BRISE
CHEMICALS

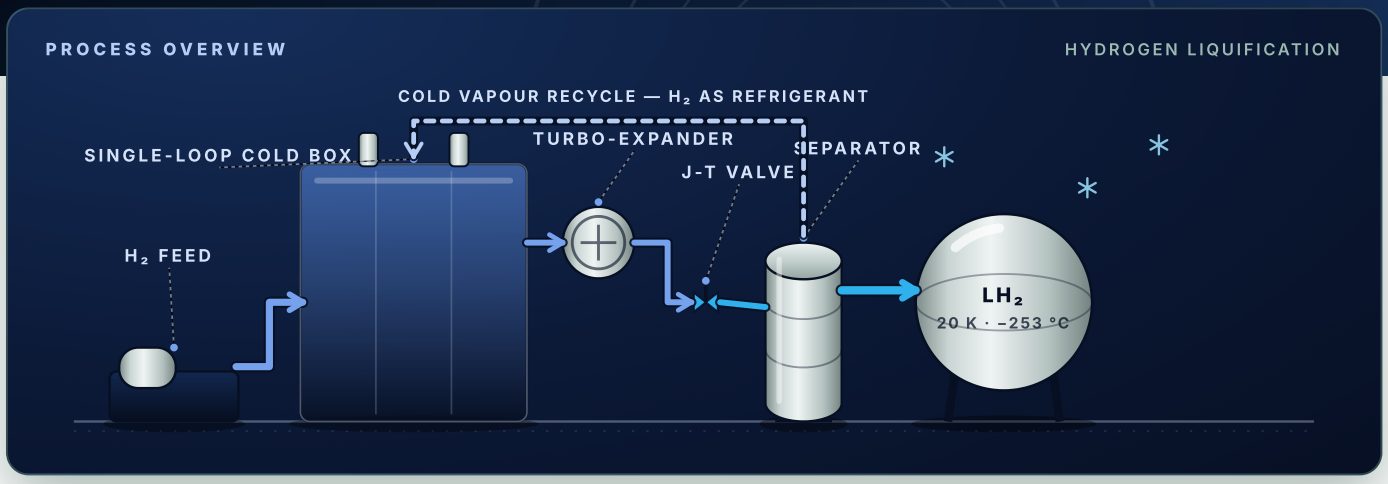
PRODUCT BROCHURE
BRC-PB-11 · 2026 EDITION

SPECIALTY SYSTEMS · PATENTED CRYOGENICS

Hydrogen Liquification

Patented single-loop liquefaction — Patent No. 432769 — using hydrogen itself as the sole refrigerant. 7.3 kWh/kg, 32% below industry benchmarks.

7.3	−32%	20 K	100%
KWH/KG SPECIFIC ENERGY	VS INDUSTRY BENCHMARK	−253 °C PRODUCT TEMPERATURE	ORTHO→PARA CONVERSION



01 Overview

Burning one kilogram of hydrogen yields roughly three times the energy of a kilogram of gasoline — and produces only water. But hydrogen's role as the storage medium of the energy transition depends on one final, difficult step: liquefaction to −253 °C, where conventional plants burn 9–13 kWh for every kilogram they liquefy.

Brise Green Liquefaction Technology, protected under Patent No. 432769, re-architects the cycle: a single closed-loop system deploys hydrogen gas itself as the sole refrigerating agent. No liquid-nitrogen pre-cooling, no mixed refrigerants, no LNG dependency — just 7.3 kWh/kg specific energy consumption, a 32% reduction against prevailing industrial benchmarks, from a plant that pairs cleanly with renewable electricity.

02 At a Glance

Patented cycle
Indian Patent No. 432769 — hydrogen as its own refrigerant

No external refrigerants
Zero LIN, mixed-refrigerant or LNG pre-cooling required

Boil-off engineered out
100% catalytic ortho→para conversion inside the exchangers

Renewable-compatible
Runs on solar and wind power; no auxiliary GHG agents

03 Technology & Process

Feed hydrogen at 25–30 bar is split 0.12 : 0.88 into product and refrigeration streams, driven through pre-cooling, cryogenic cooling to ~63 K, catalytic ortho-para conversion and Joule–Thomson expansion — all within one closed loop:

1

Feed pressurisation

Incoming hydrogen is compressed to 25–30 bar and conditioned.

2

Precision stream split

The flow divides at a 0.12 : 0.88 ratio between product path and refrigeration duty.

3

Pre-cool & cryo-cool

Multi-stream brazed-aluminium exchangers drive the temperature down to ≈ 63 K.

4

Ortho→para conversion

Specialised catalysts inside the exchangers convert 100% of ortho-hydrogen to para-hydrogen during cooling — preventing storage boil-off.

5

Joule–Thomson expansion

The chilled stream flashes across the J-T valve, dropping into the vapour–liquid region.

