



polar zone

components and systems for extreme temperatures





Our customers' safety in their day-to-day work is the main focus of our business. The company has been working towards this for over 80 years and has had a major impact in the sector of explosion protection. Development of explosion protected, electrical control devices and control units was speeded up consistently and successfully since 1926. This resulted in pioneering new developments and innovative products. R. STAHL specialists have been working actively for many years now in national and international committees to define new standards and ever better safety regulations. R. STAHL presented the EXLUX 6000 explosion protected series of strip lighting units in 1989. The company quickly became a leading supplier on the world market in the sector of lighting. In 1993, three independent Fieldbus systems of the R. STAHL company were used on an offshore drilling platform off the coast of Norway. What was then the company's largest Fieldbus project required customer-specific, innovative solutions and a high engineering content. R. STAHL's Remote I/O system IS1 was introduced in the year 2000 as a further decisive step into a new millennium. It is an important element of the new Fieldbus solutions of the company today. Then as now, safety standards did not pose a barrier to us but represented a challenge. We not only comply with all standards, but are generally also involved in helping to create these standards and set new ones. The result is that the R. STAHL Schaltgeräte GmbH company numbers among the leading suppliers of explosion protected components and systems for measurement, control, instrumentation, power distribution, operator control and observation, besides lighting, world-wide. And the result of this is that we offer all-in services in the explosion protection sector.

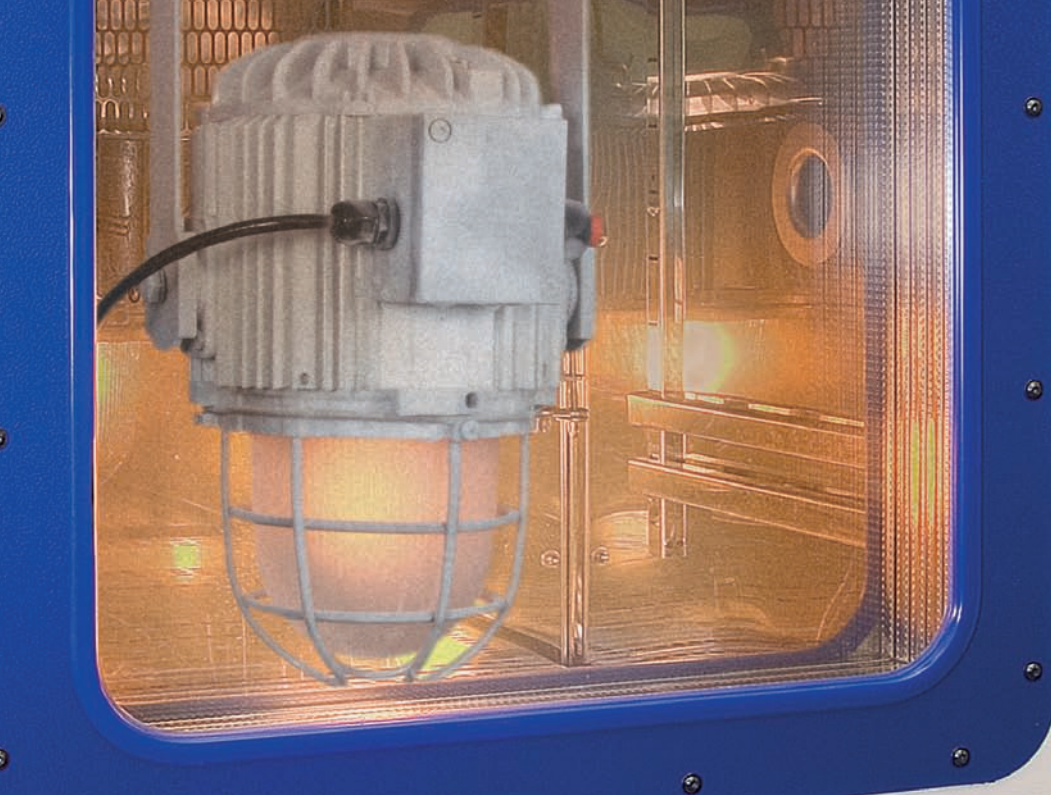


certified

for very low temperatures

The working temperature range for explosion protected electrical apparatus defined in IEC 60079, Part 0: General Requirements, extends from -20°C to $+40^{\circ}\text{C}$. If the type plate contains no other information on ambient temperature, it can be assumed that the apparatus will operate reliably within this temperature range. Frequently however, products need to be used under ambient conditions where prevailing temperatures are either far higher than $+40^{\circ}\text{C}$ or are well below -20°C . This is case in many regions of the world in the winter months where temperatures of -55°C are no rarity. In respect of explosion protection, this is no problem for a wide variety of electrical, explosion protected apparatus. However certain type tests and routine tests must be conducted and the apparatus must pass these tests which are more stringent than is the case as standard conditions. Under certain circumstances certain modifications to the products may also be required so as to pass these tests. If the tests are passed a certification is issued for use in an extended temperature range. Many R. STAHL products have been tested and approved for use at low temperatures. You can find the relevant information on these products in our catalogues, data sheets or on the Internet.





