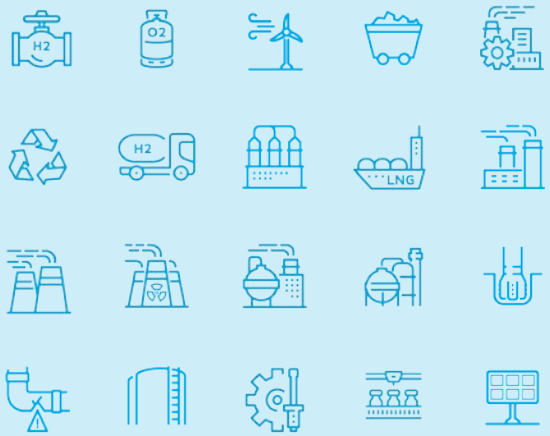
PERRIN

A member of KITZ Corporation

A passion for Ball Valves

You can find our ball valves in various industries

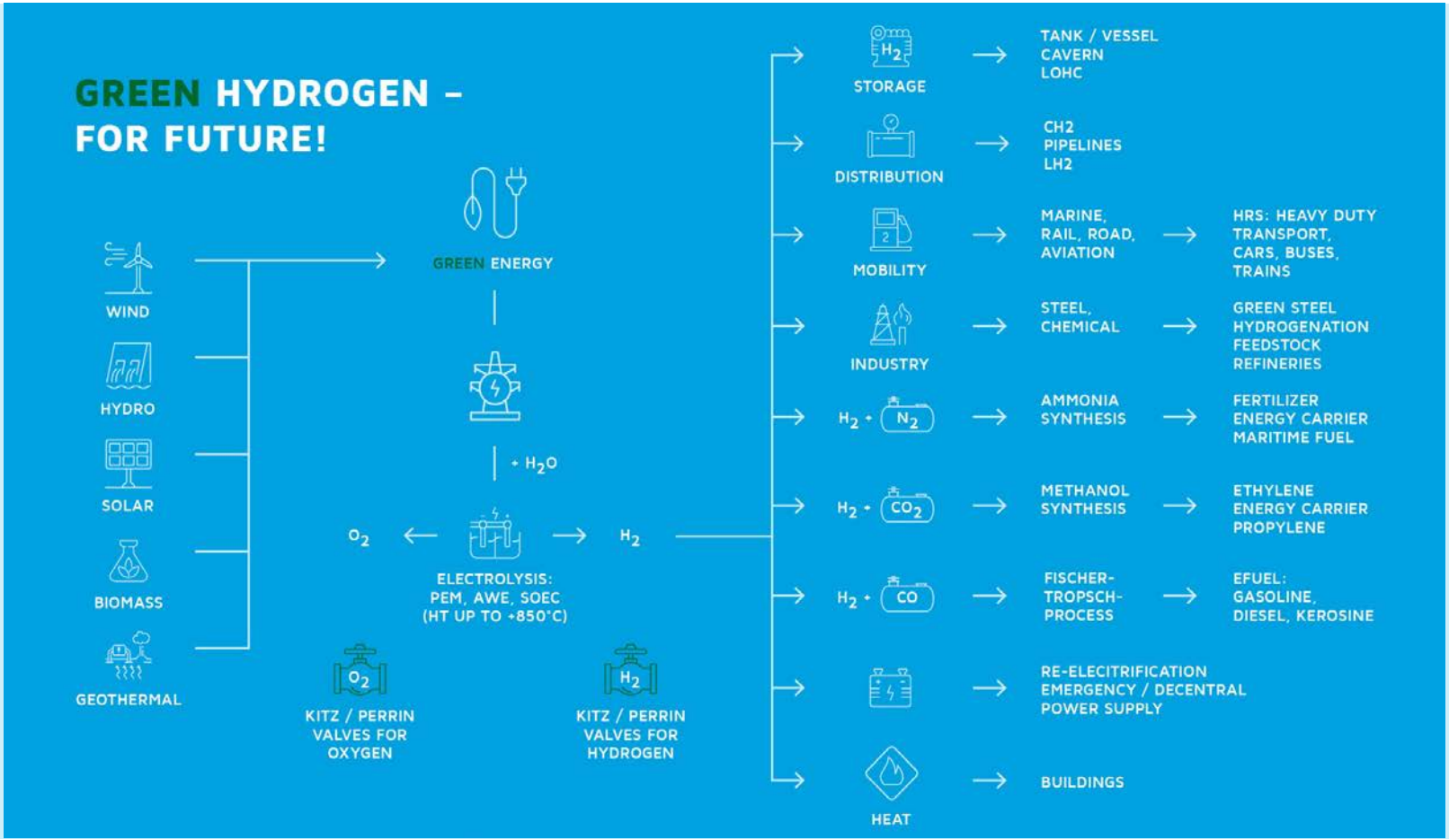


- Hydrogen
- Oxygen
- Plant engineering
- Coal gasification
- Iron, steel and aluminum
- Energy and waste management
- Transport of solids
- Refineries
- Liquefied natural gas (LNG)
- Cement
- Power plants
- Nuclear power plants
- Chemistry
- Petrochemistry
- Deep water drilling
- Corrosive media
- Storage
- Renewable energies
- Dosing
- Solar

What is to be tackled?

Hydrogen is unique

KITZ develop the hydrogen valves used under severe environmental condition, cryogenic or ultra-high pressure, with advanced technologies.



Product Range (Extract)

Type	Size up to [DN]	Pressure up to [bar]	Temperature range -196°C +850°C	Valve Type	Seats	Spring loaded	Material	Special version
KH 75	100	40		Floating	S,M,C		SS, CS	
