



Water damage restoration

Professional document recovery by BELFOR

It's true. Paper is patient. But when floods strike or sprinkler damage hits after a fire, the very opposite is true. Moisture destroys books and documents in double-quick time. Pages swell up, discolour and stick together, and covers distort. Force majeure is often followed by lots of "forces mineures", such as mould, bacteria, soot and sediment that continue the destruction, unless they're quickly stopped in their tracks!

Our methods

When it comes to document recovery, you not only need to keep a cool head, but most importantly: cool documents! Papers and books that cannot be dried immediately need to be frozen at minus 25°C to stop the growth of mould and to halt the destruction process. Even fire-damaged books should only be cleaned of soot while frozen, since otherwise they can be destroyed even more. If the moisture damage is only slight, we use adsorption or condensing dryers. If large volumes of paper and books are soaked, we prefer to use ultra-efficient vacuum freeze drying. With this method, moisture is drawn

out of deep-frozen books and documents using sublimation. This harnesses one of the physical properties of water: at the 'triple point', as it is known, the three physical states – solid, liquid and gas – occur together. Below the triple point (less than 6 millibars in the vacuum), the liquid phase can be skipped: the frozen water goes directly into the gaseous state (sublimation) without soaking the paper again. Depending on the degree of damage, further measures may then be required, such as gamma radiation or gasification with ethylene oxide, antibacterial or anti-fungal treatment, disinfection and odour elimination. However, bringing BELFOR on board early often means

that none of these expensive follow-up measures are needed.

Our methods for drying and preserving documents at a glance:

- ▣ Adsorption drying
- ▣ Condensation drying
- ▣ Vacuum drying
- ▣ Freeze-drying
- ▣ Molecular sieve drying
- ▣ Gamma radiation
- ▣ Disinfection
- ▣ Odour elimination
- ▣ Document cleaning, smoothing and restoration

+++ 2000: India, Hyderabad – 100,000 historic scripts fall victim to a flood. BELFOR restores. +++ 2002: flood of the century devastates the Prague state archives. 500 tonnes of paper are soaked. BELFOR wades in. +++ 2007: Vienna University of Economics – BELFOR restores 200,000 books after arson attack +++

Country	Number of vacuum chambers	Type	Volume of documents	Response time (for immediate measures)
Belgium	1	TVGD*, mobile	1,000 kg	< 6 hours
Germany	1	TVGD, mobile	600 kg	< 6 hours
France	1 1	TVGD TVGD, mobile	10,000 kg 1,000 kg	< 12 hours
United Kingdom	1 2	TVGD, mobile TVGD, mobile	20,000 kg 2 x 1,000 kg	< 24 hours
Italy	1	TVGD, mobile	1,000 kg	< 6 hours
Austria	1	TVGD, mobile	600 kg	< 6 hours
Poland	1	TVGD, mobile	600 kg	< 8 hours
Czech Rep.	1	TVGD	20,000 kg	< 8 hours
Total number of chambers:	11	Monthly drying volume throughout Europe:	Approx. 100 t	

*Thermal Vacuum Freeze Dryer

Our capacities

BELFOR has over 28 vacuum chambers worldwide, which can accommodate a total volume of around 570 cubic metres. 11 of the chambers are located in Europe. The rest are in the USA, Canada, Israel and currently in Chile. However, it's impossible to say exactly where these vacuum chambers will be at any one time, since the majority of them are mobile and can be moved to where they're needed. In Europe alone, 70 to 80 tonnes of paper can be dried out simultaneously. Moderately soaked paper needs around two to three weeks until it is completely dry. This puts the total drying capacity throughout Europe at around 100 tonnes of paper a month. If drying chambers cannot be used for logistical reasons, damaged documents can also be transported directly to the specialist BELFOR branches, such as our centres of expertise in Prague, Paris or Abingdon, Oxford.

Our qualities

Vacuum freeze drying is only the "tip of the iceberg". Before and after this stage, numerous highly specialist procedures need to be followed that combine innovative, high-tech with painstaking manual work. These include a precise inventory of all the documents and careful pre-cleaning, in order to remove deposits and sediment. Warped books need to be reshaped while they're still wet. All documents need to be sorted according to their level of moisture, in order to make the best possible use of the drying capacities. Before being frozen, suitable measures need to be taken to stop the documents from freezing together. After drying comes the after-treatment, which at BELFOR is more than just a cosmetic exercise: bacteria and spores are vacuumed away and the documents may need treatment with disinfectant. Swollen pages are thermally smoothed, and unpleasant odours are eliminated with ozone treatment, radiation or fogging.



Top: mobile vacuum chamber
Bottom: ice formation in the vacuum chamber

For restorative work such as trimming, paper splitting or deacidification, we collaborate with specialist companies and before you know it, your damaged documents will once again be as beautiful as the magazine you're holding in your hands right now!