

Milestone Checklist by Discipline

Construction Field Review: Total direct cost of rework work in the field regardless of initiating cause or source						
Process	Mechanical	Piping	Civil/Structural	Instrumentation & Controls	Electrical	
Establish Process Design Basis	Preliminary Equipment List - Issue for DSM	Preliminary Plot Plan	Verification of Site Selection	IC Inputs for DSM - IFC	Electrical Infrastructure and Requirements Defined	
Client business drivers identified	Historical mechanical data collected	Code and standards defined	Construction design criteria defined	Client input about operations, control philosophy received	Code and standards defined	
Site data collected (elevations, temperatures)	Dimensions, weights rough based in process engineering	Fire protection requirements defined	Mobilization strategy defined	Control philosophy defined	Local site conditions and profiles reviewed	
Hazards identified	IFDs - IFC received	Building enclosure philosophy determined	Underground and above ground existing facilities identified	Preliminary Control system architecture issued	Preliminary horsepower data received	
Feedback information collected (composition, size, etc.)	MSDs - IFC	Metecological data received	Metecological (snow, winds, etc.) information compiled	Standards and specifications defined	Electrical power studies to define requirements	
Process design criteria identified	Vendor packaged equipment identified	Existing facilities information collected	Geographical map compiled	Preliminary Control system functional specification defined	Preliminary electrical equipment list	
Product information prepared	Critical/lag delivery items identified	Historical plot plan data collected	Preliminary geotechnical report received	Control building preliminary sized	Electrical underground, aboveground, substation information defined	
Spacing philosophy defined	Legal and regulatory requirements determined	Topographic information / coordinates (under/above ground) required	Land issues resolved	Preliminary PFD's received	Electrical design criteria defined	
Environmental considerations identified		Spacing guidelines (installation, hazards, etc.) established	Regulatory issues (three level government, environmental, etc.)	Major equipment process datasheets received		
	Preliminary Equipment Pricing (Quotes)	IFDs (IFC received)	Site infrastructure information collected	Critical infrastructure devices identified	Area Classification IFC	
	Functional mechanical specifications	Main piping to be identified	Transportation/logistics issues information collected		PFD (IFC received)	
Material information reviewed	Mechanical spacing philosophy defined	Equipment preliminary data received	Preliminary plot plan issued by plant layout (with infrastructure input)	Preliminary Instrument Index	Plot plan IFC received	
Heat and material balance completed	Vendor list approved	Client operational input received		Instrument tagging procedure IFC	Process input area classification received	
Major equipment identified and preliminary sizing	Process data/rough equipment data sheets completed	Hazardous equipment location analysis completed	Call inputs for Plot Plan IFC	P&ID's IFC received		
Control philosophy decided (including DCS, PLC, etc.)	Critical equipments shop fabrication milestones identified	Civil structural input (ditches, roads, drainage, geotechnical, etc.)	Preliminary site grading	Wire device data sheets IFC	Single Line IFC	
Material selection guidelines issued		Electrical and instrumentation layout input received	Processors input on fire water system and drainage received	Area classifications IFC received	P&ID's IFC received, horsepower defined	
Preliminary tie-in points identified	Equipment Data Sheets - IFC/Equipment list - IFC	Client infrastructure requirements identified	Fire water systems layout	Pipe specifications received	Equipment list IFC received	
Preliminary utility balance	MDMT and other temperature design criteria defined	Construction input received	Steam/drainage systems layout	Process and equipment data received	Preliminary electrical vendor information	
TRP review and amplification completed	MSDs - IFC	Logistics and shipping constraints study received	Major equipment preliminary size received	Control system I/O index defined	Lighting load estimated	
	IFDs - IFC received	Mobilization strategy received	Spacing guidelines/code received	Control system architecture developed	Heat tracing load estimated	
DSM (FEED) Items	P&ID's - IFC received		Main pipe racks preliminary sized	System key matrix (cause and effect) generated from index	All electrical loads defined	
Instrumentation philosophy decided	Preliminary hydraulic calculations completed	Plot Plan - IFC	Preliminary large bore pipe layout received	Packaged equipment instrument specifications issued		
