



AMMONIA 6000[®]

Single Stream 6,000 MTPD Ammonia Plant

Single Stream 6,000 MTPD Ammonia Plant Using KBR's Purifier™ based technology

KBR offers its commercially well-proven and reliable Purifier™ based ammonia technology to leverage economy of scale and expand single-train production capacity beyond the classic threshold of just 2,700 MTPD to more than 6,000 MTPD, using industry standard equipment sizes and catalysts.

PURIFIER™ HIGHLIGHTS

- Large-scale, single-train units – Up to 6,000 MTPD capacity
- Commercially proven technology – Purifier™
- Reduced CAPEX and OPEX - Smaller size/count of equipment
- Achieved highest energy efficiency – 6.27 Gcal/MT (LHV basis)
- Lower environmental footprint – Reduced CO₂ and NO_x emissions
- Proven safety and reliability record vis-à-vis ATR
- No oxygen-fired ATR

PROVEN DESIGN, LOW CAPEX AND OPEX

KBR's ammonia process uses its proprietary Purifier™ based technology for expanding single-stream capacity to 6,000 MTPD, using the same proven and highly reliable design as used in established single stream plants (Purifier™ technology is used in 39 plants worldwide, with 33 in operation). Purifier™ ammonia process uses a single top-fired Primary Reformer that is not limited by size, unlike competing technologies that employ an Auto Thermal Reformer (ATR) to overcome this limitation. The design

uses an optimized equipment/piping count and sizes, and the factors that make it low on capital and operating expenditures are:

- No hazardous oxygen-fired ATR
- No expensive Air Separation Unit (ASU) or Nitrogen Wash Unit (NWU)
- All equipment except ammonia converter and pumps in single unit i.e.:
 - One Primary Reformer
 - One Secondary Reformer without metallic burner
 - One Waste Heat Boiler
 - One vessel each for HT and LT Shift
 - One CO₂ Absorber, HP/LP Flash Column and Stripper
 - One Methanator
 - One Purifier unit – No Purge Gas Recovery Unit
 - One Synthesis Loop
 - One each of air compressor, refrigeration Compressor and Synthesis Compressor
 - One Unitized Chiller
 - All exchangers in single unit
 - One ammonia converter
 - Optimized Plot size – 210 M x 120 M

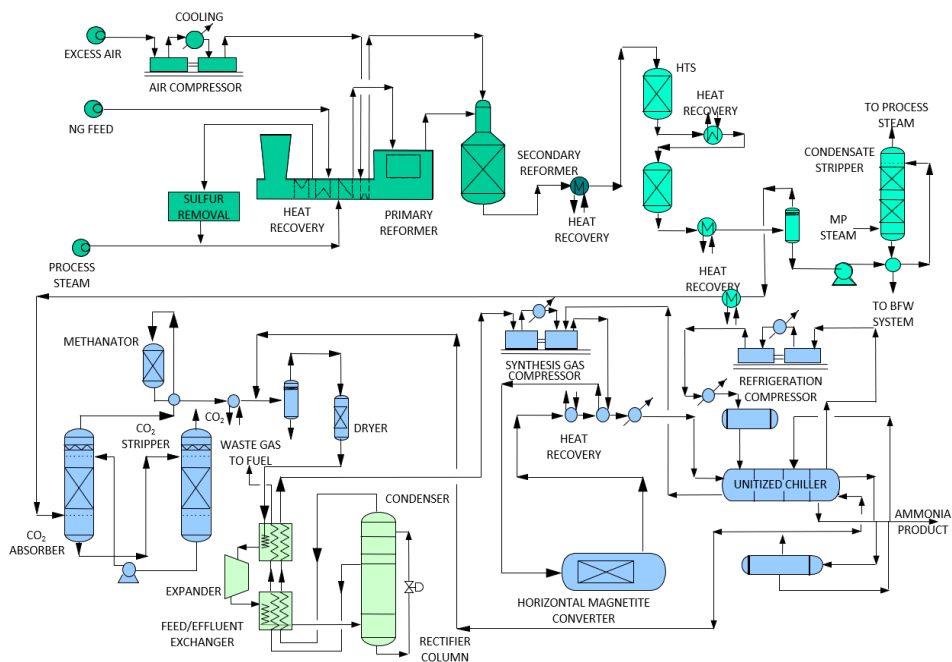


Fig : KBR Purifier™ for 6,000 MTPD Ammonia Plant

UNPARALLELED ENERGY EFFICIENCY

The Purifier™ ammonia process exhibits a proven low energy consumption of just 6.27 Gcal/MT (LHV basis) that can't be matched by other technologies including Auto Thermal Reformer (ATR) based technology.

SAFETY AND RELIABILITY

Purifier™ design guarantees safety as it does not use a hazardous oxygen-fired ATR, which has been proven to make a plant inherently unsafe by leaving it vulnerable to safety incidents that occur due to explosions caused by mishandling of oxygen or malfunction of pure oxygen compressors and pumps. KBR Purifier™ plants have achieved more than 1,600 consecutive on-stream days without any shutdown!

EVOLUTION IN ECONOMY OF SCALE

As a world leader in developing design for single-stream, large-scale ammonia plants, the technology for the world's first 600 to 2,200 MTPD single-stream plants was developed by KBR. Based on KBR's Purifier™ technology, a 2,700 MTPD capacity plant was commissioned in 2015, while another plant designed for 2,700/2,890 MTPD was commissioned in 2019. By 2017, KBR successfully completed the design for a single-stream 4,000 MTPD ammonia plant and has now completed design for a single-stream 6,000 MTPD ammonia plant that uses its time-tested Purifier™ technology.



KBR – YOUR RIGHT PARTNER

Since 1960s, KBR has licensed, engineered or constructed more than 250 Ammonia plants worldwide and 40 of them are Purifier™ based (33 in operation), achieving breakthrough operating performance and low energy costs. The KBR Purifier™ Ammonia process helps plant owners stay competitive by expanding single-train capacity up to 6,000 MTPD to exploit economy of scale, increase margins and reduce cost per ton of ammonia produced.

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technology@kbr.com

