

Always stay cool – thanks to perfectly welded hose lines There's no telling exactly what grave damage would happen if the power converter on an electric locomotive ceased to be properly cooled. Everything depends on the cooling system, and its hoses' accurate fabrication is critical. Angst + Pfister has standardized its welding processes to the highest quality level – to the benefit also of the Bordline® converters manufactured by ABB, which are used in all types of rail vehicles.

A hose that can do it all is called for here. The solution deployed must reliably endure a service life of 30 or more years at an ambient temperature spectrum ranging from -40 °C to +80 °C. The heat produced by the power converter as it converts electricity supplied by the overhead catenary wire into three-phase alternating current for the drive motors must be dissipated continuously and efficiently. The connecting hoses in the cool-

ing circuit therefore have to be durable in every respect and under all conceivable circumstances.

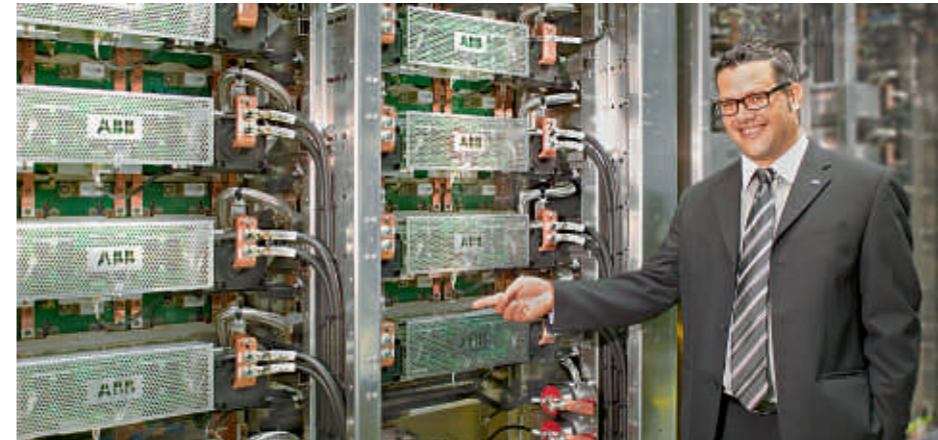
The ASSIWELL® all-metal hose from Angst + Pfister can leverage all of its strengths here. "It is not only resistant to aging and impermeable to diffusion, but also very flexible," explains technical application consultant Urs Nötzli. "This corrugated hose with its

stainless steel braiding tolerates even tight bending radii and is exceptionally fire-resistant to boot."

In short, the ASSIWELL® all-metal hose's properties and durability meet all of the rigorous technical and performance specifications stipulated by the lead product engineers at ABB. Working from that spec sheet, Angst + Pfister and ABB jointly developed the right solution.



In rail transport, precision begins with the technological exactitude of the various individual components. Angst + Pfister masters the art of the mechanized welding of rolling stock parts to the highest certified level.



"Angst + Pfister's reliability and innovativeness, and the joint further development of ideas, products and processes, help us to keep time-to-market short and to reach our goals."

Daniel Sturzenegger, Local Business Unit Supply Manager, ABB Switzerland Ltd.

Perfectly fabricated, flawlessly welded The hose sections and the connector parts both require exact manufacturing precision because only the perfect union between fitting and hose line can be perfectly welded. To avoid residual stress in the material, its structure must be altered as little as possible. The less heat that is applied to the steel during welding, the better the steel's quality and corrosion resistance. The welded joints, after all, have to be as durable as the metal hoses themselves.

Angst + Pfister operates its own welding shop staffed by highly qualified employees.

Angst + Pfister operates its own welding shop staffed by 20 highly qualified employees in Embrach, Switzerland, just a few kilometers away from the group's headquarters in Zurich. The welding shop fabricates prototypes quickly and in precise accordance with customers' specifications. The workers in Embrach weld the connector parts to the all-metal

hose sections. Additionally, Angst + Pfister has two mechanized welding workstations in operation specifically for ABB and other customers with large batch volumes.

Highest certification level rating

Automated welding of connector parts onto metal hoses with stainless steel braiding is not exactly a routine task. Angst + Pfister's welding shop and its team of certified welding experts meet the demanding requirements of DIN EN 15085-2 CL1.

This highest certification level rating for mechanized welding of railway vehicle components also requires systematic machine-data logging.

The high degree of automation yields uniform high quality. That lets everyone rest assured – not just the operator of the electric

locomotive equipped with the ABB power converter, but all the train passengers as well.

Angst + Pfister's experience and expertise – specifically also in the area of welding metal hose lines – accelerated the evolution of the project and quickly brought about a successful solution despite the complexity involved. Angst + Pfister's contribution to the project also included innovative suggestions for configuring the hose lines. The cooperation with Angst + Pfister has won over Daniel Sturzenegger, a local business unit supply manager at ABB Switzerland: "Angst + Pfister's reliability and innovativeness, and the joint further development of ideas, products and processes, help us to keep time-to-market short and to reach our ambitious goals."

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Equipped with a flawlessly fabricated hose line system from Angst + Pfister: the ABB propulsion converter for double-deck electric multiple units.