

Section 7 – PRODUCT REALISATION
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7 Product realisation

KSPHC is a Government owned company, which is entrusted with such works as Government feels and as set out in Memorandum of Association and KSPHC in turn gets these projects executed through registered agencies as required.

In this section, the clauses of ISO 9001:2000 pertaining to product realisation is integrated with those of ISO 10006:2003 to provide an integrated system that fulfills the KSPHC Quality Management System.

7.1 Planning of product realisation

In order to realize product that would fulfill requirement of product quality, all necessary processes have been identified and established giving due consideration for the following as appropriate:

- 1) Quality objectives and requirements for the product;
- 2) The need to establish processes, documents, and provisioning of resource specific to the product;
- 3) Required verification, validation, monitoring, inspection, and test activities specific to the product and criteria for product acceptance;
- 4) Records needed to provide evidence that the realisation processes and the resulting product fulfill requirements

The seven project management process groupings (ISO 10006:2003) necessary to produce the project's product are as follows:

- 1) Interdependency-related processes
- 2) Scope-related processes
- 3) Time-related processes
- 4) Cost-related processes
- 5) Communication-related processes
- 6) Risk-related processes, and
- 7) Purchasing-related processes

Requirements of elements of above stated processes are integrated with the requirements of ISO 9001:2000 elements in the following clauses.

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7.2 Customer related processes

7.2.1 Determination of requirements related to the product

KSPHC mainly executes construction projects for its client organisations; thus its chief products are buildings and services. Other products and services are as set out in the Memorandum of Association (Annexure- 1) and / or as decided by the Board.

KSPHC always strives to add value to its products and services. Every effort is made in order to identify and fulfill the necessities of these products/ services. Requirements related to product are determined by various means. This includes, but is not limited to,

- 1) Available standards published by the National / International organisations related to construction and related subjects,
- 2) Determining customer expectations for the product by
 - a) Analysing product features and value with that of competitor's products,
 - b) Enhancing product's "value for the money" optimizing Quality-Cost relationship
 - c) Considering cultural and other needs of product users,
 - d) Changing needs and future projected expectations of the customers
 - e) Attending various conferences related to technical advances in product and project management and also by referring to available literature and consulting experts.

While planning for the execution of projects, following points are considered:

- a) Requirements specified by the customer including the requirements for delivery, post-delivery activities and for maintenance purposes.
- b) Requirements not stated by the customer but necessary for specified or intended use where known,
- c) Statutory and regulatory requirements related to the product if any (e.g., stipulated requirements by the local / regional authorities such as corporations, municipal councils, act and rules related to construction and related activities etc.), and
- d) Any additional requirements determined by the organisation

7.2.1.1 Concept development

Customer needs and expectations for product and processes, both stated and generally implied, are translated into documented requirements, including statutory and regulatory aspects which, when required by the customer, are mutually accepted.

Other stake holders are identified and their needs established. These are translated into documented requirements and, where relevant, accepted by the customer.

7.2.2 Review of requirements related to the product.

Superintending Engineer (Designs) and Executive Engineer (Quality and Contracts) review the contract requirements related to the product. This review is conducted prior to the organisation's commitment to supply a product to the customer to ensure that,

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- a) Product requirements are defined,
- b) Order requirements differing from those previously expressed are resolved, and,
- c) The organisation has the ability to meet the defined requirements.

Records of the result of the review and action arising from the reviews are maintained.

d) **KSPHC** has identified all the processes of its business. The key processes of the Quality Management System, their sequence and interactions are briefly illustrated in **Annex A**. Further, project processes have been identified and documented (relevant procedures are referred in **Annex A** under product realisation processes. The originating organisation (e.g., Govt. of Karnataka, Police department, Prisons department, Forest department) may communicate the experience gained in developing and using its own processes, or those from its other projects to **KSPHC** (the project organisation). **KSPHC** takes into account this experience when establishing the project's processes and exchanges with the user an instrument / document setting forth the parameters and responsibilities and deliverables of the project. In this instrument **KSPHC** set out the processes that are unique to the project.

7.2.2.1 Scope development and control

When developing the project scope, the characteristics of the project's product are identified and documented in measurable terms and as completely as is possible. These characteristics are used as the basis for design and development. Project management plan, which makes reference to the quality plan, specifies how these characteristics will be measured or how their conformity to the customers and other requirements of the other stakeholders will be assessed. KSPHC ensures that product and process characteristics are traceable to the documented requirements of the customer and other stakeholders.