6

Separation & recycle

Liquid H_2 at 20 K goes to storage; cold vapour returns as the loop's refrigerant.

Energy benchmark — where 7.3 kWh/kg sits

Specific energy consumption for hydrogen liquefaction, kWh per kg of LH_2:

Thermodynamic ideal	3.90 kWh/kg — the physical minimum
Brise patented cycle	7.30 kWh/kg — single loop, H_2 refrigerant
Industry benchmark	9–13 kWh/kg — conventional plants (30–35% efficiency)

End-to-end EPC delivery
Concept, FEED and engineering through construction, commissioning and PG testing.

Certified quality
ISO 9001 / 14001 / 45001 systems; designs per PESO, IEC, ATEX & IS standards.

Lifecycle partnership
Operator training plus AMC/CMC programmes for maximum plant uptime.

04 Technical Specifications

PARAMETER	SPECIFICATION
Technology	Single closed-loop liquefaction; H_2 as sole refrigerant
Patent	Patent No. 432769
Product temperature	−253 °C (20 K)
Specific energy consumption	7.3 kWh/kg LH_2
Energy vs industry standard	32% lower (benchmark 9–13 kWh/kg)
Inlet pressure	25–30 bar
Cycle operating pressure	15–20 bar
Stream split ratio	0.12 : 0.88
Cryo-cooling stage	≈ 63 K
Ortho→para conversion	100%, catalytic, in-exchanger
Key equipment	Turbo-expanders · multi-stream BAHX · J-T valve · adiabatic canister · separator · water coolers

Plant capacity is engineered per project; the cycle scales from pilot to export-terminal duty. Figures shown are design values from Brise Chemicals product documentation; final specifications are confirmed during detailed engineering.

05 Key Features

32% less energy
7.3 kWh/kg against the 9–13 kWh/kg conventional benchmark — OPEX transformed.

Green & self-contained
No auxiliary greenhouse-gas cooling agents; no LIN/LNG pre-cool infrastructure.

Site-independent
No adjacent ASU or LNG bunker required — deploy where the hydrogen is.

Lean cost architecture
Internal cooling loop erases external refrigerant OPEX; fewer compressors, less heat rejection.

Low-pressure stability
The internal refrigerant circulates at a modest 15–20 bar, easing mechanical strain.

Boil-off prevention built-in
In-exchanger catalytic o→p conversion protects stored LH_2 from evaporation loss.

06 Applications & Industries

LH_2 mobility & transport
Mass transportation running on liquid hydrogen

Long-term storage
Dense storage where pipelines don't reach

Export & supply chains
Liquid hydrogen despatch and bunkering

Hydrocarbon transition
Industries replacing fossil fuels with clean H_2

07 Scope of Supply

- Complete patented liquefaction cold box
- Turbo-expanders, BAHX & J-T assembly
- Catalytic ortho-para conversion system
- Adiabatic storage interface & separator
- Controls, safety systems & commissioning
- Training & AMC/CMC support

CERTIFIED & COMPLIANT

ISO 9001:2015 · ISO 14001:2015 · ISO 45001:2018

Designs compliant with PESO, IEC, ATEX & IS safety standards

08 About Brise Chemicals

Brise Chemicals Pvt. Ltd. is a technology-driven OEM and industrial gas plant technology owner, founded by professionals with deep experience across turbo-machinery, oil & gas, refineries and the industrial gas sector. From our engineering and fabrication base in Pune, India, we design, engineer, manufacture, install and commission cryogenic and non-cryogenic gas plants — spanning alkaline electrolysis, gas generation, gas purification, ammonia and methanol synthesis, air separation and hydrogen liquefaction.

Our name derives from the ballet step “Brisé” — a reminder that precision, integrity and discipline underpin everything we build. With in-house fabrication, certified welding, an HVOF catalyst-coating facility and rigorous QA/QC, we deliver complete EPC projects and stand behind them through long-term AMC/CMC support.

09 The Brise EPC Lifecycle

1 Pre-FEED / Concept
Technology selection, plant sizing, site assessment

2 FEED Study
P&IDs, plot plans, equipment lists, CAPEX estimates

3 Basic Engineering
Process design, instrumentation philosophy, safety studies

4 Detailed Engineering
Construction drawings, datasheets, 3D models

5 Procurement & Supply
Core equipment, BoP packages, electrical panels

6 Construction
Civil, mechanical, piping and electrical installation

7 Commissioning
Pre-checks, wet commissioning, performance-guarantee tests

8 Training
Operations and maintenance team instruction

9 AMC / CMC
Predictive maintenance, spares and long-term support

10 Industries We Serve

- Healthcare & Medical
- Oil & Gas
- Steel & Metal Processing
- Chemical & Petrochemical
- Energy & Power
- Food & Beverage
- Electronics & Semiconductor
- Automotive & Manufacturing

Let’s engineer your plant.

Request a detailed proposal, FEED study or site consultation for the Hydrogen Liquification.

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