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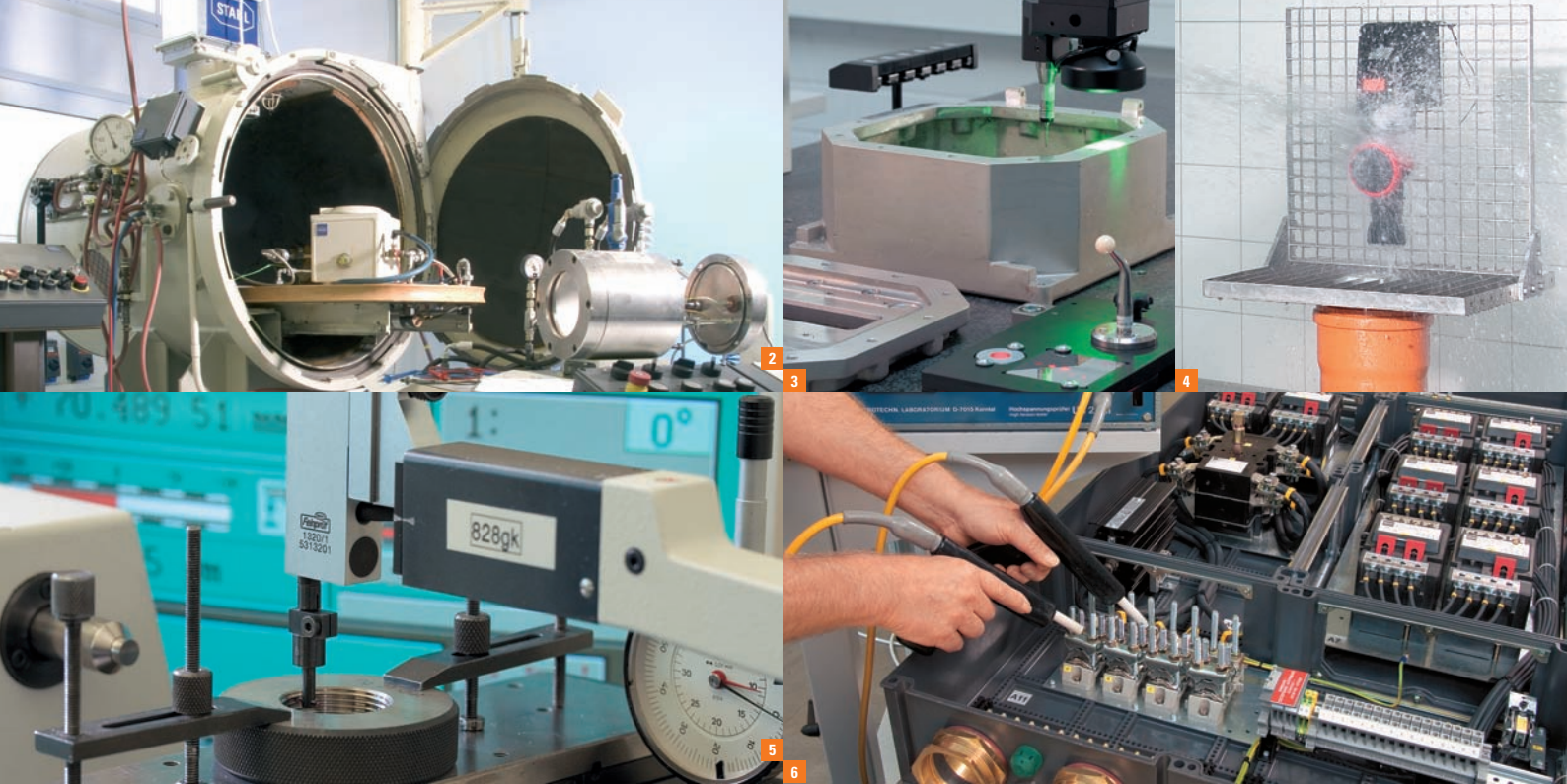
uncompromising



Low working temperatures may impact on explosion protection of electrical apparatus. This is why it is necessary to modify various type tests when certifying the products. For instance, 24-hour low-temperature storage of plastic enclosures and seals is conducted at the intended minimum ambient temperature before the mechanical impact test of the plastic is made. The materials may not become so brittle during the test that leaks occur.