KH 85	150	40		Floating	S,M	Y	SS, CS	
KH 70	300	250		Floating	S,M,C,K,		free	
KH 80	300	420		Floating	S,M,C,K, N,E,H	Y	free	Cryo High temp.
KH 14	600	420		Trunnion	S,M,C,K, N,E,H	Y	free	Cryo High temp.
KH 16	250	420		Trunnion	S,M,C,K	Y	free	High cycle
KH 20 ..	500	420		Both	S,M,C,K	Y	free	3-a. 4-way
CTB	**40**	**1030**		**Both**	**S,M**	**Y**	**SS**	**H2 High Pressure**

H_2 - Production

- **Electrolysis**
  - PEM
  - AWE
  - SOEC (High temperature up to + 850°C)

- **Valves for Oxygen**
  - Oxygen has special requirements
  - Perrin-oxygen-valves for many other applications

- **Valves for other media**
  - Demineralised water, heat transfer media, steam

H_2 - Production

Electrolyzer
Valve products for Electrolyzer



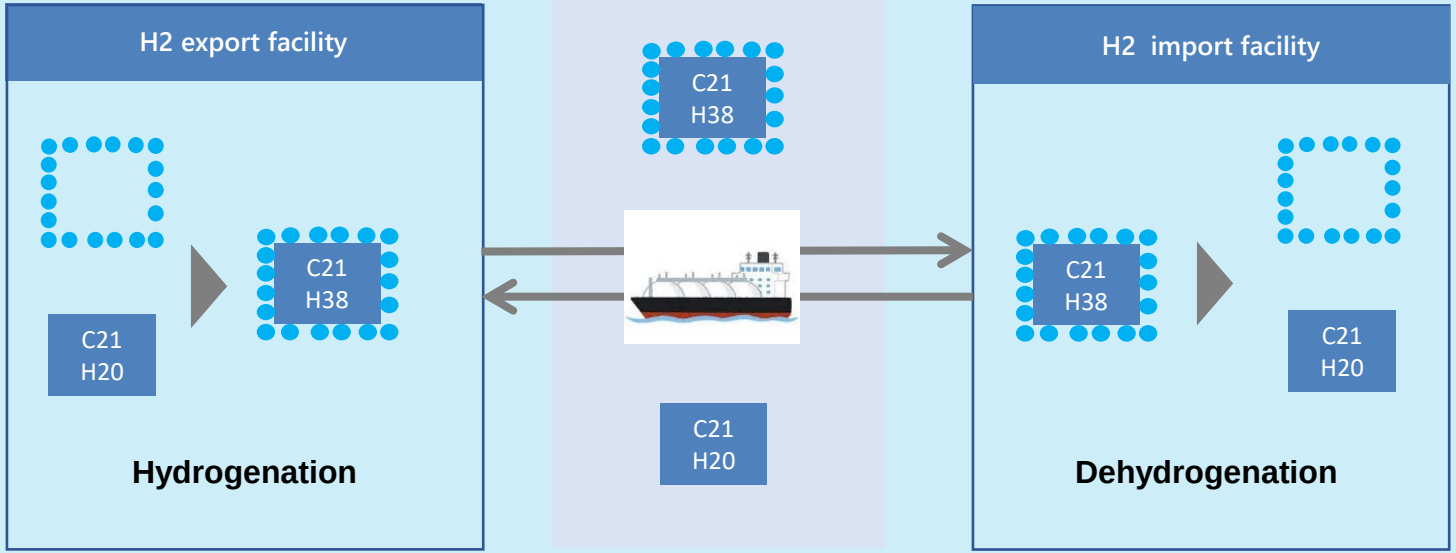
Valve	Material	Class	Size
Globe	SCS13A	10K, 20K	15 ~ 125A
Check	SCS13A	10K, 20K	15 ~ 250A
Butterfly	FCD450-10	10K	80 ~ 350A

