ITT

GOULDS PUMPS | RHEINHÜTTE PUMPEN | Bornemann | Engineered Valves | HABONIM

ITT Brands

Pumps and valves for a clean, sustainable fuel option as renewable energy:

Hydrogen & Ammonia

Hydrogen

It is one of the leading environmentally friendly renewable fuels and the most abundant chemical substance in the universe. Hydrogen has the capacity to be used as an electrical energy carrier or as a direct source of energy.

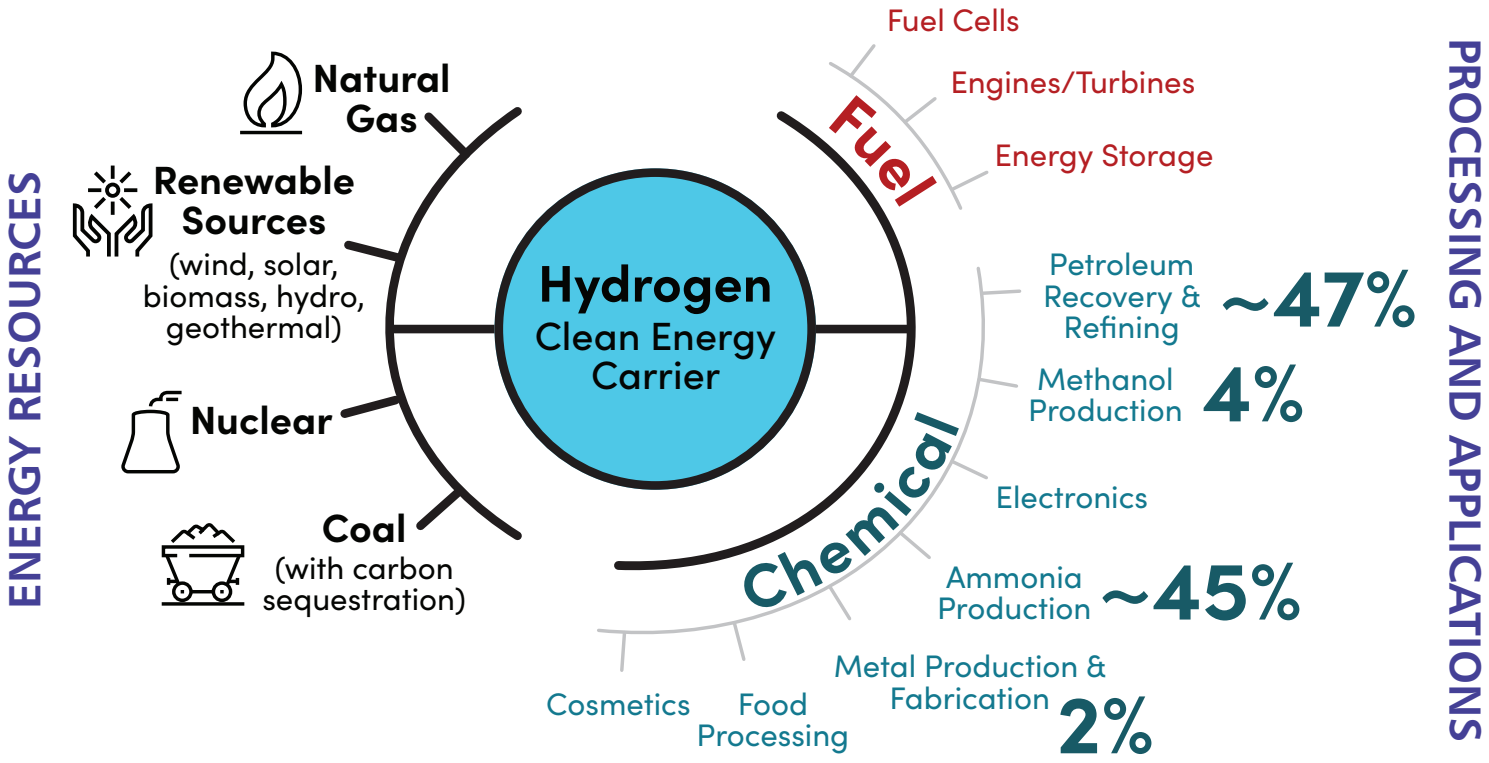
Ammonia molecule contains 3 Hydrogen atoms and is therefore considered to be another form of "Hydrogen" to serve as an electrical energy carrier or to be used as another direct source of environmentally friendly renewable energy.

Goulds Pumps, Rheinhutte Pumpen, Bornemann, Engineered valves and Habonim have the required equipment and the environmental standard qualifications to meet the most challenging applications in the different hydrogen and ammonia production processes in the industry:

Nearly all hydrogen for Industrial uses is currently produced in refineries and manufacturing plants steam reforming of natural gas.

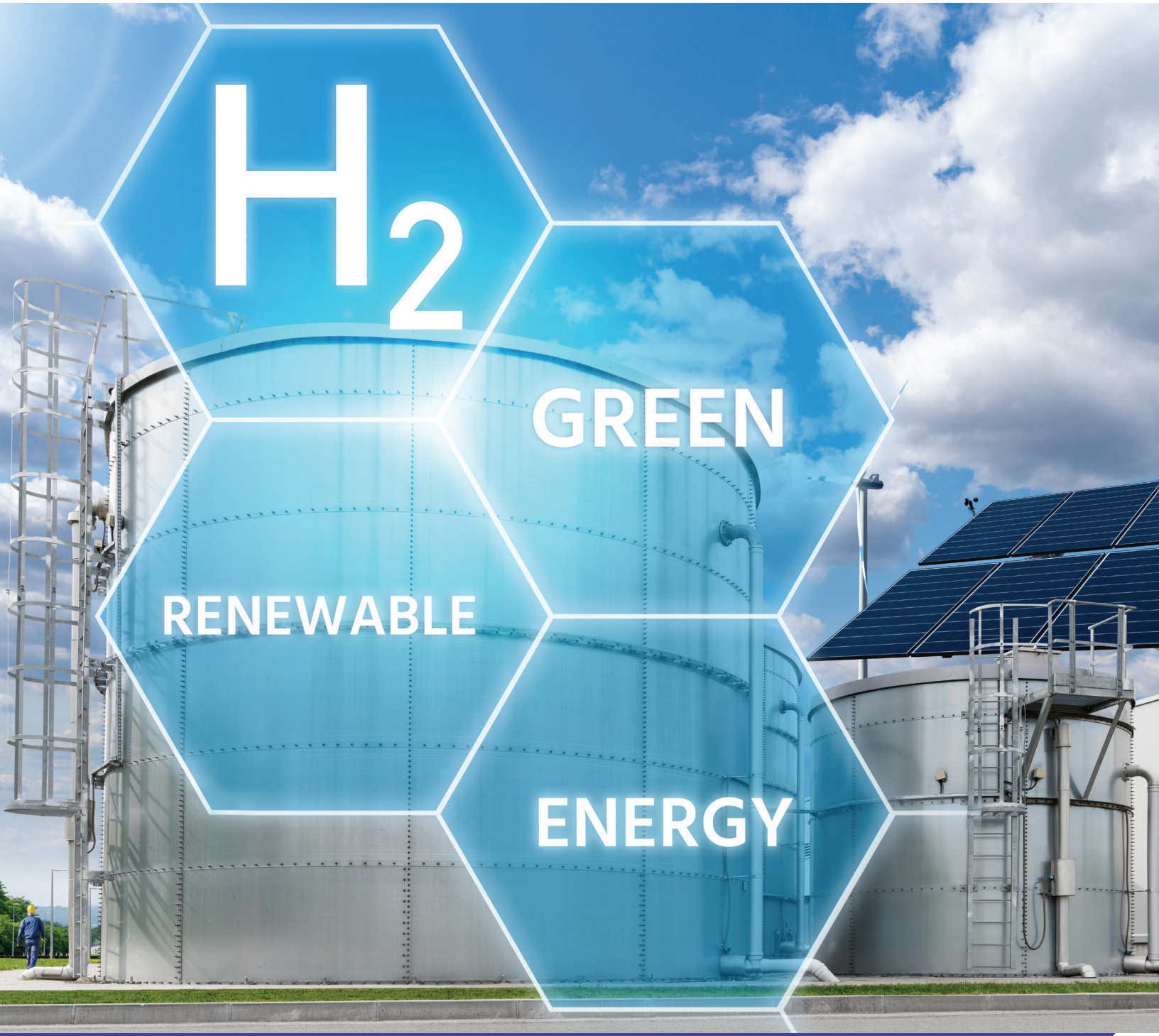
ITT is committed to its customer's offering:

- High-efficiency pumps for all the hydrogen colors from electrolysis in green hydrogen, carbon capture or gasification in blue hydrogen, coal gasification in brown/black hydrogen to steam methane reforming (SMR) in grey hydrogen.
- Customized onboard diagnostics that improve efficiency, increase operation up-time and optimize life cycle costs.
- Global service network with unrivaled experience in hydraulic performance and technology.



Goulds Pumps is constantly providing the industry with Technology to fulfill the needs of our customers in the production of Hydrogen (H_2) and Ammonia (NH_3).

Hydrogen is the most abundant element accounting for roughly 75% of all mass on the planet. It is applicable to diverse energy sources, production processes, transportation and storage models. It is the basic chemical building block that can be used in a variety of ways.