When alternative approaches and solutions are considered during scope development, supporting evidence (including the analysis performed and other considerations used) are documented and referred in the scope.

Where the customer provides no documented statement of requirement, the customer requirements are confirmed before acceptance.

7.2.2.2 Change management

Change management covers the identification, evaluation, authorization, documentation, implementation and control of change. Before a change is authorized, the intent, extent and impact of the change are analysed. Those changes that affect the project objectives are agreed with the customer and other relevant stakeholders.

Change management takes the following into account:

- Managing changes to project scope, project objectives, and to the project management plan;
- Coordinating changes across inter-linked project processes and resolving any conflicts.

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Changes may result in negative impacts (e.g. claims) on the project and are identified as soon as possible. The root causes of negative impacts are analysed and the results used to produce prevention-based solutions and implement improvements in the project process.

Where Product requirements are changed, it is ensured that relevant documents are amended and concerned department / personnel are made aware of the change in requirement.

7.2.3 Customer communication

Concerned Superintending Engineer ensures implementation of effective communication established (as described in the procedure **QSP 12**) for communicating with customer in relation to

- a) Product information,
- b) Enquiries, and
- c) Customer feedback, including customer complaints

7.2.3.1 Communication planning

KSPHC ensures that appropriate communication processes are established for the project, and that communication takes place regarding the effectiveness and efficiency of the Quality Management System.

Communication planning takes into account the needs of the originating organisation, customers and other stakeholders, and should result in a documented communication plan.

This communication plan defines the information that will be formally communicated, the media used to transmit it and the frequency of communication. The requirements for the purpose, frequency, timing and records of meetings are defined in the communication plan.

The format, language and structure of project documents and records **as far as possible in digital form** are planned to ensure compatibility. The communication plan defines the information management system, identify who will send and receive information, and reference to the relevant document control, record control and security procedures. The format for progress evaluation reports is designed to highlight deviations from the project management plan.

Reference: Quality system procedure for Project Management – QSP 12

7.3 Design and development

7.3.1 Design and development planning

Superintending Engineer-Designs [SE-DES] plans and controls the design and development of product designed specifically for the customer (originating organisation) requirements that is provided / specified in Memorandum of Understanding or other customer communication.

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SE-DES coordinates with originating organisation or their representative for the development of product and determine

- a) The product development stages
- b) The review, verification and validation that are appropriate to each stage of product development
- c) The responsibilities and authorities for various development activities.

SE-DES manages the interface between different groups involved in the development of project management plan to ensure effective communication and clear assignment of responsibility and fulfilling of liaison requirements.

Design development planning is updated, as appropriate, as the development progresses. *Design development plan is referred in the project management plan.*

7.3.2 Design and development inputs

SE-DES or his designated representative determines inputs relating to the product requirements. Records of design inputs are maintained. The inputs include

- a) Product characteristics,
- b) Applicable statutory and regulatory requirements, (if any), and
- c) Where applicable, information derived from previous similar products and other requirements essential for product development

These inputs are reviewed for adequacy to ensure that requirements are complete, unambiguous and not in conflict with each other.

7.3.2.1 Conceptual design for customer approval

Customer needs and expectations for product and processes, both stated and generally implied, are translated into documented requirements, including statutory and regulatory aspects after being reviewed by the customer and mutually accepted. Based on this, conceptual drawings are made and sent to customer for approval. *The approved conceptual drawings are used as design input to develop design outputs and a set of approved drawings is made available to the customer for record. The executing agency is required to follow these drawings faithfully. Any difficulty encountered during execution will be brought to the notice of KSPHC by the agency for immediate resolution in consultation with customer*

7.3.2.2 Time related issues (constraints) as design inputs

The time related processes aim to determine dependencies and the duration of the activities and to ensure timely completion of the project. The constraint of project time (duration) is taken into account while designing the product or process specifications (for example, using quick setting methods / materials to avoid time-overrun). Any time spent

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on obtaining statutory and regulatory licenses is to be excluded from the project time, as it is the duty of the customer to obtain these licenses.

7.3.2.3 Risk identification and assessment as input to design

Risk identification is performed at the initiation of the project when significant decisions are made. Experience and historical data from previous projects are used for this purpose. The output of this process is recorded as a part of design input records. *Examples of risk identification – land condition, surrounding environmental conditions, potential natural risks, and applicable current and anticipated statutory and regulatory requirements.*

Risk assessment is the process of analysing and evaluating identified risks to the project processes and to the project's product.

