



SPECIAL CONDITION: Polymers

Version: SCPolymers/2020-11-19/PILOT

PILOT VERSION AND EFFECTIVE DATE

This policy has been issued as a pilot as of November 19, 2020. The pilot period will extend until full implementation of the policy in the HPD Builder, planned for 2022. All aspects of the policy are open for comment and feedback during the pilot. Please direct comments to customersupport@hpd-collaborative.org.

This policy becomes effective as a required part of the HPD Open Standard when it is implemented in the HPD Builder. That “Effective Date” will be published here when it is available: _____.

UPDATES

HPDC will update this policy when feasible to keep up with advances in science, regulation, and available methodologies. Visit the [Emerging Best Practices for Special Conditions section](#) of the HPDC website to check for the most up-to-date version. If you are using the HPD Builder to complete your HPD, or another HPD-compliant automated tool, the most up-to-date guidance is automatically integrated into those tools.

PURPOSE

By developing and requiring the use of this policy, HPDC provides guidance to manufacturers so that HPD reporting of polymers is more consistent, accurate, and verifiable, and that HPD reports and their data are more useful.

SCOPE

Required for all HPDs with polymer content

Use of this policy is required for all Product HPDs and Supplier HPDs reporting polymer content above the stated reporting threshold and published after the effective date.

Includes substances present in connection with polymers

As part of that scope, this Special Condition provides guidance on reporting substances that are not polymers but that may be present in connection with them, including oligomers, functional additives, and both unreacted and residual monomers.

Not intended for hazard assessment of polymers



This policy supports the reporting of data that is useful in assessing potential hazards of polymers. However, full collection of all data to conduct a hazard assessment on a polymer is beyond the scope of this policy.

How polymers are identified

Polymers will be identified as falling under the scope of this policy in one of the following ways:

1. An appendix to this policy [forthcoming during pilot period] lists known polymer CAS RNs identified by HPDC. This covers many of the most common polymers reported on HPDs, as well as many less-common ones. When a CAS RN from that list is entered on an HPD, use of this policy will be triggered.
2. If the CAS RN is not on HPDC's list (see #1) but is identified by the HPD preparer as a polymer (see Glossary), use of this policy will be triggered. (This will be applicable for less-common or novel polymers with CAS RNs.)
3. If there is no CAS RN for the polymer, the manufacturer completing the HPD will identify this situation and follow the steps in this policy for reporting a polymer with no CAS RN.
4. If "Polymer" is selected as the Substance Role for a substance on the HPD, this policy will be triggered if it has not been by one of the methods above.

When any of these situations trigger use of this policy, an HPD-Open-Standard-compliant reporting tool (like the HPD Builder) will automatically display inputs relevant to this policy.

QUALITY CONTROL

HPDC reserves the right, under its [HPD Quality Control Protocol](#), to review published HPDs and check that this policy was completed correctly. This may involve corresponding with manufacturers and requesting clarification.

As discussed elsewhere, a key concern of this policy is to ensure consistent reporting of substances used in connection with polymers. For example, polyvinyl chloride (PVC) is frequently used in resilient flooring alongside plasticizers. If an HPD reported the use of PVC in resilient flooring but did not report use of a plasticizer, HPDC may seek assurance that the plasticizer is not missing from the HPD report.

GLOSSARY

See the Glossary in the [HPD Open Standard](#) for all terms relevant to HPDs, including important terms such as "substance" and "material." The following terms are specific to this guidance.

Unless otherwise specified, the term "polymer" within this policy refers to all of the following terms: polymer substance, polymeric material, and oligomer.



Polymer Substance: Chemical compound characterized by the sequence of one or more types of monomer units. Such molecules must be distributed over a range of molecular weights wherein differences in the molecular weight are primarily attributable to differences in the number of monomer units. In the context of this definition a “monomer unit” means the reacted form of a monomer in a polymer.¹ Examples: polypropylene, polyethylene terephthalate, polyamide (nylon) 6. [Note: this is a summary definition; see U.S. EPA, REACH, and others for more complete technical definitions.]

