

How to prepare registration dossiers covering nanoforms

May 2023

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1. Introduction

1.1. Objective

The purpose of this manual is to assist you in the preparation of a REACH registration dossier using IUCLID, in the case when you manufacture or import nanoform(s) of a substance. The manual introduces the basic concepts that are specific to the registration of nanoforms and provides you with detailed and practical instructions on how to fill in the relevant IUCLID sections.

This manual complements the manual *How to prepare registration and PPORD dossiers* for the parts where specific requirements apply to nanoforms, and does not constitute on its own a complete manual for preparing a registration dossier. The manual is available at <https://echa.europa.eu/manuals>.

This manual assumes that IUCLID has been installed, that you are using the web user interface and that you have a valid ECHA account. More information about each field, the different functionalities in IUCLID, and how to use those functionalities can be found in the help system of IUCLID (see chapter 1.8 *Functionalities of IUCLID*).

The manual also assumes that you have decided on your registration approach and have all relevant information available. Please consult the Guidance documents for support on the information requirements for registration, in particular the *Appendix for nanoforms applicable to the Guidance on Registration and Substance Identification* at <https://echa.europa.eu/support/guidance>.

The advice provided in this manual does not cover particular types of nanoforms or registration situations. Please consult the Q&A on nanoforms available on the ECHA website for more specific questions at:

<https://echa.europa.eu/support/qas-support/browse/-/qa/70Qx/view/scope/REACH/Nanoforms+of+substances>

1.2. Specific requirements for nanoforms

The amendment of the REACH Annexes to address nanoforms of substances establishes that when nanoforms of a substance are manufactured or imported, the standard information requirements and the chemical safety report must specifically address the different nanoforms. The registration dossier must contain information specific to each nanoform for every applicable information requirement and for the chemical safety report.

This chapter 1.2 introduces the specific concepts and requirements that apply when registering nanoforms. The subsequent chapters 2-4 explain how to report the information in the IUCLID format for the purpose of preparing a complete registration dossier.

1.2.1. Registering a single nanoform or a set of nanoforms

In principle, every manufacturer or importer of nanoforms of a substance must register each of their nanoforms in the registration dossier of the corresponding substance. Therefore, each registrant has the obligation to characterise each nanoform they manufacture/import as per REACH Annex VI, 2.4. It also implies to fulfill the requirements of Annexes VII-X by submitting a specific hazard dataset for each nanoform.

By derogation to the obligation to submit characterisation and hazard information on each single nanoform, registrants may register individual nanoforms via a so-called *set of nanoforms*, if two conditions are fulfilled:

- (i) the registrant reports clearly defined boundaries in terms of characterisation parameters of the nanoforms, which are part of the set;
- (ii) the registrant justifies that the hazard, exposure and risk assessment of the nanoforms can be performed jointly.

When individual nanoforms are registered through a set of nanoforms, the requirements of Annex VII-X can be fulfilled by submitting only one hazard dataset covering all the nanoforms within the set.

1.2.2. One hazard dataset per nanoform or set of nanoforms

Unlike for non-nanoforms of a substance, all information requirements that arise from the application of REACH Articles 10 and 12 (or Articles 17 and 18), and related Annexes must be specifically fulfilled for each nanoform or set of nanoforms. As a consequence, for registrations covering several nanoforms, for every nanoform or set of nanoforms, and for every information requirement as per Annex VII-X, the registrant must submit either:

- (i) study/ies performed on the nanoforms concerned or nanoforms representative of the set of nanoforms; or
- (ii) studies on other forms of the substance accompanied by endpoint-specific justifications as to why this information is adequate for assessing the nanoforms or set of nanoforms concerned (read-across according to Annex XI, 1.5); or
- (iii) a relevant adaptation in accordance with Annex XI of REACH or Column 2 of the relevant Annex VII-X; or
- (iv) a testing proposal for a study performed on the nanoform concerned or on a nanoform representative of the set of nanoforms.

The Annex VII-X information must be reported in such a manner that it is clear which information pertains to which nanoform or set of nanoform. In IUCLID, this is done by creating an electronic link between a (set of) nanoform(s) and each corresponding Annex VII-X information requirement. This linking is described in more detail in chapter **4.1**.

When data generated on a non-nanoform of the substance are used to fulfil an information requirement on a nanoform of the substance, a justification for this read-across must always be provided in accordance with section 1.5 of Annex XI. Similarly, the use of data generated on one nanoform of the substance to fulfil an information requirement on another nanoform of the substance, must always be justified in accordance with section 1.5 of Annex XI. Finally, the use of data generated on one nanoform of the substance to fulfil an information requirement of a set of nanoforms to which it does not belong must also be justified in accordance with section 1.5 of Annex XI. Technically, the justification for using data on one form to fulfil the requirements on another form are reported in IUCLID using a read-across approach.

1.2.3. Registering nanoforms in a joint submission

As mentioned above, any manufacturer or importer of nanoforms of a substance must register specifically each of these nanoforms in the registration dossier of the corresponding substance. Therefore, each registrant has the obligation to:

- 1) characterise the nanoforms they manufacture/import in accordance with Annex VI, either individually or through sets of nanoforms, and
- 2) ensure that a specific hazard dataset as per REACH Annexes VII-X is provided for each nanoform or set of nanoforms.

The information required under Annex VI, including the characterisation of nanoforms, must always be submitted separately by each registrant in their own IUCLID dossier. Before submitting the information characterising their nanoforms, registrants must decide whether they will register them as single nanoforms or within a set of nanoforms.

The information required under Annexes VII-X must be submitted for each specific nanoform or set of nanoforms. If the registrant decides to submit this information jointly, they need to agree on the data to be submitted in agreement with the co-registrants of the same nanoform or set of nanoforms. The jointly submitted information can concern single nanoform(s) or set(s) of nanoforms.

If the Annex VII-X information required for specific nanoforms or sets of nanoform is not submitted jointly in the lead dossier, the registrant of this nanoform or set of nanoforms must submit this information separately via the opt-out mechanism. In other words, they will have to provide in their own dossier a separate Annex VII-X dataset for each nanoform or set of nanoforms, as well as the resulting classification and labelling, hazard conclusions and safety assessment.

1.3. Validation assistant

The IUCLID Validation assistant has been developed to enable you to check your dossier before you submit it to ECHA via REACH-IT, to avoid that your dossier fails the completeness check. However, as of 2016, the technical completeness check performed on registration dossiers includes additional verifications by ECHA staff. These checks cannot be replicated using the Validation assistant and the related completeness issues are not displayed by the tool.

The areas of manual verifications by ECHA staff are described in the document *Information on manual verification at completeness check*, which is available at <https://echa.europa.eu/manuals>.

It is important to note that the completeness of the Annex VII-X information can be verified by the Validation assistant only if the dossier is expected to contain only **one dataset** of Annex VII-X data. When the dossier is required to contain Annex VII-X data for multiple (nano)forms or sets of nanoforms of the substance, the Validation assistant cannot detect if each Annex VII-X dataset is complete for each information requirement, or if it has been appropriately linked to the related (set of) nanoform(s). The Validation assistant will display if all endpoint study records indicated as key study or weight of evidence have been filled in with the necessary information for completeness. However, it will not detect if all the required endpoint study records have been included in the dossier, nor their linking to a specific nanoform or set of nanoforms.

When the registration dossier of a substance covers multiple nanoforms or sets of nanoforms, registrants must therefore manually ensure that they have linked a complete and specific Annex VII-X dataset to each nanoform or set of nanoforms.

1.4. Confidentiality flags and dissemination

Some of the information on the nanoforms and sets of nanoforms provided as part of your IUCLID dossier may be disseminated on the ECHA website. For detailed information on placing confidentiality requests and the principles of dissemination of information, please refer to the

manual *Dissemination and confidentiality under the REACH Regulation* available at <http://echa.europa.eu/manuals>. You are also strongly recommended to use the IUCLID *Dissemination preview* tool before submitting your dossier to ECHA, to simulate which information will be disseminated.

2. Section 1.2 Composition (Annex VI requirements)

The information arising from the application of REACH Annex VI subsections 2.3 and 2.4 are reported in IUCLID section 1.2 Composition. The main part of the composition record must be filled in as described in chapter 9.3.2 *Section 1.2 Composition* of the manual *How to prepare registration and PPORD dossiers*. The same concepts apply both for nanoforms and non-nanoforms when reporting the identity and concentration of the constituents of the composition, including any impurities or additives.

The advice provided in this section is valid for both the composition types **legal entity composition of the substance** and **boundary composition of the substance**, unless it is specifically otherwise indicated.

2.1. General information

In order to fill in information concerning nanoforms you must select *solid: nanoform* in the picklist *State/form*. This selection activates the fields under the heading *Characterisation of nanoforms* in the same composition record where you can report the key characterisation parameters for nanoforms and sets of nanoforms. Depending on the approach chosen to fulfil the REACH information requirements, different fields may be relevant. However, the principles of reporting individual nanoforms should be applied to report the characterisation parameters of the nanoforms that define the boundaries of the set.

When registering nanoforms of the substance as single **nanoforms**, then each different nanoform must be reported as a separate composition record in IUCLID section 1.2. All characterisation parameters reported should be specific to that nanoform.

When registering similar nanoforms as a **set of nanoforms**, the set must be reported in one composition record. In this case, all reported characterisation parameters must reflect the boundaries of the set as explained in detail in the *Appendix for nanoforms applicable to the Guidance on Registration and Substance Identification*.

For legal entity compositions: you must ensure that the information included in IUCLID section 1.2 *Composition* and section 1.4 *Analytical information* is sufficient to clearly report the characterisation parameters of the registered nanoform/set of nanoforms and that these sections are consistent with each other. Each of the compositions covering nanoforms must be linked with relevant analytical data using the field *Related composition(s)* in section 1.4.

For boundary compositions: when separate boundary composition records are created, you must ensure that each of them is linked with corresponding classification information in section 2.1. Several compositions may be linked to the same C&L record only if they have the same classification.

2.1.1. Linking of section 1.2 legal entity compositions to boundary compositions

Nanoforms (or sets of nanoforms) that are manufactured or imported by a registrant are reported in IUCLID section 1.2 as 'legal entity composition of the substance'. The nanoforms and sets of nanoforms that are reported in legal entity compositions are those that are considered registered when the registration dossier is successfully submitted.

In dossiers where Annex VII-X information is submitted for nanoforms or sets of nanoforms, compositions of the type 'boundary composition of the substance' must be reported, in addition to legal entity compositions. The boundary composition serves as a link between the legal entity composition (i.e., the registered nanoform or set of nanoforms) and the corresponding Annex VII-X data. When a boundary composition describes a set of nanoforms, it specifies the boundaries of the characterisation parameters of nanoforms that are included in the set of nanoforms and are covered by the submitted Annex VII-X information. When a boundary composition represents a single nanoform, the same characterisation parameters should be reported as for the legal entity composition it covers.

Each legal entity composition covering a nanoform (or set of nanoforms) must be explicitly linked to the boundary composition which relates to the relevant Annex VII-X information. This is crucial to establish that the information requirements for the nanoforms or sets of nanoforms reported in the legal entity composition have been fulfilled. The steps to link a legal entity composition to a boundary composition depend on whether the boundary composition, and hence also the related Annex VII-X information, has been reported in the same registration dossier or in the lead registration dossier:

For joint submission lead registrations, joint submission member registrations with separately submitted Annex VII-X data, and registrations where a joint submission does not exist: In the field *Related composition*, add an electronic link from a legal entity composition to the relevant boundary composition.

For joint submission member registrations that rely on jointly submitted Annex VII-X data in the lead dossier: In the field *Reference to related composition(s)*, provide a textual link from a legal entity composition to the relevant boundary composition, by indicating the name of the related nanoform / set of nanoforms described in the boundary composition of the lead dossier, or the name of the boundary composition record.

2.2. Characterisation of nanoforms

Step 1. Specify the *Type of information* reported by selecting the appropriate option from the picklist. Note that the selection determines which fields are visible to you in this subsection.

