H_2+O_2-APPLICATIONS

AND OTHER GASEOUS MEDIA



ARCA VALVES



OUR GUARDIAN-PROGRAM

Hydrogen is *the* key element in the future energy mix.
As a low-emission energy carrier, hydrogen is of fundamental importance for the national and international energy strategy, especially when it is produced from renewable energy sources. Consequently, hydrogen is a fundamental element of the energy transition.

The *safety* when handling this highly combustible element is particularly important for the operation of energy-intensive industries as well as for the supply of public energy networks.

ARCA is leading the way in the following fields with its innovative technology that meets the highest safety standards:

1. **Power generation:** As a combustible in fuel cells
2. **Industry:** For the production of ammonia, methanol, etc.
3. **Space travel:** As propellant for rockets and spacecraft
4. **Metallurgy:** For the chemical reduction of iron ore and steelmaking etc.
5. **Food industry:** For hardening of plant-based oils, etc.

Hydrogen can be produced in various ways:

- Steam reforming of natural gas
- Electrolysis of water
- Solar-driven hydrogen production
- Biological hydrogen production

These are just a few examples for methods of hydrogen production.
Each method comes with its own technical challenges and has its own pros and cons regarding costs, energy efficiency and environmental impact. Each requires its own optimized and safe control solution.

We do not just support pilot projects, but also transform existing processes to make them future-proof. This requires a wealth of experience. Our engineers have vast experience in all processes for hydrogen production, storage and transportation, based on decades of practical work with gases. We know how to control volatile and highly flammable elements extremely safely and very efficiently – and guarantee full control with our solutions.

We will be your partner when it comes to controlling energy transformation. Fortunately, the element H2 is an "old acquaintance" for us. ARCA has been designing and constructing control valves for hydrogen applications since the 1990s. By the way: For decades, we have also been controlling the element oxygen. Here, too, we ensure the highest level of safety for the generation and use of oxygen in air separation, in the chemical industry and in steel processing, right up to the blast furnace.

We would be happy to present our Engineering Excellence to you in a personal meeting.

CONTROL THE ELEMENT: O_2

Anyone who has mastered the element hydrogen will also be able to control the element oxygen. Our expertise in controlling this gas is based on decades of experience – for example in the steel industry. Direct injection into the combustion process, specifically the charging of blast furnaces through the reliable control of oxygen lances, also consolidates our gas expertise in oxygen applications.

Special materials for seat and plug or bellows (e.g. *Inconel*®), extremely short actuating times, high control performance and much more, round off our expertise in the field of O_2 applications.

Because SAFETY is also a top priority here, customers value our capability on high-purity valve assemblies that meet their specifications. In the 120 m² clean room at our Strotzbüsch (Eifel) site, an airlock, an ultrasonic cleaning bath and a UV light inspection help to meet particularly stringent cleanliness requirements. From valve cleaning and overhauling to assembly, we ensure compliance with particularly safety-sensitive requirements. ARCA is a qualified and certified supplier of O_2 control valves for customers in the manufacturing, transport and storage sectors.



120 m² clean room at the Strotzbüsch site

YOUR TEAM: H_2 + O_2-READY

Which leads us to the necessity of regular maintenance and inspections. Only valves that work perfectly are also economical. Therefore, if you value a low-emission energy supply, you should also pay attention to efficiency. Our maintenance services ensure that this is the case for you.

Our GUARDIAN seminars for external employee training ensure the proper operation of control valves. We provide theoretical and practical training on the latest technology and teach our customers how to recognize potential hazards, signs of wear and leaks at an early stage.