Polymeric Material: A mixture of substances that includes one or more polymer substance(s) , all other functional additives (i.e., intentionally added substances), residual or unreacted monomers, and unintentional impurities.

Monomer: A substance capable of forming covalent bonds with a sequence of additional like or unlike molecules under the conditions of the relevant polymer-forming reaction used for the particular process.² Examples: propylene, terephthalic acid, caprolactam. An *unreacted monomer* is an intended component in a polymeric material . A *residual monomer* is an unintended impurity in a polymer.³

Functional Additive: A chemical compound, chemical substance, or mixture of chemical substances intentionally added to impart a desired characteristic to a product or serve a particular function in the product, e.g., stabilizer, colorant, plasticizer. Functional additives can be polymeric or non-polymeric in nature.⁴

Impurity: An unintended constituent present in a substance as manufactured. It may, for example, originate from the starting materials or be the result of secondary or incomplete reactions during the production process. While it is present in the final substance, it was not intentionally added. In most cases impurities constitute less than 10% of the substance.⁵

Number Average Molecular weight (Mn): The arithmetic average (mean) of the molecular weights of all molecules in a polymer. (This value should not take into account unreacted monomers and other reactants, but must include oligomers.)⁶ *Molecular weight* is mass of a given molecule, measured in Daltons (Da).

¹ Derived from U.S. EPA Polymer Exemption Guidance Manual: <https://www.epa.gov/sites/production/files/2015-03/documents/polyguid.pdf>. Accessed 2020-01-04. Closely aligned with REACH Article 3: <https://reachonline.eu/reach/en/title-i-chapter-2-article-3.html>. Accessed 2020-01-04.

² REACH Article 3: <https://reachonline.eu/reach/en/title-i-chapter-2-article-3.html>. Accessed 2020-01-04.

³ GreenScreen v1.4: <https://www.greenscreenchemicals.org/learn/guidance-and-method-documents-downloads>.

⁴ GreenScreen v1.4: <https://www.greenscreenchemicals.org/learn/guidance-and-method-documents-downloads>.

⁵ ECHA: <https://echa-term.echa.europa.eu>. Accessed 2020-01-04.

⁶ U.S. EPA Polymer Exemption Guidance Manual: <https://www.epa.gov/sites/production/files/2015-03/documents/polyguid.pdf>. Accessed 2020-01-04.



Oligomer: A polymer fragment containing three or more monomer units. An oligomer is of intermediate relative molecular mass, and is derived as an intermediate step in the polymerization reaction.⁷

BACKGROUND: WHY THIS IS A SPECIAL CONDITION

HPD reporting methodology typically relies on the identification of a single chemical substance by a single CAS RN. Health hazard information can then be identified solely with that CAS RN. In the case of polymers, the CAS system does not provide the following details, all of which are needed to better understand health hazards associated with polymers:

- The inclusion of residual monomers, impurities, and functional additives.
- The molecular weight of the polymer (a key measure of how “reacted” the polymer is). CAS RNs do not differentiate partially reacted from fully reacted polymers.
- The specific chemistry of the polymer utilized. (CAS RNs for polymers may refer to a general type of polymer chemistry, e.g., “Polyurethane Foams.”)

Additional detail is needed to establish a fundamental report of health information relevant to polymers.

SUMMARY OF POLICY

Key Points

This policy describes how HPD preparers should report and screen polymers on a Product HPD or Supplier HPD. Key points:

- The policy largely relies on the typical HPD reporting and screening methods. See the most current version of the [HPD Open Standard](#) for those methods.
- This policy elaborates on those methods where necessary to account for the complexities of polymers such as functional additives, oligomers, and residual monomers.

See “Explanation of Policy,” below, for details.

Preferred CAS RNs

In the course of developing this policy, HPDC identified the most common CAS RNs used for reporting polymers on HPDs. A small number of these CAS RNs do not meet the required level of specificity for reporting under this policy. The disallowed CAS RNs, and notes on preferred CAS RNs to use instead, are as follows:

- [This list will be developed during the pilot period. Please direct any questions to customersupport@hpd-collaborative.org]

⁷ Based on U.S. EPA Polymer Exemption Guidance Manual and on Review of REACH With Regard To The Registration Requirements on Polymers.