KITZ Valves in the PtG project in Fukushima

Photo by NEDO(New Energy and Industrial Technology Development Organization)

H_2 - Distribution and Storage

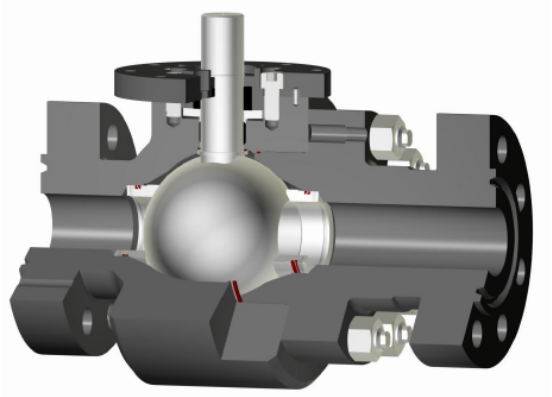
- Valves for **HIGH PRESSURE** storage Class 4500 (PN 700 bar)
- For **LOHC**, KITZ offer valves for each processes in plant on land and ship at ocean.



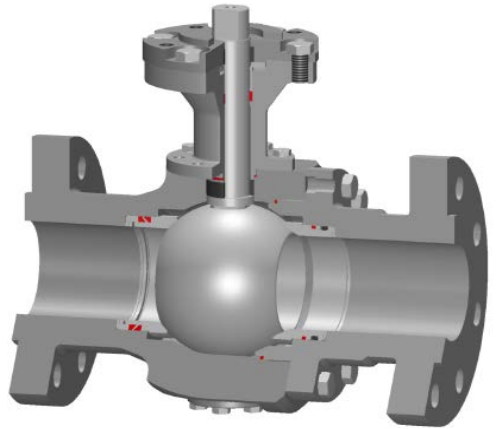
Cavern Underground Storage

Leakage rate A
Plate Springs
Coil Spring

Two-way ball valve metallic sealing
Series 88-M for cavern use



Two-way ball valve metallic sealing
Series 14-M for cavern use



H_2 - Distribution and Storage

KITZ – Cryogenic valves for shipping and storage

Category	Temperature range	-256 -196 -104 -48	Valve Type	Service	Valve shell material	Standard
I	-256°C (-492°F)		Globe	LH2	Stainless steel	T.B.D
II	-196°C (-321°F)		Gate, Globe, Check, Ball	LNG	Stainless steel	A351 Gr.CF8 A351 Gr.CF8M A351 Gr.CF3M
III	-104°C (-155°F)		Gate, Globe, Check, Ball	Ethylene	Stainless steel	
IV	-48°C (-35°F)		Gate, Globe, Check, Ball	LNH3 etc.	Stainless steel	
			Gate, Globe, Check, Ball		Carbon steel	A352 Gr.LCB A352 Gr.LCC





