

BASICS PROFESSIONAL PRACTICE TENDERING

Tim Brandt, Sebastian Th. Fransen

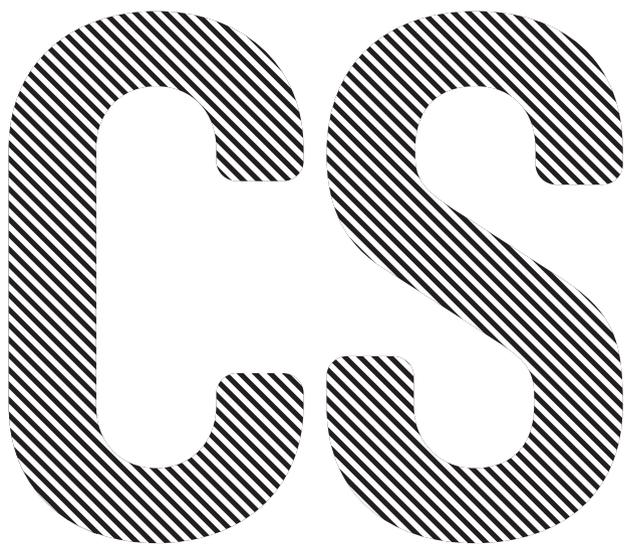
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Foreword

Architectural quality does not derive from good and creative designs alone, it must also be reflected in the built reality. So in architecture quality is a continual concern, from the first sketch via design and final planning to built structures and surfaces. Tendering is the link between planning and realization, defining the project requirements. The responsible contractors use the tender specifications to familiarize themselves with the details of the commission and can then submit a tender to carry out the work described, which then forms the basis for the contract and the actual building programme. In this way the tender specification, as the final design development stage before building starts, is an important planning component. It should therefore be compiled with the same precision and faithfulness to the concept as a design or working plan.

As students and professional beginners usually have little professional experience, they need carefully structured, practical information about tender types, the sequence of events, and descriptions of the individual services required to help them handle their first tender specifications. The present volume starts at this early stage and works through the subject matter with the aid of readily understood introductions and explanations.

First of all it describes how building services are specified in a tender, and explains the fundamental principles of the process. One important practical topic is organizing tendering for a building project. It discusses types of award, fixing award units, time planning and not least the style of the tender specification. The possibilities for describing the work required range from the purely functional to more detailed description, as will be shown. Readers discover the components of the tendering process, what they are there for and how they should be compiled in detail. This is supported by practical tips, examples and simple, clear summaries that help when drawing up a tender specification. *The Tendering* volume of the *Basics* series passes on all the key background and context needed for a sound and practical start on tendering work.

Bert Bielefeld, Editor

Introduction

Planners – this includes architects, civil engineers and specialist engineers – have to involve another group of people by the end of the plan submission and planning permission process at the latest. The earlier phases of the process focused on communicating with the client and the authorities, but now planners have to turn their attention towards the firms who will be responsible for realizing the project: craftsmen and women, building contractors, specialist companies.

From planning to realization

All the information needed for realizing the project is provided to building firms as part of an invitation to tender, in the form of descriptions or drawings of the work to be done and services needed. The invitation to tender must contain all the information the bidding firms need to perform the necessary services and to submit a bid for the contract and, where appropriate, for planning the work.

Tender content

○

○ **Hint:** The tender becomes part of the contract that the client concludes with the building contractor. Planners can incur penalties for errors and omissions in the bid.

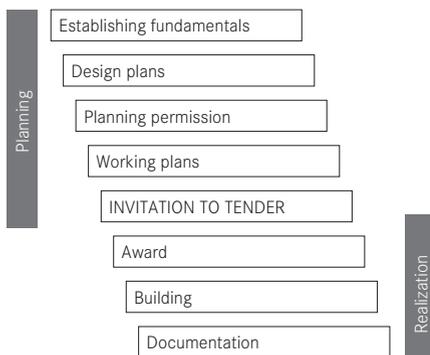


Fig. 1: Planning phases

The tendering process aims to attract as many appropriate bids as needed to form a broad view of the market. The invitation to tender is compiled by the planner and submitted to suitable contractors, who then calculate prices and submit a bid, which is binding. This is then examined by the planner and compared with other bids. The comparison gives the planner an insight into current prices and enables the client to commission the work from the bidder who has submitted the most reasonable offer for the particular project.

TENDERING REQUIREMENTS

The invitation to tender collects all the requirements that have come to light in the planning phase. These requirements are essentially laid down by the client, but they may also relate to legal or technical matters. They can be categorized as follows: > Fig. 2

- Costs
- Deadlines
- Function
- Scope
- Quality

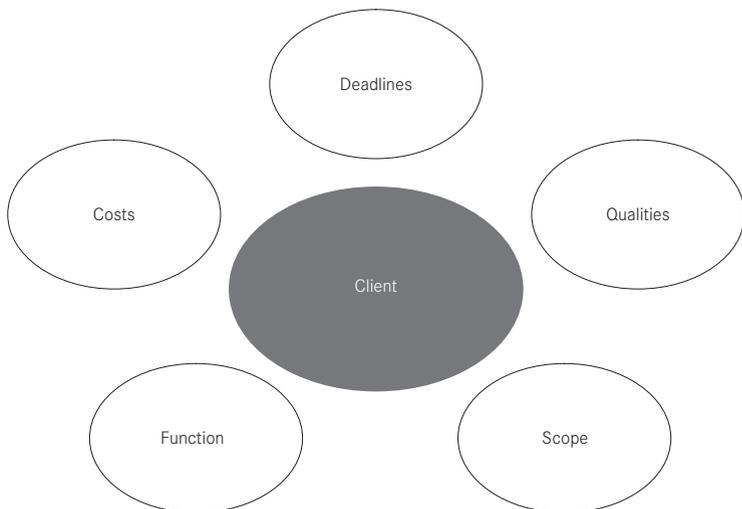


Fig. 2: Tendering criteria

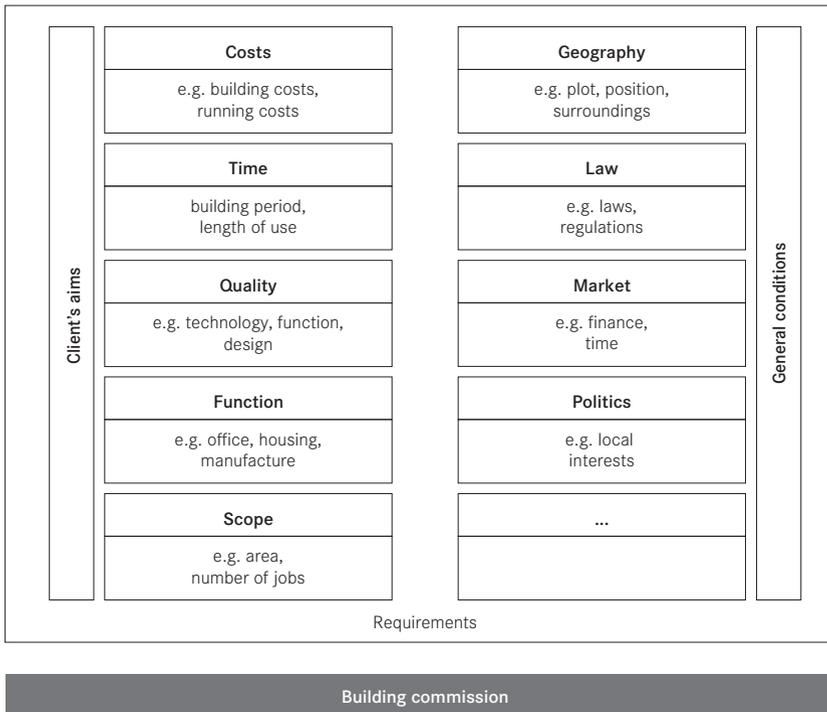


Fig. 3: Definition of requirements

These criteria are used to fix the realization phase and to identify any planning services that are still required. > Fig. 3

Costs

In most cases cost is the key criterion for or against a realization bid, or even for or against the building project itself. Planners are obliged to spend a client's money on the project in the client's best interest. Planners generally have a prescribed budget, and must set all the costs arising from the building work against this. This will mean drawing up separate budgets for the various service packages or award units. > Chapter Organizing the tender, Fixing bid units



Fig. 4: Range of prices as an aid to choosing a firm

- For the client, keeping to the prescribed budget is often crucial to the success of the entire project. The contractors' concrete bids are the first check on the planner's suggested costs in relation to real market prices.

■ **Tip:** Bids submitted in response to the first invitation to tender are crucially important in establishing the client's confidence in the planner's costing competence. If even the first bids come in outside the planned cost framework, it is possible that the client, anxious about keeping within the overall budget, might make radical adjustments at an early stage that could affect all the other criteria, e.g. a marked reduction in the standards for the finished building.

An overview of the individual budgets makes it possible for planners to control costs. If the bid for a particular unit is above the budget allocated to it, planners will have to cut the budget for other units and take this into consideration when drawing up invitations to tender, for example by reducing quality standards or the scope of the work required. Conversely, if an item comes in under budget, planners can, for example, include clients' requirements that had previously fallen outside the cost framework.

Cost control

Clients can best ensure that costs are firmly fixed by attempting to eliminate all cost risks arising from unpredictable events during building, from market developments, and from submitting a series of individual tenders. One possible way of doing this is for a single contractor to take on the whole operation, which guarantees completion costs and deadlines. > Chapter Organizing the tender, Fixing bid units, Package awards

Cost guarantees

Deadlines

Clients will generally set firm deadlines, or at least express their wishes about them. Once deadlines are agreed, they are binding. ■

Constraints on deadlines arise mainly from the planned use of the building concerned. For example, completion dates, and thus possible moving-in dates, are crucially important for private clients building their own home, who need to give appropriate notice on their previous, rented accommodation. Renovation work in schools can often be carried out only in the school holidays. Here both the starting and completion dates are deciding factors.

Deadline constraints

■ **Tip:** Planners must establish that the client's ideas about deadlines are realistic. This affects the services that can be delivered by the firms involved, and the planners' own ability to deliver. Some events that occur in the course of building can be influenced only slightly or not at all. These include gaining permission from authorities, the weather, and some product delivery times.

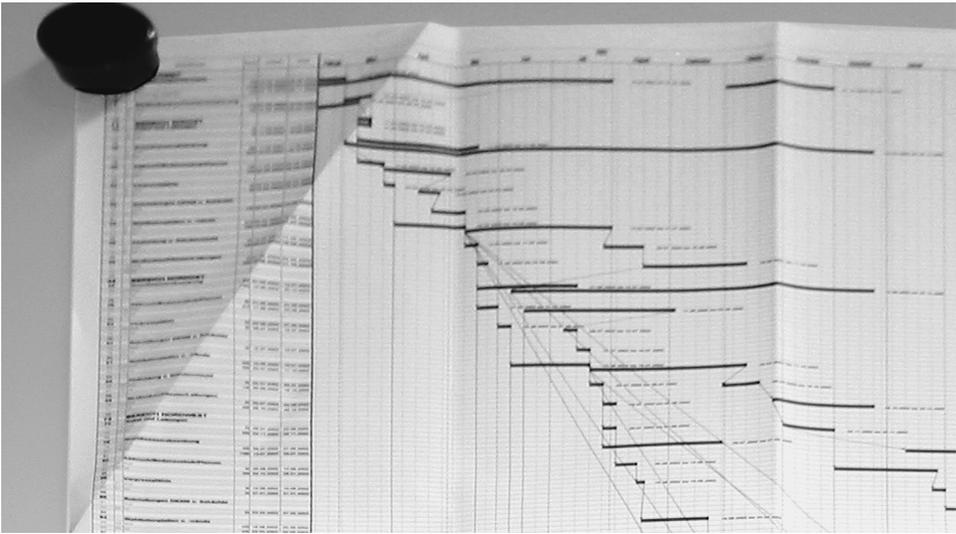


Fig. 5: Example of a deadline plan as a bar chart

Deadlines as a
cost factor

Deadline requirements also influence possible construction processes and thus costs. The only realistic way of working faster is to employ a larger workforce, more machines and materials. Contractors could then be compelled to hire equipment or to complete the work in overtime, working at weekends or even at night. This will result in high bid prices, as the company factors the extra costs into the bid price.

Effects on tendering

Deadline requirements also affect the way planners submit their tenders. Robust and detailed planning involves investing a great deal of time, so planners have to consider whether they will be able to submit such plans at the appropriate time. If they cannot do so, they can transfer some of the planning services to the contractor, by defining some aspects in terms of functions, rather than in full detail. > Chapter Organizing the tender, Tendering style, Tendering by function

Function

Realization range

The client's requirements establish the extent and bandwidth of the realization variants. For example, if a private client wants to buy land and build a home on it, this can be a terraced house, a semi-detached house or a detached house. Function is thus one of the factors determining the form the building will take. It is also possible to decide on particular building methods from a function description. When building a warehouse with



Fig. 6: Various functions

no special requirements, a choice will usually be made between favorably priced variants (e.g. reinforced concrete or steel construction). Thus function is linked with a particular range of possible solutions, modified by the client's individual requirements.

The more strongly clients identify themselves with a commission, the more influence they will wish to exert on planning the invitation to tender. If the project is their dream house, the client could well wish to be involved in every last detail of the planning process. The invitation to tender will thus have to be correspondingly detailed, so that the client's ideas can be implemented in full. > Chapter Organizing the tender, Tendering style, Detailed tendering

Client profile

If the finished building is intended as a for-profit project, however, clients will be mainly interested in minimum costs for maximum yield. They will want to scale their requirements down as much as possible at first, and will be prepared to raise their technical or aesthetic sights only if there is a prospect of higher profits or greater marketability. If clients are simply after a box to put something in (e.g. a warehouse or an industrial production hall), they will also tend to see the commission pragmatically in terms of function, and not want to bother themselves with too much detail.



Fig. 7: There are various ways of meeting requirements for a building.

Range of services

Minimum scope

The range of services derives from clients' wishes. For example, when building an office block, clients can state how many office workstations are intended and what other spaces are needed to serve the desired function (foyer, conference rooms, server areas, etc.). The more precise the requirements, the more precisely the minimum project range can be determined.

Rationalization

If the project range is inappropriate to the desired cost framework, planners can reduce costs by rationalization (for example, by using a large number of identical elements and focusing on the same service provider as much as possible): facade design can match the facade panel format the manufacturer produces, so that large quantities of a particular panel format can be used without cutting or having to order special formats.

