the change of a drum.

The drum may not remain opened longer than necessary.

Please observe also all recommendations of the equipment manufacturer.

2.5 Application heads and nozzles

The application head, nozzle or slot nozzle may be protected over night or on weekends with a paraffin oil or mineral grease free of water and acids, or with Jowat® Flushing Agent, so that no moisture can penetrate into the system and cause an unwanted reaction.

Before start-up, clean the nozzles from the outside (during the heating phase), then extrude all Flushing Agent remnants with PUR hot melt adhesive.

Please observe also all recommendations of the equipment manufacturer.

2.6 Roller coaters (made of steel, or rolls covered with Viton-/silicone rubber o. s.)

Drain the roller applicator system with the respective cleaning programme of the machine (reverse direction). The hot melt residues should be allowed to run into a lined basin or similar container.

Switch roller applicator to standard operation. Fill in Jowat® Flushing Agent 930.50 (approx. 1 kg) and allow to take effect with running rollers for about 10 minutes. Drain the unit again as described above.

Switch roller applicator to normal operation. Fill in Jowat® Flushing Agent 930.20 (approx. 1 kg) and melt. Allow to take effect with running rollers for 10 – 15 minutes, then drain the unit again (if necessary repeat this step).

Residues of the Flushing Agent should be removed completely after cooling down – but while still warm, using a dry rag (or moistened with Jowat® Cleaner 401.10).

Request a copy of our Jowat News "Easy Cleaning" for more details.

Please also observe the recommendations of the equipment manufacturer.

2.7 Rollers and open reservoirs (e.g. edgebanders and wrapping machines)

At the beginning of the shift, while the machine is warming up, remove crosslinked PUR hot melt mechanically from reservoir and roller.

Over the weekend, holidays and other extended down times, the reservoir has to be emptied, rinsed with Jowat® Flushing Agent and again completely emptied. Residues of the Flushing Agent should be removed mechanically after cooling down. When the unit is switched on again, fill with PUR hot melt adhesive and flush out all remnants of the Flushing agent with the PUR hot melt adhesive.

For complete cleaning remove reservoir, disassemble and clean parts in a separate container with Jowat® Cleaner 930.60 at approx. 180 °C.

Please observe also all recommendations of the equipment manufacturer.

2.8 Cleaning of tools, nozzles, filters, and other small metal parts

Tools, nozzles, filters and other small (or disassembled) parts made of metal may be cleaned in a heated bath with Jowat® Cleaner 930.60 at approx. 180 °C (e.g. an electrical deep fat fryer is suitable). Depending on the degree of contamination, the cleaning procedure takes about 60 to 120 minutes. The temperature of the cleaning bath should not exceed 190 °C. Remove parts from the bath, allow for cooling, rinse with water and dry completely.

Seals and most plastic parts may be dissolved by Jowat® Cleaner 930.60 and must be replaced prior to assembly or installation.

Remarks:

For all maintenance and cleaning operations, observe all recommendations in the corresponding operating instructions of the equipment manufacturer.

3. Instructions for handling, safety and disposal

3.1 Change of adhesive

If PUR hot melts are to be used intermittently with other, non-PUR hot melts, it has to be checked if these products are compatible - also when switching among different PUR hot melts. Contact your adhesive supplier for further information. If the hot melts are not compatible, an unmeltable compound may form due to a chemical reaction, also due to extremely different processing temperatures.

3.2 Protective measures in the workplace

Jowatherm-Reaktant® PUR hot melt adhesives contain Isocyanate as reactive groups. While at ambient temperature, all components of the hot melt are almost non-volatile, isocyanate vapours may form during melting and processing of the hot melt. The German MAK-value (= max. concentration in the workplace/TLV) for monomer isocyanate (MDI) is 0.005 ppm (0.05 mg/m³).

In any case, PUR hot melt vapours which may form have to be extracted via suitable exhaust systems just like those for any other hot melt. With appropriate exhaust systems, the values will remain far below the a.m. TLV limits, and safe working conditions are ensured.

