

TWO SHIFT OPERATION POWER PLANTS

Wind, solar power and other renewables energy generation creates a more flexible demand on gas fired power stations to balance the grid.

To operate in a reliable, quick, modulating and start/stop regime, some improvements are necessary.

To start and stop a CCGT installation takes time. The gas turbine should be warmed through as well as the rest of the power plant, the HRSG, (Heat Recovery Steam Generator) downstream of the gas turbine, the interconnecting steam pipework, the steam turbine and all other balance of plant items.

This should be done as quick as possible to limit the starting costs and to supply as soon as possible to the grid. For all CCGT plants the demand for being reliable and the need to be able to start the installation, to supply to the grid, is the single most important driving factor

MOST CRUCIAL

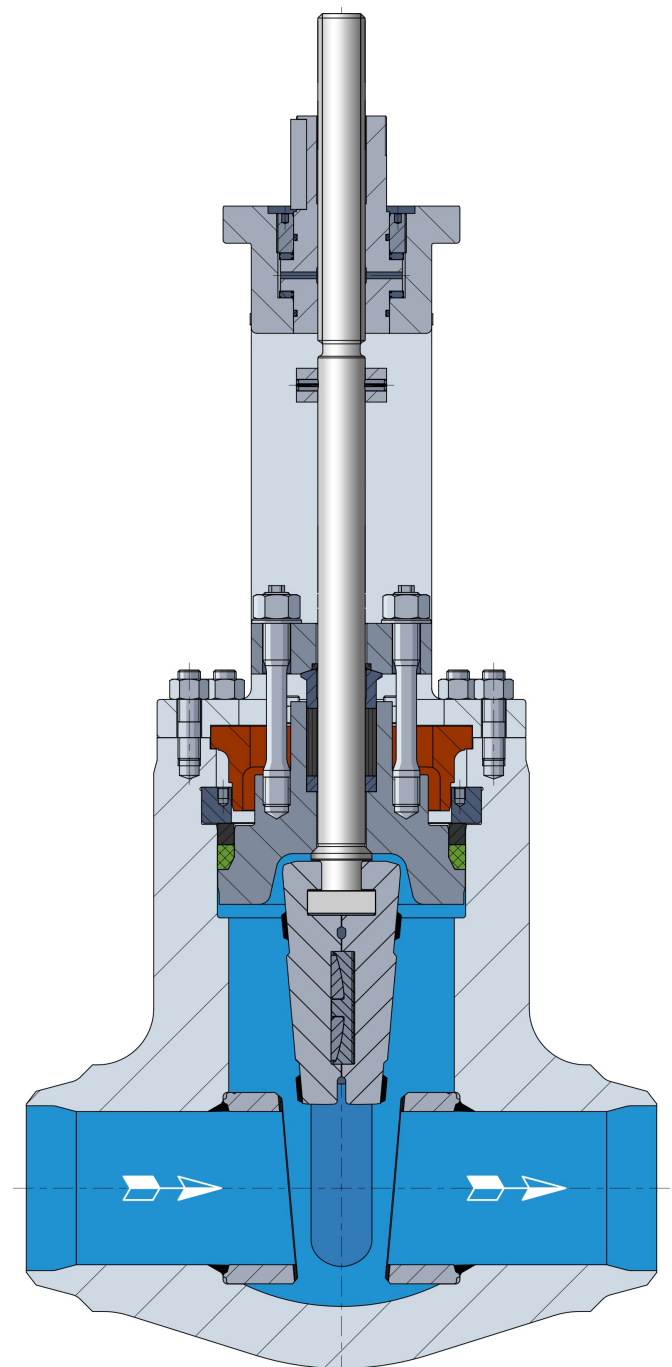
Crucial components in an installation are the main steam stop valve and the hot reheat stop valve.. These components have to be designed and chosen carefully.

TAPERED PARALLEL SLIDE GATE VALVES

Stop valves do have an important role in power stations. They can isolate certain parts of the installation and are operated in an on-off mode. In old installations the parallel slide gate valve is popular. This old design is based around two separate discs, guided by the seats during the full stroke. in the closed position the upstream pressure pushes the downstream disc on the seat and creates the seal. during the opening and closing however the disc is in constant contact with the seat potentially “scratching” the seat during the full stroke.

