



ATT 2099 MOD

CHEMICAL ANALYSIS (PERCENTAGE BY MASS)

	C	Si	Mn	P	S	Cr	Fe
Guide analysis	0.05	0.40	2.50	0.03 max	0.10	12.30	Bal
Standard	0.05	-	1.00	-	≤0.12	12.5	-

CHARACTERISTICS

ATT 2099 MOD presents a martensitic matrix with low amount of carbides that is intended to provide high mechanical properties in combination with corrosion resistance. The high chromium content assures good corrosion resistance during operation and storage.

ATT 2099 MOD has good resistance to corrosion caused by humid environments and when processing chlorinated plastics under normal production conditions. Due to the low amount of hard particles, this steel presents an excellent machinability. The low amount of carbon and silicon assures a high weldability of this product.

APPLICATION

ATT 2099 MOD is designed for following applications:

- Hot runners
- Mold holders
- Refrigeration plates
- Thermoplastics injection molds with low demands in polishing

DELIVERED CONDITION

Annealed material is available in round, square or flat bars : 280 - 320 HB.

ATT 2099 MOD aims to substitute	
DIN	X33CrS16
UNS	S42020
AISI	420F
AFNOR	Z33CS16+S
EN	X33CRS16

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www.att-metal.com



WeChat

Advanced Tooling Tek (Shanghai) Co Ltd

No. 255 Xinxiao Road, Xinqiao Town, Songjiang Dist.,
Shanghai 201612 China
Tel: +86 21 3373 8146 | Fax: +86 21 3373 8193

Guangdong branch

No.1G, Sanhe Road, Hecheng Sub-district, Gaoming Zone, Foshan,
Guangdong 528511 China
Tel: +86 757 8862 2983 | Fax: +86 757 8862 2983

info@att-metal.com



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HEAT TREATMENT

Stress relieving : ATT 2099 MOD is already supplied in the hardened and tempered condition, the recommended procedure is slow heating to 500°C, holding until complete homogenization, and cooling inside the furnace at least down to 100 °C.

Hardening : When required, preheat the part to 400-650°C in two steps, until the temperature from center to surface is equal in each step. The austenitizing temperature should be between 890 and 910°C holding the temperature until complete homogenization of the part. Surface decarburization cause decrease in hardness and may cause polishing problems named "overpolishing". Therefore, the use of protective atmosphere (or vacuum) is important during heating to hardening.

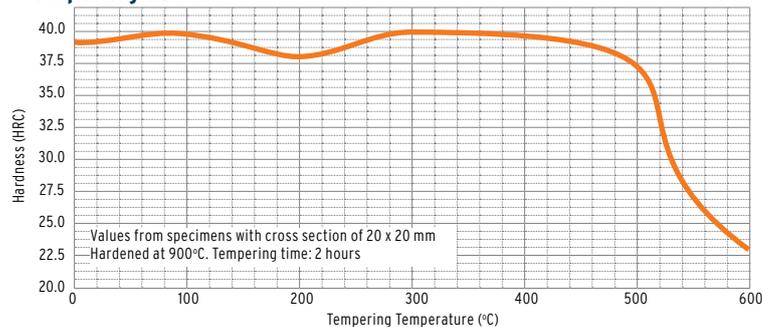
Quenching:

After austenitization, the quenching can be performed in warm and agitated oil, 30-70°C until the part temperature reaches 100°C, followed by air cooling until 60-70°C. The maximum expected hardness will be up to 40 HRC.

Tempering : After quenching, the parts shall be tempered immediately and as soon as reaches 60°C. It is necessary at least double tempering. After each tempering, parts shall be slowly cooled to room temperature.

Tempering temperatures are generally between 500-600°C, depending upon the desired hardness. The time of each tempering cycle shall be at least 1 hour for each 25.4mm of thickness after temperature equalization between surface and core.

Tempering curve

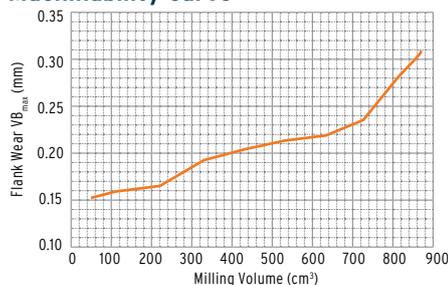


PROCESSING OPERATIONS

Machining : ATT 2099 MOD can be conventionally machined in the hardened and tempered condition. Care need to be taken in the selection of the tool and the speed in order to allow a good machinability. It has an excellent machining performance especially in deep drilling. A good machinability property can be evaluated by tests of cutting tool end like in milling operation. Considering a flank wear of 0.25mm, cutting tool end life.

Electro-erosion process can be employed in heat treated dies or molds. After electro-erosion machining it is recommended to remove the superficial layer thru fine grinding wheel. The white layer in ATT 2099 MOD is not as hard as in AISI P20 grades, due to the lower carbon content. After electro-erosion process and removal of the white layer, it is also recommended a stress relief treatment at 400°C.

Machinability curve



Toroidal Tool
R300-25T12-10M
Diameter = 25 mm
Number of teeth = 3
Insert
Hard metal with covered surface
R300-1032M-PH 4230
Insert Radius: 5 mm
Milling Parameters
Consistent Cut
Cutting Speed = 200 m/min
Advance = 0.12 mm/tooth
Depth of axial cut = 0.5 mm
Depth of radial cut = 10 mm

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