

Building instructions for a filament storage box



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Introduction

Filaments adsorb moisture from the ambient air. To reduce moisture adsorption, the filaments should be stored in a box with low humidity.

The essential feature is that as little water as possible diffuses through the wall of the box. If possible, provide the box with an adsorber (dehumidifier) and the openings with a seal.

This manual describes how to build a suitable dry box for ZEDEX Tribofilament.

What is needed:



Fig.1

1. Box airtight approx. 4.7 litres made of PP with a wall thickness of at least 1.5mm with cover seal (see Fig. 1, [1])
2. drilling machine (see Fig. 1, [2])
3. IQS Bulkhead push-in connector made of nickel-plated brass plug connection 4 mm, each two M12 nuts and sealing rings (see Fig. 1, [3])
4. PTFE hose with a diameter of 4mm (see Fig. 1, [4])
5. Permanent marker (see Fig. 1, [5])
6. 5 drills (3 mm, 5 mm, 8 mm , 11 mm, 11,6 mm) (see Fig. 1, [6])
7. hydrometer (made of horsehair are most accurate) (see Fig. 1, [7])
8. cloth bag (see Fig. 1, [8])
9. silica gel with indicator (see Fig. 1, [9])

Bau der Box

1. In the first step, a mark for a hole is drawn (see Fig 2).

For the next step the drill machine and the 5 drills with different diameters are needed. In order not to cause cracks in the box and to ensure safety, the smallest drill bit (maximum 3 mm) is used. A hole is drilled at the marked point. This is repeated with the larger drills (5mm, 8mm, 11mm and 11.6 mm) until the hole has reached a sufficient diameter of 11.6 mm. (see Fig. 3)

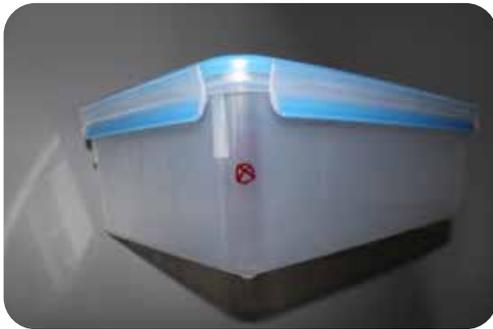


Fig. 2



Fig. 3

2. Now the IQS Bulkhead is inserted into the hole. (see Fig. 4) A sealing ring is inserted inside and outside the wall and tightened with the appropriate nuts. (see Fig. 5)



Fig. 4



Fig. 5

3. Next you need the PTFE hose, which must have a diameter of 4mm, the length can be chosen freely. The hose is pushed into the outlet of the bulkhead. (see Fig. 6) Now the spool is placed in the box and the filament can be pressed out of the box through the IQS bulkhead and the PTFE hose. (see Fig. 7)



Fig. 6



Fig. 7

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>> If the 3D printer does not pull in the filament easily, the use of a spool holder or an axis is recommended. (See Fig. 8)



