

VisiJet® Material Handling Guide

How to properly use, handle and dispose of Accura® VisiJet materials for the InVision™ and InVision HR 3-D printers.



July 2004
23080-M01-01
Rev. A



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Disclaimer

Nothing contained herein is intended to be and should not be relied upon as legal or medical advice. Users of VisiJet® materials should review the Material Safety Data Sheets (MSDS) 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.

Check the Model Name

The InVision 3-D printer system and the InVision HR 3-D printer system are two printers from the Multi-Jet-Modeling (MJM) line of printers. Check your model name by looking at the front panel of the printer or by locating the model name on the serial number plate on the rear panel. Any differences in operation between the two MJM models is clearly indicated in the text; for example, "InVision HR 3-D printer system only," or "InVision 3-D printer system only."

Check the Material Name

The InVision 3-D printer system and the InVision HR 3-D printer system use the same support material, designated VisiJet S100 support material. However, the two systems use different model materials. The InVision 3-D printer uses VisiJet M100 model material and the InVision HR 3-D printer uses VisiJet HR-M100. **DO NOT USE M100 MODEL MATERIAL IN THE INVISON HR 3-D PRINTER SYSTEM AND DO NOT USE HR-M100 MODEL MATERIAL IN THE INVISON 3-D PRINTER SYSTEM.**

S100 support material cartridges, M100 model material cartridges, and the InVision 3-D printer system are the models used for illustrative purposes throughout this guide. Any references to specific material will be clearly indicated in the text; for example, "Use M100 model material in the InVision 3-D printer system only."

Material Handling

Packaging inspection

VisiJet material is packaged in cartridges, which are packaged within polybags, then within shipping cartons. Upon receipt of the material shipments, inspect the cardboard carton for signs of physical damage and evidence of leakage by inspecting the carton exterior. If leakage is observed, don't open the carton, and contact 3D Systems' Customer Support Hotline. Assuming no leakage is observed, store materials in their cartons until the material is loaded into the printer.

Storage

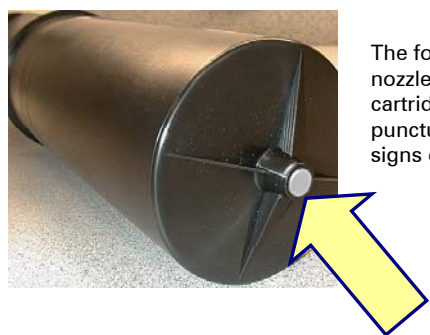
Shelf life of VisiJet model material is one year from date of manufacture. For VisiJet support material, shelf life is two years. Each cartridge is marked with its expiration date. Use the oldest inventory first. VisiJet material should be kept indoors in a cool, dry area with adequate ventilation, and at temperatures between 16°C (60°F) and 27°C (80°F). **DO NOT EXCEED A MAXIMUM STORAGE TEMPERATURE OF 35°C (95°F).** Keep away from direct sunlight, heat, flames and other direct light or UV energy sources. For optimal results, keep stored cartons closed and sealed, and do not open polybags until the cartridge is ready for loading into the printer.

Cartridge loading

Do not load cartridges into the printer if they are about to expire. Cartridges that are not used before one year past the expiration date will be ejected from the printer.

VisiJet support material (the white cartridge) must be loaded in the left side feed slot, and VisiJet model material (the black cartridge) must be loaded in the right side feed slot.

Prior to loading the cartridge, and before removing the protective polybag, inspect each cartridge for any signs of leaking or physical damage. Do not load any leaking or damaged cartridge. Do not open any polybag containing a leaking model material cartridge, and dispose of in accordance with local and other regulatory disposal requirements.



The foil seal on the nozzle end of the cartridge should not be punctured or exhibit signs of leakage.



The seal between the plunger and the cartridge should not exhibit signs of leakage.

Model building

If uncured material is ever observed on the model or platform at the end of a build, this is an abnormal (and very unlikely) condition, and is an indication that the printer requires servicing by 3D Systems. Assume that any liquid or paste-like material is model material. Do not directly touch uncured model material without protective gloves. Discontinue use of the printer, pending service by a 3D Systems representative.

