

# Green Roof Architecture

FLL 1982" under the direction of Prof. Dr. H.-J. Liesecke. Thus in 1982, a set of regulations was published for the first time, claiming to comprehensively represent the state of technology for green roofs valid at the time, taking constructional and vegetation-related aspects into account.

The "Basic principles for green roofs, FLL 1982, 1984 and 1986" already distinguished between intensive and extensive green roofs, whereby most of the statements made concern intensive green roofs, since little was known about extensive green roofs at this point. Extensive green roofs was only focused on as a central theme at the beginning of the 1980s. As the ecology movement picked up momentum, the wish was heard for "more nature on the roof", and mottos such as "green not gravel" illustrate the way of thinking at this time. In place of a layer of gravel 5 cm thick, which was installed as protection on many roofs and had a load of around 100 kg per m<sup>2</sup>, a landscaping structure was to be installed with a thickness of about 10 cm but with about the same load.

Comprehensive preliminary work is required in order to provide experts with the necessary information about the constructional and vegetation-related aspects of extensive green roofs in a set of guidelines. The FLL took over the research project "Low-cost methods of green roofs – basic principles of planning, execution and maintaining extensive green roofs and simple intensive green roofs, FLL 1989" from the Federal Ministry for Planning Research, Building and Town Planning. The status of knowledge and development for extensive green roofs was evaluated under the direction of Prof. Dr. H.-J. Liesecke and in cooperation with landscape architect Dipl.-Ing. B. Krupka. This created the basis for the evaluation and comparison of the numerous products and constructional methods, as well as structural prerequisites. The results are integrated in the "FLL guidelines for green roofs", published in 1990. These deal with both intensive and extensive green roofs, and specify very detailed requirements.

Due to the wide acknowledgement given to the "Basic principles for green roofs" in practical planning and execution, the updates since 1990/1992 have been published as the "FLL Guideline for the Planning, Execution and Upkeep of Green Roof Sites – Roof-Greening Guideline". These guidelines were revised in 1995, 2002 and most recently in 2008, and updated in line with technical progress.

The FLL regulations for green roofs are now about 27 years old and, on the one hand, are thus relatively young compared with other regulations in the building industry. However, on the other hand, international comparison reveals that they are the oldest regulations for roof landscaping in the world. In the meantime, the FLL "Roof-Greening Guideline" for green roofs is regarded as generally recognised technical regulations, and their importance is additionally underlined by the fact that they are integrated in several standards issued by the German Industrial Standards Association, DIN, and are used in a translated form with identical or modified wording in some neighbouring countries. In countries that have not developed their own regulations for green roofs, and for the drafting of international regulations, it is worth consulting the contents and basic development conditions of the FLL green roof guidelines.

## 3 | Key criteria for green roof guidelines

If national or international regulations are to be created for green roofs, different basic conditions must exist; these can be illustrated using the example of the FLL "Roof-Greening Guideline".

### 3.1 | Green roof market and public interest

Regulations always become necessary when questions arise from practical applications that need answering across all products. In other words, a small green roof market has to exist – the further development of which can be pushed through technical regulations. The planners, companies and builders involved must be so interested in regulations for green roofs that they see the drafting of green roof guideline as a common objective. The necessity of making regulations results, for example, when

- Roof landscaping is carried out without technical specifications being available
- Roof landscaping finds little acceptance amongst planners and builders
- Expert knowledge about roof gardening is not very widespread
- Structural damage has been caused through a lack of building engineering knowledge
- Plants die through a lack of vegetation-related knowledge
- Criteria for the acceptance of the work performed are not defined and this leads to disputes