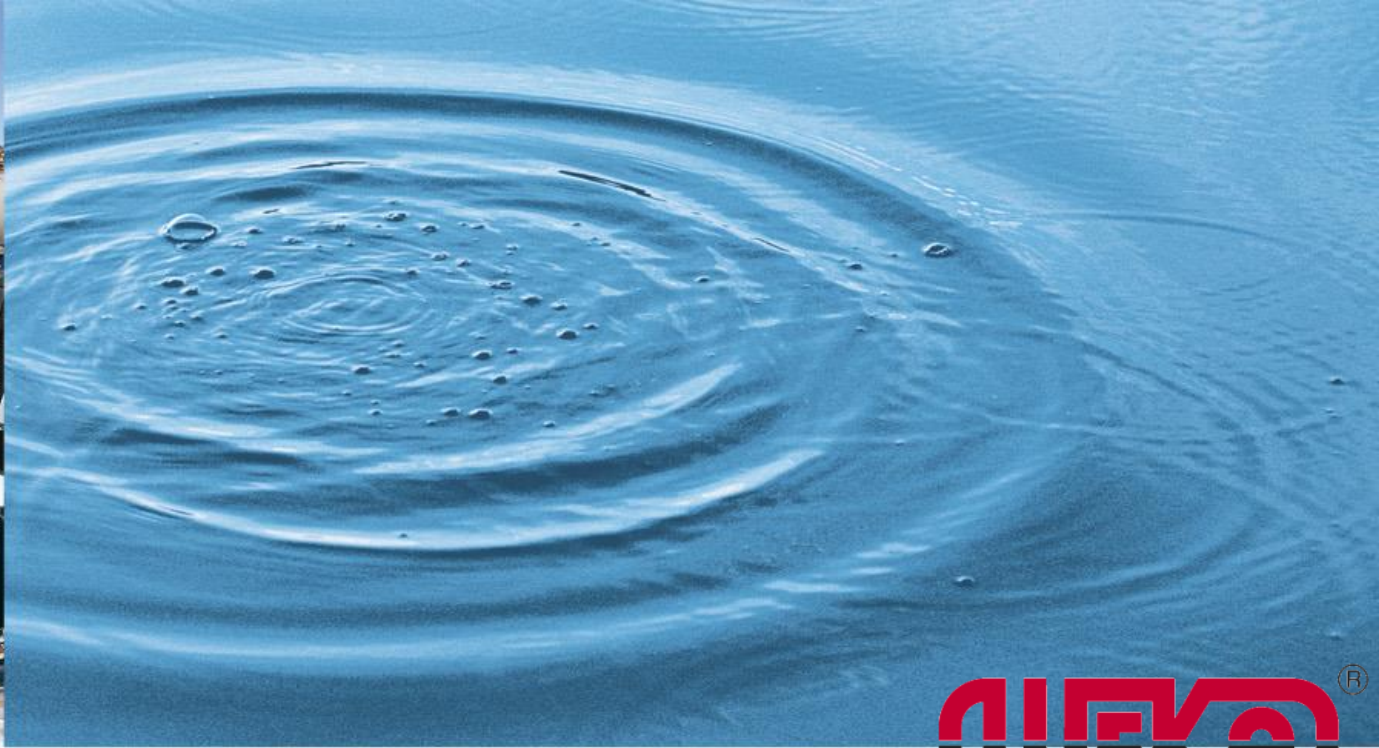




Member of the **ARCA** Group
FLOW

Short introduction to WEKA Valves & Cryogenic Components

Content

- Introduction
- Products & Markets
- Testing and Qualification of components
- WEKA valve inquiry guideline
- References

Introduction

Cryogenic Components		Valve Technology	
Valves and components for temperatures down to 1.8K, typically Helium and Hydrogen applications		Valves and components for temperatures down to 1.8K and up to 1000 bars	
• Cryogenic flow meter WEKA SENSE® • Cryogenic transferline couplings • Ejectors	• Cryogenic low pressure valves • Cryogenic high pressure valves • Bättig valves • Cryogenic needle valves • Cryogenic check valves • Cryogenic safety valves	• High pressure valves • Needle valves • H2-valves • Gas recovery check valves	

