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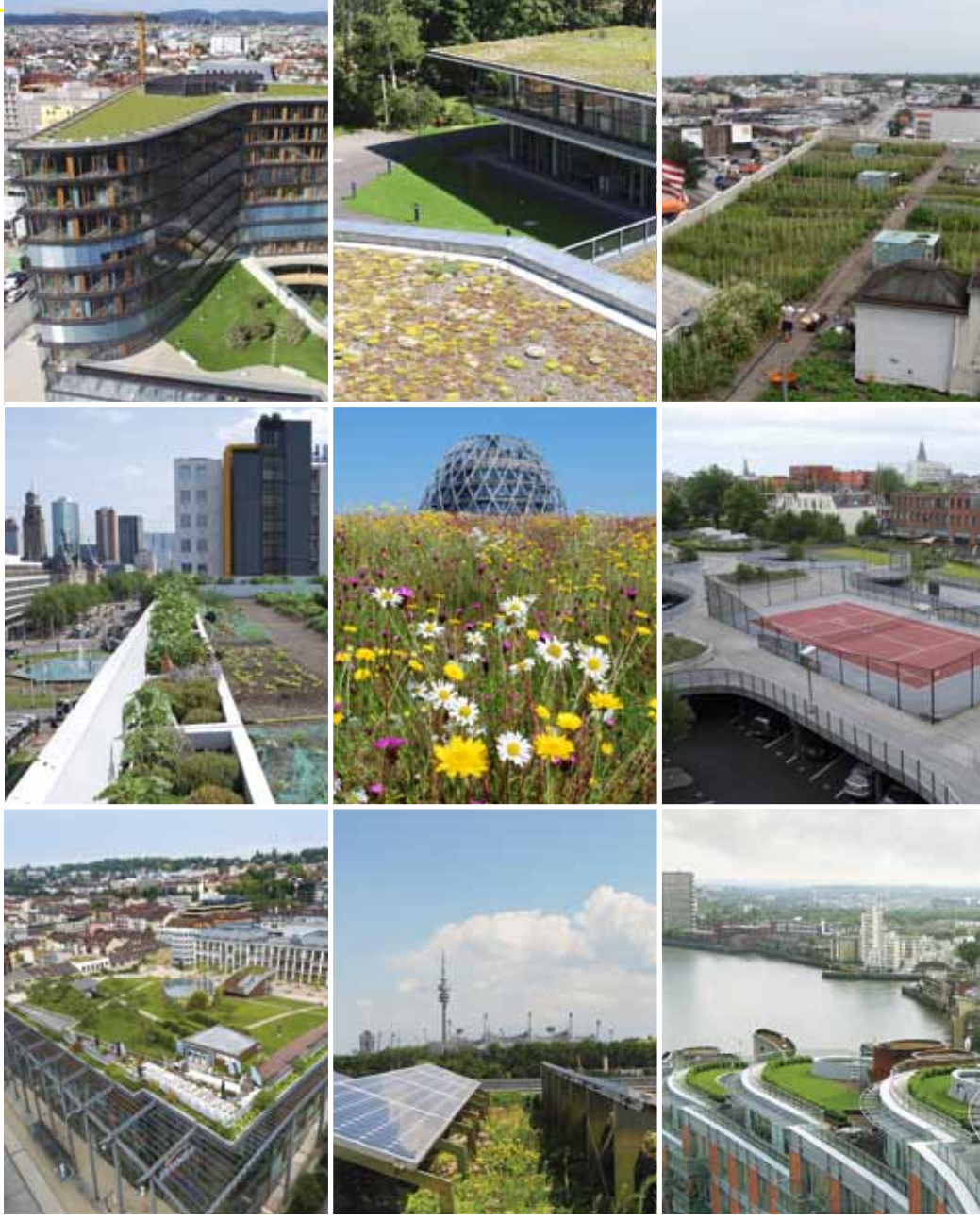

– Green Roof Guidelines –

Guidelines for the Planning, Construction and Maintenance of Green Roofs

2018 edition

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FLL – Landscape Development and Landscaping Research Society e.V.

