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## Research Article

# SALIENT ASPECTS AND CRITICAL PARAMETERS TO BE TAKEN CARE IN CONTRACTS OF PROJECT ENGINEERING FOR INTEGRATED PROCESSING AND MANUFACTURING PLANT BUILDING WITH THE PROVISIONS OF ARBITRATION UNDER GLOBAL ENVIRONMENT

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### ABSTRACT

Plant building is the pillar of industrialization in manufacturing and processing sectors. Technologies developed by the scientists are implemented in reality through project Engineering, for the mankind and development of civilization. Conceptual aspects/ideas proceeds towards it's implementation through basic design, detail Engineering, inter-disciplinary compatibility, procurement, installation, fabrication, erection, inspection, testing, & commissioning within the environment of Project Engineering & management under the Contract. Basic objectives of the project contract and Engineering for plant building is to provide the facilities and installation to achieve the specified rate of production/manufacturing in terms of quantities and qualities of recognized standards conforming all the relevant statutory provision including the control of pollution and maintaining the safety. A number of parameters, agencies, materials, machinery/equipments and it's activities are involved in the project engineering. A contractual relationship is evidenced by (1) an offer, (2) acceptance of the offer, and a (3) valid (legal and valuable) consideration. Each party to a contract acquires rights and duties relative to the rights and duties of the other parties. However, while all parties may expect a fair benefit from the contract (otherwise courts may set it aside as inequitable) it does not follow that each party will benefit to an equal extent. Its management is needed to be executed in such a way that the basic objectives are achieved with minimum cost & effort, minimum space/land, minimum time without affecting /disturbing the interest of the different agencies associated with the project. The management of the project engineering for plant building must ensure the mutual respect and interest of all the agencies and people involved with as the project.

Scope of work, responsibilities and authorities of different agencies associated in the project must be specified completely in the contracts to avoid the interference of interest of one agencies with others and also to avoid the fouling of activities being executed simultaneously.

This also ensure the utilization of all machineries/equipment, utilities, consumables, raw materials, skills and expertise at it's maximum/optimum level of efficiencies and effectiveness and customers satisfaction. Therefore, contracts of the project engineering are needed to be framed considering all relevant aspects to achieve the aforesaid criteria. However, opportunities are to be exercised by all concerned to respect the mutual faith, humanities and ethics.

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### INTRODUCTION

Plant building are the major activities for establishment/installation of the industries in manufacturing and processing sectors and also in core sectors of engineering. These are associated with the different parameters/activities like selection of lands, it's survey, landscaping, civil construction, foundation, sheds, structure, supply of electricity

& water, roads, drainage & sewerage, material handling system, fabrication yard, installation/erection of main processing machineries/equipment, accessories, auxiliary machineries, equipment, utilities systems, fuel system & it's storage & handling, electrical systems, fire-protection system, instrumentation & control, communication systems, PLC & computer systems, liquid & gas storage & it's handling systems, Air-conditioning & ventilation systems, quality

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control, inspection & testing system, pollution control and emission system, safety & preventive measures. Storage & packaging and other relevant systems. All these activities are executed as per the design & engineering approved by the competent authorities. Different agencies including purchaser (plant builder) and Consulting Engineers are generally associated and cumulative effort and responsibilities are exercised to execute the project for plant building. Therefore, the scope of work & responsibilities of all agencies associated in the project are needed to be precisely specified in the contracts generally made amongst the various agencies. All terms & references are also needed to be furnished in the contract and must be defined within the provisions of relevant rules & Act. Execution of Plant building through project engineering are involved with the flow and exchange of materials, energy & effort, skilled & expertise, fund and other relevant parameters. Necessary technical, commercial, social & legal aspects are taken care to maintain & control the flow/movement of the aforesaid parameters for execution of the project within the specified schedule and maintaining the qualities and without affecting the interest and reasonable right of anybody or agencies associated in the projects. Excellence in Project Management is achieved through a structured process that includes multiple phases like (i)Initiating (ii)Planning (iii)Executing (iv)Monitoring and (iv) Closing.