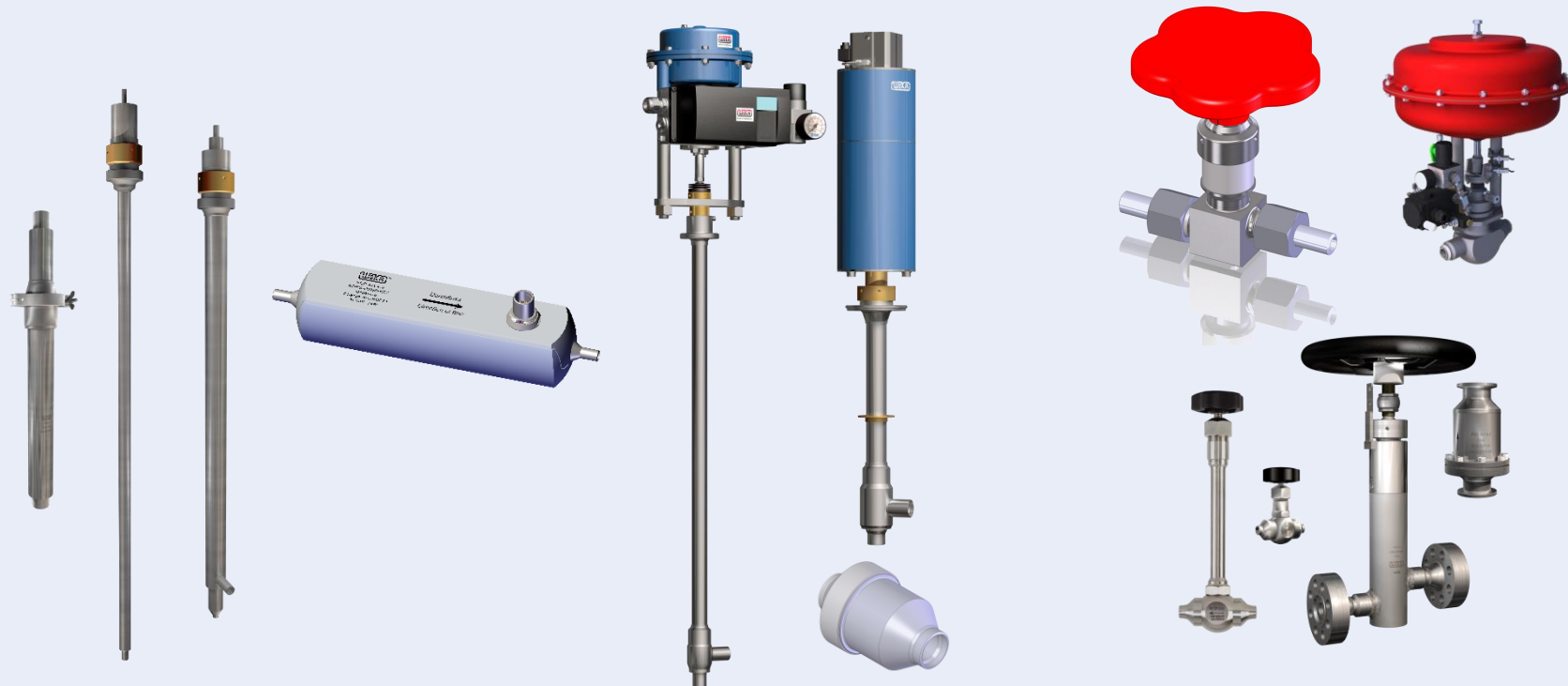
Introduction

Cryogenic Components

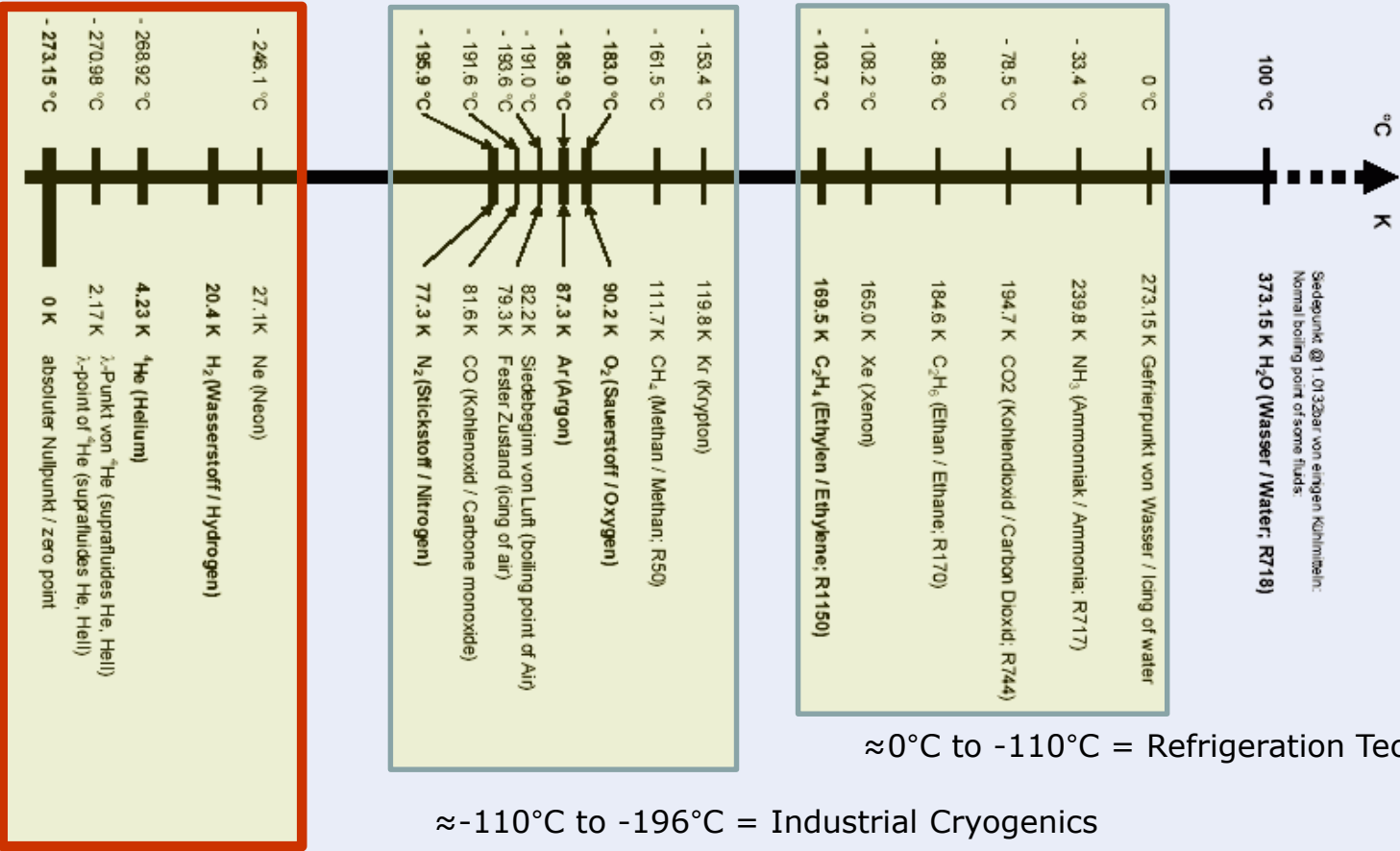
Valves and components for temperatures down to 1.8K,
typically Helium and Hydrogen applications

Valve Technology

Valves and components for temperatures down to 1.8K
and up to 1000 bars



Introduction



- **cryo or cryos:** Greek for "icy cold"
- **Cryogenics:** study of producing very low temperatures
- T<100K

