ATT 2083 ESR

CHEMICAL ANALYSIS (PERCENTAGE BY MASS)

	C	Si	Cr	Mn	V
Guide analysis	0.40	0.80	13.50	1.00 max.	0.25

CHARACTERISTICS

ATT 2083 ESR is a martensitic stainless steel indicated for manufacturing of plastic molds. It is produced with special procedures, including vacuum degassing and also refining by ESR (Electro-Slag-Remelting), leading to high homogeneity of properties. When applied in plastic molds, ATT 2083 ESR presents the following properties:

- High corrosion resistance
- Excellent polishability
- Good wear resistance
- Good machinability
- High mechanical strength

AISI	420
DIN	42Cr13
WNr.	1.2083

APPLICATIONS

ATT 2083 ESR is applied in molds which work in corrosion conditions or need to be stainless for other reasons. Typical applications are:

- Molds for injection or extrusion of chlorinated thermoplastic polymers, such as PVC
- Molds that work or are storage in corrosion environment or wet conditions
- Molds for glass industry, requirements for high polishability such as sunglasses, medical and cosmetic packagings.
- Other applications where high mechanical strength and high corrosion resistance are necessary

DELIVERED CONDITION

Annealed to maximum hardness of 200HB.

PHYSICAL PROPERTIES

Density, kg/dm³ at	20°C 7.7
Thermal Conductivity (W/m.K) at	100°C 23.0

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HEAT TREATMENT

Annealing : soft annealing should be carried out by slow heating (100°C/h) to 780/840°C for 1 hour (after soaking), followed by slow cooling at 30°C per hour to 600°C and then by air cooling.

Stress relieving : intense material removal during machining of molds can induce considerable stress. A stress relieving treatment is important to remove such stresses, in order to avoid distortions, being applied after machining and before heat treatment. The indicated procedure is slow heating (100°C/h) to approximately 650°C, holding until complete homogenization (normally 30 min for 25 mm of the larger section, with minimum of 2 hours), and slow furnace cooling at least down to 100°C.

Hardening and Tempering :

	Pre-heating	Hardening	Tempering*
The indicated recommended hardening and temperatures are	400 - 450°C	1000-1040°C (usually 1025°C)	175 -550°C (see graph)

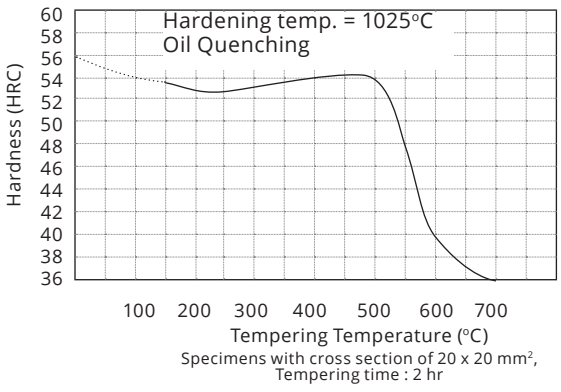
* For providing maximum corrosion resistance, tempering temperatures should be between 200-300°C (see graph).

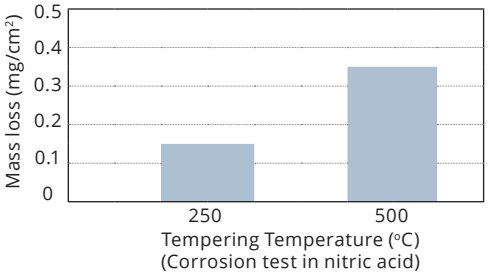
After preheating : molds must be slow heated (300°C/hr max) to hardening temperature, holding 30 min after soaking (i.e. after mold is fully heated throughout). Surface decarburization cause polishing problems. Therefore, the use of protective atmosphere (or vacuum) is important during heating to hardening.

Quenching may be done in oil, holding until reaching 80°C. Then it is recommended that molds are carried to another furnace at 100/150°C in order to equalize temperature (in this step 1 hr for each 100 mm is required). Immediately after this treatment, heating to tempering should start.

Tempering temperatures should be suitable to the required hardness (see diagram). Double tempering is required and after each one mold must cool down to room temperature. For each tempering treatment, the holding time of at least 2 hr (after soaking) is necessary. As discussed before, tempering between 200-300°C is recommended to improve corrosion resistance.

Case hardening and nitriding : these treatments impair corrosion resistance and are not normally applied.





PROCESSING OPERATIONS

The following processes can be applied for producing molds with ATT 2083 ESR:

Machining : turning, milling or grinding. The parameters should be adequate for machining of martensitic stainless steels. Note that ATT 2083 ESR is magnetic, either in annealed or in hardened condition.

Electrical discharge machining : the white layer should be mechanically removed, by grinding or sanding. It is also important to re-temper the molds in a temperature 50°C lower than that of the previous tempering.

Polishing: ATT 2083 ESR can be polished in the usual techniques, presenting excellent polishability due to its high microstructural cleanness. For improving polishing, a proper heat treatment must be applied, being important the absence of carburization or decarburization.

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