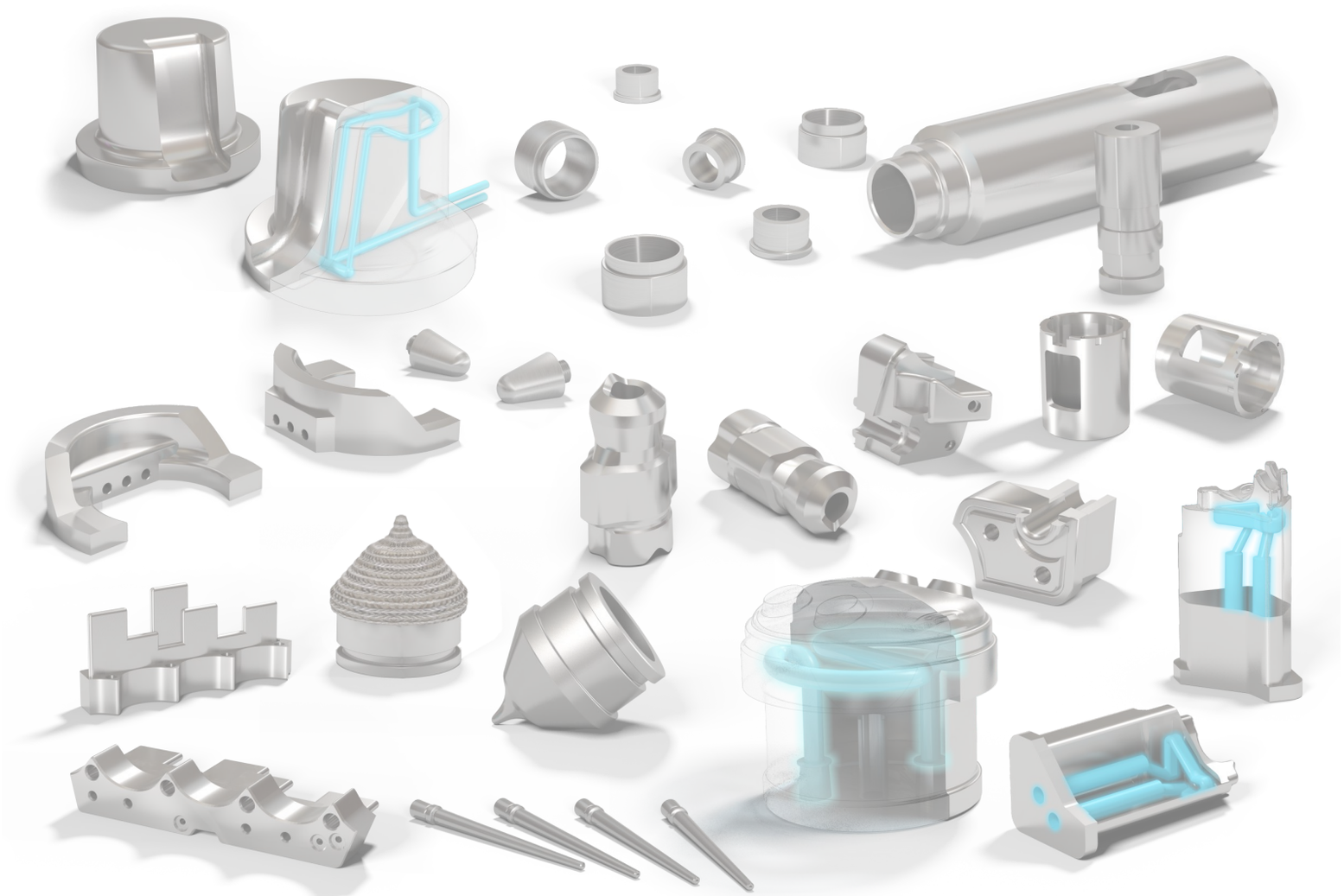
ANVILOY® PRODUCTS

WELDSTONE
TUNGSTEN COMPONENTS

SPECIAL PRODUCTS
FOR DIE CASTING



IBG GROUP

ANVILOY® General Information

Anviloy® is the brand name for a group of tungsten-based alloys, exclusively developed by a team of metal experts from the former US tungsten producer CMW and its partner Weldstone Group. Today, Astaras, Inc and the Weldstone Group are the exclusive producers of Anviloy® Products and owner of the brand worldwide. All our Anviloy® products are produced in our new 20.000m² facility. This facility is ISO 9001:2015 certified and 300+ very-skilled employees use the latest technology to make sure we meet the highest standards. Anviloy® Products are distributed by Weldstone and its US sister company Astaras, Inc. located in Florida.