Factors open to influence

As well as the scope set by minimum standards, there are also variable quantities that affect the quality of the building as a rule. For example, planners can minimize the window area, which is more expensive than a closed facade, at the expense of user comfort, or reduce the number of workstations at the expense of subsequent flexibility.



Fig. 8: The relationship between function and quality

Quality

Function also affects the quality expected. Here we can speak of technical and aesthetic criteria. > Fig.9 Technical requirements include building law provisions (e.g. statutes relating to assembly of persons or the fire prevention concept), or health aspects (e.g. ventilation or hygiene); aesthetic requirements relate to the visual impact, form and characteristics of the building as a whole, down to individual details such as door handles.

There are fixed minimum standards for most building services, intended to guarantee the use of appropriate materials and professional execution. Clients will have requirements for their property that go beyond minimum quality. As soon as the planned finish deviates from the standard quality, planners must mention this expressly in their service description and describe the finish or the desired result.

Standards of quality

If requirements relating to quality of finish exceed the normal standard, costs will rise as well. For example, the amount of work and cost involved in dry-building a wall with a high level of overall finish on the plasterwork is considerably greater than for one that is simply smoothed and finished at the joints.

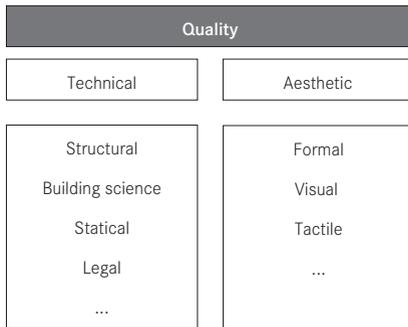


Fig. 9: Division into technical and aesthetic criteria

Longer-term planning

Long-term considerations should always be included in relation to quality. For example, installing a more expensive but higher-calibre heating system can easily compensate for its greater cost through lower energy costs over the period of use.

TENDER ITEMS

Building services and construction products

The building process involves choosing and coordinating an enormous range of structural elements. Here, planners have a very wide range of prefabricated items at their disposal (e.g. doors and door frames), but can also work with individually manufactured elements (e.g. hand-crafted door fittings). A building can be planned down to the position of the last screw, and the shape of its head. Invitations to tender for building services relate both to parts of the planning process and also to the whole realization process. They summarize all the services needed. The scope of the invitation to tender will vary according to the scope of the building project and the nature of the tender. > Chapter Organizing the tender, Tendering style

For example, if tenders are being invited for a complete building project, starting from scratch to the very end, they can include all construction services from digging the foundations to cleaning at the end of the construction phase and handing the key over to the client. Invitations to tender may also be issued for replacing a single window.



Organizing the tender

The possible scope of the project, and the diversity and complexity of the invitation to tender, mean that it makes sense to divide the building process into significant phases. To do this, planners must be familiar with events within the construction process and the individual events' interdependence, so that they can arrange them in the correct time sequence. ○

Fundamentals
of organization

TIMETABLING THE INVITATION TO TENDER

Deadlines are an important element of the tendering process. Planners have to know what periods of time are realistic for realizing the project. A timetable for the planner's and the bidding companies' work on the tender can be drawn up with reference to the realization deadlines, bearing possible preliminary planning periods for specialist firms and for the awarding procedure in mind.

Deadlines and
tendering

○ **Note:** The process following the invitation to tender, collecting in bids and subsequently commissioning of firms by clients, is called the awarding procedure. Information about awarding tenders can be found in *Building projects in the European Union* by Bert Bielefeld and Falk Würfele, Birkhäuser Verlag, 2005.

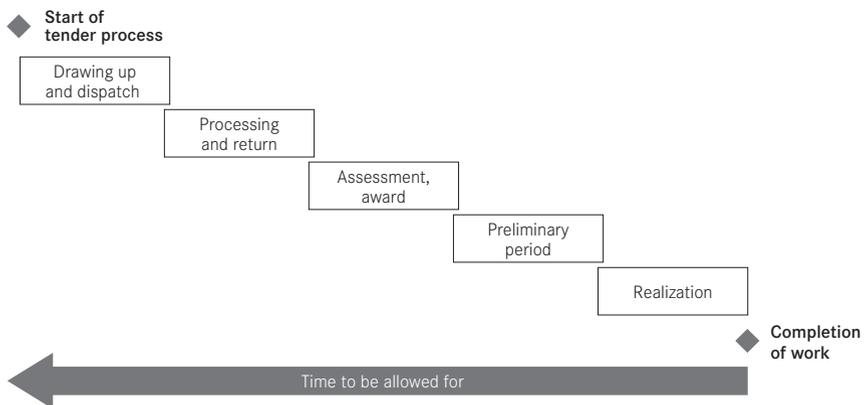


Fig. 11: Timetabling an invitation to tender

Time invested by participants

Time invested
by planner

Planners need sufficient time to draw up an invitation to tender. > Fig.11
Once they have compiled a list of all the client's wishes and requirements, they must take time to organize the invitation to tender and think how to convey the requirements in such a way that the invitation can be formulated meaningfully. Planners must establish quantities needed, to define the scope of the services required. Any question arising must be cleared up with manufacturers, specialist organizations or other appropriate contacts. It is often necessary to provide any experts approached with documents about the general conditions, and drawings, to ensure that responses are robust and appropriate for describing the services required. If difficult installations or complex construction processes are involved it often makes sense for planners to cover themselves by asking manufacturers for written statements or opinions.

Once planners have drawn up their lists of services needed, they must compile a list of bidders, i.e. the names of all the firms invited to tender, in consultation with the client where appropriate. The tender documents have to be duplicated and sent out to the companies concerned, allowing an appropriate length of time for processing by the companies.

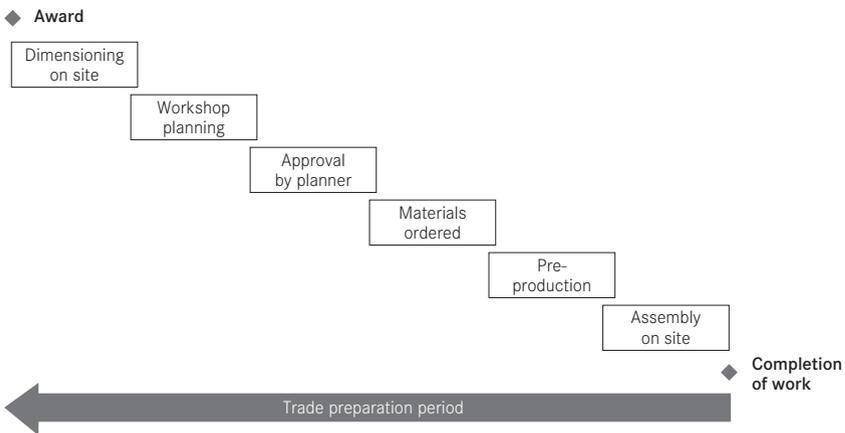


Fig. 12: Preliminary trade planning period: window production

Construction companies submitting bids who receive a description of the services required have to familiarize themselves with a new building project, and thus need an appropriate period to work on the invitation to tender. In some cases, the nature and scope of the tender may require additional planning work before the price can finally be calculated; manufacturers or other firms and their internal price enquires may need to be considered in their turn. The calculation must take wages, materials, equipment and outside services into account. As well as these factors relating directly to the building commission, general overheads and possible profit have to be built into the bid price. Preparing the bid can take anything from a day to several weeks, according to the complexity and scope of the tender. The necessary processing period is extended correspondingly if the invitation to tender also covers planning services or technical tests.

Time needed for processing the bid

The time span from commissioning to the actual delivery of the services (start of building work) on the building site is the preliminary planning period for specialist firms. > Fig. 12 During this period, the firms being commissioned can construct working plans or samples and submit them to the planner for approval. Construction elements are often modified or assembled in advance in the factory by the firms involved. Measurements

Preliminary planning period for trades

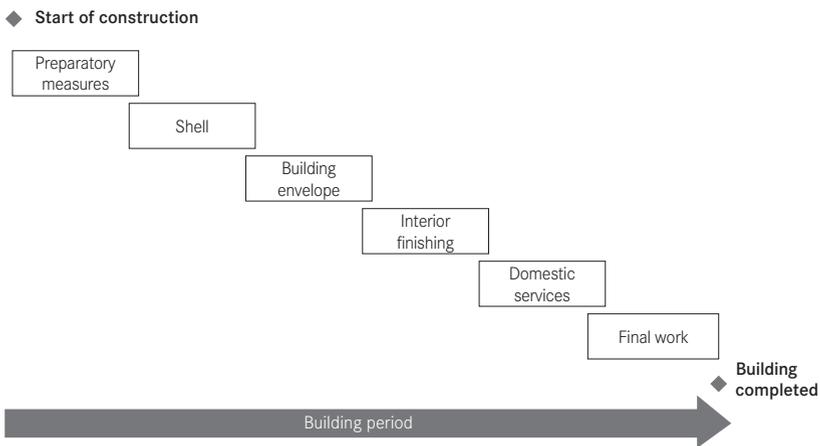


Fig. 13: Sequence of building work

for prefabrication may need to be made on site, which adds another factor for meeting completion deadlines, for example if masonry with apertures has to be completed before fixing the dimensions of the windows that have to be prefabricated.

Time needed
for realization

When timetabling tenders it is important to know how long it will take to complete a particular piece of work, given that a possible completion deadline has to be fixed. > Fig. 13 There is only limited scope for shortening such an individual completion time. The length of time needed can be affected by the number of people working on the job, working hours and the use of machines. There are natural restrictions on speeding up work, for example the time that certain building materials take to dry or harden (e.g. screed). Space on the building site may be at a premium, so increasing the workforce could mean people getting in each other's way while working.

TENDERING SEQUENCE AND NATURE OF TENDER

Time sequence

The order for drawing up invitations to tender is usually based on the order in which work is carried out on the building site. > Fig. 13 First bids are invited for preparatory measures for the actual building project, followed by bids for shell realization, exterior finish, interior finish and fittings, down to bids for the final work needed. Sometimes the preliminary preparation period makes it necessary to deviate from the on-site sequence when inviting to tender. For example, facade construction can

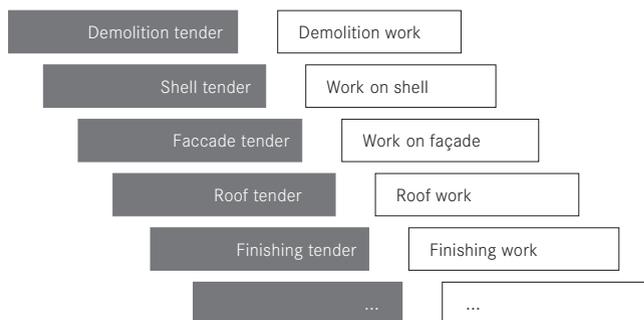


Fig. 14: Sequential planning when awarding by trade (award by specialist lot)

entail a preparatory period lasting several months, which must be taken into consideration when drawing up the invitation to tender.

The sequence described here relates to invitations to tender issued while building is in progress. > Fig. 14 For tendering in this way, all the services required are drawn up in sequence, and invitations to tender issued. For example, the interior is planned and invitations to tender are issued after the shell has already been completed. In comparison with a blanket invitation to tender > Chapter Organizing the tender, Fixing bid units, Package awards this approach offers the advantage that an appropriate response can be made to unexpected cost developments. > Introduction, Tendering requirements, Costs It is also possible to accommodate changes that have occurred during the completed building phases. For example, if the ceiling slab thicknesses have had to be changed for practical reasons, they can be compensated for in the finished floor height. However, it is impossible to be certain about costs until the last invitation to tender, because of the difficulty in predicting the effect market fluctuations and other eventualities could have on services offered.

Invitations to tender while building is in progress

Awarding to a main contractor offers greater cost security. > Chapter Organizing the tender, Fixing bid units, Package awards Here, all the services have to be identified in full, and submitted to the contractor with an invitation to tender. The planning period involved is correspondingly long. Planning previously undertaken in parallel with the building work now has to be

Blanket tendering

Contractor with detailed invitation to tender



Contractor with functional invitation to tender



Fig. 15: Award procedure and time consumed

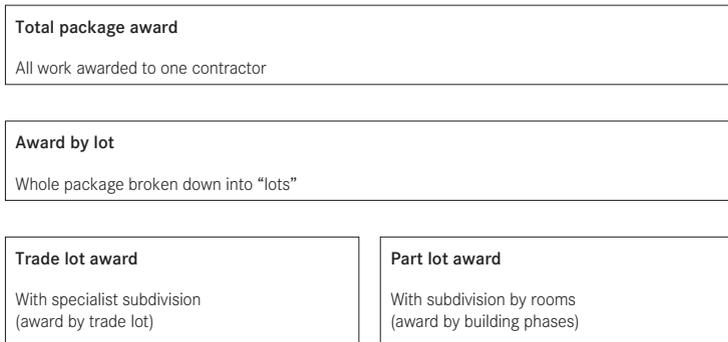


Fig. 16: Definition of the terms for award units

completed before the first ground is dug. > Fig. 15 If there is not enough time available for a detailed invitation to tender, planners must concentrate on requirements that are important to the client and describe only these in detail > Chapter Organizing the tender, Tender style, Detailed tendering and the rest merely functionally. > Chapter Organizing the tender, Tendering style, Tendering by function Sometimes the pressure of time can be so great that a purely functional invitation model has to be considered, giving no detail at all.