– Green Roof Guidelines – Guidelines for the Planning, Construction and Maintenance of Green Roofs

2018 edition

Prepared by the editorial board and working group “Dachbegrünungen”

with

Investigation methods for growing media and drainage layer bulk materials for green roofs

2018 Edition

and

Method for investigating the root resistance of membranes and coatings for green roofs

1999 edition, with editorial changes 2002/2008 as well as

supplementary notes to "Requirements for transcription / renewal of test certificates"
(adopted and implemented by the FLL presidium at the end of 2016)

Notes for the user

Any interested party may freely use the technical regulations issued by the FLL. An obligation to apply these guidelines may arise from any legal, administrative or contractual regulation or from any other legal requirements.

FLL guidelines are the result of voluntary technical and scientific cooperative work. The principles and rules applied when establishing these guidelines mean they can be considered technically correct.

FLL guidelines are an important source of expertise for professional behavior in standard working situations. However, they cannot include all special cases for which additional or restrictive measures may be required. Nevertheless, they present a benchmark for faultless technical behavior. This benchmark is also significant in the context of the law.

FLL guidelines are intended to be established as a “recognized code of practice”.

Using the FLL guidelines does not diminish the user’s responsibility for their own actions. Everyone is liable for his or her own actions. Everyone acts at his or her own risk.

Anyone who identifies a mistake or ambiguity, which may lead to a wrong application of these guidelines, is requested to report it immediately to the FLL to ensure any flaws can be eliminated. Modal auxiliary verbs (e.g. shall, should, must) and their meanings are of particular significance to gain a clear understanding of the regulations. See information in DIN 820 “Standardization”.

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From 1990 Richtlinien für Dachbegrünungen: 1990, 1992, 1995, 2002, 2008

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Preface

The FLL "Green Roof Guidelines – Guidelines for the Planning, Construction and Maintenance of Green Roofs" were developed from the "Principles for Green Roofing" published in 1982 and have been revised several times since 1990. They are recognized as a benchmark set of guidelines for green roofs in Germany. Abroad, the FLL Green Roof Guidelines are noted with great acceptance and serve as a basis for the development of national regulations in some neighboring countries.

The FLL has revised the 2008 edition in the Editorial Board (EB) Green Roofs, which was valid until now. One major change is the fundamental revision of the topic 'Securing against material displacement on flat and pitched roofs'. For the first time, the different forms of material displacement, such as surface erosion, slippage and exceeding the angle of repose are now considered separately. Corresponding safeguards against these three types of material displacement are described. In addition, topics have been supplemented that have been subject to technical developments and where new issues have arisen. Turf greening has been taken up as a vegetation with its own turf substrate requirement profiles. The issue of biodiversity of green roofs is another new topic being considered, since a better protection of the flora and fauna than providing habitats on roofs will hardly be possible to achieve in urban areas.

Finally, the information on the neighboring works of roof and building waterproofing has been adapted due to the extensive and fundamental changes to DIN 18195, DIN 18531, DIN 18532 and DIN 18533.

In the 'White Paper Urban Green' from the Federal Ministry for the Environment, Nature Conservation, Construction and reactor safety it says, "Greening buildings has an impact on the climate in cities. The environmental and urban climatic effects of greening roofs and facades are so far little known. Therefore, the federal government will analyze the effects of green facades and roofs in inner-city neighborhoods and will develop a guide for builders, owners and tenants on the possibilities of greening buildings".

The FLL Green Roof Guidelines are an important instrument in the structural implementation of these goals and other efforts to increase the proportion of green infrastructures in urban areas

We would sincerely like to thank the members of the Editorial Board (EB) and the Working Group (WG) "Dachbegrünungen", without whose great honorary commitment it would not have been possible to continue and develop standards for the greening of roofs.

Bonn, in July 2018

Prof. Dr. Ulrich Kias
President of the FLL

Prof. Gilbert Lösken
Head of the EB and WG Green Roofs

1 Scope, Purpose

1.1 Scope

The "Guidelines for the Planning, Execution and Maintenance of Green Roofs – Green Roof Guidelines" apply to intensive greening, simple intensive greening and extensive greening on roofs and ceilings/decking e.g., roof terraces, hall roofs, underground garages and other building decking with generally up to 2 m overhang (section 9.2.2, table 3).