### **Objectives**

The objective of the project management is to guarantee good-quality implementation of the engineering project with optimal costs pursuant to the contract agreement, technical standards and norms. It is required for execution of supply of plant machineries and equipment and complete erections/installation, testing and commissioning of the new plant or modernization or expansion of the existing plant and simultaneously to provide the equal opportunities to all the agencies to discharge their specified responsibilities and also protect their interest and self- defense.

### **METHODS**

The clauses and Provisions generally include, but not to be limited to the followings:

(i) Purpose of the contract of the project (ii) Purchaser (iii) Project (iv) Contract (v) Tenderer (vi) Contractor (vii) Sub-Contractor (viii) Engineer(Consulting) (ix) Tender Specification (x) Technical Specification (xi) Work Plant (xii) Machinery and Equipment (xiii) Facilities (xiv) Materials and stores (xv) Erection and installation (xvi) Work schedule(xvii) Site (xviii) Drawings and dimensions (xix) Supervisions (xx) Inspection and Testing and commissioning (xxi) Quality control and its assurances(xxii) Delivery (xxiii)FOR(Freight on Rail and FOB port of shipment (xxiv)Liquidity Damages(xxv) Representation (xxvi) Warranties and Replacement (xxvii) Responsibilities for performance of contract (xxviii) Performance and provisional acceptance (xxxix)Ownership of drawings and documents (xxx) Cancellation of contract (xxxi)Force majeure (xxxii)Arbitration (xxxiii) Other relevant aspects.

These provisions are to be specified clearly in the project contract to ensure the achievement of the basic objectives of the project & plant building.

### **Purpose**

The contract document stipulates the conditions for the supply of plant, machineries and equipment and for complete fabrication, erections, installation, inspection, testing and commissioning as per the technical requirements and recognized standards and to meet the specified output. It also specifies the provisions of liquidity damages in case of defaulted conditions and arbitrations.

### **Definitions**

The following terminologies generally used in the contracts bear the meanings defined hereunder.

**Purchaser:** Any seven or more persons for any lawful purposes may, by subscribing their names to a memorandum of associations and otherwise complying with the requisitions of **The Indian Companies Act, 1882 and its amendment** in respect of registration form an incorporated Company, with or without limited liability. The term “**Purchaser**” means the name of the organization registered / incorporated under the Indian companies Act, 1882 and having its address and location and shall include its authorized representatives, agents, successors and assigns.

**Project:** The word "project" means "before an action". A project consists of a temporary endeavor undertaken to create a unique product, service or result. Another definition is a management environment that is created for the purpose of delivering one or more business products according to a specified business case. It means the title of the job to be executed under the specifications.

**Bidder:** The term “Bidder” means the person, firm, company or corporation(s) submitting a quotation against the invitation to Tender and includes his/it’s heirs, executors, administrators, legal representatives, successors and permitted assigns.

**Contractor:** The term “Contractor” means the Tenderer whose tender has been accepted by the purchaser and shall include contractor’s heirs, executors, administrators, legal representatives, successors and assigns approved by the Purchaser.

**Sub-contractor:** The term “Sub-Contractor” means a person, firm, company or corporation who directly or indirectly associated for supplies or services to the Contractor.

**Engineer:** The term “Engineer” means the name of the Consulting Engineers, such other Engineer or Engineers, if any as are designated by the purchaser /competent authority.

**Approval of the Purchaser:** The term “Approval of the Purchaser” shall mean the written approval of the Purchaser in favour of a document or drawing or other particulars or matters in relation to the contract based on the recommendation, if any by the Consulting Engineers.

**Contract:** A voluntary, deliberate, and legally binding agreement between two or more competent parties. Project

## Contracts.

A contractual relationship is evidenced by (1) an offer, (2) acceptance of the offer, and a (3) valid (legal and valuable) consideration. Each party to a contract acquires rights and duties relative to the rights and duties of the other parties. However, while all parties may expect a fair benefit from the contract (otherwise courts may set it aside as inequitable) it does not follow that each party will benefit to an equal extent. The term "Offer" includes the invitation to tender, technical and general contract specifications, the bid, Contract drawings and the general conditions of contract and such special conditions that may be added and shall also include agreement, if any, signed by and between the Purchaser and the Contractor in terms of relevant clauses (s) of invitation to Tender.