Please, observe the instructions of the corresponding material safety data sheet.

3.3 Environmental protection

The extracted air containing isocyanate is subject to the local laws concerning clean air. In Germany, the regulations of the "TA Luft" (technical regulations concerning clean air limit values) classifies isocyanates in class 1. For products in class 1, the upper concentration limit of 20 mg/m³ may not be exceeded, when the emission exceeds 100 g/h.

The emissions have to be monitored.

3.4 Disposal and Recycling

3.4.1 General Information

When processing Jowatherm-Reaktant[®] PUR hot melt adhesives, any residual amounts of adhesive or mixtures of adhesive with cleaner or flushing agents should be disposed of in a professional and correct way, in order to avoid any detrimental effect on humans and the environment.

3.4.2 Disposal of PUR hot melt adhesive residues

Fully crosslinked PUR hot melt can be disposed of as "adhesive waste" under the European Waste Catalogue Number 080410; disposal is possible on household waste disposal sites or household waste incineration plants. To achieve complete crosslinking, allow sufficient exposure time of the adhesive with moisture.

3.4.3 Disposal of flushing agent

The flushing agent is also classified in Germany as "adhesive waste" and at ambient temperature solid. It is also covered by the European Waste Catalogue Number 080410. Disposal is possible on household waste disposal sites or incineration plants for household waste.

3.4.4 Disposal of used cleaning agent

Jowat[®] Cleaner 930.60 is at ambient temperature liquid and in Germany classified as special waste (EWC No. 070208, "other reactive and distillation residues"). Residues and remnants must be incinerated in special waste incineration plants.

Remarks:

For further information concerning handling, transport and disposal, please refer to the Material Safety Data Sheet.

3.5 Recycling of packaging material

Recycling of packaging material is to be carried out according to local/national regulations.

4. Jowat® Flushing Agents and Jowat® Cleaner for PUR hot melt adhesives

4.1 Product overview technical data and application area/use

Jowat®		930.20	930.50	930.30	930.34	930.70	930.74	930.60
To be used as		Flushing Agent	Flushing Agent	Flushing Agent	Flushing Agent	Flushing Agent	Flushing Agent	Cleaning Agent
Viscosity at 20 °C	[mPas]	powder	pasty	---	---	---	---	thin liquid
Viscosity at 120 °C	[mPas]	thin liquid	thin liquid	approx. 8,500	approx. 8,500	approx. 25,000	approx. 25,000	---
Density	[g/cm ³]	approx. 1.05	approx. 1.03	approx. 0.95	approx. 0.95	approx. 0.95	approx. 0.95	approx. 1.10
Softening point	[°C]	approx. 65	---	---	---	---	---	---
Appearance / Colour		white	beige	beige/white	red-orange	beige/white	red-orange	clear translucent
Application / Properties		Especially for flushing and cleaning of <u>roller coater systems</u>	Especially for flushing and cleaning of <u>roller coater systems</u>	Low viscosity flushing agent <u>for bulk melting units, hoses, and nozzles;</u> contains reaction stopper		Medium viscosity flushing agent <u>for bulk melting units, hoses, and nozzles;</u> contains reaction stopper		For heavily <u>contaminated metal parts</u> (nozzles, rollers, filter a.o.); dissolves burned and cured PUR hot melt

Please refer to the corresponding technical data sheets for more information.

4.2 Packaging units (Changes without notice are possible)

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|--|---|
| 4.2.1 Jowat® Flushing Agent 930.20 | 20 kg plastic bucket (powder) |
| 4.2.2 Jowat® Flushing Agent 930.50 | 2 kg pullring can
with aluminium composite pouch (pasty) |
| 4.2.3 Jowat® Flushing Agent 930.30/34
and 930.70/74 | 310 ml aluminium cartridge
1,5 kg pullring can (block)
5 kg plastic bucket (granules)
15 kg metal bucket (block)
20 kg paper bag (granules) |
| 4.2.4 Jowat® Cleaner 930.60 | 1 kg plastic container (liquid)
10 kg plastic container (liquid) |