Hydrogen Value Chain

PRODUCTION

FUEL-BASED PRODUCTION

Natural Gas
Stream methane reforming/autothermal Reforming with or without CCS

Coal
Gasification of coal with or without CCS

Biomass
Gasification of biomass with or without CCS

CCS
CO_2

Steam reforming and gasification with CCS

ELECTRICITY SYSTEM

Renewable Energy
Electricity from wind, solar, hydro or geothermal power

Nuclear
Electricity and heat from nuclear power

Water electrolysis

H_2

CONVERS & TRA

PURE
- Boiling

PROC
- Liquific regasifi
- H_2 gas

CONV
- **Haber-** H_2 & N_2 NH_3 Boi (H_2 18w
- **Methar** H_2 + CO or H_2 + (synthe

H_2

Liquified H_2 in storage tanks

SION, PROCESSING ANSPORTATION

H_2

poing: -423°F/-253°C

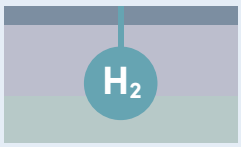
CESSING

ation and
cation of H_2
compressed

VERSION

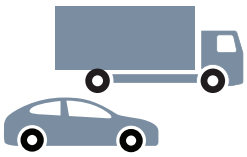
Bosch process
→ ammonia
ling point -280F/-330C
t%)
nization
$_2$ → CH + H_20
CO → CH_2OH (methanol)
tic or substitute natural gas)

STORAGE



Geological storage in underground salt caverns

USE



TRANSPORT

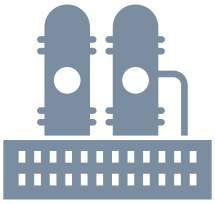
- Hydrogen into **fuel cells** for trucks, passenger vehicles
- **Synthetic fuels** for shipping and aviation

INDUSTRY

- Hydrogen as **feedstock** in refining, steel production, chemical production
- Hydrogen for **heat generation** for industrial processes

BUILDINGS

- Hydrogen for **heating**
- Hydrogen for onsite **power** through fuel cells



POWER

- Fuel cell **electricity**, turbines and H_2 CHP
- **Energy storage** and system buffer (Combined Heat and Power Fuel cell)

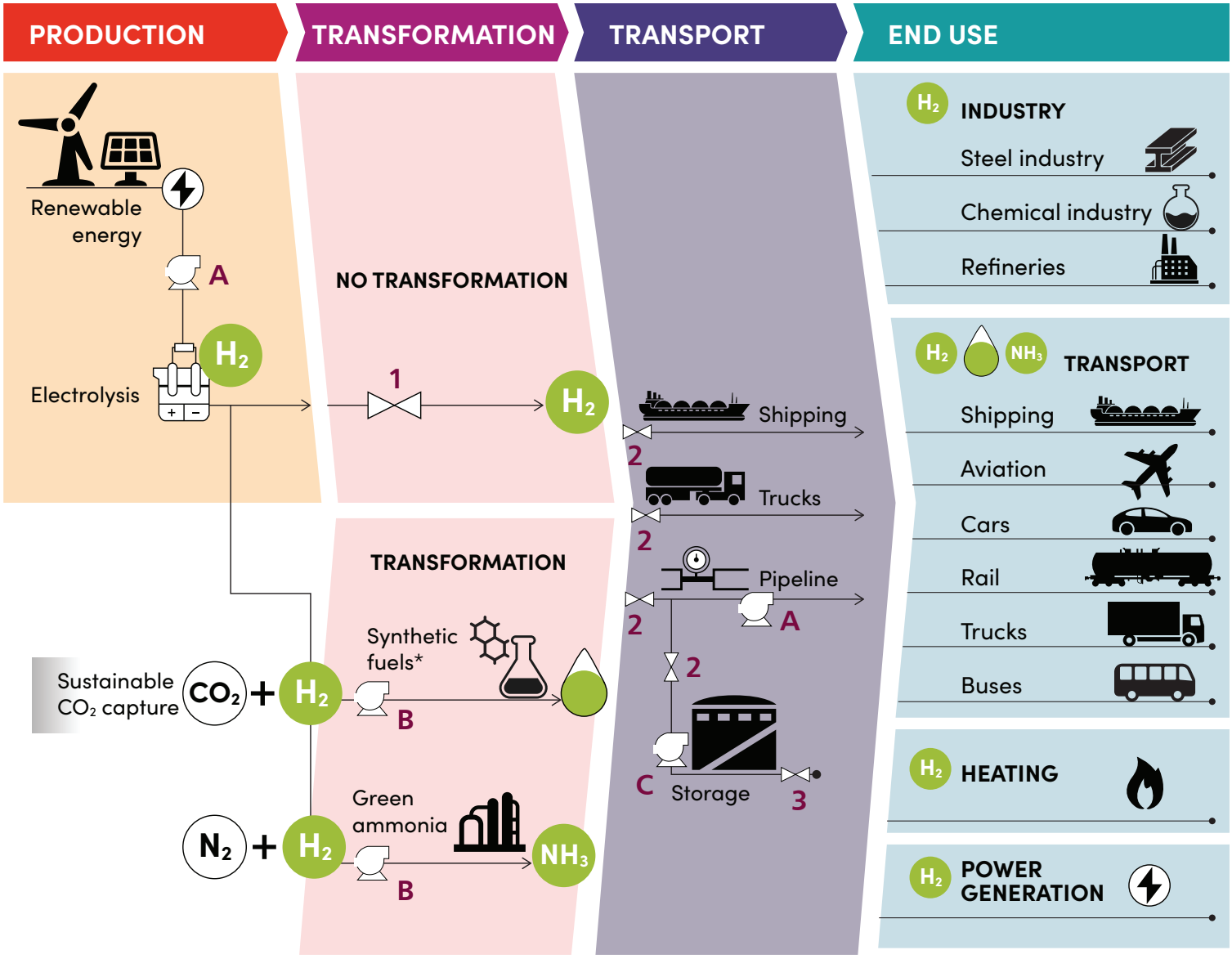
NH_3 direct combustion gas turbine

NH_3 Furnace

Fuel Cell

Green Hydrogen

Green Hydrogen is a renewable energy-friendly alternative that can be produced from wind, solar, geothermal, hydro, biomass and water thru electrolysis. It has the potential to highly contribute to the global energy system decarbonization.



Goulds, Rheinhutte and Bornemann Pumps

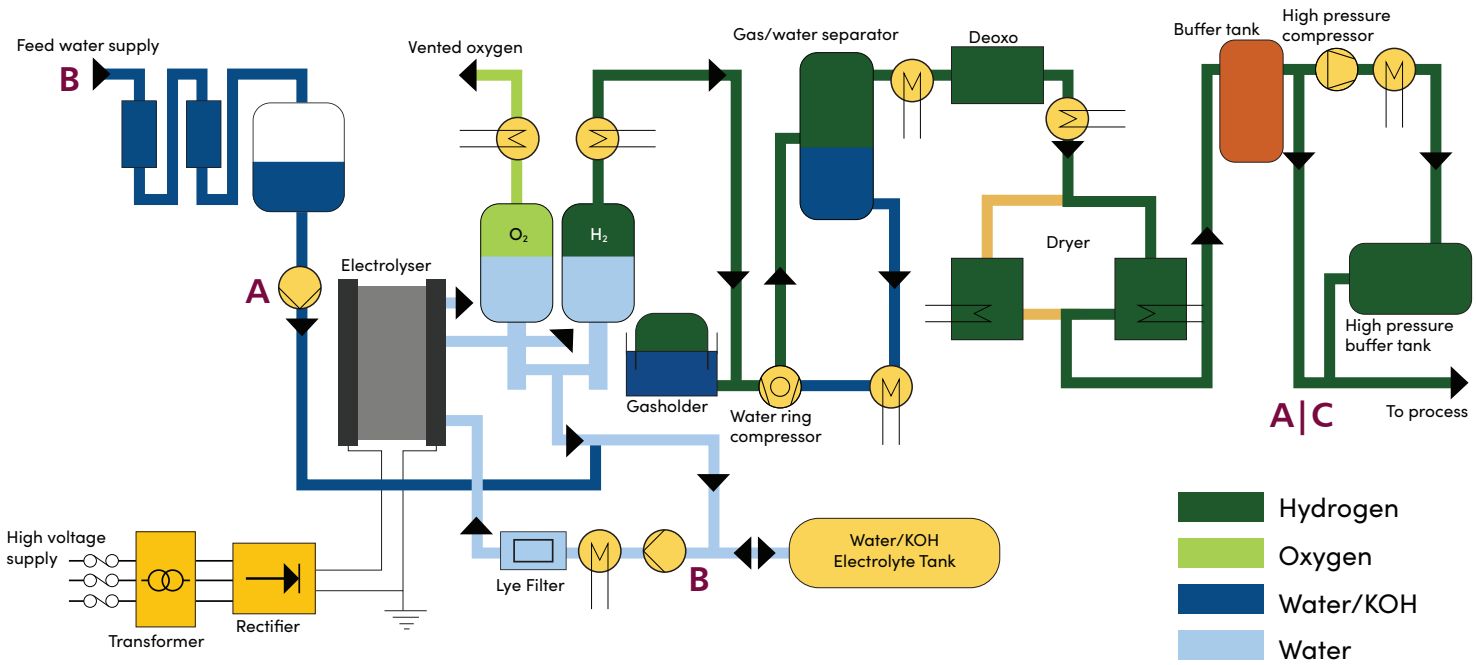
A. Pump for water booster/high pressure
B. Pump for circulation
C. Pump for storage

Engineered and Habinom valves

1. Valve for liquefaction
2. Valve for transportation and storage
3. Valve for dispensing

Green Hydrogen

There are several Electrolyser technologies and one of the most common and mature process is this Alkaline Electrolysis for Green Hydrogen production:



Other Technologies involve Proton exchange membrane and solid oxide electrolyzers, which are the latest generation.