Specific Guidance on LEED v4 Compliance

Many manufacturers aim to complete HPDs that are not only compliant with the HPD Open Standard but also meet additional qualifications for LEED v4 credit. Use of this Special Condition is required for a complete HPD and thus also for LEED v4 compliance.

Where noted in this policy, data points are required for an HPD to be marked “Yes” for “Characterized” and “Screened,” as needed for a LEED v4 compliant HPD [See 2.1.2.3 Characterized, Screened, Identified in the [HPD Open Standard](#)].

EXPLANATION OF POLICY

1a. REPORTING OF POLYMER DATA WITHIN SECTION 2 OF AN HPD

When a polymer is reported on an HPD, it must follow the typical guidance for reporting substances specified in Section 2.2.2 of the [HPD Open Standard](#) for the polymer species. All fields typically required must be completed. A valid entry in the following additional data fields will also be required. Required data points will be displayed on the HPD as custom data fields, utilizing the requirements of Section 2.2.2.13: Additional Structured Data Fields.

For reference, here is an example of a how a polymer would appear on an HPD after utilizing this guidance:

Polyethylene Terephthalate			ID: 25038-59-9		
HAZARD DATA SOURCE: Pharos Chemical and Materials Library			HAZARD SCREENING DATE: 2019-08-08		
%: 1.0000-2.0000	GREENSCREEN: LT-UNK	RC: None	NANO: No	SUBSTANCE ROLE: Polymer	
HAZARD TYPE	AGENCY AND LIST TITLES		WARNINGS		
None found	No warnings found on HPD Priority Hazard Lists				
POLYMER TYPE: Thermoplastic					
ADDITIONAL SUBSTANCES CONSIDERED: Yes					
NUMBER AVERAGE MOLECULAR WEIGHT: >10,000 Da					
LOW-MOLECULAR WEIGHT (<500 Da) CONTENT: <100 ppm of Polymer					
SUBSTANCE NOTES:					

Required Data

- **Polymer type:** Choose from the following list of polymer types
 - Thermoset⁸ prepolymer (i.e. partially crosslinked)
 - Crosslinked thermoset⁸ (i.e. extensively crosslinked)

⁸ Thermoset, i.e., reactive or cross-linked, polymers have a life cycle, from prepolymer to extensively cross-linked. The current life-cycle state of a polymer is relevant both to identifying it, and to characterizing its hazards. Thermoset polymers can contain additives that are not reactive. If the thermoset polymer has completely reacted, please indicate “Crosslinked thermoset.” If it is partially-reacted, please list “Thermoset prepolymer.”



- Thermoplastic⁹
- Elastomer
- Other
 - If “Other” is selected, a brief note is required.
 - “Other” is given as an option to provide flexibility for specific situations. However, it is expected that most polymers will fall into a category above. “Other” is also not intended to be used to report the species of polymer chemistry, e.g., polypropylene, PVC, etc.
- Note: “Unreacted,” or similar, is not a valid entry here. If the HPD is reporting on a polymer in its unreacted state, then the HPD should by definition be reporting the monomers and any other constituent substances above the reporting threshold. This reporting should follow typical HPD reporting methodology, not this procedure.
- **Molecular weight:**
 - Report a number average molecular weight for the polymer in Daltons (Da).
 - Select from among the following:
 - <1,000 Da
 - $\geq 1,000$ Da and $\leq 10,000$ Da
 - >10,000 Da
 - Enter a specific numerical value
 - “Unknown”
 - Note: Selecting “Unknown” will result in the HPD being marked “No” for “Screened.”
 - Percentage of polymer <500 Da.
 - Provide the percentage of the polymer that has a molecular weight of <500 Da. If unknown, list “Unknown.”
- **Additional Substance Identification:** Report all residual or unreacted monomers, catalysts, functional additives, or processing aids present above the selected reported threshold, i.e. 100 ppm, 1000 ppm, etc
 - These substances should be reported on the HPD as separate substances subject to typical HPD reporting requirements, i.e., list CAS RN, percent weight, etc.
 - Examples of additional substances include, but are not limited to: residual or unreacted monomers, UV or heat stabilizers, colorants, plasticizers, processing aids, and catalysts.
 - Processing aids serve a function in the manufacture of the polymer and include but are not limited to catalysts and heat stabilizers. All processing aids present above the reporting threshold should be reported as a separate substance on the HPD.