Flammability/combustibility

Flammability or combustibility is the ability of a material to burn. The degree of flammability hazard is expressed as the flash point of a material or the temperature to which a material must be heated before a flame will ignite the vapors. The flash points of VisiJet materials are shown on their respective Material Safety Data Sheets (MSDS). VisiJet materials have flash points greater than 110°C (230°F). The United States' Department of Transportation considers materials with flash points greater than 60°C (140°F) as combustible, rather than flammable. Special precautions should be taken to prevent exposure of VisiJet materials to heat, flames, sparks, or any source of ignition.

Health hazards

Any chemical may exert harmful effects if it enters or contacts the body in sufficient quantities. VisiJet model material is a sensitizer and irritant.

Skin sensitization

Uncured VisiJet model material is a sensitizer, and can cause allergic reactions if it comes into contact with the skin without appropriate chemically resistant protective gloves. Nitrile or neoprene gloves are recommended. Do NOT use latex gloves. To avoid sensitization, do not allow uncured material to contact skin. Consult the MSDS for specific information about the sensitization potential.

Sensitization dermatitis is the result of an allergic reaction to a given substance. In almost all cases, direct skin contact is necessary to cause sensitization. It is possible for individuals to become sensitized to a substance even after a trouble-free period of exposure. Many factors affect a person's susceptibility

including: existing skin conditions, personal habits, and individual sensitivity. Sometimes even slight exposure can trigger a severe outbreak of dermatitis. Since sensitization is permanent, a sensitized individual should avoid further contact with the sensitizing agent.

Inhalation

Under normal operation, inhalation is not an expected route of entry.

Ingestion

Uncured VisiJet model material is toxic if ingested. Therefore, uncured material must not be present where food and drink are stored, prepared or consumed and should not be ingested. As a precaution, after handling VisiJet materials, users should wash their hands with soap and water before consuming or preparing food.

Handling finished parts

Finished (cured) VisiJet parts can be handled or disposed of in the same manner as standard household plastic products. VisiJet parts are not recyclable. VisiJet materials are not intended for, and cannot be used for medical implant, or for food or drink handling applications.

Burning finished parts

Burning of finished (cured) parts, as required for investment casting applications, may result in toxic gas formation depending on burn out temperature and conditions. Higher temperatures will assist in complete combustion of the material.

Exposure control

The InVision printer has a variety of built-in engineering controls that are designed to prevent operator exposure. Users should not try to change or disable these controls.

Personal protective equipment

Skin protection

Exposure to uncured VisiJet model material may occur; such as when removing and disposing of the bin liner containing spent model material cartridges, and the waste bag. To prevent contact, wear chemically resistant protective gloves — nitrile or neoprene gloves are recommended.

Eye protection

In the event of a leak or spill of uncured VisiJet model material, wear safety glasses with side shields to provide eye protection.

Respiratory protection

Because of the InVision printer's built in engineering controls, respiratory protection is not necessary during normal operation.

A NIOSH-approved dust mask is recommended when sanding cured VisiJet material parts.

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 printer, or disposing of material waste.

Disposal

User management

Users of the InVision 3-D printer and the InVision HR 3-D printer should be informed about the potential hazards of VisiJet model material prior to working with an InVision printer, or performing other duties which may result in exposure to uncured VisiJet model material, such as removal and disposal of bin liners and empty cartridges, or waste bags.

Spills

Spills of material are HIGHLY UNLIKELY, and should NOT occur in the normal operation of the printer. If a leak does occur, it is an indication of a serious printer malfunction.

The first priority is to protect users from inadvertently touching the material. Spills of VisiJet **support material** can be cleaned without use of protective gear, and disposed of as ordinary office trash. Handling **uncured VisiJet model material requires use of gloves and other protective equipment** to ensure that no direct contact with uncured model material is possible. If you don't know which material it is, assume it to be uncured model material, and handle accordingly — with the recommended protective gloves and other safety gear.

Eliminate the potential for others to contact the spill. Promptly remove the spilled material, and dispose of the waste material and cleanup materials per local applicable regulatory requirements. Discontinue use of the printer, and contact 3D Systems for a service visit to determine and repair the source of leakage.

