GRW

GRW BEARING MATERIALS

www.grw.de

WIDE **MATERIAL RANGE TO MEET HIGH STANDARDS** FOR PRECISION BEARINGS

Perfect performance demands material of the highest quality.

The correct selection of raw materials, processed parts and components enables us to provide our customers with consistently high quality products. Our ball bearings are made of 100Cr6, stainless steel (X65Cr13 or 440C), or high nitrogen corrosion resistant steel (X30CrMoN15-1). Similar load ratings are achieved for all these steel types following ISO and ABMA standards.

It has always been our policy to choose the most advanced material available – for example the alloy SV30 (X30CrMoN15-1) uses the elements nitrogen, carbon, chrome and molybdenum in an advanced type of alloy composition. Paired with Ceramic balls a bearing can be designed to exceed the boundary conditions of even the most challenging ball bearing applications. The following criteria should be considered during the selection process:

- hardness
- material cleanliness
- fatigue resistance
- workability
- dimensional stability
- corrosion resistance
- wear resistance
- temperature resistance value

Ceramic balls can be used in conjunction with any of our bearing materials; So called Hybrid Bearings, further extend the solutions GRW can offer. Combine GRW‘s “know how” with more than 30 different kinds of cage material, hundreds of different lubricants including dry coatings and different packaging’s. Anti-friction bearings belong to the most highly stressed components of mechanical engineering. Therefore, extremely high demands are made on the bearing steels, because of the ever-increasing need for longer bearing life and improved running costs. In aggressive environments, corrosion resistance is essential.

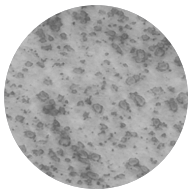
100Cr6/ 52100

available according to DIN EN ISO 683-17, AMS 6440 and AMS 6444

Developed in 1901, 100Cr6 is a basic through hardened steel with a good cost use factor. It is widely used in the industry for components exposed to extreme wear and speed in mechanical engineering or the automotive industry.

At GRW we use a 100Cr6 with high purity which guaranties a top-quality bearing. 100Cr6 is nearly identical to the steel known as 52100. GRW uses a specially developed heat treatment process for this steel. The particular strengths of this material are its high resistance to static loads and its high achievable hardness.

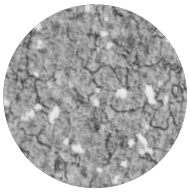
Note: 100Cr6 / 52100 must be delivered lubricated to avoid corrosion. Dry bearings are not appropriate.