**Tender Specifications:** a substantive body of information including time schedule, drawings and prices, if applicable concerning restrictive tendering specifications and furnished with the invitation to tender for the purpose of submitting the offer by the Tenderer.

### Technical Specifications

A detailed description of technical requirements, usually with specific acceptance criteria, stated in terms of suitable to form the basis for the actual design, development and production processes of an item having the qualities specified in the operational characteristics, performance characteristics and all such particulars mentioned directly and referred to or implied as such in the Contract.

### Work Plant, Machinery, Equipment, Facility, Materials or Stores:

The terms "Work, Plant, Machinery, Equipment, Facility, Materials or Stores" mean all or any part of the materials, equipment, drawings, fabrication, erection and other services required for the design, supply and execution of the work which is either specifically required by the Contract or is required in connection with such services and such materials which is within the scope of the Contract and not specifically excluded by the Contract from the materials and services which the contractor is required to furnish under the Contract or implied from contract specifications, drawings and schedules.

**Installation:** The term "installation" mean the putting up and/or erection under the Contract of structures and/or equipment including start-up and commissioning with all accessories supplied and will include any service which the Contractor is required to perform for the due fulfillment of Contract at the plant site with staff, labour and equipment and auxiliary materials either or his own or of his sub-contractors.

**Schedule, Work Schedule:** In project management, a **schedule** is a listing of a project's milestones, activities, and deliverables, usually with intended start and finish dates. Those items are often estimated by other information included in the project schedule of resource allocation, budget, task duration, and linkages of dependencies and scheduled events. The terms "Schedule, Work Schedule" mean the mutually agreed schedules between the Contractor and the Purchaser forming a part of the Contract.

**Site:** The term "Site" mean the place or places envisaged by the Purchaser at which the plant and equipment supplied under

the Contract are to be installed and/or services are to be performed under the Contract.

**Dimensions:** the term "Dimensions" shall mean the extent of a line, area or volume. These are to be based on the metric system.

**Time:** The term "Time" shall be reckoned by months, days and hour. "Month" means one calendar month and "day" means one calendar day according to the Gregorian Calendar.

**Tender Drawings:** The term "Tender Drawings" mean such drawings, plans, sketches and details as are issued together with the Purchaser's tender specification for the purpose of preparing tenders. These drawings are used for estimating/pricing the cost of the building/machineries/items to be supplied/installed.

**Contract Drawings:** The term "Contract Drawings" mean the designs, plans, drawings, sketches and details which have been provided by the Contractor for the execution of the contract work and approved by the Purchaser or by the Engineer as applicable.

**Supervision:** The term "Supervision" shall mean the successive control and directions given by the Purchaser or Engineer in relation to the contract work, during the manufacture and erection in the Contractor's and/or his sub-contractor's works and at the site.

**Testing:** The term "Testing" includes all tests made, without releasing the Contractor of his liability as may be considered necessary by the Purchaser or Engineer, in order to ascertain the quality and efficiency of the contract work or parts thereof including material tests and performance of the plant and equipment. Technical testing generally includes hydraulic, pneumatic, radiography, ultrasonography, dye penetration, soap-bubble, etc as specified in the contract for testing of strength, sealing, leakage, etc or as may be deemed necessary for compliances of the statutory requirements or safety of the systems and equipments.

**Delivery:** The term "Delivery" shall mean delivery by the dates and at the place specified in the contract, of plant and equipment which are found acceptable by the Purchaser and not the delivery of plant and equipment which are not to the required standard or which are not delivered by due dates and at the place specified and in case of erection work, delivery shall mean the approval by the Purchaser of the said erection work, within the period prescribed for such completion.

**Bolts:** The term "Bolts" shall include all types of nuts, bolts and washers.

**FOB Port of Shipment:** The term "FOB Port of Shipment" shall mean delivered, duly packed, free of expenses to the Purchaser on board of a vessel in terms of INCOTERMS 1990 [International Commercial Terms 1990] with its latest amendments.

