A DIVISION OF
SPECX TECHNOLOGIES PVT. LTD.



TECHNOLOGY BROCHURE · 2026

08 ETHANOL MANUFACTURING PLANT

FERMENTATION · DISTILLATION · DEHYDRATION

Turnkey ethanol plants for sugar-based feedstocks, from fermentation to fuel-grade dehydration, engineered for low steam use and minimal waste water.

- Feedstock preparation
- Fermentation
- Multi-column distillation
- Dehydration to fuel grade
- Potable alcohol option
- Evaporation & effluent treatment

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SUGAR TO FUEL

COMPLETE ETHANOL DISTILLERIES

Ethanol is made by letting yeast convert sugar into alcohol, then separating that alcohol from water. The chemistry is old; the economics depend on doing it with as little steam, power and water as possible. HiTorq engineers distilleries as one integrated system, from feed handling through fermentation, distillation and dehydration to the treatment of spent wash.

Sugar-rich crops and the by-products of sugar mills are the natural feedstocks. For a sugar producer, a distillery turns surplus juice or molasses into a product with a large and growing market in fuel blending, alongside industrial and potable alcohol.

FEED 01

Cane juice / syrup

Fermented directly after clarification, or stored as concentrated syrup.

FEED 02

Molasses

The residual sugar from crystallisation, diluted before fermentation.

FEED 03

Other sugar crops

Juice from crops such as sweet sorghum or sugar beet, where available.

PROCESS ROUTE

01 **Feed preparation** Dilution, clarification, sterilisation

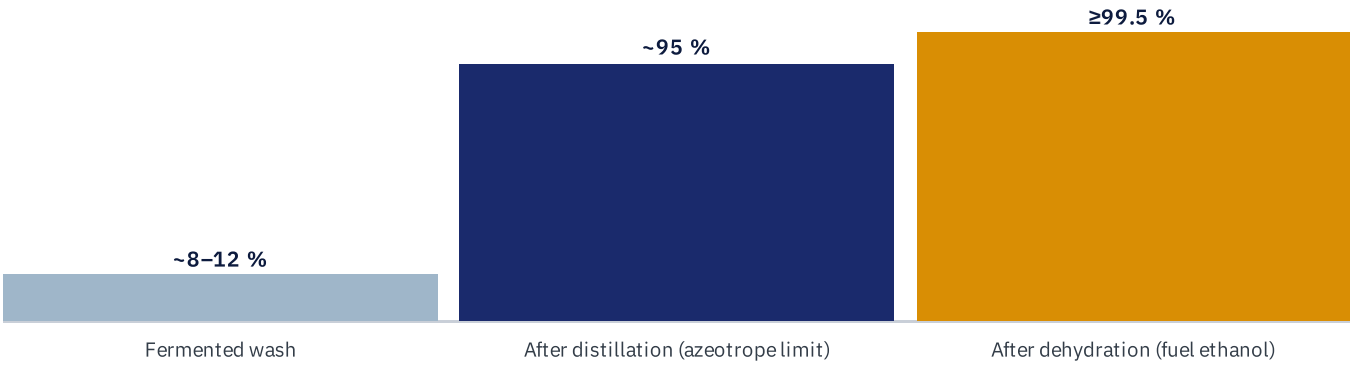
02 **Fermentation** Yeast turns sugar into a dilute “wash”

03 **Distillation** Alcohol stripped and concentrated

04 **Dehydration** Last water removed for fuel grade

05 **Spent wash** Concentrated and treated

HOW THE ALCOHOL CONCENTRATION RISES (INDICATIVE)



WHY A SEPARATE DEHYDRATION STEP

Ethanol and water form an azeotrope at roughly 95 % ethanol: beyond that point the vapour has the same composition as the liquid, so further distillation achieves nothing. Fuel blending needs almost water-free alcohol, so the final water is taken out by other means, most commonly molecular-sieve adsorption.

WHERE THE MONEY IS MADE

EFFICIENCY DECIDES THE ECONOMICS

Most of a distillery's running cost is energy, and most of that energy goes into boiling liquid in the distillation columns and evaporators. Good design reuses that heat several times: columns operated at different pressures so one condenses into the next's reboiler, vapour recompression where power is cheap, and hot product streams preheating the feed.

The second priority is water. Spent wash from the columns is the largest liquid stream on site. Concentrating it in multiple-effect evaporators recovers clean condensate for reuse and leaves a smaller, thicker stream that can be burnt in a boiler or composted, depending on local practice and regulation.

TABLE 8.1 PLANT SECTIONS IN OUR SCOPE

SECTION	WHAT IT DOES	DESIGN PRIORITY
Feed handling	Receives, dilutes and conditions juice, syrup or molasses	Hygiene, steady feed quality
Fermentation	Yeast propagation and fermenters, batch or continuous	Yield, temperature control
Distillation	Strips alcohol from the wash and concentrates it	Heat integration, steam per litre
Dehydration	Molecular-sieve units produce fuel-grade ethanol	Product dryness, regeneration energy
Rectification	Extra columns remove impurities for neutral spirit	Purity, removal of fusel oils
Evaporation & effluent	Concentrates spent wash, recovers condensate	Water reuse, compliance
Utilities & storage	Cooling water, steam, CO_2 handling, product tanks	Reliability, safety

Capacities and configurations are engineered to client requirement and feedstock availability.

ENERGY

Less steam per litre

Columns, reboilers and heat recovery designed as one system.

WATER

Condensate reused

Evaporation and recycling planned into the flow sheet from day one.

PROJECT

Single point of contact

Engineering, equipment, erection and commissioning handled by one team.

The feedstock is already growing in the fields. Careful engineering turns it into fuel at the lowest cost per litre.

LET'S TALK ABOUT YOUR PLANT

FROM A FEED SAMPLE TO A RUNNING PLANT.

Share your feedstock, the products you want and the capacity you have in mind. Our process team will come back with a technical route, a block flow diagram and the next steps.

01 · Send

Feed details

Feedstock type, source, analysis if available, and the volume you expect per day.

02 · Define

Target products

The grades or cuts you need, the quality they must meet, and site constraints.

03 · Receive

Technical proposal

Process route, equipment scope and an execution plan for your review.

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HiTorQ LUBRICANTS

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Xtending Engineering Possibilities

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