

<b>Preface</b>	<b>7</b>		
<b>1 Introduction</b>	<b>9</b>		
History	9		
Earth as a building material: the essentials	11		
Improving indoor climate	13		
Prejudices against earth as a building material	16		
<b>2 The properties of earth as a building material</b>	<b>17</b>		
Composition	17		
Tests used to analyse the composition of loam	19		
Effects of water	22		
Effects of vapour	27		
Influence of heat	29		
Strength	30		
pH-value	33		
Radioactivity	33		
Shelter against high-frequency electromagnetic radiation	33		
<b>3 Preparing of loam</b>	<b>34</b>		
Soaking, crushing and mixing	34		
Sieving	36		
Mechanical slurring	36		
Water curing	36		
Thinning	36		
<b>4 Improving the earth's characteristics by special treatment or additives</b>	<b>37</b>		
Reduction of shrinkage cracks	37		
Stabilisation against water erosion	38		
Enhancement of binding force	40		
Increasing compressive strength	41		
Strength against abrasion	45		
Increasing thermal insulation	45		
<b>5 Rammed earthworks</b>	<b>50</b>		
Formwork	51		
Tools	52		
Method of construction	53		
Shaping of openings	53		
New wall construction techniques	54		
Rammed earth domes	57		
Drying	57		
Labour input	58		
Thermal insulation	58		
Surface treatment	58		
<b>6 Working with earth blocks</b>	<b>59</b>		
History	59		
Production of earth blocks	60		
Material composition	63		
Laying earth blocks	63		
Surface treatment	64		
Fixing fasteners to walls	65		
Lightweight loam blocks	65		
Special acoustic green bricks	66		
<b>7 Large blocks and prefabricated panels</b>	<b>67</b>		
Large blocks	67		
Prefabricated wall panels	68		
Floor slabs	68		
Floor tiles	69		
Extruded loam slabs	69		
<b>8 Direct forming with wet loam</b>	<b>70</b>		
Traditional wet loam techniques	70		
The "Dünne loam loaf" technique	72		
The <i>stranglehm</i> technique	73		
<b>9 Wet loam infill in skeleton structures</b>	<b>78</b>		
Thrown loam	78		
Sprayed loam	78		
Rolls and bottles of straw loam	79		
Lightweight loam infill	80		
Infill with <i>stranglehm</i> and earth-filled hoses	80		
Sprayed loam in steel-reinforced walls and ceilings	81		
<b>10 Tamped, poured or pumped lightweight loam</b>	<b>83</b>		
Formwork	83		
Tamped lightweight straw loam walls	83		
Tamped lightweight wood loam walls	84		
Tamped, poured or pumped lightweight mineral loam walls	85		
Pumped lightweight mineral loam floors	88		
Loam-filled hollow blocks	89		
Loam-filled hoses	90		
<b>11 Loam plasters</b>	<b>92</b>		
Preparation of ground	92		
Composition of loam plaster	92		
Guidelines for plastering earth walls	94		
Sprayed plaster	95		
Lightweight mineral loam plaster	95		
Thrown plaster	95		
Plastered straw bale houses	95		
Wet formed plaster	96		

Protection of corners 96  
Stabilised loam plasters 97  
Characteristics of different loam plasters 98

## **12 Weather protection of loam surfaces 100**

Consolidating the surface 100  
Paints 100  
Making surfaces water-repellent 103  
Lime plasters 103  
Shingles, planks and other covers 105  
Structural methods 105

## **13 Repair of loam components 106**

The occurrence of damage in loam components 106  
Repair of cracks and joints with loam fillers 106  
Repair of cracks and joints with other fillers 107  
Repairing larger areas of damage 107  
Retrofitting thermal insulation with lightweight loam 108

## **14 Designs of particular building elements 109**

Joints 109  
Particular wall designs 110  
Intermediate floors 112  
Rammed earth floorings 114  
Inclined roofs filled with lightweight loam 117  
Earth-covered roofs 117  
Earth block vaults and domes 119  
Earthen storage wall in winter gardens 131  
Loam in bathrooms 132  
Built-in furniture and sanitary objects from loam 133  
Wall heating systems 134  
Passive solar wall heating system 134

## **15 Earthquake-resistant building 135**

Structural measures 136  
Openings for doors and windows 140  
Bamboo-reinforced rammed earth walls 141  
Steel-reinforced spayed loam walls 143  
Steel-reinforced adobe wall system 143  
Domes 144  
Vaults 145  
Textile walls with loam infill 147  
Steel-reinforced earth walls 149

## **16 Built examples 150**

### **Residences**

Two semi-detached houses, Kassel, Germany 150  
Residence cum office, Kassel, Germany 152

Residence, Palo Alto, California, USA 154  
Weekend house, Ajijic, Mexico 156  
Residence, Phoenix, Arizona, USA 158  
Residence and studio, Gallina Canyon,  
New Mexico, USA 160  
Low compound, Scottsdale, Arizona, USA 162  
Residence, Des Montes, near Taos, New Mexico, USA 164  
Casita Nuaanarpoq, Taos, New Mexico, USA 166  
Residence and office, Bowen Mountain, New South Wales,  
Australia 167  
Vineyard residence, Mornington Peninsula, Victoria,  
Australia 168  
Residence, Helensville, New Zealand 170  
Residence, Merrijig, Victoria, Australia 172  
Farmhouse, Wazirpur, India 174  
Residence, Santiago, Chile 175

### **Cultural, Educational and Sacred Buildings**

Kindergarten, Sorsum, Germany 176  
School, Rudrapur, Bangladesh 178  
Kindergarten and nursery of Druk White Lotus School,  
Ladakh, India 180  
Youth centre at Spandau, Berlin, Germany 182  
National Environment Centre at Thurgoona Campus,  
Albury, New South Wales, Australia 184  
WISE Centre for Alternative Technology, Machynleth,  
Wales, Great Britain 186  
Chapel of the central clinic, Suhl, Germany 188  
Chapel of Reconciliation, Berlin, Germany 190  
Center of Gravity Foundation Hall, Jemez Springs,  
New Mexico, USA 192  
School, Solvig, Järna, Sweden 194

### **Commercial and Hospitality Buildings**

Rivergreen Centre, Aykley Heads, Durham,  
Great Britain 195  
Printing plant, Pielach, Austria 196  
Office building, Santiago, Chile 198  
Feng shui office building, Suhl, Germany 199  
High Country Visitor Information Centre, Mansfield, Victoria,  
Australia 200  
Twelve Apostles Visitor Amenity Building, Port Campbell,  
Victoria, Australia 202  
Mii Amo Spa, Sedona, Arizona, USA 204

Bibliographical references 206

Illustration credits 207

Acknowledgements 207