Words importing persons shall include firms, companies, corporations, associations or body of individuals whether incorporated or not. Words importing masculine gender and/or singular number shall also include the feminine gender and plural number and vice versa where the context so requires or permits.

**Cost, insurance and freight (CIF)** is a trade term requiring the seller to arrange for the carriage of **goods** by sea to a port of destination, and provide the buyer with the documents necessary to obtain the goods from the carrier.

#### **Examination of site & Local conditions**

The Contractor is deemed to have visited the site of the work and ascertained there from all conditions and information pertaining to his work prior to the preparation of his tender. No claim shall be permitted arising from non-fulfillment of the above.

The Contractor is deemed to have ascertained all special local and national standards, regulations, customs etc which may affect his design schedule, choice of supervisory personnel, etc prior to the preparation of his tender. Typical of such information would be the average Indian height-of-eye (for design of control desks and pulpits), special restrictions or considerations, details of facilities to be expanded, modified or duplicated, details of materials available in India etc.

#### **Representations, Warranties and Replacements**

The contractor represents and warrants to the Purchaser that;

1. The design of all plant and equipment will be modern, approved and of the latest type as developed by recent experience and that the plant shall be capable, under normal use, operation and maintenance of accomplishing the purpose for which it is furnished.
2. The plant will comply with the specifications, drawings and other documents furnished therefore by the Purchaser or by the Contractor and approved by the Purchaser / Engineer as the case may be.
3. The materials, workmanship, fabrication and construction of the plant will be of high quality in all details and conforming to the latest relevant standards.
4. The plant when erected and assembled at the site will constitute a complete, efficient, functioning unit, capable of practical operation on a commercial scale at the rate and capacity set forth in the specifications therefore.
5. The contractor at the time of delivery to the Purchaser of the plant will own the same free and clear of all lines and encumbrances.
6. During warranty period, the contractor shall at his own expense, upon written demand by the purchaser, promptly repair or replace at site free of cost to Purchaser any part(s) comprising the plant:
  - a. Most of the project contracts include a one-year (or longer) warranty period. Any defective work found during the warranty period or warranty inspection will be corrected by the Contractor at no extra cost to the Purchaser
  - b. which may not comply with the specifications therefore and the representations and warranties set forth herein , or
  - c. which may be of defective or incorrect design, or
  - d. Which under normal and proper use and maintenance proves defective in workmanship or materials or deficient in performance.
7. All repairs and replacements carried out by the Contractor to rectify defects shall be made to the

satisfaction of the Purchaser. Work which is so repaired or replaced shall be guaranteed by the Contractor, for an additional period together with any portion of the work which has been affected by such defect.

#### **Responsibilities for Performance of Contract**

**General:** The Contractor shall be responsible for the due performance of the Contract in all respects according to the intent and meaning of the drawings, specifications and all other documents referred to in clause above. It shall be lawful for the Purchaser/Engineer to reject the complete plant/equipment, if it is found that the plant/equipment supplied and supervision of erection work or erection work carried out by the Contractor are not in conformity with the terms and conditions of the Contract in all respects.

1. The Contractor shall obtain instructions for carrying out the work pertaining to the Contract from the Purchaser and/or the consulting Engineers.
2. The Contractor shall be under obligation to comply with written instructions given by the Purchaser and/or the consulting Engineer. In the event that the Contractor should consider that such an instruction is harmful to the Contractor's interests, he may object to the same in writing; if within specified period from the receipt of the instruction , the Contractor has not objected to it, he shall forfeit his right to do so at a later date.
3. The contractor shall take care of the progress of the work through a competent representative. Any instructions given to such representative shall be considered as having been issued directly to the Contractor.
4. Program Evaluation and Review Technique (**PERT**) and Critical Path Method (**CPM**) help managers to plan the timing of projects involving sequential activities. **PERT/CPM** charts identify the time required to complete the activities in a project, and the order of the steps.
5. Responsibility for Completeness: Any materials, equipment, fittings and services which may not be specifically mentioned in the specifications or drawings but which are usual and/or necessary for the completeness of the work under the Contract are to be provided by the Contractor without any extra charge and the plant must be complete in all details to ensure the specified performance.
6. Subletting of Contract: The Contractor shall not sublet, transfer or assign the Contract or any part thereof without the written permission of the Purchaser. In the event of the Contractor contravening this condition, the Purchaser shall be entitled to place the Contract elsewhere on the Contractor's account and at his sole risk and the Contractor shall be liable for any loss or damage which the Purchaser may sustain in consequence or arising out of such placing of the Contract.

