

Bz. Int 23,13

INSTITUT FÜR INDUSTRIALISIERUNG DES BAUENS  
Prof. Dr.-Ing. habil. Dr.h.c. Helmut Weber · Forschungs-, Entwicklungs- und Planungs GmbH  
TELEFON: (05 11) 79 60 88 + 79 60 89 · TELEFAX: (05 11) 75 62 27 · TELEX: 09-23 868 (UNIVERSITÄT HANNOVER)



Hannover, 19.12.1996  
29.o - We-Wi-Bs

## **BRIEF REPORT**

### **WORK SPECIFICATIONS FOR THE CONSTRUCTION OF RECYCLING-ADEQUATE RESIDENTIAL BUILDINGS**

Project BI5 - 800195-8  
by order of the  
Federal Ministry for Regional Planning, Building and Urban Development, Bonn

carried out at the  
Institut für Industrialisierung des Bauens,  
Prof. Dr.-Ing.habil. Dr.h.c. Helmut Weber  
Forschungs-, Entwicklungs- und Planungs-GmbH  
Hannover

by:  
Dipl.-Ing. Barbara Bredenbals  
Prof. Dr.-Ing.habil. Wolfgang Willkomm

## **Objective**

The attempt of this research project was to work out models for work specifications and bills of quantities as assistance to transfer the strategy for recycling-adequate constructions into the practice. To increase the positive base of recycling-adequate constructions assistance for planners and constructors is necessary as clear work descriptions for the invitation to bid. The investigation is carried out for new buildings and for demolition of buildings.

## **Execution**

In a first working phase the actual conditions for recycling of building wastes were analyzed with main focus to the technical and legal frame upon the basis of interviews of recycling firms and analysis of technical literature.

In a further working phase the different steps of building production of typical residential building constructions and new developments were analyzed to identify the relevant sectors of waste emergence, waste prevention and utilization. Upon the basis of four construction examples the key areas of waste prevention and recycling were worked out for new buildings and for demolition.

Alternatives were shown to the work specifications for the main sectors. Advice and additions were given for the recycling-adequate modification of standard work descriptions for new buildings and for demolition.

## Summary of results

As one result of this research project a „basic textbook for decisions“ is elaborated which comprises the main rules for planning and execution of recycling-adequate buildings for the different steps of building production: design and final planning, work specifications, invitation to bid, execution and building supervision.

The main rules for **design and final planning** are:  
**new buildings:**

- long-term value conservation
- recycling-adequate construction
- low material-heterogeneity
- waste reduction by dimensional co-ordination

**demolition:**

- separation of materials with different recycling processes
- identification and re-utilization of complete building elements
- working out of a concept for demolition (dismounting plan)

The main rules for **work specifications and invitations to bid** are:  
**new buildings:**

- description and request of recycling-products
- re-utilization of complete building elements
- choice of materials and bill of quantities under the aspects:  
waste-free raw material, packing-free delivery, recycling materials,  
materials without contamination, preference of building materials  
with declaration and identification of all contents
- demand to separate and recycle building materials

**demolition:**

- demand to protect existing components
- prohibition to mix recyclable wastes
- separate bill of quantities and work specification for site facilities of  
separation of waste

The main rules for **execution and building supervision** are:

**new buildings:**

- avoiding waste of packing material and back-flow of packing and rest material to the trade
- preparation of building site advice
- plan of building site equipment for material separation and collection

**demolition:**

- waste prevention in reconstruction through protecting of reusable components, utilization of damage-free working machines
- waste prevention in demolition works through building analyses and structural possibilities for demounting in steps
- separation of rest materials.

With the aid of work specifications and invitations to bid of recycling-adequate residential new buildings the building costs can be reduced. It is possible by reducing the costs for building materials (optimize the offcut of building material) and by minimizing the waste disposal costs (waste prevention and recycling). The finishing and services works are really important in this context.

Recycling-adequate constructions can minimize the costs for alterations and demolition of buildings but to construct recycling-adequate buildings on base of today's recycling technique 3,5 % to 6 % additional costs will be necessary. The long period between the additional costs and the saving of costs causes a conflict of aims.

As another result of the research project examples are worked out for models for bills of quantities. They are differentiated in three parts of the invitation to bid: technical introductory remarks, text-elements for work descriptions and enclosures.

Important regulations for new buildings and for demolition can be made through technical introductory remarks. They are completed through practical specifications to the choice of materials and the connection of building elements in the work descriptions of the different trades.

The main strategies are:

- re-utilization of complete building elements
- using of recycling-products
- avoiding waste
- recycling of building materials.

The enclosures can contain further information's e.g. for contacts to waste disposal and recycling firms and their conditions for the acceptance of parts and materials.