Should other requirements be placed on the planned construction or on the vegetation layer - also for partial areas, then it is necessary to examine whether deviations from the individual guidelines are necessary e.g., if

- when using thicker construction layers the principles of Landscaping according to DIN 18915 or the principles of Earthmoving according to ATV DIN 18300 need to be adhered to;
- in the case of turf sports fields or other load-bearing lawns, DIN 18035-4 should apply for the vegetation layer;
- in individual cases when planting trees in the vegetation layer, the FLL-„Empfehlungen für Baumpflanzungen – Teil 2: Standortvorbereitungen für Neupflanzungen“ [Recommendations for tree planting - Part 2: Site preparation for new plantings] should apply;
- other types of greening, forms of vegetation or uses are planned (e.g. planted water features, marsh planting, horticultural production areas, meadows, orchards, renewable raw materials etc.) and therefore the construction methods along with materials and structural elements need to be adjusted to meet the demands of the greening goals;
- in the case of retention roofs, water discharge is to be slowed in the greening structure or backed up and temporarily stored in an additional layer. The discharge is different from the usual drainage under defined conditions.

For traffic areas on buildings see FLL-„Empfehlungen zu Planung und Bau von Verkehrsflächen auf Bauwerken“.

1.2 Purpose

The greening of buildings is one of the possibilities for ecological, functional and design improvement of the living and working environment. This applies to intensive greening as well as simple intensive greening and extensive greening and includes construction methods as well as building materials and plant use.

The purpose of the guidelines is to present general principles and requirements for planning, execution and maintenance that conform to the current state of knowledge and reflect state-of-the-art technology. They relate to the object level with supplementary planning and construction fundamentals and focus on the building and vegetation engineering requirements. They are aimed at professionals of all participating disciplines and trades.

2 Normative References

The documents listed in this section contain stipulations that are necessary for the application of these guidelines.
In the case of dated references, the stated edition applies; for undated references, the current edition of said document applies.

LAWS, REGULATIONS OR SIMILAR

- Düngegesetz (DüngG) [Fertilizing Act] from 9 January 2009, Federal Law Gazette (BGBl.) I p. 54, 136, last amended by Article 2 of the law of 31 July 2009 (BGBl. I p. 2539).
- Verordnung über das Inverkehrbringen von Düngemitteln, Bodenhilfsstoffen, Kultursubstraten und Pflanzenhilfsmitteln (Düngemittelverordnung – DüMV)
  [Ordinance on the Marketing of Fertilizers, Soil Additives, Cultivation Substrates and Plant Additives] of 16 December 2008 (BGBl I p. 2524), last amended by Article 1 of the Ordinance of 14 December 2009 (BGBl. I p. 3905).

German Construction Contract Procedures – (VOB)

Part C: General Technical Specifications in Construction Contracts – (ATV)

- DIN 18299 General rules applying to all types of construction work
- DIN 18300 Earthworks
- DIN 18320 Landscape works

DIN-Standards:

DIN 1986-30	Drainage systems on private ground - Part 30: Maintenance
DIN 1986-100	Drainage systems on private ground - Part 100: Specifications in relation to DIN EN 752 and DIN EN 12056
DIN 4045	Wastewater engineering - Vocabulary
DIN 4102-4	Fire behaviour of building materials and building components - Part 4: Synopsis and application of classified building materials, components and special components
DIN 4102-7	Fire behaviour of building materials and building components - Part 7: Roofing; definitions, requirements and testing
DIN 4426	Equipment for building maintenance - Safety requirements for workplaces and accesses - Design and construction
DIN 18035-4	Sports grounds - Part 4: Sports turf areas
DIN 18040-1	Construction of accessible buildings - Design principles - Part 1: Publicly accessible buildings
DIN 18040-2	Construction of accessible buildings - Design principles - Part 2: Dwellings
DIN 18040-3	Construction of accessible buildings - Design principles - Part 3: Public circulation areas and open spaces
DIN 18195	Waterproofing of buildings - Vocabulary