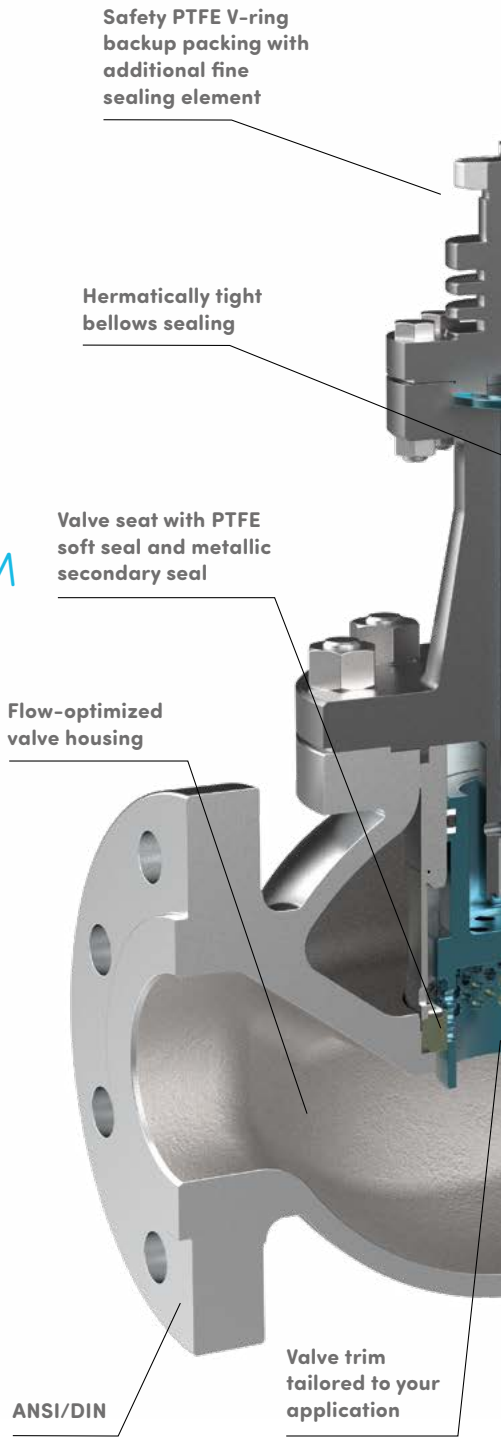
CONTROL THE ELEMENTS

The use of hydrogen in the energy industry continues to grow, both as a storage medium for renewable energies and as a fuel for a low-emission future. Transformation is in full swing. New manufacturing processes, transportation routes, feed-in systems and uses are rapidly evolving – with one constant: the safe control and monitoring of this element. ARCA ECOTROL® control valves have proven their worth in hydrogen plants and infrastructure, from production and transportation to feed-in.

Our control solutions operate with high precision and extreme reliability to control the enormous pressures that occur during transportation in pipelines and in plants (for example during storage). Our valve series with a modular design ensures smooth and precise control.

Further specific requirements that hydrogen places on processes and plants mean additional challenges for materials and control valve design. Due to the tiny size of the molecule, hydrogen can leak more easily than any other gas. Furthermore, it is highly explosive in mixtures of about 4 % or more in air. This requires sophisticated solutions and materials with the appropriate chemical and physical properties.

Control valve technology
such as the high-pressure contro



THE SOLUTION: OUR GUARDIAN PROGRAM

With our control solutions optimized for hydrogen applications and their complementary security program called GUARDIAN, we cover three aspects for optimal H_2 security and reliability:

• CONSTRUCTION AND MATERIALS:
Hydrogen control valves are made of special materials that are highly corrosion resistant and can withstand the extreme pressures and temperatures associated with hydrogen production, transportation and use. Leaks must be avoided at all costs, not only because of the explosive hazard, but also for economic reasons.

• INSPECTION AND CERTIFICATION:
Hydrogen control valves must pass special tests and certifications to ensure that they meet the required safety standards. We collaborate closely with standards committees, certification authorities, independent laboratories and planning offices to achieve this, fulfilling the requirements of PED, API, REACH regulation, DNV Marine Type Approvals, ISO 14001, ISO 9001, AD 2000 data sheet HP0, TA Luft DIN EN 15848-1, ATEX and many other standards.

• TRAINING AND MAINTENANCE:
Hydrogen control valves require professional maintenance by specialized personnel. Therefore, training your employees in hydrogen applications is particularly important. Our seminars, with a theoretical and practical focus, not only reflect our many years of expertise in the control of hydrogen, but also convey the current state of technical knowledge.