FIXING BID UNITS

Bid unit

A bid unit defines the range of service provision awarded to a particular contractor. Bid units can be itemized according to size for individual trades (trade lots), part lots and complete packages; it is also possible to include all the services in a total package award. > Fig. 16

Tendering by trade

Trade (specialist lots)

Subdivision by trades (trade or specialist lots) is based on craft and technical skills traditionally delivered by an individual or a firm (e.g. craft trades such as stonemason, carpenter or screed layer). This is generally the smallest bid unit. > Fig. 17

- A trade can be broken down into even smaller units if a number of different services are provided. For example, a tender invitation for metalworkers could include all the services this trade offers. It is also possible to draw up several invitations to tender identifying individual items, such as a service described under facade construction in metal, and

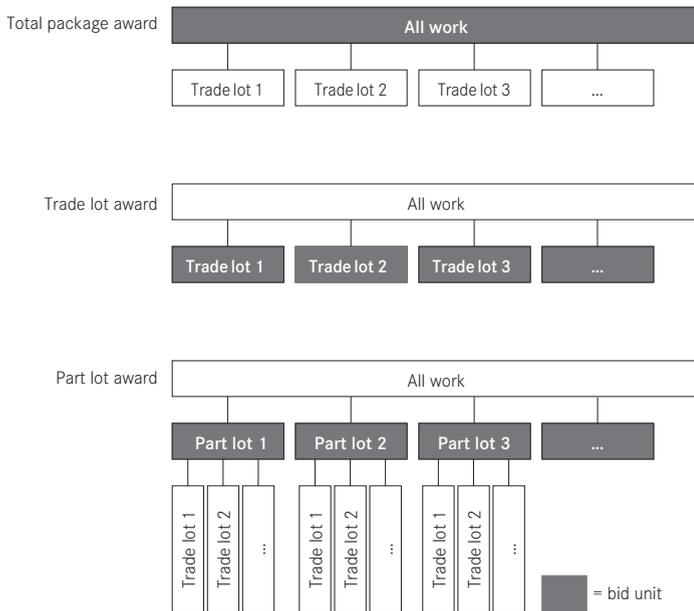


Fig. 17: Bid units

another for steel staircases and banisters. The smallest possible bid unit is a single service. > Fig. 18

So tendering by trade may include all the services performed by that trade or just some of them. It makes sense to break a trade down into smaller units if particular firms' specialist fields are to be used. ●

○ **Note:** The term trade is also generally applied to less traditional work such as structural engineering, media planning or sign-making. Although these are not traditional trades, the important feature here is that the services form a unit.

● **Example:** A construction company that produces and assembles stairs every day can offer this service more professionally and possibly more cheaply than a metal-worker who specializes in facades but theoretically covers all aspects of that trade.

Preparatory measures	Shell	Building envelope
<ul style="list-style-type: none"> - Building site preparation - Demolition work - Clearing site - Excavations - Site preparation - ... 	<ul style="list-style-type: none"> - Excavations - Masonry work - Concrete construction work - Steel construction work - Sealing work - Carpentry and timber work - Scaffolding work - ... 	<ul style="list-style-type: none"> - Carpentry and timber work - Steel construction work - Sealing work - Roofing work - Plumbing work - Heat insulation work - Plastering - Facade work - Metal construction work - Glazing work - Painting - Scaffolding work - ...
Finishing	Domestic services	Final measures
<ul style="list-style-type: none"> - Plastering - Screed work - Floor covering work - Concrete block work - Natural stone work - Tiling and - Parquet laying - Metalwork - Dry construction work - Joinery - Painting - Scaffolding work - ... 	<ul style="list-style-type: none"> - Heating installation - Ventilation installation - Sanitary installation - Electrical insulation - Lifts - Media technology - ... 	<ul style="list-style-type: none"> - Cleaning building - Installing locks - Outside areas - Clearing site - ...

Fig. 18: Typical trade subdivisions

The disadvantage is that more time and effort have to be invested in coordination when commissioning several firms, and synergies (e.g. travel to the building site or larger delivery quantities at correspondingly more favorable prices) could be lost.

Bundling trades

It can sometimes make sense to bundle a number of trades. It seems logical to commission a single firm to take on all the work relating to a roof, and avoid having to coordinate a number of firms. Thus, carpentry

(constructing the roof truss), roof-covering work (roof construction from insulation to the pantiles), and some metal-fitting work (fitting gutters, protective leading) can all be done by the same firm. Many firms have adapted to the clients' desire to deal with a single contact person, and advertise as providing a complete service. Note here that some firms that seem quite large simply "buy in" services and often cannot offer them at particularly reasonable prices. The client is then buying convenience by paying an additional price for in-house subcontractor organization by the firm commissioned. > Chapter Organizing the tender, Fixing bid units, Invitation to tender by part lot

Invitation to tender by part lot

The part lot is another bid unit. Here, services are not classified in terms of a specific trade, but structured in sections. These sections derive mainly from a desire to be able to award to several firms when a great deal of work is involved. Part lot

In public commissions, this can take place with the intention of involving as many firms as possible in the bidding process, as the scope of services required will then be based on the capacities of essentially average companies. Subdividing services

Another sensible reason for structuring in part lots is when planning work over a long period with possible interruptions. Building phases are often fixed for larger building projects so that some parts of the building can be used while others are completed at a later stage. > Fig. 19 Building phases

Package awards

Bundling several trades, with only one contact person on the realization side, as mentioned above, is pursued further in awards to a main contractor. > Chapter Organizing the tender, Fixing bid units, Invitation to tender by part lot Main contractor tendering

○ **Note:** A subcontractor works for the firm with which the client has signed the building contract. The subcontractor has no official relationship with the client. The commissioned firm remains responsible for commissioning, finish, payment and guarantees.

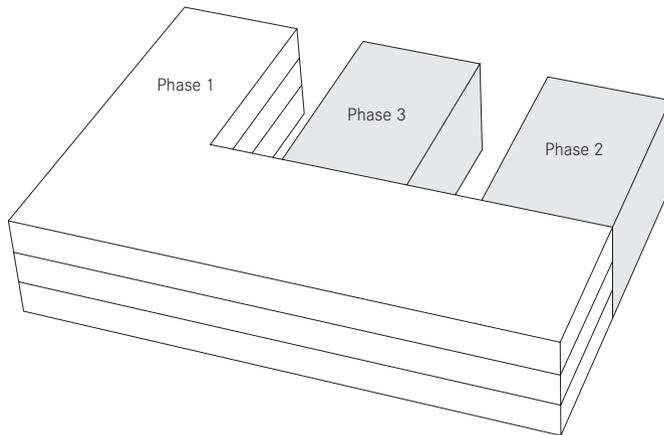


Fig. 19: Bidding for part lots is possible if buildings are constructed in various phases.

Here, the client commissions a single building firm to provide all the services needed to complete the building work. A single contract is agreed, rather than a large number of them.

Meeting deadlines

It is easier for a main contractor to fix completion dates because such a firm will be able to compensate for delays in parts of the project by pushing the work ahead in other areas, as part of the overall coordination process. It is more difficult to set binding deadlines when commissioning a number of individual firms because of the large number of mutual dependencies: individual building firms are not contractually obliged to each other.

Main contractor
supplement

A main contractor is responsible for all this, and will generally exact payment for this often voluminous coordination work, and sometimes also risk coverage for guarantees undertaken, by building supplements into the bid. In practice there are few firms that can cover all the services required using in-house workers. In fact, they tend to tender the services out to other firms, which then – if they are commissioned – work as sub-contractors. A main contractor's bid concludes in a guaranteed price for which the services must be delivered by a contractually fixed deadline.

TENDERING STYLE

A distinction is made between functional and detailed tendering, but these are rarely separated consistently in practice. Any detailed invitation to tender will always contain functional elements. For example, even a meticulously detailed description of a plasterboard stud wall will not contain precise information about fixing the plasterboard panels. It is assumed that the workmen will have the appropriate technical knowledge and will know the correct screws to use for fixing the panels to the frame. A functional invitation to tender can work without detailed elements, but here, too, there will in practice be areas where the requirements are formulated in greater detail. The more questions the planner asks the client about requirements, the longer the list of detailed requirements within the actual functional invitation will become.

Tendering by function

Functional tendering does not describe how the work is to be done or the precise building process, but focuses on the required outcome. The bidder takes responsibility for planning the work and thus also carries the risk of achieving the required result even if there were omissions in the original bid. As well as being responsible for possible planning errors, the contracted firm also carries the quantity surveying risks.

Bidders are able to determine how the work is done by choosing procedures in the light of their expertise and experience. They can optimize the entire range of services offered in terms of their own resources, as the contract offers room for manoeuvre.

The criteria for assessing bids include price, and the way the set requirements are addressed. The bidder will have spent time and effort on the bid, and the planner now has to assess it in some depth. Consequently, clients or planners have no further influence in principle on the subsequent execution of the process. This loss of control, which applies to detailed planning in particular, may lead to a loss of design quality.

Assessing bids

Functional tendering is often chosen through lack of time. > Introduction, Tendering requirements, Deadlines It thus clearly reduces the extensive planning process that would have to precede award to a main contractor. Lower client demands on the realization details may lie behind a functional invitation to tender, especially as the firm to which the contract is awarded takes on a large number of risks as well. Another reason for choosing a functional style may be simply that the planner has no idea how to achieve the required aims by means of a detailed invitation to

Choosing functional tendering

tender. Thus, planners will not invite tenders for the individual components of an air-conditioning plant or the way they are assembled, but will simply describe cooling or ventilation rate requirements.

Detailed tendering

Detailed tendering requires every detail of the work required to have been planned in advance to the greatest possible extent. Planners do not simply describe the required result, but also how it is to be achieved. They thus accept the risk that the finished work will not meet demands, or that there will be errors and omissions in the tender invitation, or it will not be completely clear. This can lead to additional costs for additional work (services that are needed but were not included in the original invitation to tender).

Assessing the bids It is much simpler to assess a detailed invitation to tender, as the choice of procedure is fixed, and only the prices have to be compared.

Choosing a detailed invitation to tender It always makes sense to opt for a detailed invitation to tender if the client wishes to remain in control of the building process. This is the only way of checking every detail of the realization work, and avoids disagreeable surprises.

Depth of tender

It is fundamentally possible to mix functional and detailed tendering. This opens up considerable creative possibilities for planners. They will be able to submit detailed final working plans for all the areas that are important to clients, and to describe the realization process with equal precision. In areas that do not require so much detail they can confine themselves to describing requirements and choose the contractor who offers the best possible solution.

Detailed or functional? If planners put out detailed invitations to tender they must have the appropriate knowledge at their fingertips. They will be responsible for any mistakes in their description of the services they are offering. It is therefore advisable to tender on the basis of function, bearing the desired result in mind, for any elements about which they are not thoroughly informed.

Completeness of the bid Planners must always ask themselves whether the invitation to tender they have prepared is complete, in other words whether the information they have provided is unambiguous, and that there are no omissions. For example, if they ask for an “orderly and symmetrical” pattern of screws for securing the facade elements, they must add a diagram showing the pattern of screws, to avoid contentious interpretations of this

requirement. As a rule, only detailed descriptions allow control of the way the work is ultimately done. This is very time-consuming, and cannot always be managed for every aspect of the building. Planners should always consider carefully what degree of detailing is necessary and appropriate. For example, requirements about formwork for an exposed concrete wall must be much more carefully formulated than those relating to formwork for foundations that will not be visible when the building is completed.



Structuring an invitation to tender

The invitation to tender – functional or detailed – is made up of several elements. > Figs. 20, 21 It includes all the documents required for awarding a building contract.

○

TEXTUAL ELEMENTS

Textual elements mean all the descriptions couched in words and figures that provide information about the sequence and execution of the planned building project. An invitation to tender is drawn up using these elements, and consists of the following components:

- General information about the project
- Contractual conditions
- Technical requirements
- Information about building site conditions
- Description of the work required

Textual elements usually make up a large proportion of a tender bid. Words enable planners to convey information that cannot be found in the plans.

General information about the building project

A complete tender package contains general information about the planned building project and the awarding procedures. This information is conveyed in a cover sheet or accompanying letter containing the invitation to tender and other details relevant to the award, as well as the names of the key participants and a short description of the building.

General
description

○ **Note:** For an invitation to tender to be absolutely unambiguous it is important for individual elements not to contradict each other; this may be avoided by fixing a rank order for the individual elements. Thus, a precise description of the services required always ranks higher than the technical requirements.

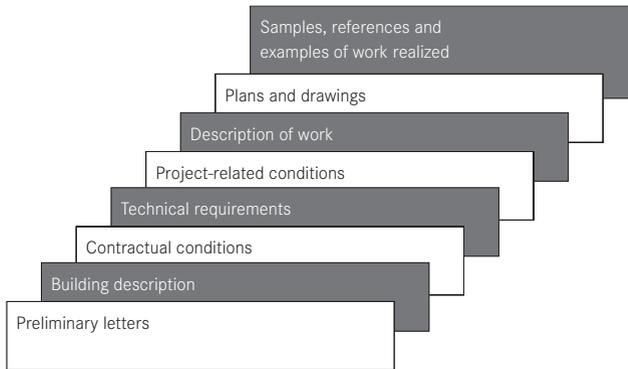


Fig. 20: The elements of an invitation to tender

	Textual elements	Drawing elements	Miscellaneous elements
Concrete elements	<ul style="list-style-type: none"> - Functional description - Detailed description of work - Records of award, negotiations and meetings - Building description - Preliminary remarks - Building site conditions - Reports - Special contractual conditions where applicable - Special technical requirements where applicable 	<ul style="list-style-type: none"> - Plans - Sketches 	<ul style="list-style-type: none"> - Tests - Samples - Reference objects - Realized examples
Standardized elements	<ul style="list-style-type: none"> - Standard service text - General contractual conditions - Special contractual conditions - General technical requirements - "Accepted technical rules" - List of manufacturers 	<ul style="list-style-type: none"> - Reference drawings - Key details - Manufacturers' details 	<ul style="list-style-type: none"> - Reference drawings - Key details - Manufacturers' details