Small spills of uncured liquid VisiJet model material can be cleaned up using disposable towels, non-reusable rags, or absorbing materials such as sawdust, clay, diatomaceous earth, activated charcoal, etc. If the material is liquid – it is hot. Do not attempt a clean up the material while still hot (as a liquid). Allow to cool, then clean with denatured or isopropyl alcohol, followed by a thorough washing with soap and water.

Cleaning a spill on carpeting can be particularly difficult. Consider avoiding placement of the printer over carpeting, or consider use of a barrier to avoid the possibility of carpet damage if a spill were to occur.

Advise any service provider involved (e.g. a carpet cleaning service or disposal service), of the nature of the spilled material, and provide MSDS and other material information prior to their contact with the material. Advise them of the disposal requirements for model material and clean-up products if model material (uncured) is the spilled material. Use of heat (above 65°C) may prove helpful in removing spilled model material from carpet.

Tools, which may be contaminated with VisiJet model material, should be cleaned prior to reuse. Recommended solvents such as DNA or IPA are normally required to clean equipment and tools. A final wash with soap and water will remove any last traces of excess VisiJet model material or solvent. Solvent suppliers should be contacted for information on the proper handling of solvents if used in a clean up.

Hygiene

Appropriate hygienic practices should be followed, including washing with soap and water before meals, breaks, smoking, applying cosmetics, using toilet facilities and after work.

Housekeeping

Good housekeeping should be practiced in the work area. Employees should be alerted to the need to clean and rinse off any contacted surface promptly in order to prevent further contamination. Ensure a convenient washroom location is provided with access to soap, water and disposable paper towels.

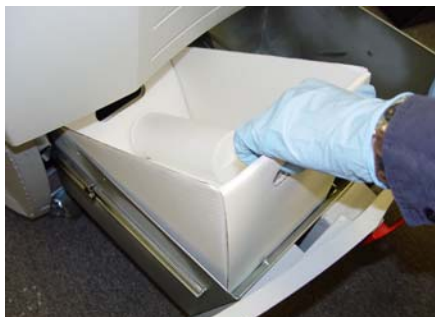
Waste removal

Three “waste” items must be removed from the InVision 3-D printer – a white cardboard liner holding empty support material cartridges, a black cardboard “bin liner” holding empty model material cartridges, and a waste bag containing a combination of support and uncured model material. **Wear protective gloves before removing any waste product from the printer.** Be careful to not spill, drop or expose others to these materials — particularly the model material cartridges or the waste bag. Dispose of all waste material appropriately per local and other regulatory requirements.



Bottom drawer, showing white VisiJet support material cartridges in the left side bin liner, and black VisiJet model material cartridges in the right side bin liner.

In the middle is the waste bag, which collects residual support and uncured model materials.



Support material bin liner being removed from the bottom drawer.



Model material bin liner being removed from the bottom drawer.



Removal of the bag from the drawer



Replacing waste bag into bottom drawer.



Sealing the bag prior to disposal.

Regulatory information

VisiJet support material has no known regulatory requirements.

The disposal of cured, partially cured, or uncured VisiJet model materials should comply with all applicable local, state, and federal environmental and safety regulations. Within the U.S., UNCURED VisiJet model material is subject to an EPA mandated “SNUR” (Significant New Use Rule) — EPA regulation 40 CFR 721.3850. See Appendix for the entire SNUR statement. This SNUR regulates methods of disposal for uncured material, and also imposes record-keeping requirements. In this case, the “uncured materials” includes any model material cartridge (empty or full), and the waste bag (of which about half is uncured model material).

Record keeping requires maintenance, for a five-year period from the time of disposal, of the following:

1. The quantity of model material received (new or “virgin”).
2. The name and address of the shipping location (the “responsible party” – generally your waste disposal service provider)
3. The quantity of model material shipped (disposed)

If required, users will need to provide the quantity of uncured model material waste disposed of (#3 above). Each model material cartridge will result in 83 ml of residual uncured model material waste (removed from the printer through the waste bag or “empty” cartridges). Multiplying this quantity by the number of cartridges used during that time period will result in the total amount of model material waste that was disposed of. The waste from a partially empty cartridge can be calculated by multiplying how full the cartridge is by 470 ml. For example, a cartridge that was two-thirds full would contain $0.66 * 470$ ml or 310 ml. For additional information or assistance, contact your local 3D Systems’ Customer Support Hotline.

