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0.1 VisiJet® Materials Overview

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0.2 Disclaimer

Nothing contained herein is intended to be and should not be relied upon as legal or medical advice. Users of VisiJet® CP200 and CPX200 Materials should review the Safety Data Sheets (MSDS/SDS) for these materials, and independently determine their compliance with applicable laws. The information contained in this guide is necessarily general in nature and suggestions should be implemented only after review for applicability to specific situations. Users are responsible for implementing health and safety procedures that comply with governing laws.

0.3 Ispropyl Alcohol (IPA) and Polypropylene Glycol (PPG) Handling Guidelines

Ispropyl Alcohol- IPA(90 - 100%) Safety and Handling Guidelines

FLAMMABLE LIQUID AND VAPOR. HARMFUL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO EYES AND RESPIRATORY TRACT. AFFECTS CENTRAL NERVOUS SYSTEM. MAY BE HARMFUL IF ABSORBED THROUGH SKIN. MAY CAUSE IRRITATION TO SKIN. Refer to the manufacturer's MSDS sheet for more information.

Personal Protective Equipment

- Safety Goggles, Chemical Resistant Gloves, Protective Clothing

Handling and Storage

- Protect against physical damage. Store in a cool, dry well-ventilated location, away from any area where the fire hazard may be acute. Outside or detached storage is preferred. Separate from incompatibles.
- Containers should be bonded and grounded for transfers to avoid static sparks. Storage and use areas should be No Smoking areas. Use non-sparking type tools and equipment, including explosion proof ventilation.
- Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.
- Small quantities of peroxides can form on prolonged storage. Exposure to light and/or air significantly increases the rate of peroxide formation. If evaporated to a residue, the mixture of peroxides and isopropanol may explode when exposed to heat or shock.

Disposal Considerations

- Empty containers can have residues, gases and mists are subject to proper waste disposal. Dispose of all wastes in accordance with federal, state, provincial and local regulations.
Polypropylene Glycol (PPG) Safety and Handling Guidelines

Personal Protective Equipment

- Safety Goggles, Chemical Resistant Gloves, Protective Clothing

Handling and Storage

- Do not breath in vapors.
- Avoid eyes and skin contact.
- Store in a cool, dry place. Keep container tightly closed.

Disposal Considerations

- Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility.
- Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

0.4 Material Handling

- Burning Finished Parts
- Exposure Control
- Handling Finished Parts
- Loading Cartridge
- Material Disposal
- Packaging Inspection
- Personal Protective Equipment
- Storage
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Burning Finished Parts

Burning finished parts, as required for investment casting applications, can produce carbon monoxide, oxides of nitrogen, and other potentially harmful gases/fumes. Concentrations of these products depend on burn-out temperature and conditions. Higher temperatures will assist in complete combustion of the material. Consult the Safety Data Sheet for further information.

Exposure Control

The ProJet 3-D modelers have a variety of built-in engineering controls designed to prevent operator exposure. Users should not try to change or disable these controls.

Handling Finished Parts

The VisiJet® CP200, CPX200 and S200 materials do not cure. No special measures are necessary in normal use of this product. Refer to the materials' MSDS Sheet for detail information.

This product is not a hazardous waste as specified in 40CFR 261. Dispose in accordance with all Federal, State, Provincial and Local regulations.

Loading Cartridge

Do not load expired cartridges in the modeler. If a cartridge is one or more year beyond its expiration date, the modeler will reject it.

VisiJet® support material (the white cartridge) must be loaded in the left feed slot, and VisiJet® build material (the gray cartridge) must be loaded
in the right feed slot.

Inspect each cartridge for leakage or physical damage and load it in the modeler. Refer to Packaging Inspection for more information on damage cartridges.

Material Disposal

This product is not a hazardous waste as specified in 40 CFR 261. Avoid disposal; if possible, completely utilize product. Dispose of unused product in accordance with applicable Federal, State, Provincial and Local regulations.