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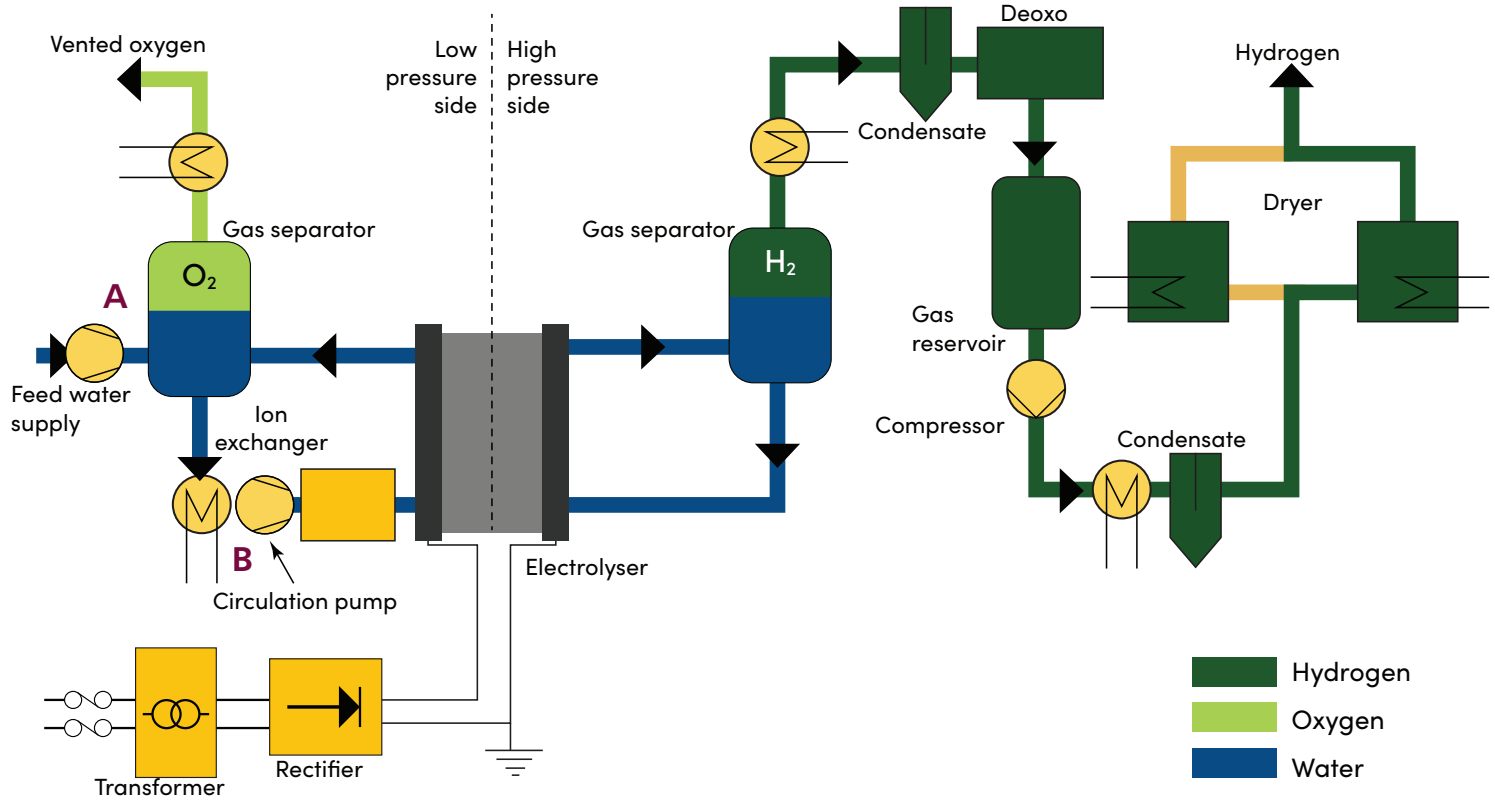
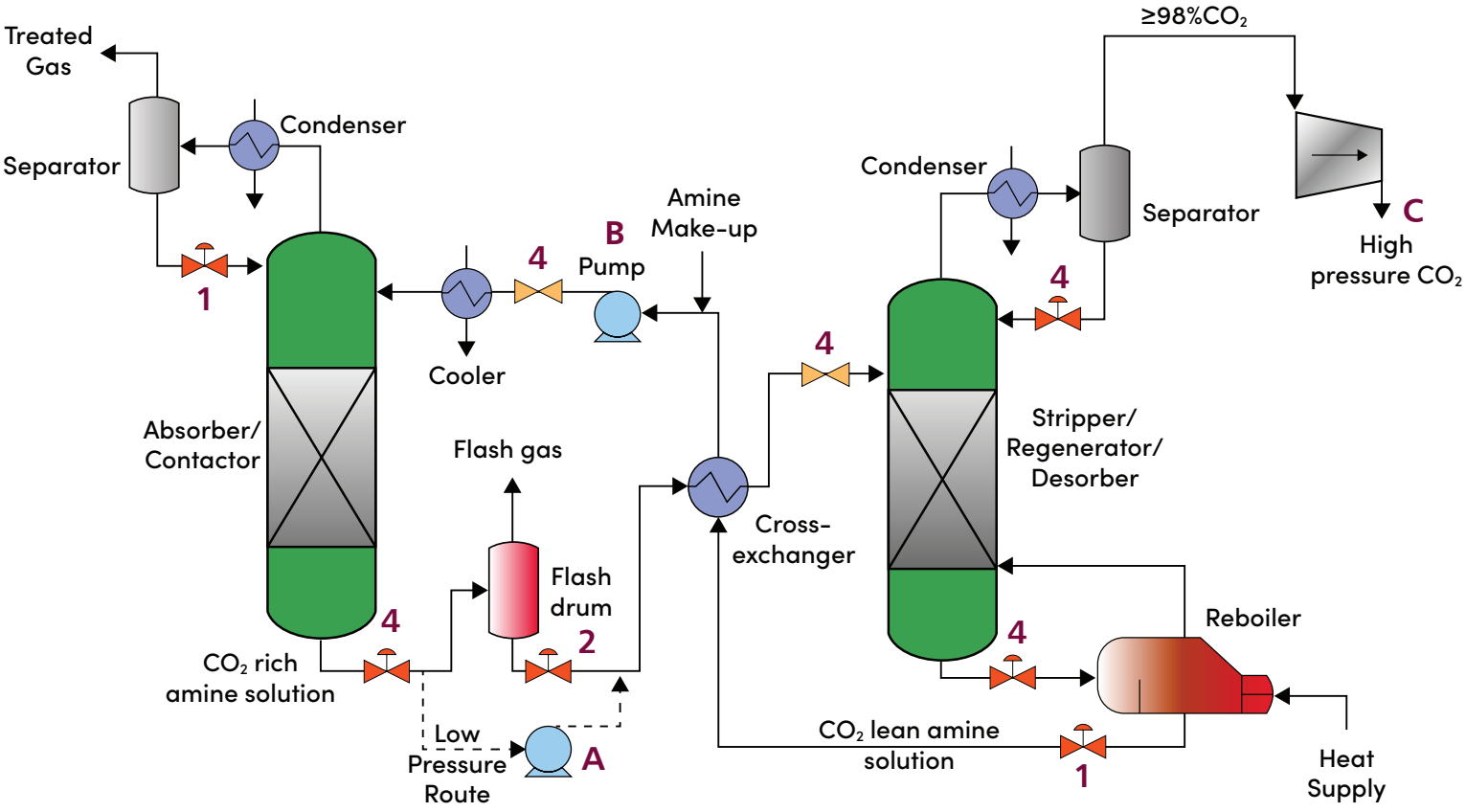


Blue Hydrogen

Blue Hydrogen production has rich amine and lean amine circulation pumps are vital for carbon capture and steam methane reforming (SMR).