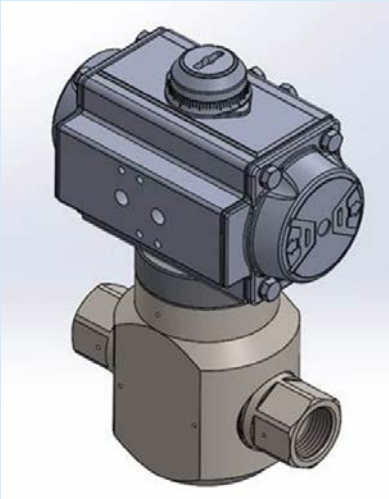
H_2 - Mobility and Storage

- **HRS – Hydrogen refueling stations**
  - Our CLESTEC-Series (ball-/needle-valves, filter, check and excess flow)
  - Maximum Flow → Up to trucks, buses and trains
  - High pressure up to 103 Mpa / 1030 bar

High-Pressure Hydrogen Valves

High-Pressure valve series for Hydrogen refueling station

PERRIN‘s high-pressure valve series for hydrogen stations take advantages especially for managing large flow owing to straight passage by a shape of a ball valve.



High-Pressure ball valve for Hydrogen

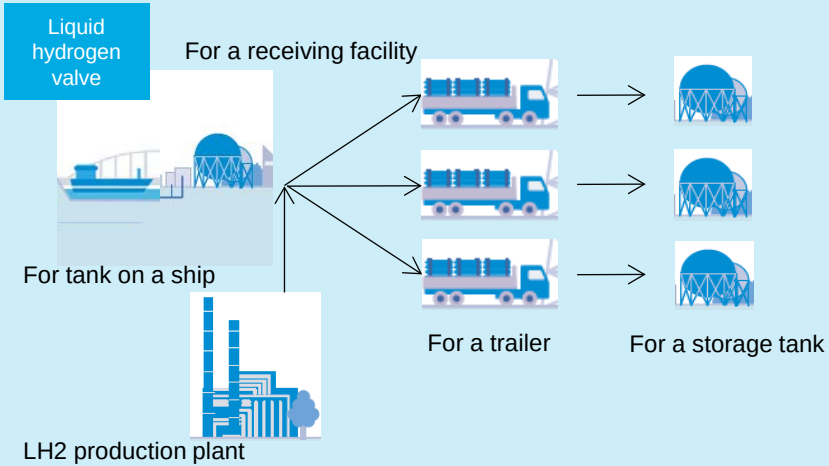
At the hydrogen station, high pressure hydrogen of 70MPa is filled in FCV. We have realized a valve for high pressure hydrogen with a ball valve. Even in an ultra-high pressure environment, the high CV Value realized by the straight structure with a wide flow path and the high seal structure developed by our own technology provide reliability / durability.

Design	Specification
Valve Type	Trunnion ball valve, Full port (straight)
Maximum Service Pressure	103 MPa
Fluid Temperature Range	-50 to 85°C
End Connections	• Cone & Thread • Mechanical joint
Cv Value	2.1 (9/16OD)
Operation	• Pneumatic actuator (spring return) • Manual

LH2 Valves for Storage & Transportation

LIQUID HYDROGEN

When hydrogen gas is liquefied at **-253℃**, its volume is reduced to 1/800. So **liquid hydrogen** is easier to transport and storage. Now, KITZ has been developing the technology for liquid hydrogen transport and storage.

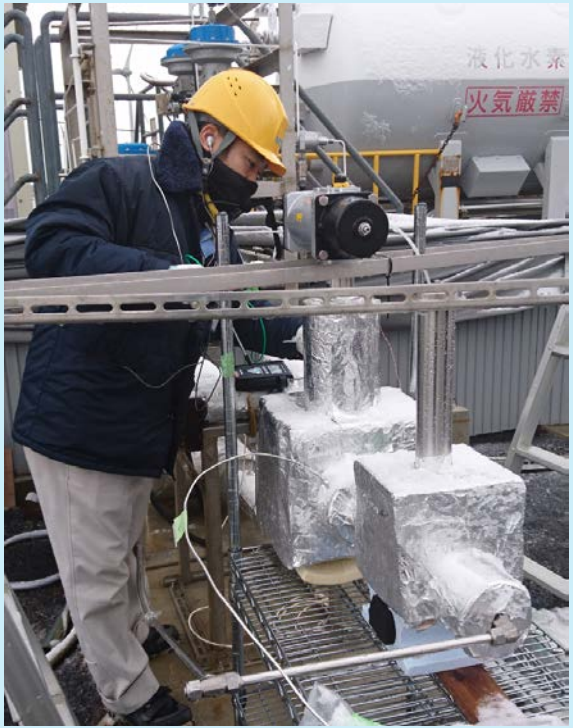


BASIC DESIGN

- **Vacuumed structure & Long body** with full jacket for managing cryogenic gas
- **Bellow Seal** at a stem for tight seal performance