⁹ Thermoplastic polymers are fully reacted as placed on the market and are not designed to further react, so do not have the various stages of cure that thermosets do. Thermoplastic polymers can also contain additives that are likewise not reactive.



- If possible, use a primary data source for reporting:
 - Request disclosure from your polymer supplier of the CAS RN and percentage of all additional substances present above the reporting threshold.
 - If available, use laboratory data to determine whether additional substances are present above the reporting threshold.
- Pharos Process Chemistry may be used as a resource for monomers and catalysts when primary data from the supplier or testing data cannot be obtained.
 - In [Pharos](#), search for the CAS RN and click on the “Process Chemistry” tab. Identify any substance with a “Type” of “Monomer” on this page and include each as a separate substance on the HPD. List “Residual/Impurity” in place of percentage weight if a specific weight.
 - An explanatory statement on this reporting approach may optionally be included in the Substance Notes for these monomers, such as: “Information is not available to confirm the presence or absence of this residual monomer above the reporting threshold, so it is included per the HPDC Polymers Special Condition Policy.”
 - Potential residual catalysts associated with your polymer CAS RN can be identified using Pharos Process chemistry. In the “Process Chemistry” tab, identify any substance with a “Type” of “Catalyst” in the “Known or Potential Residuals” section and include each as a separate substance on the HPD. List “Residual/Impurity” in place of a percentage weight.
 - An explanatory statement on this reporting approach may optionally be included in the Substance Notes for these catalysts, such as: “Information is not available to confirm the presence or absence of this catalyst above the reporting threshold, so it is included per the HPDC Polymers Special Condition Policy.”
- Review the Guidance for Reactive Chemistries below to understand documentation requirements when chemical reactions affect the content inventory.
- To confirm all additional substances have been identified, **the following attestation must be marked Yes/No** and will be reported on the HPD as a data element of the polymer:
 - “All intentionally added substances associated with the polymer, e.g., residual and unreacted monomers, stabilizers, colorants, plasticizers, processing aids, catalysts) present above the selected reporting threshold have been reported elsewhere on this HPD.”
 - The result of this attestation will be reported as follows:
 - Additional Polymer-Related Substances Considered: Yes/No
 - “Yes” must be selected for the HPD to be marked “Yes” for Characterized, Screened, and Identified.



- **Oligomers:**
 - Oligomers are considered part of a polymer substance. Therefore, separate CAS RNs are not typically available for them. Due to this, additional information about oligomers shall be reported as part of the polymer substance. In the substance notes for the related polymer substance(s) include as much of the following additional information as is available:
 - Descriptive term for the oligomers, e.g., acrylated oligomers
 - Any GHS or other hazard statements provided by the supplier that are applicable to the oligomer(s)

Optional data

Specific certifications or labels that use HPDs as a data source may have more specific requirements than the HPD for full assessment of polymers. While that goes beyond the current scope of most HPDs, these data points are noted here so that manufacturers can become familiar with them and report them if possible. As such data becomes more commonly available, and the reporting of these data points becomes more standardized, HPDC may update this policy to require more of these data points. At this time, reporting one or more of the following data points is encouraged but optional.

When available, provide these optional data points in the Substance Notes:

- Accession Number or PMN number
- Mole Ratio (or percent) of Each Monomer
- Solubility/Dispersibility/Swellability
- Particle size, including if the particles are respirable
- Overall polymer charge, e.g., cationic
- Reactive functional group(s)
- Percent amine nitrogen (can be used for estimating aquatic toxicity)
- Are the monomers blocked? (Y/N)

Detailed explanation of these terms and how to report them is beyond the scope of this policy. For more guidance see other resources, for example, [GreenScreen for Safer Chemicals](#).