Fig. 21: Systematizing the elements of an invitation to tender

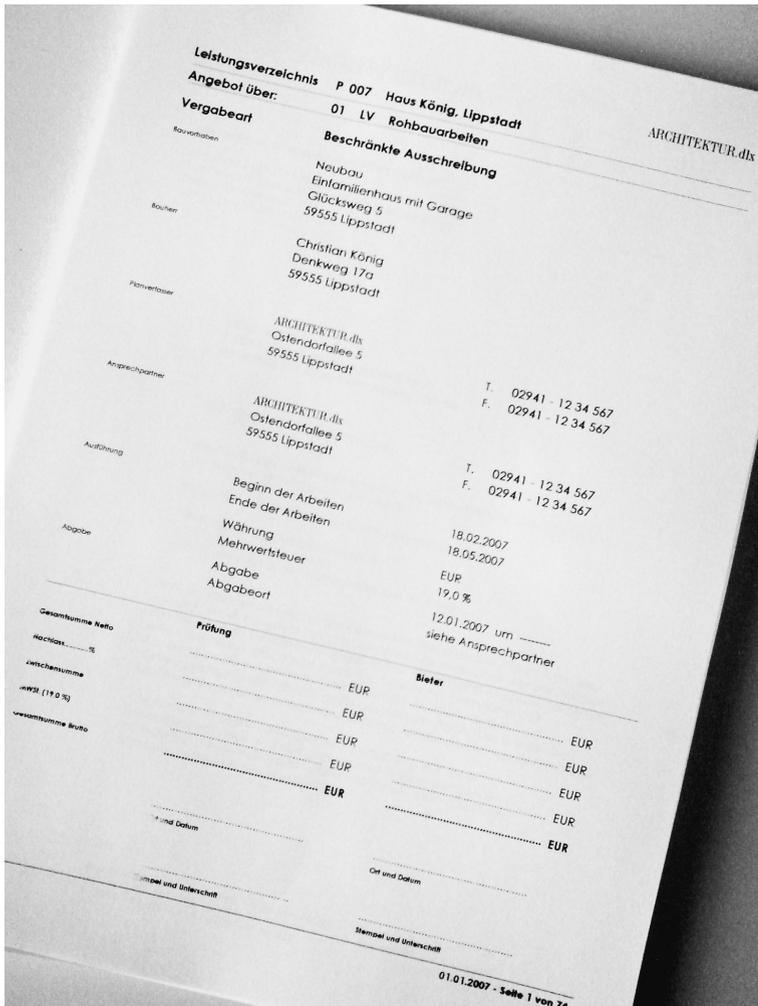


Fig. 22: Example of a cover sheet

The cover sheet is both an introduction to and a summary of the contents of the invitation to tender. It includes brief summary of all the information required for the building firm to process the tender, along with the conditions of application. The cover sheet should contain the following information:

Cover sheet/
accompanying letter

- Details of the sender and recipient of the documents
- Date
- Definition of the building project
- Location, nature and scope of the work required
- General conditions relating to the building project (type of award, timescales, etc.)
- Express invitation to tender
- Conditions of application
- List of documents enclosed (contractual documents)

Description of the building project Details about the location, nature and scope of the services required are needed, along with a definition of the building project, so that it can be clearly identified. These should be as succinct as possible. If more information about the project is required, this should be included in the building description. > Chapter Structuring service specifications, Approach to functional service specifications, Functional specification with designs

Information about the awarding procedure The awarding procedure should be clearly defined in the cover sheet and must be given by public clients. > Chapter Organizing the tender, Timetabling the invitation to tender, Time invested by participants

Viewing dates Identifying the location is also important in relation to possible viewing dates. Such dates should be identified on the cover sheet, giving location and date. The same applies to planned inspection dates in other documents not included in the tender package.

Tendering period/ submission Details about the tendering period, the submission date and binding dates for the tender are equally important. > Chapter Organizing the tender, Timetabling the invitation to tender The tendering period identifies the date by which the bid must be submitted. The bidder will be committed to the offer made until the date given. Bidders should be informed about the essential award criteria (e.g. price) in the cover sheet for the tender documents.

Binding nature of the bid To avoid misunderstanding, the cover sheet should include a formulation stating that the bidder will incur costs as a result of bidding. The formulation could be:

“We request your binding bid for this building project, at no cost to us or our client...”

Conditions of application/ admissibility criteria Planners can influence potential applicants through the application conditions in the accompanying letter. Possible conditions can regulate the use of subcontractors, or admit or exclude group bidding for the award.

● **Example:** “The ... project relates to a three-storey office building with a gross floor area of approx. 10,000 m², to be constructed as a reinforced concrete skeleton structure with exposed concrete. The building plot is between ... street and ... street, and can be accessed only by the entrance at the junction of ... street and ... street. The precise location of the building site can be found in the site plan.”

This example makes it clear how little the building description covers. It provides important information about the desired building method (skeleton structure with exposed concrete), the nature of the work (reinforced concrete building work), size (gross floor area, three storeys), function (office building) and the location of the building site (reference to the site plan).

Planners can use a request for proof of suitability and admission criteria to check whether bidding companies are qualified to carry out the work. As well as an informed check on suitability, by reference to projects previously carried out, for example, it is also possible to call for information about a company’s economic situation, to ensure that it is sufficiently liquid. It is also customary to ask for information about the building firm’s capacities, its membership of professional organizations and its liability insurance, stating the minimum sum covered.

Proof of suitability

The building description contains other general information about the building project. It provides the company carrying out the work with a general summary of the building project, with no detailed information about individual services. Bidders should complete the picture for themselves with construction descriptions and information about the key conditions affecting costs for the building project.

Building description

For larger building projects it can make sense to include more precise information about the body of the building or the structure and organization of individual building sections in the building description, so that bidders can form a clearer picture of the possible building phases.

Contractual conditions

The invitation to tender aims to prepare the way for a contractual relationship between the client and one or more companies realizing the project. Against this backdrop, provisions governing contractual modalities for carrying out the building work are important, as well a description of the services required.

Planners prepare the way for the future contract appropriately in the invitation to tender, by stating general and particular contract conditions. General contract conditions are available in the form of complete sample contracts, but as a rule special contractual conditions must be formulated as business conditions laid down by the client.

■ **Tip:** As the regulations involved are often very complicated, it is advisable to use recommended contract texts, drawn up by professional associations, for example, or at least to have lawyers draw up the contract conditions for larger projects.

General
contractual
conditions

General contractual conditions are based on national or international standards for managing building projects. They contain important information about:

- Nature and scope of the work required (details of contract elements and their ranking, and information about rights of change or extension relating to the building project)
- Compensation (provisions for dealing with claims for compensation in cases of deviation from the work as described)
- Implementation (provisions for supervision of the work by the client, for ensuring general order on the building site and the use of on-site facilities by the company carrying out the work; provisions governing rights of appeal if the company carrying out the work has complaints about a service required by the client or the planner)
- Implementation documents (information about handing over the documents relating to implementing the services required)
- Timings (general provision, for example ensuring that building work will begin within a stated period of time if no date was fixed contractually)
- Impediments (fixing procedures if impediments are in the offing. For example, obstructions should be notified to the client in advance and their effect described, so that counter-measures can be taken)
- Cancellation (provisions for cancellation by the client or the company carrying out the work)
- Liability (details of the contractual parties' responsibilities)
- Contract penalties (provisions governing modalities for contractual penalties not covering the penalty level)
- Acceptance (setting down timings for legal acceptance of building work)
- Guarantee (provisions for securing the client's claims after the building work has been accepted)

- Settlement (details about how and in what order settlement must take place after completion of work required, or parts of that work)
- Work paid by the hour (provisions for dealing with remuneration for services required that are not contained in the description of services, for example a commitment by the firm carrying out the work to inform the client before undertaking such work)
- Payments (general provisions governing instalments, part-final and final invoices, for example, timings are laid down for the duration of the final invoice check)
- Security (provisions governing mutual security for the contract partners, for example in the form of guarantees or security retentions)
- Disputes (provisions in case of dispute, such as fixing the client's location as the place of jurisdiction)

Special contractual conditions can relate to the same matters as the general contractual conditions and complement them in certain points. They serve as an addition to the general contractual conditions, and not as a substitute for them. Typically, special contractual conditions are included in the tendering documents if there is already a provision in principle in the general contractual conditions. The following areas are also addressed:

Special contractual conditions

- Invoices (invoices must be identified according to their purpose as instalment, part-final or final invoices, and always numbered continuously. Other formal requirements can deal with the sequence of the work carried out, identifying it according to the description of work required, for example.)
- Special payment modalities (provisions governing the client's payments to the company carrying out the work and the conditions to which the payments are linked. For example, a payment plan can be agreed, giving information about the level and date of payments. Payments are often agreed at particular times to cover the work carried out to this point.)
- Basis for establishing the price (the bidder's calculations used to determine the prices in the bid)
- Flexible price clauses for wages or materials (provisions allowing for contract prices to be modified if the agreed wage levels or building material prices change during the building phase)
- Notification of additional costs (provisions establishing that the client be informed at an early stage of any additional costs that may occur)

- Subcontractors (subcontractors are used to provide services that a company cannot itself cover. If the use of subcontractors is to be excluded or is permissible only under certain circumstances, this should be laid down in the special contractual conditions.)
- Competition restriction (inadmissible competition restrictions arise from prior agreements that are unfavorable to competition between bidders relating to the submission or non-submission of bids, to prices or profit supplements. Special contractual conditions lay down the consequences of behavior that is unfavorable to competition.)
- Price reductions (are regularly agreed as a percentage and deducted from all invoices appropriately)
- Environmental protection (Normally no concrete environmental protection measures are formulated. It is customary for the special contractual conditions to refer to reduction of environmental damage by the building measures.)
- Changes to the contract (Contract alteration modalities should be stipulated in the special contractual conditions. For example, it can be agreed that alterations to the contract must be in writing.)

Technical requirements

As a rule, planning a building project and describing the work required to realize it end when a certain degree of detail has been reached. Everything else is fixed by the agreement on technical requirements. This contains instructions about the way the work is to be carried out. For example, planners might provide a drawing of a reinforced concrete wall, and possibly supplement it in the text with description containing details about formwork, reinforcement and concrete. But they will not describe in detail how the formwork should be constructed, the reinforcing steel secured in position or the concrete compacted. Such information forms part of the specialist knowledge of the company carrying out the work, and will be conveyed by the planners to the building firm via the technical requirements laid down in the invitation to tender.

Technical requirements are available as a comprehensive package of provisions for most services provided by different trades. > Appendix They contain relevant stipulations for a large number of building jobs in the form of a minimum standard. Special technical requirements are formulated to define a higher standard.

General technical requirements

General technical requirements are standards that apply in terms of the generally acknowledged rules for a particular technology.

○

Regulations are usually arranged specifically to trades and contain information about the sphere of validity, the substances and materials used, implementation, additional services that form part of the service as a whole, and about financial settlement and hints for compiling a description of the services.

Special technical requirements are regulations that are used either to complement the general technical requirements or that apply to areas not previously regulated. For example, a special technical requirement can relate to a building process not covered by the general regulations, or can stipulate a higher dimension tolerance requirement to complement the existing minimum requirements.

Special technical
contractual
conditions

Special technical requirements are based on standards, as well as on other sets of technical regulations, manufacturer's guidelines or provisions, and instructions from interested parties.

It is also possible to agree on more demanding requirements taking account of the current state of technology and of science and technology for certain services; these requirements will be based on individual licences.

Furthermore, there are special technical requirements for intermediate acceptance: for example, when for technical reasons certain pieces of work have to be accepted during the building period as they will be inaccessible at a later stage because of building progress.

○ **Note:** If certain provisions apply to one particular building project, they should be addressed in the contractual conditions relating to the project, and not in the special contractual conditions, which are usually formulated to cover several building projects.

○ **Note:** The generally acknowledged rules of technology are a set of regulations based on technologies that have proved their worth over a long period of time. A higher standard is set by a level of technology that represents the latest technical progress, but need not be tried and tested. A further step upwards is offered by a level of science and technology that takes the most recent scientific insights into account.

Project-related contractual conditions

Project-related information covers the general conditions of the building project. They cover all the regulations of a contractual and technical nature affecting the building project as such.

Information about
the building site

These particular contractual conditions have to be compiled specially for every project. They should contain the following information about the building site:

- Location (address and description of where the building site is situated)
- Access (how to reach the building site)
- Storage space (areas that will be at the contractor's disposal for work on the building program)
- Lifting equipment (lifting equipment such as cranes or hoists are often in place on building sites and can be used by various firms to transport their building materials)
- Scaffolding (scaffolding may be placed at the disposal of other firms)
- Connections for electricity, water and sewage (the appropriate supply points are fixed before building starts as part of the site equipment)
- Sanitary facilities (if available)
- Waste disposal
- Telephone connections

Apportioning general
building site costs

The general building site costs can be contractually apportioned to all the contractors involved. Costs for setting up site signs, using on-site equipment and waste disposal can also be apportioned in the project-related contractual conditions.

Implementation
period/contract
deadlines

Stipulations about the time available for the work are particularly important. All statements relating to this are fixed in relation to the project. They include statements about the beginning and end of the building work. These periods are binding for later implementation of the building commission, and if not observed they represent a breach of contract with the possible consequence of claims for damages, or a contract penalty. Only contractual periods that the company undertaking the work has acknowledged in the project-related contract conditions are legally binding. If intermediate deadlines other than the starting and finishing deadlines are agreed contractually with the company undertaking the work, these must be identified as individual fixed periods in the project-related contract conditions.

If contract deadlines are not met, this usually means claims for damages by the client against the company undertaking the work. Here, only losses that have actually resulted can be considered. If other provisions are also made for handling breach of contract, these must be indicated appropriately in the project-related contract conditions with reference to a contract penalty.

It is also possible to agree on other project-related contractual conditions if required, for example stipulations about parallel services by other contractors, or provisions for clearing and cleaning the building site.

Tender specification

The tender specification is the key element in an invitation to tender. The distinction between functional and detailed tendering is based solely on the nature of the tender specification. A directory of services is used for a detailed tender specification, and a program of services is drawn up for a functional tender specification. In exceptional cases, building descriptions are used as functional tender specifications. > Fig. 23

The procedure for drawing up a detailed or functional tender specification is discussed in detail in the final chapter.

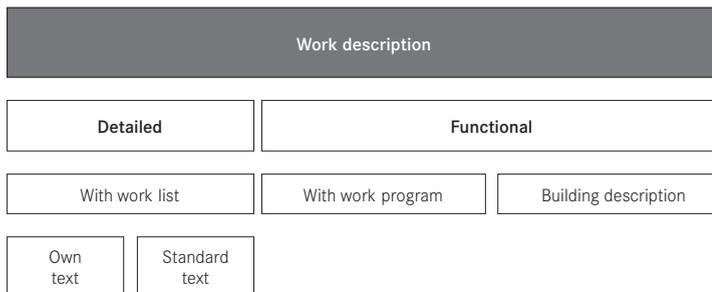


Fig. 23: Tender specification types

DRAWING ELEMENTS

- The plans, drawings or sketches appended to an invitation to tender should make it easier for the contractors to compile their bid in terms of the services to be calculated. They will therefore need all the planning documents necessary for general geometrical orientation, and for understanding the services required.

