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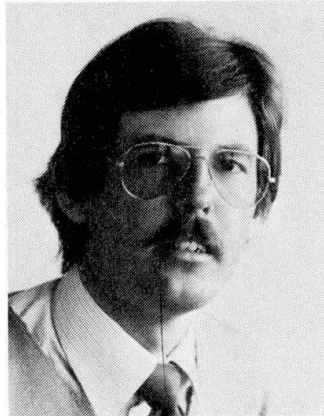
## Quality and Quality Assurance in Tender Documents

Qualité et assurance de qualité dans des documents d'appels d'offres

Qualität und Qualitätssicherung in Ausschreibungsunterlagen

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### SUMMARY

This report gives some indications of the definition of quality and quality assurance in tender documents and outlines the different approaches towards this problem in the United Kingdom, Fed. Rep. of Germany and in international tenders.

### RESUME

Ce rapport donne un aperçu de la définition de la qualité et de l'assurance de qualité des documents d'appels d'offres et montre les différentes approches en Angleterre, Rep. féd. d'Allemagne et lors d'appels d'offres internationaux.

### ZUSAMMENFASSUNG

Dieser Beitrag gibt einen Einblick in die Definition von Qualität und Qualitätssicherung in Ausschreibungsunterlagen und stellt die unterschiedlichen Ansätze in dieser Hinsicht für England, Bundesrep. Deutschland und in internationalen Ausschreibungen dar.



The definition of Quality and Quality Assurance in the construction process is traditionally the professional field of the Architect/designer/Engineer and the Contractor. A well established division of design and construction responsibility therefore results.

Legally, the duties of the Architect and the Contractor with regard to definition of Quality and Quality Assurance are defined in their Contracts and are governed by the relevant system of laws and standards.

### 1. Contract for Design and Supervision

The Contract between the Owner and the Architect is usually divided into the Design Contract and the Supervision Contract. In the Design Contract, "Quality" is mainly defined by forcing the Architect to prepare his design in accordance with the laws and regulations and to apply the latest codes and standards available.

As laws, regulations and standards only define minimum Quality requirements, it is the Owner's responsibility, in conjunction with the Architect, to establish the actual quality requirements. Quality during the design phase is assured by the Architect's professionalism and a close dialogue between the Owner and the Architect.

In the Supervision Contract, the Architect's/Engineer's role is defined as being the guarantor of a defined quality level and his responsibilities in this respect are usually described in the relevant fee regulations or listed in the Contract.

### 2. Construction Contracts

The legal document for the construction and erection of a building consists of the tender documents. The tender documents are legally binding for the Contractor with regard to Quality requirements and Quality Assurance.

Tender documents consist of the following:

- Conditions of Contract, which describe the contractual relationships between the Owner and the Contractor, define the role of the Engineer and regulate all administrative matters, such as duties of the various parties, certificates, and payments etc.
- Specifications, which describe all technical aspects of the work and specifically define materials and workmanship.
- Bills of Quantities, which indicate the quantities of the various items required for the proper completion of the work.
- Drawings, which define the visual requirements and indicate layout and appearance.



The following analysis examines the conditions of contract as they are adopted from local authorities in Germany and England, and the internationally applied FIDIC Conditions, with regard to the definition of Quality and Quality Assurance.

## 2.1 Germany

The standard form of building contract as applied to public works in West-Germany, does not refer to the word "quality" at all, but is limited to the statement "... The general conditions for the execution of Construction Work are

- DIW 1961 - VOB/B, the general technical regulations.
- ATV - VOB/C and any further DIN-standards as referred to in the tender documents, in their latest edition ...."

Also, Part B/VOB defines Quality only in very general terms:

" ... The Contractor has to execute the work under his own responsibility in accordance with the Contract. He has to follow the recognized rules of technique and note the laws and regulations as issued by the Government and the public authorities."

Even Part C/VOB provides no direct definition of Quality, but lists all those DIN-standards, which describe Qualities.

As an example, DIN 1833 for concrete and reinforced concrete work, refers to 21 further DIN's, which describe Quality Requirements and Quality Assurance procedures. These DIN's refer to further DIN's etc.

As the DIN-standards are a provision of the construction contract, the actual specification writing can concentrate on the specific requirements of the actual job and those requirements which exceed the DIN-standards.