**Other clauses** regarding following matters are also needed to be included in the scope of work of the contract:

1. Commissioning and maintenance spares, and consumables.

**Project commissioning** is the process of assuring that all systems and components of an industrial plant are designed, installed, tested, operated, and maintained according to the operational requirements of the technical specification or final client. A commissioning process may be applied not only to new projects but also to existing units and systems subject to expansion, renovation or revamping.

2. Drawings, documents and operating and maintenance manual
3. Erection drawings and documents
4. Submission of drawings and its approval
5. Inspection and testing during maintenance
6. Rejection of defective plant, materials and workmanship
  - Packing and it's list, protective paint, marking and shipping
  - Marking, cautioning symbols.
7. Replacement and Insurance, unserviceable materials
8. **Time of completion:** A detailed time schedule prepared by the contractor and approved by the purchaser showing the starting and completion of all phases and items of the contract work shall be a part of the contract.
9. **Liquidity Damages** need to be specified and documented for (a) F.O.B. supplies (b) for indigenous supplies (c) for erection and commissioning (d) for non fulfillment of performance guarantee.

#### **Performance Tests and Provisional acceptance**

The contractor shall be responsible for Carrying out performance tests as specified in the technical specification on all equipment supplied by him, his sub-supplies, associates and/or procured by the purchaser based on his drawings, documents in the presence of the purchaser and/or the consulting Engineers.

The plant shall be considered to have concluded the performance test satisfactorily if, during the entire duration of the test, the plant shall have achieved the guaranteed parameters with guaranteed capacity utilizing the quantity and quality of raw materials, utilities, fuel and other supplies.

If the results are beyond the tolerance limits even for one single guaranteed parameters, then provision of clause for rejection of defective plant, materials and workmanship shall become applicable. Purchaser however at his sole and absolute discretion may accept the plant with enhanced damages payable by the contractor.

On the satisfactorily completion of the performance test, the plant will be deemed to have been commissioned and put into commercial operation and the purchaser will issue a provisional Acceptance Certificate, provided that the contractor undertakes to promptly rectify the defects, if any which are indicated in writing by the purchaser to the contractor. The date of the provisional certificate shall be considered to be the date of commencement of the commissioning of the plant.

Guarantee period and Final Acceptance on successful completion of one (1) year guarantee period, the Purchaser will issue the contractor a Final Acceptance Certificate subject to contractor's fulfilling all contractual obligations.

#### **Ownership of Drawings and Documentations**

All drawings, specifications, manuals and all specific designs furnished by or through the contractor shall be the property of the Purchaser and may be used by him for his own plant use.

#### **Force Majeure**

A **Force Majeure** clause (French for "superior force") is a contract provision that allows a party to suspend or terminate the performance of its obligations when certain circumstances beyond their control arise, making performance inadvisable, commercially impracticable, illegal, or impossible. The provision may state that the contract is temporarily suspended, or that it is terminated if the event of force majeure continues for a prescribed period of time.

The list of events to be included is a matter of negotiation between the parties. A typical list of force majeure events might include any war (whether declared or not), hostility, acts of the public or enemy, civil commotion, sabotage, fire, flood, earthquake, hurricane, typhoon, explosion, epidemic, quarantine restrictions or other acts of God, (hereinafter referred to as 'eventuality') and acts of state or governmental action prohibiting or impeding any party from performing its respective obligations under the contract. In the absence of a force majeure clause, parties to a contract are left to the mercy of the narrow common law contract doctrines of "impracticability" and "frustration of purpose," which rarely result in excuse of performance.