Ball bearing outer rings during visual inspection in production

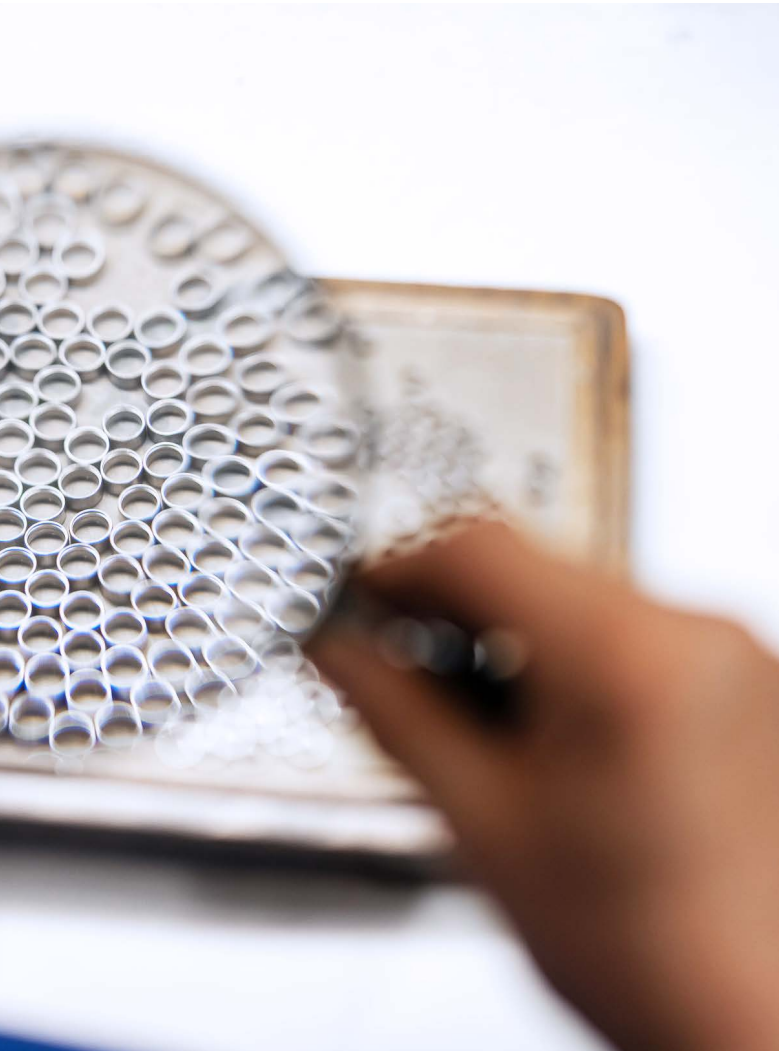
S

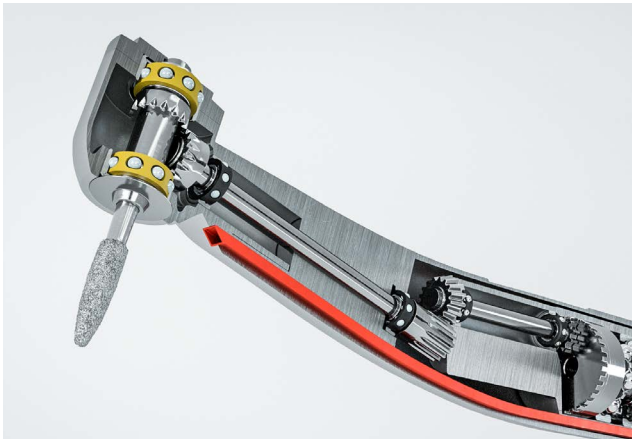
Stainless Steel (440C)
available according to AMS 5618



The bearing steel “S” is a martensitic alloy with high carbon content, which makes it well suited for bearings, traditionally found in the aerospace and food sector. The high chromium content forms a passive chromium oxide layer at the surface that provides substantial protection against corrosion; however, it is not totally inert and these alloys can corrode in hostile environments. 440C has a long proven heritage in aerospace applications.

GRW harden the ball bearing steel at over 1000°C/1832°F and temper it with a specially defined tempering process. The particular strength of this material is its low value of retained austenite of <7%, mainly important for aerospace applications and dimensional stability. A decisive factor of the “S” bearing steel is the conformity with AMS 5618.

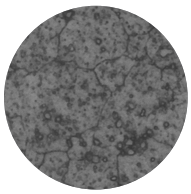




Contra-angle handpiece for dental applications

SS

Stainless Steel (X65Cr13)



Our bearing steel “SS” is the most commonly used bearing steel for miniature ball bearings. It is a martensitic alloy steel with higher carbon content. It is widely used in the industry for cutting tools of any kind, especially for surgical applications.

We harden the ball bearing steel at over 1000°C/1832°F and temper it with a specially defined tempering process. This results in the high-alloy steel achieving its typical characteristics.

The particular strength of this material is its low retained austenite value of <7%. Another strength is its better resistance to corrosion, due to its smaller carbides after heat treatment the corrosion resistance is comparable with that of 440C. An additional factor of the “SS” bearing steel is the tested Biocompatibility according to DIN EN ISO 10993-5 and 10993-10.

Aerospace application: Mars Rover - equipped with deep groove ball bearings made of SS (X65Cr13)

SV/SP

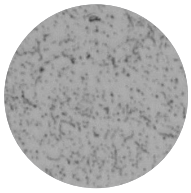
High Nitrogen Stainless Steel (X30CrMoN15-1)

