

## Quality Regulations for Intensive Green Roof Substrates for Multi-Layer Construction



All values relate to the condition in a specified laboratory compaction test.

Quality Parameters	Range of Values
<b>1 Permissible constituents</b>	Organic, mineral and synthetic substances. If there is an RAL quality assurance system for the organic starting substances, quality-assured or equivalent products are to be used. The decision rests with the Quality Committee "Substrates for Green Roofs and Substrates for Tree Planting"
<b>2 Declaration</b>	
2.1 Constituents	Declaration of constituents > 5 vol. % in descending order. Recycling materials must be considered.
<b>3 Physical properties</b>	
3.1 Grain size distribution [mass %]	The granulation curve must lie in the set granular distribution range; see figure 6-1 <sup>1)</sup>
3.1.1 Proportion of clay and silt ( $d \leq 0.063$ mm)	$\leq 20$
3.1.2 Proportion of fine / medium gravel ( $d \geq 4$ mm)	$\leq 40$
3.2 Bulk density (volume weight) [g/cm <sup>3</sup> ]	
3.2.1 dry	To be analysed
3.2.2 at maximum water capacity	To be analysed
3.3 Water and air management	
3.3.1 Total pore volume [vol. %]	To be analysed
3.3.2 Maximum water capacity [vol. %]	$\geq 45 \leq 65$
3.3.3 Air content at max. water capacity [vol. %]	$\geq 10$
3.3.4 Air content at pF 1.8 [vol. %] (if 3.3.3 is exceeded)	$\geq 20$
3.3.5 Water permeability mod. $k_f$ [mm/min]	0.3 - 30
3.4 Selectable foreign matter [mass %]	
3.4.1 $d > 6$ mm; e.g. tiles, glass, ceramics, wood remains	$\leq 0.3$
3.4.2 Plastics (loss due to heating > 70% by weight)	$\leq 0.1$
3.4.3 Surface sum of plastics (if 3.4.2 is exceeded) [cm <sup>2</sup> /l]	$\leq 10$
<b>4 Chemical properties</b>	
4.1 Organic content [g/l] [mass %]	$\leq 90$
4.2 pH value	6.0 - 8.5
4.3 Salinity [g/l]	Water extract: $\leq 2.5$ ; gypsum extract $\leq 1.5$ (if necessary)
4.4 Soluble nutrients [mg/l] <sup>2),3)</sup>	Tolerance for an upward deviation: 50 %
4.4.1 Nitrogen (NO <sub>3</sub> -N + NH <sub>4</sub> -N)	CaCl <sub>2</sub> : $\leq 80$ CAT: $\leq 80$
4.4.2 Phosphorous (P <sub>2</sub> O <sub>5</sub> )	CAL: $\leq 200$ CAT: $\leq 50$
4.4.3 Potassium (K <sub>2</sub> O)	CAL: $\leq 700$ CAT: $\leq 500$
4.4.4 Magnesium (Mg)	CaCl <sub>2</sub> : $\leq 200$ CAT: $\leq 200$
<b>5 Biological properties</b>	
5.1 Growth inhibitors	Germination test produces no evidence of growth inhibitors
5.2 N Immobilisation	None
<b>6 Requirements as to environmental relevance</b>	The substrates must be examined for environmentally relevant substances in the eluate (see table on environmental relevance) (Table 6-7).
<b>7 Heavy metals</b>	The substrates must be examined for heavy metals (see table 6-8).

<sup>1)</sup> FLL Guidelines for the Planning, Construction and Maintenance of Green Roofing (2008)

<sup>2)</sup> The nutrient contents of substrates for green roofs should be declared for each type of roof greening system separately. Information should be provided on how to adjust nutrient contents to plant requirements when incorporating the substrate or performing finishing care. Nutrient contents must always adhere to the threshold requirements specified in the table.

<sup>3)</sup> Analyse and declaration of the nutrients after both methods is possible

**Granulometric distribution for Intensive Green Roof Substrates (multi-layer)**  
**Quality assurance Substrates for Green Roofs RAL-GZ 250/6**