Range of drawn descriptive elements

The spectrum of drawn descriptive elements extends from simple hand-drawn sketches to technical drawings, with plan content varying from site plans to scaled implementation details. > Figs. 24, 25

References

The architect can use references to particular planning details in the tender specification to identify particular points that do not emerge directly from the descriptive text or that are more easily conveyed by a drawing.

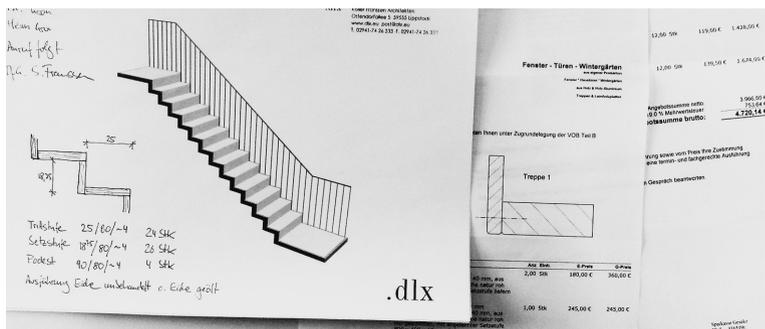


Fig. 24: Sketch by hand

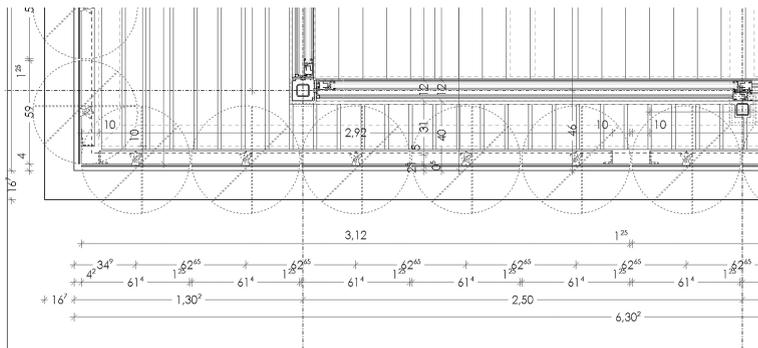


Fig. 25: Representing complex spatial connections

○ **Note:** Building work is done on the basis of the architect's working plans, not of the tender specification. The tender specification forms the basis for compiling the tender bid. If information in the tender specification contradicts the plans, each case should be examined individually, following the contractually fixed hierarchy where applicable.

OTHER DESCRIPTIVE ELEMENTS

If texts and drawings cannot define the services required adequately, specimens can be used. For example, if the reinforced concrete requires a particular surface structure that is not covered by the general regulations and definitions for surface quality in exposed concrete, it makes sense to construct a specimen surface and make this accessible to bidders or even enclose it with the invitation to tender (e.g. a related wood veneer that is already in the building). Specimens

If a specimen is available, the invitation to tender text need not embark on a full description, but concludes with the formulation "*Finish as per specimen ...*"

Markings can also be addressed in the invitation to tender. Markings need to be considered in the case of materials such as natural stone, as the appearance of stone can vary considerably. Here, verbal descriptions and drawings are almost impossible. The company carrying out the work should be required to lay a representative area of the material, so that the crucial criteria such as color, shade and the nature and distribution of inclusions can be fixed according to the sample. Markings

It is also possible to set up show rooms in which the client can see and assess the effect made, from surface materials to individual pieces of furniture and fittings in context.

Reference items are particularly important when building in existing stock, or in the case of ensembles. For example, when designing the exterior of a building, the choice of brick can be specified to be the same as the existing buildings, with the same pattern of joints, without the planner needing to explain format, coloring or bond. Reference to buildings that are already in existence and the quality achieved there can also form the basis for describing building work. Reference items,
examples of finish



Structuring service specifications

We distinguish between three basic starting situations for functional or detailed service specifications. > Fig. 26

1. No design is supplied
2. Plans or planning permission are available
3. The final planning stage has been reached

APPROACH TO FUNCTIONAL SERVICE SPECIFICATIONS

The aim of functional tender specifications is to bring all the necessary requirements for a building together. Aims

Drawing up a functional tender specification can be considerably facilitated by recourse to various descriptive instruments. They include: Functional specification instruments

- Building descriptions
- Building programs
- Room programs
- List specifying all the work required

Construction and fittings and furnishings manuals are a further step in relation to detail in tender specifications. Their language is not essentially functional. It contains too many concrete requirements, and thus runs counter to the open concept principle of a functional invitation to tender. But such manuals can be used as part of a functional invitation

	Detailed tender specification	Functional tender specification	
Planning stage	With working plans	With design	Without design
Ways of examining the bid	Financial approach (bid price)	Design, functional, technical and financial approach	Technical and financial approach

Fig. 26: Service specification characteristics

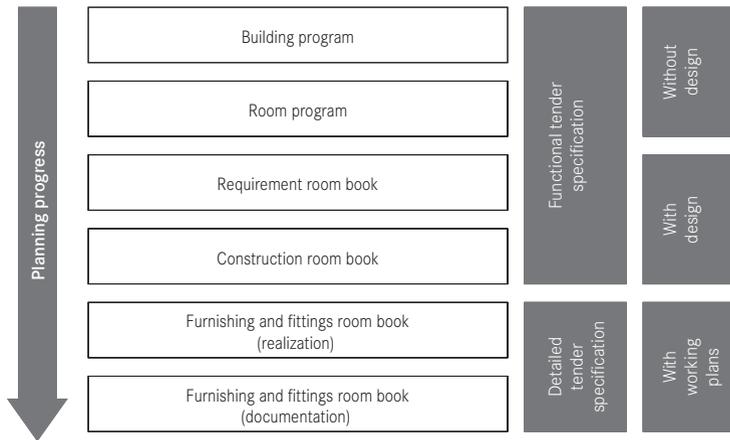


Fig. 27: Instruments for functional tender specification

to tender if a quality requirement is fixed beyond further discussion and is to be implemented when furnishing or decorating certain rooms, for example. > Fig. 27

The instruments listed either serve as a basis for drawing up a functional tender specification, or become part of the specification themselves. Without a design, only a building or room allocation program can be drawn up; a design must be made available if a book listing all the work required for the rooms (“room book”) is to be compiled.

Whether a design is available or not, nothing changes the basic principles of functional tender specification. The aim is to define everything the client requires, although more creative input is required from the bidder if no design is provided.

○ **Note:** Building program and room allocation program can be used for functional tender specification even when a design is provided, as long as they do not contradict it. But it is customary to provide a more detailed description of services required in terms of rooms, structural elements and construction products.

Functional tender specifications without a design

A building program and a room allocation program, offered without a design, simply describe requirements for the building as a whole, for individual parts of a building or for areas intended for a particular use. The bidder is responsible for design, technical, use-oriented and economic planning.

○

A building program makes basic statements about a building. It first gives details of the property, for example covering use, office size, office type, the number of floors, number of offices per floor, or cellarage.

Building program

No.	Field	Requirement
I	Area	Sample street 12, 00001 Sample town
II	Requirement (description)	Inner-city office complex
III	Nature of project	Conversions
IV	Use	Office, canteen
V	Plot size	10,000 m ²
VI	Number of floors	3
VII	Cellars	yes (1 floor)
VIII	Building structure	2 Main building office 1 Ancillary building, canteen
IX	Office space	from ... m ² to ... m ²
X	Canteen space	from ... m ² to ... m ²
XI	Office type	Individual offices and open-plan office
XII	Individual offices	from ... m ² to ... m ²
XIII	Open-plan office	from ... m ² to ... m ²
XIV	Access	The building is to be connected to public utilities and transport
XV	Parking	Underground car park in cellar, parking spaces on the north side of the building, 1 parking space per workspace
XVI	Waste	Central waste disposal
XVII	Open spaces	Park with pond
XVIII	Rules and regulations	Development plan, local building requirements

Fig. 28: Sample structure for a building program

Building programs contain information about the building project in general, supplying additional information about connections to public services (sewerage, water, gas, electricity and telecommunications), the transport system and access to outside areas.

Building programs must specify requirements for the prescribed areas of use. These requirements can be differentiated and concretized in part. For example, it is possible even at this stage to fix sound insulation requirements for an area with individual offices. > Fig. 28

Room allocation
program

A room allocation program provides a more refined definition of the requirements. It will give information about rooms and use areas, and also about how they are placed and linked together. The bandwidth of possible information in a room allocation program depends on the planning stage reached. Sensible subdivision of the areas according to the following criteria forms a good basis for a description system:

- Use
- Number
- Size
- Position and orientation > Fig. 29

Function scheme

A function scheme shows how individual areas relate to each other without illustrating the areas required. Essential links between individual areas are indicated in order to clarify the sequence of events arising from a particular use. > Fig. 30

Graphic room
allocation
program

Information from a tabular room program and function scheme can be summarized in a graphic room allocation program. This can contain basic elements of the architectural design that have already been determined: formal statements are presented, taking the areas and rooms required and the way they relate to each other into account. > Fig. 31

■ **Tip:** Symbols can be used to add further information, such as data about the required lighting (daylight/artificial light), to graphically presented room programs.

Use	Number	Size	Position and orientation
Reception foyer	1	150 m ²	Ground floor north side/west side
Canteen	1	200 m ²	Ground floor north side/east side
Kitchen	1	80 m ²	Ground floor center/east side
Office	4	each 25 m ²	Ground floor south side/west side
Events room	3	1 × 200 m ² 2 × 50 m ²	Ground floor south side/east side

Fig. 29: Example of a tabular room allocation program

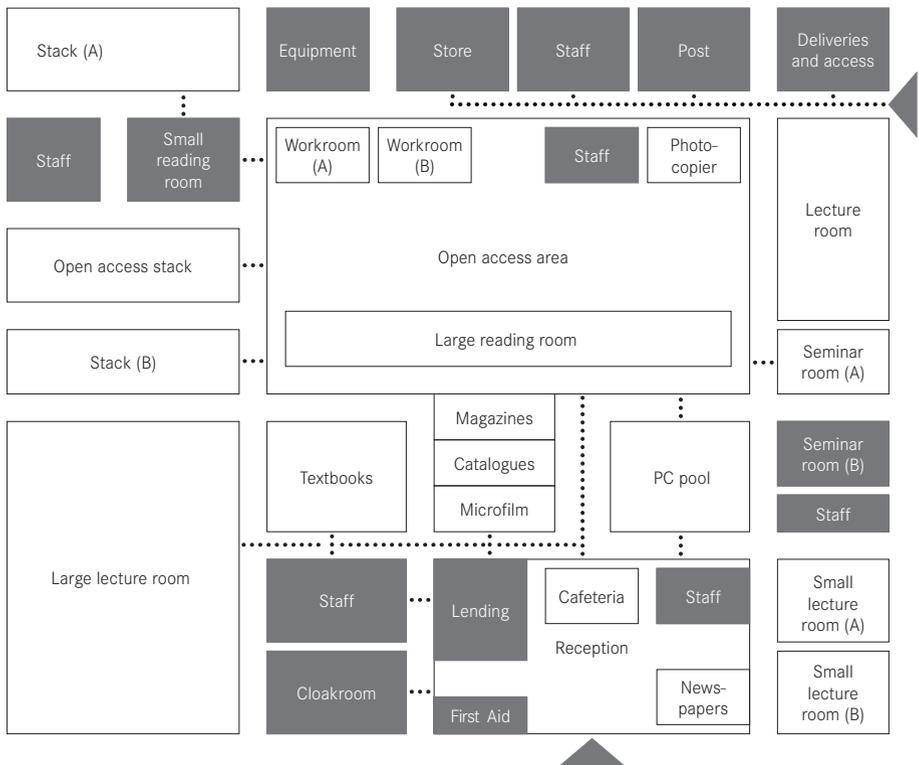


Fig. 30: Example of a function scheme

Other means of description are suitable as well as building and room allocation programs. A building description for drawing up a functional tender specification without a design is one of these.

Building description

The building description essentially provides a rough idea of the building project as a whole, but can also convey functional details. > Chapter Structuring an invitation to tender, Textual elements, General information about the building project Unlike the room allocation program, which is based on spatial organization, a building description is structured in terms of construction or trades. This is also why it is only very roughly suitable as a basis for functional tender specification. Saying “reinforced concrete hall, area 2,000 m²” is a very rough description, but it is perfectly appropriate for use as an element in a functional description. Specifying “reinforced concrete” rules out alternative construction elements, such as steel girders.

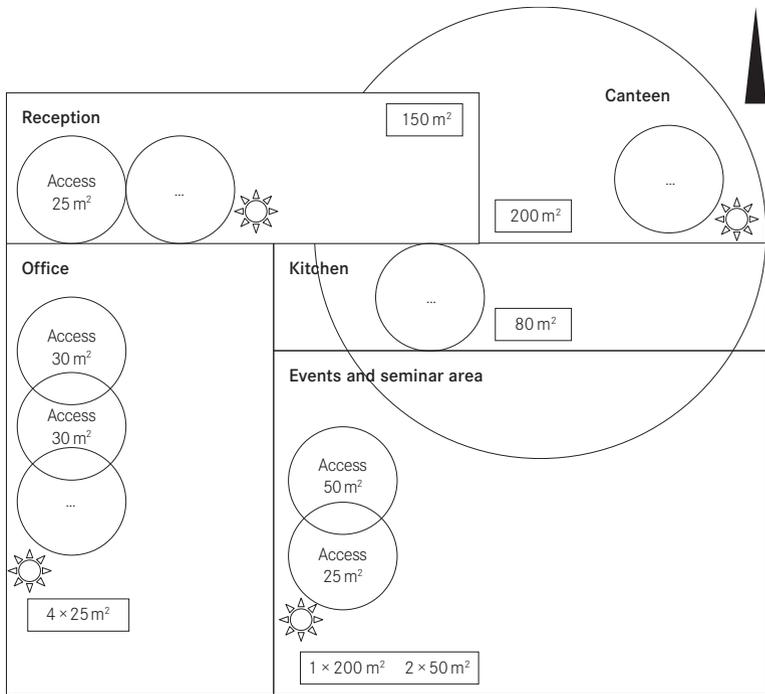


Fig. 31: Example of a graphic room program

The more specifically the building description addresses a particular construction method, the more effectively unwanted elements will be ruled out as alternatives for bidders.

Functional specification with design

If a design is available, definite requirements for the building project are already in place, and these are shown in plans. But the functional character of a tender specification with design supplied is still guaranteed, as it remains possible to define the quality of individual construction systems, structural components or construction products. In this context, using a room book – a set list of all the services required to complete a particular room – is a helpful device for systematizing requirements.