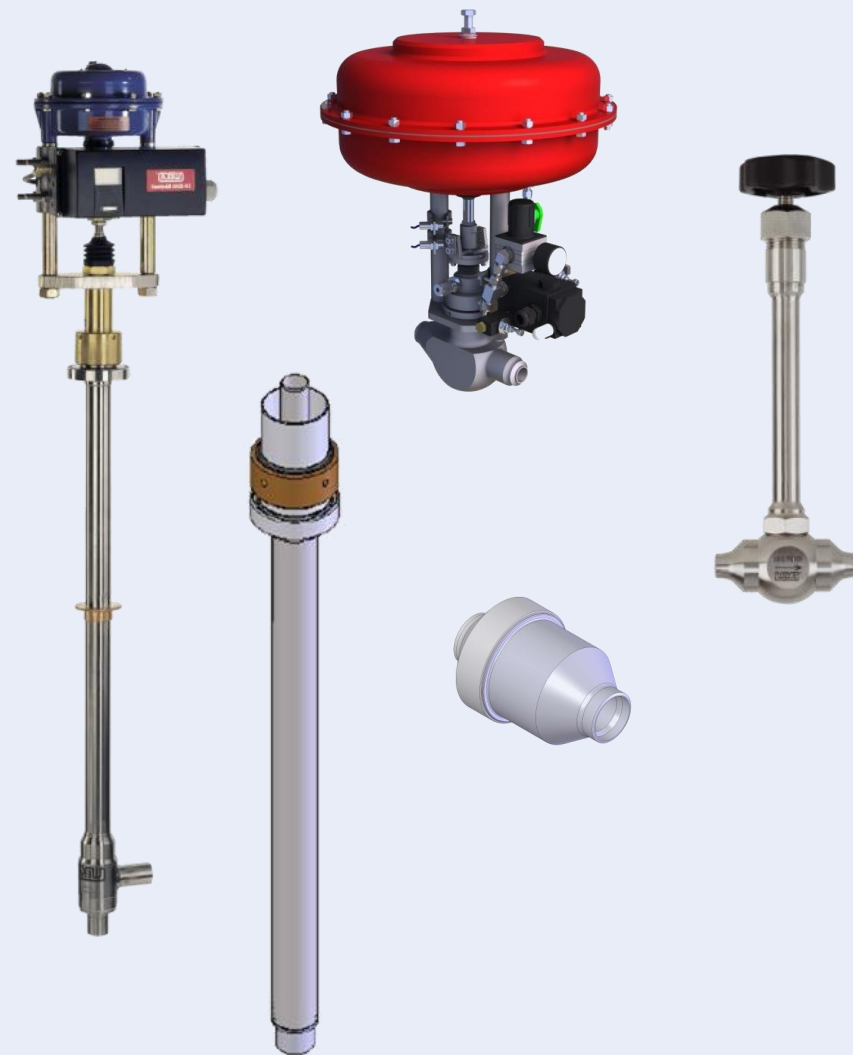
≈0°C to -110°C = Refrigeration Technology

≈-110°C to -196°C = Industrial Cryogenics

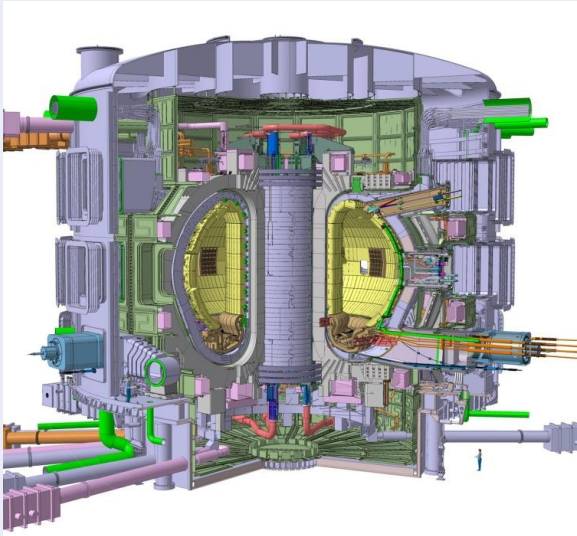
≈-196°C to -271°C and lower = Cryogenics for special requirements in research projects or for new energy storage