In a dual shift regime, every day opening and closing is needed. The solution is a gate valve design, with the sealing of the downstream disc on the seat, and the feature of a separate guide rail to guide the set of discs during the stroke of the valve without contacting the seats. Friction free opening and closing and no pressure locking. No wear to the sealing area occurs. We have called this design the tapered parallel slide valve as shown here.

This valve is based on two individual separate discs, a bearing and a spindle with a forged on hammer head. This valve has a very limited number of parts in the pressure containing body.



tapered parallel slide gate valve

BODY MATERIALS

Starting and stopping will lead to thermal stress in a valve body. The thickness of the different parts of the body is determining the heat radiance and ultimately the start-up time of the installation. The thinner the valve body, the shorter the start-up time.

High pressure valves are mainly based on cast materials. For high temperature applications material qualities as A 217 WC 6, A 217 WC9 and C12A (not even approved to PED / EN) are often used. A casting, due to possible material defects the wall thickness has to be significantly thicker than forged materials. The allowable strengths of a casting is about 40% of the figures which can be applied for calculating a forged valve.

Our forged valves, with high integrity strong material, F12, F22 and P91 are designed to pressure and temperature and do not have too much material. Forged valves are “athletic valves” quick in starting up and cooling down with the thinnest possible wall thickness.

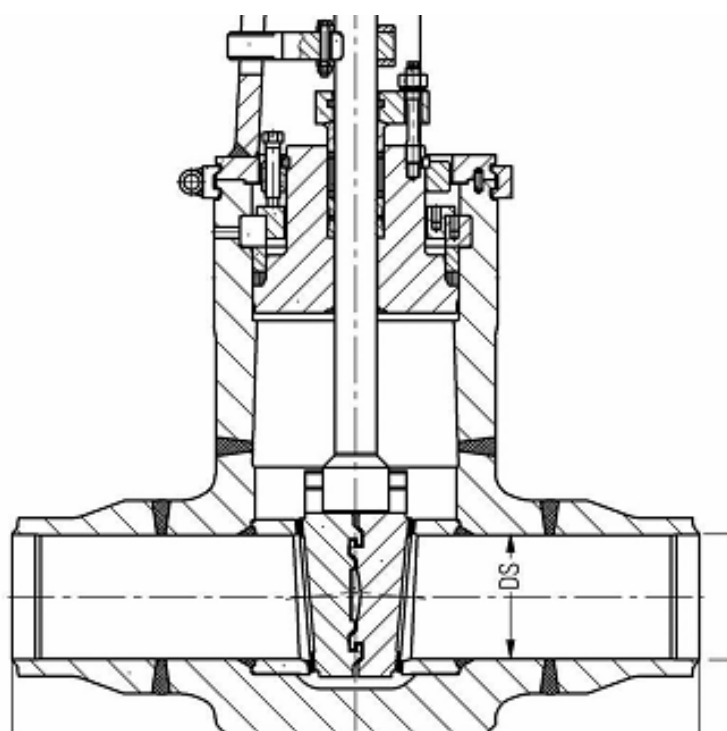
Our valves are available in different materials such as A 182 F1, F12, F22 and P91 / P92.



ABOVE LEFT AND RIGHT: Hollow forged valve bodies.

BLOCK VALVES

In case valves are needed in very high pressure classes and odd sizes Persta is building a complete line of valves based on machined forgings. Variations are unlimited.