For a definition on concepts of **nanoforms** and **sets of nanoforms** please refer to the *Appendix for nanoforms applicable to the Guidance on Registration and Substance Identification* available at:


<https://echa.europa.eu/guidance-documents/guidance-on-reach>

Step 2. If you have indicated that you are reporting information for a **single nanoform**, you must enter the name of the nanoform in the field *Name of nanoform*. The name should describe the chemical composition and the key physicochemical characterisers of the nanoform, as relevant, and should allow the unique identification of the nanoform. If you have indicated that you are reporting information for a **set of nanoforms**, you will enter the name of the set of nanoforms in the field *Name of set of nanoforms*. The

name should indicate that it refers to a set of nanoforms, describe the chemical composition and the key physicochemical characterisers of the nanoforms within the set, as relevant, and should allow the unique identification of the set of nanoforms.

- Step 3.** If you are reporting a **boundary composition** of the substance and you have indicated that you are describing a *set of nanoforms* you must provide a justification to demonstrate that any variation within the boundaries of the set characterisers does not affect the hazard assessment, exposure assessment and risk assessment of the nanoforms in the set. For further information on how to prepare a complete justification, please refer to chapter 2.2.6.

This justification must be provided in the field *Justification for reporting set of similar nanoforms*. A text template for this field is provided to facilitate the reporting. The template outlines the different elements that must be included in the justification. To open the text template, click on the icon that shows the letter

A with an arrow at the bottom right  *Insert existing templates*. A pop-up window containing the template appears. To copy the text from the template to the field, click on it. Subsequently, edit the text to insert the relevant information. Ensure to address each point of the template. Alternatively, you may copy the contents of the template into a text document, complete all relevant points, and attach the document in the field *Attached information*

Note: If you are editing the template inside the field *Justification for reporting set of similar nanoforms*, it is recommended to edit the template in the latest version of Firefox as it enables you to expand the field view.

- Step 4.** You can attach additional documentation, such as scientific reports supporting the justification, in the field *Attached information*. Ensure to clearly refer to them in the justification.
- Step 5.** You can use the field *Cross-reference* to link to other IUCLID sections containing information that supports the reported justification. For example, you may link to study summaries corresponding to nanoforms within the boundaries of the set to support the justification. Ensure to clearly refer to any linked studies in the justification.

2.2.1. Shape

Under this heading, you will report relevant information to qualitatively describe the shape(s) of particles constituting a certain nanoform/set of nanoforms.

For legal entity compositions: to support the description of the shape you must provide in section 1.4 *Analytical information* an electron microscopy image that allows visualising the shape(s) of a representative number of the particles of the nanoform/nanoforms in a set.

- Step 6.** In the table *Shape description*, click on the *New item* button. A new entry is created, click on it to provide further information. Alternatively, a CSV file can be imported.
- Step 7.** Select the *Shape category* under which the particles of the nanoform/nanoforms in the set falls in from the available options in the picklist. For nanoforms consisting of particles whose shapes belong to different shape categories, i.e., **multimodal shapes**, a separate entry in the table should be created for each of them. You will find illustrative examples of reporting of different shape characteristics in the below **Figure 1** to **Figure 3**.

Step 8. Select the *Shape* that corresponds to the category selected above. Note that where a nanoform/nanoforms in a set consists of particles with more than one shape in that category, a separate entry in the table should be created for each of the shapes.

Step 9. Indicate the occurrence of the shape by selecting appropriate option from the *Pure shape* picklist.

For a **nanoform/set of nanoforms** consisting of particles, which have been detected to have only one shape, select *yes* (see **Figure 1**).

For a **nanoform** consisting of particles with more than one shape select *no* and provide the percentage of different shapes present (see **Figure 2**).

For a **set of nanoforms** consisting of particles with more than one shape, provide the maximum and minimum percentages of the shape in any nanoform where the shape is present together with other shapes.

For a **set of nanoforms** covering both nanoforms consisting of particles with only one shape and nanoforms consisting of particles with multiple shapes, report these shapes as separate entries with *Pure shape* indicated as *yes* and *no*, respectively (see **Figure 3**).

Step 10. For a **nanoform** consisting of particles with different shapes provide the *Typical composition* in terms of specific shapes of the individual nanoform and indicate the *Range* (minimum and maximum value and the unit) reflecting the batch-to-batch variability.

For a **set of nanoforms** provide the *Range* (minimum and maximum value and the unit) reflecting the variation between the nanoforms that are part of the set.

Step 11. Additional information on shape of the nanoform/set of nanoforms can be provided in the *Remarks* field.

Table 1: Examples of nanoforms consisting of particles with different shapes. The IUCLID reporting of these nanoforms is illustrated in the Figures 1-3.

Form	Shape	Pure	Typical [%]	Range [%]
A	rod	yes		
B	rod	no	30	20-35
	polyhedral	no	50	45-55
	spherical	no	20	10-25
C	cubic	yes		
D	cubic	no	40	30-50
	spherical	no	60	50-70
E	cubic	no	75	70-80
	polyhedral	no	25	20-30
F	cubic	no	30	25-40
	polyhedral	no	50	45-55
	spherical	no	20	5-25

Figure 1: Reporting of a nanoform consisting of particles with a single shape (Nanoform A).

Shape description + New item 📄 Import file ▼							
#	Shape catego...	Shape	Pure shape	Typical com...	Range	Remarks	Action
1	elongated	rod	yes	None	None	None	🗑️

Figure 2: Reporting of a nanoform consisting of particles with multimodal shapes (Nanoform B).

Shape description + New item Import file ▼							
#	Shape category	Shape	Pure shape	Typical composition	Range	Remarks	Action
1	elongated	rod	no	ca. 30 %	>= 20 <= 35 %	None	
2	spheroidal	polyhedral	no	ca. 50 %	>= 45 <= 55 %	None	
3	spheroidal	spherical	no	ca. 20 %	>= 10 <= 25 %	None	

Figure 3: Reporting of a set of nanoforms consisting of both particles with only one shape and particles with multiple shapes (Nanoforms C, D, E, F).

Shape description + New item Import file ▼							
#	Shape category	Shape	Pure shape	Typical composition	Range	Remarks	Action
1	spheroidal	cubic	yes	None	None	None	
2	spheroidal	cubic	no	None	>= 25 <= 80 %	None	
3	spheroidal	polyhedral	no	None	>= 20 <= 55 %	None	
4	spheroidal	spherical	no	None	>= 5 <= 70 %	None	

* The range is the smallest and largest concentration of particles of a certain shape in the nanoforms which are part of the set. The 'Typical composition' value is not applicable.

Step 12. For a **set of nanoforms** covering nanoforms consisting of particles falling under different shape categories or shapes you can provide in the field *Justification for set containing multiple shape categories or shapes* a justification demonstrating that the reported shapes can be grouped together in one set of similar nanoforms.

2.2.2. Particle size distribution and range

Under this heading, you will report the particle size distribution of the nanoform/set of nanoforms that is specific for the reported shape category. You can find an overview of the relevant parameters depending on the shape category in **Table 2** and how to fill in this information into your dossier in the below steps. Note that if the particles of a nanoform are surface-treated or functionalised, the parameters listed below should be measured on the particles which are surface-treated or functionalised.

For legal entity compositions: ensure that the corresponding analytical data are provided in section 1.4 *Analytical information*.

Table 2: Overview of the relevant parameters depending on the shape category.

Parameter	Spheroidal	Elongated	Platelet
Percentile	X	X	X
Length		X	
Lateral dimension 1			X
Lateral dimension 2			X
Aspect ratio		X	X
Assembly structure	X	X	X
Rigidity		X	X
Fraction of constituent particles in the size range 1-100 nm (%)	X	X	X

Step 13. Indicate the *Shape category* of the particles of the nanoform/the nanoforms in the set from the available options in the picklist. For nanoforms consisting of particles whose shapes belong to different categories, a separate block must be created for each of them. Click on the *New item* button to create a new block. Alternatively, a CSV file can be imported.

Step 14. Next, in the table *Percentile* click on the *New item* button. A new entry is created, click on it to provide further information. Alternatively, a CSV file can be imported.

Step 15. Report as a minimum the values for the percentiles *d10*, *d50* and *d90*. In case of elongated particles and platelets, percentile values are based on the width and the thickness of particles, respectively. For each shape category the values *d10*, *d50* and *d90* must be reported in the same 'Percentile' table and must include:

For a **nanoform**, the *Typical value* and the *Range* (minimum and maximum value and the unit) reflecting the batch-to-batch variability.

For a **set of nanoforms**, the *Range* (minimum and maximum value and the unit) reflecting the variation between the nanoforms that are part of the set.


Step 16. Additional information on the percentile can be provided in the *Remarks* field.

Step 17. Next, provide information on the other parameters relevant to the shape category (see **Table 2** for the required information):

For a **nanoform**, provide the information as typical values and ranges with the unit of measurement (e.g. nm) within the batch-to-batch variability.

For a **set of nanoforms**, provide the ranges (minimum and maximum values and the units) reflecting the variation between the nanoforms that are part of the set.

Step 18. Report *Additional information* on other morphological characterisation, such as assembly structure and/or on rigidity, if applicable. A text template with suggestions on what to report is provided for this field to facilitate the reporting. To open the text template, click on the icon that shows the letter A with an arrow at the bottom right

 **Insert existing templates.** A pop-up window containing the template appears. To copy the text from the template to the field, click on it. The text should be then edited to insert the relevant data.

Step 19. Provide the number fraction of constituent particles with at least one of the external dimensions in the size range 1 nm to 100 nm in the field *Fraction of constituent particles in the size range 1-100 nm (%)*. Note that for this value all the measured particles of the nanoform/the nanoforms in the set should be taken into consideration.

2.2.3. Crystallinity

Under this heading, you will report information on crystallinity. This information includes identification and quantification of crystalline and amorphous structures present in the reported nanoform/set of nanoforms. Below you will find step by step instructions on how to fill in relevant information depending on the structure of the particles of the nanoform/the nanoforms in the set with some examples illustrating how to use the IUCLID fields to report certain type of information.

For legal entity compositions: ensure that analytical data supporting the reported structural information are provided in section 1.4 *Analytical information*.

Step 20. In the table *Structures* click on the *New item* button. A new entry is created, click on it to provide further information. Alternatively, a CSV file can be imported.

Step 21. Indicate the structure by selecting an appropriate option in the picklist. Each of the reported structures for nanoforms/set of nanoforms must be reported as a separate entry. You will find illustrative examples of reporting of different structures in the below **Figure 4** to **Figure 7**.

Step 22. Report the *Name* of the crystal structure.

For crystalline structure, provide the mineral name or another relevant name of the structure.

For amorphous structure provide 'amorphous' as the *Name* when the nanoforms are partially-crystalline (see **Step 25**).

Step 23. Indicate the *Pure structure* by selecting appropriate option from the picklist and using the following approach:

For a fully crystalline **nanofoms** consisting of particles, which have been detected to have only one crystal structure, select yes (see **Figure 4**)

For a fully crystalline **nanofoms** consisting of particles with more than one crystal structure select no and provide the percentage of each different crystalline structure present.

For a partially crystalline **nanofoms** consisting of particles with both amorphous and crystalline structures select no and provide the percentage of each different structure present. For the crystalline fraction of the nanoform, report each crystal structure with a separate entry. For the amorphous fraction of the nanoform, provide 'amorphous' as the *Name*.

For a fully amorphous **nanoforms**, select yes (see **Figure 5**).

If a **set of nanoforms** covers individual nanoforms consisting of particles with only one crystalline and/or amorphous structure and nanoforms consisting of particles with multiple structures, report each of them as separate entries within the set with Pure structure indicated as yes and no, respectively. For the crystalline fraction of the nanoform, report each crystal structure with a separate entry. For the amorphous fraction of the nanoform, provide 'amorphous' as the *Name* (see **Figure 6** and **Figure 7**).

Step 24. For a **nanoform** consisting of particles with different crystal structures provide the *Typical composition* and indicate the *Range* (minimum and maximum value and the unit) reflecting the batch-to-batch variability.

For a **set of nanoforms** provide the *Range* (minimum and maximum value and the unit) reflecting the variation between the nanoforms that are part of the set.

Step 25. For crystalline nanoforms/nanoforms in the set, report the related crystallographic parameters: *Crystal system* and *Bravais lattice*.

Figure 4: Reporting of a fully crystalline nanoform consisting of particles with only one crystal structure.