Should one or both parties be prevented from fulfilling their contractual obligations by a state of force majeure lasting continuously for a specified minimum period, both the parties shall consult each other regarding the further implementation of the Contract, provided always that, if no mutually agreed arrangement is arrived at within a specified period from the expiry period, if any referred to above, the contract shall be deemed to have expired at the end of the specified minimum period. The aforesaid expiry of the Contract will imply that both the parties have the obligation to reach an Agreement regarding the winding up and financial settlement of the Contract

#### **Cancellation of Contract**

The Purchaser at his option may cancel the Contract at any time by simple written advice to the Contractor in case of Contractor's non-compliance with his undertakings under the Contract and more specifically in case any of the following circumstances occurs:

- i. Unjustified interruption of contractual services by the Contractor including delays and/or failure to maintain delivery schedule of drawings, plant and equipment and other supplies or completion of work as agreed to.
- ii. Errors, negligence, insufficiencies in the Contractual work under execution or failure to supply required materials as per specification or manpower or in other

similar circumstances affecting the quality of work for reason attributable to the Contractor.

- iii. If the Contractor refuses to implement instructions received from the Purchaser or Engineer within the stipulations of the Contract.
- iv. Where the Contractor is declared in liquidation or bankruptcy or is involved in similar proceedings or has been implicated repeatedly in litigation or may have entered into or transfers with his creditors or others which might compromise the Contractor's solvency.
- v. In any of the relevant cases as described, the Purchaser shall inform the Contractor of its decision to cancel the Contract or to terminate the Contractor's services, in whole or part under it, specifying in such notice the reason or the basis for this decision. The Contractor shall immediately stop all work in connection with the Contract, except as directed by the Purchaser. After the notice of a specified period, the Purchaser shall be at liberty to make contract with other parties or to perform with his own personnel those services undertaken by the Contractor in the Contract. In such case, the Contractor shall be liable for any costs incurred by the Purchaser for obtaining and/or erecting the balance of the plant from another agency in excess of the Contract price. In case of termination of part of the Contract, the Contractor will continue performance of the Contract to the extent not terminated by the Purchaser.

#### **Arbitration**

##### **Governing Law and Jurisdiction**

The agreement shall be construed, governed and enforced in accordance with the law of the Country. The parties hereby agree that jurisdiction over any dispute arising under the agreement shall be vested only in the Courts of Country and the parties submit to the jurisdiction of the said courts.

##### **Dispute Resolution**

"Any dispute of difference arising between the parties hereto in respect of any aspect of the agreement or the interpretation, construction or effect of the terms and conditions of the agreement shall generally be first settled mutually by negotiations between the parties. In case no settlement is reached, such dispute or difference shall be referred to a Sole Arbitrator if both the parties agree upon the same. Should the parties not agree to the appointment of a Sole Arbitrator, each party shall appoint its own Arbitrator and the two Arbitrators so appointed by the parties shall, before entering upon the reference, appoint the third Arbitrator who shall act as the presiding Arbitrator. The arbitration proceedings shall be conducted and governed by the **Arbitration and Conciliation Act, 1996**. The award made by the Arbitral Tribunal shall become final and binding upon the parties and shall be enforced in accordance with applicable provisions of the Arbitration and Conciliation Act. 1996".

#### **CONCLUSION**

The project contract is to ensure good-quality implementation of the engineering project with optimal costs pursuant to the contract agreement, technical standards and norms. It is required for execution of supply of plant machineries and equipment and complete erections/installation, testing and commissioning of the new plant or modernization or expansion of the existing plant and simultaneously to provide the equal opportunities to all the agencies to discharge their specified responsibilities and also protect their interest and self-defense. A contractual relationship is evidenced by an offer, acceptance of the offer, and a valid (legal and valuable) consideration. Each party to a contract acquires rights and duties relative to the rights and duties of the other parties. However, while all parties may expect a fair benefit from the contract (otherwise courts may set it aside as inequitable) it does not follow that each party will benefit to an equal extent. **Project commissioning** is the process of assuring that all systems and components of an industrial plant are designed, installed, tested, operated, and maintained according to the operational requirements of the technical specification or final client. In case of any dispute and no mutual settlement is reached, such dispute or difference shall be referred to a Sole Arbitrator if both the parties agree upon the same. The arbitration proceedings shall be conducted and governed by the **Arbitration and Conciliation Act, 1996**.

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