In case of contradictions between the various parts of the tender documents, Specifications in the Bill (Leistungsbeschreibung) will take precedence over Special Conditions of Contract, Technical Instructions for Construction Work and General Conditions of Contract for the execution of Building Work.

The tests which the Contractor has to perform, are again described in the relevant DIN-standards and the Engineer may issue instructions with regard to the removal from the site of any work, material or goods, which are not in accordance with the Contract.

## 2.2 England

The I.C.T. Standard Form of Building Contract, 1980 Edition, for Local Authorities for Contracts with approximate quantities, generally states in para. 2: "The Contractor shall upon and subject to the conditions, carry out and complete the work as set out in the Contract documents in compliance therewith, using materials and workmanship of the quality and standards therein specified ...." Clause 8 of above Contract then specifies:



"8.1 Materials, goods and workmanship shall so far as procurable, be of the respective kinds and standards described in the Contract Bill".

Contrary to the quoted German conditions, reference is made to the specifications and Bills for Quality and Quality Assurance, and it is the responsibility of the specification writer to properly define the Quality and describe the Quality Assurance procedures.

He will most certainly refer to the relevant B.S. wherever possible, but it shall be noted that there is no automatic link in the Conditions of Contract to standards as under the German system."

The Guarantor for the Quality described is the Architect/Supervising Engineer.

Clause 2.1 states "... provided that where and to the extent that approval of the Quality of materials or of the standards of workmanship is a matter for the opinion of the Architect/Supervising Officer, such Quality and standards shall be to the reasonable satisfaction of the Architect/Supervising Officer. He may, according to Clause 8.4., "issue instructions in regard to the removal from the site of any work, materials or goods, which are not in accordance with this Contract" and, if the Contractor refuses or persistently neglects to comply with the written notice from the Architect/Supervising Officer, require him to remove the defective work or improper materials or goods and by such refusal or neglect, the work is materially affected - thus the work may be terminated by the Employer.

The most significant difference between the German and the English conditions is the precedence of documents in the case of ambiguities: Under the English system, the Articles of Agreement, the Conditions or the Appendix override all other documents. All other documents are mutually explanatory.

### 2.3 International

For International Contracts FIDIC (Federation International des Ingenieurs - Conseils), Conditions of Contract for work of Engineering Construction are commonly applied.

It is according to Article 8.1 of these conditions, a general obligation of the Contractor "... subject to the provisions of the Contract and with due care and diligence, execute and maintain the works ...." He "shall take full responsibility for the adequacy, stability and safety of all site operations and methods of construction...", and, described in more detail in Article 36 is "All materials and workmanship shall be of the respective kinds described in the Contract and in accordance with the Engineer's instructions and shall be subject, from time to time, to such tests as the Engineer may direct ...."

Again, as under the English system, no reference is made to a specific system of codes and standards, but it is the responsibility of the specification writer to define the Quality requirements and Quality

Assurance procedures in the specifications. However, FIDIC provides for the Engineer a wider margin for interpretation than foreseen in National contracts, whereby, similar to the English contracts, the provisions of the Conditions of Contract Parts I and II shall prevail over those of any other document forming part of the Contract and, subject to the foregoing, the documents forming the Contract are to be taken as mutually explanatory of one another; but in case of ambiguities or discrepancies, the same shall be explained and adjusted by the Engineer".

FIDIC is mainly applied to countries without a tradition in construction work and without specific laws, regulations and standards to cover the construction aspect. Emphasis is therefore placed on the professional role of the Engineer as a guarantor of "Quality." The Engineer's powers in respect to Quality Assurance under FIDIC are much broader than under national conditions of contract, as they are not defined and limited by a well defined legal system, but consequently, this enlarges his professional responsibilities to act as a fair and independent arbitrator between the Owner and the Contractor. He has the power to reject material and order the removal and proper re-execution of any work, which in respect to materials and workmanship is not, in the opinion of the Engineer, in accordance with the Contract.

### 3. Specification Writing

As Conditions of Contract refer to Quality and Quality Assurance only in very vague terms, it is left up to the specification writer to establish quality levels and specify the materials and methods which shall be used to achieve these levels.

A well defined set of procedures of Specification writing is typically not developed for building construction projects. This matter is left to the discretion of the Architect/Engineer and although he may be guided by industry codes and standards, it is mainly his own judgment and experience which governs the process of specification writing.