#	Structure	Name	Pure struct...	Typical com...	Range	Crystal syst...	Bravais latti...	Action
1	crystalline	rutile	yes	None	None	✓ tetragonal	None	

Figure 5: Reporting of a fully amorphous nanoform.


#	Structure	Name	Pure struct...	Typical com...	Range	Crystal syst...	Bravais latti...	Action
1	amorphous	None	yes	None	None	None	None	

Figure 6: Reporting of a fully crystalline set of nanoforms consisting of nanoforms which contain particles with more than one crystal structure.

#	Structure	Name	Pure structure	Typical comp...	Range	Crystal system	Bravais lattice	Action
1	crystalline	rutile	no	None	>= 20 <= 30 %	✓ tetragonal	None	🗑️
2	crystalline	anatase	no	None	>= 70 <= 80 %	✓ tetragonal	None	🗑️

* The range is the smallest and largest concentration of particles of a certain crystal structure in the nanoforms which are part of the set. The 'Typical composition' value is not applicable.

Figure 7: Reporting a set of nanoforms consisting of particles with both amorphous and crystalline structures.

#	Structure	Name	Pure structure	Typical comp...	Range	Crystal system	Bravais lattice	Action
1	partially-crystalline	amorphous	no	None	>= 5 <= 70 %	None	None	🗑️
2	partially-crystalline	anatase	no	None	>= 45 <= 55 %	✓ tetragonal	None	🗑️
3	partially-crystalline	rutile	no	None	>= 25 <= 50 %	✓ tetragonal	None	🗑️
4	crystalline	rutile	no	None	>= 70 <= 80 %	✓ tetragonal	None	🗑️
5	crystalline	anatase	no	None	>= 20 <= 30 %	✓ tetragonal	None	🗑️

* The range is the smallest and largest concentration of particles of a certain crystal structure in the nanoforms which are part of the set. The 'Typical composition' value is not applicable.

Step 26. Additional information on crystallinity can be provided in the *Description* field.

2.2.4. Specific surface area

Under this heading, you will report the surface area by mass and/or by volume for the nanoform/the nanoforms in the set. The information requirements require that you report surface area by mass and/or by volume. If you wish to report surface area by mass, follow **Step 27**. If you wish to report surface area by volume, follow **Step 28** and **Step 29**.

For legal entity compositions: ensure that the relevant analytical data are provided in section 1.4 *Analytical information*.

Step 27. For a **nanoform** provide the *Typical specific surface area* per unit mass and indicate the *Range of specific surface area* (minimum and maximum value and the unit) within the batch-to-batch variability.

For a **set of nanoforms** provide the *Range of specific surface area* (minimum and maximum value and the unit) reflecting the variation between the nanoforms that are part of the set.

Step 28. For a **nanoform**, provide the *Typical volume specific surface area* per unit volume and *Range of volume specific area* (minimum and maximum value and the unit) within the batch-to-batch variability.

For a **set of nanoforms** provide the *Range of volume specific area* (minimum and maximum value and the unit) reflecting the variation between the nanoforms that are part of the set.

Step 29. If you provide only the values for the volume surface area and the study has been performed by the BET method, you must also report the *Skeletal density* by indicating both minimum and maximum values and the unit for the values.

Step 30. Additional information on specific surface area can be provided in the *Remarks* field.

2.2.5. Surface functionalisation / treatment

Under this heading you will report whether surface functionalisation or treatment was applied to particles of the nanoform/the nanoforms in a set. This information should characterise the composition of the particles as a whole including their surface treatment.

Note that a nanoform consisting of particles without surface treatment is a different nanoform than one where the particles are surface-treated or functionalised and these must be addressed in separate composition records in section 1.2. Furthermore, nanoforms consisting of particles with surface treatment and nanoforms consisting of particles without surface-treatment must a priori not be included in one unique set of nanoforms. You must rather create, as a minimum, two sets of nanoforms; one for the nanoforms consisting of particles which are not surface-treated and another one for the nanoforms consisting of particles which are surface treated (assuming other parameters remain the same).

For legal entity compositions: ensure that, if applicable, the relevant analytical data are provided in section 1.4 *Analytical information*.

Step 31. Where surface functionalisation/treatment is applied, indicate *yes* in the picklist *Surface treatment applied*. Then to provide information on the functionalisation/treatment click on the *New item* button to create a surface treatment block and indicate further information. Alternatively, a CSV file can be imported.

Note that in case different surface treatments have been applied on particles of the **nanoforms in a set**, then a separate block in the same compositional record can be created for each of the treatments. In this case, you must ensure that the surface treating agents used are chemically similar, the resulting surface chemistry and the coverage of the surface of the particles is similar and the (eco)toxicity of the treating agents is the same.

Step 32. If you indicate *no*, then you should not provide anything further under the Surface functionalisation / treatment heading.

Step 33. For a **set of nanoforms**, indicate if the set contains both nanoforms consisting of surface-treated particles and nanoforms consisting of non-surface-treated particles. In case the set covers both nanoforms consisting of surface-treated particles and nanoforms consisting of non-surface treated particles, a very robust justification needs to be provided (see **Chapter 2.2.6**)

Step 34. Insert the *Surface treatment name*.

Step 35. In the table *Surface treatment*, report the identity of the surface treatment agents applied on the particles' surface. Click on the *New item* button to create a new entry for each layer. Click on it to provide further information. Alternatively, a CSV file can be imported.

Step 36. Indicate the *Order* of the surface treatment agent and link a reference substance that describes the agent applied by clicking the button *Select* in the *Surface treatment agent* field. If the desired reference substance is not present in your database, click the *Create* button and insert the information of the reference substance in the available fields.


Note that a reference substance linked to each surface treating agent must be specified with a IUPAC name. If a name following the IUPAC nomenclature cannot be derived, you should still provide a name defining the chemical nature of the agent. In addition, the EC number and CAS number should be provided where available. When the surface treating agents are reported in a boundary composition, and in the case that confidentiality concerns apply, it is possible to identify the treating agents by describing their chemical nature. In this case, the reference substance should describe the chemical nature of the treating agents as specifically as possible. The specific surface treating agents used must always be individually (chemical name, EC and CAS numbers where available) reported in the legal entity compositions that refer to this boundary composition.

Step 37. For a **nanofom**, provide the *Typical weight-by-weight contribution % (w/w)* and the *Range of weight-by-weight contribution % (w/w)* of each surface treating agent applied on the particles.

For a **set of nanoforms** provide the *Range of weight-by-weight contribution % (w/w)* of the surface-treatment agent applied on the particles of the nanoforms which are part of the set (minimum and maximum value).

Step 38. Additional information on the surface functionalisation/treatment agent can be provided in the *Remarks* field.

Step 39. Next, indicate the nature of the *External layer* by selecting one of the options available in the picklist.

Step 40. In the *Description* field, you must provide description of the main features of the processes used for the surface treatment/ functionalisation, molar ratio of each surface treating agent used, and the functionalities introduced by the treatment. A text template with suggestions on what to report is provided for this field to facilitate the reporting. To open the text template, click on the icon that shows the letter A with an arrow at the bottom right  *Insert existing templates*. A pop-up window containing the template appears. To copy the text from the template to the field, click on it. The text should be then edited to insert the relevant data.

Step 41. Provide the *Percentage of coverage of particles surface, %* that is representative for the nanofom/the set of nanoforms. This value refers to the percentage of the core particle surface covered by the surface treating agent.

Step 42. Any supporting information, such as illustrations of the particle structure or information that complements the description of surface functionalisation/treatment process (e.g. reaction schemes and process workflows) can be attached in the field *Attached information*.

2.2.6. Justification for set of nanoforms

A condition for registering individual nanoforms as part of a set of nanoforms is that a justification is provided demonstrating that the hazard, exposure and risk assessment of all the nanoforms in the set can be performed jointly. The justification for performing jointly the hazard assessment of the nanoforms included in a set of nanoforms must be substantiated with relevant studies. These studies must be performed on nanoforms that are representative of the nanoforms within this set. Consequently, the justification must be based only on data generated on nanoforms belonging to the set of nanoforms. This must be demonstrated in the justification by characterising each test material in accordance with parameters laid down in section 2.4 of Annex VI.

The justification must fulfil all of the conditions below:

- (i) The justification must address separately each characteriser listed in section 2.4 of REACH Annex VI. To this end, it must follow the structure of the text template available in the IUCLID section 1.2 field *Justification for reporting set of similar nanoforms* and address all applicable points in it.
- (ii) The justification must be substantiated by scientific evidence addressing the physicochemical, environmental fate, ecotoxicity and toxicity properties of nanoforms that are within the boundaries of the set of nanoforms. For each characteriser, the justification must summarise the underlying data.
- (iii) Each scientific evidence summarised in the justification must refer to a study summary or robust study summary.
 - The (robust) study summary can be provided by attaching it in the section 1.2 field 'Attached information'.
 - The (robust) study summary can also be reported as an endpoint study record in the appropriate IUCLID section. In this case, it can be referred to in the justification by linking it via the section 1.2 field 'Cross-reference'.
 - Alternatively, references to publicly available literature may be provided instead of a (robust) study summary. This can also be provided by attaching it in the section 1.2 field 'Attached information'.

In all of the above cases, the findings from the studies referred to, and the characterisers of the nanoforms used in the studies, must be summarised in the relevant part of the justification.

- (iv) For each characteriser, the justification must explain how the scientific evidence demonstrates that all the nanoforms in the set can be assessed jointly. This explanation must include a demonstration that the nanoforms used to generate the data underlying the justification are representative of all the nanoforms included in the boundaries of the set.

To this end, the nanoform characterisers of the test materials used in the generation of the data that supports the justification must be known, and the relevance of the test material for the nanoforms in the set must be addressed.

- (v) The justification must always be provided in full in the field 'Justification for reporting set of similar nanoforms' or in the field 'Attached information'. The justification cannot refer to explanations provided elsewhere in the dossier.

The justification provided in the IUCLID section 1.2 field 'Justification for reporting set of similar nanoforms' and 'Attached information' is manually verified by ECHA staff during completeness check.

3. Section 1.4 Analytical information (Annex VI requirements)

As described in the previous chapter, in section 1.4 *Analytical information* you must include information that allows obtaining a full picture of the characterisation parameters of the nanoform/set of similar nanoforms and provide analytical data that supports the values reported in each legal entity composition of section 1.2. Note that the description of the analytical methods must be given at the level of details that would allow the methods to be reproduced. Further information on requirements on analytical data for each characterisation parameter can be found from *Appendix for nanoforms applicable to the Guidance on Registration and Substance Identification* available at <https://echa.europa.eu/support/guidance>.

It is crucial that you link the reported analytical information to the corresponding legal entity composition in section 1.2 to indicate to which reported composition you refer. To link the sections, click in section 1.4 on the field *Related composition(s)* and select the relevant composition record from the dialogue window.

In order to provide analytical methods and results used to verify the identity of the nanoform/set of nanoforms use the table *Analytical determination for nanoforms*. Click on the button *New item*. This action will open a dialogue window, where you can enter relevant information following the below steps. Alternatively, a CSV file can be imported.

- Step 1.** From the picklist *Parameter* select an applicable entry corresponding to the information on a characterisation parameter reported in section 1.2. If the analytical report that you attach contains results for more than one parameter, you can select more than one entry in this picklist.
- Step 2.** Indicate the purpose for which the analysis was carried out in the picklist *Purpose of analysis*.
- Step 3.** Select the *Analysis type* and *Type of information provided*. You can add any *Remark* you consider relevant. Note that you can report several analysis types per each parameter.
- Step 4.** For each entry, you should attach the file containing the method and result of the analysis. If you cannot provide results for the indicated analysis type, select the reason from the picklist *Rationale for no results* and fill in the explanation in the *Justification* field. In this case, do not attach any file for that indicated analysis type.

4. Sections 4, 5, 6, 7 – Endpoint sections (Annex VII to X requirements)

As described in chapter, 1.2.2, when registering nanoforms, all information requirements under REACH Annex VII-X must be specifically addressed for each nanoform or set of nanoforms. Therefore, for registrations covering nanoforms, for every nanoform or set of nanoforms, and for every information requirement as per Annex VII-X, the registrant must submit in IUCLID sections 4-7 either:

- studies performed on the nanoforms concerned; or
- studies on other forms of the substance accompanied by endpoint-specific justifications as to why this information is adequate for assessing the nanoforms concerned (read-across according to Annex XI, 1.5; or
- relevant adaptations as foreseen by Annex XI of REACH or Column 2 of the relevant Annex VII-X.