Block Diagram of Blue Hydrogen Production Through CCS of CO_2 from CG & SMR

CCS - Carbon capture and storage
CO2 - Carbon Dioxide
CG - Crude Glycerol
SMR - Steam Methane Reforming

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B. Pump for circulation
C. Pump for storage

Engineered and Habinom valves

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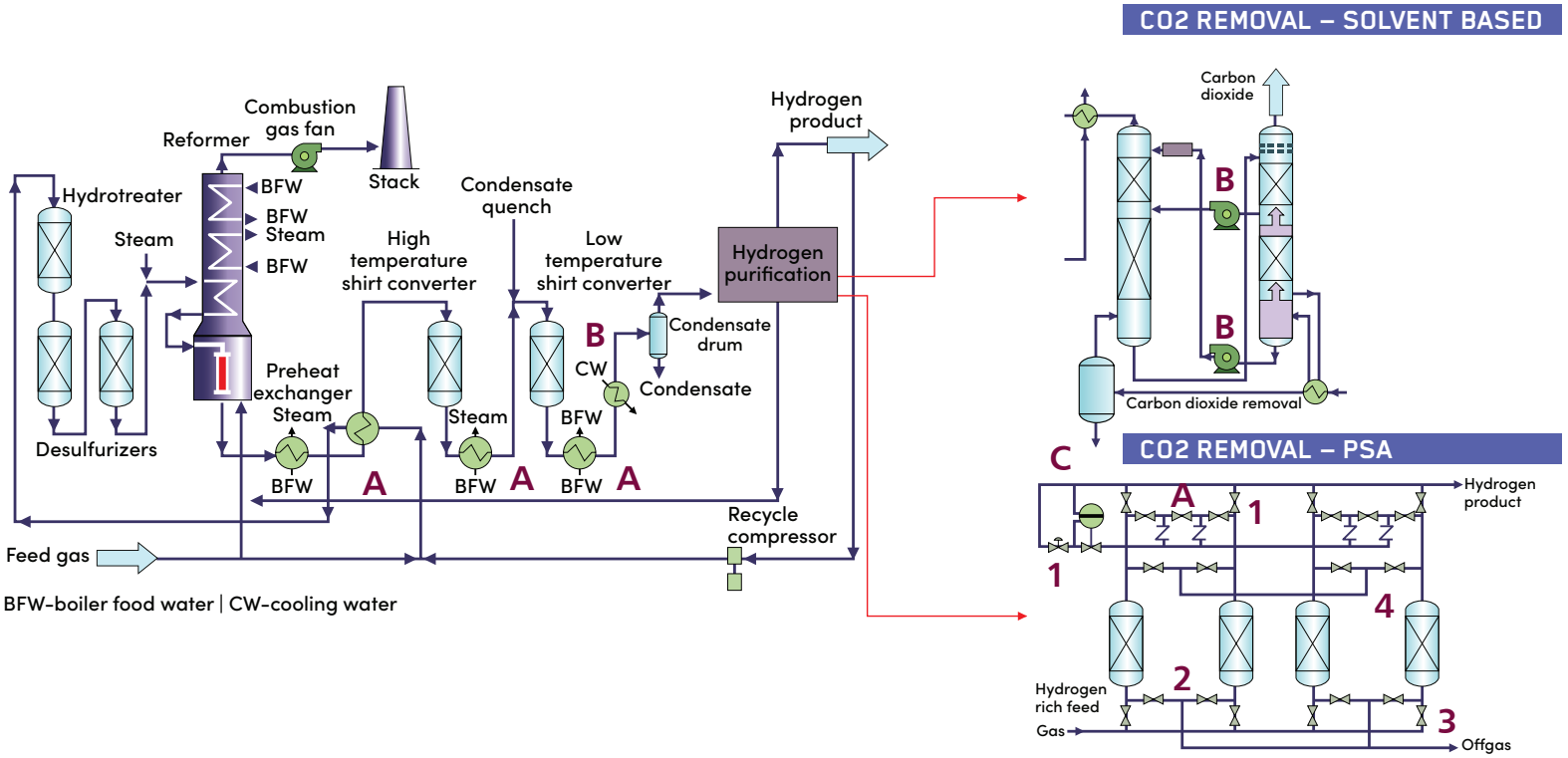
2. Valve for transportation and storage
3. Valve for dispensing
4. Valve for circulation

Grey Hydrogen

Grey Hydrogen has a steam cycle and a Pressure Swing Adsorption (PSA) process that is used to recover and purify hydrogen from a variety of hydrogen-rich streams.

STEAM METHANE REFORMING (SMR)

HYDROGEN PURIFICATION



Goulds, Rheinhutte and Bornemann Pumps

A. Pump for water booster/high pressure
B. Pump for circulation
C. Pump for storage

Engineered and Habinom valves

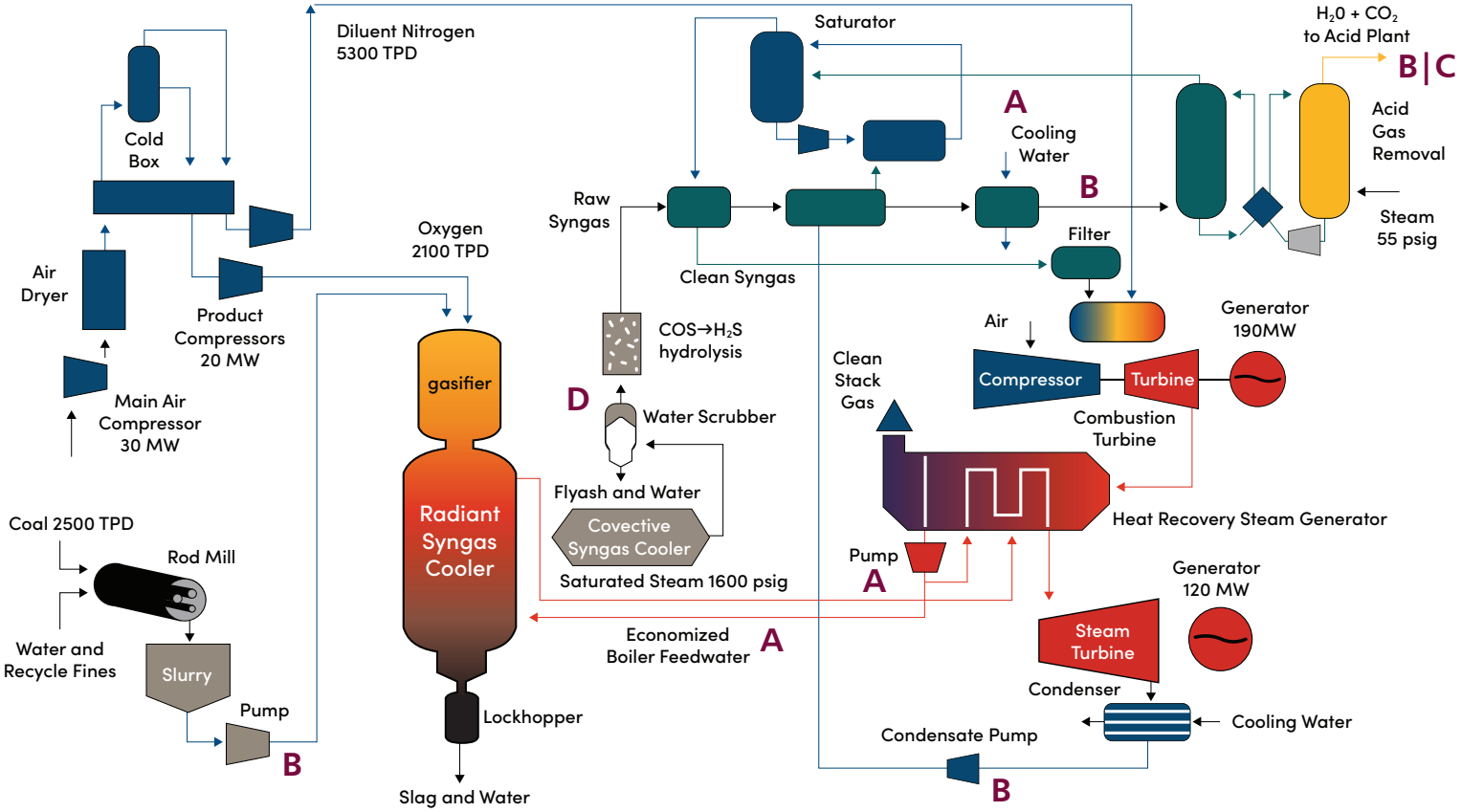
1. Valve for liquefaction
2. Valve for transportation and storage
3. Valve for dispensing
4. Valve for circulation

Brown & Black Hydrogen

Brown and black hydrogen are produced through coal gasification process with pumps handling slurry and feeding and other auxiliary pumps like fire service, filtered water and recirculation.

In principle, hydrogen can be stored in pure form as compressed gas or liquid or in various hydrogen carriers, such as ammonia and methanol. Storage of hydrogen in gaseous form requires pressures over 300 bar. To store hydrogen as a liquid, at any pressure, it must be cooled below -250C, which is 80 degrees lower than LNG due to the hydrogen's lower density.

