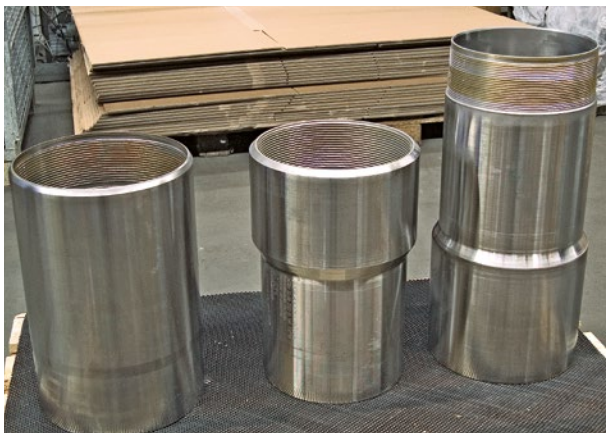
Pipes and components for geothermal energy

Geothermal energy describes the heat stored in the accessible part of the earth‘s crust. It includes all the energy stored in the earth which can be extracted and used, and is classified as a renewable energy source. The possible uses are many and various, and so the same applies to the use of pipes and pipe materials in energy branch.

In a number of areas of use involving geothermal power, what is to be transported demands highly corrosion resistant materials. For this purpose, BUTTING offers a wide variety of solutions for the entire plant structure:

- Casings
- Components ready for installation, such as
  - Float equipment
  - Line hangers
  - Tie back parts for depth drilling (for production and injection)
- Transport pipes (cross-country line pipes) in 12 m lengths between the well and the power station
- Prefabricated piping / spools for process piping in the power station

BUTTING



Casings

In order to cope with the high degree of corrosion resistance required by geothermal power, BUTTING offers casings in a variety of materials, such as

- Duplex
- Superduplex
- Alloy 625

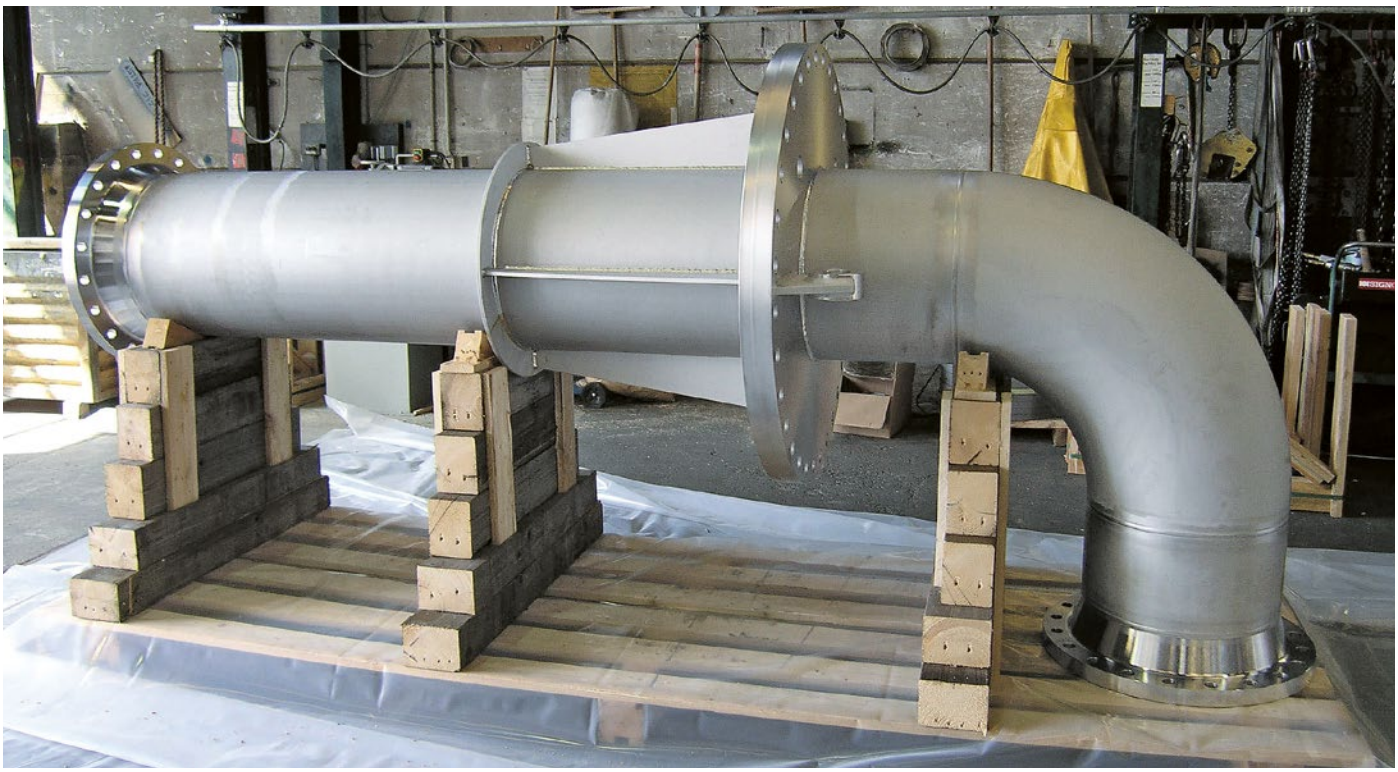
The customer can select from a whole range of dimensions. The casings are manufactured in line with standard codes (e. g. API 5CT) and customer specifications and are provided with the required licensed threads. The threads are mainly connected by flush threads.