The most commonly used high-tech materials in the Die Casting Industry are Anviloy®1150 and Anviloy®1350.

Anviloy® alloys are constantly improved and have reached the best mechanical properties and highest level of material structure to make sure they perform reliably even under most demanding conditions like water-cooled applications.

Weldstone and Astaras are currently the only companies in the world offering Anviloy® 3D Solutions with integrated 3D cooling systems. These solutions are applied in a wide range of custom-made products such as sprue post, shot blocks, combustion chamber insert or other cooling parts.

Another unique product range is our Anviloy® C Line which is a special solution for solving soldering and sticking problems.



How do we work

Usually our clients tell us their problems and we decide which Anviloy® Solution could work best. Then we get a design proposal for an Anviloy® Product and approve it or make proposals for design improvements.

Next step is we agree on the commercial terms and start producing the Anviloy® Solution.

Depending on the results, we either make further design improvements or the part gets approved by the client as part of his standard process.

Focus

In comparison to other suppliers, our global team has the advantage of owning many manufacturing facilities and has a broad network of global service companies. This makes us independent and guarantees you best possible product and service quality. Our group also focuses on its core values in everyday business. This includes treating not only the environment respectfully, but most importantly respectful and ethical dealings with our clients.

Own Production Sites

High Innovation

Reliable Quality

Professional Consulting

Ethics

Environment





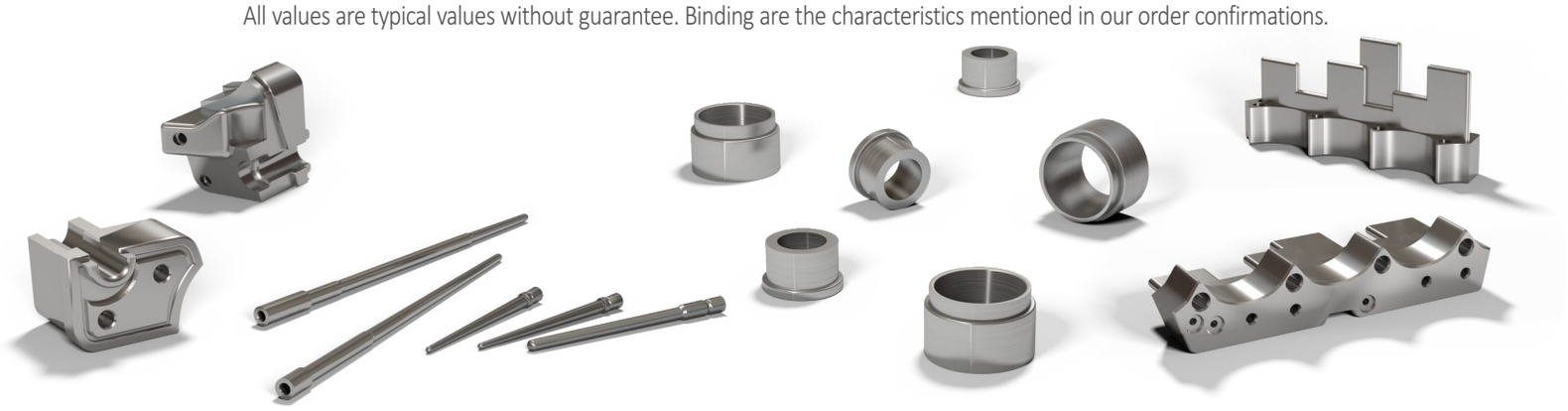
ANVILOY® Charateristics and Benefits

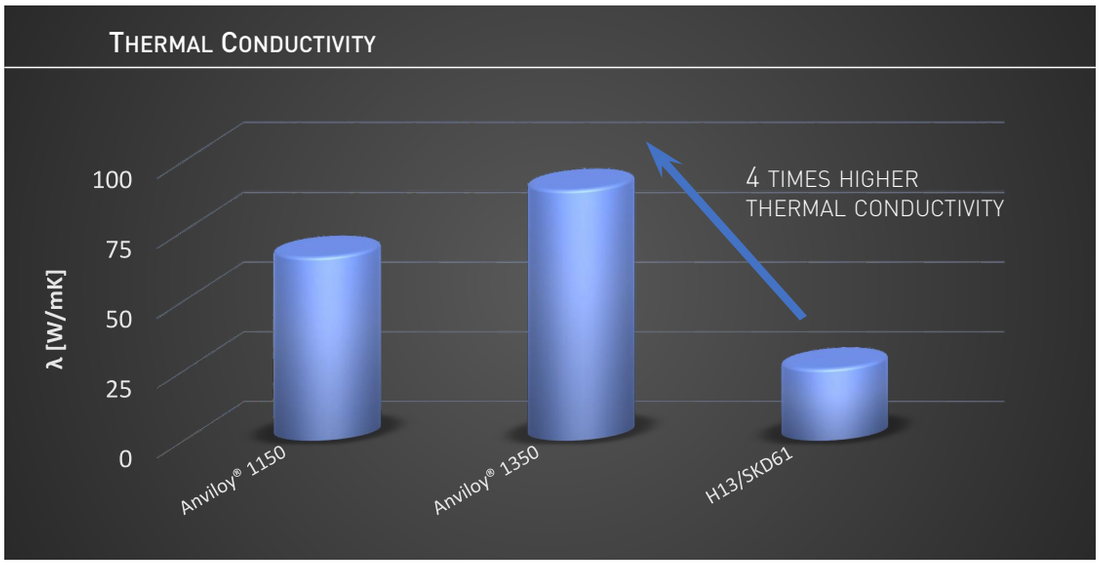
ANVILOY® CHARACTERISTICS	ANVILOY® BENEFITS
· High Resistance against Dissolution · High Hardness at high Temperature · High Strength at high Temperature · Good Thermal Conductivity · Good Tempering Resistance · Can form Separation Layers · Easy to machine	· Reduces Corrosion and Erosion · Increases Form Stability · Improves Stability of Dimensions · Removes Heat quickly · Minimizes Heat Checks · Reduces Soldering · Various Shapes possible