Disposal procedures

VisiJet support material and cartridges may be disposed of in ordinary office trash.

Models produced from the InVision printer are fully cured VisiJet model material, and as such, are not known to be regulated by any agency worldwide.

Uncured VisiJet model material waste is classified as regulated, and in some areas hazardous, thereby requiring special packaging, transportation and disposal. The disposal of partially cured or uncured VisiJet model material shall comply with all applicable local, state, and federal environmental and other safety regulations. Applicable VisiJet model material “waste” includes cartridges (empty or full) and the waste bag.

Any materials used to clean up uncured VisiJet model material should be disposed of in the same manner as the uncured model material itself.

To determine any locally applicable regulatory requirements in your area, contact a local Waste Disposal Service Provider. To determine your waste disposal requirements, you will need to provide them with the MSDS for model material, and possibly other items included in the Appendix – such as the Waste Profile Worksheet and the SNUR regulation (U.S. only). You will be provided with a report, indicating the disposal requirements that apply to you, as well as a quotation for regularly scheduled pickups.

Two possible examples of waste disposal service providers are:

- **Teris-Wilmington** —1737 East Denni Street, Wilmington, CA 90744 USA —Telephone: (310) 835-9998 —Web: <http://www.terisna.com/>
- **Safety-Kleen Systems, Inc.** — Cluster II, Building 3, 5400 Legacy Drive, Plano, Texas 75024 — Tel: (800) 669-5740; (972) 265-2000; E-mail: info@safety-kleen.com — Web: <http://www.safety-kleen.com/>

Attached are the answers required to determine applicable Waste Disposal requirements in your area. See Appendix “Waste profile worksheet” for model material, providing answers to common questions necessary to complete a Waste Profile input form provided by many Waste Disposal service providers. If you need assistance completing a form, or locating a waste disposal service provider, contact your local 3D Systems’ Customer Support Hotline.

3D Systems neither guarantees nor endorses these companies’ services, expertise, quality or capabilities. 3D Systems assumes no liability or responsibility for proper disposal of the uncured model material. Proper disposal of the uncured model material is the sole responsibility of the user.

Appendix

Waste profile worksheet (VisiJet model material)

The following answers are what are checked off an example Waste Profile input form. Other forms may vary.

A. General Information

Recert/Shipping InformationContact information and facility location

B. Waste Description:

Waste Name:Acrylate & Waste Debris

Process Generating Waste (SIC#):7389

Process Description:Facility Cleanout

Source Code:G13

Form Code:W319

C. General Characteristics:

Color:.....Varies

Liquid:10%

Solid:90%

Strength:None

Non-Wastewater as defined in 40 CFR 268.2?Yes

D. Waste Management Methods:.....None checked

E. Handling Instructions:None checked

F. RCRA Information:

Is this a USEPA hazardous waste?.....No

Is this an acutely hazardous waste? (40CFR 261.30 and 33)? Not applicable

G. Shipping Information:

DOT Proper Shipping Description:Non RCRA hazardous waste solid

Technical N.O.S. descriptions:.....Acrylate

Haz. Class:NR

Truck or Rail?T

H. (1): Hazardous Characteristics and Other Components:

None Apply:Yes

Chlorine Recycle (>0.1%):No

Metal Objects:No

H. (2): Physical Characteristics

Specific GravityNot Apply (no min, max or Avg/Actual value)

Viscosity (centipoise)Not Apply (no min, max or Avg/Actual value)

PH (constituent).....Not Apply (no min, max or Avg/Actual value)

BTUs (1000/lb).....Not Apply (no min, max or Avg/Actual value)

Flash Point (closed cup F)Not Apply (no min, max or Avg/Actual value)

H. (3):MetalsTotal PPM TCLP STLC TLIC

Aluminum (AL)0.0500

Chrome VI (CR6)0.0070

Titanium (TI)0.0500

I certify metals are below MDL levels.....Yes

I. (Note: This composition presumes a mixture of VisiJet model material with paper towels, gloves or other debris)

Chemical Composition.....	Min.	Max.	Avg.
Acrylate.....	50.000000%	50.000000%	50.000000%
Wax	25.000000%	25.000000%	25.000000%

Physical Composition.....	Min.	Max.	Avg.
Debris	25.000%	25.000%	25.000%

Appendix

SNUR information for VisiJet model material

Within the United States, **uncured** VisiJet model material is subject to a "Significant New Use Rule" ("SNUR") — 40 CFR, section 721.3850. This EPA regulation addresses record keeping requirements and disposal considerations for VisiJet model material.