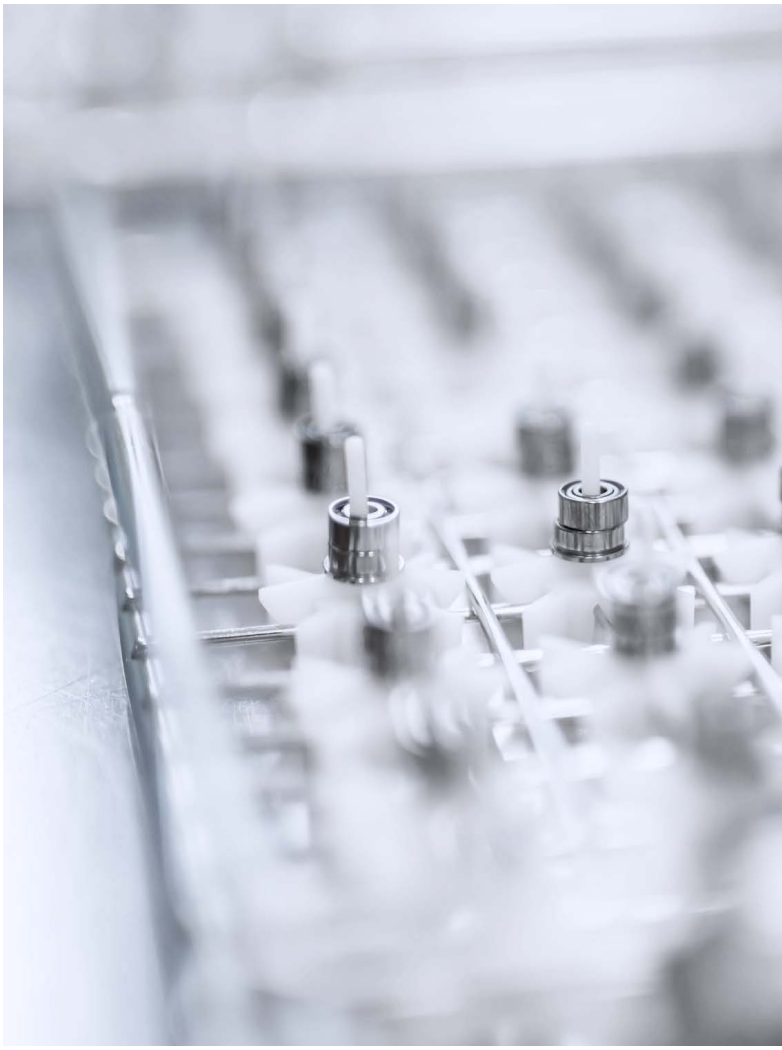
The GRW bearing steel “SV” is a highly nitrogen infused, martensitic alloy that is widely used in aerospace applications , as well as for medical applications. The superior features of high corrosion resistance as well as wear resistance are achieved by partial substitution of carbon with nitrogen. Its low carbon content provides additionally excellent behavior for mixed friction. GRW SV/SP Material - Our premium ring material for your high-tech application.

We harden the ball bearing steel at over 1000°C/1832°F and temper it with a specially defined tempering process. The particular strengths of this material are its high resistance against corrosion and chemicals. An additional factor of the “SV” bearing steel is the tested Biocompatibility according to DIN EN ISO 10993-5 and 10993-10.

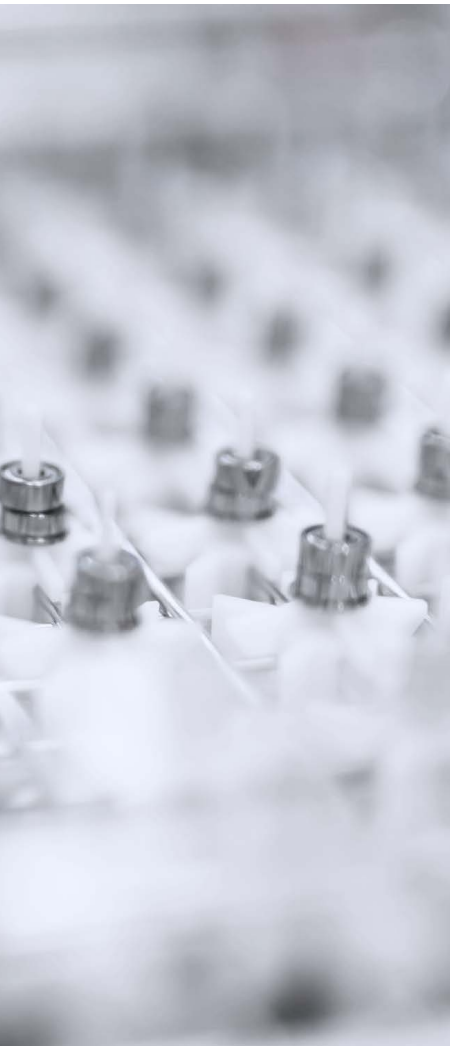
In addition we use the GRW bearing steel “SP”, based on the same chemical composition as SV. It is widely used in high-temperature applications for the machine tool industry and other areas.