COAL GASIFICATION



Goulds, Rheinhutte and Bornemann Pumps

A. Pump for water booster/high pressure
B. Pump for circulation
C. Pump for storage
D. Ash solution and scrubber service

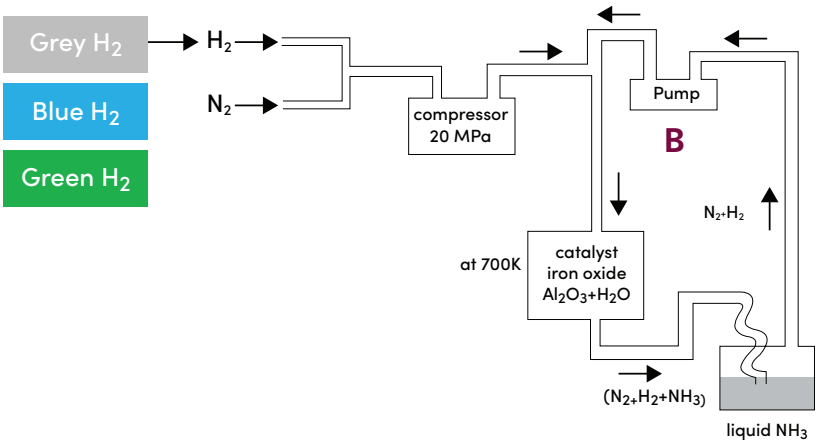
Engineered and Habinom valves

1. Valve for liquefaction
2. Valve for transportation and storage
3. Valve for dispensing
4. Valve for circulation

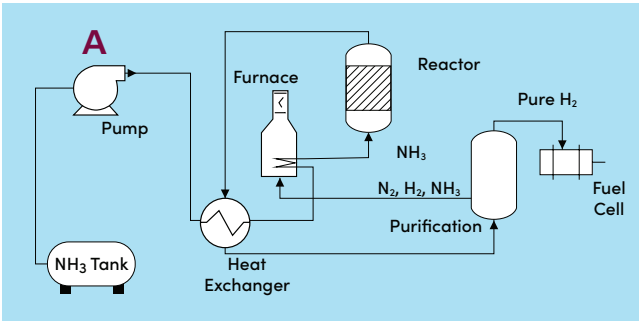
Ammonia (NH_3)

- Ammonia has three hydrogen atoms and one nitrogen atom and can flexibly be produced with conventional or renewable resources.
- It is a potential hydrogen storage and carrier.
- Transportation of ammonia is much safer compared to hydrogen.
- When liquefied, it contains approximately 48% more hydrogen by volume than hydrogen. and needs to be maintained at approximately -100°F (-75°C) only while liquefied hydrogen is deep cryogenic.
- No carbon dioxide emissions are emitted during its use since it is carbon-free.
- It can be utilized for a wide range of applications as a fuel, working fluid, refrigerant, hydrogen carrier, fertilizer, feedstock, chemical, cleaning agent, and many more.
- It can be easily detectable when any leakage occurs because of its distinctive smell.
- A strong fuel candidate for engines, gas turbines, power generators, and burners. The modifications needed for such engines are relatively small.

AMMONIA PRODUCTION



HYDROGEN PRODUCTION FROM AMMONIA



Goulds, Rheinhutte and Bornemann Pumps

A. Pump for water booster/high pressure
B. Pump for circulation
C. Pump for storage

Engineered and Habinom valves

1. Valve for liquefaction
2. Valve for transportation and storage
3. Valve for dispensing
4. Valve for circulation

Applications Solutions (Pumps)

ITT will continue supporting the Global Green Initiatives on applications such as hydrogen, ammonia, lithium/nickel and CO2 de-carbonization.

ITT Goulds pumps has certified many models of its portfolio to meet the requirements for gas explosive mixtures with high level of protection and high ignition temperature ranges >450°C and >135°C, under
ATEX Zone 1, IIC (II-/2G Ex h IIC T1...T4 Gb)

Color of Hydrogen	Process	Source	Transport	Application	Liquid		
						3600	7200SB
Grey Hydrogen	Steam Methane Reforming (SMR) or gasification	Methane/natural gas or coal	Hydrogen gas in cylinders compressed to 3,000-15,000psi (200-1000bar) Hydrogen gas in pipes 700-1,300psi (50-90bar) Liquid hydrogen LH2 (-253C)	Boiler Feed Water	Demineralized water		
				Cooling water	Water/condensate/ brackish/ brine		
				Solvents			
Brown/Black Hydrogen	Coal Gasification	coal	Organic hydrides (methylcyclohexane); (H_2 6wt%)	Coal slurry preparation and feeding	Coal slurry/slurry water/recycle		
				miscelaneous pumps	fire service, filtered water, circulating		
Blue Hydrogen	SMR+ Carbon Capture or gasification	Methane or fossil fuels/coal where CO_2 is captured	Hydrogen gas in cylinders compressed to 3,000-15,000psi (200-1000bar) in pipes 700-1,300psi (50-90bar) Ammonia NH_3 (-33C or 8.5bar); (H_2 18wt%)	Circulation of rich and lean liquid solvents used for post-combustion CO_2 capture	Solvents		
				Pumping solution for pre combustion			
Green Hydrogen	Electrolysis	Renewable electricity/Renewable Energy Resources-RES (i.e. wind, solar, geothermal, hydro, biomass), water	Hydrogen gas in cylinders compressed to 3,000-15,000psi (200-1000bar) in pipes 700-1,300psi (50-90bar) Liquid hydrogen LH2 (-253C)	**Hydrogen fuel for transportation/fuel cells** Water booster / high pressure	Water / RO sea water		
				lye circulation	lye (concentration of 20-30% KOH and NaOH)		
Ammonia	Steam distribution, syngas separation and syngas purification			Boiler feed water			
				Condensate and water recirculation	Water/condensate		
	Synthesis and cooling		ammonia converter/Chiller	refrigerant			
	Separation and scrubber			Let down drum / chiller			
		distillation column	Ammonia scrubber	high/ Low pressure scrubber			
				Distillation			
	Transfer and storage		liquid ammonia from condensate to storage tank	Circulation, transfer			

Pump Type															
VICR	3196/IC	34XX -DS 3180	3700i/3910	3620i / 3640i	3316	Rheinhutte RCE /	3296 EZMAG/	3171	JC	HSU	5500 / SRL	XHD	Geothermal	VIT / VCW	VIC

Applications Solutions (Valves)

Habonim provides ball valves across the value chain of Hydrogen and Ammonia fuels with the required certifications and safety standards up to 15,000PSIG pressure rating.

Color of Hydrogen	Process	Application	Valve Type Manual / Automated									
			Ultra-High Pressure **Hydrogen-use**	**High-Pressure** Hydrogen-use	**Industrial** Hydrogen-use	**Cryogenic** Hydrogen-Use	**High-Pressure** Ammonia-use	**Industrial** Ammonia-use	**High Pressure**	**High Temp.**	**Industrial**	**Control**
			H99,H29,H25	H24, H27	H47, H31/2, H73/4, ...	CH47, CH31, ...	M28, M27, M24	M47, M31/2, M73/4, ...	28, 27, 24	Z47, Z73/4, ...	47, 31/2, 73/4, ...	N47, N31/2, N73/4
Grey Hydrogen	Steam Methane Reforming (SMR) or gasification	Boiler Feed Water										
		Cooling water										
		Solvents										
		Hydrogen piping										
		Cylinders										
Blue Hydrogen	SMR+ Carbon Capture or gasification	Circulation of rich and lean liquid solvents used for post-combustion CO_2 capture										
		Pumping solution for pre-combustion										
		Compression & Storage										
		Liquefication										
		Cylinder filling										
		Gas Transportation										
		Piping grid delivery										
		Liquiefied Transportation										
		Dispensing										
Green Hydrogen	Electrolysis	lye circulation										
		Compression & Storage										
		Liquefication										
		Cylinder filling										
		Gas Transportation										
		Piping grid delivery										
		Liquiefied Transportation										
		Dispensing										
Ammonia	Steam distribution, syngas separation and syngas purification	Boiler feed water										
		Condensate and water recirculation										
	Synthesis and cooling	refrigerant										
	Separation and scrubber	Let down drum / chiller										
		high/ Low pressure scrubber										
		Distillation										
	Transfer and storage	Circulation, transfer										
		Ammonia-Fuel transporting										
	Engine feed	Ammonia-Fuel for shipping										

ANSI and Process Pumps

3196

- Capacities to 1,364 m³/h | 7,000 GPM
- Heads to 223 m | 730 ft
- Temperatures to 371° C | 700° F
- Pressures to 26 bar | 375 PSIG

Applications:
- Chemical
- Petrochemical
- Pulp & Paper
- Primary Metals
- Food & Beverage
- General Industries

Materials: Ductile Iron, 316SS, CD4MCu, Alloy 20, Monel, Nickel, Hastelloy B and C, Titanium

3171

- Capacities to 722 m³/h | 3,180 GPM
- Heads to 95 m | 344 ft
- Temperatures to 232° C | 450° F
- Pit Depths to 6 m | 20 ft

Applications:
- Industrial Process
- Industrial Sump Wastes
- Molten Sulfur
- Tank Unloading
- Corrosive and Non-CorrosiveLiq-uids

Materials: Cast Iron, Bronze-fitted, Carbon Steel, 316SS, Alloy 20, Hastelloy B and C, Duplex SS

3180

- Capacities to 9,000 m³/h | 40,000 GPM
- Heads to 125 m | 410 ft
- Temperatures to 230° C | 446° F
- Pressures to 16 bar | 232 PSIG

Applications:
- Paper Stock
- Black Liquor
- Chemical Process
- Wastewater

Materials: Al/CD4MCuN, CD4MCuN, 316SS, 317SS, Hast-C, Alloy 20, Super Duplex. Other materials available upon request.

