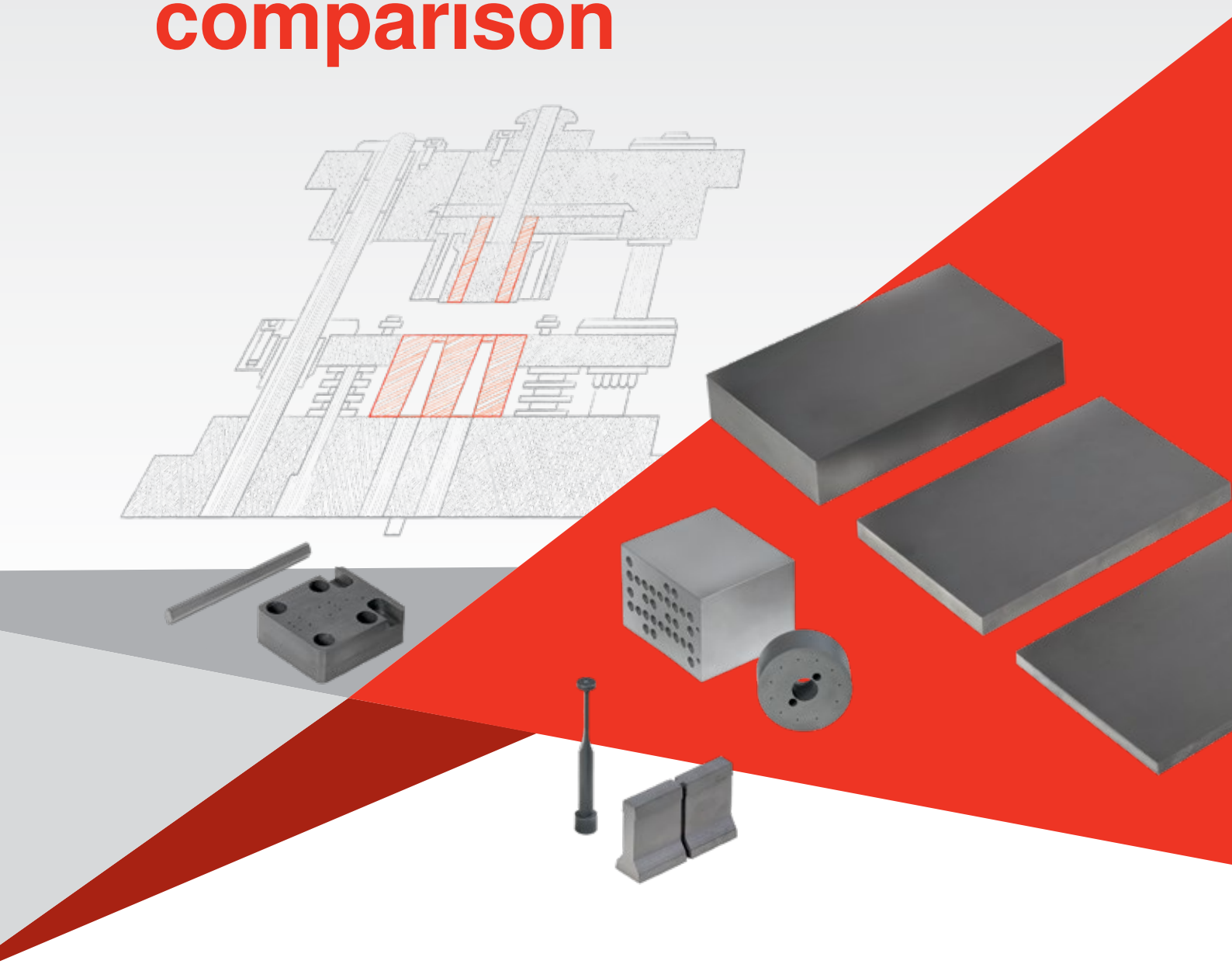
Hard Material Solutions

2021 **EN**

Carbide blocks for wire erosion – performance comparison



CERATIZIT is a high technology engineering group specialised in cutting tools and hard material solutions.

Tooling the Future

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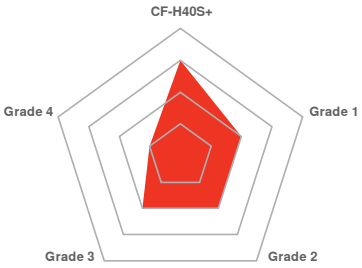
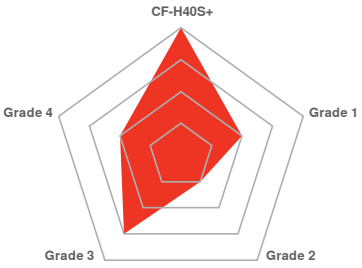
Performance of CF-H40S+ compared to similar carbide grades

This benchmark study provides a performance overview of the CF-H40S+ carbide grade in comparison with similar well established carbide grades for stamping and lamination tools. On the following pages, we have compared their most important metallurgical criteria. These valuable insights are a helpful support for the evaluation of the practical performance of active parts made from cemented carbide.