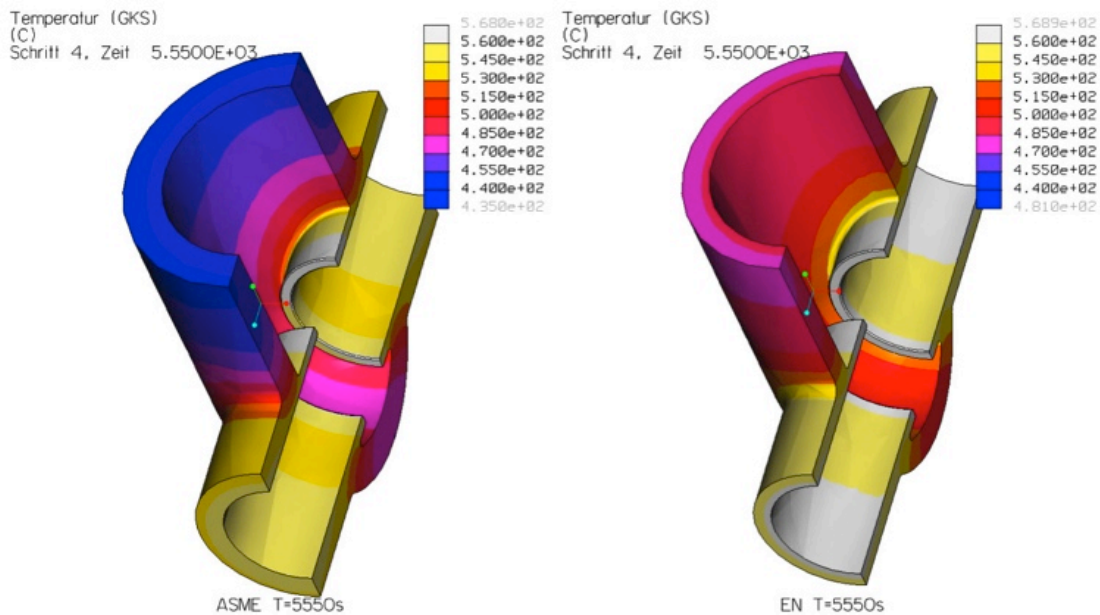


RIGHT:

Gate valve based on forged blocks

THERMAL CYCLING

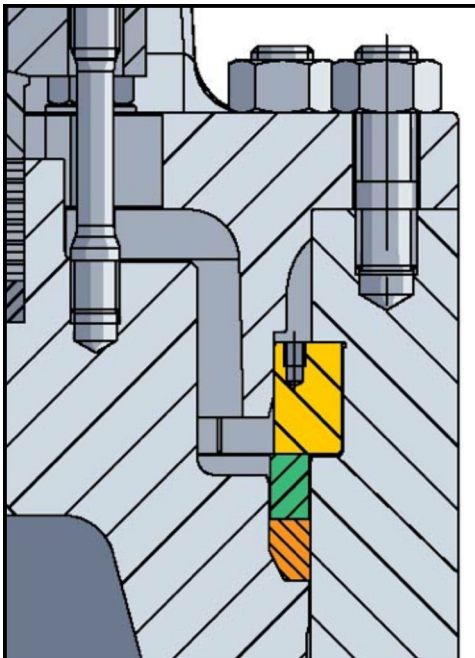
New rules for cycling valves and the calculation of thermal stress due to heating radiant are described in the **EN12592-3** and the **EN 12516-2**. Persta is one of the first manufactures who has delivered valves to these design criteria.



Comparison of a valve to **ASME 16.34** with a valve designed to **EN 12516-2** is available on request.

MAINTENANCE PRESSURE SEAL BONNET

After being successfully in operations for several years even a Persta tapered parallel slide gate valve needs inspection. In these cases the pressure seal design of Persta is different to the regular designs.



In our experience a regular pressure seal is hard to open. The split ring is held in place by the bonnet, and the bonnet has to be driven down to remove the split ring. Due to corrosion, magnetite and the tolerances this is not always easy.

The Persta design is improved. The fitting of the split ring is done by a ring as part of the yoke.

This means that during the maintenance stop the bonnet only have to be lifted. Opening this valve can be done quickly.

Persta valves are therefore very maintenance friendly.

LARGE VALVES



Large valves, such as the hot reheat shut off valves often are 24, 28 or even 32" in size, combined with the requirement to follow the heat radians from the high pressure part of the boilers new valves have been developed.

These valves are fabricated, based on P91 hot forged sheets, brought together in a special procedure.

The ultimate result is a valve with a wall thickness almost equal to the pipe material, light and easy to operate and no problem for the heating radians.