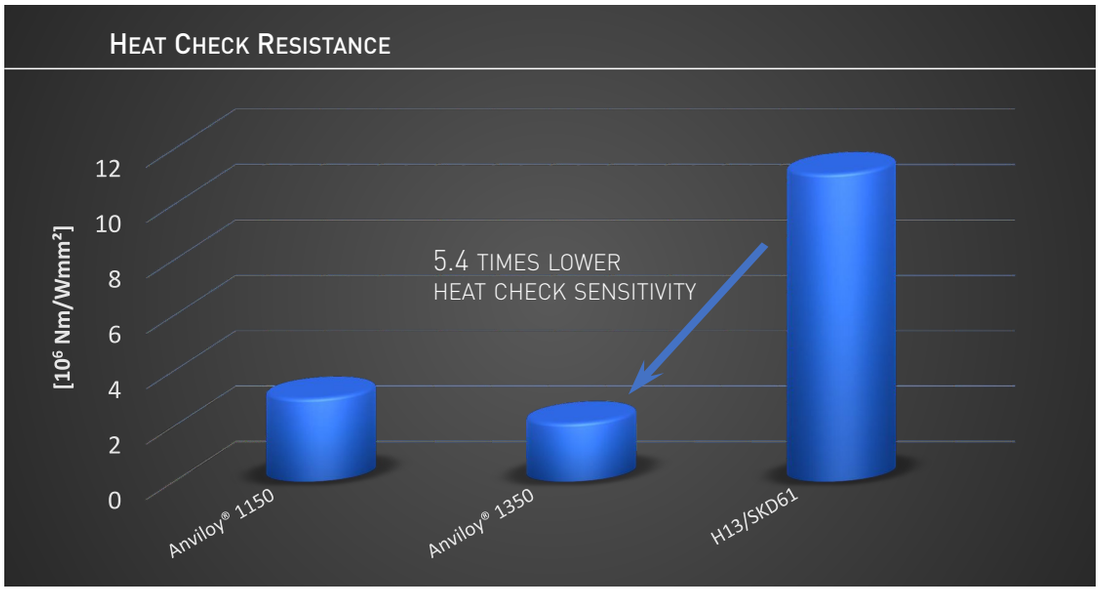
ANVILOY® Specifications

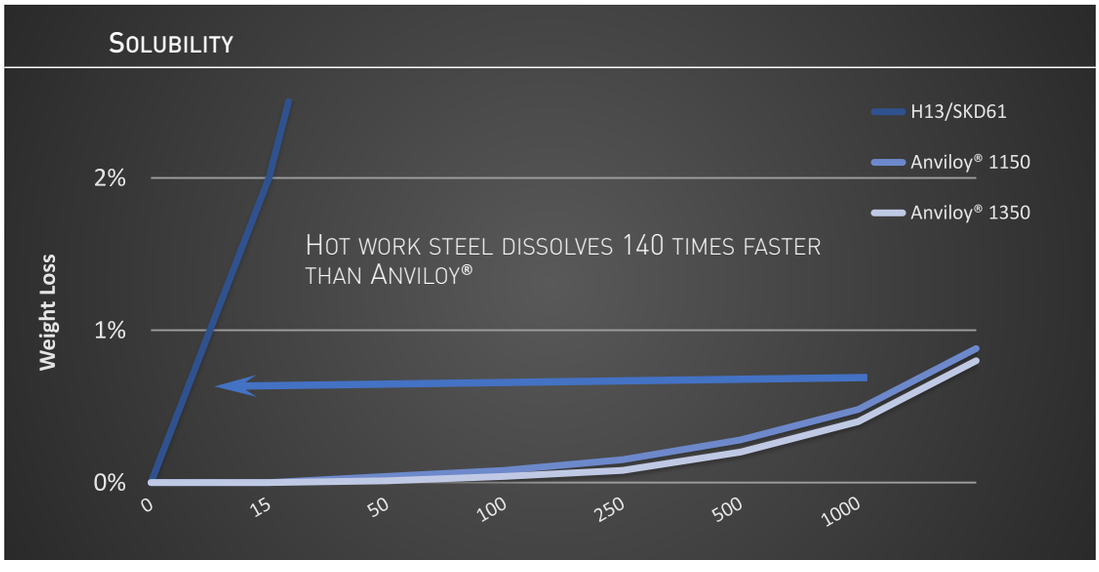
	Anviloy® 1050	Anviloy® 1150	Anviloy® 1350	EN/DIN1.2344 AISI H13	EN-GIS-500-7
Hardness [HV10]	300	350	310	380 - 480	180 - 230
Density [g/cm³]	17	17,3	18,7	8 ± 0,1	7,1 ± 0,1
UTS R_m [MPa]	> 900	965	920	1230 - 1570	500
Elongation A_5 [%]	> 20	> 10	> 10	up to 40	7
Yield Strength $R_{p0.2}$ [MPa]	600	640	620	~ 1200	320
Youngs-Modulus [GPa]	330	360	370	210	169
Thermal Expansion (20°-400°C) [* 10^{-6} 1/K]	6,2	5,6	5,1	11	12,5
Heat Conductivity λ (20°-400°C) [W/mK]	70	65	90	23	35,2

All values are typical values without guarantee. Binding are the characteristics mentioned in our order confirmations.