LH2 Valves for Storage & Transportation

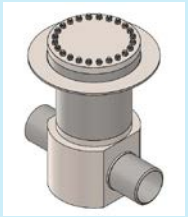
Valve test with liquid hydrogen
in JAXA‘s facility.



LH2 Valves in special use

For Shipping receiving equipment at port (under development)

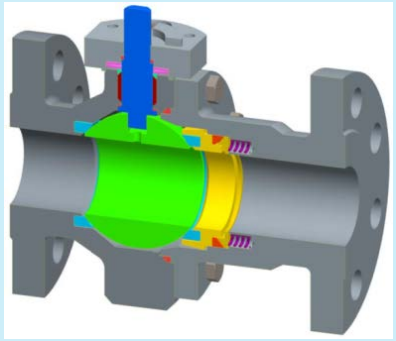
Valve	Material	Class	Size
Globe	316LSS	316LSS	½“ ~ 3“
Ball	316LSS	150/300LB	4“ ~ 20“
Check	316LSS	150/300LB	½“ ~ 20“



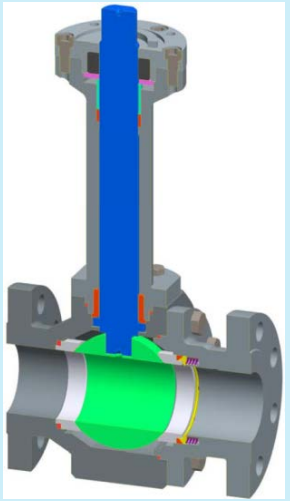
Power to X

Power to liquid: efuels

- Fuel from wind and water
- Synthesis with CO_2 (Fischer-Tropsch, T = ca. 650°C)
- Synthesis with N_2 (Haber-Bosch)
- Ammonia
- Gasoline
- Methanol



