

m4p Fe-545

Fe-base for laser powder bed fusion

Description, properties and applications

m4p™ Fe-545 is a low-alloy metal powder that was developed for use in the L-PBF process. According to its characteristic profile, the material can be classified as a fine-grained steel and is comparable in particular with the material S355 / 1.0545. Its fine-grained microstructure and high strain capability with yield strengths > 350Mpa are particularly appreciable. While fine-grain structural steels obtain their property profile through thermomechanical pretreatment, **m4p™ Fe-545** can do without such treatment. Thus, additive manufactured parts can be used in the as-built condition and do not have to undergo any costly post-treatment. This is made possible by an alloy-effective material adaptation, which has the particular effect of dispensing with the post-treatment described and counteracts the influence of the component volume. Due to the carbon content, larger component volumes with fine-grain structural steels are to be classified as critical and make the advantageous utilization of additive manufacturing more difficult - this effect was taken into account and advantageously reduced in the development of the **m4p™ Fe-545**. The metallurgical intervention results in hardly any deviations from the property profile of the fine-grain structural steels - only in a reduced tensile stress in the as-built state.

Powder characteristics



Chemical analysis [wt%]

further alloy elements	C / Si / Mn / Cr / Cu
Fe	Base

Image: Microsection; porosity < 0.04%

Material characteristics

(>99,9% rel. density; volume rate 15,2cm³/h; layer thickness 40µm; EOS M290)

Mechanical properties

	Tensile strength Rm [N/mm²]	Yield strength Rp0.2 [N/mm²]	Elongation at break A ₅ [%]	Hardness [HV]	Impact energy [J]
As-built	415 - 430	365 - 385	15 - 25	130 - 145	80 - 90

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