1b. OPTIONS FOR REPORTING WITH NO CAS RN

The following situations are addressed in this section:

- a) A CAS RN exists for the polymer but the manufacturer/supplier completing the HPD, or their supplier, chooses not to disclose it on the HPD, and is also not willing to provide typical HPD hazard screening information with the CAS RN undisclosed (via Supplier HPD, Toxnot, third-party consultant under NDA, or similar mechanism).



- b) A CAS RN does not exist for the polymer, and therefore it is not possible to disclose a CAS RN.¹⁰

In either situation¹¹, the manufacturer/supplier completing the HPD may still seek to obtain hazard screening information. The following procedure describes requirements for this data that is compliant with this policy and will support the HPD being marked “Yes” for “Screened.”

For reference, here is an example of a how a polymer might appear on an HPD after utilizing this guidance:

Reacted Polyurethane Resin			ID: Not applicable	
HAZARD DATA SOURCE: GHS-Compliant SDS			HAZARD SCREENING DATE: 2021-08-08	
#: 1.0000-2.0000	GREENSCREEN: N/A	RC: None	NANO: No	SUBSTANCE ROLE: Polymer
HAZARD TYPE		AGENCY AND LIST TITLES		WARNINGS
See GHS warnings below				
POLYMER TYPE: Crosslinked thermoset				
ADDITIONAL SUBSTANCES CONSIDERED: Yes				
NUMBER AVERAGE MOLECULAR WEIGHT: >10,000 Da				
LOW-MOLECULAR WEIGHT (<500 Da) CONTENT: 0.5% of Polymer				
GHS HAZARD STATEMENTS: No GHS Category 1 or 2 Hazard Statements				
SUBSTANCE NOTES:				
This substance is a reaction of several isocyanates and polyols to form a polyurethane foam applied to carpet backing under strict manufacturing conditions to prevent monomer exposure to employees. Residual levels of these monomers are tested regularly to ensure the full reaction is occurring.				

If the following information/procedure is not available or cannot be completed, the HPD will be marked “No” for “Screened.” In this case, the polymer will appear on the HPD using the data fields defined above in “1a. Reporting of polymeric substance data,” with all fields shown as “Undisclosed.” As typical under HPD requirements, Substance Notes should be added detailing any circumstances on why the data is undisclosed, and efforts to obtain it.

¹⁰ If it is possible to register a new CAS RN and disclose that CAS RN, that is an additional option, and the procedure under “1a. Reporting of polymeric substance data” above may be followed. However, in many cases the Chemical Abstracts Service (CAS) will not, by policy, register a new CAS RN for a polymer.

¹¹ The procedure described in this section was conceived by HPDC to support the situation where no CAS RN is available for the polymer, and not a situation of non-disclosure. However, this procedure is helpful in both situations. While disclosure of CAS RN and associated screening is generally preferred in HPD methodology, it has significant limitations with polymers. Many polymers are novel, and new ones are being created all the time. This makes it unlikely that they will appear on authoritative lists that form the basis for GreenScreen List Translator scores. In addition, the GreenScreen for Safer Chemicals methodology specifies that GreenScreen assessments of polymers, and resultant Benchmark scores, are manufacturer and trade name specific. These GreenScreen Benchmark scores are not generalizable to a CAS RN that may be used for multiple trade names from multiple manufacturers. Since there are not many manufacturer and trade name specific GreenScreen assessments for polymers as required for the Benchmark score to appear as a List Translator result, and that the polymers rarely appear on hazard lists, it is likely that CAS RN disclosure and hazard screening may result in a List Translator score of NoGS reported on the HPD, and no list-based hazards being reported.