Structure

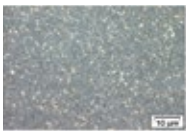
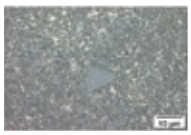
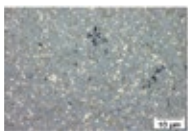
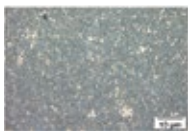
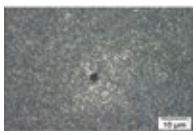


Uniform grain size

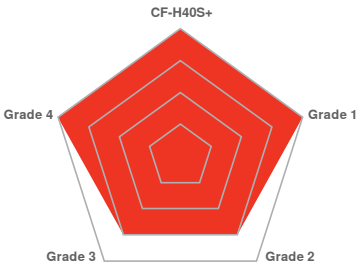


Homogeneous binder distribution

Producer Grade	CERATIZIT CF-H40S+	Producer 1 Grade 1	Producer 2 Grade 2	Producer 3 Grade 3	Producer 4 Grade 4
Uniform grain size	● ● ●	● ●	● ●	● ●	●
Homogeneous binder distribution	● ● ● ●	● ●	●	● ● ●	● ●

CF-H40S+	Grade 1	Grade 2	Grade 3	Grade 4
				

Homogeneity and hardness (HV10)



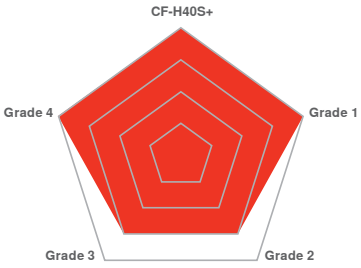
Homogeneity and hardness (HV10)

Producer Grade	CERATIZIT CF-H40S+	Producer 1 Grade 1	Producer 2 Grade 2	Producer 3 Grade 3	Producer 4 Grade 4
Homogeneity and hardness	● ● ● ●	● ● ● ●	● ● ●	● ● ●	● ● ● ●

Comment:
The more homogeneous the structure, the higher the quality of the material. The hardness must always be considered together with homogeneity.

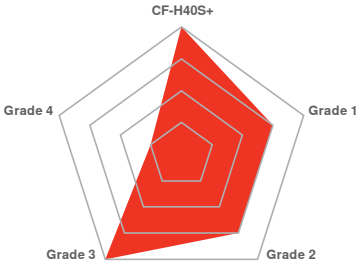
● ● ● ● = very good
● ● ● = good
● ● = satisfactory
● = sufficient

Transverse rupture strength



Transverse rupture strength

Producer Grade	CERATIZIT CF-H40S+	Producer 1 Grade 1	Producer 2 Grade 2	Producer 3 Grade 3	Producer 4 Grade 4
Transverse rupture strength	● ● ● ●	● ● ● ●	● ● ●	● ● ●	● ● ● ●
Weibull factor	● ● ● ●	● ● ●	● ● ●	● ● ● ●	●

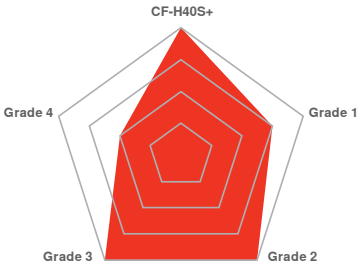


Weibull factor

Comment:
The higher the transverse rupture strength and Weibull factor, the better the material resists to bending stress. Transverse rupture strength must always be considered in conjunction with the Weibull factor.

High TRS in combination with a low Weibull factor is not a stable or desirable material property.

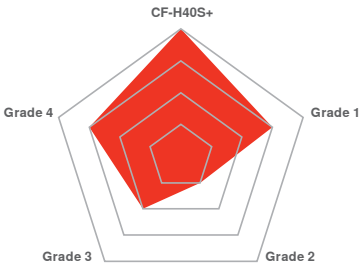
Fracture toughness



Fracture toughness

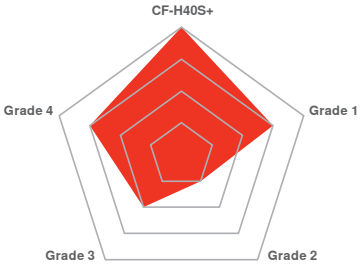
Producer Grade	CERATIZIT CF-H40S+	Producer 1 Grade 1	Producer 2 Grade 2	Producer 3 Grade 3	Producer 4 Grade 4
Fracture toughness (K_1C value)	● ● ● ●	● ● ●	● ● ● ●	● ● ● ●	● ●

Corrosion resistance

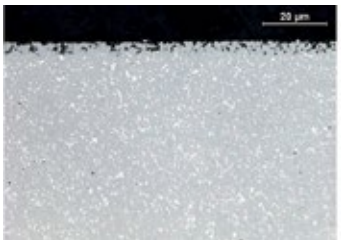


Corrosion resistance

Producer Grade	CERATIZIT CF-H40S+	Producer 1 Grade 1	Producer 2 Grade 2	Producer 3 Grade 3	Producer 4 Grade 4
Corrosion protection mass loss after SPK measurement [g] in pH3 solution	● ● ● ●	● ● ●	●	● ●	● ● ●
Max. corrosion depth after SPK measurement [µm]	● ● ● ●	● ● ●	●	● ●	● ● ●



Max. corrosion depth


CF-H40S+


Grade 2

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Conclusion

- This study, which represents the only complete one, shows that the CFH40S+ grade compared to other grades generally achieves the best performance. The CF-H40S+ grade is clearly superior in the category of **corrosion resistance**, which decisively influences the performance of a cemented carbide in stamping applications. The same goes for the categories of **fracture toughness, transverse rupture strength and Weibull factor**, which can be subsumed under the umbrella category of **mechanical properties**.
- Also, the structural quality of CF-H40S+ is extraordinary. The excellent quality of the material combined with the very good availability of the products and the largest stock range on the market result in a clear added value for our customers.