Start up/shutdown philosophy published	Plot plan - IFC received	Field survey of geomatic reference point received	Construction and operational access and egress studies		Single Line Diagrams IFC	
Preliminary drivers identified	Spacing philosophy and spare parts defined	Main pipe racks sized	Lay down areas identified	Purchase Invoce Devices	IFD requirements defined	
Process data sheets finalized	Area classification drawings - IFC received	Mobilization execution plan (tracks, etc.) established	Cable tray routing identified	Vendor list approved	Interface with power utility completed	
Process hazard analysis completed	Mobilization plan defined	Equipment data sheets (comp. compressors, pumps, etc.) received	Transportation, fitting and logistics issues defined	Process hydraulic calculations received	Plot plan IFC received	
Process logic description finalized	Safety limit conditions defined	P&ID's IFC received		Piping specifications IFC received	Power generation philosophy defined	
Preliminary material selection diagram issued	Specifications and standards issued	Material selection diagram received	Call inputs for Plot Plan IFC	Final process data provided to instrument data sheets	Power system study (load study, load flow, utility interconnection) completed	
Piping material classes published	Package equipment instrument specs issued	Piping studies for critical lines	Major buildings (pads, basements) finalized	Area classifications IFC received	Process capability requirements defined	
Drawn information firm		Fire hazard areas defined	Major pipe racks and large bore piping design frozen (including stress design)	Client review and approval of datasheets	Redundancy requirements defined	
Draft DSM for review	Equipment - Issued For Purchase	Plot plan client review and approval	Underground scope, location and services identified	Bidder's specifications/vendor data IFC	Client operation requirements defined (equipment, wiring, alarm/alarms, gases)	
Client operations input received	All equipment data sheets received	P&ID's IFC received	Electrical underground, aboveground, substation information received		Construction power defined	
Front-end PFD frozen	Vendor quotes (data, drawings) finalized	All undergrounds received	Preliminary vendor data (major vessels, equipment) received	Control System Purchase		
Process Flow Diagram - IFC	Shop fabrication schedule	Vendor list philosophy defined	Access egress finalized and confirmed	DC control / loop drawings IFC	Purchase Electrical Equipment	
DSM document issued	Technical evaluations finalized	Major equipment coordinates frozen	Major cable routing frozen	Shutdown keys IFC	Mobilization strategy defined	
	Commercial review input (bid summaries, recommendations and client approval)		Major equipment coordinates received	Marshalling philosophy issued and approved	Electrical equipment data sheets IFC	
P&ID's and IFC's - IFC	General arrangements - IFC	Plot Plan - IFC		Control system hardware footprint defined	Scope and specification finalized	
Mechanical equipment identified and sized	Hydraulic calculations finalized	Final vendor dimensional data collected	Preliminary electrical equipment loads and GAs received	Control layout / termination drawings issued	Electrical bid list approved	
Discipline-specific specifications and standards published	Logistics input - fitting, transportation, routing, receiving and storage	Building sizing and layout received	Preliminary piping drawings (rack, underground, stress) received		Electrical control schematics IFC	
Safety limit tables finalized	Start operation and maintenance review	Final civil, road and drainage drawing received	Pulsion abatement (equipment and facilities) defined	Control Room Layout IFC	Electrical control philosophy issued	
All tie-ins identified	Commissioning support - review of spare parts, training packages, and vendor support	Heat tracing IFC's IFC	Loading diagram defined		Mechanical vendor information/package equipment information received	
Line sizes, specified		Wire components defined		Instrument Index - IFC	Variable frequency drive requirements defined	
Retail requirements identified	Vendor Certified Data	Large bore stress analysis completed	Single Grading Plan IFC	Supervisor narratives received	Sparring philosophy finalized	
Major instrument list commercial	Engineering review of vendor drawings finalized	Large bore piping design and layout completed	Steel Underground IFC	PAT procedures and test plan defined	Vendor list approved	
Major vendor identified	Client operations buy-in, vendor drawing review	Utility piping definition completed		Utility IFC received	Area classification IFC	
Major control systems identified and sized	P&ID's IFC received	Electrical single line IFC received		All I&C purchase orders issued		
Vendor P&ID received	Vendor operation and maintenance manuals completed	Electrical, I&C cable trays requirements and data received	Start to Plot Plan IFC		Cable and Tray Schedules IFC	
