

**CONCEPTUAL ENGINEERING FEL 1**

**BASIC ENGINEERING FEL 2**

**BASIC ENGINEERING EXTENDED FEL 3, Pre DD.**

**Deliverables**

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<b>General</b>	<ul style="list-style-type: none"> <li>• Design Basis</li> <li>• Project Execution Plan</li> <li>• Cost Estimate Class 4</li> </ul>
<b>Processes</b>	<ul style="list-style-type: none"> <li>• Descriptive Memory</li> <li>• Process Flow Diagrams (ISBL and OSBL)</li> <li>• List of Services</li> <li>• Mass and Energy Balance</li> <li>• Equipment List</li> </ul>

<b>General</b>	<ul style="list-style-type: none"> <li>• Design Basis</li> <li>• <b>Project Execution Plan (Timelines)</b></li> <li>• <b>Cost Estimate Class 3</b></li> </ul>
<b>Processes</b>	<ul style="list-style-type: none"> <li>• <b>Process Descriptive Memory</b></li> <li>• Block Diagram</li> <li>• <b>Process Flow Diagrams (ISBL and OSBL)</b></li> <li>• <b>Service Flow Diagrams</b></li> <li>• <b>Mass and Energy Balance (Aspen-Hysys Simulation)</b></li> <li>• <b>Fire Protection System Calculation Memories</b></li> <li>• <b>Process and Service Equipment List</b></li> <li>• <b>HazID Study Report</b></li> <li>• <b>Piping and Instrumentation Diagram Basic P&amp;ID's</b></li> <li>• List of Tie - Ins</li> <li>• Piping List</li> <li>• Auxiliary Services, Chemicals and Additives Summary</li> <li>• Effluent (liquid, gaseous or solid) and waste summary</li> <li>• <b>Venting System Calculation Report</b></li> <li>• Operations Guide</li> <li>• Cause and Effect Matrix</li> <li>• Operation, Control and Safety Philosophy</li> <li>• Material Selection Diagram</li> </ul>

<b>General</b>	<ul style="list-style-type: none"> <li>• Design Basis</li> <li>• Project Execution Plan (Chronograms, Constructability)</li> <li>• Cost Estimate Class 2</li> </ul>
<b>Processes</b>	<ul style="list-style-type: none"> <li>• Process Descriptive Memory</li> <li>• Block Diagram</li> <li>• Process Flow Diagrams (ISBL and OSBL)</li> <li>• Service Flow Diagrams</li> <li>• Mass and Energy Balance (Aspen-Hysys Simulation)</li> <li>• Fire Protection System Calculation Memories</li> <li>• Process and Service Equipment List (With recommended supplier)</li> <li>• HAZOP Study Report</li> <li>• Piping and Instrumentation Diagram P&amp;ID's Detail</li> <li>• List of Tie-Ins Detail</li> <li>• Piping List (With data and specifications)</li> <li>• Summary of Ancillary Services, Chemicals and Additives</li> <li>• Summary of effluents (liquid, gaseous or solid) and residues.</li> <li>• Vents System Calculation Memory (Adjusted to isometrics)</li> <li>• Operations Guide</li> <li>• Cause and Effect Matrix</li> <li>• Operation, Control and Safety Philosophy</li> <li>• Material Selection Diagram</li> <li>• Potential Fire Areas Diagram (if applicable)</li> <li>• List of Fire Fighting Elements</li> <li>• List of special equipment, filters, samplers, etc.</li> </ul>