A SMALL SELECTION OF STANDARD SOLUTIONS FOR HYDROG

1
GROUND SUPPLY SYSTEM FOR ARIANE-6
FRENCH GUIANA

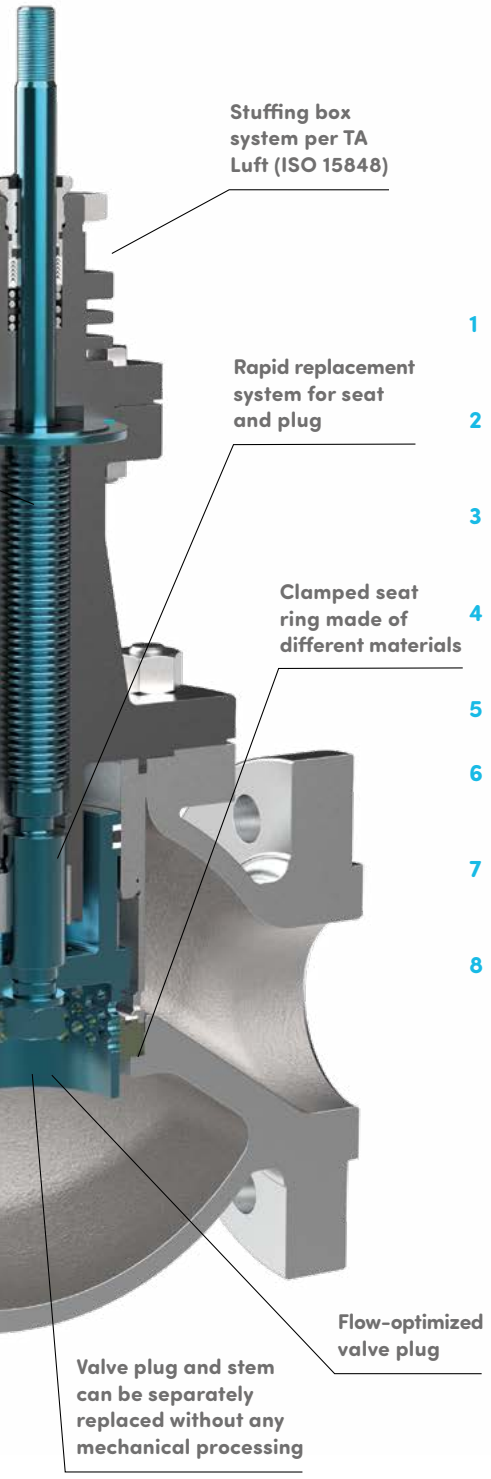
2
PSA PLANTS
SAUDI-ARABIA

3
HEXA-METHYL-ENEDIAMINE PLANT
FRANCE

4
200 MW ELECTROLYSIS PLANT
FRANCE

: H_2

for hydrogen applications,
ol valves in our ECOTROL® series:



When it comes to control solutions for hydrogen applications, ARCA prioritizes safety and reliability. Our control valves must work reliably in any situation and in any location in hydrogen processes. This is where you benefit from our experience with the elements H_2 (and O_2 too).

After all, as engineers, we have been working on safely, reliably and efficiently controlling the elements hydrogen and oxygen for much longer than the EU's *Green Deal* transformation strategy and the national hydrogen strategy.

We would welcome the opportunity to discuss our references in more detail, for example:

1 **GROUND SUPPLY SYSTEM** for the ESA (European Space Agency) ARIANE 6 mission

2 **PSA PLANTS** for a European industrial group specializing in process plants for gas extraction and gas production in Al-Jubail (Saudi Arabia)

3 **HEXAMETHYLENEDIAMINE PLANT** of an international chemical company, for effectively doubling current high-purity hydrogen production capacity (France).