Valves and Components for Gas & Cryogenic Applications

- Cryogenic Valves and components for service temperatures **down to 1.8K** (-271°C)
- **Cryogenic control and shut-off valves, bellow sealed** towards outer environment
 - DN2 to DN250, high flow rate relative to nominal size due to optimized valve design
 - Standard PN25 and PN40 (specific types up to PN1000)
 - Low mass design for minimal heat loss, reducing operating costs
 - Seat sealing function and flow control function clearly separated
 - 316L for pressure bearing parts, connections usually welded
- **Johnston couplings**, multi coaxial couplings, warm and cold check valves
- **High pressure valve**
- Cryogenic and ambient **check valves**
- **Manual needle valves**
- **Cryogenic flow meter** **WEKA SENSE**[®]



Market of WEKA Valves and Cryogenic Components



Nuclear Fusion
Basic Research
Plasma Physics



Liquefaction, Distribution and Storage
of Hydrogen for Automotive Application



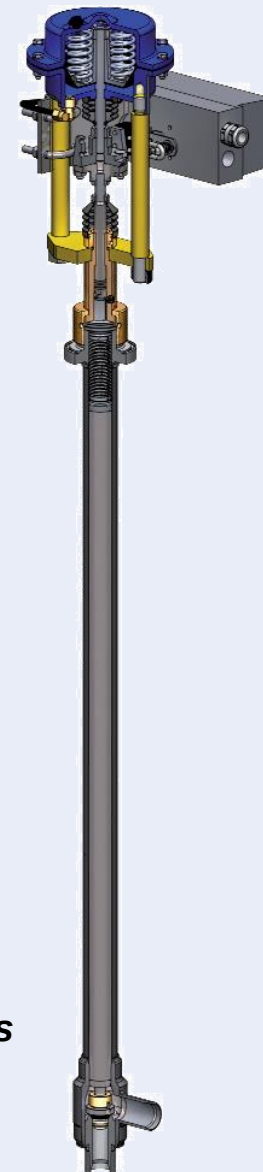
Supply of Oxygen, Hydrogen, Helium,
Nitrogen for Aerospace Infrastructures

WEKA Cryogenic bellow-sealed valves

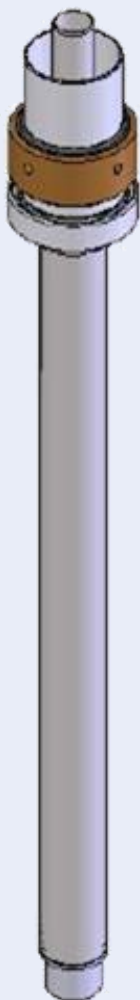
- Manual or pneumatic actuated raising stem valve
- Seat integrated in valve body, interchangeable seat seal
- Top load design and built-in flange for welding on vacuum-insulated valve box
- Low heat load and several options to reduce heat load
- Shut-off or control function
- Flow plug without sealing function
- DN6 to DN250
- PN25
- -271°C...+50°C
- butt weld ends, direct or angle body pattern
- bellow-ring-sealed stem

Application

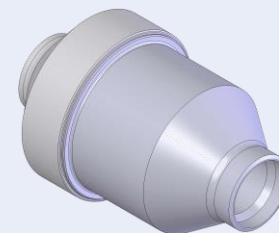
- Process valve for helium and hydrogen liquefaction and refrigeration
- Valve inside of vacuum insulated box
- ***Standard solution for Linde and Air Liquide helium and hydrogen liquefiers***



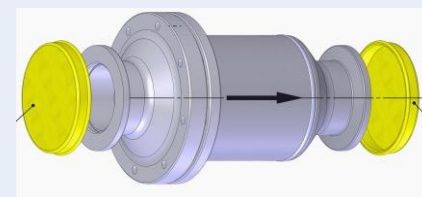
Cryogenic Transferline Couplings and Cryogenic Check Valves



- Cryogenic couplings based on “Johnston” design principle
- Sizes DN 6 – DN200, PN25
- Standard single line couplings including male, female & blind plug for:
 - vertical installation
 - for horizontal installation, including spring loaded cold seal
- Multi-Coaxial couplings
Depending on applications, several different types of standards are available
- Optional design features on request:
 - blinding ball valve
 - x-ray proof sealing materials
 - metallically sealed to outside environment
 - Thermal contact
- Single line coupling including High Voltage Isolation up to 3.0kV



