
















GRANTA SELECTOR

Getting Started with GRANTA Selector

Compare & Find Similar

Records similar to: PET (unfilled, amorphous)

Select records to add to comparison table:

	Name	Nearness (%)
<input checked="" type="checkbox"/>	 PET (unfilled, amorphous)	100
<input type="checkbox"/>	 PET (unfilled, semi-crystalline)	97
<input type="checkbox"/>	 PVC (rigid, molding and extrusion)	90
<input type="checkbox"/>	 PVC (chlorinated, molding and extrusion)	90
<input type="checkbox"/>	 PTT (general purpose)	88
<input type="checkbox"/>	 PVC (rigid, high impact, molding and extrusion)	86
<input type="checkbox"/>	 POM (copolymer)	86
<input type="checkbox"/>	 SMMA (clarity, stiffness)	85
<input type="checkbox"/>	 PLA (general purpose)	85
<input type="checkbox"/>	 PCTA (unfilled)	85
<input type="checkbox"/>	 MABS (unfilled)	84
<input type="checkbox"/>	 POM (homopolymer)	84

1 About these exercises

The Getting Started exercises provide an overview of the key tools and features in GRANTA Selector, and form a set of tutorials to help you familiarize yourself with the software. You can choose whether to work through them in order, or complete only the exercises relevant to you. They are intended for use with GRANTA Selector 2020, and may not work correctly with earlier or later versions of GRANTA Selector.

There are also [Quick Start Videos](#) provided online to teach you about GRANTA Selector. These can be used independently of the videos, or alongside them, to test and check your knowledge.

This set of exercises covers how to compare the performance of different materials with a Comparison Table, or use the Find Similar tool to find records with similar properties to an existing material.

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Document conventions

In this document:

- ❖ Each step of the exercises is shown on a gold background, like this.

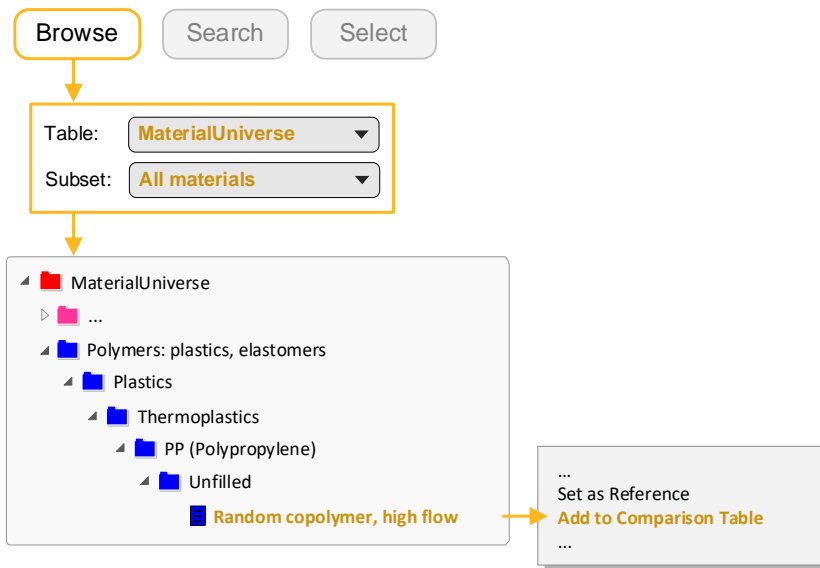
More detailed instructions appear below the main instruction.

Text on elements in the software (such as buttons, dialogs and tabs) appears in **bold**, **like this**. The names of records, datatables, and documents are emphasised *like this*.

Words and numbers that you type as you follow the instructions appear in monotype, `like this`.

2 Exercises

Exercise 1: Comparison Tables



- ❖ Add an unfilled PP (Polypropylene) and an unfilled high-density PE (Polyethylene) record to a **Comparison Table**.

Find an example of each in the Browse tree, then right-click and select **Add to Comparison Table**.

- ❖ Set the high-density PE as the reference record

Hover over the record name in the Comparison Table and click **Set as Reference** .