THERMAL CONDUCTIVITY
100
75
50
25
0
λ [W/mK]
4 TIMES HIGHER
THERMAL CONDUCTIVITY
Anviloy® 1150
Anviloy® 1350
H13/SKD61


HEAT CHECK RESISTANCE
12
10
8
6
4
2
0
[10⁶ Nm/Wmm²]
5.4 TIMES LOWER
HEAT CHECK SENSITIVITY
Anviloy® 1150
Anviloy® 1350
H13/SKD61


SOLUBILITY
H13/SKD61
Anviloy® 1150
Anviloy® 1350
2%
1%
0%
Weight Loss
HOT WORK STEEL DISSOLVES 140 TIMES FASTER
THAN ANVILOY®
0
15
50
100
250
500
1000

ANVILOY® Results

IMPROVED WEAR PROTECTION

· Reduced Erosion
· Reduced Corrosion
· Reduced Hot Soldering
· Reduced Cold Soldering
· Reduced Heat Checking

IMPROVED THERMAL FUNCTIONS

· Improved Heat Transfer to avoid Pores
· Improved Heat Transfer to reduce Dendrite Arm Spacing (DAS)
· Improved Heat Transfer to shorten Cycle Times
· Improved Heat Transfer for optimized Filling of the Mold

IMPROVED PRODUCTION COSTS

· Shorter Cycle Times
· Longer Lifetime of Dies and Molds
· Reduced Maintenance

IMPROVED CAST QUALITY

· Better Mechanical Properties of the Cast (DAS)
· Better Surface Quality of the Cast
· Less Pores in the Cast

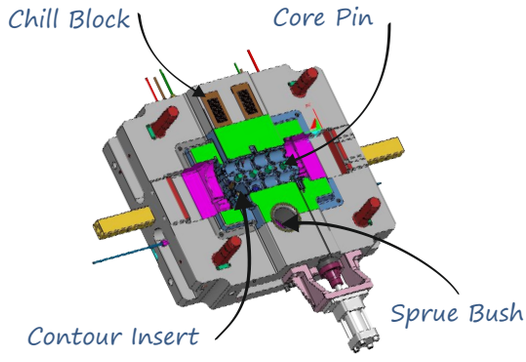
ANVILOY® Applications

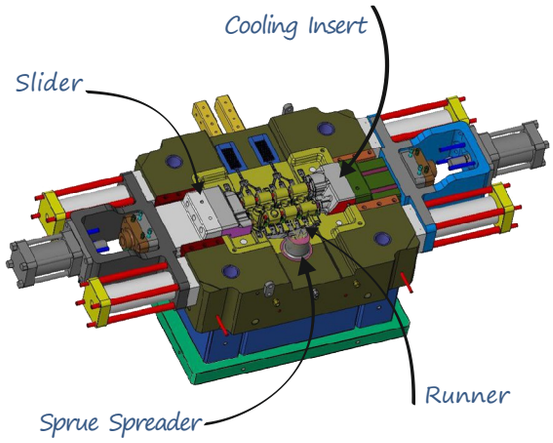
ANVILOY® PRODUCTS FOR FOLLOWING PROCESSES:

· High Pressure Die Casting (HPDC)
· Low Pressure Die Casting (LPDC)
· Gravity Casting
· Other Special Casting Technologies

ANVILOY® PRODUCTS AS FOLLOWING COMPONENTS:

· Cooling Sprue Posts
· Wear Resistance Sprue Bushes
· Wear Resistance Runners
· Non-Sticking Core Pins
· Cooling Core Pins
· Wear Resistance Inserts
· Cooling Inserts
· Chill Blocks
· Porosity Removing Inserts





ANVILOY® 3D Conformal Cooling

Anviloy® 3D describes a group of Anviloy®-Products with complex internal cooling channels which up to now were only possible to produce by additive manufacturing or 3D printing.

In combination with the already 4-times higher thermal conductivity of the Anviloy®-Products, Anviloy® 3D provides by its conformal cooling design incredible cooling rates.

ADVANTAGES OF ANVILOY® 3D

· Unmatched Cooling Rates
· Significant Improvement of Wear Resistance
· Remarkable Increase of Service Life



ANVILOY® C COATING

Anviloy® C are Anviloy®-Products with a special Surface Treatment. This complicated treatment creates an extremely hard surface without any geometrical deformation. The hardness can be increased by up to 6-times without any negative effect on the thermal conductivity.