Packaging Inspection

Inspect the cardboard shipping carton containing cartridges for VisiJet® CP200, CPX200 and the S200 support materials upon receipt for signs of physical damage and leakage. If leakage is observed, do not open the carton. Contact your authorized ProJet™ 3-D modeler reseller or 3D Systems’ Customer Support Hotline. Assuming no leakage is observed, store materials in their cartons until they are ready for use. The VisiJet® CP200 carton should contain eight (8) cartridges and CPX200 should contain four (4) cartridges. The VisiJet® S200 should contain eight (8) cartridges sealed in poly bags.

When opening the carton, inspect each cartridge for any signs of leaking or physical damage. Do not load any leaking or damaged cartridges into the modeler. If you find a leaking cartridge, call your authorized ProJet™ 3-D modeler reseller or the 3D Systems’ Customer Support Hotline, and arrange for return of the leaking cartridge, and replacement with a new cartridge. If you do not return the cartridge, dispose of it in accordance with local and other regulatory disposal requirements.

Personal Protective Equipment

Eye Protection: Fumes may cause light irritation to eyes. Wear chemical goggles for protection.

Respiratory Protection: If ventilation cannot effectively keep dust concentrations below established limits, appropriate NIOSH approved respiratory protection must be provided.

Skin Protection: Wax, when heated, can cause skin burn. To prevent contact, use impervious gloves such as Nitrile or neoprene gloves and an apron to protect clothing.

For more information on CP200 and CPX200 materials, refer to the MSDS Sheet.

Storage

VisiJet® build and support materials should be stored in a conveniently located storage cabinet in proximity to the modeler itself and in a dry, well-ventilated place. A cabinet is recommended to protect against long term exposure to external UV light sources, including sunlight, overhead lighting, or other UV light sources. Storage temperature of the material should not exceed the specified maximum of 35°C (95°F). VisiJet® model material should be stored away from strong oxidizing agents, such as hydrogen peroxide, bromine, or chromic acid.
More detailed information on the VisiJet® model material and VisiJet® support material, relevant applicable safety precautions and remediation, and specific storage and disposal requirements, can be found in the Material Safety Data Sheet (MSDS) included in each case of VisiJet® material shipped by 3D Systems. Your organizations’ Facilities Manager (or equivalent) should maintain a copy of the two MSDS documents, and provide ready, convenient access to these documents. If further information is needed, please contact 3D Systems’ Customer Hotline within the U.S. at (800) 793-3669 (or from outside the U.S.A. at +49 (0) 6151 357-357, or by visiting 3D Systems website.

Training

Employees should be trained in the hazards and management of VisiJet® materials. Such training should be provided to new employees before they begin working with the modeler, or disposing of material waste.

0.5 Part Post-Processing for VisiJet® CPX200 and S200 Materials

Post Processing are recommended procedures that provide detail instructions for removing the wax supports from parts and how to clean the part to obtain a finish product. It describes the tools and equipment that are necessary when performing the cleaning procedures.

To obtain a successful finished part, please follow the instructions closely and do not deviate from the steps described in the procedures.

- 0.5.1 Recommended Equipment, Tools and Supplies for CPX200 Post Processing
- 0.5.2 Removing the Part From The Platform (VisiJet® CPX200)
- 0.5.3 Prepare Cleaning Solutions (VisiJet® CPX200)
- 0.5.4 Removing Support Material (VisiJet® S200 & CPX200)
- 0.5.5 Rinsing Parts
- 0.5.6 Drying Parts

0.5.1 Recommended Equipment, Tools and Supplies for CPX200 Post Processing

**Supplies**

- Polypropylene Glycol PPG-425 (PPG-400 to 450 may be used)- Refer to Section 0.3, Isopropyl Alcohol (IPA) and Polypropylene Glycol (PPG) Handling Guidelines before using PPG.
- Isopropyl Alcohol- 91% (IPA)- Refer to Section 0.3, Isopropyl Alcohol (IPA) and Polypropylene Glycol (PPG) Handling Guidelines before using IPA.
- Water (tap)
- Paper Towels / Absorbent Pads
- Nitrile gloves
- Safety Glasses
- Protective clothing

**Equipment and Tools**

- Hotplate to heat build platform
- A heated magnetic stirrer with digital heat control. The ideal system includes an automatic temperature control feedback system. The magnetic stirrer unit size should be matched to the size and quantity of parts you plan to build and process.

