

## Operating instructions for the use of Xioneer VXL 111 Support Material



### 1. General information

The soluble support material **Xioneer VXL 111** was specifically developed for the use in additive manufacturing, namely *fused filament fabrication* (FFF). The FFF printer must be able to process several materials.

The material is **not** another PVA/PVOH/BVOH-type. Compared to these solely water-soluble support materials, our material is soluble in a mild alkaline solution. Thus, it is less sensitive to moisture, has increased shelf life and consistent print quality over time. This avoids failed prints through clogged nozzles and saves material. Our material has high melt stability and strong adhesion to model materials like PCTG, ABS, ASA, TPU, TPC, PA, PC, PPS, PEEK, PEKK or PAEK. Temperature resistance of **VXL 111** support materials is ideal for usage in heated build chambers.

As with any other material the best print results are obtained at minimal moisture content. Just use our dry storage cabinet **Xioneer DryBox EZ**.

Unlike when HIPS functions as the support material, to dissolve the support structure you do not need any foul-smelling, expensive solvent that must be disposed of as dangerous waste. Instead of this, **Xioneer VXL EX** and **Xioneer VXL solve**, our specially developed detergents, provide the opportunity to dissolve the **VXL 111** in water. Just use our heated and stirred washing bath **Xioneer Vortex EZ**. The detergent, dissolved in water, produces a mild alkaline which usually, together with the dissolved support material, can (in limited quantities) be disposed of via the wastewater. Please check your local regulations.

For making your entry into printing our material is as easy as possible, advice on processing is enclosed as follows.

## 2. Advice on processing the VXL 111 support material:

### Handling and storage:

- Like almost every thermoplastic, the **VXL 111** support material slowly absorbs small amounts of moisture when it comes into contact with air. Therefore, it is in a welded aluminum composite bag on delivery. Depending on the spool size, several units of drying agent are enclosed, to keep the moisture level low in the bag. The maximum storage duration of the unopened sealed bag is one year.
- The aluminium composite bag has a pressure seal. Please return the filament spools to the bag after their use; then carefully seal the bag shut. In this way you effectively prevent unwanted absorption of moisture. If necessary, you can always regenerate the desiccant at 80 °C for four hours.
- Ideally you possess a storage box from which you feed the filament in a dry state. In this case you can also store the filament in the dry unit and, after use, you do not need to return it to the aluminium composite bag. We are happy to offer you our **DryBox EZ**, as a practical resource for filament storage, with an opportunity to feed a supply of product. We recommend using the **DryBox EZ** for your model materials as well.

### Print parameters:

#### Parameter recommended for the use of a 0.4 mm nozzle

| Print parameters             | VXL 111                                            |
|------------------------------|----------------------------------------------------|
| Nozzle temperatures          | 240 – 260 °C                                       |
| Inactive nozzle temperatures | 190 °C*                                            |
| Heated bed temperatures      | 90 – 110 °C                                        |
| Build plate substrate        | PI or PEI („Kapton“ or „Ultem“), BuildTak, ABS, PC |
| Build chamber temperature    | ≤ 100 °C                                           |
| Fan speed                    | 0 – 100 %                                          |

\* Typically not necessary

### Processing:

- The use of breakaway support frequently entails a laborious optimisation of parameters. The challenge is to achieve a surface as good as possible while maintaining a level of connection as low as possible. In many instances, provision is made for a fissure of air between the last support layer and the first model layer. In the case of soluble support materials this is **not** necessary; the result is that outstanding surfaces are possible at the connection points between support material and model material. The closer to the connection point the support material is printed, the better the surface becomes, i.e. the larger the actual contact area is.