The Annex VII-X information and the corresponding nanoform or set of nanoforms must be clearly linked.

Chapter 9.6: *Sections 4, 5, 6, 7 and 8 - Endpoint sections* of the manual *How to prepare registration and PPORD dossiers* provides a thorough description of the concepts that apply when filling in these IUCLID sections and guides you to the most relevant fields to be completed. The information provided in chapter 4 of this manual complements that advice with instructions that are specific to the reporting of information for nanoforms.

4.1. Linking the Annex VII-X data to a nanoform or set of nanoforms

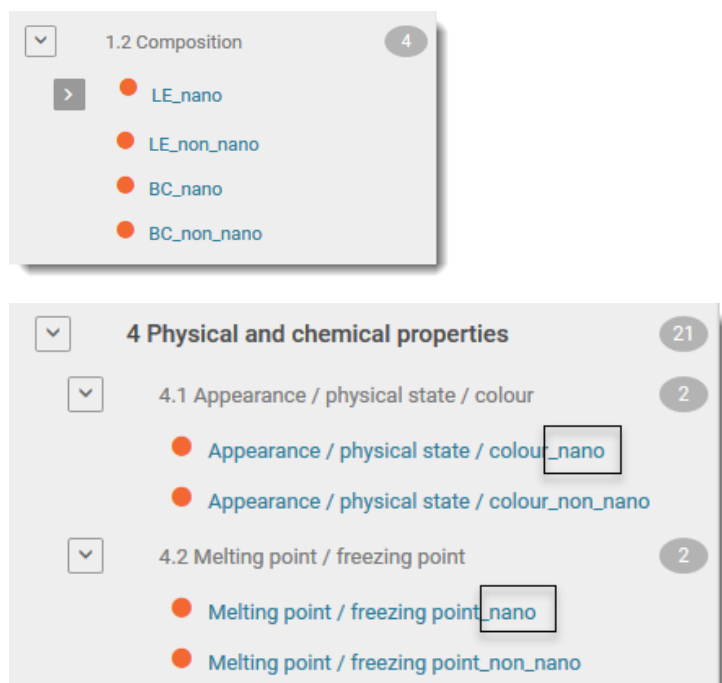
As explained above, when registering nanoforms, all information requirements under REACH Annex VII-X must be specifically addressed for each nanoform or set of nanoforms. The Annex VII-X information and the corresponding nanoform or set of nanoforms must be clearly linked.

The recommended approach to link the information is by use of the IUCLID Assessment entity feature. In the following, the steps to perform the linking are described (see illustrative examples in **Annex 3**).

- Link the legal entity composition covering a nanoform or a set of nanoforms to the corresponding boundary composition, as described in chapter 2.1.1.
- For each boundary composition in the dossier that describes a nanoform or a set of nanoforms, create an Assessment entity in IUCLID section 1.10 of the type 'Specific composition/form of the registered substance'. To this end, follow the advice in Annex 5: *Assessment entities in IUCLID 6* of the manual *How to prepare registration and PPORD dossiers*.
- For each boundary composition in the dossier that describes a nanoform or a set of nanoforms, create a specific endpoint summary for each information requirement in REACH Annex VII-X that applies at the tonnage of registration. To read more about completing endpoint summaries, please refer to chapter 9.6.7: *How to complete endpoint summaries > Endpoint summaries at endpoint level* of the manual *How to prepare registration and PPORD dossiers*.
- Link each endpoint summary to the specific endpoint study record(s) for fulfilling the information requirement for that nanoform or set of nanoforms. To fulfil an information requirement, at least one endpoint study record reported as a key study, weight of evidence, data waiving or testing proposal (Annex IX and X information requirements) must be linked. Please refer to chapters 4.3 to 4.7 of this manual for more information on completing these types of endpoint study records in registrations covering nanoforms.
- Link the Assessment entity to the corresponding boundary composition via the Assessment entity field *Related composition*.
- Link the Assessment entity to the corresponding endpoint summaries via the field *Endpoint summary*.

Alternatively, linking of the information can be done through the clear and consistent naming of the Annex VII to X records that are relevant for a nanoform or a set of nanoforms (see **Figure 8**).

Figure 8: Linking information through the naming convention.



Regardless of the chosen linking method, the same linking convention must be used through the dossier i.e., it is not acceptable to use the naming convention for certain endpoints and the Assessment entity feature for other.

The linking of a specific set of Annex VII-X information is an explicit requirement for boundary compositions describing nanoforms or sets of nanoforms. However, if the registration also includes boundary compositions for non-nanoforms of the substance, it is advisable to apply the same approach to those boundary compositions, to bring clarity to the dossier.

4.2. The test material record

Chapter 8: *Test material* of the manual *How to prepare registration and PPORD dossiers* explains the concept of the test material record that is used to describe the test material in the endpoint study records of IUCLID sections 4–8. Chapter 9.6.2: *How to complete endpoint study records* provides advice on how to fill in the test material record. This advice is largely relevant also when reporting an endpoint study record for a nanoform, with the following additional information to be reported in the test material record:

- Under the heading *Other characterisers*, report the *Test material form*. If the test material corresponds to a nanoform, select one of the values in the picklist starting with 'solid: nanoform', as appropriate.
- In the field *Details on test material*, provide information on the characterisers of the tested nanoform. To this end, it is recommended to load the text template that is available in the field and guides you to provide relevant information. As a minimum, provide information on the:
 - shape;
 - aspect ratio;
 - particle size distribution;
 - crystal structure;
 - specific surface area;
 - surface treatment of the tested nanoform.

4.3. How to report experimental studies

Chapter 9.6.2: *How to complete endpoint study records* of the manual *How to prepare registration and PPORD dossiers* provides advice on how to report an endpoint study record for an experimental study in IUCLID. This advice is largely relevant also when reporting experimental study information for a nanoform, with the following additional instructions:

- Ensure to report the information on the tested nanoform as indicated in chapter 4.2.
- Keep in mind that an experimental study performed on a given nanoform can only be used as such to fulfil the information requirement for the same nanoform or a set of nanoforms where the tested nanoform is included. Whenever the study is intended to be used to fulfil the information requirement for another nanoform or a set of nanoforms in which the tested nanoform is not included, this must be justified, as described in chapter 4.5.

4.4. How to report data waiving

Data waiving refers to the omission of an Annex VII-X information requirement with a justification that falls within the reasons foreseen by REACH Annex VII-X columns 1 or 2, or Annex XI section 2 or 3.

- Chapters 9.6.2: *How to complete endpoint study records* and 9.6.5: *Examples of completing endpoint study records* of the manual *How to prepare registration and PPORD dossiers* provide advice on how to complete a data waiving endpoint study record in IUCLID.

- Chapter 2 of the document *Information on manual verification at completeness check* contains advice on how to report a complete justification for data waiving.

When registering nanoforms of substances, the following additional instructions apply:

- As mentioned above, each information requirement under Annex VII-X must be specifically addressed for each nanoform or set of nanoforms. When addressing an information requirement through data waiving, in principle, a specific data waiving endpoint study record should be reported for each nanoform or set of nanoforms.
- However, if you address an information requirement for a nanoform or a set of nanoforms with data waiving, and the **same data waiving justification applies** to several nanoforms or sets of nanoforms, then it is not necessary to replicate the data waiving record for each of them, as long as the justification applies to, and explicitly mentions, all (sets of) nanoform(s) it covers. You must still report a separate endpoint summary for each nanoform or set of nanoforms for which Annex VII-X information is submitted. The common data waiving record should then be linked to the endpoint summaries of the relevant nanoforms or sets of nanoforms (see **Figure 9**).
- When addressing an information requirement for nanoforms using data waiving, pay attention to that Column 2 of REACH Annexes VII-X has been amended with specific provisions for nanoforms for a number of information requirements. You need to ensure that your justification for data waiving is in line with these amendments for it to be considered complete.
- Note that if you consider that you are not able to fulfil an information requirement for a (set of) nanoform(s) because there are no available data or adaptations that can address the information requirement in an adequate manner, and test guidelines and guidance for nanoforms are still under development, you should follow the advice provided in chapter 4.6 precisely.

4.5. How to report read-across from one form to another

As explained in chapter 1.2.2, when data generated on a non-nanoform of the substance is used to fulfil an information requirement on a nanoform of the substance, a justification for this read-across must always be provided in accordance with section 1.5 of Annex XI. Similarly, the use of data generated on one nanoform of the substance to fulfil an information requirement on another nanoform of the substance must always be justified in accordance with section 1.5 of Annex XI. Finally, the use of data generated on one nanoform of the substance to fulfil an information requirement of a set of nanoforms to which it does not belong must also be justified in accordance with section 1.5 of Annex XI. Technically, the justification for using data on one form to fulfil the requirements on another form are reported in IUCLID using a read-across approach.

For further information on how to use information on one (nano)form of the substance to fulfil the information requirements for another (nano)form, please refer to the *Appendix R.6-1 for nanoforms applicable to the Guidance on QSARs and Grouping of Chemicals* available at <https://echa.europa.eu/guidance-documents/guidance-on-information-requirements-and-chemical-safety-assessment>.

Chapter 9.6.3: *How to report read-across in IUCLID* of the manual *How to prepare registration and PPORD dossiers* describes how to report read-across in a IUCLID dossier. The instructions to be followed when applying read-across between forms of the same substance are those for *Read-across from supporting substance (structural analogue or surrogate)*. In essence, the approach entails the reporting of one or several source records and a target record. Each source record describes the experimental study performed on the source material(s) and form(s); the target record describes the outcome of reading across from the source study/ies to the target material and form. Both the source and target records must be present in the registration dossier and the target record must link to its source record(s).

When registering nanoforms of substances, the following additional instructions apply:

- As mentioned above, the target record of an analogue read-across approach must contain the link to its source record(s) that must be present in the same dossier. Additionally, when registering nanoforms of a substance, there is the need to link the endpoint study records to the appropriate nanoform or set of nanoforms, as follows (see **Figure 10**):
 - The read-across target record [*Type of information = read-across from supporting substance (structural analogue or surrogate)*] must be linked from the endpoint summary that corresponds to the (set of) nanoform(s) which is the target of the read-across. In other words, the read-across target record must be linked to the nanoform for which read-across is used to fulfil the information requirement.
 - The read-across source record(s) [*Type of information = experimental study*] must be linked from the endpoint summary/ies of the (set of) nanoform(s) on which the experimental studies were performed.
- When providing the justification for the read-across in the read-across target record field *Justification for type of information*, ensure to provide a thorough explanation as to why the information generated on one (nano)form of the substance is adequate to fulfil the information requirements for another (nano)form of the substance. The field contains a text template that can be further adapted and extended, as needed, to report the necessary justification for the particular read-across hypothesis. For further information, please refer to the *Appendix R.6-1 for nanoforms applicable to the Guidance on QSARs and Grouping of Chemicals*.
- As mentioned above, each information requirement under Annex VII-X must be specifically addressed for each nanoform or set of nanoforms. When addressing an information requirement through read-across, in principle, a specific read-across reporting should be provided for each nanoform or set of nanoforms.
- However, if you address an information requirement for a nanoform or a set of nanoforms with read-across, and the **same read-across justification applies** to several nanoforms or sets of nanoforms, then it is not necessary to replicate the read-across target record for each of them, as long as the justification applies to, and explicitly mentions, all (sets of) nanoform(s) it covers. You must still report a separate endpoint summary for each nanoform or set of nanoforms for which Annex VII-X information is submitted. The common read-across target record should then be linked to the endpoint summaries of the relevant nanoforms or sets of nanoforms (see **Figure 11**).
- As instructed in chapter 9.6.3 of the manual *How to prepare registration and PPORD dossiers*, you need to under the heading *Test material information*:
 - In the target record of the read-across approach, specify the material that is the **target** of the read-across. Ensure to describe in the test material information the **form of the substance to be read-across to**, as per the advice in chapter 4.2 of this manual.
 - In the source records(s) of the read-across approach, specify the material on which the experimental study was performed that is used as the read-across source. Ensure to describe in the test material information the **form of the substance that was tested**, as per the advice in chapter 4.2 of this manual.

