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**Press Release**

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## **ITER: MAN technology for the groundbreaking energy project**

**MAN Energy Solutions in Deggendorf has been awarded an additional contract for the internationally renowned "ITER" project – the world's largest fusion experiment.**

MAN Energy Solutions in Deggendorf has received the fourth order for the world-renowned ITER (Latin: "the way") fusion experiment. "We are proud to continue our work for the most ambitious energy project worldwide," says Uwe Lauber, CEO at MAN Energy Solutions. "Thanks to this new order, we are demonstrating that we meet the highest industrial and technological challenges of the energy generation sector."

In Cadarache, Southern France, 35 nations are working on the construction of the world's largest Tokamak: a fusion reactor that works according to the principle of magnetic confinement. It aims to demonstrate that CO<sub>2</sub>-free power generation using nuclear fusion is a realistic energy source for the future. The fusion reaction is based on the same principle that powers our sun and stars. The heart of the Tokamak (Russian: "Toroidal chamber with magnetic coils") is a vacuum vessel in which, under extreme heat and pressure conditions, gaseous hydrogen is converted into plasma – a hot, electrically charged gas that can be used to generate energy. One gram of fusion plasma contains roughly the same amount of energy as twelve tonnes of coal. ITER will work with just three grams of fusion plasma and, from this, will generate 500 MW of thermal power.

The Tokamak building has been under construction since 2012. Together with CNIM, a French engineering company, MAN Energy Solutions has created scenarios and procedures for installing the Cryostat. Preparatory works on the Cryostat are now being carried out in Cadarache and the construction of the Tokamak is expected to commence at the beginning of 2019.

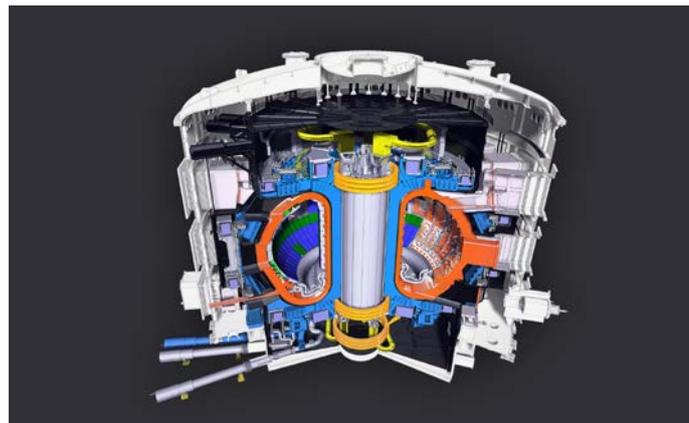
In 2016, MAN received the contract to assemble the Cryostat. The largest stainless steel high-vacuum chamber ever built, with a height of 30 m and a volume of 16,000 m<sup>3</sup>, provides the high vacuum, the ultra-cold environment for the vacuum vessel and the superconducting magnets. With this contract, MAN was one of the first companies at the construction site in France, where work commenced in mid-2016 and is still continuing. Employees from various international companies, including ten delegates from MAN Deggendorf, are participating.

"Due to our previous collaboration and earlier orders, the ITER organization was already aware of our unique expertise with regard to complex stainless steel processing and innovative welding technology," explains Prof. Dr. Rolf Bank, Head of MAN Energy Solutions in Deggendorf.

One of these contracts involved the delivery of 18 upper ports, the production of which involved processing more than 1000 tonnes of stainless steel at MAN in Deggendorf. Furthermore, in 2017, MAN provided central components for the ITER

project: 13 port stubs were installed in ITER's vacuum vessel. The vessel and the ports serve as the first safety barrier. The port stubs are the connecting element between the vacuum vessel and the ports (access openings). The latter permits access for remote control processes and other systems, such as diagnostics, heating and vacuum systems.

MAN Energy Solutions in Deggendorf has a vast experience with demanding projects within the scope of large-scale fusion experiments. The company has already participated in the construction of the Wendelstein 7-x plant in Greifswald, Germany, built by the Max Planck Institute of Plasma Physics (IPP). MAN supported the project by supplying the internal and external vessel as well as the machinery foundation. Wendelstein 7-x produced the first plasma in 2016 – scientists are now studying the basis for the energy supply of the future.



Tokamak cross section illustration – surrounded by the Cryostat



The base section of the Cryostat during assembly



800 tons of concrete and over 200 tons of steel are being used for the Tokamak building.



The Tokamak building under construction

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MAN Energy Solutions enables its customers to achieve sustainable value creation in the transition towards a carbon neutral future. Addressing tomorrow's challenges within the marine, energy and industrial sectors, we improve efficiency and performance at a systemic level. Leading the way in advanced engineering for more than 250 years, we provide a unique portfolio of technologies. Headquartered in Germany, MAN Energy Solutions employs some 14,000 people at over 120 sites globally. Our after-sales brand, MAN PrimeServ, offers a vast network of service centres to our customers all over the world.