Commissioning Checklist – Step-by-Step Guide

For Cryogenic Nitrogen Plants

By Satya Cryogenic Consulting

Introduction

Commissioning is the bridge between construction and full-scale operation — the stage where a nitrogen plant truly comes to life.

This guide provides a clear, step-by-step framework to ensure a safe, efficient, and error-free startup process.

Developed from real on-site experience, it’s ideal for:

- Plant commissioning engineers
- Operators and maintenance teams
- Engineering students and industrial trainees

Section 1:

Pre-Commissioning Checklist

Objective: Ensure all systems are ready before introducing cryogenic fluids.

#	Item	Verification Notes
1	Mechanical completion of all systems. (no leaks, flanges tightened)	
2	Liquidation of Punch list	
3	Verify as per P&ID • Erection / Installation of Equipment, Piping, and Instruments etc. • Correct locations of all Instruments. • Correct directions of check valves, globe valves, flow orifice, strainers, control valves etc.	

#	Item	Verification Notes
4.	Piping insulation, and supports verified as per design.	
5.	Carry out Internal Inspection of Equipment	
6.	Electrical & Instrumentation: • Verify Instruments calibrated and signal tested. • Control system loop tested and interlocks verified. • Electrical connections and earthing verified.	
7.	Safety relief valves tested and tagged.	
8.	Check for Purification / drying system	
9.	Purging and drying sequence ready.	
10.	Calibration of analyzers.	

#	Item	Verification Notes
11.	No Load Run of Motors.	
12.	Adsorbent charging	
13.	Lubricant charging.	
14.	Carry out Water flushing / Air blowing of piping.	
15.	Conduct Leak checks of systems after flushing & blowing, including inside cold box piping & Equipment.	

Section 2:

Commissioning Checklist

Each phase should be completed in sequence to avoid process disruptions or damage.

Phase 1: System Purging & Leak Test

- Verify all lines are clean and dry.
- Conduct pressure test with inert gas (typically nitrogen).
- Apply soap solution or detector to check for leaks.
- Ensure proper venting before next step.
- Nitrogen purging of Cold box Insulation.

Phase 2: Utilities Charging

- Electrical charging
- Instrument air
- Cooling water

Phase 3: Cooling Down Process

- Do cooling down gradually to avoid thermal shock.
- Monitor temperature gradients.

- Check expansion joints and cold box integrity.
- Record cooling duration and steady-state time.

Phase 4: Product Gas Stabilization

- Maintain design flow and temperature.
- Measure product gas purity and dew point.
- Adjust air separation or distillation parameters as needed.

Phase 5: Storage & Transfer System

- Verify storage tank insulation and pressure buildup.
- Check valves, level gauges, and vent lines.
- Ensure transfer lines are cooled before operation.

Section 3:

Safety Guidelines

Safety during commissioning is non-negotiable. Always follow plant-specific SOPs and ensure all personnel are trained.

Safety Checklist:

☐ No oil / grease spillage in nearby area

☐ PPE worn (cryogenic gloves, face shield, jacket, safety shoes)

☐ Oxygen monitoring system active

☐ Pressure vessels certified and vented properly

☐ No unauthorized personnel in the zone

☐ Emergency isolation valves accessible

Section 4:

Conclusion

A well-commissioned nitrogen plant ensures efficiency, safety, and long-term reliability.
This checklist serves as both a guide and a record of professional commissioning practices.

Next in Series:

- *Troubleshooting eBook – Solve Common Plant Issues*
- *Mini Course – Nitrogen Plant Commissioning & Safety*

For more resources, visit **Satya Cryogenic Consulting**.
