

# New technology for CO<sub>2</sub> reduction





“Next-generation fossil-fuelled power plants place much more exacting demands on valves. We intend to provide the technology required in good time.”



Dr. Christopher Lange

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Head of Globe, Gate and Control Valves



High-performance gate valve for new power plants

## ULTIMATE PERFORMANCE FOR ENERGY AND THE ENVIRONMENT

By 2020, the amount of greenhouse gases emitted into the atmosphere must have been reduced by at least 20 percent compared with 1990 – this is the target the European Union has set itself. Fossil-fuelled power plants must contribute significantly to this goal. As a result, energy providers and the industry sector have been discussing how to generate more power with lower CO<sub>2</sub> emissions under the banner “Power Plants 2020+”. A key part of this endeavour is increasing efficiency by raising boiler pressure and temperatures from the max. 600 °C present in highly efficient power plants today to over 700 °C. This places extreme demands on durability and thus requires innovative technologies and the use of specialised materials. As part of the scope of the “725 HWT GKM” [joint research project](#), KSB successfully tested newly developed high-performance valves in a major power plant in Mannheim, Germany. Two prototypes of the ZTS high-pressure gate valve were operated at temperatures of up to 725 °C for almost two years; high-pressure globe valves had previously demonstrated their suitability.

The basic design of these valves developed at KSB’s Pegnitz factory has proven its worth in power plants for decades. With an eye on the challenges of the future, KSB has now optimised the product. The valves are manufactured from a nickel base alloy resistant to high temperatures; a spherical body reduces thermal stresses and elongated yoke arms protect the actuators from the potentially negative effects of the hot steam. The goal of the long-term tests: to establish the permissible operating limits of the valves under these extreme conditions. The findings offer a basis for designing components to be used in future power plants with steam temperatures of over 700 °C – ensuring that technology from KSB makes its contribution to achieving our climate goals.



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## RESPONSIBILITY STATEMENT

To the best of our knowledge, and in accordance with the applicable reporting principles, the consolidated financial statements give a true and fair view of the assets, liabilities, financial position and profit or loss of the Group, and the group management report includes a fair review of the development and performance of the business and the position of the Group, together with a description of the principal opportunities and risks associated with the expected development of the Group.

Frankenthal, 17 March 2015

The Board of Management

## AUDITOR'S REPORT

We have audited the consolidated financial statements prepared by KSB Aktiengesellschaft, Frankenthal (Pfalz), comprising the balance sheet, the statement of comprehensive income, the statement of changes in equity, the statement of cash flows and the notes to the consolidated financial statements, together with the group management report for the business year from 1 January 2014 to 31 December 2014. The preparation of the consolidated financial statements and the group management report in accordance with IFRSs, as adopted by the EU, and the additional requirements of German commercial law pursuant to section 315a(1) of the *HGB* [*Handelsgesetzbuch* – German Commercial Code] are the responsibility of the parent company's management. Our responsibility is to express an opinion on the consolidated financial statements and on the group management report based on our audit.

We conducted our audit of the consolidated financial statements in accordance with section 317 of the *HGB* and German generally accepted standards for the audit of financial statements promulgated by the *Institut der Wirtschaftsprüfer* [*IDW* – Institute of Public Auditors]. Those standards require that we plan and perform the audit such that misstatements materially affecting the presentation of the net assets, financial position and results of operations in the consolidated financial statements in accordance with the applicable financial reporting framework and in the group management report are detected with reasonable assurance. Knowledge of the business activities and the economic and legal environment of the Group and expectations as to possible misstatements are taken into account in the determination of audit procedures. The effectiveness of the accounting-related internal control system and the evidence supporting the disclosures in the consolidated financial statements and the group management report are examined primarily on a test basis within the framework of the audit. The audit includes assessing the financial reporting information of those entities included in consolidation, the determination of entities to be included in consolidation, the accounting and consolidation principles used and significant estimates made by management, as well as evaluating the overall presentation of the consolidated financial statements and group management report. We believe that our audit provides a reasonable basis for our opinion.

Our audit has not led to any reservations.

In our opinion, based on the findings of our audit, the consolidated financial statements comply with IFRSs, as adopted by the EU, the additional requirements of German commercial law pursuant to section 315a(1) of the HGB and give a true and fair view of the net assets, financial position and results of operations of the Group in accordance with these requirements. The group management report is consistent with the consolidated financial statements and as a whole provides a suitable view of the Group's position and suitably presents the opportunities and risks of future development.

Frankfurt am Main, 20 March 2015

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## GLOSSARY

### ABBREVIATIONS

#### ANSI

American National Standards Institute

#### API

American Petroleum Institute

#### BRIC

Collective abbreviation for the emerging markets of Brazil, Russia, India and China

#### DIN

Deutsches Institut für Normung e.V. [German Institute for Standardisation]

#### ELSY

Intelligent electronic systems for use in device and plant engineering and in medical engineering

#### IE3 + IE4

International efficiency classes for motors

#### IMO

International Maritime Organisation

#### LNG

Liquefied natural gas

#### USCG

United States Coast Guard

#### VDMA

Verband Deutscher Maschinen- und Anlagenbau e.V. [German Engineering Federation]

### KEY CORPORATE AND TECHNICAL TERMS

#### 725 HWT GKM

Joint project involving partners from science and industry. Power plant components are tested at steam temperatures of up to 725 °C in a high-temperature materials testing facility at the German "Großkraftwerk Mannheim" power plant.

#### Cloud application

Storage of data and programs in a remote data centre

#### Industry 4.0

A visionary project from the German government's future technologies strategy

#### InnoTop

A programme led by the government of Rhineland-Palatinate to promote research and development projects of companies based in the federal state

#### Retrofit

Modernisation of installed systems or components, often aimed at extending their service life, increasing efficiency or complying with new legislation

#### Synchronous reluctance motor

Highly energy-efficient motors whose specially designed rotor laminations guide the lines of magnetic flux. Rare earths are not required to manufacture these motors.

#### Triple-offset butterfly valve

Butterfly valve design suitable for use in applications with extremely high and low temperatures. The triple-offset design ensures that the butterfly valve opens and closes smoothly.

#### UN Global Compact

A global initiative for businesses and organisations launched by the United Nations with the aim of shaping social and ecological globalisation

## CONTACTS

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### PHOTOGRAPHY

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As a signatory to the United Nations Global Compact , KSB is committed to endorsing the ten principles of the international community in the areas of human rights, labour standards, environmental protection and anti-corruption.