The particular strengths of this material are its good resistance to static loads and effective resistance against corrosion. Additionally high temperature hardness is achieved.





Duplex bearings during transport on a tray

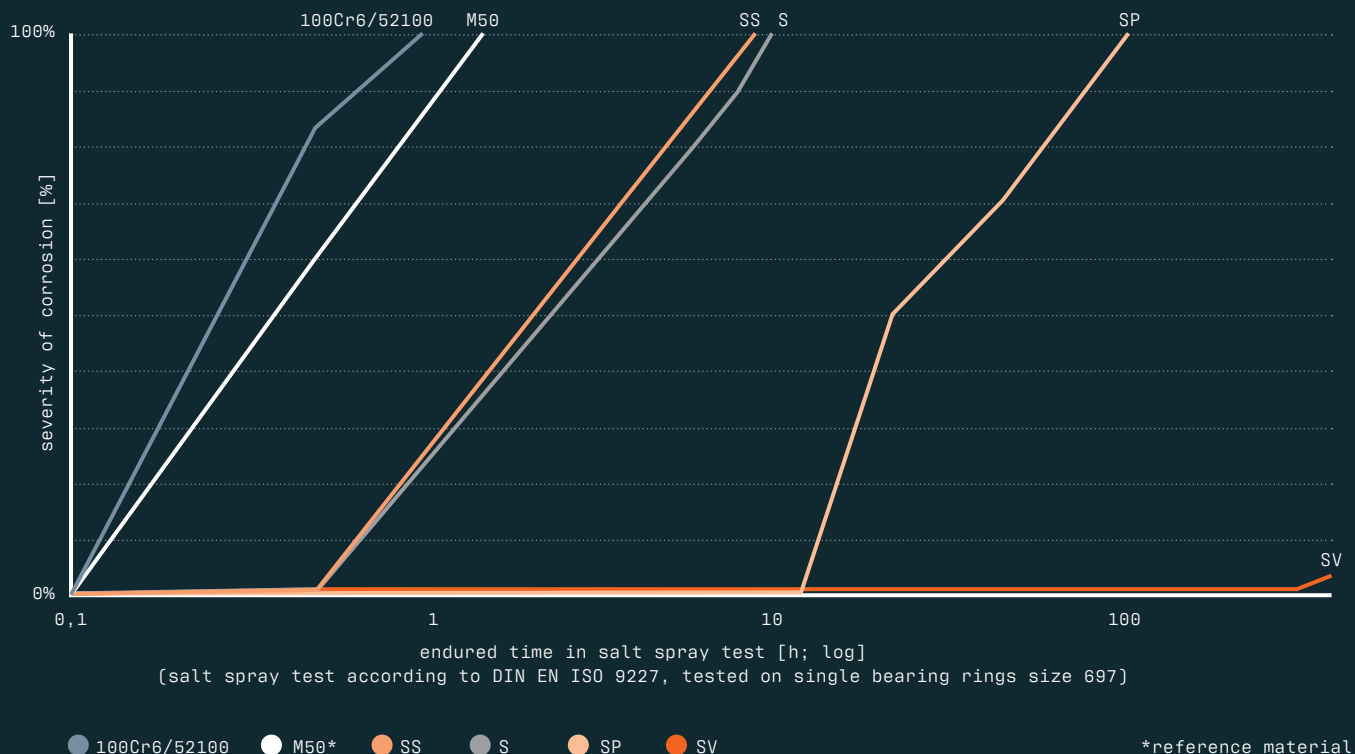


„GRW SV/SP MATERIAL - **OUR PREMIUM RING MATERIAL** FOR YOUR HIGH-TECH APPLICATION.“

GRW Name	Standard Bearing Steel	S	SS	SV	SP
EN ISO	100Cr6	X102CrMo17	X65Cr13	X30CrMoN 15-1	X30CrMoN 15-1
AISI	52100	440C			
Material number	1.3505	1.3544	1.4037	1.4108	1.4108
Trade Name				Cronidur 30	Cronidur 30
Properties					
Density (g/cm³)	7.80	7.70	7.70	7.70	7.70
Young´s modules (GPa)	210	215	215	223	223
Poisson´s ratio	0.3	0.3	0.3	0.3	0.3
Expansion coefficient (x 10^{-6} K^{-1})	11.4	10.4	10.5	10.4	10.4
Corrosion resistance	limited	good	good	very good	good
Hardness (HRc)	>60	>58	>58	>58	>58