RCE

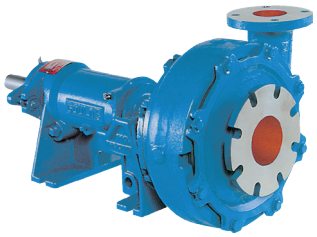
- Capacities to 1200 m³/h | 5283 GPM
- Heads to 180 m | 591 ft
- Temperature ranges from -40 °C to 450 °C | -40 °F to 842 °F
- Pressures to 16 bar | 232 PSIG

Applications:
- Phosphate fertilizer
- Ammonium nitrate melt
- Pitch and Tar
- Urea melt
- Molten Suphur
- Aggressive Slurries

Materials: 12 different cast irons, cast steels, Nickel based materials and high alloy cast steels

Abrasive/Solids

JC



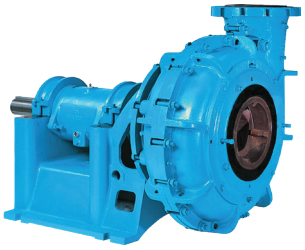
- Capacities to 1,600 m³/h | 7,000 GPM
- Heads to 73 m | 240 ft
- Temperatures to 121° C | 250° F
- Pressures to 10 bar | 127 PSIG
- Solids to 57 mm | 2.25 in

Applications:

- Wet scrubber systems
- Waste sludge
- Fracking slurries
- Paper mill wastes and liquors
- Clay and sand slurries
- Dirty water
- Kaolin water
- Carbon slurry
- Lime mud
- Precipitated $CaCO_3$

Materials: Cast Iron, High Chrome Iron, 316SS, CD4MCuN, Endura Chrome

SRL



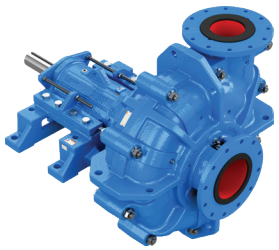
- Capacities to 4,542 m³/h | 20,000 GPM
- Heads to 50 m | 164 ft
- Temperatures to 121° C | 250° F
- Pressures to 28 bar | 400 PSIG

Applications:

- Sag Mill
- Rod & Ball Mill
- Primary & Secondary Cyclone
- Thickener Feed
- Flotation Feed
- Tailings

Materials: Natural Rubber, Neoprene, Nitrile, Polyurethane, Chlorobutyl, Hypalon, EPDM, Ceramic Composites and Metal Alloys

XHD



- Capacities to 2,950 m³/h | 13,000 GPM
- Heads to 85 m | 280 ft
- Pressures to 17 bar | 250 PSIG

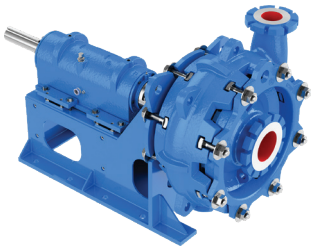
Applications:

- Primary Metals – SAG/Ball Mill, Cyclone Feed, Tailings
- Mineral Processing – Slurry Transfer, Flotation Cells, Thickener Underflow
- Non-Metallic Mining – Heavy Media, Cyclone Feed, Raw Coal, Clay, Soda Ash and Phosphate Slurries, Slurry Heater, Slurry Digestion, Hydrate
- Power – Absorber Recycle, Gas Cooling, Filter Feed, Lime and Ash Slurries
- Sand & Aggregate – Sand Slurries, Tailings

Materials: HC 600, Endura Chrome

Abrasive/Solids

5500



- Capacities to 3,861 m³/h | 17,000 GPM
- Heads to 139 m | 425 ft
- Temperatures to 121°C | 250° F
- Pressures to 35 bar | 500 PSIG
- Solids to 127 mm | 5 in

Applications:
- Tailings
- Thickener Underflow
- Pipeline
- Potash
- Mud Disposal

Materials: High Chrome Iron, CD4MCuN, Endura Chrome

Sump/Solids Handling

HSU

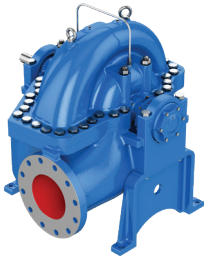
- Capacities to 910 m³/h | 4,000 GPM
- Heads to 67 m | 220 ft
- Temperatures to 90° C | 194° F
- Solids to 152 mm | 6 inches

Applications:
- Waste Treatment Plants
- Sewage Wet Wells
- Reclaim Sumps
- Industrial Waste Sumps
- Sludge Pits
- Drainage Sumps
- Power Plants
- Collection Basins
- General Service Sumps

Materials: Cast Iron, High Chrome Iron, CD4MCuN, 316SS

Multistage

3316



- Capacities up to 681 m³/h | 3,000 GPM
- Heads to 305 m | 1,000 ft
- Temperatures to 177° C | 350° F
- Pressures to 38 bar | 550 PSIG

Applications:
- Boiler Feed
- Mine Dewatering
- Booster
- High Pressure Process
- Condensate
- High Pressure Cleaning

Materials: Bronze-fitted, Cast Iron, 316SS, SS-Fitted. Other materials available upon request.

Vertical

VICR

- Capacities to 636 m3/h | 2,800 GPM
- Heads to 1,372 m | 4,500 ft
- Temperatures to 204°C | 400° F
- Discharge flange sizes from 38 mm to 203 mm | 1.5" to 8"
- Powers to 3,000 KW | 4,000 hp

Applications:
- Pentane, Propane, LPG and other light hydrocarbons with specific gravities ranging from 0.2 to 1.0
- Hotwater applications such as Boiler feed water

Materials: Any Machinable Alloy

VIT

- Capacities to 15,900 m3/h |70,000 GPM
- Heads to 1,067 m | 3,500 ft
- Pressures to 176 kg/cm2 | 2,500 psi
- Bowl sizes from 152.4 mm to 1,400 mm| 6" to 55"
- Temperatures to 204°C | 400° F
- Horsepower to 3,730 KW | 5,000 HP

Applications:
- Cooling Water
- Seawater & River Water Intake
- Industrial Process Pumps
- Utility Circulating Water
- Condenser Circulating Water Pumps
- Fire Service
- Reclaimed Water

Materials: Any Machinable Alloy

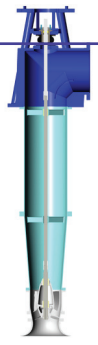
VIC

- Capacities to 15,900 m3/h | 70,000 GPM
- Heads to 1,067 m | 3,500 ft
- Pressures to 176 kg/cm2 | 2,500 psi
- Bowl sizes from 152.4 mm to 1,400 mm | 6" to 55"
- Temperatures to 204°C | 400° F
- Horsepower to 3730 KW | 5,000 HP

Applications:
- Pipeline Booster
- Product Transfer, Refinery Blending
- Injection-Secondary Recovery
- Chemical Transfer
- Boiler Feed
- Condensate
- Cryogenics
- LNG Transfer
- Light Hydrobarbons
- Water Services

Materials: Any Machinable Alloy

VCW

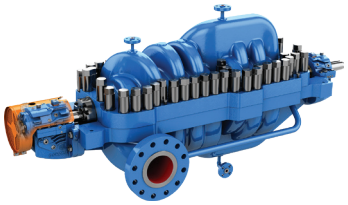


- Capacities to 91,000 m3/h |400,000 GPM
- Heads to 180 m | 600 ft
- Powers to 7,500 KW | 10,000 hp

Materials: Bronze Fitted, All Bronze, SS Fitted, Ni Resist, All SS

API Process

3600



- Capacities to 1,930 m³/h | 8,500 GPM
- Heads to 2,740 m | 9,000 ft
- Temperatures to 205° C | 400° F
- Pressures to 275 bar | 4,000 PSIG

Applications:

- Refineries
- Injection offshore platforms
- Pipeline
- Boiler feed
- Descaling
- Mine dewatering
- Process transfer
- Desalination
- Water injection
- CO^2 injection

Materials: All API materials, custom materials available

3620i/3640i

- Capacities to 4,540 m³/h | 20,000 GPM
- Heads to 455 m | 1,500 ft
- Temperatures to 455° C | 850° F
- Pressures to 70 bar | 1,000 PSIG

Applications:

- Refinery – Tower bottoms, process feed, column reflux, circulation and pump around, process booster
- Power Plant – Boiler feed booster, boiler circulation, ash sluice

Materials: All API materials, custom materials available

7200SB

- Capacity to 600 m³/h | 2,200 GPM
- Total Dynamic Head to 2430 m | 8,000 ft
- Temperature to 425° C | 800° F
- Pressure to 275 Bar | 4,000 PSIG
- Operating Speed to 3,600 RPM

Applications:

- Petroleum refining, production, and distribution
- Petrochemical and demanding chemical processing
- High temperature applications including boiler circulation
- General industrial requiring high temperature or high pressures

Materials: All API materials, custom materials available

API Process

3700i

- Capacities to 1930 m³/h | 8,500 GPM
- Heads to 360 m | 1,200 ft
- Temperatures to 425° C | 800° F
- Pressures from full vacuum to 60 bar | 870 PSIG

Applications:

- Column Reflux
- Column Bottoms
- Reboiler
- Injection
- Fuel Blending
- Heat Transfer
- Slop Gas Oil Transfer
- Heavy Gas Oil
- Stripper Overhead
- Hot Oil
- Column Charge
- Reactor Feed
- Stabilizer Overhead
- Scrubber Circulation
- Tower Bottoms
- Offsite Hydrocarbon

Materials:

All API materials, custom materials available

3910

- Capacities to 1,360 m³/h | 6,000 GPM
- Heads to 230 m | 750 ft
- Temperatures to 340° C | 650°F
- Pressures to 42 bar | 600 PSIG

Applications:

- Refinery Units – Distallation, Flasher, CCU, Hydrotreater, MTBE, Alkylation, Reformer, Gas Plant, Isomerization
- Petrochemical Plants – Olefins, BTX Recovery, Ethylene Glycol, Vinyl Chloride, Styrene, Phenol, Propylene Glycol, Alcohols, Ketones, Acids, Acrylonitrile, Anhydrides

Materials:

