

## Design Engineering Work

### Content A. Statement of Requirements

- **Introduction** – Background – Objectives and scope of the project – Design philosophy and basis of design – Relevant information to be made available to the project.
- **Site Conditions** – Location and site data (basic design data) - Access considerations and social impact.
- **Feed Materials** - Design case - Feedstock quantities and compositions - Flexibility requirements.
- **Products** - Main product quantities/composition/specification - Secondary/by-product quantities/composition/specification.
- **Process** – Description - Relief philosophy - Process control considerations/cause and effect diagrams - Preliminary PFD and P&ID - Main plant item lists - Mass and heat balance.
- **Offsite** - Feed storage - Product storage - Chemicals storage.
- **Utilities** - Electrical power – Steam - Fresh water (potable) – Air – Nitrogen - Fire water – Drains - Fire protection - Effluent treatment – Process water.
- **Electrical, Instrumentation and Control** - Control and operating philosophy - Control systems/instrumentation - Power supplies, see also utilities – Telecommunications - Control buildings/electrical substation - Emergency shutdown/instrument protective systems - Fire and gas detection system – CCTV.
- **Civil and Structural** – General - Ground conditions - Foundation requirements - Paving and drainage – Structure.
- **Construction** - Construction philosophy - Site location and access - Plant layout - Tie-ins/philosophy/method - Specific considerations.
- **Buildings** - Process hall - Tank farm requirements - Offices and rest rooms - Security office and fencing requirements - Laboratories and laboratory equipment - Control room.
- **Health, Safety and Environment** - Safety issues - Emissions to air, water and land - Occupational - Health issues.
- **Operation and Maintenance** – Philosophy - Special access and layout requirements.
- **Project Programme** - Bar chart programme - Identify long lead items.
- **Capital Cost Estimate** - Basis of estimate – Accuracy - Notes to cost estimates.
- **Business Plan** - Operating cost estimates - Marketing strategy.
- **Codes And Practices**
- **Project Documentation**
- **Pre-Commissioning/Commissioning Plan**
- **Confirmation Laboratory Work**

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## **Content B. Front End Engineering Design and Procurement.**

- **Project Engineering** - Plant design basis - Project status report - Master systems diagram - Project schedule - Cost estimate.
- **Process Engineering** - Process design basis - Process design simulations - Detailed process descriptions - Process flow diagrams - Piping & instrumentation drawings – Equipment list - Equipment data sheets - Heat and material balance - Relief valve sizing - Hazop study - Safety integrity levels - Control philosophy - Area classification drawings.
- **Mechanical Engineering** - Develop and agree mechanical equipment design basis - Equipment list – Equipment specifications - Plot plan - Equipment general arrangements.
- **Piping Engineering** - Piping design basis - Piping specifications - Piping Tie-In list - Specify non-standard piping items - Pipe stress analysis - Valve list - Pipe insulation specification - Pipe support standards.
- **Instrument and Controls Engineering** - I&C design basis - Instrument specifications - Instrument list - Instrument data sheets - Control valve data sheets only - Control system description.
- **Engineering** - Electrical design basis - Electrical specifications - Electrical single line diagram - Motor list.
- **Civil/Structural Engineering** - Civil/structural design basis - Laboratory specification - Gatehouse and security - Office specification - Civil/structural specifications - Site grading/drainage plan - Outline major structure design - Outline structure steel drawings - Equipment ladder and platform drawings.
- **Procurement** - Procurement strategy - Documentation packages.