4 **200-MEGAWATT ELECTROLYSIS PLANT** for a multinational energy and petroleum company (France)

5 **PSA PLANTS** in Germany for world-leading chemical companies (Germany)

6 **HYDROGEN CONTROL SYSTEM** for the European Organization for Nuclear Research CERN (Switzerland)

7 **INDUSTRIAL SCALE 14 MW ELECTROLYSIS TEST PLANT** for two different electrolysis processes on behalf of a leading energy supplier (Germany)

8 **H_2-READYNESS-TEST PROGRAM** to the factory standard for a leading European gas transporter for later installation (Germany)

Our GUARDIAN PROGRAM always involves individual support and advice. Because optimal safety for hydrogen applications is not achieved with off-the-shelf solutions, but through constructive collaboration.

We are at your side when it comes to analyzing on-site conditions. We provide innovative material selection and manufacturing processes to improve resistance to hydrogen embrittlement. We offer advice and provide components to increase service life. We use intelligent digital bus systems with real-time data processing. We take care of regular maintenance and provide training for your employees on control solutions for hydrogen applications.

EN APPLICATIONS – PLEASE CONTACT OUR SALES TEAM FOR FURTHER REFERENCES:

5
PSA PLANTS
GERMANY

6
CERN HYDROGEN CONTROL
SWITZERLAND

7
14 MW ELECTROLYSIS PLANT
GERMANY

8
TEST PROGRAM FOR H_2 READINESS
GERMANY

ARCA VENTILE · ARTES VALVE & SERVICE · feluwa EXCELLENCE IN PUMPS · von Rohr Armaturen AG · von Rohr ARCA BV · WEKA®

for example, the ECOTROL® series for critical gas service

Valve Size / Rating	8C	6N	6H
DN / Size	15–100 / 1/2"–4"	125–800 / 5"–32"	15–400 / 1/2"–16"
PN / ANSI	16–63 / Class 150–600	16–63 / Class 150–600	100–250 / Cl. 900–1500

Inherent characteristic	equal percentage or linear, optional: modified equal percentage
Rangeability	8C series: 50 : 1 6N/6H series: 40 : 1
Double guided plug	optional: integrated double guided plug for valve size DN 40 – DN 800 / 1½"–32", Kvs > 25
External tightness	certified to TA-Luft / ISO 15848-1 (optional - recommended for hydrogen service)
Seat leakage	metal seated: Leakage class IV (0.01 % of rated Kv); optional leakage class V soft seated: Leakage class VI
Bellows seal	multi-layer made of stainless steel 1.4571, optionally made of Inconel® 625, Hastelloy® C276

Valve housing material	DIN	ANSI	Temperature range
for hydrogen up to 100 bar	1.0619 GP240GH	A 216 WCB	-10 / -29 °C to 400 / 425 °C
for hydrogen up to 100 bar	1.7357 G17CrMo5-5	A 217 WC6	-10 / -29 °C to 530 °C
for hydrogen up to 250 bar	1.4408 GX5CrNiMo19-11-2	A351 CF8M	-196 °C to 538 °C
for oxygen up to 26 bar	1.4408 GX5CrNiMo19-11-2	A351 CF8M	-196 °C to 538 °C
for oxygen up to 69 bar	2.4856 Inconel® 625	A 494 CW6MC	-29 °C to 538 °C
for oxygen up to 86 bar	2.4816 Inconel® 600	A 494 CY40	-29 °C to 475 °C
for oxygen up to 206 bar	2.4365 Monel 400	A 494 M35-1	-29 °C to 475 °C
	Further materials available on request		

ARE YOU FAMILIAR WITH OUR SERVICE PACKAGES?

Based on our extensive knowledge of hydrogen applications, the ARCA service team offers you a special program.

GUARDIAN ARCA PROGRAM

AS INDIVIDUAL AS YOUR PROCESSES, AS MODULAR AS YOUR PLANNING REQUIRES.

service@arca-valve.com

GUARDIAN ARCA launch

GUARDIAN ARCA care

GUARDIAN ARCA 24/7

GUARDIAN ARCA safe

GUARDIAN ARCA knowhow

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