In Germany, specification writing is commonly the professional field of the designing Architect, which to some extent guarantees that the intentions with regard to Quality and Quality Assurance are properly described in the specifications, but on the other hand this creates administrative problems as the Architect is sometimes unfamiliar with the legal background routine procedures of specification writing.

In England and America, specification writing is commonly assigned to specialists (Quantity Surveyors/specification writers) with a special training in specification writing, but here the information transfer between the Architect and the specification writer creates problems which often result in incomplete specifications.

To make the process of specification writing more objective, standard phraseologies have been developed both in England and Germany and in Germany it is mandatory to apply them to all public authority construction work. However, due to the nature of building construction work, still a vast number of items still have to be worded on an individual basis.



#### 4. Industry Codes and Standards

Industry codes and standards play an important role for the definition of the desired quality levels. However, industry codes and standards have developed on the basis of the traditional approaches to building construction in the various countries. These approaches have been affected by climatic conditions and availability of local materials. Certain items have no equivalent (e.g. Trass cement is unknown in England). Certain laws and regulations have developed differently (e.g. fire regulations in Germany and the States).

Since the preparation of standards has generally been undertaken by National committees which represent all interested bodies including manufacturers and suppliers, standards generally reflect the current status within a particular section of the industry, and only comparatively recently have attempts been made for the Standards Committees to normalize accepted standards on a European basis.

Thus, standards for basic materials such as cement and steel reflect local manufacturing practice. For instance, comparison of weldable structural steels under DIN 17100 and BS 4360 indicate that of the 14 qualities noted in the DIN and 21 (excluding weathering steels) in the BS, only 5 are directly comparable via the Euronorm 25 Standard.

In the field of fabricated products, the possible diversification is vastly increased. Many BS products are only now being standardized in SI units, and the necessity for repair and maintenance as well as usage, means that imperial or near imperial measure continues to be used.

In structural steel sections for example, a much larger range of sections is listed in the DIN standard and only a very small number of near exact BS equivalents exist.

In principle, the designers work to either DIN, BS, American or other Standards, depending on nationality or training. The use of Codes of Practice relates directly via other National standards to various dimensional, manufacturing and material standards. There is at present, no exact relationship or point of interchangeability. The end result may be very similar, but the component parts will vary in a number of major and minor ways.

Thus, to design to DIN and specify to BS or vice versa, is extremely difficult and may be dangerous because of the interrelationship between the design methods adopted and the standard of material and construction technique employed in the structure.

Obviously, most of the differences are minor and will have little effect on overall structural stability or durability. Nevertheless, they should be taken into account in areas of high stress.

Their major effect is in complicating the construction supervision - both for the Engineer and the Contractor. Overseas sites rarely have extensive libraries of both DIN and BS standards, and there is therefore always a risk that the designer's intentions are misinterpreted on site when mixing the two systems in design and construction.



## 5. Summary

Conditions of Contract refer to Quality and Quality Assurance only in a minor way and in vague terms. The German conditions automatically link the Contract to the relevant DIN system and thereby guarantee a certain minimum degree of Quality and Quality Assurance. The English conditions with regard to Quality and Quality Assurance refer to the remaining Contract documents and it becomes the responsibility of the specification writer to refer to established industry codes and standards in order to define the desired quality levels. As most of the industrial countries have well defined codes and standards, it is relatively easy to establish such a reference system. Furthermore, the general system of laws and regulations in such countries guarantees a certain quality level - even without such references.

However the existence of Standards by no means guarantees a similar understanding of Quality and Quality Assurance within different European Countries.

FIDIC for International Contracts again refers to the remaining Contract documents for Quality and Quality Assurance. However, most of the countries in which FIDIC is applied have no developed system of regulations of standards. Thus, it is one of the most essential functions of the specifications, to establish a well defined network of descriptions in order to ensure the desired quality levels and procedures of Quality Assurance. If reference is made to codes and standards, these references should be limited to only one system of codes and standards: e.g. DIN or BS or ASTM etc, in order to avoid contradictions and ambiguities.

Both National and International specifications are the primary documents specifying the materials and methods which shall be used to achieve the required quality levels. However, the traditional approach of specification writing relies very much on the individual specification writer's inspection rather than on formal processes for the definition of Quality and Quality control programs.

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