GRW BEARING MATERIALS OFFER CLASS LEADING **HIGH TEMPERATURE STRENGTH AND CORROSION RESISTANCE**

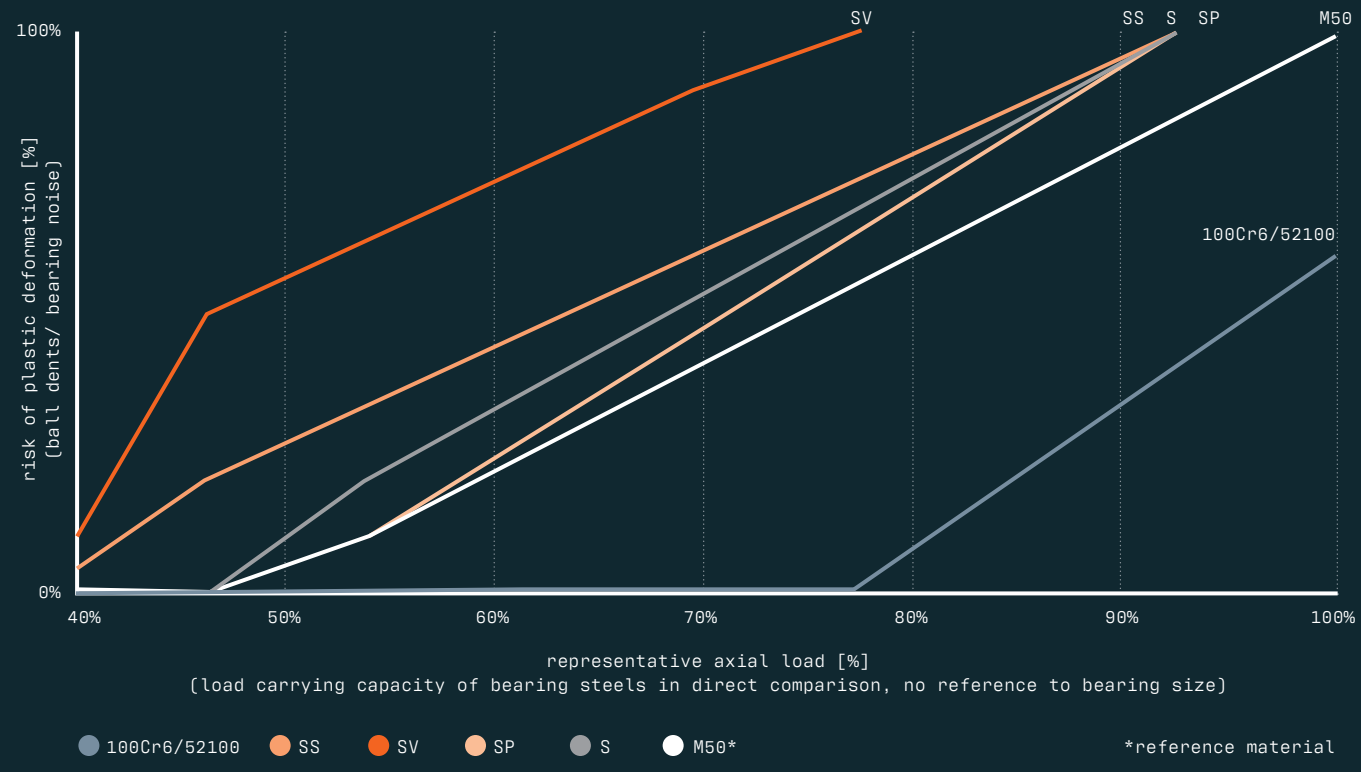
Test Results for Corrosion Resistance



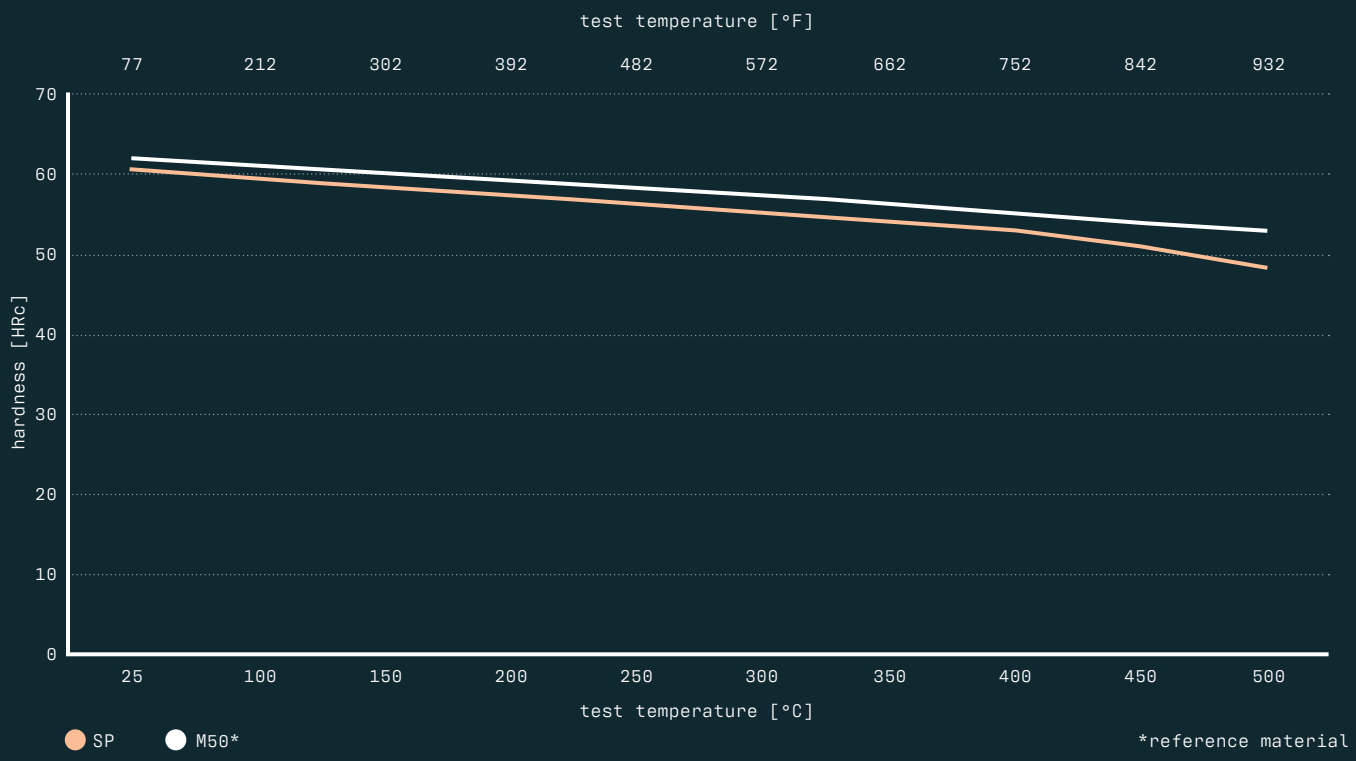
We are pleased to offer you our premium material XTRAstrox for your special application. It is anti-magnetic, highly corrosion resistant and suitable for extreme loads. Please feel free to contact us for more information.

Please find more information in the XTRAstrox brochure.

Static load capacity



Hot hardness



Examples of Applications

APPLICATION	100Cr6/52100	S	SS	SV	SP
Medical					
Dental			X	X	X
Surgical equipment			X [1)]	X	
Blood pump				X	
X-Ray					X
Aviation and Aerospace Industry					
Space application		X	X	X	X
Measurement systems		X	X	X	X
Fans (aerospace)	X		X		
Model jet					X
Chemical industry					
Flow meter			X	X	
Hostile environment				X	
Mechanical engineering					
Spindle bearing	X				X
Turbo charger		X	X	X	X
Vacuum application			X	X	X
Turbo molecular pump	X			X	X
Electric motor	X		X	X	

X = Common steel for this basic application

1) Only for applications without direct contact to any organisms

Please note that this matrix only gives examples of cases in which the respective steels are currently usually used. There is no guarantee of transferability to applications in individual cases. Each application must be designed in consultation with one of our specialists at GRW in each individual case.

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