4.6. How to report practical constraints with fulfilling information requirements due to absence of guidance/test guidelines applicable for nanoforms

For a registration dossier to be complete, all the information requirements outlined in REACH Annexes VII-X at the tonnage band of the registration must be fulfilled by either (i) (robust) study summaries indicated as key study or weight of evidence; (ii) a justification for waiving the information requirement as per REACH Annex VII-X columns 1 or 2 or Annex XI section 2 or 3; or (iii) a testing proposal, for Annex IX and X information requirements.

Exceptionally, for nanoforms of substances, for endpoints where there are no available data or adaptations that can address the information requirement in an adequate manner and where relevant test guidelines and guidance for nanoforms are still under development, the following temporary approaches can be used.

Annex IX and X requirements:

- Submit a testing proposal following the instruction in chapter 9.6.4: *How to report testing proposals in IUCLID* of the manual *How to prepare registration and PPORD dossiers* and **chapter 4.7** of this manual.
- Under the heading *Test guideline*, provide in the field *Principles of method if other than guideline* the statement that existing guidance and/or test guidelines are not applicable for nanoforms and specific guidance and/or test guidelines are still to be developed.
- For testing proposals on vertebrate animals, ensure to provide considerations for why the different adaptation possibilities provided by the REACH Regulation cannot be used to address the information requirement, and why animal testing is necessary. For further advice on how to report these considerations, refer to chapter 3 of the document *Information on manual verification at completeness check*.

Annex VII and VIII requirements:

You may report the practical constraints in fulfilling the information requirements at the present moment. The approach can only be used for endpoints where it is recognised that existing test guidelines/guidance cannot be applied to nanoforms. As soon as validated test methods become available, you will need to (i) generate the necessary information to fulfil this information requirement in line with the REACH Regulation and (ii) update your registration dossier accordingly without undue delay. To report the practical constraints to fulfil a specific Annex VII or VIII information requirement as long as validated test methods are not available:

- Indicate the endpoint study record as a data waiving by selecting in the field *Data waiving* the value 'other justification'.
- In the field *Justification for data waiving*, select only the value 'other:' and in the adjacent text field, type in the following statement: "This information requirement is not addressed until the relevant guidance and/or validated test methods for nanomaterials are available. Evidence that no other adequate information exists to fulfil this requirement is provided below under 'Attached justification'."
- In the same endpoint study record, in the field *Attached justification*, attach the template available on the ECHA nanomaterials page where you have addressed all points. The justification must be specific to the endpoint where it is attached, and to the nanoforms or sets of nanoforms that it covers.
- ECHA nanomaterials page: <https://echa.europa.eu/regulations/nanomaterials> (the template to report practical constraints with fulfilling Annex VII-VIII information requirements is available under 'Guidance and manuals').

4.7. How to report testing proposals

Chapter 9.6.4: *How to report testing proposals in IUCLID* of the manual *How to prepare registration and PPORD dossiers* describes concepts and main fields to be used when reporting testing proposals in IUCLID. When registering nanoforms of substances, the following additional instructions apply.

For registrations covering nanoforms of substances, testing proposals must always specify the particular form that is proposed to be tested, or the form that you propose to read-across to from another (nano)form of the substance. It is not possible to submit a generic testing proposal covering various nanoforms or covering both a non-nanoform and nanoform of the substance.

- When proposing to test a nanoform of the substance that you are registering with this dossier, you should report it as a testing proposal with the *Type of information* set to 'experimental study planned'. Ensure to describe in the test material information the form of the substance to be tested as per the advice in chapter 4.2 of this manual.
- When you have submitted a testing proposal for a particular (nano)form of the substance that you are registering with this dossier, and you are proposing to read-across from these study results to another (nano)form of the same substance, this should be reported as a testing proposal with the *Type of information* set to 'experimental study planned (based on read-across)'. Ensure to describe in the test material information the form of the substance to be tested as per the advice in chapter 4.2 of this manual, and to provide a thorough justification as to why the information generated on one (nano)form of the substance is adequate to fulfil the information requirements for another (nano)form of the substance.

4.8. IUCLID section 4.28 – Additional physico-chemical properties of nanomaterials

IUCLID sections 4–7 contain the formats for reporting of (robust) study summaries of tests or adaptations to fulfil the information requirements arising from REACH Annexes VII–X. The sub-sections under IUCLID section 4.28 allow the user to report (robust) study summaries of tests performed on nanomaterials to determine specific physicochemical properties.

Only one sub-section in IUCLID section 4.28 is a formal information requirement when registering nanoforms of a substance; this is section 4.28.8 Nanomaterial dustiness, which corresponds to the Annex VII requirement 7.14bis Dustiness. This section is subject to completeness check whenever a registration covering nanoforms of a substance is submitted.

The remaining sub-sections under section 4.28 are optional, and should be provided whenever available and relevant information exists. For example, these sections may be used to provide further information on the characterisation of the test materials that have been used to generate information to fulfil information requirements under REACH Annexes VII–X. As described in chapter 4.2 of this manual, a summary of the characterisers of a nanoform used as test material must nevertheless always be provided in the field *Details on test material*, of each IUCLID section where a (robust) study summary of a test on a nanoform is reported.

It is important to note that the information that can be reported under IUCLID section 4.28 is not equivalent and does not replace the characterisation of the nanoforms or sets of nanoforms that must be reported in section 1.2 as per REACH Annex VI, 2.4.

5. IUCLID section 14: Opt-out information for REACH registration

To prepare an opt-out dossier where you submit separately the hazard information for your nanoforms or set of nanoforms, you need to follow the advice provided in chapters 9.9.2: *Section 14 Opt-out information for REACH registration* and 10.2: *How to include endpoint summaries in an opt-out dossier* of the manual *How to prepare registration and PPORD dossiers*.

In addition, the following should be considered when opting out for information concerning nanoforms.

5.1. Opt-out scenarios when registering nanoforms

Each registrant is responsible for registering the nanoforms that it itself manufactures or imports. Unlike for non-nanoforms of a substance, when nanoforms are registered, the registration dossier must contain information specific to each nanoform (or set of nanoforms) for every applicable information requirement.

The registrant of a nanoform must decide whether the information required under Annex VII-X, which may be specific to his nanoform, will be submitted:

- (i) by the lead registrant, as part of the jointly submitted information; or
- (ii) by itself, as information submitted separately (opt out).

5.1.1. The jointly submitted information does not cover the nanoform or set of nanoforms of a registrant

A particular nanoform or set of nanoforms may not be covered by the jointly submitted information in the lead registrant dossier. In this case, the registrant(s) of this nanoform or set of nanoforms will have to submit separately all the information required for the registration of the nanoform or set of nanoforms. This includes all the Annex VII-X information corresponding to the nanoform at the registrant's tonnage band, as well as the resulting classification and labelling, hazard conclusions and safety assessment.

The separately submitted information can concern single nanoforms or set(s) of nanoforms. A justification must be provided for submitting separately all the information. The justification for the opt-out must be based on REACH Article 11(3)(c) or 19(2)(c), i.e. the registrant disagrees with the information submitted jointly by the lead registrant, as it does not cover their specific nanoform or set of nanoforms. Even when submitting all of the data separately, registrants must still submit their registration dossiers within the framework of the joint submission for the substance in REACH-IT.

5.1.2. The jointly submitted information covers a set of nanoforms

The fundamental principle for registering a set of nanoforms is that the hazards of all the nanoforms included in the set must be assessed jointly. Therefore, if the joint submission uses the approach to register various nanoforms within one or several sets of similar nanoforms, a registrant that relies on one of these sets to register their nanoforms must refer to all the information submitted jointly by the lead registrant for the set of nanoforms in order to comply with the requirements of Annexes VII-X. A registrant relying on a set of nanoforms that is jointly submitted cannot submit separately any information required under Annexes VII-X.

If your nanoforms are not covered, for each information requirement, by the Annex VII-X information submitted by the lead registrant for the set of nanoforms, then your nanoforms cannot be part of this set of nanoforms. In this case you have the options to either register your nanoforms as individual nanoforms or as part of another set of nanoforms, and to have the Annex VII-X information submitted either by the lead registrant on your behalf, or separately in your own dossier, via the opt-out mechanism.

In line with the above, when a registration dossier covers a set of nanoforms and contains information selected for opt-out that is related to the set of nanoforms, this implies that the registrant is not relying on any of the jointly submitted information to fulfil the information requirements for this set of nanoforms. Consequently, it is verified that the opted-out information covers the full Annex VII-X information, as relevant for the registrant's tonnage band, as well as the resulting classification and labelling, hazard conclusions and safety assessment. In addition, a justification must be provided for submitting separately all the information, following REACH Article 11(3).

5.1.3. The jointly submitted information covers a single nanoform and there is disagreement on selection of data, disproportionate cost or commercially sensitive information

According to REACH Articles 11(3) and 19(2), registrants can submit some or all of the data separately if they do not agree with the selection of the jointly submitted data; or if the jointly submitted data is disproportionately costly and they are in the possession of other adequate data; or if submitting jointly would lead to the disclosure of confidential business information.

However, as explained in the above chapter 5.1, when a registrant relies on a jointly submitted set of nanoforms to register their nanoforms, they cannot submit separately any information required under Annexes VII-X.

Therefore, the scenario wherein the jointly submitted information covers the registrants nanoform(s), but the registrant decides to submit some or all the information separately under the reasons foreseen by REACH Articles 11(3) and 19(2), applies only when the jointly submitted information relates to a single nanoform. When a particular co-registrant submits separately the information for which they do not rely on the data jointly submitted by the lead registrant, they must provide a justification following the reasons given in REACH Article 11(3) or 19(2).

Annex 1. Overview of endpoints and information requirements

This table lists the information requirements that depend on the REACH Annex for which the registration is made. The following abbreviations are used: r = required endpoint; o = optional endpoint. Some REACH information requirements do not directly translate to one IUCLID section; for these, additional instructions are provided in the column 'REACH information requirements which do not have a 1:1 correspondence with a IUCLID section'. In addition, note that according to REACH, all relevant physicochemical, ecotoxicological and toxicological information that is available shall always be provided, irrespective of whether it is required at the registered tonnage band.

IUCLID section number	IUCLID section name	REACH Annex	REACH Column 1 number	REACH information requirements which do not have a 1:1 correspondence with a IUCLID section	1 – 10T, physicochemical requirements, Annex VII	1 – 10T, standard requirements, Annex VII	10 – 100T, Annex VIII	100 – 1000T, Annex IX	above 1000T, Annex X	on-site isolated intermediates above 1T	transported isolated intermediates 1 – 1000T	transported isolated intermediates above 1000T, Annex VII	PPORD
4	Physical and chemical properties												
4.1	Appearance / physical state / colour	7	7.1		r	r	r	r	r	o	o	r	o
4.2	Melting point / freezing point	7	7.2		r	r	r	r	r	o	o	r	o
4.3	Boiling point	7	7.3		r	r	r	r	r	o	o	r	o
4.4	Density	7	7.4		r	r	r	r	r	o	o	r	o

IUCLID section number	IUCLID section name	REACH Annex	REACH Column 1 number	REACH information requirements which do not have a 1:1 correspondence with a IUCLID section	1 – 10T, physicochemical requirements, Annex VII	1 – 10T, standard requirements, Annex VII	10 – 100T, Annex VIII	100 – 1000T, Annex IX	above 1000T, Annex X	on-site isolated intermediates above 1T	transported isolated intermediates 1 – 1000T	transported isolated intermediates above 1000T, Annex VII	PPORD
4.5	Particle size distribution (Granulometry)	7	7.14		r	r	r	r	r	o	o	r	o
4.6	Vapour pressure	7	7.5		r	r	r	r	r	o	o	r	o
4.7	Partition coefficient	7	7.8		r	r	r	r	r	o	o	r	o
4.8	Water solubility	7	7.7		r	r	r	r	r	o	o	r	o
4.10	Surface tension	7	7.6	As a minimum, one complete endpoint study record must be provided with the 'Endpoint' selection 'Surface tension of an aqueous solution'	r	r	r	r	r	o	o	r	o
4.11	Flash point	7	7.9		r	r	r	r	r	o	o	r	o
4.12	Auto flammability	7	7.12		r	r	r	r	r	o	o	r	o