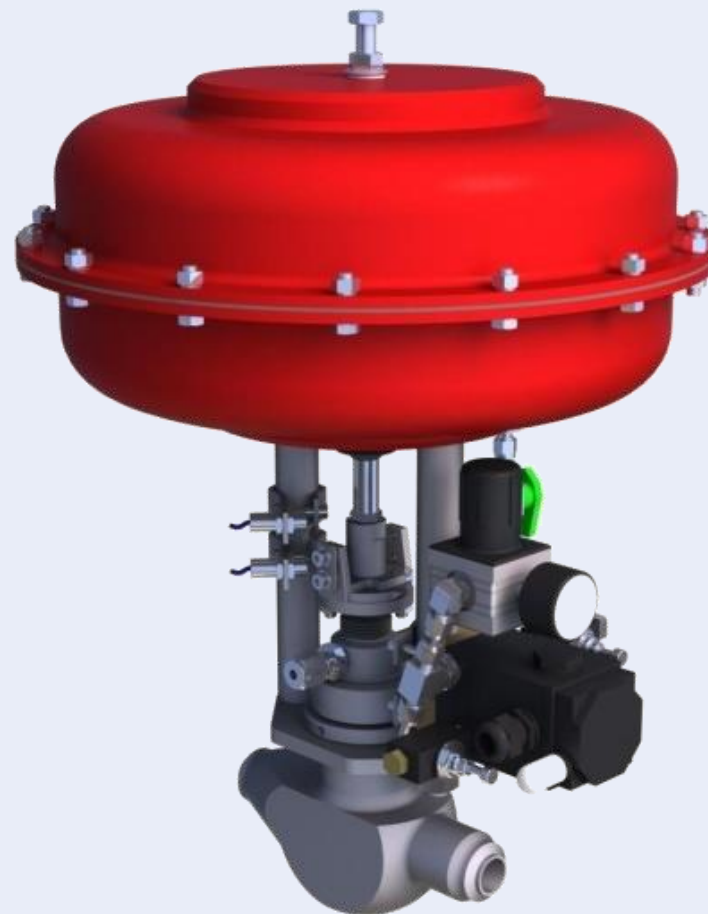
- Non-return valves for cryogenic temperatures and gases up to PN25 / PN40
- Sizes from DN6 to DN200
- Low cracking pressure



- Non-return valves for recovery lines
- Room temperature, pressure up to PN4
- Sizes from DN25 to DN50
- Coupling with KF-flanges

WEKA High pressure Hydrogen Valves

- Manual or pneumatic actuated raising stem valve
- Seat integrated in valve body, interchangeable seat seal
- Top-load design
- Shut-off or control function
- Flow plug without tightening function
- DN6 to DN25 up to PN640 and DN6/PN1000
- -250°C...+50°C
- butt weld ends or high pressure threaded connections
- Double sealing with spring-loaded PTFE v-ring and O-Ring and proof connection
- Blow-out preventing construction



Applications

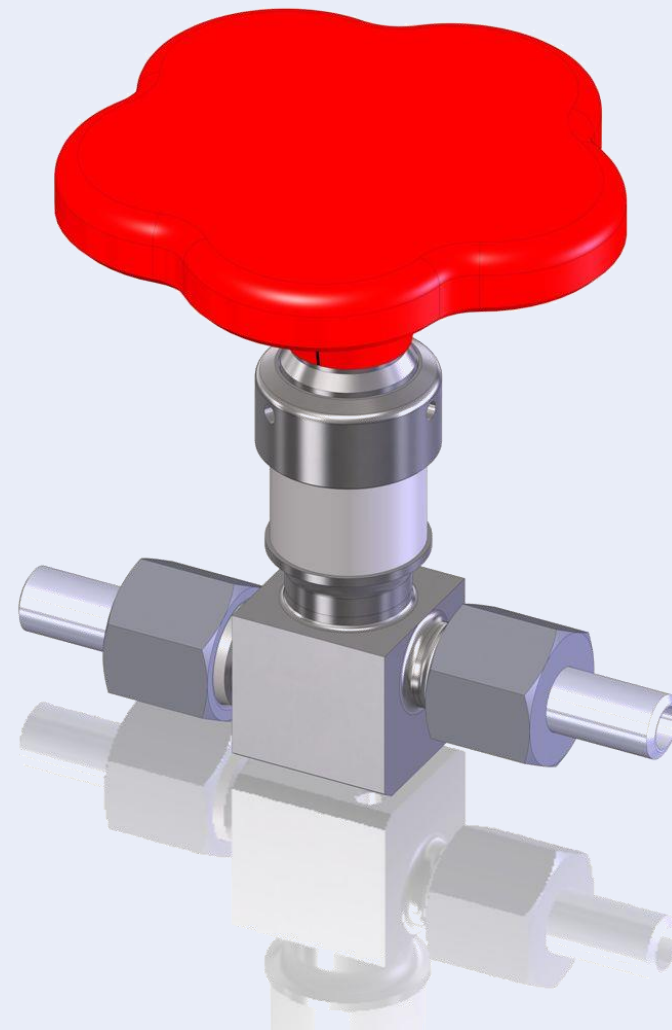
- Process regulating valve and safety relevant shut-off valves
- High-pressure gaseous hydrogen
- Cold service for temperatures down to -250°C with elongated stem