All API materials, custom materials available

ISO

IC i-FRAME

- Capacities to 450 m³/h | 1,980 GPM
- Heads to 160 m | 525 ft
- Temperature ranges from -40° C to 280°C | -40° F to 530˚ F
- Pressures to 25 bar | 360 PSIG

Applications:

- Chemical
- Petrochemical
- Pulp & Paper
- Primary Metals
- Food & Beverage
- General Industries

Materials:

Ductile Iron, Carbon Steel, 316SS, Duplex SS, Alloy 20, Hastelloy C, Titanium

Sealed Lined & Non-Metallic

3296

- Capacities up to 159 m³/h | 700 GPM
- Heads to 213 m | 700 ft
- Temperatures to 280° C | 535° F
- Pressures to 19 bar | 275 PSIG

Applications:
- Batch Chemical Process
- Rail Car or Tank Unloading
- Specialty Chemicals

Materials: 316SS, others upon request

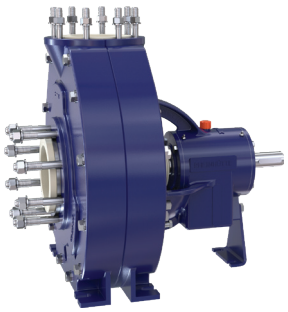
3298

- Capacities to 270 m³/h | 1,200 GPM
- Heads to 162 m | 500 ft
- Temperatures to 121°C | 250° F
- Pressures to 16 bar | 225 PSIG

Applications:
- Rail Car or Tank Unloading
- Batch Chemical Process
- Specialty Chemicals
- Column Reflux or Bottoms
- Reactor Feed

Materials:
- ETFE

RCNKu



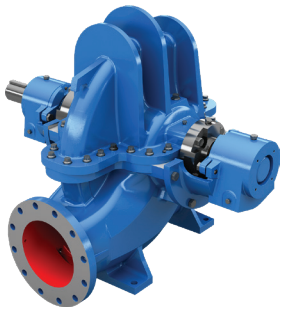
- Capacities to 2500 m³/h | 11007 GPM
- Heads to 100 m | 328 ft
- Temperature ranges from -40 °C to 190 °C | -40 °F to 374 °F
- Pressures to 16 bar | 232 PSIG

Applications:
- Brine
- Chemical Wastewater
- Chloralkali
- Flue gas scrubbers
- Waste incineration plants
- Hydrochloric acid
- Sea water
- Steel industry
- Sulphuric acid

Materials:
- PP
- PE 1000
- PE 1000R
- PVDF
- PTFE

Multistage/Double Suction

3409



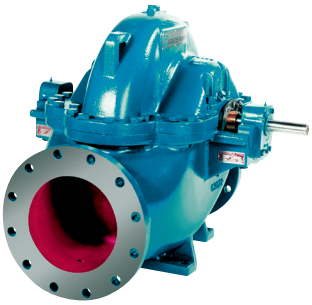
- Capacities to 2,725 m3/h | 12,000 GPM
- Heads to 259 m | 850 ft
- Temperatures to 120° C | 250° F
- Working Pressures to 2758 kPa | 400 PSIG

Applications:

- Process – Quench water, Stripper bottoms, Reboiler circulation, Cooling tower
- Pulp & Paper – Primary and secondary cleaner, filtrate, mill water supply Fan pump, Headbox supply, Shower
- Primary Metals – Cooling water, quench and leaching
- Municipal – High lift, low lift, wash water, waste water, raw water
- Power Generation – Cooling tower, Component cooling, Service water, Ash Sluicing, Heater drain
- Marine – Bilge and ballast, cargo, cooling water, fire pump
- General – River water, Brine, Sea water

Materials: Cast Iron / Bronze, All Iron, Cast Iron / Stainless Steel, Cast Iron / Ni-Al-Br, All Stainless Steel. Other materials available upon request.

3410



- Capacities to 1,817 m3/h | 8,000 GPM
- Heads to 174 m | 570 ft
- Temperatures to 177° C | 350° F
- Pressures to 1,724 kPa | 250 PSIG

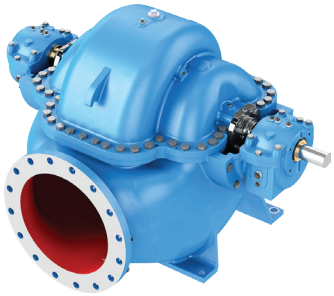
Applications:

- Process – Quench water, Stripper bottoms, Reboiler circulation, Cooling tower
- Pulp & Paper – Primary and secondary cleaner, filtrate, mill water supply shower, fan pump
- Primary Metals – Cooling water, quench and leaching
- Municipal – High lift, low lift, wash water, waste water, raw water
- Utilities – Cooling tower, component cooling, service water
- Marine – Bilge and ballast, cargo, cooling water, fire pump

Materials: Cast Iron / Bronze, All Iron, Cast Iron / Stainless Steel, Cast Iron / Ni-Al-Br, All Stainless Steel. Other materials available upon request.

Multistage/Double Suction

3498



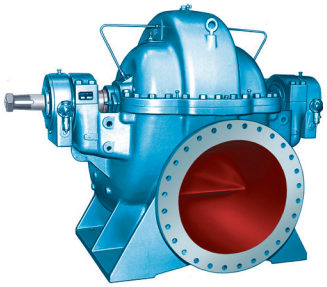
- Capacities to 18,000 m3/h | 80,000 GPM
- Heads to 244 m | 800 ft
- Temperatures to 135°C | 275°F
- Working Pressures to 200 PSIG

Applications:

- Process – Quench water, Stripper bottoms, Reboiler circulation, Cooling tower
- Pulp & Paper – Primary and secondary cleaner, filtrate, mill water supply Fan pump, Headbox supply, Shower
- Primary Metals – Cooling water, quench and leaching
- Municipal – High lift, low lift, wash water, waste water, Raw water
- Power Generation – Cooling tower, Component cooling, Service water, Ash Sluicing, Heater drain
- Marine – Bilge and ballast, cargo, cooling water, fire pump
- General – River water, Brine, Sea water

Materials: Cast Iron / Bronze, All Iron, Cast Iron / Stainless Steel, Cast Iron / Ni-Al-Br, All Stainless Steel. Other materials available upon request. (1724 kPa)

3420



- Capacities to 14,762 m3/h | 65,000 GPM
- Heads to 122 m | 400 ft
- Temperatures to 135°C | 275°F
- Working Pressures to 1379 kPa | 200 PSIG

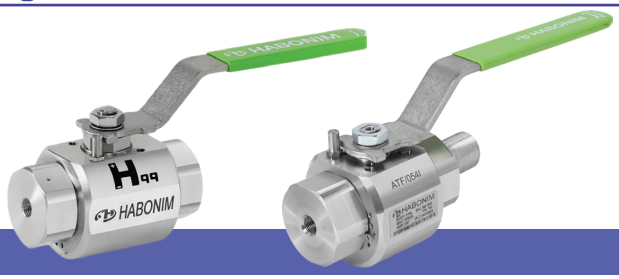
Applications:

- Process – Quench water, Stripper bottoms, Reboiler circulation, Cooling tower
- Pulp & Paper – Primary and secondary cleaner, filtrate, mill water supply Fan pump, Headbox supply, Shower
- Primary Metals – Cooling water, quench and leaching
- Municipal – High lift, low lift, wash water, waste water, raw water
- Power Generation – Cooling tower, Component cooling, Service water, Ash Sluicing, Heater drain
- Marine – Bilge and ballast, cargo, cooling water, fire pump
- General – River water, Brine, Sea water

Materials: Cast Iron / Bronze, All Iron, Cast Iron / Stainless Steel, Cast Iron / Ni-Al-Br, All Stainless Steel. Other materials available upon request. (1724 kPa)

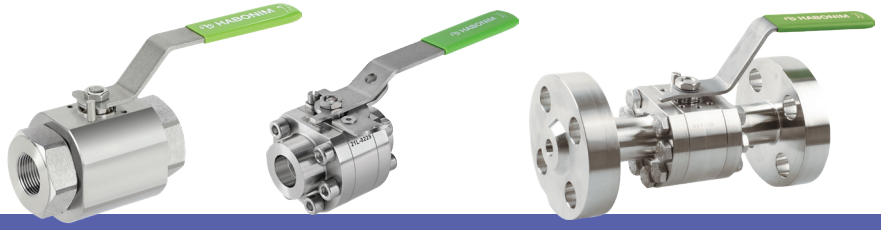
Habonim Valves

Ultra High Pressure (Series H99,Series H29,Series H25, Series H24)



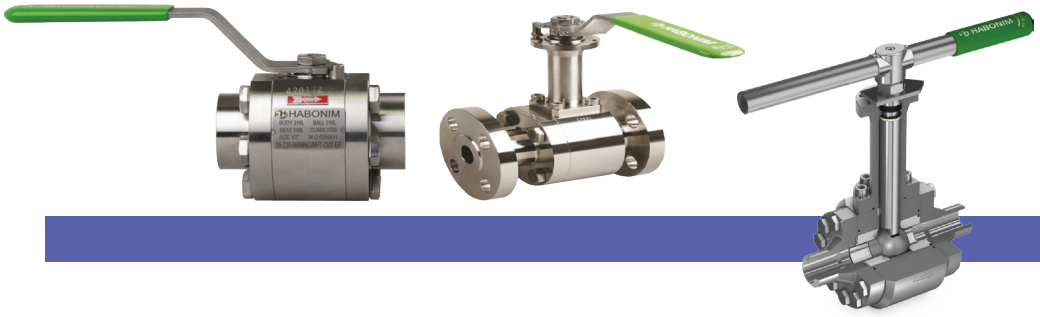
- Size Range: ¼" – 11/2"
- Pressure Rating: 15,000 PSIG Max
- Temperature: 185F Max
- End Connection: Coned & Threaded, Threaded