IUCLID section number	IUCLID section name	REACH Annex	REACH Column 1 number	REACH information requirements which do not have a 1:1 correspondence with a IUCLID section	1 – 10T, physicochemical requirements, Annex VII	1 – 10T, standard requirements, Annex VII	10 – 100T, Annex VIII	100 – 1000T, Annex IX	above 1000T, Annex X	on-site isolated intermediates above 1T	transported isolated intermediates 1 – 1000T	transported isolated intermediates above 1000T, Annex VII	PPORD
4.13	Flammability	7	7.10	As a minimum, one complete endpoint study record must be provided with the 'Endpoint' selection 'flammable solids' or 'flammable gases'. For liquids, a data waiving record should be provided.	r	r	r	r	r	o	o	r	o
4.14	Explosiveness	7	7.11		r	r	r	r	r	o	o	r	o
4.15	Oxidising properties	7	7.13		r	r	r	r	r	o	o	r	o
4.17	Stability in organic solvents and identity of relevant degradation products	9	7.15		o	o	o	r	r	o	o	o	o
4.21	Dissociation constant	9	7.16		o	o	o	r	r	o	o	o	o
4.22	Viscosity	9	7.17		o	o	o	r	r	o	o	o	o
4.28.8	Dustiness	7	7.14bis		r	r	r	r	r	o	o	o	o

IUCLID section number	IUCLID section name	REACH Annex	REACH Column 1 number	REACH information requirements which do not have a 1:1 correspondence with a IUCLID section	1 – 10T, physicochemical requirements, Annex VII	1 – 10T, standard requirements, Annex VII	10 – 100T, Annex VIII	100 – 1000T, Annex IX	above 1000T, Annex X	on-site isolated intermediates above 1T	transported isolated intermediates 1 – 1000T	transported isolated intermediates above 1000T, Annex VII	PPORD
5	Environmental fate and pathways												
5.1.2	Hydrolysis	8	9.2.2.1		o	o	r	r	r	o	o	o	o
5.2.1	Biodegradation in water: screening tests	7	9.2.1.1	As a minimum, one complete endpoint study record must be provided with the 'Endpoint' selection 'biodegradation in water: ready biodegradability' or 'biodegradation in water: screening test, other'.	o	r	r	r	r	o	o	r	o
5.2.2	Biodegradation in water and sediment: simulation tests	9	9.2.1.2 (water) 9.2.3	One complete endpoint study record must be provided with the 'Endpoint' selection 'biodegradation in water: simulation testing on ultimate degradation in surface water'.	o	o	o	r	r	o	o	o	o

IUCLID section number	IUCLID section name	REACH Annex	REACH Column 1 number	REACH information requirements which do not have a 1:1 correspondence with a IUCLID section	1 – 10T, physicochemical requirements, Annex VII	1 – 10T, standard requirements, Annex VII	10 – 100T, Annex VIII	100 – 1000T, Annex IX	above 1000T, Annex X	on-site isolated intermediates above 1T	transported isolated intermediates 1 – 1000T	transported isolated intermediates above 1000T, Annex VII	PPORD
		9	9.2.1.4 (sediment) 9.2.3	One complete endpoint study record must be provided with the 'Endpoint' selection 'biodegradation in water: sediment simulation testing'.	o	o	o	r	r	o	o	o	o
5.2.3	Biodegradation in soil	9	9.2.1.3 9.2.3		o	o	o	r	r	o	o	o	o
5.3.1	Bioaccumulation: aquatic / sediment	9	9.3.2		o	o	o	r	r	o	o	o	o
5.4.1	Adsorption / desorption	8	9.3.1		o	o	r	r	r	o	o	o	o
6	Ecotoxicological Information												
6.1.1	Short-term toxicity to fish	8	9.1.3		o	o	r	r	r	o	o	o	o

IUCLID section number	IUCLID section name	REACH Annex	REACH Column 1 number	REACH information requirements which do not have a 1:1 correspondence with a IUCLID section	1 – 10T, physicochemical requirements, Annex VII	1 – 10T, standard requirements, Annex VII	10 – 100T, Annex VIII	100 – 1000T, Annex IX	above 1000T, Annex X	on-site isolated intermediates above 1T	transported isolated intermediates 1 – 1000T	transported isolated intermediates above 1000T, Annex VII	PPORD
6.1.2	Long-term toxicity to fish	9	9.1.6		o	o	o	r	r	o	o	o	o
6.1.3	Short-term toxicity to aquatic invertebrates	7	9.1.1		o	r	r	r	r	o	o	r	o
6.1.4	Long-term toxicity to aquatic invertebrates	9	9.1.5		o	o	o	r	r	o	o	o	o
6.1.5	Toxicity to aquatic algae and cyano-bacteria	7	9.1.2	As a minimum, one complete endpoint study record must be provided in section 6.1.5 or in 6.1.6.	o	r	r	r	r	o	o	r	o
6.1.6	Toxicity to aquatic plants other than algae	na	not req.		o	o	o	o	o	o	o	o	o
6.1.7	Toxicity to micro-organisms	8	9.1.4		o	o	r	r	r	o	o	o	o
6.2	Sediment toxicity	10	9.5.1	At >1000T, as a minimum one complete endpoint study record must be provided with the 'Endpoint' selection 'sediment toxicity: long-term'.	o	o	o	o	r	o	o	o	o

IUCLID section number	IUCLID section name	REACH Annex	REACH Column 1 number	REACH information requirements which do not have a 1:1 correspondence with a IUCLID section	1 – 10T, physicochemical requirements, Annex VII	1 – 10T, standard requirements, Annex VII	10 – 100T, Annex VIII	100 – 1000T, Annex IX	above 1000T, Annex X	on-site isolated intermediates above 1T	transported isolated intermediates 1 – 1000T	transported isolated intermediates above 1000T, Annex VII	PPORD
6.3.1	Toxicity to soil macro-organisms except arthropods	9	9.4.1 (short-term)	At 100-1000T, as a minimum one complete endpoint study record must be provided in section 6.3.1 in 6.3.2.	o	o	o	r	r	o	o	o	o
		10	9.4.4 (long-term)	At >1000T, as a minimum one complete endpoint study record must be provided in section 6.3.1 with the 'Endpoint' selection 'toxicity to soil macroorganisms except arthropods: long-term', or in section 6.3.2 with the 'Endpoint' selection 'toxicity to soil arthropods: long-term'.	o	o	o	o	r	o	o	o	o
6.3.2	Toxicity to soil arthropods	9	9.4.1 (short-term)	At 100-1000T, as a minimum one complete endpoint study record must be provided.	o	o	o	r	r	o	o	o	o
		10	9.4.4 (long-term)	At >1000T, as a minimum one complete endpoint study record must be provided with the 'Endpoint' selection 'toxicity to soil arthropods: long-term'.	o	o	o	o	r	o	o	o	o
6.3.3	Toxicity to terrestrial plants	9	9.4.3 (short-term)	At 100-1000T, as a minimum one complete endpoint study record must be provided.	o	o	o	r	r	o	o	o	o
				At >1000T, as a minimum one complete endpoint study record must be provided with the 'Endpoint' selection									

IUCLID section number	IUCLID section name	REACH Annex	REACH Column 1 number	REACH information requirements which do not have a 1:1 correspondence with a IUCLID section	1 – 10T, physicochemical requirements, Annex VII	1 – 10T, standard requirements, Annex VII	10 – 100T, Annex VIII	100 – 1000T, Annex IX	above 1000T, Annex X	on-site isolated intermediates above 1T	transported isolated intermediates 1 – 1000T	transported isolated intermediates above 1000T, Annex VII	PPORD
		10	9.4.6 (long-term)	'toxicity to terrestrial plants: long-term' or 'toxicity to terrestrial plants: short-term (with study design considered suitable for long-term assessment)'	o	o	o	o	r	o	o	o	o
6.3.4	Toxicity to soil micro-organisms	9	9.4.2		o	o	o	r	r	o	o	o	o
6.3.5	Toxicity to birds	10	9.6.1	At >1000T, as a minimum one complete endpoint study record must be provided with the 'Endpoint' selection 'long-term toxicity to birds: reproduction test', 'long-term toxicity to birds', or 'toxicity to birds, other'.	o	o	o	o	r	o	o	o	o
7	Toxicological information												
7.2.1	Acute toxicity: oral	7	8.5.1	For nanoforms, the Annex VII study by the oral route must be replaced by a study by the inhalation route, unless exposure of humans via inhalation is unlikely.	o	o	r	r	r	o	o	r	o

IUCLID section number	IUCLID section name	REACH Annex	REACH Column 1 number	REACH information requirements which do not have a 1:1 correspondence with a IUCLID section	1 – 10T, physicochemical requirements, Annex VII	1 – 10T, standard requirements, Annex VII	10 – 100T, Annex VIII	100 – 1000T, Annex IX	above 1000T, Annex X	on-site isolated intermediates above 1T	transported isolated intermediates 1 – 1000T	transported isolated intermediates above 1000T, Annex VII	PPORD
7.2.2	Acute toxicity: inhalation	7	8.5.2	As a consequence, at Annex VIII, in a dossier covering nanoforms, in addition to the inhalation the information should be provided for at least one other route with the appropriate type of record.	o	r	r	r	r	o	o	o	o
7.2.3	Acute toxicity: dermal	8	8.5.3		o	o	r	r	r	o	o	o	o
7.3.1	Skin irritation / corrosion	7	8.1.1 (in vitro skin corrosion)	As a minimum one complete endpoint study record must be provided with the 'Endpoint' selection 'skin corrosion: in vitro/ex vivo', 'skin irritation: in vitro/ex vivo', or 'skin irritation/corrosion, other'.	o	r	r	r	r	o	o	r	o
		7	8.1.2 (in vitro skin irritation)		o	r	r	r	r	o	o	r	o

IUCLID section number	IUCLID section name	REACH Annex	REACH Column 1 number	REACH information requirements which do not have a 1:1 correspondence with a IUCLID section	1 – 10T, physicochemical requirements, Annex VII	1 – 10T, standard requirements, Annex VII	10 – 100T, Annex VIII	100 – 1000T, Annex IX	above 1000T, Annex X	on-site isolated intermediates above 1T	transported isolated intermediates 1 – 1000T	transported isolated intermediates above 1000T, Annex VII	PPORD
7.3.2	Eye irritation	7	8.2.1 (in vitro)	As a minimum, one complete endpoint study record must be provided with the 'Endpoint' selection 'eye irritation: in vitro / ex vivo' or 'eye irritation, other'.	o	r	r	r	r	o	o	r	o
7.4.1	Skin sensitisation	7	8.3 (in vitro or in chemico)	As a minimum, one complete endpoint study record must be provided with the 'Endpoint' selection 'skin sensitisation: in vitro', 'skin sensitisation: in chemico', or 'skin sensitisation, other'.	o	r	r	r	r	o	o	r	o
7.5.1	Repeated dose toxicity: oral	8	8.6.1 (short-term)	At 10-100T, as a minimum, one complete endpoint study record must be provided in section 7.5.1, 7.5.2 or 7.5.3.	o	o	r	r	r	o	o	o	o
		9	8.6.2 (sub-chronic)		o	o	o	r	r	o	o	o	o

IUCLID section number	IUCLID section name	REACH Annex	REACH Column 1 number	REACH information requirements which do not have a 1:1 correspondence with a IUCLID section	1 – 10T, physicochemical requirements, Annex VII	1 – 10T, standard requirements, Annex VII	10 – 100T, Annex VIII	100 – 1000T, Annex IX	above 1000T, Annex X	on-site isolated intermediates above 1T	transported isolated intermediates 1 – 1000T	transported isolated intermediates above 1000T, Annex VII	PPORD
7.5.2	Repeated dose toxicity: inhalation	8	8.6.1 (short-term)	At >100T, as a minimum, one complete endpoint study record must be provided in section 7.5.1, 7.5.2 or 7.5.3 with another 'Endpoint' selection than 'short-term repeated dose toxicity: oral/inhalation/dermal'. As a minimum, one complete endpoint study record must be provided with the 'Endpoint' selection 'in vitro gene mutation study in bacteria'. The in vitro gene mutation study in bacteria does not need to be conducted for nanoforms where it is not	o	o	r	r	r	o	o	o	o
		9	8.6.2 (sub-chronic)		o	o	o	r	r	o	o	o	o
7.5.3	Repeated dose toxicity: dermal	8	8.6.1 (short-term)		o	o	r	r	r	o	o	o	o
		9	8.6.2 (sub-chronic)		o	o	o	r	r	o	o	o	o
7.6.1	Genetic toxicity in vitro	7	8.4.1 (in vitro gene mutation in bacteria)	o	r	r	r	r	o	o	r	o	