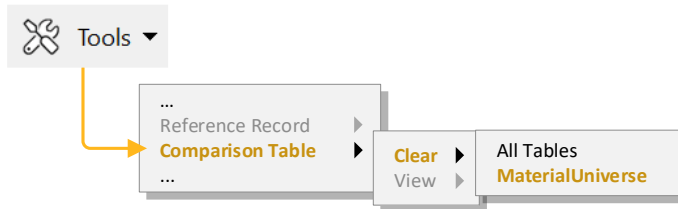
All Data Project Data ↔ Ranges Averages # Values % Change Highlight % Change > 10 Apply			
	PE-HD (high molecular weight)	PP (random copolymer, high flow)	
General information			
Included in Material data for simulation	✓	✓	
Composition overview			
Material family	Plastic (thermoplastic, semi-crystalline)	Plastic (thermoplastic, semi-crystalline)	
Base material	PE-HD (Polyethylene, high density)	PP (Polypropylene)	
Polymer code	PE-HD	PP	
Composition detail (polymers and natural materials)			
Polymer (%)	100	100	

- ❖ Change the display to show the differences relative to the reference record as percentages

Click **% Change** in the Comparison Table toolbar.

❖ Clear the Comparison Table

Click **Tools** on the main toolbar, then select **Comparison Table > Clear > MaterialUniverse**.



Exercise 2: Find Similar and Nearness Settings

❖ Open the datasheet for *PVC (flexible, Shore A85)*

❖ Find similar materials

Click **Find Similar** and confirm changing the reference record, if prompted.

Available materials are ranked by their similarity to the reference material. In this instance, calculations are based on the default nearness criteria for this table.

Datasheet

PVC (flexible, Shore A85)
Find Similar

↓

Records similar to: PVC (flexible, Shore A85)

Name	Nearness (%)
<input checked="" type="checkbox"/> PVC (flexible, Shore A85)	100
<input type="checkbox"/> TPU (Ether, aromatic, Shore D45)	86
<input checked="" type="checkbox"/> TPU (Ether, aliphatic, Shore A80)	85
<input type="checkbox"/> PVC (flexible, Shore A65)	85
etc.	

Comparison...

↓

Comparison - MaterialUniverse

Averages	#	Values	Highlight % Change > 10
			<div style="display: inline-block; width: 15px; height: 15px; background-color: #f08080; border: 1px solid gray;"></div> PVC <div style="display: inline-block; width: 15px; height: 15px; background-color: #f08080; border: 1px solid gray;"></div> TPU
Density (kg/m ³)		1330	1080 ↓
Young's modulus (GPa)		0.0324	0.033 ↑

❖ Compare PVC with one of the near materials

Select *TPU (Ether, aliphatic, Shore A80)* and click **Comparison**.


A comparison table is generated, showing the selected result and the reference record. Significant differences in the attribute values are highlighted.

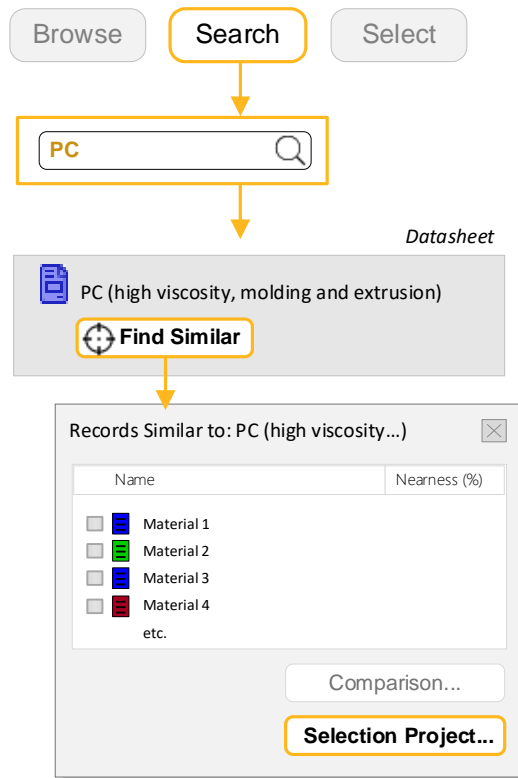
Exercise 3: Search and Find Similar

❖ Search for a material and open its datasheet

Use **Search** to find and display *PC (high viscosity, molding and extrusion)*.

❖ Find records similar to the selected record

Click **Find Similar** . Use the default weightings to calculate nearness; do not open the Nearness Settings window.