- If you have already found the ideal settings for printing ABS on your machine, you can use these settings as a basis for conducting first print tests with our **VXL 111** support material. Usually, except for the temperature, typical ABS parameters are also suitable for printing with **VXL 111**.
- As an example, here is a set of parameters for **VXL 111**:
  - Nozzle diameter: 0.4 mm
  - Thread width: 0.4 mm
  - Layer thickness: 0.3 mm
  - Printing speed: 50 mm/s or respectively 6 mm<sup>3</sup>/s
  - → Nozzle temperature: 250 °C
- The example given is solely for orientation purposes. The nozzle temperature depends to a large degree on the print speed, the track width, the layer thickness, and the temperature of the heated chamber/heated print bed. There are also other parameters such as *retraction* that depend on the printer set-up (*direct drive* vs. *Bowden*). If appropriate, change the parameters in accordance with your peripheral conditions and your preferred printer settings.
- The adhesion on various substrates is comparable with ABS types. Therefore, use a build plate which, based on what your own work indicates, achieves good adhesion characteristics for ABS. Build plates with PI ("Kapton") or PEI ("Ultem") are especially suitable as a substrate. If necessary/appropriate to do so, use an additional adhesion promoter. Ideally your printer has a heated build chamber with a temperature set up to 100 °C. If not, your heated bed temperature (= actual surface temperature) should be set between 90 – 110 °C.
- Generally, plastics have a defined dwell time in a heated extruder; if this is exceeded it can lead to thermal degradation. With **VXL 111**, cooling down the nozzle during inactivity is typically not necessary. If the nozzle was cooled down, heat it to the desired print temperature before the nozzle is put into operation. This prevents dripping of the material.

### Dissolving the support material:

- The **VXL 111** support material shows very good adhesion to model materials like PCTG, ABS, ASA, TPU, TPC, PA, PC, PPS, PEEK, PEKK or PAEK. This is required to prevent delamination from the model material. You can use appropriate tools to remove parts of the support structure to reduce the time needed for dissolution. ***Wear protective gloves*** to avoid cuts and ***use tightly closing eye protection***. Do not remove any support material mechanically from delicate structures to avoid damage to the model. Therefore, always finish with a solvent bath to completely remove the supports.
- Only use our detergents **VXL EX** and **VXL solve** to dissolve **VXL 111** support material.
- The fastest way to dissolve the support material is in our heated and stirred washing bath **Vortex EZ**, which, depending on the model material, is at least 65 °C warm.
- **IMPORTANT:** Please follow the instructions of our detergents and support removal devices.

**Safety data sheet:**

Be sure to completely read and understand the Safety data sheet.

**Material properties of VXL 111 support material:**

| Product properties               | Unit                    | VXL 111                       |
|----------------------------------|-------------------------|-------------------------------|
| Colour                           |                         | Natural                       |
| Net weight filament              | <b>kg</b>               | 0.1; 0.5; 0.75; 1.00          |
| Spool dimension<br>(Ø x height)  | <b>mm</b>               | 140 x 44; 200 x 55; 200 x 80  |
| Core hole diameter of the coil   | <b>mm</b>               | 52                            |
| Filament properties              |                         |                               |
| Material                         |                         | Proprietary acrylic copolymer |
| Transparency                     |                         | Opaque                        |
| Diameter                         | <b>mm</b>               | 1.75; 2.85                    |
| Diameter tolerance               | <b>mm</b>               | ±0.05                         |
| Glass transition temperature     | <b>°C</b>               | 110                           |
| Circularity tolerance (max.)     |                         | ±5 %                          |
| Density (21.5 °C)                | <b>g/cm<sup>3</sup></b> | 1.1                           |
| Solubility in water              |                         | No                            |
| Solubility in <b>VXL EX</b>      |                         | Yes                           |
| Solubility in <b>VXL solve</b>   |                         | Yes                           |
| Minimum pH value for dissolution |                         | >10                           |

**3. Contact details:**
**BellandTechnology AG**

Kühlenfelser Str. 47  
91278 Pottenstein  
Germany

Website: [www.xioneer.com](http://www.xioneer.com)  
Email: [wecanhelp@xioneer.com](mailto:wecanhelp@xioneer.com)  
Phone and Messenger: +49 (0) 171 220 006 7