A GHS-compliant Safety Data Sheet (SDS) is required for this procedure. Look for the following to check for GHS compliance:

- Publication date later than June 2015 GHS guidelines
- Check for verbiage stating:
 - Compliance with the United States OSHA Hazard Communication Standard (HCS) (29 CFR 1910.1200(g));
 - and/or Commission Regulation (EU) No 2015/830 (EU CLP)

Polymer data reporting (required)

Report the following information in the standard HPD fields:

- Substance name: Enter the most appropriate of the following:
 - The most accurate name possible according to typical HPD procedure
 - “Undisclosed”
- Identifier: Enter the most appropriate of the following:
 - “Not applicable”
 - “Undisclosed”
- GreenScreen score: Enter “N/A,” or enter the GreenScreen Benchmark score if an assessment is freely and publicly available (this is not common)
- Hazard Screening Method: “GHS-compliant SDS”
- Hazard Listings: “See GHS warnings below”
- Additional Listings: Follow the procedures specified in HPDC’s [Best Practices for Additional Listings](#) for screening polymers with no CAS RN against relevant lists.

Report the following information in data fields customized to this Special Condition:

- GHS Hazard Statements: Enter any applicable GHS Category 1 and 2 hazard statements
- Hazard Screening Compliance: “Hazard screening data sourced from GHS-compliant SDS, as allowed by HPDC Special Conditions policy for polymers”

In addition, *all fields from 1a shall be provided using guidance found in that section (see above).*

For reference, those fields are:

- *Polymer type*
- *Number average molecular weight*
- *Residual or unreacted monomer(s)*
- *Functional Additives*
- *Oligomers*

Alternatively, the manufacturer can instead inventory the unreacted substances using typical HPD reporting methodology rather than listing the polymer. Include notes in appropriate sections of the HPD, i.e., Inventory and Screening Notes, Substance Notes, and Product Notes or Material Notes, describing the expected reaction and composition of the final product. In this case it is strongly encouraged to provide a URL to public documentation on the manufacturer website, or elsewhere, documenting the chemical reaction.



- Example: With sugar-based binders in insulation products, there is no CAS RN for the reaction product. Manufacturers may report the input substances to this process with notes in each describing the chemical reaction.

2. GUIDANCE ON REACTIVE CHEMISTRIES

Different reporting constraints of the HPD Open Standard can lead to dilemmas in the reporting of reactive chemistries. This section provides principles-based guidance to resolve those issues.

The main issue is the possibility of conflict between the “as delivered” HPD definition and the fact that substance information is typically collected from the supply chain prior to any reaction taking place.

As defined in the HPD Open Standard, a Product HPD reports on the contents of a building product as delivered to the job site. A Supplier HPD reports on the contents of ingredients as delivered to a manufacturer. The purpose of these respective “snapshot in time” conventions is to provide accuracy of the content inventory at a clearly defined moment.

Because the chemical identity and hazards of polymers may change significantly during manufacturing or installation, i.e., after the “as delivered” snapshot, the following guidance is intended to clarify and elaborate upon those initial constraints.

The Supplier HPD and the Product HPD should both be completed based on specific knowledge and documentation. As the chemicals used to make polymers move through the supply chain, the manufacturer completing an HPD must use documentation to demonstrate when chemical reactions have occurred.

For example, a manufacturer of a building product using a Supplier HPD as documentation can and should list the substances listed on that Supplier HPD as content on their Product HPD. However, this is not an ideal outcome if those substances are monomers that the manufacturer will react to form a polymer. The resulting Product HPD would not describe the “as delivered” product. It would also list hazards based on the monomers that are not expected to be present, or present at the same concentrations, in the finished product.

If the manufacturer can obtain a supplier’s declaration letter or a laboratory analysis documenting the reacted polymer as present in their finished product, they may use those to complete the HPD report. In fact, this is preferable from all perspectives, as it is more accurate to the “as delivered” constraint of the HPD, and more accurate in terms of hazard information.