Another example is the explosion test of the flameproof-encapsulated enclosures. Either this test is conducted at the intended low temperatures or stricter specifications are applied to the routine tests on manufacturer's premises. If operation at temperatures below -55°C is planned, the test pressure is increased by 62 % by comparison with the standard pressure in the routine test.

R. STAHL's uncompromising use of its know-how and many years of experience allows it to modify virtually all products from its range for use at low temperatures without compromising safety. The effectiveness of the product modifications implemented, such as use of special seals or installation of auxiliary heating systems, can be tested at the company's own modern development laboratory.



Low-temperature test 1

- > Polar zone simulation

Pressure test 2

- > hydrostatic

3D measuring 3

- > optical and tactile

Degree of protection 4

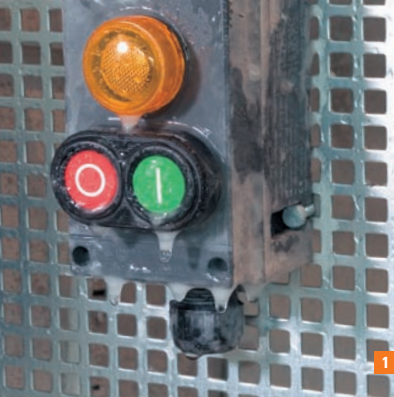
- > water ingress and dust ingress

Measuring equipment 5

- > more than 3000 regularly calibrated mechanical tools
- > more than 700 regularly calibrated electrical measuring equipment
- > own calibration lab

Insulation and high voltage test 6

- > 1500 V DC for control panels up to 500 V
- > 2500 V AC for bus bar systems and distribution panels
- > 5000 V AC for applications with rated voltage higher than 500 V



please note

restrictions and special aspects

Restrictions and special aspects that are important for operation at low temperatures:



Restricted functionality **1**

- > Moving parts such as the actuators of switching elements may no longer be operable after thawing followed by freezing.
- > Various types of lamp, such as low-pressure gas-discharge lamps, cannot be ignited or can be ignited only with difficulty at temperatures below 0 °C and suffer a substantial loss in light output.
- > The accuracy of many measuring instruments drops with decreasing temperature.
- > Protective circuit breakers with bimetallic trip mechanism change their trip characteristic.



Cable glands **2**

- > It must be noted that various plastic cable glands provide the mechanical impact strength necessary for explosion protection only down to -20 °C.
- > In such cases, metal glands must be used for operation at temperatures below this (this must be stated when ordering!).
- > In this case, metal entry plates that must be connected to the PE terminal are still necessary.



Flameproof enclosures (Ex d) **3**

- > Pressures that far exceed the values determined under standard conditions may occur if internal explosions occur at low temperatures. Consequently, if no special certifications have been issued for operation below temperatures of -20 °C, heating systems must be provided in order to raise the interior temperature.



Seals **4**

- > Most sealing materials become very tacky at temperatures of below -20°C . Installation, maintenance and repair work should not be carried out at low temperatures in order to avoid destruction of the seals when enclosures are opened.
- > Special seals that must be stated when ordering the product can be used to seal moving parts.



Cables and leads **5**

- > Many types of cable are unsuitable or only restrictedly suitable for use at low temperatures.
- > The permitted bending radius must be complied with, depending on temperature.



Strip lamps **6**

- > The reduced light output of strip lamps, mentioned in Point 1, can be avoided by installing auxiliary heaters in the lamp enclosure.
- > Since such heaters cannot be fitted after installation and the environmental conditions are known, appliance or apparatus should be stated when ordering, so that heater can be fitted in advance.



Mechanical action **7**

- > Plastics in particular respond to low temperatures by having a reduction in their mechanical strength. The certificate prescribes what additional mechanical protection is required if the mechanical impact tests have been conducted with half the required impact energy. The type of mechanical protection which can be provided are protective gratings or metal cages or by selecting a particular mounting position.
- > Special mechanical strains and stresses, such as bending stress or compressive stress, must be avoided.