The results of this huge increase in hardness is a significant improvement of wear resistance and remarkable reduction of sticking.

ADVANTAGES OF ANVILOY® C

· Huge Increase in Hardness
· Significant Improvement of Wear Resistance
· Great Reduction of Hot & Cold Soldering and Sticking



ANVILOY® Weld Rod Filler Metal

Anviloy® Weld Rod products are offered as filler metal rods and wires, which can be provided in spools. They are used to repair, armor or coat dies made of tool steel or Anviloy®. It is also used to create weld connections of Anviloy®-Products e.g. like for threaded or welded inserts.

This is done by melting Anviloy® Weld Rod filler metal rods or wires in a TIG-Arc and apply it to a work piece.

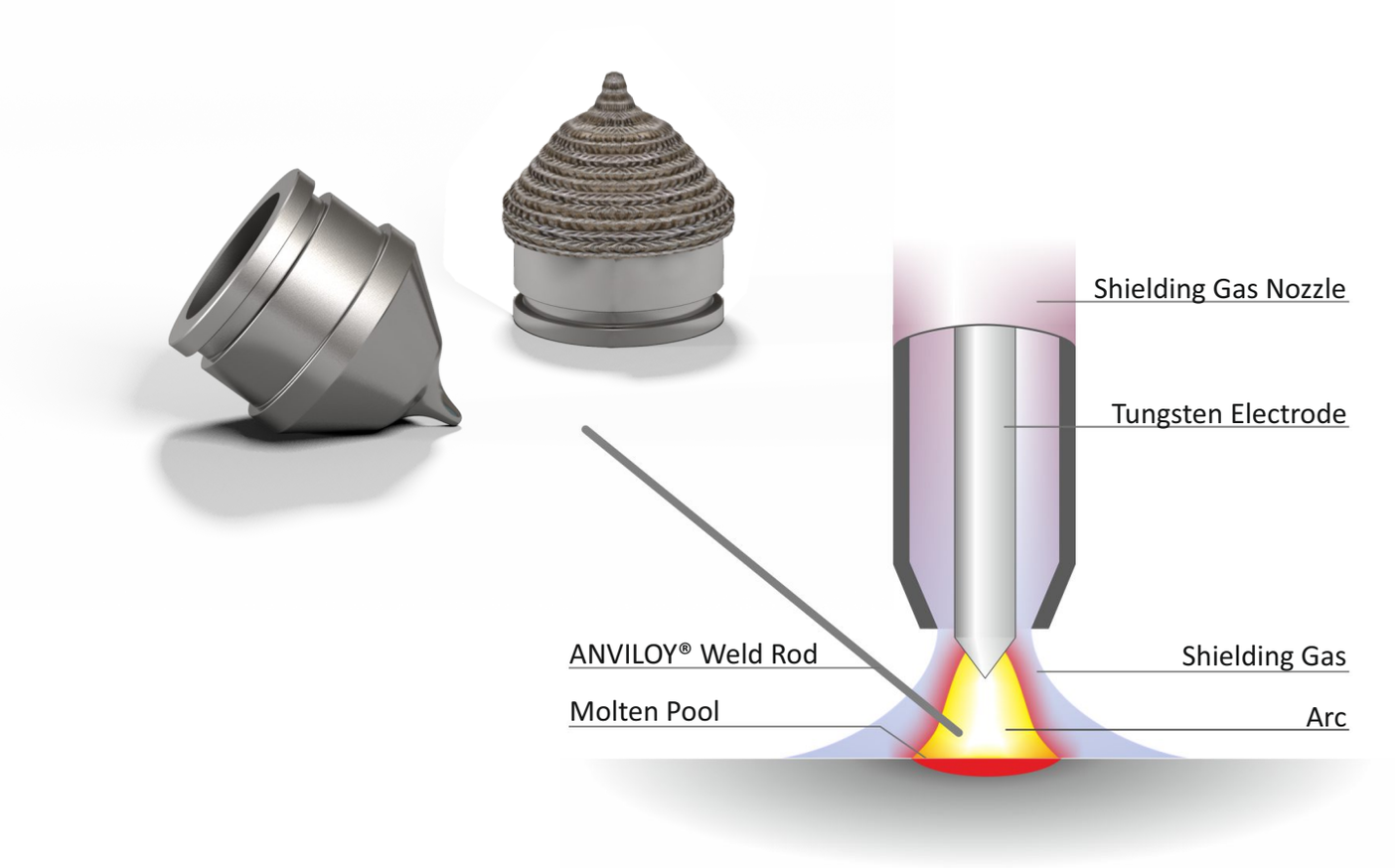
There are also other coating technologies applied especially for the Anviloy® Weld Wire.