A room allocation program can be addressed in greater detail by introducing room books at an appropriate point in the planning phase. This is a system that makes it possible to supply information about any planned room. A room book sums up the space required systematically and defines use requirements. Each room book should contain the following information to ensure unambiguous identification and simplify further use of the information provided:

- Room number, following a defined system for structuring the building project
- Definition of the room
- Information about the nature of the area
- Information about requirement or furnishing characteristics

○ **Note:** Room books can be used for different purposes: identifying planning needs for a design; forming the basis of a function tender specification; as sales documents for marketing buildings; supporting the site management teams during the construction phase; recording the state of affairs when work is completed to provide a guarantee; or in relation to running the building. They also provide a useful basis for planning as a stocktaking device for future extension or conversion measures.

There are three different kinds of room book, fulfilling different purposes and so requiring different planning levels:

- Requirement room books
- Construction room books
- Furnishing and fittings room books

Room book		Requirement room book	Sheet: 05
Building project:	Weinreich Versicherungen, Musterstadt South (P45/145)		
Building type:	Office complex		
Date:	05.03.2007	Prepared by:	Mr Müller
		Approved:	Ms Sanders
Room description:	Office	Floor:	1st floor
Room number:	1.304		
Technical requirements			
Area	Requirement	Statistics	
Statics	Maximum deflection	f = l / 300	
...	
Building science	Fire prevention as per DIN 4102	Structural component at least F30	
...	
Requirements by function			
Area	Requirement	Statistics	
...	
Design requirements			
Area	Requirement	Statistics	
...	
Financial requirements			
Area	Requirement	Statistics	
...	
Ecological requirements			
Area	Requirement	Statistics	
...	

Fig. 32: Example of a requirement room book

A requirement room book plays a key part for a functional tender specification with design supplied. A sheet with a table of all the known requirements is drawn up for every room or area. > Fig. 32

Requirement room book

A construction room book offers another form of description, providing a detailed description of the construction, but not the fittings and furnishings in a particular room. > Fig. 33

Construction room book

Room book				
				Page: 05
<input type="checkbox"/>	Construction room book		Building project:	Oberstrasse 1
<input checked="" type="checkbox"/>	Furniture and fittings room book		Building type:	12345 Dorla
Date:	05.03.2007	Prepared by:	Mr Müller	
		Approved:	Ms Sanders	
Room description:	Office		Room height:	3.00 m
Room number:	1.304	Area:	20.60 m ²	
Floor:	1st floor	Type:	Use	
No.	Element	Fixtures/Structure	Properties	Quantity
1	Floor	Reinforced concrete slab in site-poured concrete Impact sound insulation Separating layer Screed, carpet	C20/25 PE sheet ZE 20, d = 50 mm	1
2	Ceiling	Reinforced concrete slab in site-poured concrete False plasterboard ceiling Grouted joints Paint ...	C20/25.........	...
3	Wall	...	...	...
4	Window	...	...	...
5	Doors	...	...	...
6	Lighting	...	...	...
7	Power supply	...	...	...
8	Heating	...	...	...
9	Ventilation	...	...	...

Fig. 33: Example of a furnishing and fitting and construction room book

○ **Note:** A furnishing and fittings room book giving detailed information about every room is suitable primarily for preparing a detailed tender specification with a complete list of technical and general requirements for each trade. Care should be taken to ensure that the services are listed in relation to trades, and not in relation to rooms.

Furnishing and fittings room book

A furnishing and fittings room book simply provides a complete description of the furniture and fittings for every room. It lays down which elements are to be fitted in each room, and in what quality and quantity. Each element is listed by number and manufacturer's description, or in comparable detail.

○

Structuring a functional tender specification

Building breakdown

The building should be broken down in order to systematize a tender specification by function offering a general program of services – in contrast with a trade-oriented tender specification with a complete list of services. Rooms are recorded clearly and systematically, and numbered consecutively, following their position in a part of the building and a storey.

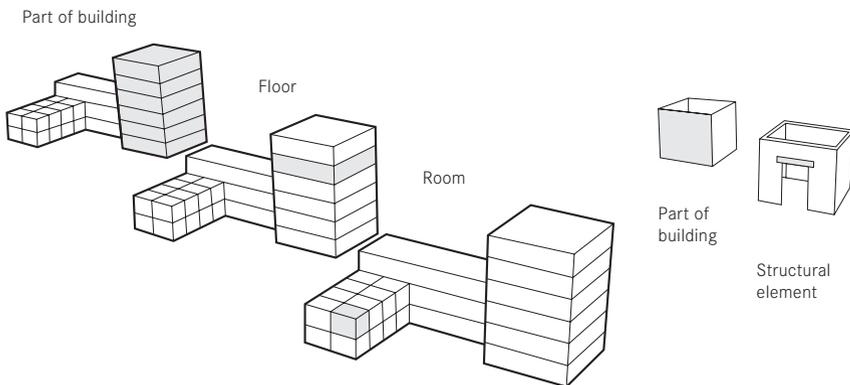


Fig. 34: Building breakdown

For further breakdown, a list of use or function areas should be drawn up. At this level, it is already appropriate to provide information about individual supply and technology elements, foundations, the loadbearing structure, the facade and the roof. If individual uses are known or intended, requirements can even be defined on the basis of structural components, such as a non-loadbearing wall between two offices. > Fig. 34

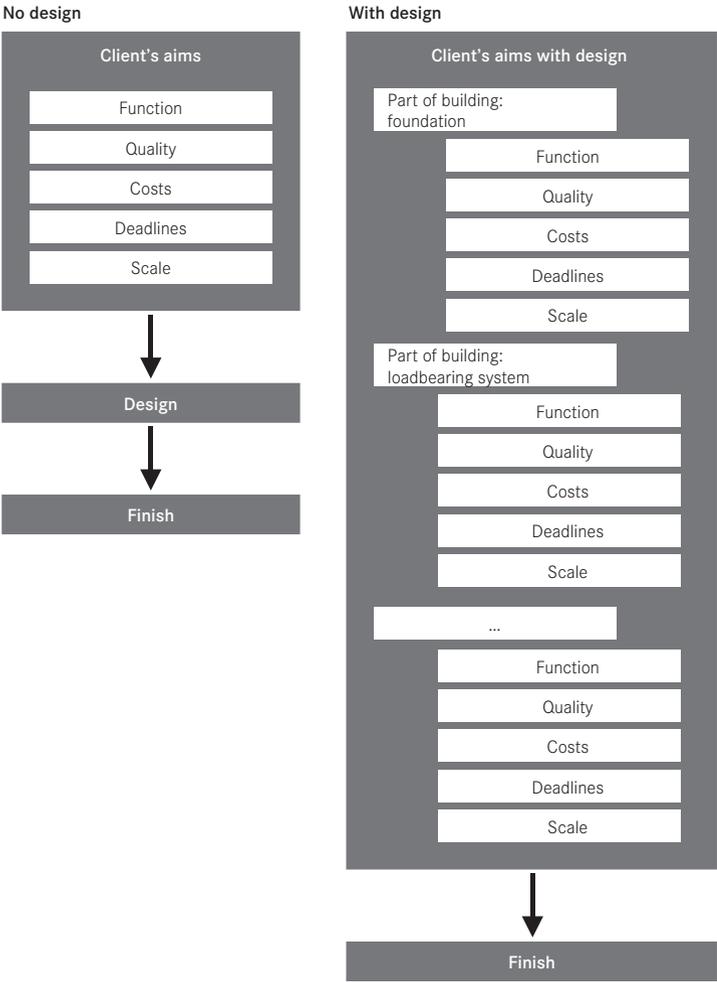


Fig. 35: Plane of reference

A building project needs to be broken down only to a certain extent: it must be possible to define different requirements on the basis of the client's intentions and the known general conditions. If the client prescribes a function specifically, it does not make sense, and it is usually not possible, to break such a function down into its individual components. > Fig. 35

Breakdown by building or room allocation program and by room book

The above-mentioned building program, room allocation program and room book are structured to provide a breakdown. They can be used in relation to the different breakdown levels as a function tendering specification with program of services, by allocating requirements. They do not have to be used, however. All that is fundamentally necessary is to establish a plane of reference for defining requirements. This could be a part of the building, or a construction component.

Drawing up a requirement profile

After establishing a breakdown system the use profile (client's aims and general conditions) can be applied successively to the smallest unit selected (a room or a construction component).

Rough description of the function of a building

It is recommended that the first step should be to allocate the planned building project to a function group:

- Housing construction
- Office building
- Department store
- School, college
- Factory
- Hospital

Requirement categories and aspects

The use profile can be differentiated further by identifying design (social and aesthetic), technical, functional, financial, and other categories if required. Each category will contain coherent requirement aspects. For example, building science and construction are both requirement aspects within the technical requirement category.

Individual requirements and ratings

Further subdivision is also possible on the basis of individual aspects. These again refer to certain subsections of the requirement aspects, and can be fixed more precisely in terms of ratings. Individual requirements regularly contain references to standards and regulations laying down certain minimum values. One possible individual requirement in terms of building science is fire protection for a door that can be fixed at a minimum rating of F30.

Requirement category	Requirement aspect	Individual requirement	Statistics
e.g. Technical requirements	e.g. Building science	e.g. Fire prevention	e.g. F60
	
	
	e.g. Statics	...	...
	
	
e.g. Aesthetic requirements	...	...	...
...

Fig. 36: Example of a system for recording service program requirements

The individual requirements and the ratings that lie behind them can be compiled clearly using the breakdown system shown in Fig. 36.

However, summing up requirements in a service program is not the only descriptive language available. Requirements can also be defined in continuous prose, so long as this retains concrete allocation of the requirement to a particular element (e.g. a part of the building or a room).

Possible ways of presenting a functional tender specification

Requirements should be defined in full and unambiguously with a view to the client's wishes and the general conditions of the building project. Possible requirements are explained in greater detail with reference to this below, following the categories identified above.

Defining requirements

● **Important:** Considerable variations are possible in the depth of analysis required to describe a client's intentions. It is possible that a client will simply identify an output value for a production plant. It is then up to the bidder to investigate all other criteria within the general conditions, which cannot be changed. If this procedure is being followed, it is neither possible nor appropriate to break the building project down.

○ **Note:** Ratings provide a clear, measurable basis for individual requirements. If no ratings are given, or if they are defined only qualitatively (e.g. enhanced sound insulation), this may give undesirable scope for the bidder's interpretation.

Design requirements

The design requirement category includes both aesthetic and social aspects. The content of this category is largely a matter of the client's sensibilities, and includes aspects like convenience, privacy and comfort in the social sphere, and architectural quality, elegance and prestige in the aesthetic sphere.

These subjective requirements might include specifying high quality building materials or imposing public areas (for example a spacious atrium).

Function-oriented requirements

Functional requirements are also determined by the client's aims. Mere allocation to a general function group (e.g. school) identifies key features of the intended function. The requirement aspects within this category provide information about the function grid, ceiling spans, the number of floors, floor area, usable area, variability for the ground plan, or possible changes of use for the building. Various requirements of a technical nature also follow from the building's function.

Technical requirements

Technical requirements are derived directly from the function, from standards and regulations, or from the client's express wishes. Essentially, all the areas relating to loadbearing capacity, stability and building science (e.g. heat and sound insulation, fire protection and waterproofing) are defined more fully by requirements.

For example, a technical requirement may follow from a client's wish for air-conditioned office spaces, and would have to be accounted for in the functional specifications.

Financial requirements

Financial aspects applying to a building are also largely determined by the client's aims. Aspects such as investment costs, building maintenance costs, running costs or yields from use are directly linked to the client's intentions and the function and technology of the planned building. One of the client's strategic aims could be to use alternative rather than fossil fuels in his or her building, which could mean higher investment costs, but lead to savings in the long run.

Ecological requirements

Themes like recycling potential, environmental soundness of the building materials used or implementation of an environmentally friendly energy concept are covered in the ecological requirement category. The general conditions for this category are primarily of a legal nature, but they can also be determined by the client's aims. The client may view state subsidies for environmentally friendly technologies as a reason for using them. However, the client may ask for a low-energy building without going into any further detail. Other examples of ecological require-

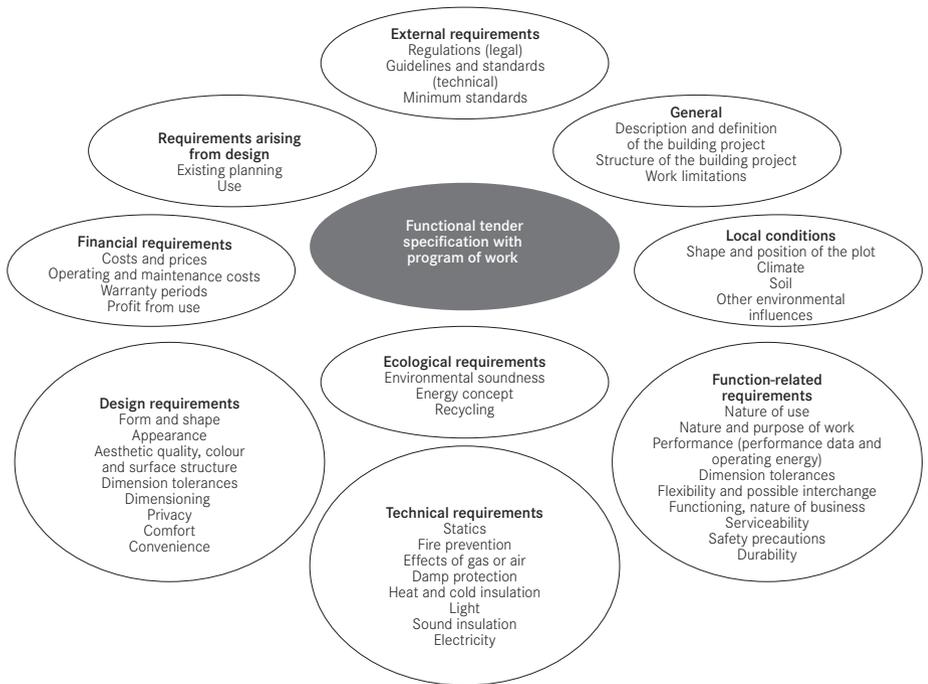


Fig. 37: Requirement criteria

ments arise from long-term considerations in terms of pollution-free conversion or demolition of the planned building.