To review and summarize, HPDs should follow these rules:

1. Use the HPD to report contents of the “as delivered” product or ingredient.



2. Use documentation, not assumptions, to report polymers. This can include documentation from a supplier of what was delivered to you, scientific documentation of how monomer substances are expected to react based on your manufacturing process (this can be informed by your supplier), or laboratory analysis on the polymer in the product as delivered to the job site.
3. Be transparent about your documentation approach and report any assumptions. Appropriate locations on the HPD to report these include at the product level (2.1.1.1 Product Name, 2.1.1.5 Product Description, and/or 2.1.3.5 Inventory and Screening Notes), and at the Material and Substance levels (Material Notes, Substance Notes).
4. In case of conflict between #1 and #2, give preference to #2. I.e., report what you can document. Use #3 to orient readers of your HPD to your constraints and choices.

Examples of documentation include the following:

1. Safety Data Sheets (SDSs)
2. Supplier HPD (used as documentation for a Supplier HPD or a Product HPD)
3. Toxnot submittal
4. Supplier declaration letter (see Appendix)
5. Laboratory analysis, e.g. nuclear magnetic resonance, or NMR, spectroscopy

Required Data for Reporting Reactive Polymers

When reporting reactive polymers on an HPD, the following guidance shall be followed:

- If the CAS RN for the polymer species is known, follow guidance in 1a above
 - Be sure to include all additional substances per section 1a if they are present above the reporting threshold.
- If the CAS RN for the reacted polymer species is not known, the manufacturer may choose from these options¹²:
 - Follow the guidance above: 1b. Options for reporting with no CAS RN.
 - Inventory the unreacted substances using typical HPD reporting methodology. Include notes in appropriate sections of the HPD, i.e., Inventory and Screening Notes, Substance Notes, and Product Notes or Material Notes, describing the expected reaction and composition of the final product. In this case it is strongly encouraged to provide a URL to public documentation on the manufacturer website, or elsewhere, documenting the chemical reaction.
 - Example: With sugar-based binders in insulation products, there is no CAS RN for the reaction product. Manufacturers may report the input substances to this process with notes in each describing the chemical reaction.

¹² An option not listed here is to register the reacted polymer with CAS and report the new CAS RN. Experts consulted by HPDC in formulating this policy expressed that such an option would be desirable to facilitate more clear identification of polymers. However, CAS is not currently supporting that.



Reactive Chemistry Examples

The following example is intended to help implement the above principles. For situations not addressed here, manufacturers may use their best judgment to interpret the HPD Open Standard instructions and this Special Conditions guidance. HPDC may update these examples regularly to support consistent reporting. In case of questions or unique situations, HPDC is available to help interpret this guidance; please contact customersupport@hpd-collaborative.org.

Example: Context for hazard warnings

If an HPD is for a product with reacted polymer chemistry but the manufacturer has elected to inventory the unreacted polymer chemistry, the manufacturer may attest in the Substance Notes of the unreacted substances that they are not expected to be present in the product, or that they may be present in a different form or percentage weight. See Section 2.2.2.12 Substance Notes in the [HPD Open Standard](#) for all requirements for Substance Notes.

An example of a statement that would comply with this guidance (and may be used as a template) is:

This substance was supplied to [Name of Manufacturer] in unreacted form. [Name of Manufacturer] reacted this substance with other substances listed here to form a polymer that is part of the finished product reported on this HPD. This substance is listed here in compliance with HPD documentation rules because the polymer reaction product does not have an associated CAS RN; however, [Name of Manufacturer] attests that this substance and associated hazards are expected to be present in the finished product [only in residual form, below 1,000 ppm, below 100 ppm, etc]. The following study documents the expected chemical reaction under a series of process conditions: [public URL]. The following document shows the process conditions of the manufacturer of this product and how that relates to the chemical reaction (link). This statement provides information consistent with the HPD Special Condition policy for Polymers: www.hpd-c.org/polymers.

HARMONIZATION

[This section remains in draft form during the initial pilot period for this policy.]

This Special Condition has been harmonized with the following:

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INSTRUCTIONS



[This section remains in draft form during the initial pilot period for this policy.]