Pressure relief valves preliminarily sized	Installation instructions completed			FAT	Cable tray routing/location defined	
RTM requirements identified	Support load diagrams completed	Tie-in List - IFC	Piping IFC	All graphics built	Plot plan IFC received	
		P&ID's - IFC received	Structural pipe rack model	Configuration completed	Electrical equipment layout IFC	
P&ID's, IFC's and LDT's - IFC	Mechanical inputs to Contracts	LDT's IFC received	Preliminary structural design		Control system layout IFC received	
Flow and stall calculations completed	Equipment list finalized	Survey of pipe wall thickness, metallography received	Construction drawings IFC		All vendor list locations defined	
All client input completed	Start lists finalized	Shutdown philosophy received	Equipment loads and GAs received		Certified packaged equipment electrical data received	
Hydraulic calculations finalized	Start lists finalized	Schedule of plant planned shutdown received	Underground piping and electrical locations fixed		Piping layout and/or 3D model completed	
TRP's implemented as applicable	Scope and specification finalized	Client approval for operation and engineering	Large bore pipe stress design frozen		Single line diagrams IFC	
Start-up systems defined	Start-up and commissioning plan defined		Installation plan (hoisting and craning requirements) defined		Other systems defined (DCTV, fire system, LAN, third party input) completed	
Shutdown keys defined		Final Client Model/Layout Reviews				
Final site sizing for process engineering	Recommissioning / Commissioning Plan	Plot plan - IFC	Construction - Steelwork Concrete IFC		Electrical Heat Tracing ISO's IFC	
Final control valve and P&V sizing	Manufacturing records (no-bid data book, certified performance) compiled	Large bore piping layout completed		GLOSSARY	Piping ISO's IFC received	
HAZOP review held	Operating manuals finalized	Large bore stress analysis finalized	Final electrical equipment loads and GAs received	1000 Design Basis Memorandum	1001 Material Selection Diagram	
SIL review held (if applicable)	OEM support	P&ID's - IFC	Piping drawings IFC (rack, underground, stress) received	1010 Closed circuit TV	1002 Material Take Off	
		All hydraulic calculations completed	All penetrations and embarks identified by other disciplines	FAT Factory Acceptance Test	1003 Non Destructive Examination	
P&ID's IFC		Structural - pipe racks modeled	Vendor package equipment loads and GAs certified	1100 Front End Engineering Design (includes FEL 2&3)	1004 Original Equipment Manufacturer	
Final Equipment List received		Equipment modules design finalized	Building design IFC	1200 Front End Loading	1005 Process & Instrument Diagram	
General operators information (specification sheet, data sheet, availability, utility) received		Vendor data received		GA General Arrangement	1100 Process Flow Diagram	
HAZOP issues resolved		Electrical tray modeled	Structural Steel IFC	1300 Hazard and Operation analysis	1101 Pressure Relief Valve	
Test levels finalized (operations & elevation)		Clash analysis completed	Piping drawings IFC (rack, underground, stress)	1110 Heat tracing and insulation	11 Safety, Integrity Level	
		Constructability review completed	RVAC drawings IFC	1140 Heating, Ventilation, Air Conditioning	1006 Supplier of Choice	
Operating Guidelines Defined		Operation and maintenance (O&M) review completed	Mechanical drawings IFC	1150 Issued For Construction	1102 Utility Flow Diagram	
Commissioning/start-up assistance planned		IFC list completed	Final electrical equipment loads and GAs received	1160 Issued For Design	1103 Uninterrupted Power Supply	
		Critical small bore piping (high pressure, toxic, utility/tracing isolates etc.) identified and modeled	Vendor package equipment loads and GAs certified	1170 Issued For Detailing	1104 Value Improving Practices	
		Wire components included	Building design IFC	1180 Issued For Review		
		All large bore valves indicated	Small bore piping routing completed	1190 Independent Project Analysis Inc.	IPA Definitions	
		Structures for cable trays identified		1200 Isometric Drawings	FEL 1 (Block Flow)	
		Secondary supports included	Review Structure Shear Slab Drawing	LANN Local Area Network	FEL 2 (Process Flow)	
			Final ISO Issue	LDT Life Designation Table	FEL 3 (P&ID's)	
		Certified vendor equipment drawings received	Final Grading and Paving IFC	Minimum Design Metal Temperature	Detailed Design	
		Welding, hydro test and NDE specifications IFC	Civil Drawing IFC (fitting, supports)			
		All piping details and standards IFC (supports, hangers, etc.)				
		MSD IFC				
		Fabrication philosophy determined (field/shop)				

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This Checklist is intended for the use of Owners, Engineers and Contractors in reducing field rework by ensuring that the correct sequence of activities takes place in the design efforts.

PROJECT NAME: _____