Other information not contained in the program of services is important for a functional tender specification over and above the requirements that have already been mentioned. It includes details of legal and technical regulations, a rough description of the building, from which it should be possible to discover the local conditions for the project, and establish which works do not have to be included in the tender bid.

Other information for a functional tender specification

Figure 37 sums up the most important points to illustrate the possible requirements.

Requirements must be clearly presented in the program of works. The presentation can be in the form of continuous prose, lists or tables. This largely depends on the way the program of works is broken down. If the program runs from the building as a whole to the individual room, a table of requirements can be systematized as follows:

Requirements for the building as a whole:

- Two storeys
- Solid construction
- Minimum requirement low-energy building in accordance with current regulations

Requirements for individual parts of the building:

- Conservatory finish with overhead glazing
- Natural ventilation
- Maximum summer temperature in rooms: 29 °C

Requirements for individual rooms:

- Study facing the garden
- Staircase with natural lighting
- Bathroom with separate toilet

Systematic listing of this kind quickly produces a program of works that is very highly differentiated in individual areas. Individual requirements can be formulated down to a particular rating, but design requirements are difficult to formulate precisely. It is perfectly clear to stipulate that all the rooms in a hotel must have a sea view, but descriptions like “comfortable atmosphere” or “lounge style” are very much governed by individual ideas and experience, and serve little purpose unless they are not made more specific.

PROCEDURES FOR A DETAILED DESCRIPTION OF WORKS

Aims The most economical bid for required work can be compiled with a detailed description of works. The tendering pathway must be described to bidders in detail, and in full, on the basis of the completed working plans. A tried-and-tested system is available to planners.

Structure The tender specification is a general structural system that makes it possible to record individual works coherently. The individual works are itemized in tables, giving quantities by batch, trade and title. In practice, the tender specification breakdown shows the work to be done expressed by location and specialist fields. > Fig. 38

Tender specification with list of work							
Lot 1	Trade 1	Phase 1	Item 1	Item 2	Item 3	Item 4	...
		Phase 2					
		...					
	Trade 2						
...							
Lot 2							
...							

Fig. 38: Breakdown system for a tender specification

Subdivision by location or room is familiar from the procedure for a function tender specification. Subdivision by trades is another possible way of systematizing the work required.

The principle behind the tender specification is that it aims to make a direct enquiry about prices for the smallest descriptive elements, item by item. Bidders should provide unit prices for the items, which are described precisely by nature, quantity and quality.

Tender specification and unit price contract

○

The total price for an item is arrived at by multiplying the planned quantities by the unit price in each case. The sum of all the totals is the net total for the bid. When invoicing work after it has been carried out, the unit prices are quoted, but not the planned quantities. A unit price contract of this type is usually billed in terms of the quantities actually used.

○ **Note:** Unit prices are prices based on a unit, for example EUR 10/m².

If a description of the work required is needed with a tender specification, the information has to be systematically converted from the plans into individual subjobs arranged by trade, as plans are, by their very nature, structured according to construction components.

If individual subjobs are to be listed with absolute clarity, it is first necessary to consider the sequence of work and the construction method. Adopting this approach makes it easier to identify subjobs of the same nature in more detail, and allot them to a trade. Identifying the subjobs, allocating them to individual trades and also actually describing the work required can be based on answering the following simple questions:

- What are the construction elements for which subjobs have to be described?
Ceiling; wall; foundations ...
- What are the construction types for which subjobs have to be described?
Masonry; reinforced concrete ...
- What are the processes for which subjobs have to be described?
Earth moving; reinforced concrete work ...
- What connections are there between the building phases and the trades?
Excavations = earth moving; foundations = reinforced concrete work ...
- What subjobs can be allocated to particular trades and construction components?
 - Reinforced concrete ceiling = formwork, reinforcement, concrete ...

The next step is to record more detail about the individual subjobs. Here we recommend that the relevant standards, guidelines and regulations are summed up, to provide a frame of reference for describing

■ **Tip:** A useful instrument for compiling a tender specification with list of works is a room book detailing furnishings and fittings. This gives the number of rooms with a detailed description, as well as information about areas. Certain jobs can thus be recorded quickly and systematically in terms of quality and quantity for further description in the tender specification.

○ **Note:** Information about professional execution of building work can be found in the trading standards. These standards also contain information about classifying the work, the building materials and construction components used, the units to be used as a basis, the appropriate subjobs, and for invoicing and drawing up the tender specification (see Appendix).

each subjob in detail in terms of a sound, expert source of information about building materials, construction components for listing the works required. ○

The tender specification for all jobs can be drawn up stage by stage on this basis.

Lot

The lot is a complete award unit allocated to a company. Lots are to be seen as independent subprojects that can be defined equally on the basis of criteria relating to spaces (part lot) or to expert services (specialist lot, trade).

Subdivision into lots by area usually only takes place for large building projects, and would allow for dividing a road-building project up into several phases or street construction contract sections. If the client perhaps intends to commission only part of the building work and allocate subsequent work to other firms, he or she must draw up appropriate lots. Part lot

If the client is awarding the contract by breaking down trades, the term specialist lot is used. > Chapter Structuring an invitation to tender A trade can be split up into several specialist lots. For example, one metalworker can be commissioned to make railings and another to work on the facade. ○ Specialist lot

Title and subtitle

Titles are a further way of breaking down the building project below the level of the project as a whole. A title describes a part of a building or a particular trade within a lot or an overall building project. It can describe a subjob within a trade, without representing a unit that is complete in itself with its own price within the bid. The function of the title, as opposed to the lot, is to sum individual job items up in coherent sections. Bundling individual jobs (items) that belong together in terms Title

○ **Note:** Just like an independent building project, lots can also be further broken down in terms of areas and expertise to relate to parts of a building or individual trades. Lots can also be defined on the plane of individual trades or titles, and are then awarded as a complete package of works.

of speciality or physical area provides a suitable basis for establishing prices by placing an item within the overall context.

For example, the “metalwork” tender specification may contain titles such as “stairs and banisters,” “doors and frames,” and “fencing,” in order to break the work down into coherent sections. Further differentiation can then be done in subtitles, such as “outdoor stairs and banisters” and “indoor stairs and banisters.” Work can also be divided up according to individual structural elements. The tender specification for “shell construction work” can be broken down into titles such as “foundations,” “floor slab,” “exterior masonry,” “interior masonry,” “ceilings” etc., or even more fully in relation to the place where the work is to be done, as in “kitchen tiles,” “toilet tiles” and then again into “floor tiles” and “wall tiles.”

The number of breakdown levels is up to planners. They should break the tender down only to the extent that the complexity of the project requires. Breakdown by title and subtitle should always aim to form coherent units. As well as better understanding by making it easier to allocate the individual job items, this means that when comparing bids it is possible to compare something other than just individual items within the total price. In addition, planners can compare the bids in terms of the titles. For the above-mentioned example of metalwork, it could turn out when comparing the individual titles that one metalworker is offering the best prices for stairs and doors, but is bidding well above the average for

- fencing work.

Subtitle Individual titles can be further broken down by the use of subtitles. For example, the reinforced concrete work required for a particular job can be summed up under a title, and the formwork and reinforcing material it requires in subtitles.

The extent to which there is differentiation between titles and subtitles or other breakdown levels (main titles where appropriate), and the sequence in which subdivisions are made in terms of working area and

■ **Tip:** Listing by title makes it easier to evaluate bids for individual sections or trades. To do this, the total prices for items under a particular title are summed up and presented in a list of the individual titles.

- Earthworks
- Drilling
- Preparatory work
- Ramming, sieving, compressing
- Waterpipes
- Sewerage drains
- Draining
- Spray concrete
- Road and path construction
- Landscaping
- Injection spraying
- Underground cabling
- Rail construction work
- Masonry
- Concreting
- Natural stonework
- Artificial stonework
- Carpentry and woodwork
- Steel construction
- Sealing
- Roof covering and roof sealing
- Plumbing
- Dry construction work
- Plastering and stucco
- Ventilated curtain facades
- Tiling and slab installation
- Screed work
- Poured asphalt work
- Joinery
- Parquet work
- Metal fittings
- Blinds
- Metalwork
- Glazing
- Painting, varnishing, coating
- Corrosion prevention for steel
- Floor coverings
- Wallpapering
- Timber flooring
- Ventilation installations
- Heating and central water-heating facilities
- Gas, water and drainage facilities
- Low- and medium-frequency equipment
- Lightning protection
- Conveyor systems, lifts, escalators
- Building automation

Fig. 39: List of different trades

expert fields depends on the size and complexity of the individual building project and the nature of the contract relating to it. Figure 39 shows possibilities of breakdown that are already available on the basis of specialist allocation of individual services.

Items

A single item within a tender specification is the smallest tender unit and represents a subjob within the building work. It is made up of individual descriptive elements defining the work to be done and the particular service required clearly and unambiguously. The descriptive elements can be formulated as required or put together from standard catalogues.

It is possible to include more than one activity within a particular item, as long as they can be seen to be the same in their technical nature, and for price calculation.

No.	Text	Item	Quantity	Unit	UP	TP
01.02.02.0001	... Formwork Floor slab ...		50	m		

Fig. 40: Components of a tender item

Components of a tender item

Against this backdrop we recommend describing all the items systematically in a tender specification. In this context, the typical components of a tender item are grouped within the following categories:

- No. number
- Text descriptive text (short and long text)
- ITy item type
- Quantity the quantity worked out from the plans in terms of UQ
- UQ unit of quantity
- UP unit price (price for a unit)
- TP total price per item (unit price × planned quantity)

These categories are applied to every item, thus producing a specification arranged by lots, trades and titles or subtitles. The bidder enters the unit and total prices. > Fig. 40

The following information should be given in the individual categories for a tender position:

Number

The number helps to make it easier to find one's way around a tender specification. Each piece of work (subjob) in the same category in terms of techniques and pricing is identified by a particular number according to a defined breakdown key. This number relates directly to the way in which the project is broken down, and reflects this in the tender specification. In a relatively simple project a subjob can be identified by number as follows.

Lot	Trade	Title	Item	Index
01	01	01	0001	a

Index

The index can be used to show the relationship between a basic and an alternative item in the numbered list.

Numbering is consecutive at every level. > Fig. 41

Tender specification text

The tender specification text should be drawn up in long and short form by the planner inviting tenders.

01.02.01.0001	Activity 1 of title 1 in trade 2 des Loses 1
01.02.01.0002	Activity 2 of title 1 in trade 2 des Loses 1
01.02.01.0003	Activity 3 of title 1 in trade 2 des Loses 1
01.02.02.0001	Activity 1 of title 2 in trade 2 des Loses 1
01.02.02.0002	Activity 2 of title 2 in trade 2 des Loses 1
01.02.02.0003	Activity 3 of title 2 in trade 2 des Loses 1
01.02.02.0004	Activity 4 of title 2 in trade 2 des Loses 1
01.03.01.0001	Activity 1 of title 1 in trade 3 des Loses 1
01.03.01.0002	Activity 2 of title 1 in trade 3 des Loses 1
01.03.01.0003	Activity 3 of title 1 in trade 3 des Loses 1
01.03.02.0001	Activity 1 of title 2 in trade 3 des Loses 1
01.03.02.0002	Activity 2 of title 2 in trade 3 des Loses 1
01.03.02.0003	Activity 3 of title 2 in trade 3 des Loses 1

Fig. 41: Example of the use of numbering

The short text is used essentially as a short textual summary of the service required for further use in drawing up the bid and raising the invoice. The short form must not lead to possible confusion between items, each item should be identified unambiguously: “masonry 36.5 cm, cellar,” “masonry 36.5 cm ground floor,” “masonry 17.5 cm ground floor” etc.

Short text

In contrast, the long text should describe the work required unambiguously and exhaustively, so that all the bidders understand exactly the same thing.

Long text

In principle, texts can be freely formulated, taking legal and technical regulations into consideration. But to simplify this process, planners can make use of standardized sample texts, which are generally available.

Freely formulated or standard texts

Such standard works catalogues are collections of texts that can be used to described work required or subcategories of it. These are structured according to predefined patterns and contain a range of information about building work, building materials, dimensions and units of quantity for various works.

Standard texts

The great advantage of standardized specification texts is that they mean the same to all bidders, and so there is no unnecessary effort or additional risk when fixing prices. Furthermore, the usually modular

■ **Tip:** Standardized texts are available in most countries to reduce the amount of effort needed when drawing up tender specifications. They are arranged by trade and constructed as modules: the descriptive text for a required service is compiled in sequence using a system containing several steps, with information on building type, realization type, realization quality, structural component, type of material, quality of material and dimensions, and possibly on the conditions of realization as well. There is however no guarantee of the technical correctness of the texts, as in principle it is possible to arrive at combinations that would not make sense.

compilation of the standard text collections and the hierarchical structure imposed facilitate the exchange of data between the compiler and the recipient of the tender specification, because of good IT compatibility. All that remains for planners is to check the accuracy of the content.

It is possible to ensure that a description is complete to the greatest possible extent on the basis of the prescribed system using standard texts. But it should be noted that appropriate pattern texts are not available for all special solutions.

Building product manufacturers in particular usually offer appropriate pattern texts, which can be taken over into the tender specification very easily. Planners should remember that manufacturers do not see this as an altruistic service, but use drawing up a tender specification as a way of placing their own product. They are also keen to establish unique selling points to exclude rival products from the competition. So information can be supplied with the tender specifications containing production-related information about the thickness of layers or alloys for a particular product that are unique to one manufacturer, but irrelevant in terms of the product's suitability for use and durability. This often sets the hurdle for finding a possibly more reasonably priced alternative unreasonably high for the tendering firm.

In any case, planners are advised to be careful when adopting a manufacturer's product descriptions. If they are not sure what a particular formulation implies, they should consult the manufacturer or more neutral institutions.