A quantitative and / or qualitative analysis is made for the risks identified and the risk assessment results are used as design input.

7.3.3 Design and development outputs

The product development outputs are provided in a form that enables verification against the development input and are approved before release.

SE-DES reviews the product development outputs to ensure that they

- a) Meet the input requirements for product development,
- b) Provide appropriate information for purchasing (contracting) and construction activities,
- c) Contain or reference product acceptance criteria, and
- d) Specify the characteristics of the products that are essential for its safe and proper use.

7.3.4 Design and Development Review

At suitable stages, systematic reviews of product development are performed in accordance with planned arrangements (documented in design and development plan).

- a) To evaluate the ability of the results of design & development to meet requirements, and
- b) To identify any problems and propose necessary actions.

Participants in such reviews include the representatives of functions concerned (client, if necessary) with the design and development stage that are being reviewed. Records of the results of the reviews and action taken are maintained.

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7.3.5 Design and Development Verification

Verification is performed in accordance with the procedure to ensure that product development outputs have met the product development input requirements. Records of the results of the verification and action taken are maintained.

7.3.6 Design and Development Validation

It is impracticable to validate the project's product (buildings) before its delivery. However, product characteristics and related process specifications are established using proven data or using a national / international standard. In addition to this, complaints received regarding product / product performance during the maintenance period, subsequent action taken to resolve it are correlated with relevant monitoring and measurement data to determine deficiency in product / process specifications. This information is analysed to determine the design related deficiency and to validate the design.

7.3.7 Control of Design and Development changes

The changes identified during any stage of design and development cycle are reviewed, verified and validated, as appropriate, and approved before implementation. The review of product development changes includes evaluation of the effect of the changes on the product already delivered (i.e., in case of similar previous projects such mistakes that have happened will be identified and evaluated to initiate necessary action).

Records of the results of the review of changes and any necessary actions are maintained.

Reference:

Quality system procedure for

- 1) Design and development – QSP 13
- 2) Eco-friendly measures – QSP 14*
- 3) Energy saving and other alternatives – QSP 15*

* Comes into effect from 1 July 2005

7.4 Purchasing

7.4.1 Purchasing process

At KSPHC, the core business element is contractor control activity since the project is generally contracted and executed. Also, the purchase activity carried out by the organisation for supporting administrative and for providing infrastructure and related maintenance services are covered under this process. The purchase activities are being carried out through tendering process.

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The purchase-related processes deal with obtaining finished product (building) and also other products/ services required by the organisation. The purchase-related processes are

- a) Purchase planning and control,
- b) Registration of suppliers (open ended process),
- c) Documentation of purchase requirements,
- d) Supplier evaluation,
- e) Contracting, and
- f) Contract control.

7.4.1.1 Purchase planning and control

For projects, which are administratively approved by the competent authority, and for which expenditure has been sanctioned, the estimates are prepared by the Concerned Executive Engineer, based on the “Schedule of Rates” (SR) wherever applicable to a particular circle. These estimates are subjected to technical approval / sanction by competent authority. In case the project is under deposit contribution scheme, client’s approval is sought for the estimate. These technically cleared estimates form the basis for purchase planning and further activities.

The purchase activities carried out by the organisation for supporting administrative and for providing infrastructure and related maintenance services are carried out by functional Heads within the ambit of the powers delegated.

7.4.1.2 Registration of suppliers

For any supplier carrying out business with KSPHC, registration with KSPHC is a pre-requisite. This registration process is a open ended process which can be done by the suppliers either through on-line or through direct approach .

7.4.1.3 Documentation for purchase

Each project taken by **KSPHC** is treated as unique since project characteristics are generally unique. The designated functional heads prepare following documentation for purchase.

- a) Notice inviting tenders including terms and conditions and pre-qualifying criteria for suppliers (for the project under consideration)
- b) Tender documents

E - tendering system is also in vogue. Where and to the extent possible, this facility will be utilized.

7.4.1.4 Purchase Procedure

Purchase process is carried out in the following stages.

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- Evaluation of intending suppliers
- Approval of eligible suppliers by competent authority
- Issue of tender documents
- Pre-bid meeting whenever required
- Training to prospective suppliers in case of e-tendering
- Receipt of offers
- Evaluation of offers
- Approval of the supplier by the competent authority
- Issue of letter of acceptance
- Entering into contract

7.4.2 Purchase information

Purchase information describes the product to be purchased, including where appropriate

- a) Requirements for approval of product, procedures, processes and equipment,
- b) Requirements for qualification of personnel, and
- c) Quality management system requirements.