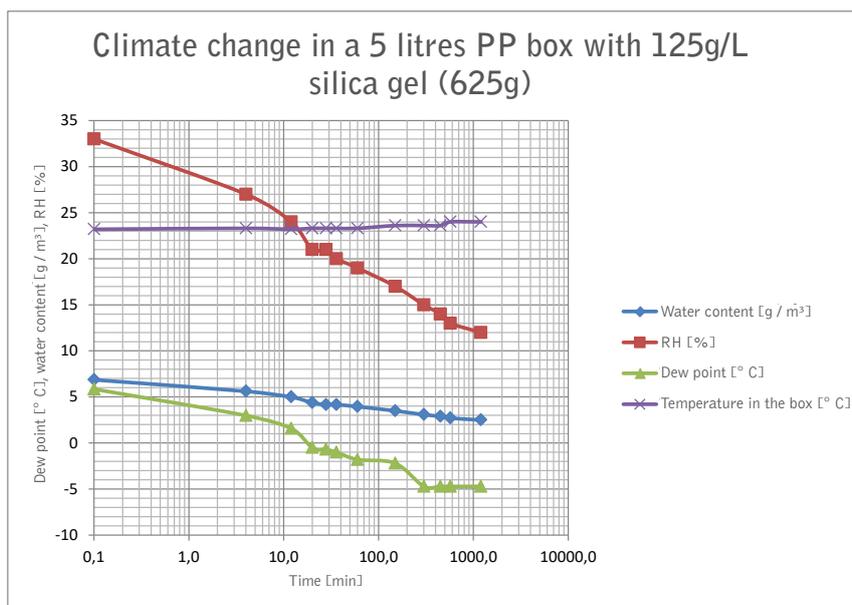
Fig. 8

>> The distance between the box and the printer should be as short as possible

- The silica gel and hydrometer are placed in the box. Silica gel can normally be used as the adsorber material. Alternatively, a dehumidifier can be used (Fig. 1 [8]) There are different ways of inserting the silica gel into the box. Either by placing in the box the required amount as a packed small bags, or as unpackaged granules (see Fig.1, [9]), by packing yourselves the granules into a sealable bag. (see Fig.1, [8])

In order to simplify handling, the silica gel should be filled into a cloth bag and sealed. It is important, that the silica gel is regenerated (dehumidified) at 120°C and the cloth bags are suitable for this temperature.

By placing the silica gel in the closed filament storage box, the air humidity is reduced.



The adsorber material (silica gel) removes the water and the relative air humidity drops. It usually takes about 2 hours until the air is sufficiently dry. Only then should be opened the sealed bag of the filament and inserted the spool into the box.

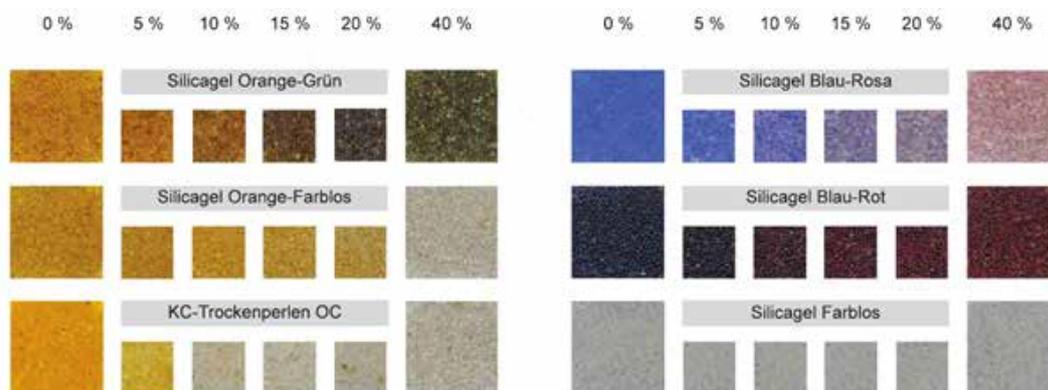
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The more water is removed from the air, the more the adsorber material (silica gel) becomes saturated. The water adsorption capacity and speed decrease with increasing saturation.

Below 10% relative air humidity, silica gel adsorbs only a little water from the air. If the air humidity is to be reduced further, the amount of silica gel has to be increased significantly, or at least doubled.

The saturation of silica gels with an indicator can be recognized by the colour change. From a saturation of 70%, the silica gel should be regenerated. See instructions for regeneration of silica gel



Calculation of the required amount of silica gel

Based on moist ZX-100K Tribofilaments, the following amount of silica gel is recommended as an approximate value:

60g of silica gel are required per kg of filament

Additionally

Per litre volume of the filament storage box

- 370g for tropical climate (worst case)
- 80g for winter in Germany
- 130g for summer in Germany

Example:

Climate: Germany summer, 5 litres box, 1 kg filament => $5 \times 130g + 60g = 710g$

Climate: tropics, 10 litres box, 1 kg filament => $10 \times 370 + 60g = 3760g$

Please note that the silica gel must be dry. That the indicator balls must not have changed colour yet. If this is the case, the silica gel must be regenerated, or a larger amount of silica gel must be used.

We recommend a grain size of the silica gel of 3-5mm

Now the box can be closed.

The hydrometer should have shown a falling amount of water in the box for hours

Links to the sourcing of the required equipment

[IQS Bulkhead push-in connector made of nickel-plated brass plug connection 4 mm, IQS standard](#)

[4.7 liter box](#)

[PTFE tube with a diameter of 4mm](#)

[Hydrometer](#)

[cloth bag](#)

[Unpackaged silica gel with indicator](#)

[Silica gel packed in small bags](#)



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