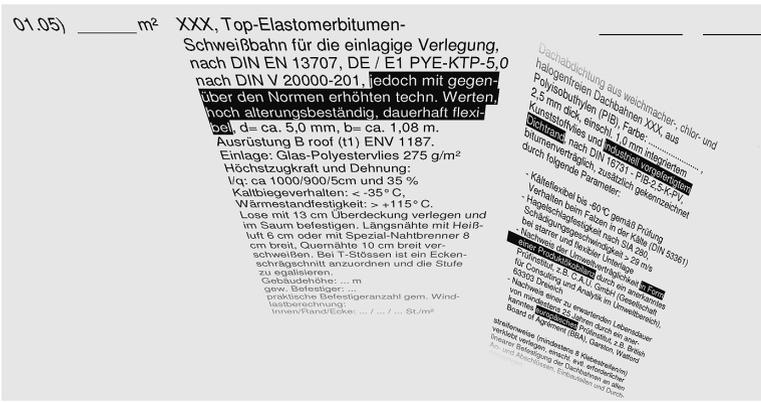


Fig. 42: Biased manufacturer's description

Formulating the text freely requires a high level of expert knowledge of the work to be described. This approach is also used to distinguish important from less important information. A range of manufacturers, the appropriate associations or other competent partners should be consulted in order to obtain the information relevant to particular requirements. Planners must apply requirements arising from standards and directives responsibly. The same applies to checking for completeness. To ensure this, the description should cover the following points:

Freely formulated texts

- Description of the work required
- Description of the type of work required
- Spatial frame of reference for the work required (information about the part of the building, but also its location in the building, if this is not clear from the numbering)
- Information about quality (material, surfaces, etc.)
- Information about dimensions falling outside the reference unit

○

○ **Note:** A tender specification can be based on a reference object without excluding alternatives (e.g. “door handle stainless steel 1076 brand FSB or of equal standard”). Equality of standard can be checked by requesting data sheets or samples accompanying an alternative suggestion in the bid.

Systematization

The following scheme systematizes the textual description of work, and can be applied to any subsection of the work in this form. Modular standard texts are based on similar patterns.

- Building method, building type (production by fitting building materials and components together)
- Structural element (part of the building forming a room or system)
- Building materials (required or desired building materials)
- Dimension 1 (element dimensions, such as the thickness of a wall)
- Dimension 2 (general dimensions, such as the installation height for a particular piece of work)

Supplementary information

It would also be possible to place other information about the purpose of the work on hints on invoicing or realization techniques in the descriptive text. For example, if a building is to be in reinforced concrete, the building method is directly influenced by the requirement to use pre-fabricated elements. Equally, legal requirements can form part of a tender specification, for example if material removed is to become the contractor’s property when the work is completed.

References

It is customary when using texts to describe work required to make reference to other documents, such as statical calculations, plans, samples or reports. For example, a tender specification text could contain the formulation “*reinforcement as per reinforcement plan.*”

Reference to a drawing is particularly useful in the case of spatially complex situations or complex building sections. For example, if an item describes the construction of stairs with a banister, a drawing will help to identify individual elements mentioned in the text and to understand

● Example:

Building method:	masonry according to the standard xxxx	This subservice can be further explained by complementing the above description with information on quality relating to the structural element (e.g. finished as exposed masonry on both sides) or the building material (e.g. salt-water-resistant finish) or on the building method (e.g. build with prefabricated wall elements).
Structural element:	for the interior wall in section EG XX/YY	
Building material:	with calcareous sandstone blocks yyy standard	
Dimension of element:	with a thickness of 17.5 cm	
General dimension:	built to a height of 3.00 m	

unambiguously the way they fit together. This means that the bidding firm can check the completeness of the service description, and it is easier to estimate the assembly time required.

Reference to reports makes sense in the case of special sound insulation requirements, for example. In this case the relevant requirements laid down in the report do not have to be described in the individual items, but are defined in an appropriate reference: *“Higher than usual demands will be made on the completed building element according to the appended sound insulation report. These requirements must be met, and considered in the bid price.”* In this way, planners avoid possible sources of error when transferring individual requirements into the tender specification.

Different types of works positions can be used in a tender specification. Planners identify a particular item appropriately in the “Item type (ITy) column.”

Distinguishing between different item types makes it possible for planners inviting tenders to test the market with a view to optional and alternative services. For example, not all decisions will necessarily have become final at the time the work is put out to tender (e.g. the choice of floor coverings), or the requirements for a particular service will not have been fixed (e.g. installing drainage). Subsequent changes can then be addressed through contingent items. If these works are not ordered until after the contract has been completed, the bidder’s prices given as per tender specification are binding.

Standard items are always realized. Bidders will provide a unit price and a total price for these in the tender specification.

○ **Note:** If identical descriptions occur in different items, there are two ways of avoiding unnecessary repetitions. Planners can describe the work in full in one item and then refer back to this in subsequent items (e.g. plasterboard stud wall, finish as in previous item, but with double boarding). If identical descriptions apply to a number of items, planners can sum them up and identify them in their preliminary notes (e.g. finish

plasterboard stud wall as in preliminary note type A). Preliminary remarks always relate to particular pieces of work and are used exclusively in the context of tender specifications listing the works in full. Fundamentally they are the same as texts with lists of works and should therefore match them in terms of content. There is no conflict with general or special contract conditions.

No.	Text	Item	Quantity	Unit	UP	TP
01.02.02.0001	... Textile floor covering ...	BI	30	m ²		
01.02.02.0001a	... Parkett ...	AI	30	m ²		

Fig. 43: Example of alternative items

Contingency items

- Contingency items make it possible for planners to test the market in relation to services they may wish to use additionally.

- If it is not certain that an item of this type will be realized, it is not provided with a total price in the tender specification and thus not in the final bid price either. If the client orders a contingency item after the contract is concluded, its price will be calculated on the basis of the unit price entered by the bidder. If they are not commissioned, contingency items are omitted without claim to remuneration.

Basic and alternative items

Basic items are items that are fixed for realization. Enquiries can also be made about alternative items. Thus, a basic item is considered to be a component of this service to be carried out, and must be provided with a unit and a total price.

- Alternative items can replace basic items if the service described is to be realized in an alternative way. As for a contingency item, an alternative item must also be identified appropriately and provided with a unit price only by the bidder. > Fig. 43 Planners can use such items to make the best financial decision about a service. The basic item is always realized unless the client expressly orders the use of the alternative item.

○ **Note:** Contingency items should be used only for subsidiary works that are not essential to the overall success of the building project. It would make sense to use contingency items if certain items have not been fixed before building starts because of insufficient information about the soil conditions on the building site.

■ **Tip:** Contingency items are often not checked carefully enough when examining the bid, as they are not included in the bid total. This can lead to accepting inflated unit prices that have to be kept to when ordering the realization of contingency items.

No.	Text	Item	Quantity	Unit	UP	TP
01.02.02.0001	... Excavation soil class 3–5 ...		1000	m ²		
01.02.02.0001a	... Excavation soil class 6 ...	SI	200	m ²		

Fig. 44: Supplementary item

Supplementary items are a different item type. They identify potential impediments or additional work needed in relation to a standard item. Bidders provide a unit price and a total price for supplementary items in the tender specification. The corresponding standard item then covers something like a basic finish for the item, and the supplementary item describes a higher standard or a special installation situation. The price for a supplementary item is calculated from the difference between the price for a higher standard and the basic finish.

Supplementary item

An example shows the possibilities arising from using a supplementary item. Figure 45 presents two variants for describing the same work for applying exterior rendering.

The first variant shows the rendering in two standard items, separated for the high and the low building. The other provides a tender specification with a standard item for the whole building project and a supplement for the higher areas, for which scaffolding costs may have to be quoted. The second variant has the advantage that a bid will not be made for the ground floor of the high-rise building at a higher price because of additional scaffolding costs.

○ **Note:** An alternative item offers the possibility for contractors to propose their own solution for implementing a basic item (e.g. "Masonry to be produced according to previous item, but realized according to the bidder's choice.") A description of the proposed finish must be appended.

● **Example:** The example in Figure 44 clarifies the principle behind a supplementary item. The work described in item 01.02.02.0001 covers excavating 1000 m³ of soil in classes 3–5. The appropriate supplementary item enquires about the price if the problem arises from "excavating class 6 soil" to the extent of 200 m³. Thus the price contains only the proportion (supplementary price) for dealing with the problem, and does not represent a price in its own right for excavating class 6 soil. Hence the areas (200 m²) are already included in the standard item.

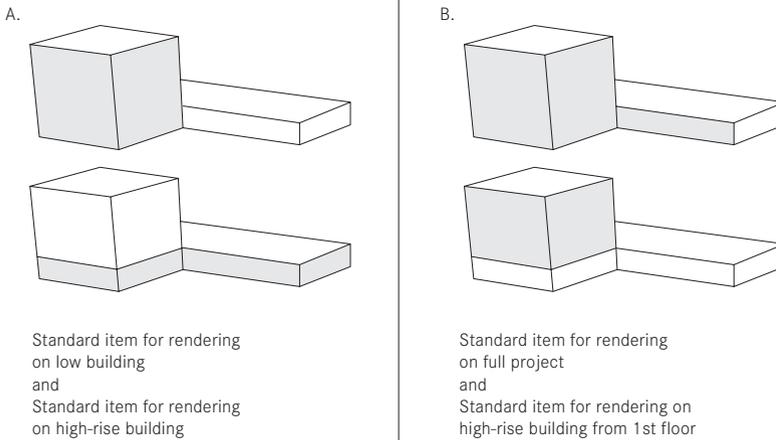


Fig. 45: Example of supplementary item

Quantity and units of quantity

Quantities can be expressed in various units. But the unit of quantity (UQ) should always relate meaningfully to a particular subservice. Thus, it is possible to calculate reinforcement in cubic meters (m^3), although this is a disadvantage in terms of the form reinforcement bars will take and the industry standard of calculating in tones to determine prices. Sensible units are tones, or where applicable square meters (m^2)

- for steel mats and meters for steel bars.

The unit of quantity fixed for an item forms the basis for quantity surveying and is the reference value for bidders when fixing prices for subsections of the work.

■ **Tip:** Supplementary items often differ only very slightly from the corresponding standard positions. In such cases the descriptive text can be reduced to the essential changes, there is no need to repeat textual elements that remain unchanged. It is sufficient to write "supplement to item xxx for double boarding."

○ **Note:** The general and special requirements contain guidelines for the use of units of quantity. For example, wall areas are calculated by area (m^2) for rendering work and soffits by length (m).

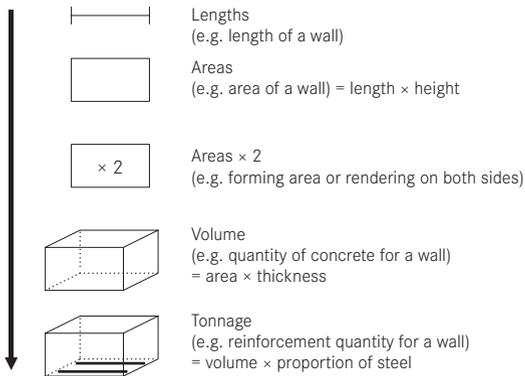


Fig. 46: Quantity surveying procedures

Quantities relate to the quantities required for completing a piece of work on the scale required. The quantity is given as a preliminary estimate representing the quantities required for completing the work according to plan. They are derived directly from the working plans, or in the case of refurbishment work also by on-site estimates, and built into the tender specification by the planner inviting tenders. It is fundamentally advisable to record the quantities for a work item within a particular frame of reference (total building project, part of building, floor, etc.) and to color code the corresponding structural elements in the plan appropriately to avoid redundancies. Quantities can also be worked out by using appropriate construction software (e.g. CAD). The degree of automatic quantity calculation extends from simply working out area to a complete component-oriented list of quantities using a 3D model.

Conscientious quantity surveying also makes it easier to account for building works at a later stage.

The unit price (UP) is calculated by unit quantity by the bidder on the basis of the description of the subservice and built into the tender specification. As a rule the unit price is fixed and usually forms the basis for later invoicing for the work. Unit prices are changed only if quantities vary considerably or content deviates from the work as described.

Unit price (UP)

Total price (TP)

The total price is arrived at primarily from the product of unit price and preliminary estimate (planned quantity). Bidders should work it out for all items basic and supplementary items intended for realization and include it in the tender specification in the appropriate place. The sum of all the intermediate totals for a building project is the net final tender price. Adding VAT at the statutory rate gives the gross price the bidder is offering for the commission to provide the services described in the various lists. Total prices are not stated for alternative and contingent items, as it is not clear at the point the bid is being made whether these items will be realized or not.

Subservices are invoiced on the basis of the total prices for the individual items and the quantities actually realized.

In conclusion

Tendering is not usually one of the activities planners find themselves looking forward to with particular glee. This is understandable, as the charms of a beautiful design, a magnificent view and even carefully planned details seem incomparably greater. The large proportion of text alone often detracts from the allure of the tendering process.

But planners who take the trouble to tender carefully for the ideas in a design will gain some very sound insights into their own planning and the necessary sequences of events needed to realize it.

It is only the invitation to tender that will ensure a high standard of planning is also reflected in outstanding realization.

So this volume is intended to spur planners on to formulate their own invitations to tender comprehensibly, and to structure them meaningfully. If the contractors understand the invitation to tender, the planners have not let themselves down.

Appendix

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- Bert Bielefeld, Lars-Philip Rusch: *Building projects in China*, Birkhäuser Verlag, Basel 2006
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- Institution of Civil Engineers, Association of Consulting Engineers and Civil Engineering Contractors Association: *Tendering for Civil Engineering Contracts*, Thomas Telford Ltd, 2000
- Richard H. Neale, David E. Neale: *Construction Planning*, Telford, London 1989
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SAMPLE INTERNATIONAL CONTRACTS

FIDIC	Fédération internationale des ingénieur communauté
NEC	New Engineering contract

ADDITIONAL SOURCES OF INFORMATION

ISO	International Organization for Standardization (http://www.iso.org)
CEN	European Committee for Standardization (http://www.cen.eu)

In addition to the above-mentioned sources, there are a number of national and international associations and institutions that offer leaflets, examples of additional technical contractual terms, as well as sample tender texts for certain items of work. Sample tender texts that can be used by all types of contractors can be found on the following Internet sites:

Internet sites

<http://publications.europa.eu>
<http://www.neccontract.co.uk>
<http://www.fidic.org>

Tendering portal

<http://ted.europa.eu>

PICTURE CREDITS

Figure 6 left: aboutpixel.de

Figure 6 center right: PixelQuelle.de

Figure 7: PixelQuelle.de

Figure 8: PixelQuelle.de

Figure 10 centre left: aboutpixel.de

Figure 10 right: aboutpixel.de

All other figures: The authors

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