<b>Piping</b>	<ul style="list-style-type: none"> <li>• Equipment Layout</li> </ul>
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<b>Piping</b>	<ul style="list-style-type: none"> <li>• Equipment Lay Out (Equipment Lay Out)</li> <li>• Piping Material Classes (Piping Class)</li> <li>• <b>Specification and Typical Design</b></li> <li>• <b>Lay Out-General Lay Out of complex-Units location, 3D</b></li> </ul>
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<b>Piping</b>	<ul style="list-style-type: none"> <li>• Equipment Layout (Equipment Lay Out detail)</li> <li>• Piping Class Materials (Piping Class)</li> <li>• Specifications and typical design</li> <li>• Lay Out - General of the complex - location of units with piping detail, 3D.</li> <li>• Piping description report (Pressure drops and velocities with isometrics).</li> <li>• <b>Insulation technical specifications</b></li> <li>• <b>Painting and coating technical specifications</b></li> <li>• Lay Out of elevated structures (Pipe Racks)</li> <li>• <b>Floor Plans, Cut and Detail Drawings (Piping Isometrics and 3D)</b></li> <li>• Piping Bill of Materials</li> <li>• Bill of materials and job costing.</li> </ul>
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<b>Mechanical</b>	<ul style="list-style-type: none"> <li>• <b>Static Mechanical Equipment Data Sheet</b></li> <li>• <b>Rotating Mechanical Equipment Data Sheet</b></li> <li>• <b>Mechanical Equipment Technical Specification</b></li> </ul>
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<b>Mechanical</b>	<ul style="list-style-type: none"> <li>• Static Mechanical Equipment Data Sheet</li> <li>• Rotating Mechanical Equipment Data Sheet</li> <li>• Mechanical Equipment Technical Specification (supplier recommendation)</li> <li>• Welding Technical Specification (if applicable)</li> <li>• Bill of Materials and job computation.</li> </ul>
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<b>Civil</b>	<ul style="list-style-type: none"> <li>• <b>Steel Structures - Technical Specification</b></li> <li>• Civil Works - Descriptive Memory (Where applicable)</li> <li>• Soil Study - Technical Specification</li> <li>• <b>Preliminary Lay out per level, 3D</b></li> </ul>
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<b>Civil</b>	<ul style="list-style-type: none"> <li>• Architectural Drawings of Buildings, Facades</li> <li>• Reinforced Concrete Structures - Preliminary Design Report.</li> <li>• Technical Specification. Concrete Structures.</li> <li>• Metal Structures - Technical Specification. Includes fireproofing</li> <li>• Metallic Structures - Preliminary Calculation Memory.</li> <li>• Implantation Structures - General Lay Out</li> <li>• <b>General Lay Out, Floor Plans, views, cuts and details, 3D.</b></li> <li>• Bill of Materials and Construction Cost Estimates</li> </ul>
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<b>Electricity</b>	<ul style="list-style-type: none"> <li>• Descriptive Memory of the Electrical Installation</li> <li>• <b>Preliminary Unifilar Diagrams</b></li> <li>• <b>Major Electrical Equipment Technical Spec. (if applies)</b></li> <li>• Important Electrical Equipment Data Sheets (if applicable)</li> <li>• Preliminary List of Electrical Equipment</li> <li>• Preliminary Load List</li> <li>• Preliminary Classification of Electrical Areas</li> </ul>
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<b>Electricity</b>	<ul style="list-style-type: none"> <li>• Descriptive Memory of the Electrical Installation</li> <li>• Definitive Unifilar Diagrams</li> <li>• Electrical Equipment Technical Spec. (supplier recommendation)</li> <li>• Electrical Equipment Data Sheets (Transformers, etc.)</li> <li>• Definitive List of Electrical Equipment</li> <li>• Definitive Load List</li> <li>• Classification of electrical areas</li> <li>• Typical Functional Schematics</li> <li>• Typical Lighting Mounting Diagrams</li> <li>• Typical Mounting Drawings</li> <li>• General Lighting Drawings</li> <li>• Lightning Arresters and Grounding System</li> <li>• Cathodic Protection Technical Specifications</li> <li>• Lay Out of SE/Electrical Room</li> <li>• MC of Main Power Cables</li> <li>• Short Circuit and Load Flow MC</li> <li>• Motor Starting MC</li> <li>• General Routing of Main Cables</li> <li>• General Routing of Main Cables</li> <li>• Electrical Materials List</li> <li>• Main Power Cables List</li> </ul>
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<b>Instruments</b>	<ul style="list-style-type: none"> <li>• Instrumentation &amp; Control Installation Descriptive Report</li> <li>• List of Instruments</li> <li>• Control Valves Data Sheet</li> <li>• Data Sheet ON-OFF Valves</li> <li>• Safety Valves Data Sheet</li> <li>• Primary Flow Element Data Sheets (Coriolis, Ultrasonic, Electromagnetic)</li> <li>• Temperature Instrument Data Sheets</li> <li>• Level Instrument Data Sheets</li> <li>• Pressure Instrument Data Sheets</li> <li>• Complex Process Analyzers Technical Specification</li> <li>• DCS and SIS Technical Specification</li> <li>• Control &amp; Safety System Architecture</li> <li>• <b>Technical Specification of Instruments</b></li> <li>• Basic Communication Systems Specification</li> </ul>
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<b>Instruments</b>	<ul style="list-style-type: none"> <li>• Instrumentation and Control Installation Descriptive Report</li> <li>• Instrumentation List (Supplier's Recommendation)</li> <li>• Control Valves Data Sheet</li> <li>• Data Sheet ON-OFF Valves</li> <li>• Safety Valves Data Sheet</li> <li>• Primary Flow Elements Data Sheet (Coriolis, Ultrasonic, Electromagnetic)</li> <li>• Temperature Instrument Data Sheets</li> <li>• Level Instrument Data Sheets</li> <li>• Pressure Instrument Data Sheets</li> <li>• Complex Process Analyzers Technical Specification</li> <li>• DCS and SIS Technical Specification</li> <li>• Control Loops</li> <li>• Motor Control Schematic Diagrams</li> <li>• Control &amp; Safety System Architecture</li> <li>• Typical Electrical and Mechanical Mounting of Instruments</li> <li>• Instrumentation Technical Specifications</li> <li>• Communications Systems Specification</li> <li>• Layout of control room, main panels and remote panels</li> <li>• Electrical wiring diagrams for main and remote panels.</li> <li>• Electrical routing of instruments, control and/or communication network.</li> <li>• List of cables and materials (electrical and mechanical) for installation.</li> </ul>
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