- Stir bar is a magnetic bar used to stir the solutions. The stir bar rotates and thus stirs with a separate rotating magnet located beneath it.
Two (2) tempered glassware (e.g. Pyrex) containers, with lids, that are large enough to contain your largest parts and slightly smaller than the surface area of your magnetic stirrer. The containers need to be large enough to completely submerge your largest parts.

A non-rigid basket or silicone strainer to hold parts above the magnetic stirrer bar

Magnetic stirrer bar

Digital Cooking Thermometer

Optional Equipment - Temperature controlled oven large enough to contain all containers of solution that can consistently maintain a temperature of 45 °C.

0.5.2 Removing the Part From The Platform (VisiJet® CPX200)

**STEP 1:**

- DO NOT SCRAPE RealWax™ parts off the platform as DAMAGE TO PART may occur. DO NOT PLACE PARTS IN FREEZER as this can damage RealWax™.
- To remove parts from the build platform, apply heat to the bottom of the platform until the support wax begins to melt and the part is loosened from platform. The best method is to use the heated magnetic stirrer (with out stirring action on), but other heat generating devices such as heat gun can also be used.
0.5.3 Prepare Cleaning Solutions (VisiJet® CPX200)

STEP 2:

- Fill container #1 with 91% IPA and PPG, in a 1:1 ratio by weight (solution #1). Place container #1 on the magnetic stirrer, insert the magnetic stirrer bar, and heat to a constant temperature between 45 - 47°C.
- Ensure stirring action remains on at all times to ensure uniform heating.
- Fill container #2 with a solution of 80% water and 20% PPG by weight (solution #2). Place container #2 on hotplate and warm to 42 °C (+/- 5 °) or place in a temperature controlled oven at 45 °C.

0.5.4 Removing Support Material (VisiJet® S200 & CPX200)

STEP 3:

- When solution #1 (PPG/IPA) has reached a constant temperature of 46°C (+/- 1°C), place one or more parts into the strainer and lower the strainer into container #1 completely submerging the parts in solution.
- Cover and monitor temperature of solution #1. (Note: strainer must hold parts above the magnetic stirrer bar to avoid part damage.)
Step 3- Removing Support Material (Continued)

Adjust the stirring speed so that solution #1 circulates around the parts. The ideal stirring speed will vary depending on geometries and strainer types.

Support material will be removed in 10-120 minutes depending on size and geometry of parts. Check the parts every ten minutes and remove parts from solution #1 when all of the support material has been removed.

If the support material is not fully removed after 60 minutes, remove the parts and allow them to dry for 15 minutes, then return the parts to solution #1 and resume the support removal process. Continuous exposure to solution #1 in excess of 60 minutes may result in damage to the part surfaces.

NOTE: Solution #1 (PPG/IPA) in Container #1 will become saturated with support material over time and will result in inadequate support material removal. When this occurs, solution #1 will need to be replaced with fresh solution. Dispose of the used PPG/IPA solution according to local regulations and the original manufacturers’ Material Safety Data Sheet (MSDS).

0.5.5 Rinsing Parts

STEP 4:

After support material has been removed and the parts removed from solution #1, it is necessary to rinse the parts in solution #2.

Ensure that solution #2 is heated 42 °C (+/- 5 °)

Place parts into contain #2 and completely submerge them in solution #2.

Rinse the parts in solution #2 for one (1) to two (2) minutes.

0.5.6 Drying Parts
Step 5:

- Remove the parts from solution #2 and gently blow off the excess liquid using low pressure air.
- Place parts under slow moving air for a minimum of 60 minutes until completely dry.
- **Optional:** Drying process may be shortened by placing the parts into a temperature controlled oven at no more than 45 °C for 15 to 30 minutes.
- Your parts are now ready to use.