WEKA High pressure Process Shut-off Valves

- Manual or pneumatic actuated raising stem valve
- Seat integrated in valve body, interchangeable seat seal
- Top-load design
- Shut-off or control function
- Flow plug without tightening function
- DN6 to DN25 up to PN420
- DN6 to DN50 up to PN280
- DN6 to DN100 up to PN100
- -250°C...+50°C
- Flanges, thread or butt weld ends
- Double sealing with spring-loaded PTFE v-ring and O-Ring
- Blow-out preventing construction

Applications

- Process valve
- Nitrogen, air, oxygen, CNG, LNG, helium, hydrogen
- Cold service for temperatures down to -250°C with elongated stem

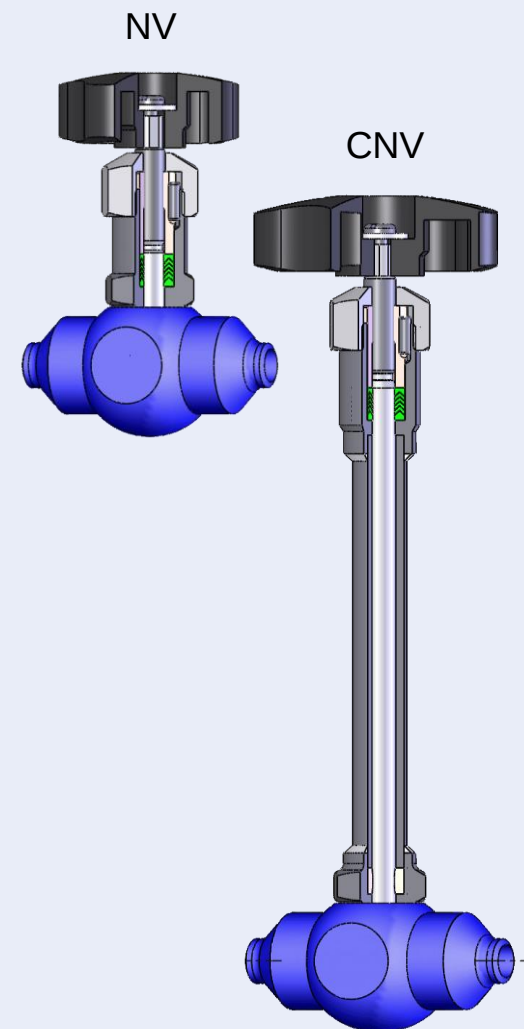


WEKA Stainless Steel Needle Valves

- Hand operated rising stem needle valves
- DN4 to DN15
- PN110, PN260, PN420
- -250°C...+450°C
- Weld neck, thread or butt weld ends
- PTFE or graphite gland package

Applications

- By-pass lines
- Interface to instruments
- Purge
- For Nitrogen, Air, Argon, etc.
- Cold service for temperatures down to -250°C



Testing and Qualification

Test bench 77K, up to 1000bar

- Valve body: test pressure toward vacuum
- Seat: Test pressure toward vacuum
- Function test