Tolerance requirements
The casings are made from steel plates at BUTTING and welded longitudinally. The specified tolerances for roundness and ovality are extremely tight, at < 0.5 %. Thus the current requirements such as the drift test and above all cutting the threads on the pipe bodies (with relatively thin wall thicknesses) can be ensured. Tests such as an X-ray test of the longitudinal weld, corrosion tests and a collapse test on the pipe body are part of our standard procedure. In addition, the casings can be provided with centralizers at the outside circumference.

Mechanical and technological properties
BUTTING is able to optimise the casings with a cold work. This procedure offers you a whole series of advantages: the cold work allows the strength and the yield strength to be increased; the latter is important for constructive laying. As a result, the wall thicknesses at the casing can be considerably reduced, and the same applies to both the weight and the costs

Geothermal Applications

Order Date	Operator / Engineering	Quantity	Description	Dimensions	Type of thread	Material
2013	CalEnergy	720 ft / 220 m	Casings	9 5/8" x 0.472"	Seal Lock Flush	Alloy 625
2015	CALPINE	2 600 ft / 792 m	Casings	8 5/8" x 0.352"	VAM FJL ND	Alloy 2507 / UNS S32750
2016	CalEnergy	9 500 ft / 2896 m	Casings	10 3/4" x 0.4"	VAM FJL ND	Alloy 2507 / UNS S32750
2017	CALEnergy	900 ft / 274 m	Casings	13 3/8" x 0.48"	Tenaris Wedge 521	Alloy 625
2017	Hudson Ranch	miscellaneous	Pipe spools	24" x 0.435" / 609.6 x 11.05	-	Alloy 2507 / UNS S32750
2018	CALEnergy	2 144 ft / 653 m	Casings	10 3/4" x 0.4"	Tenaris Wedge 521	Alloy 625
2018	CALEnergy	6 812 ft / 2076 m	Casings	13 3/8" x 0.48"	Tenaris Wedge 521	Alloy 625
2019	CALEnergy	6 600 ft / 2011 m	Line-Pipe	24" x 0.375" / 609.6 x 9.53	-	Alloy 2205 / UNS S32205
2019	Hudson Ranch	2 015 ft / 614 m	Casings	13 3/8" x 0.48"	Tenaris Wedge 521	Alloy 625
2020	CalEnergy	3 000 ft / 915 m	Casings	13 3/8" x 0.48"	Tenaris Wedge 521	Alloy 625



Spools ready for installation – prefabrication in our plant ensures good quality

Components ready for installation

Fittings for geothermal drilling
As well as the casings, BUTTING also supplies the appropriate components, such as

- Float collars
- Float shoes
- Cross over subs
- Drill bits
- Lifting plugs
- Tie back components

The basis of these components is always our high-quality, longitudinally welded pipe, calibrated to very tight roundness tolerances. The pipes go through a complete turning and milling process and are equipped with compatible threads.

Prefabrication, unlike “on-site” completion, brings benefits in terms of quality and time. Welding and testing the individual components (e. g. X-ray, dye-penetrant and ultrasonic testing) take place under optimum workshop conditions.

Another advantage is the **full-body and spray pickling** of the piping components, which is only possible on site to a very limited extent, with high, cost-intensive environmental conditions. In addition, optimum anti-corrosion protection of the pipe surfaces is ensured.

Dispatch by land, water or air – safely round the world in any case

Our store includes about 5 000 metric tons of pipes

Transport pipes

To transport thermal water from the bore hole to the power station, BUTTING also manufactures the required pipes, using material grades including duplex, superduplex and nickel alloys. Delivery lengths of 12 m reduce the number of circumferential welds to be performed on site, and thus also cut the laying costs. The increased demands imposed by the customer specifications of the tolerances for the roundness and ovality allow the pipes to be fitted together on site using orbital technology with no problems whatever, and are the basis for the high quality of the circumferential weld seam.

Prefabricated piping / spools for power station construction

For the piping systems of a plant, BUTTING buys in the required fittings and flanges and welds the pipes it has constructed itself into prefabricated piping / spools. Here the standard codes like PED 2014 / 68 / EU, ASME B31.1 and B31.3, are used as desired by the customer.

BUTTING is one of the world's leading processors of stainless steels. The range of services includes welded stainless steel pipes, customised components as well as piping components and vessels. Its core competences lie in forming, welding and material grade technology. The company's headquarters are located in Knesebeck (Germany). Other production facilities are in Schwedt and Könnern (both in Germany) and in Tieling (China). More than 1 900 employees worldwide process over 80 000 metric tonnes of stainless steel and clad materials each year.

Your Contact
Stefan Präger
Sales Manager

Phone: +49 5834 50-368
stefan.praeger@butting.de
www.butting.com

Gifhorner Straße 59
29379 Knesebeck
Germany

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