Operation at low temperatures must always be stated when ordering. **8**



comprehensive

the range of products

Automation 1

- > Safety barriers
 - Single-channel safety barriers
 - Two-channel safety barriers
- > Ex i isolators
 - Transmitter supply units
 - Isolating repeaters
 - Switching repeaters
 - Binary output
 - Temperature transmitters
 - HART multiplexers
 - Input module
 - pac-Bus
 - Fieldbus isolating repeaters
- > Remote I/O
 - CPU & power modules
 - Input/output modules for analogue signals
 - Input/output modules for digital signals
 - BusRail
- > Fieldbus technology
 - Ex e/Ex i field device couplers
 - Ex e/Ex e field device couplers
 - Fieldbus power supply

Alerting/Alarming 2

- > Positioning switches
- > Control and indicating devices
- > Control device system
- > Alarm devices and fire detectors/
fire alarm call points
- > Built-in devices for control stations
- > Signal and monitoring equipment
- > CCTV camera
- > Traffic light-type signalling device
- > Optical beacon
- > Horns
- > Measuring and monitoring devices

Operator control/Observation 3

- > Operator Interfaces
- > Open HMI
- > Mobile HMI
- > Remote HMI
- > WLAN solutions for the hazardous area



Installation and Wiring 4

- > Installation switches
- > Junction boxes
- > Terminal boxes
- > Plugs and sockets
- > Couplers
- > Coupling sockets
- > Socket-outlet assemblies
- > Maintenance socket isolators
- > Cable and lead routing systems
- > Cable glands
- > Cable bushings
- > Stopping plugs
- > Lock nuts
- > Flat rings
- > Extensions
- > Reducing adapters
- > Adapters
- > Breather glands

Illumination and Lighting 5

- > Fluorescent light fitting
- > Emergency lights
- > Bulkhead light fittings
- > Pendant light fittings
- > Floodlights
- > Portable lamps
- > Emergency lighting systems
- > Mounting accessories

Switching/Distribution 6

- > EEx e enclosures
- > EEx d enclosures
- > Lighting and heating power distribution panels
- > Standard motor starters
- > Safety switches
- > Load and motor control switches
- > Circuit breakers for motor protection
- > Switchgear installations
- > Pressurised enclosure
- > Components for control and distribution systems



focussed on the customer



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For your safety

- > 80 years of experience and know-how with solutions focussing on explosion protection
- > Designing individual solutions
- > Major competence, recognised worldwide
- > Competence in efficient combination of all types of protection
- > Many years of experience in working together with national and international testing agencies
- > Involvement in national and international standardisation committees
- > Member of many years standing of the "Zentralverband Elektrotechnik und Elektro-industrie e.V."
- > Precise overview of services thanks to the use of the ZVEI service categories
- > Competence Centre structure:
Open communication and teamwork
- > Optimum customer support from the enquiry through to after-sales

Enquiry

- > Proximity to the customer and efficiency thanks to over 70 locations on all five continents
- > Worldwide, professional sales network
- > Websites with
 - Contact information
 - Information on locations and suppliers
 - Product catalogue
 - Certificates and test certifications
 - Press releases and publications
 - Information on explosion protection
 - Customer-related e-commerce
- > Competent information from our Hotline



Services

- > Individual customer developments
- > Provision of all-in solutions for
 - Development
 - Production
 - Packaging
 - Transport
 - Use
 - Disposal
- > Qualified consultancy in relation to financing and direct cooperation with large national and international banks

Sales order

- > Expert information on sales order status thanks to proximity to production
- > Flexibility right through to just before sales order completion
- > Fast, easy allowance for customer requirements even during production

Production

- > Quality management from goods receipt through to final inspection
- > Certified to ISO 9001 since 1993
- > Ongoing quality inspections
- > Regular quality meetings
- > ATEX recognition of the Quality Management System by PTB

Delivery (shipping)

- > Fast, reliable shipping
- > Fully automatic warehouse for fast delivery capability
- > Series devices and standard solutions are available from stock
- > Round-the-clock delivery service
- > Various shipping options:
 - Normal shipping
 - Express shipping
- > Transport-safe packaging
- > International customs and shipment handling

After-sales service

- > Warranty on all products
- > Extended warranty period for projects and systems
- > Round-the-clock, competent information from our Hotline
- > Efficient advice thanks to worldwide presence
- > Ex-Magazine, the customer magazine
- > Informative websites:
 - News, dates, deadlines and campaigns
 - Product information
 - Certificates and test certifications
 - Information on current seminars
 - Information on sites and suppliers
 - Press releases, publications and downloads



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