			<p>appropriate. In such case, the registrant shall provide a justification and perform an in vitro study referred to in Annex VIII, point 8.4.3 'in vitro gene mutation in mammalian cells'.</p> <p>Follow-up testing requirements:</p> <p>In case of a positive or ambiguous result in 8.4.1, at least one endpoint study record must be provided as per Annex VIII 8.4.2 and one record as per Annex IX 8.4.4 (see below in this table)</p> <p>In case 8.4.1 is not applicable for the substance, at least one endpoint study record must be provided as per Annex VIII 8.4.3. If also this study is not applicable, at least one endpoint study record must be provided as per Annex IX 8.4.4 (see below in this table)</p>										
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IUCLID section number	IUCLID section name	REACH Annex	REACH Column 1 number	REACH information requirements which do not have a 1:1 correspondence with a IUCLID section	1 – 10T, physicochemical	1 – 10T, standard requirements, Annex VII	10 – 100T, Annex VIII	100 – 1000T, Annex IX	above 1000T, Annex X	on-site isolated intermediates above 1T	transported isolated intermediates 1 – 1000T	transported isolated intermediates above 1000T, Annex VII	PPORD
		8	8.4.2 (in vitro chromosome aberration mammalian cells or in vitro micronucleus) 8.4.3 (in vitro gene mutation in mammalian cells)	As a minimum, one complete endpoint study record must be provided under 8.4.2 and one record under 8.4.3. Follow-up testing requirements: In case of a positive or ambiguous result in 8.4.1 or 8.4.2 or 8.4.3, at least one complete endpoint study record must be provided as per Annex IX 8.4.4 or 8.4.5 (see below in this table). In case either 8.4.2 or 8.4.3 is not applicable for the substance, at least one complete endpoint study record must be provided as per Annex IX 8.4.4 (see below in this table).	o	o	r	r	r	o	o	o	o

IUCLID section number	IUCLID section name	REACH Annex	REACH Column 1 number	REACH information requirements which do not have a 1:1 correspondence with a IUCLID section	1 – 10T, physicochemical requirements, Annex VII	1 – 10T, standard requirements, Annex VII	10 – 100T, Annex VIII	100 – 1000T, Annex IX	above 1000T, Annex X	on-site isolated intermediates above 1T	transported isolated intermediates 1 – 1000T	transported isolated intermediates above 1000T, Annex VII	PPORD
7.6.2	Genetic toxicity in vivo	9	8.4.4 (in vivo mammalian somatic cell)	<p>Follow-up testing requirements:</p> <p>At 1-10T, in case of a positive or ambiguous result or studies not applicable under 8.4.1 or 8.4.3, at least one complete endpoint study record must be provided with the endpoint selection relevant to 8.4.4 'In vivo mammalian somatic cell'</p>	o	(r)	(r)	(r)	(r)	o	o	(r)	o
		9	8.4.5 in-vivo mammalian germ cell)	<p>At >10T, in case of a positive or ambiguous result in any in-vitro study in section 7.6.1, at least one complete endpoint study record must be provided with the endpoint selection relevant to 8.4.4 'In vivo mammalian somatic cell' or 8.4.5 'In-vivo mammalian germ cell'.</p> <p>In case either 8.4.2 or 8.4.3 is not applicable for the substance, at least one complete endpoint study record must be provided as per Annex IX 8.4.4.</p>	o	o	(r)	(r)	(r)	o	o	o	o

IUCLID section number	IUCLID section name	REACH Annex	REACH Column 1 number	REACH information requirements which do not have a 1:1 correspondence with a IUCLID section	1 – 10T, physicochemical requirements, Annex	1 – 10T, standard requirements, Annex VII	10 – 100T, Annex VIII	100 – 1000T, Annex IX	above 1000T, Annex X	on-site isolated intermediates above 1T	transported isolated intermediates 1 – 1000T	transported isolated intermediates above 1000T, Annex VII	PPORD
7.8.1	Toxicity to reproduction	8	8.7.1 (screening)	At 10-100T, as a minimum, one complete endpoint study record must be provided.	o	o	r	r	r	o	o	o	o
		9	8.7.3 (extended one-generation)	At >100T, as a minimum, one complete endpoint study record must be provided with the "Endpoint" selection "extended one-generation reproductive toxicity".* *Also two-, three- or multigeneration studies are considered valid to fulfil the requirement.	o	o	o	r	r	o	o	o	o
7.8.2	Developmental toxicity / teratogenicity	9	8.7.2 (first species)	At 100-1000T, as a minimum, one complete endpoint study record must be provided.	o	o	o	r	r	o	o	o	o
		10	8.7.2 (second species)	At >1000T, as a minimum, two complete endpoint study record must be provided, for two different species.	o	o	o	o	r	o	o	o	o

Annex 2. Overview of the completeness check performed on the dossiers covering nanoforms

IUCLID section	Check	Relevance
Substance identification		
1.2 – Composition, General information	<p>'State/form' of a composition must be specified by selecting the appropriate value in the picklist.</p> <p>If a substance covers different physical states or forms, a separate composition should be created for each of them.</p> <p>If a composition covers nanoforms, then 'solid: nanoform' must be selected in the picklist. Note that an incorrect indication in this field will not enable to provide the information on nanoforms under the Characterisation of nanoforms heading.</p>	<p>Single nanoform and set of nanoforms</p> <p>Legal entity and boundary composition</p>
1.2 Composition, Related composition(s)	Each legal entity composition covering a nanoform or a set of nanoforms must have a link in the 'Related composition(s)' field to a boundary composition in the same dossier.	<p>Registration covering single nanoform and set of nanoforms</p> <p>Individual and JS lead</p> <p>Legal entity composition</p>
1.2 Composition, Related composition(s)	Each legal entity composition covering a nanoform or a set of nanoforms must have a reference in the 'Reference to related composition' field to the name of a boundary composition in the lead dossier or if a name has not yet been derived, the name of the boundary composition record.	<p>Registration covering single nanoform and set of nanoforms</p> <p>JS member relying on lead data</p> <p>Legal entity composition</p>
1.2 Composition, Related composition(s)	<p>For each reported nanoform, all the required Annex VII-X information must be provided. To this end, a 'boundary composition of the substance' which describes the Annex VII-X data must be provided and linked to the boundary composition via the field 'Related composition(s)'.</p> <p>In case of a partial opt-out from information provided by the lead registrant, a textual reference must be provided in the 'Reference to related composition' field to a boundary composition in the lead dossier and an own boundary composition.</p>	<p>Registration covering single nanoforms</p> <p>JS member opting-out</p> <p>Legal entity composition</p>
1.2 Composition, Related composition(s)	<p>For each reported set of nanoforms all the required Annex VII-X information must be provided. To this end, a reference in the 'Reference to related composition(s)' field to the name of a boundary composition in the lead dossier or if a name has not yet been derived, the name of the boundary composition record.</p> <p>In case of full opt-out a 'boundary composition of the substance' which describes the Annex VII-X data must be provided and linked to the boundary composition via the field 'Related composition(s)'.</p>	<p>Registration covering set of nanoforms</p> <p>JS member opting-out</p> <p>Legal entity composition</p>
1.2 – Composition, Type of information reported	For a registration dossier covering nanoform(s) of a substance, information under the heading Characterisation of nanoforms must be provided.	Single nanoform and set of nanoforms

	It is mandatory to indicate whether the information is reported for a single nanoform or a set of nanoforms in the field 'Type of information reported'.	Legal entity and boundary composition
1.2 – Composition, Type of information reported	For each reported composition covering a nanoform the name of the nanoform must be provided in the field 'Name of nanoform'. The name should describe the chemical composition and the key physicochemical characterisers of the nanoform and allow the unique identification of the nanoform.	Single nanoform Legal entity and boundary composition
1.2 – Composition, Type of information reported	For each reported composition covering a set of nanoforms the name of the set of nanoforms must be provided in the field 'Name of sets of nanoforms'. The name should describe the chemical composition and the key physicochemical characterisers of the set of nanoforms and allow the unique identification of the set nanoforms.	Set of nanoforms Legal entity and boundary composition
1.2 – Composition, Type of information reported	For a set of nanoforms, a scientifically valid justification must be provided in the field 'Justification for reporting set of similar nanoforms'. The justification must demonstrate that the hazard assessment of the nanoforms included in the set can be performed jointly. The text template available for the field should be used to structure the justification.	Set of nanoforms Boundary composition
1.2 – Composition, Shape	At least one entry must be created under the Shape description heading. A selection must be made in the 'Shape category' field and each entry must be filled in as follows: -For a nanoform consisting of particles with a single shape, only one entry must be created for the corresponding 'Shape category' with selection of the appropriate 'Shape' and indication 'yes' under 'Pure shape'. -For a nanoform consisting of particles with more than one shape, a separate entry for each shape must be created. Each entry must contain the appropriate 'Shape category', 'Shape', and selection 'no' under 'Pure shape'. In addition, the full 'Range' with unit corresponding to the fraction of particles with that shape must be provided. If for any of the fields available picklist values do not apply, value 'other:' should be selected and the appropriate information provided in the below field.	Single nanoform Legal entity and boundary composition
1.2 – Composition, Shape	At least one entry must be created under the Shape description heading. A selection must be made in the 'Shape category' field and each entry must be filled in as follows: -If the set covers nanoforms consisting of particles with a single shape, a separate entry for each shape must be created with selection of the appropriate 'Shape category', 'Shape', and indication 'yes' under 'Pure shape'. -If the set covers nanoforms consisting of particles with more than one shape, a separate entry for each shape must be created. Each entry must contain the appropriate 'Shape category', 'Shape', and selection 'no' under 'Pure shape'. In addition, the full 'Range' with unit corresponding to the fraction of particles with that shape must be provided. The range should describe the minim and maximum fraction of a shape in all those nanoforms covered by the set where the shape occurs mixed with other shapes.	Set of nanoforms Legal entity and boundary composition

	If for any of the fields the available picklist values do not apply, value 'other:' should be selected and the appropriate information provided in the below field.	
1.2 – Composition, Particle size distribution and range	<p>At least one entry must be created under the Particle size and distribution heading. A selection must be made in the 'Shape category' field and each entry must be filled in as follows:</p> <ul style="list-style-type: none"> - For each shape category, the percentile parameters must be provided. As a minimum, the values D10, D50 and D90 must be reported as separate entries in the same table under the Percentile heading. In addition, the full range of the 'Fraction of constituent particles in the size range 1-100 nm' with unit must be provided. - For the 'elongated' the full 'Range of length' with unit and the full 'Range of aspect ratio' must be provided. - For the 'platelet' the full ranges of lateral dimension 1 and lateral dimension 2 with units and the full 'Range of aspect ratio' must be provided. 	<p>Single nanoform and set of nanoforms</p> <p>Legal entity and boundary composition</p>
1.2 – Composition, Crystallinity	<p>At least one entry must be created under the Crystallinity heading. A selection must be made in the 'Structure' field and each entry created must be filled in as follows:</p> <ul style="list-style-type: none"> -For a fully amorphous nanoform, one entry with the 'Structure' indicated as 'amorphous' and the selection 'yes' under 'Pure structure' must be provided. -For a fully crystalline nanoform consisting of particles with only one crystal structure one entry with the 'Structure' indicated as 'crystalline' and the selection 'yes' under 'Pure structure'. In addition, information on the 'Name' or the 'Crystal system' of the structure, must be provided as a minimum. -For a fully crystalline nanoform consisting of particles with more than one crystal structure, a separate entry for each crystal structure must be created. Each entry must contain indication, 'crystalline' under 'Structure' and selection 'no' under 'Pure structure'. In addition, as a minimum the 'Name' or the 'Crystal system' and the full 'Range' with unit corresponding to the fraction of particles with that crystal structure in the nanoform must be provided. -For a nanoform consisting of particles with both amorphous and crystalline structures, separate entries for the amorphous and crystalline structure(s) must be created. Each entry must contain indication 'partially-crystalline' under 'Structure' and selection 'no' under 'Pure structure' In addition, the full 'Range' with unit corresponding to the fraction of particles with that structure must be provided. For the crystalline fraction of the nanoform, a separate entry for each crystal structure and as a minimum the 'Name' or the 'Crystal system' must be provided for each entry. For the amorphous fraction of the nanoform, 'amorphous' as the 'Name' should be provided. <p>If for any of the fields the available picklist values do not apply, value 'other:' should be selected and the appropriate information provided in the below field.</p>	<p>Single nanoform</p> <p>Legal entity and boundary composition</p>
1.2 – Composition, Crystallinity	<p>At least one entry must be created under the Crystallinity heading. A selection must be made in the 'Structure' field and each entry created must be filled in as follows:</p> <ul style="list-style-type: none"> -If the set covers nanoforms consisting of particles with a fully amorphous structure, an entry with the 'Structure' indicated as 	<p>Set of nanoforms</p> <p>Legal entity and boundary composition</p>