High Pressure (Series 28,Series 27,Series 24)



- Size Range: ¼" – 8"
- Pressure Rating: 6,000 PSIG Max
- Temperature: 185F Max
- End Connection: Welded, Flanged, Threaded

High Temperature (Series Z47,Series Z73,Series Z74)



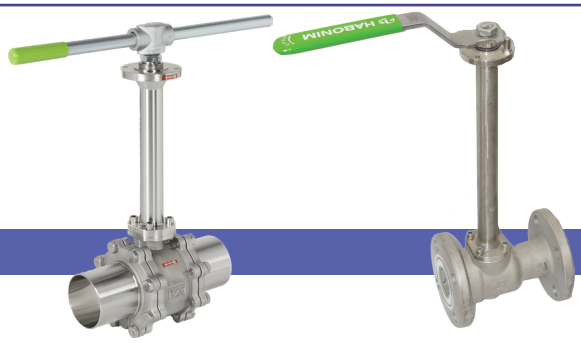
- Size Range: ¼" – 12"
- Pressure Rating: 6,000PSIG Max
- Temperature: 1,200F Max
- End Connection: Flanged, Threaded, Welded

Industrial (Series 47,Series 31,Series 32,Series 73,Series 74)

- Size Range: ¼" – 16"
- Pressure Rating: 2,175PSIG Max
- Temperature: 500F Max
- End Connection: Flanged, Threaded, Welded

Habonim Valves

Cryogenic (Series CH47,Series CH31)



- Size Range: ¼" – 12"
- Pressure Rating: 1,500PSIG Max
- Temperature: -434F Min
- End Connection: Flanged, Threaded, Welded

Control (Series N47,Series N31,Series N32,Series N73,Series N74)

- Size Range: ¼" – 8"
- Pressure Rating: 2,175PSIG Max
- Temperature: 500F Max
- End Connection: Flanged, Threaded, Welded

Standards & Certifications:

- ISO23826; TPED – Valves for gas cylinders
- ISO19880-3 – Valves for Hydrogen fuel stations
- ATEX IIC – Explosive environment
- SIL3 – Safety
- API607; ISO10497 – Fire Safe
- API641; ISO10497 – Fugitive Emission
- ASME B16.34 – Valve Design

Engineered Valves

Dia-Flo

Dia-Flo® diaphragm valves are an economical solution for various Hydrogen & Ammonia applications due to their versatility in body and diaphragm materials. Capable of handling clear fluids as well as slurries, diaphragm valves are well-suited for corrosive, abrasive and clogging services. Both Dia-Flo weir and straightway style valves are available with a manual operator or Dia-Flo® actuator (pneumatic or electric).

- Size Range: ½" – 12"
- Pressure Rating: 200 PSIG Max
- Temperature: 350F Max
- Materials: Unlined, Plastic/Rubber/Glass Lined, Solid Plastic
- End Connection: Flanged, Weld End, Threaded

Cam-Tite

Cam-Tite ball valves are engineered to provide the very best performance in demanding hazardous and corrosive applications. The unique non-spherical ball mechanically compresses both upstream and downstream seats to provide a tight, dependable seal independent of line pressure.

- Size Range: ½" – 6"
- Pressure Rating: 150#, 300# & 600#
- Temperature: 550F Max
- Materials: Carbon Steel, Stainless Steel, Alloy 20, Monel, Hastelloy C, Nickel, Titanium, Inconel
- End Connection: Flanged, Weld End, Threaded

Benefits:

- Minimizes pressure on seats to reduce cold flow and extend seat life.
- Eliminates the problem of "breakaway torque" in valves that must rest in the open position for long periods.
- Assures positive sealing regardless of line pressure or pressure differential.
- Eliminates seat damage caused by the leading edge of the ball port cutting into the seat as the ball closes.

Cam-Line

The unique Cam-Line trunnion ball valve was designed to overcome problems inherent in conventional lined plug and ball valves (high operating torque and stem leakage). The design objective was to produce a lined quarter-turn valve that is easy to operate with positive shut off at high and low pressures. To provide a reliable stem seal design, every Cam-Line valve comes standard with a low emission stem seal packing design.

- Size Range: ¾" – 6"
- Pressure Rating: 250 PSIG Max
- Temperature: 250F Max
- Materials: Ductile Iron / ETFE Lined
- End Connection: Flanged

Monitor & Control

i-ALERT®

Remote Monitoring Solution

Zero Unplanned Downtime

Sensor | App | Gateway | Diagnostics | Ai Platform

Monitor
Tracks vibration, temperature & run-time hours 24/7/365.

Alarm
Takes high resolution data when an alarm condition occurs and stores it for later analysis.

Trend
Captures data every 30 seconds - 60 minutes and has up to 170 days of hourly on-board storage.

Analyze
Diagnose machine faults with vibration tools
Fast Fourier Transform (FFT) & Time Wave Form Analysis.

Environment
Rated for any industrial environments; Water & dust resistant.
Intrinsically safe with a 2-3-year battery life (use dependent).
- Class1 div1
- ATEX Zone 0 AEx ia IIB Ga (Groups C & D)

Wireless
Sync data via Bluetooth 5.0 or i-ALERT Gateway enabled smartphones and tablets.

Online Monitoring & Diagnostics
Monitor and manage your i-ALERT enabled machines in one place - i-ALERT Ai Online Platform with automated diagnostics. This subscription service requires no software to download or dedicated hardware to run.

www.i-alert.com

PumpSmart

PS220
Smart Control and Protection

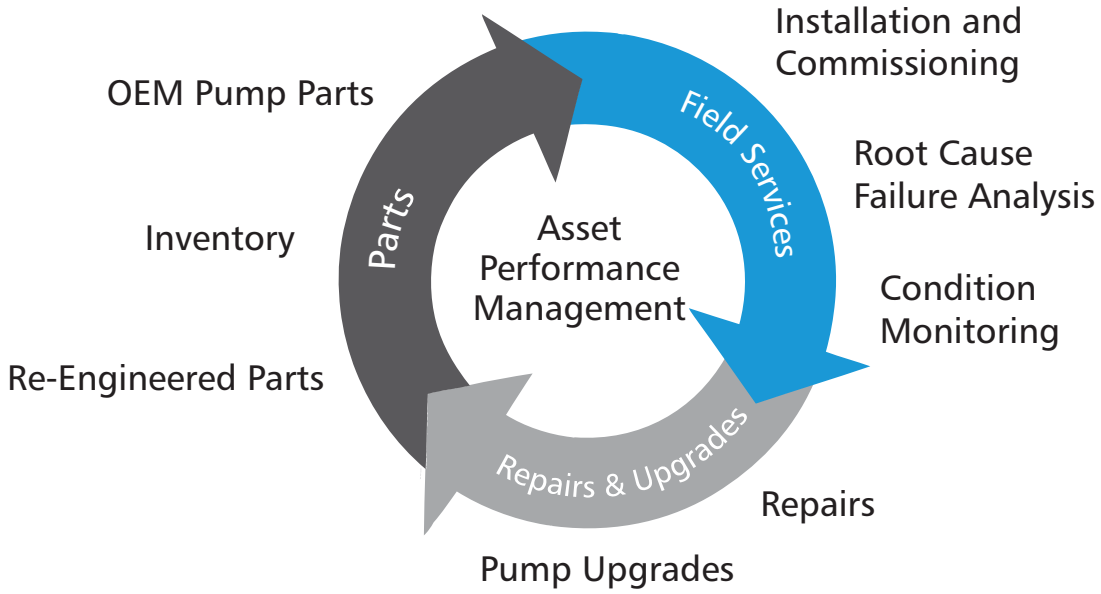
The industry award-winning and patented pump control logic delivers real-time control and protection of your pumps while also providing valuable process insight. By protecting against pump failure due to process upsets, PumpSmart keeps your operation running longer and reduces unplanned repair activities and expense. By right-sizing your pumps to your system, we can reduce not only your energy consumption, but also wear & tear on your process systems.

Features:
- **Smart Flow**
  This patented feature allows PumpSmart to accurately control a process flow WITHOUT a flow meter.
- **Pump Protection**
  Provides the operator the ability to set protection for low flow, no flow, run-out and cavitation.
- **Flow Economy**
  Calculates process efficiency by flow of product versus energy consumption (gpm/kW).
- **Multi-Pump Control**
  Provides control for up to four pumps in a parallel for automatic lead/lag changeover, redundancy back-up and synchronized torque control while still communicating to a field bus or DCS system.
- **Options and Engineered Solutions**
  Available in a low-harmonic configuration guaranteed to meet IEEE519 harmonic specifications for industries requiring low-harmonic distortion on the utility line.

Reliability has no quitting time.

PRO services
An ITT Brand

Building on centuries of pump design experience, **PRO Services** provides an array of services focused on reducing equipment total cost of ownership (TCO) and increasing plant output, including condition monitoring, predictive maintenance contracts, field service, engineered upgrades, inventory management, and overhauls for pumps and other rotating equipment.



https://www.ittproservices.com/About/Service-Locations

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Habonim
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