KSPHC will ensure the adequacy of specified purchase requirements prior to their communication to the supplier.

7.4.3 Verification of purchased product

Purchase activities are carried out against purchase documents. In case of construction activities, it is dealt in detail under clause number 7.5.1 (Control of production and service provision).

In case of construction activities, Contract control starts with the issue of letter of acceptance. Web based project monitoring system has been established to assist in contract control.

Contract control includes the establishment of appropriate contractual relationships and the integration of the outputs for overall management of the project.

Supplier performance is monitored continuously to ensure it meets contract conditions. The results of monitoring are provided to suppliers to initiate necessary corrective actions.

Prior to contract closure, it is verified that all contract conditions have been met and that feedback on supplier performance has been obtained to update the register of approved suppliers. This data is used for future evaluation or determining re-evaluation of the suppliers.

Reference:

Quality system procedure for

- 1) **Purchasing (General) – QSP 16**
- 2) **Purchasing – Construction contracts – QSP 17**

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7.5 Production and service provision

7.5.1 Control of production and service provision (project execution and control)

Concerned Executive Engineer (of particular division to which the project is assigned) with due delegation to respective sub-division and designated AEE, AE / JE plan and carry out project execution activities under controlled conditions. Controlled conditions includes, as applicable

- a) The availability of work instructions, as necessary
- b) The use of the suitable equipment,
- c) The availability and use of monitoring and measuring devices,
- d) The implementation of monitoring and measurement,
- e) Frequent quality checks including third party checks if necessary and
- f) The implementation of release, delivery and post-delivery activities.

Since the project execution activities are contracted, responsibilities of **KSPHC** personnel are mainly to exercise control on project's product through effective monitoring and quality control of project's product characteristics as per contract conditions.

The process of project execution and control is carried out in accordance with established quality system procedure.

Reference: Quality system procedure for Construction management – QSP 18

7.5.2 Validation of processes for production and service provision

KSPHC executes construction projects for the originating organisation. Some of the processes of construction and related activities require validation. Processes where the resulting output cannot be verified by subsequent monitoring or measurement are validated. This includes any processes where the deficiencies become apparent only after the product is in use or the service (Construction) has been delivered.

Validation of these processes are made considering:

- ❖ Product and process characteristics
- ❖ Acceptance criteria
- ❖ Quality test methods

These validations demonstrate the ability of these processes to achieve planned results. Generally, national standards are made available for such processes, which provide necessary requirements for the process and the product characteristics. **KSPHC** adopts these standards. These quality system requirements are communicated to the contractor(s).

Concerned Project Engineers establish arrangements with contractors for these processes including, as applicable:

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- a) Defined criteria for review and approval of the processes,
- b) Approval of equipment and qualification of personnel,
- c) Use of specific methods and procedures
- d) Requirements for records
- e) Revalidation.

7.5.3 Identification and traceability

Through out the process of construction, products / materials (used for construction) are identified for their status (Fitness for use). Where traceability is a requirement (pre-determined at the stage of project initiation), methods are evolved for the purpose. Examples include, Cement (make, batch number), steel (make, grade).

7.5.4 Customer property

Customer property provided by the originating organisation to **KSPHC** may include one or more of the following:

- a) Land for construction,
- b) Intellectual property such as architectural design,
- c) Interiors – fittings etc.,

Necessary controls are applied to ensure that customer property (material) is identified, verified, protected and safeguarded. If any customer property is lost, damaged or otherwise found to be unsuitable for use, it is reported to the customer and those records are maintained.

7.5.5 Preservation of product

Project Engineers with due delegation to contractors and by carrying out monitoring activities, ensure proper identification, handling, storage and protection of construction materials, equipment and the product (building) during the course of project execution.

While evolving procedures, considerations are given for the special requirements arising from the nature of the product, application/use of products that are unique where product quality may deteriorate.

7.6 Control of monitoring and measuring devices

The established system procedures ensure that monitoring and measurement can be carried out and are carried out in a manner that is consistent with the monitoring and measurement requirements.

Quality system procedure provides details on checks and controls needed to ensure that monitoring and measuring devices are controlled so as to ensure that results obtained through them are correct and valid.

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Reference: Quality system procedure for control of monitoring and measuring devices - QSP 19.