	<p>'amorphous' and selection 'yes' under 'Pure structure' must be provided.</p> <p>-If the set covers nanoforms consisting of particles with fully crystalline structures, a separate entry for each crystalline structure with indication 'crystalline' under the 'Structure' must be provided.</p> <p>-If the set covers nanoforms with fully crystalline structures consisting of particles with the same crystal structure, one entry with the 'Structure' indicated as 'crystalline' and the selection 'yes' under 'Pure structure' must be created. In addition, information on the 'Name' or the 'Crystal system' of the structure, must be provided as a minimum.</p> <p>-If the set of nanoforms with fully crystalline structure consist of particles with multiple crystal structures, separate entries with the 'Structure' indicated as 'crystalline' and the selection 'no' under 'Pure structure' must be provided for each mineral. In addition, information on the 'Name', 'Crystal system' and the full 'Range' with unit corresponding to the presence of the crystal structure in the nanoforms must be provided as a minimum.</p> <p>-If the set of nanoforms covers nanoforms consisting of particles with both amorphous and crystalline structures, separate entries for the amorphous and crystalline structure(s) must be created. Each entry must contain indication 'partially-crystalline' under 'Structure' and selection 'no' under 'Pure structure' In addition, the full 'Range' with unit corresponding to the fraction of particles with that structure must be provided. For the crystalline fraction of the nanoform, a separate entry for each crystal structure and as a minimum the 'Name' or the 'Crystal system' must be provided for each entry. For the amorphous fraction of the nanoforms, 'amorphous' should be entered under 'Name'.</p> <p>If for any of the fields the available picklist values do not apply, value 'other:' should be selected and the appropriate information provided in the below field.</p>	
1.2 – Composition, Specific surface area	The specific surface area or the volume specific surface area must be provided with indication of both the range values and the respective units.	<p>Single nanoform and set of nanoforms</p> <p>Legal entity and boundary composition</p>
1.2 – Composition, Specific surface area	If information on the volume specific surface area is reported, then the 'Skeletal density' must be provided with indication of both range values and the applicable unit.	<p>Single nanoform and set of nanoforms</p> <p>Legal entity and boundary compositions</p>
1.2 – Composition, Surface functionalisation/treatment	A selection must be made in the field 'Surface treatment applied'.	<p>Single nanoform and set of nanoforms</p> <p>Legal entity and boundary composition</p>
1.2 – Composition, Surface functionalisation/treatment	If 'Surface treatment' has been applied to particles of the nanoforms in the set, then an indication whether the set also covers non-treated nanoforms must be provided in the field 'Does the set contain both treated and non-surface treated nanoforms?'.	<p>Set of nanoforms</p> <p>Legal entity and boundary composition</p>

<p>1.2 – Composition, Surface functionalisation/treatment</p>	<p>If 'Surface treatment' has been applied, then an entry under the 'Surface treatment' heading must be provided for each different surface treatment agent applied.</p> <p>Each created entry must be complete, and contain at least the following:</p> <ul style="list-style-type: none"> - A reference substance linked in the field 'Surface treatment agent' with the IUPAC name, or if not available, another international chemical name of the surface treatment agent given in the field 'IUPAC name'. In addition, if available the EC number and CAS number should be provided. - Both values of the field 'Range of weight-by-weight contribution, % (w/w)' indicating the fraction of each surface treatment agent with respect to the total particle weight. 	<p>Single nanoform</p> <p>Legal entity and boundary composition</p>
<p>1.2 – Composition, Surface functionalisation/treatment</p>	<p>If 'Surface treatment' has been applied, then at least one entry under the 'Surface treatment' heading must be provided for each different surface treatment agent applied on the particles of the nanoforms that are part of the set.</p> <p>Each created entry must be complete, and contain at least the following:</p> <ul style="list-style-type: none"> - A reference substance linked in the field 'Surface treatment agent' with the IUPAC name, or if not available, another international chemical name of the surface treatment agent given in the field 'IUPAC name'. In addition, if available the EC number and CAS number should be provided. In case of confidentiality concerns the chemical nature of surface treating agent(s) can be provided - Both values of the field 'Range of weight-by-weight contribution, % (w/w)' indicating the fraction of each surface treatment agent with respect to the total particle weight. 	<p>Set of nanoforms</p> <p>Legal entity and boundary composition</p>
<p>1.2 – Composition, Surface functionalisation/treatment</p>	<p>If 'Surface treatment' has been applied, then the 'Description' of the surface treatment process, specifying the process steps and conditions, and the order and concentration of applied surface treatment agents must be provided in the 'Description' field. The text template available for the field should be used to structure the description.</p>	<p>Single nanoform and set of nanoforms</p> <p>Legal entity and boundary composition</p>
<p>1.4 – Analytical information</p>	<p>At least one record must be created in section 1.4. The table 'Analytical determination for nanoforms' must contain at least one entry, and each entry created must be filled in as follows:</p> <ul style="list-style-type: none"> - at least one selection must be made in the 'Parameter' picklist - at least one selection must be made in the 'Analysis type' picklist - either an attachment must exist in the 'Attached methods/results' field, or a reason for not providing a method/result must be indicated by making a selection in the field 'Rationale for no results' and by inserting a further explanation in the 'Justification' field. <p>The 'Parameter' and 'Analysis type' fields are multi-select lists and you can indicate several determination parameters and analysis types with the same entry, if applicable. If you select 'other:' in any of the picklist fields, the below text field must be filled in.</p> <p>The information provided must cover analytical determination of 'Particle size distribution', 'Shape', 'Crystallinity', 'Specific surface area', as indicated in the 'Parameter' field. In addition, this information must be linked with relevant compositional information record through the field 'Related composition(s)'.</p>	<p>Single nanoform and set of nanoforms</p> <p>Legal entity composition</p>

Endpoint study records – sections 4, 5, 6, 7		
4.28.8 – Dustiness, Results and discussion	<p>For each endpoint study record marked as 'key study' or 'weight of evidence', under 'Dustiness index' heading, the fields 'Mean' and 'St. dev. ' must be given, with unit. Each created entry must be complete.</p> <p>If a quantitative result was not determined, an explanation must be provided in the field 'Remarks on result'. If none of the available picklist values apply, select 'other:' and provide the reason for not determining a quantitative result in the below field.</p>	Registration covering single nanoform and set of nanoforms
5.1.2 – Hydrolysis 5.2.2 – Biodegradation in water and sediment: simulation tests 6.1.1 – Short-term toxicity to fish 6.1.3 – Short-term toxicity to aquatic invertebrates 6.1.5 - Toxicity to aquatic algae and cyanobacteria 6.1.6 - Toxicity to aquatic plants other than algae 6.1.7 – Toxicity to microorganisms	<p>When fulfilling information requirements for nanoforms, these studies cannot not be waived on the basis of insolubility in water alone.</p>	Registration covering single nanoform and set of nanoforms: data waiving
7.2.2 - Acute toxicity: inhalation	<p>For registrations at Annex VII covering nanoforms, an acute toxicity study by the oral route shall be replaced by a study by the inhalation route (8.5.2), unless exposure of humans via inhalation is unlikely.</p> <p>If exposure of humans via inhalation is unlikely, you still need to address the inhalation endpoint with a data waiving record where you make a selection in the field 'Data waiving' and select in the field 'Justification for data waiving' the picklist value <i>"the study does not need to be conducted because exposure of humans via inhalation is not likely taking into account the vapour pressure of the substance and/or the possibility of exposure to aerosols, particles or droplets of an inhalable size"</i>.</p>	Registration covering single nanoform and set of nanoforms: Annex VII

Annex 3. Assessment entity data structure

All information requirements under REACH Annex VII-X must be specifically addressed for each nanoform or set of nanoforms and the Annex VII-X information and the corresponding nanoform or set of nanoforms must be clearly linked. The recommended approach to link the information is by use of the IUCLID Assessment entity feature.

This annex provides some illustrative examples of linking of different type of information with compositions covering nanoforms or sets of nanoforms.

Figure 9: Relation between boundary composition, assessment entity, endpoint summary and endpoint study record with a data waiving justification that covers multiple nanoforms.

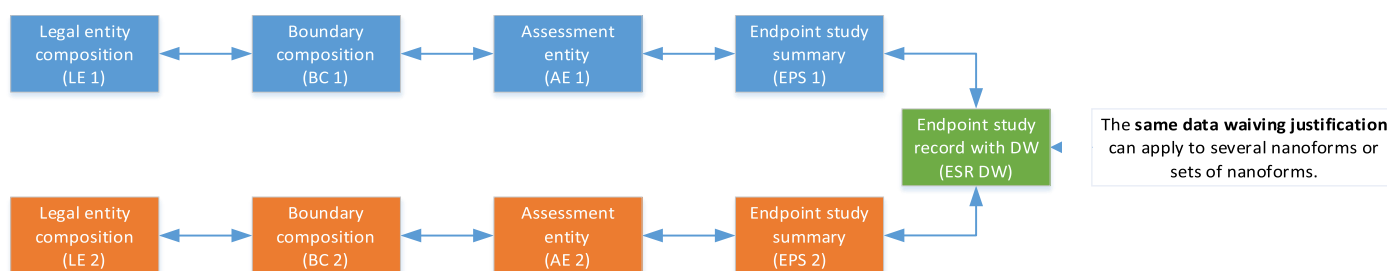


Figure 10: Relations between legal entity composition, boundary composition, assessment entity, endpoint study summary, endpoint study record

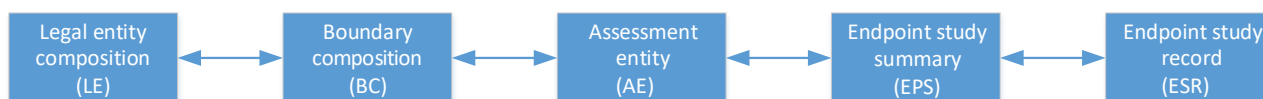


Figure 11: Relations between boundary composition, assessment entity, endpoint summary and endpoint study record with read-across from one nanoform to another.

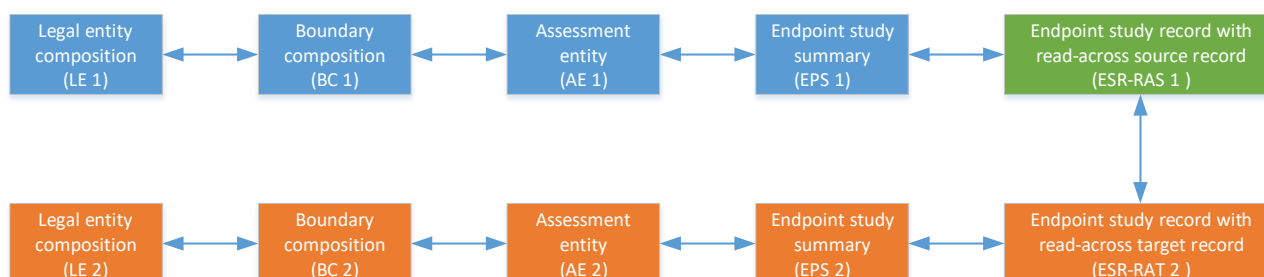


Figure 12: Relations between boundary composition, assessment entity, endpoint summary and endpoint study record with read-across justification that covers multiple nanoforms