Warm test bench, up to 1000bar

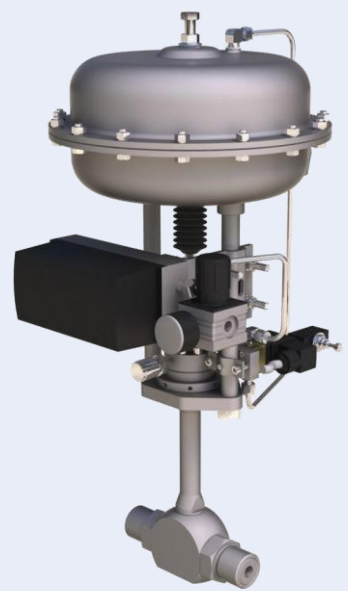
- Valve body: Test pressure toward atmosphere
- Seat: Test pressure toward vacuum
- Function test



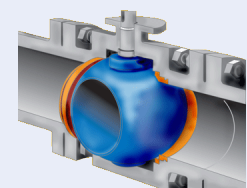
Inquiry guideline



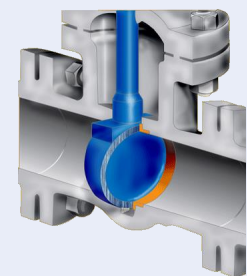
- ✓ Globe valves with butt weld ends or high precision connections (VCR, Hélicoflex, etc.)
- ✓ High tightness (helium) requirement



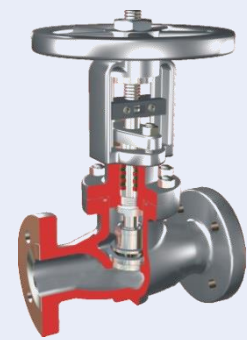
- ✗ Ball valves



- ✗ Gate valves



- ✗ Industrial globe valves



Inquiry guideline

Valve Type	Process Medium	Valve Connections	Tightness	Pressure	Temperature	
Globe valve	Helium Hydrogen Rare gases	Welded	Helium-tight, bellow-sealed or similar	<50bar	-270°C...-50°C	☺
					-50°C...+150°C	☹
				50bar to 300bar	-270°C...-50°C	☺
					-50°C...+150°C	☹
				>300bar	-270°C...-50°C	☺
					-50°C...+150°C	☺
	Nitrogen Air gases LNG	Welded	Helium-tight, bellow-sealed or similar	<50bar	-200°C...-50°C	☹
					-50°C...+150°C	☹
				50bar to 300bar	-200°C...+150°C	☹
					-200°C...+150°C	☹
		Industrial level				☹
						☹
	Oxygen	Welded or Brazed	High-tight sliding seal	<13bar	-200°C...-50°C	☺
						☹
						☹
						▲
	Deuterium, Tritium, Heavy Water					▲
	Water					☹
	Oils and petrochemical fluids					☹
	Chemical products					☹
					>150°C	☹
Gate valve						☹
Butterfly valve						☹
Ball valve						☹
Safety valve						▲

In general WEKA prefers a direct contact with the customer, at least at a technical level.
Customer name, field of application, name of the project or/and plant must always be communicated to WEKA in order to clarify possible Dual-Use restrictions, possible connections to worldwide operating customers, conflicts with guarantee and maintenance contracts, etc.

☺	Interesting for WEKA	Specification should be requested and sent for quotation
☹	Interesting for WEKA, but probably not very competitive	Specification and price expectation should be requested and sent for evaluation
☹	Not interesting for WEKA or not included in the product portfolio	Request should be declined
▲	Possible for WEKA, but connected with high risk factors	Request should be discussed with WEKA

References

Cryogenics and Special Valves

-  Linde Group
-  Air Liquide
-  Cryotherm
-  CERN
-  KIT
-  DESY
-  Taiyo Nippon Sanso
-  Demaco
-  AS Scientific
-  ITER

Thank you for your attention!



Member of the  Group

WEKA AG

Schuerlistrasse 8, CH-8344 Baeretswil
Phone +41 43 833 43 43

Homepage:

www.weka-ag.ch

Email related to valves & cryogenics:

cryo@weka-ag.ch

Email related to level measurement:

level@weka-ag.ch