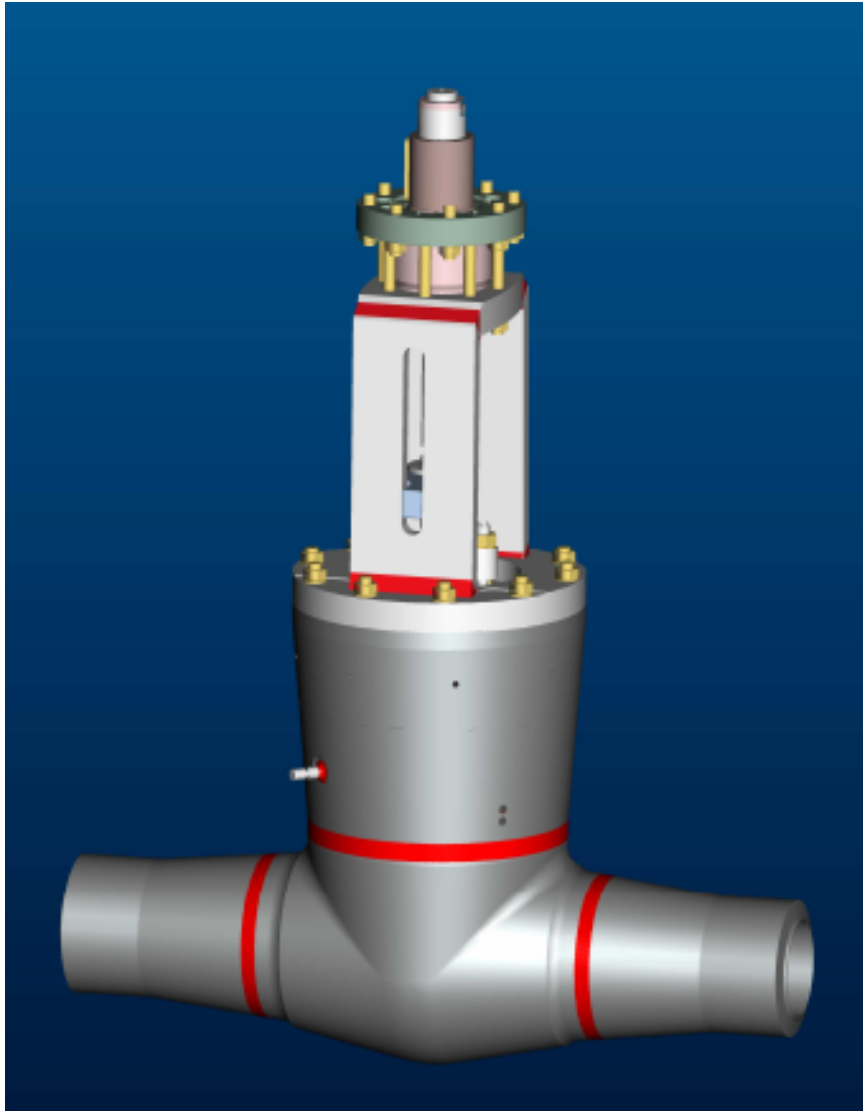
Valve built of forged plate, large sizes possible.



One of the installed valves in the UK in a HRSG reheat application has performed 100.000 cycles without any problems.



The Future ? Is already built !



Uniper Irsching, tapered parallel slide valve, DN300 (12') in F92 material

Advanced Valve Solutions B.V.

Keplerstraat 8 - 1704 SJ Heerhugowaard - The Netherlands - Tel: +31 (0)72 576 28 90

E-mail: info@advancedvalvesolutions.nl - web: www.advancedvalvesolutions.nl

Advanced Valve Solutions UK Ltd.

Unit 7c, East Bridgford Business park, East Bridgford, Nottingham, NG13 8PJ, United kingdom

Tel. 01270 586944

E-mail: info@advancedvalvesolutions.co.uk - web: www.advancedvalvesolutions.co.uk

Advanced Valve Solutions USA Inc.

7 Wells street , Saratoga Springs, NY 12866- USA - Tel: 518 260 2574

E-mail: info@advancedvalvesolutions.com - web: www.advancedvalvesolutions.com

Advanced Valve Solutions Middle East

Emirates Towers office Tower, Floor 41, Sheikh Zayed Road, Dubai

P.O.box 39670. United Arab Emirates.