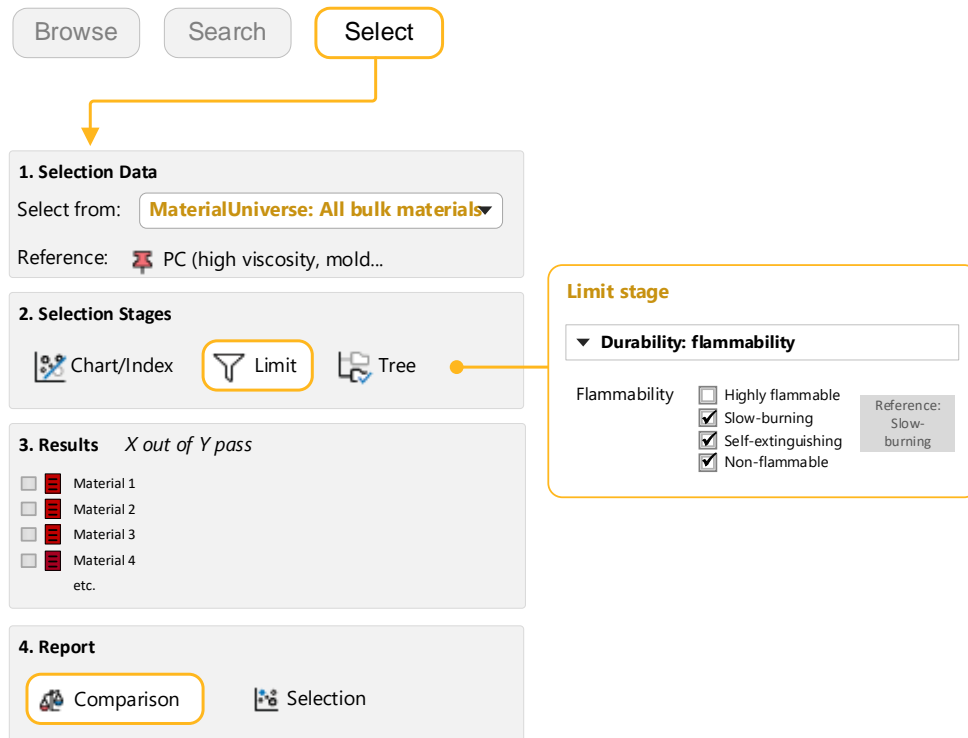


❖ Apply additional design constraints

Click **Selection Project** to create a selection project and rank the results by nearness to the reference record.

Add a Limit Stage and select materials with equal or poorer flammability than the reference:

Flammability: Slow-burning ; Self-extinguishing ; Non-flammable.



❖ Compare the selection results

In the **Results** list, select *PBT (general purpose)* and *PPE+PS alloy (15% glass fiber)*. Then, under **Report**, click **Comparison**.

❖ Use the Comparison Table to check for other significant differences in performance (for example, *Elongation*)

Exercise 4: Find Similar with Limits

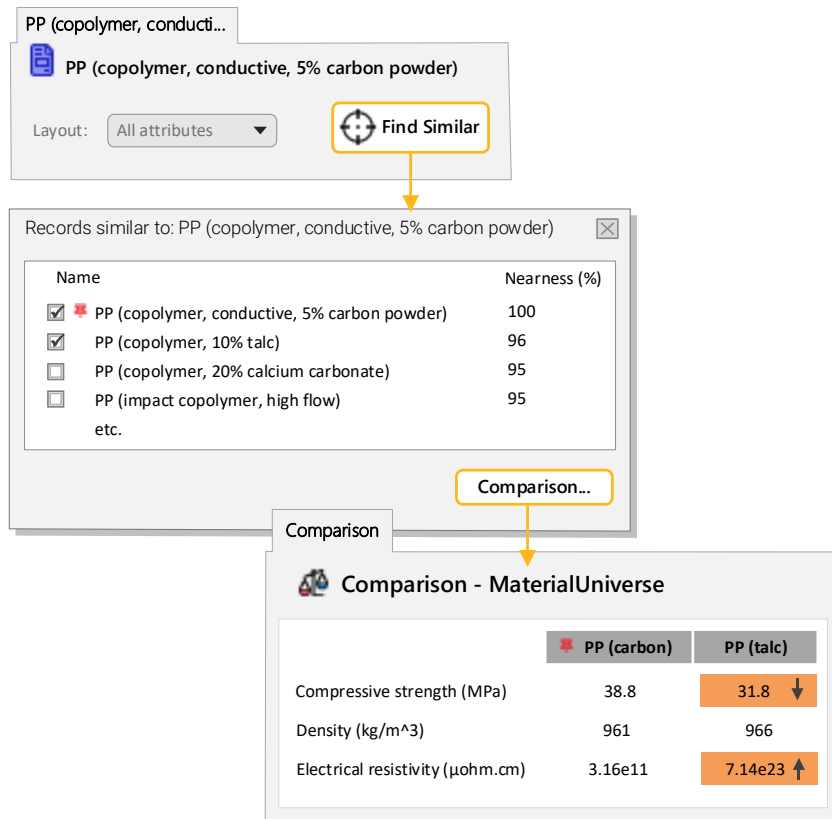
❖ Open the record for *Polypropylene (Copolymer, Conductive, 5% Carbon powder)*