ANVILOY® WELD ROD ADVANTAGES

· Significant Increase in Wear Resistance
· Reduction of Soldering
· Repair Welding provides increased Lifetime

ANVILOY® WELD ROD MAJOR APPLICATIONS

· Repair of cracked or broken Dies
· Reconstruction of Damages and Washouts
· Armor, Strengthen or Recoat Areas exposed to high Erosion or Corrosion



ANVILOY® MACHINING

We prefer to machine the parts for you and supply them finished according to 2D and 3D data. We are very experienced and have the right equipment for it. Additionally, we have some special technologies which enable us to save costs compared to conventional CNC machining.

Turning

All turning jobs- inside and outside- can be accomplished with common tools made from tungsten carbide listed in the ISO groups of machine cuttings K 05 to K 20. Using tungsten carbide turning tools, cuts without chamfer with a setting angle of 6° and a face angle of 6°- 12° should be selected. For cutting, positive plates are to be preferred with chip breaker without chamfers. Cutting speeds of 80- 120 m/min can be achieved. Also, High Speed Turning is possible. Cooling agents are not necessary.

Drilling

For this treatment are drills made from high-speed steel (preferably material NR. 1.3342 or 1.3343) or tungsten carbide of the ISO group of machine cuttings K 10 suitably. The tip angle of the drill should be 120°. Depending on the choice of the tool material cutting speeds from 20 to 80 m/min are possible. Since no cooling agent is used, the drilling made of high-speed steel needs often to be ventilated, in order not to let cutting edge of the drill rise to a temperature over 550°C.

Milling

Knife heads with positive indexable inserts made from tungsten carbide of the groups of ISO machine cuttings of K 10 K 20 and/or P 20 to P 30 proved to be very suitable. With an angle of the major cutting edge of 80° the face angle of the indexable insert should be 6°- 10°. Likewise, the angles of inclination should be 6° and the setting angle 6°. As cutting speed 80- 120 m/min is recommended. High speed Milling is possible. No cooling agent is used.

Grinding

For sharpening Tungsten alloys ceramically bound grinding wheels made of silicon carbide can be used. With a granulation of 50- 120 the degree of hardness of the disk should be H to K. For cooling of the disk and reliable clearing of the splinters the grinding area must be rinsed with a strong cooling agent jet. The cooling agent can be a mixture of water and a commercial additive.

Electrical discharge machining (EDM)

Generally, all here mentioned metals can be machined by spark eroding. To machine these high melting metals, you must use high melting electrode materials. We recommend TUCOMET®80 and W90NiCu which can be ordered from us. Please take care that the electrode is used as a cathode.

Bonding

All Anviloy® Alloys can be well hard brazed. As silver solder the silver solder 8427 with 840°C and 8449 with 690°C work temperature work satisfactorily. In special cases Anviloy® Alloys can be connected also by friction welding with steel, copper, aluminium and their alloys.