Special Conditions instructions for specific data fields follow; ***if there are no Special Conditions instructions for a data field, the requirements of the HPD Open Standard should be followed.*** If the HPD Open Standard and Special Conditions instructions are followed, the HPD will not be barred from qualifying for the LEED v4/4.1 Material Disclosure and Optimization, Material Ingredients credit.

HPD Field	Polymer Substance with known CAS RN	Polymer Substance with unknown CAS RN
Standard HPD Fields		
Substance Name	No change to requirements	The most accurate name possible according to typical HPD procedure or “undisclosed”, as appropriate
Identifier		“Not Applicable” or “Undisclosed”, as appropriate
Percent (%)		No change to requirements
GreenScreen Score		“N/A” or available BM score
Recycled Content		No change to requirements
Nanomaterial		No change to requirements
Substance Role		No change to requirements
Hazards, Agency(ies) with Warnings		“See GHS warnings below”
Hazard Screening Method		“GHS-compliant CLP” or “GHS-compliant SDS”
Screening Date	Date of the supplier disclosure	Date of the supplier disclosure
Substance Notes	In addition to standard requirements, list any of the following	



	<p>items, as applicable:</p> <ul style="list-style-type: none"> ● Descriptions of reactions ● Additional detail if “Other” is selected for Polymer type ● Details on oligomers ● Optional Reporting fields, including: <ul style="list-style-type: none"> ○ Accession Number or PMN number ○ Mole Ratio (or percent) of Each Monomer ○ Solubility/Dispersibility/Swellability ○ Particle size, including if the particles are respirable ○ Overall polymer charge ○ Reactive functional group(s) ○ Percent amine nitrogen (can be used for estimating aquatic toxicity) ○ Are the monomers blocked? (Y/N) ● Reason for the CAS RN to not be available, if applicable 	
Additional Listings	No change to requirements	Indicate any Additional Listings based on procedure for screening with no CAS RN
Polymer Special Condition Fields		
Polymer Type	<p>Choice of:</p> <ul style="list-style-type: none"> ● Thermoset prepolymer (i.e. partially reacted) ● Crosslinked thermoset ● Thermoplastic ● Elastomer ● Other 	
Number Average Molecular Weight	<p>Choice of:</p> <ul style="list-style-type: none"> ● <1,000 Da ● ≥ 1,000 Da and ≤ 10,000 Da ● >10,000 Da ● Enter a Specific Numerical Value ● Unknown <p>Percentage of Polymer with Molecular Weight <500 Da</p>	
Residual or Unreacted Monomer(s)	<p>“Residual or unreacted monomers associated with this polymer that are present above the selected reporting threshold have been reported elsewhere on this HPD.”</p>	



	[Yes/No]	
Functional Additive(s)	“All intentionally added functional additives, e.g. stabilizers, colorants, and plasticizers, present above the selected reporting threshold have been reported elsewhere on this HPD.” [Yes/No]	
GHS Hazard Statements	N/A	Enter any applicable GHS Category 1 and 2 Hazard Statements
Hazard Screening Compliance	N/A	“Hazard screening data sourced from OSHA and/or EU compliance CLP or SDS, as allowed by HPDC Special Conditions policy for polymers”

APPENDIX: SUPPLIER DECLARATIONS

[This section remains in draft form during the initial pilot period for this policy. The intent of this section is to support gathering of information from suppliers]

Data that may be requested by supplier declaration for use under this policy:

- Additional Listings: Procedures specified in HPDC’s [Best Practices for Additional Listings](#) [forthcoming] for screening against relevant lists with no CAS RN
- A manufacturer of a building product using a Supplier HPD as documentation can and should list the substances listed on that Supplier HPD as content on their Product HPD. However, this is not an ideal outcome if those substances are monomers that the manufacturer will react to form a polymer. The resulting Product HPD would not describe the “as delivered” product. It would also list hazards based on the monomers that are not expected to be present, or present to the same extent, in the finished product.
 - If the manufacturer can obtain a supplier’s declaration letter or a laboratory analysis documenting the reacted polymer as present in their finished product, they may use those to complete the HPD report.