Complete Milk Powder Plant Catalogue

Integrated process line, utilities, automation and project services



1. Plant Overview

This catalogue presents a complete, hygienic milk powder production plant from raw-milk reception to finished-product packing. The modular design can be configured for whole milk powder, skim milk powder and selected formulated dairy powders. Final capacity, product specification, energy targets and equipment sizes are confirmed during process design.

Typical design range: 1–10 tonnes of powder per hour, with smaller or larger lines available by engineering review.

Supply scope: process equipment, utility packages, automation, installation support, commissioning, operator training and documentation.

2. Process Flow

1. Raw milk reception, filtration, weighing and chilled storage

2. Clarification, separation and fat standardisation
3. Pasteurisation and optional homogenisation
4. Multi-effect vacuum evaporation with condensate recovery
5. Concentrate balance and high-pressure feed
6. Spray drying with primary powder separation
7. External fluid-bed final drying and cooling
8. Sifting, metal detection and intermediate storage
9. Automatic bag filling, sealing, check-weighing and palletising
10. Clean-in-place (CIP) and production data recording

3. Main Process Equipment

Area	Equipment included	Key features
Milk reception	Unloading manifold, inline filter, deaerator option, flow meter, reception tank and transfer pumps	Sanitary design, rapid unloading, temperature and volume monitoring
Storage and standardisation	Insulated silos, agitators, cream separator, clarifier and blending tanks	Automatic fat/SNF control, gentle product handling
Heat treatment	Plate or tubular pasteuriser, holding tube, homogeniser and balance tank	Recipe-controlled temperature, regeneration and diversion protection
Evaporation	Falling-film multi-effect evaporator, vapour separator, condenser and vacuum system	High thermal economy, low residence time, hygienic CIP coverage
Drying	Feed system, atomiser or nozzle system, air heater, drying chamber, cyclones/bag filter and fluid bed	Controlled moisture, bulk density, solubility and particle size
Powder handling	Vibro sifter, pneumatic conveying, magnets, metal detector and powder bins	Low dust, enclosed transfer and foreign-body control
Packing	Valve/open-mouth bag filler, nitrogen option, sealer/sewing unit, check-weigher and pallet handling	Typical 10–25 kg bags; retail formats available as an option



Representative spray-drying and powder-recovery section

4. Complete Utility Systems

Utility	Package scope	Typical design basis
Steam and condensate	Boiler, feed-water tank, chemical dosing, steam header, pressure reduction, traps and condensate return	Process steam for pasteurisation, evaporation, drying-air heating and CIP
Water treatment	Raw-water tank, filtration, softener, reverse osmosis, UV/ozone option and treated-water storage	Potable/process water quality defined by local and product requirements
Refrigeration	Chiller or ammonia package, chilled-water/glycol pumps, buffer tank and distribution	Milk cooling, process cooling and HVAC loads
Cooling water	Cooling tower or closed-circuit cooler, pumps, side-stream filter and dosing	Condenser, compressor and equipment cooling duties
Compressed air	Compressors, receiver, filters, refrigerated/desiccant dryer and oil-free final filtration	Instrument air and plant air supplied as separate quality classes where required
Electrical	Transformer interface, MCCs,	Voltage and frequency

power	VFDs, distribution boards, cabling, earthing, UPS and standby-generator interface	matched to project location
CIP	Multi-tank CIP station, heaters, dosing, return monitoring and route management	Caustic, acid, hot-water and recovery circuits with recipe control
HVAC and hygiene	Filtered make-up air, room pressure control, dehumidification option, extraction and personnel hygiene stations	Dryer/packing zoning and condensation control
Effluent	Drain segregation, balance tank, pH correction, dissolved-air flotation option and wastewater interface	Load reduction and compliance with local discharge limits
Fire and safety	Detection, alarms, hydrant/sprinkler interfaces, dust protection and emergency systems	Final design subject to local code and fire-risk assessment



Representative central utility systems

5. Automation and Digital Control

- PLC/SCADA control with graphical process overview and recipe management
- Automatic sequences for start-up, production, shutdown and CIP
- Trend recording for temperature, pressure, flow, conductivity, moisture and energy use
- Batch reporting, alarm history, audit trail and user-access levels
- Remote support interface and optional connection to MES/ERP systems
- Instrumentation selected for hygienic service and maintainability

6. Quality, Hygiene and Safety

- Product-contact parts in food-grade stainless steel with hygienic welds and drainable design
- Validated pasteurisation controls and hygienic separation between raw and treated product zones
- Inline sampling points and laboratory testing provision for moisture, fat, protein, solubility and microbiology
- Powder-zone dust extraction, explosion venting/suppression options and bonded/grounded equipment
- Guarding, interlocks, emergency stops and safe access platforms
- Design aligned with the applicable local food, pressure, electrical, environmental and occupational-safety requirements

7. Performance and Consumption Guide

Parameter	Catalogue guidance
Feed product	Standardised whole or skim milk; formulated dairy liquids by review
Powder capacity	Project-specific; typical modular range 1–10 t/h
Final moisture	Normally selected to suit the product specification and storage requirements
Energy configuration	Conventional multi-effect evaporation, mechanical/thermal vapour recompression options, heat recovery and condensate reuse
Cleaning	Automatic CIP circuits with recipe, concentration, temperature, flow and return monitoring
Availability target	Defined during project engineering based on operating hours, redundancy and maintenance strategy

Exact mass balance, utility consumption and equipment sizing require confirmed feed composition, powder specification, production schedule, site conditions and local utility data.

8. Project Delivery Scope

- Concept design, process description, mass and energy balance
- Process flow diagrams, P&IDs, equipment layouts and utility schedules
- Equipment manufacture, factory inspection and packing for shipment
- Site supervision for installation, pre-commissioning and commissioning
- Performance testing against an agreed product and operating basis
- Operator and maintenance training
- Operation manuals, maintenance schedules, spare-parts lists and certificates

Optional Services

- Civil and building design coordination
- Laboratory, warehouse and cold-store packages
- Automatic palletising and warehouse integration
- Energy optimisation and water-reuse study
- Preventive-maintenance agreement and remote technical support

9. Information Required for a Quotation

1. Required powder type and hourly/daily capacity
2. Raw milk composition, reception temperature and daily availability
3. Target powder moisture, fat, protein, bulk density and packaging format
4. Operating hours, cleaning philosophy and planned product changeovers
5. Available steam/fuel, power, water, cooling and compressed-air conditions
6. Site location, ambient conditions, building constraints and applicable codes
7. Desired automation level, laboratory scope and project delivery boundary

Catalogue note: The photographs are representative concept visuals. Final equipment arrangement, dimensions, materials, performance guarantees and utility figures are confirmed in the project proposal and approved design documents.