---

### 0.6 Part Post-Processing for VisiJet® CP200 and S200 Materials

Post Processing are recommended procedures that provide detailed instructions for removing the wax supports from parts and how to clean the part to obtain a finish product. It describes the tools and equipment that are necessary when performing the cleaning procedures.

The VisiJet ® S200 wax support material is easily soluble in heated solvents with good down facing surface quality.

It is important to remember that temperature control and time control are critical when cleaning parts built on the CP system.

To obtain a successful finished part, please follow the instructions closely and do not deviate from the steps described in the procedures.

#### 0.6.1 Recommended Equipment, Tools and Supplies for CP200 Post Processing

**Liquids**

- Polypropylene Glycol PPG-425 (PPG-400 to 450 may be used)
- Isopropyl alcohol (91%) (IPA)
  - Refer to the [PPG, IPA safety guidelines](#) and the manufacturers' MSDS before using these products.
- Water (tap)

**Supplies**

- Paper Towels / Absorbent Pads
- Nitrile gloves
- Safety Glasses
- Protective clothing

**Equipment and Tools**
Temperature Controlled Oven similar to Invision® Finisher

Three (3) containers, with lids, that are large enough to contain your largest parts. The containers need to be large enough to completely submerge your largest parts.

Soft Bristle Paint brushes of various sizes

- Small wooden tools or wooden cotton swabs

0.6.2 Removing the Parts From The Platform (VisiJet® CP200)

**STEP 1**

- It is very important not to try to scrape RealWax™ parts off the platform as they could be damaged. Also freezing parts could cause sudden expansion and damage the part.
- The preferred way to remove parts from the build platform is to apply heat to the bottom of the platform until the support wax begins to melt and loosen the part from the platform. This is best achieved using a hotplate, but other heat generating devices such as heat gun can also be effective.
0.6.3 Prepare Cleaning Solutions (VisiJet® CP200)

**STEP 2**

- Fill container #1 with water.
- Fill container #2 with Polypropylene Glycol (PPG-425).
- Fill container #3 with 20/80 solution of PPG and Water.

- Cover containers and heat containers to 46° C ±1.

0.6.4 Cleaning Parts in Heated Water
STEP 3

- Place one or more parts in container #1 of water for 30 minutes or more until the supports are soft to the touch.

- Take parts out of container #1 and gently remove the supports manually, peeling supports into a separate catch pan.
- Use brushes and small wooden tools to gently remove softened support wax off the part.
- Work quickly to remove wax from part to prevent support wax from cooling and sticking to part.

0.6.5 Second Finishing Bath

STEP 4

- Place parts in the container #2 filled with PPG that is pre-heated to 46° C ±1 degree. Let parts soak for 30 minutes or more until supports are easy to remove. After soaking in the PPG, most of the external, residual wax should be removed.
• To remove external supports, use a soft bristle paint brush to brush the external surface of the part while submersed in the PPG.

• Parts with internal cavities will require tools such as the wooden end of a swab for pushing and scraping support wax from crevices. Low pressure air may also be used. These particular parts may require additional soaking in the PPG bath until the supports dissolve.

• Optional: Once parts are clean, remove the excess PPG with a paper towel. Place part on a paper towel and place in finisher or similar oven for approximately three (3) to five (5) minutes (oven temperature should not exceed 47°C).

0.6.6 Finishing Part (VisiJet® CP200)

STEP 5

• Rinse parts in the container #3 of water/PPG between 35°C to 45°C. Set the part aside on paper towels and let air dry or use low pressure compressed air to dry.

• Your part is complete and ready to use
0.7 Option 2- Part Post-Processing for VisiJet® CPX200, CP200 and S200 Materials

Please click on the link to view Option 2 for cleaning CPX200, CP200 and S200 Parts.

Option 2- Part Post-Processing for VisiJet® CPX200, CP200 and S200 Materials