KH 80-S

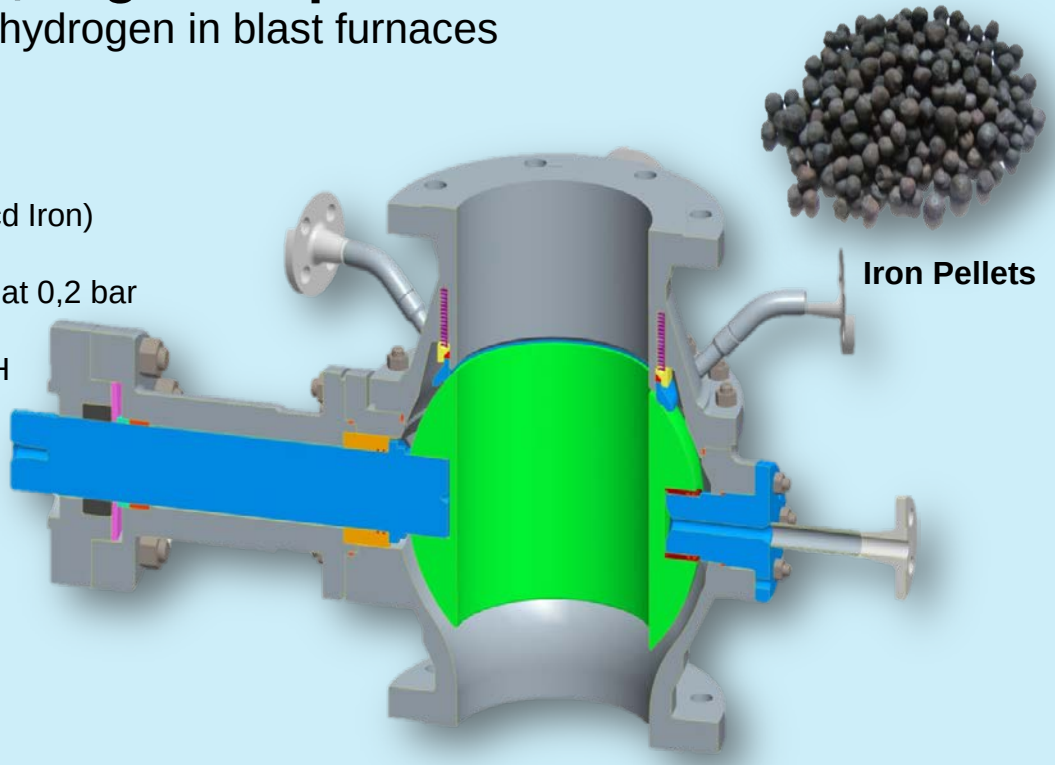


KH 80-K

Green Steel
Direct Iron Reduction, High Temperature

Substitution of coal powder by hydrogen in blast furnaces

- **Ball Valve Type 14-E**
- Process: HDRI (Hot Direct Reducecd Iron)
- Medium: Iron Pellets ø8 to 18mm
- Temperature: up to 750°C (1380°F) at 0,2 bar
- DN 4” to 18”
- Material Flow Rate: up to 400 MTPH (Metric Ton Per Hour)
- Installed in vertical pipe
- Purge Connections for N2 injection
- SS A351 CF8M with F316 trims



Iron Pellets

Direct Iron Reduction, High Temperature

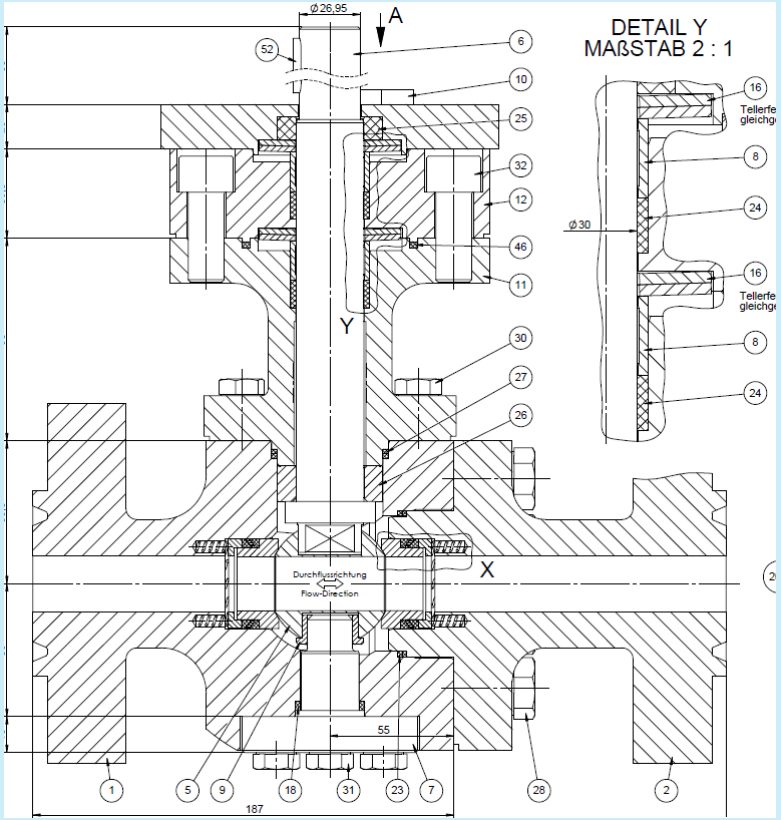
Lock-hopper ball valves
Type 14-E
DN 12“ Class 300
4,4 bar at 774°C
With Control-Cabin, Pneumatic
Seat- and Graphite-Injection-System

Design and Testing

- Customised product solutions „H2-Readiness“
- Application of existing regulations:
  - Material selection
  - Design
- Highest quality in production
- Acceptance test according to strict criteria, especially internal and external tightness, e.g. DIN EN ISO 15848-2

Hydrogen specific design

- 100% H2 resistance/compatibility
- Internal and external leakage
- Double packing
- Double sealing
- Material selection
  - Carbon steel, stainless steel
  - Graphite / PTFE
- Avoiding Hydrogen Embrittlement, Permeation



HYDROGEN FOR FUTURE