Key Engineering Activities & Deliverables specific for EPC projects

Guidance List
Department: Projects / Engineering
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AmmoniaKnowHow
NH3 HNO3 CH3OH NPK [NH4][NO3]

UreaKnowHow.com
Where the Urea industry meets

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1. SYNOPSIS

AmmoniaKnowHow.com and UreaKnowHow.com support fertilizer manufacturers by providing essential services to the industry, using our syngas technologies and scientific knowledge developed in multiple projects worldwide.

Together we initiate a program to enhance the guidelines and procedures for operation, engineering, maintenance and process safety in the fertilizer industry utilizing the best practices and standards available today.

Using knowledge gained from our industry, historic risk registers, lessons learned from projects and from FIORDA members we are committed to give proper advice to improve safety, reliability and projects performance of fertilizer plants.

2. PURPOSE OF THIS DOCUMENT

The key engineering activities and deliverables for EPC projects are listed in the table below.

This list is subject to variation, however, based on good engineering practice, these are the key engineering activities and deliverables that shall be present in EPC projects for ammonia and urea plants and delivered at the end of the project.

Activity/ Deliverable	Status at end of Select Phase	Status at end of Define Phase	Status at end of Execute Phase
Project Management/Multidiscipline			
Work Program	Conceptual	Ongoing	Finalized
Allocation of Resources	Preliminary	Ongoing	Finalized
Basis of Design	Conceptual	Preliminary	Finalized
Identification of and compliance with legislated Occupational Health and Safety and Environmental requirements	Preliminary	Ongoing	Final
Identify Safety hazards for asset lifecycle, Assess Risks and develop hazard management strategies in line with hierarchy of controls	Preliminary	Ongoing	Finalized
Design Reviews	Complete	Complete	Complete
FEED Report	N/A	Final	N/A
Design Reports	Conceptual	Preliminary	Finalized
Safety & Risk			
Hazard Identification (HAZID) & Risk Assessment (Qualitative) Study	Comparative	Preliminary	Finalized
Safety Philosophies	Preliminary	Complete	Complete
Quantitative Assessment of hazard consequence zones and risks (e.g. Fire and Explosion Analysis, Transport Risk Analysis, Fire Safety Study etc.)	Preliminary to aid decision making	Ongoing	Finalized
Non Hydrocarbon Hazard Assessment	Comparative	Preliminary	Finalized
Smoke and Gas Ingress Analysis	N/A	Preliminary	Finalized
Emergency Systems Survivability Analysis	N/A	Preliminary	Finalized
Safety Case or Security Report	Conceptual	Preliminary	Complete
Hazard & Operability Study (HAZOP)	N/A	Preliminary	Complete
Safety Integrity Level Determination	N/A	Preliminary	Complete
Safety Integrity Level Verification	N/A	Preliminary	Complete
Human Factors Analysis / Ergonomics	N/A	Preliminary	Complete
Permitting and approvals	Preliminary	Ongoing	Finalized
HSE / Environmental			
Review of emissions	Preliminary	Ongoing	Finalized
HSE Management Plan	N/A	Ongoing	Finalized
Human Health Assessments	N/A	Preliminary	Finalized
Environmental Impact Assessments	Preliminary	Complete	Finalized
Process Engineering			
Process Description	Preliminary	Final	-
Equipment Sizing	Preliminary for major equipment	Complete for major equipment Preliminary for other equipment	Finalized

Activity/ Deliverable	Status at end of Select Phase	Status at end of Define Phase	Status at end of Execute Phase
Line Sizing	Preliminary for major process lines	Complete for major process lines Preliminary for minor process and utility lines	Finalized
PFDs	Preliminary	Complete	Finalized
P&IDs	Preliminary for major systems	Complete	Finalized
Heat and Material Balances	Preliminary	Complete	Finalized
Operating and Control Philosophy	Conceptual	Complete	Finalized
Hazardous Material Notes	Preliminary	Complete	Finalized
Relief and Blowdown Study	Preliminary	Complete	Finalized
Mechanical Engineering			
Mechanical Equipment List	Preliminary	Complete	Finalized
Pipe Stressing	-	Preliminary	Finalized
Equipment Specifications and Data Sheets	-	Preliminary	Finalized
Piping Design			
Site Survey Documents	Conceptual	Preliminary	Finalized
Plot Plan Development	Conceptual	Complete	Finalized
Piping Arrangements	Conceptual	Preliminary	Finalized
Piping Specifications	Conceptual	Preliminary	Finalized
Piping Isometrics	-	Preliminary	Finalized
MTO's	-	Preliminary	Finalized
Electrical Engineering			
Electrical Equipment List	Conceptual	Complete	Finalized
Power Requirements	Conceptual	Complete	Finalized
Hazardous Area Design	Conceptual	Complete	Finalized
Single Line Diagrams	Conceptual	Complete	Finalized
Instrument Engineering			
SIL Determination	N/A	Complete	Finalized
Instrument Index	-	Preliminary	Finalized
Block Diagrams	Conceptual	Complete	Finalized
Loop Diagrams	-	Preliminary	Finalized
Safety Related Instrumentation Philosophy	Conceptual	Complete	Finalized
Cause and Effect Diagrams	Conceptual	Complete	Finalized
Civil/ Structural Engineering			
Building and Construction Specifications	-	Preliminary	Finalized

Activity/ Deliverable	Status at end of Select Phase	Status at end of Define Phase	Status at end of Execute Phase
Structural Framing General Arrangements	Conceptual	Preliminary	Finalized
Foundation General Arrangements	Conceptual	Preliminary	Finalized
Roads, Paving and Drainage Arrangements and Details	Conceptual	Preliminary	Finalized
Underground Services Arrangement and details	Conceptual	Preliminary	Finalized
Transportation and Lifting Assessment	Conceptual	Preliminary	Finalized
Geotechnical Assessment	Preliminary	Complete	-
Demolition Requirements	Conceptual	Preliminary	Finalized
Constructability Assessment	-	Preliminary	Finalized
Weight Control Reports	Conceptual	Preliminary	Finalized

3. DEFINITIONS

The terms in the table are as follows:

- Conceptual – Work on the deliverable has commenced. Development normally limited to sketches, approximate outlines, concept descriptions/philosophies or a similar level of early completion.
- Preliminary – Work on the deliverable is advanced. Interim, cross functional reviews have usually been conducted. Development may be near completion except for final reviews and approval.
- Complete – Deliverable has been completed reviewed and approved as appropriate to the level it could be with due consideration being given to the level of detail that the respective phase has considered.
- Finalized – Similar to complete in that the deliverable has been reviewed and approved, but also incorporating any changes during the course of the phase (e.g. certified supplier data incorporation, final comments arising for detailed design process etc).

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