Repair

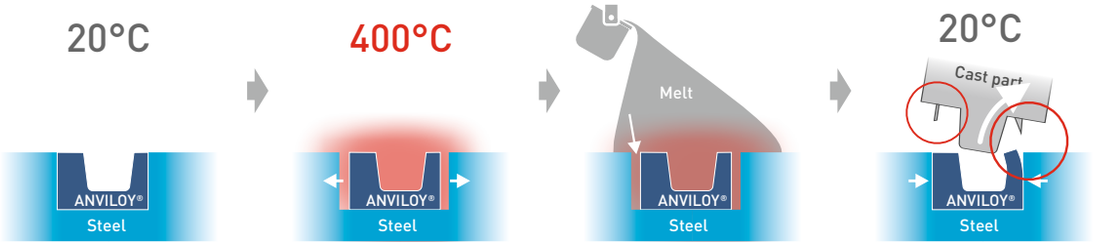
ANVILOY® Products can be repaired by using ANVILOY® Weld Rod. ANVILOY® Weld Rod is a tungsten-based TIG-welding filler metal, available as rod or as wire. It is used to repair cracks, breaks and washouts. For more information please check the last page.





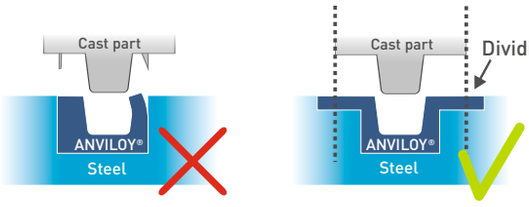


PROBLEM

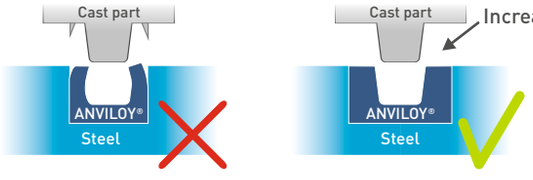


SOLUTIONS

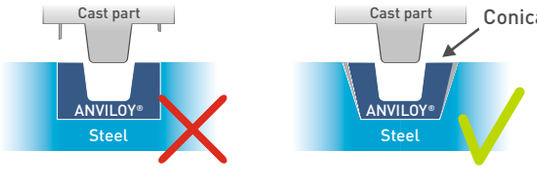
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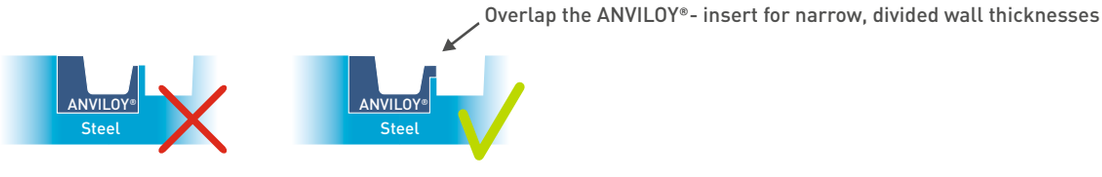
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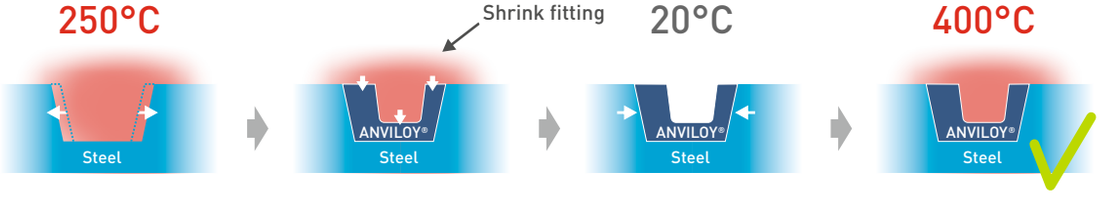
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Americas

Contact:
Ross Wayman

Astaras Inc.
6901 Bryan Dairy Road, Suite 160
Largo, FL 33777, USA

Tel.: +1 727-515-9225
+1 727-546-9600
Fax : +1 727-546-9699
E-Mail: rossw@astaras.net
Internet: www.anviloy.com

Europe, Asia, Australia

Contact:
Andreas Endemann, Thomas Hoehn

Weldstone Components GmbH
Am Ruebgarten 2
D-57299 Burbach
Germany

Tel.: +49 8031-94 13 99-0
Fax: +49 8031-94 13 99-09
E-Mail: hello@weldstone.com
Internet: www.weldstone.com

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