The SNUR 40 CFR § 721.3850 Acrylated (long-chain) alkyl glycidyl ether (generic).

(a) Chemical substance and significant new uses subject to reporting.

(1) The chemical substance identified generically as an Acrylated (long-chain) alkyl glycidyl ether (PMN P-99-0467) is subject to reporting under this section for the significant new use described in paragraph (a)(2) of this section.

(2) The significant new uses are:

(i) Release to water. Requirements as specified § 721.90 (a)(4), (b)(4) (N=2 ppb).

(ii) [Reserved]

(b) Specific requirements. The provisions of subpart A of this part apply to this section except as modified by this paragraph.

(1) Record keeping. Record keeping requirements as specified in § 721.125 (a), (b)l, (c), and (k) are applicable to manufacturers, importers, and processors of this substance.

(2) Limitations or revocation of certain notification requirements. The provisions of §721.185 apply to this section.

Implications For VisiJet Model Material Customers

1. Keep records* of the amount of uncured VisiJet model material that you receive on site.
2. Keep records* of the quantity of uncured VisiJet model material that you ship off site. Include the names and addresses of the responsible parties receiving the material. This includes shipments to other sites of your company and waste handling facilities.
3. Avoid discharge of uncured VisiJet model material to the sewer or to surface waters.

*Records must be kept for five years.

Appendix

3D Systems' sales and service locations

France	3D Systems France SARL Parc Club Orsay Universite 26 Rue Jean Rostand F-91893 Orsay Cedex, France	General Inquiries: Material Orders: Customer Support Hotline: E-mail:	(+33) 1 69 35 17 17 (+33) 1 69 35 17 17 (+33) 1 69 35 17 17 hotline.fr@3dsystems.com
Germany	3D Systems GmbH Guerickeweg 9 D-64291 Darmstadt Germany	General Inquiries: Material Orders: Customer Support Hotline: E-mail (Customer Support):	+49-6151-357 0 +49-6151-357 234 +49-6151-357 357 hotline.de@3dsystems.com
Hong Kong	3D Systems 21st Floor, Honest Motor Building 9-11 Leighton Road, Causeway, Hong Kong	General Inquiries: Material Orders: Customer Support Hotline: E-mail:	(+852) 29 23 50 77 (+852) 29 23 50 77 (+852) 29 23 50 77 asiainfo@3dsystems.com
Italy	3D Systems Italia srl. Via Archimede, 42 20041 Agrate Brianza (MI) Italy	General Inquiries: Material Orders: Customer Support Hotline: E-mail:	(+39) 039 6890400 (+39) 039 6890400 (+39) 039 6890400 marketing.it@3dsystems.com
Japan	3D Systems Japan K.K. 4-6-8 Tsurumaki Setagaya-ku, Tokyo 154-0016 Japan	General Inquiries: Material Orders: Customer Support Hotline: E-mail:	(+81) 3 5451 1690 (+81) 3 5451 1690 (+81) 3 5451 1690 japaninfo@3dsystems.com
Portugal	<i>Contact 3D Systems' UK office</i>		
Spain	<i>Contact 3D Systems' UK office</i>		
UK	3D Systems Europe Ltd Mark House, Mark Road Hemel Hempstead Herts HP2 7UA United Kingdom	General Inquiries: Material Orders: Customer Support Hotline: E-mail:	+44 1442 282600 +44 1442 282665 +44 1442 282665 marketing.uk@3dsystems.com
USA	3D Systems, Inc. 26081 Avenue Hall Valencia, CA 91355 USA	General Inquiries: Material Orders: Customer Support Hotline: E-mail:	(661) 295-5600 ext. 2882 (800) 889-2964 (661) 295-5600 ext. 2277 (800) 793-3669 (970) 257-4700 moreinfo@3dsystems.com

Emergency (MSDS)

Chemtrec

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Europe +1.703.527.3887