❖ Find records similar to it

Click **Find Similar**. Use the default weightings to calculate nearness; do not open the Nearness Settings window.

❖ Compare the current material with the nearest alternative

Select the closest record from the list of results, *PP (copolymer, 10% talc)*, and create a Comparison Table by clicking **Comparison**.



The **Comparison Table** is highlighted where there is a difference between the original (reference) and alternative materials. The reference material in this exercise was chosen specifically because it has low electrical resistivity. However, the nearest match does not, because the default criteria for nearness in this table do not account for electrical resistivity. You can change this manually.

The nearest materials in the results have similar physical properties to the reference material (density, yield strength, Young's modulus). However, the original material may have been chosen for its other characteristics. In this case, the polymer is conductive (has a low electrical resistivity).

The results from **Find Similar** can be used as the basis of a Selection Project. In this case, you can use a Limit Stage to filter on the additional requirement for conductivity.

❖ Create a Selection Project using the results

In the **Records similar to** dialog, click **Selection Project**. The results are loaded into a new project, ranked by nearness.

- ❖ Filter the results for an electrical resistivity that is equal to or lower than that of the reference material

Create a Limit Stage, and set the maximum value for electrical resistivity to 3.16e12, which is the maximum value for the reference record. **Apply** the stage.

Records similar to: PP (copolymer, conductive, 5% carbon powder)

Name	Nearness (%)
<input checked="" type="checkbox"/> PP (copolymer, conductive, 5% carbon powder)	100
<input checked="" type="checkbox"/> PP (copolymer, 10% talc)	96
<input type="checkbox"/> PP (copolymer, 20% calcium carbonate)	95
<input type="checkbox"/> PP (impact copolymer, high flow)	95
etc.	

Selection Project...

2. Selection Stages

Chart/Index **Limit** Tree

Limit Stage

▼ Electrical properties

	Min	Max	Reference
Electrical resistivity		3.16e12 $\mu\text{ohm.cm}$	3.16e10 – 3.16e12

Example results, with Nearness (%):

- PP (10-12% stainless steel fiber) - **87%**
- PP (10% carbon fiber) - **83%**
- ABS (40% aluminum flake) - **81%**

- ❖ Delete this stage.

Exercise 5: Changing the Find Similar Nearness Settings

Instead of filtering on additional attributes, you can change the criteria used for calculating nearness to take account of different requirements.

- ❖ Find records similar to *Polypropylene (Copolymer, Conductive, 5% Carbon powder)*

Open the datasheet and click **Find Similar**.

- ❖ Re-calculate the list of alternative materials, taking *Electrical resistivity* into account and prioritizing results with a resistivity that is the same or lower than the reference material.

Click the **Nearness settings** link on the **Records Similar to** dialog.

Under **Electrical Properties**, select **Electrical resistivity**. Set it to *100% when Same or lower*, and increase the **Weighting factor** to 2.

Click **OK** to generate the new results.

Note: These results are conceptually different to those from the previous exercise. We have ranked similar materials, taking into account the conductivity, but there is not a fixed upper limit as there was when filtering using the Limit Stage. Materials with a higher conductivity than the reference will still be included in these results.

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