

Uddeholm Tyrax[®] ESR

Premium Plastic Mold Stainless Tool Steel

	Vacuum	Salt Bath** Fluidized Bed	Atmosphere Furnace Muffle Furnace / Packed
	** Salt Bath heat treatment can be performed but is not recommended for details with blind holes or threaded holes that will not be rework after heat treatment.		
Preheating Temperature	1. Bring up to 1200°F, equalize 2. Heat up to 1550°F, equalize	1. 1100 – 1200°F, equalize 2. 1500 – 1550°F, equalize	1. Bring up to 1200°F, equalize 2. Heat up to 1550°F, equalize
Hardening Temperature (Austenitizing)	1920 – 1975°F Holding time after the tool or part has fully heated through at the hardening temperature: 30 minutes, alternatively hold 20 minutes for first 1" and then 15 minutes for each additional inch of wall thickness.		
Quenching	Alt. 1 Inert gas, positive pressure Alt. 2 Inert gas, positive pressure; interrupted quench at 660 to 840°F. Then cool in circulating air.	Alt. 1 Martempering bath at 490-1020°F Alt. 2 Circulated high speed inert gas	Alt. 1 Circulated inert gas Alt. 2 Circulated air
	Quench as rapidly as possible without cracking or creating excessive distortion.		
Tempering (minimum twice*) Temper immediately after quenching when the complete tool reaches 150°F	Tempering Temperatures 1000°F 1020°F 1050°F	Hardening Temperatures and Hardness 1920°F 53-55 HRC 52-54 HRC 50-52 HRC 1975°F 56-58 HRC 54-56 HRC 52-54 HRC	
	Tempering Times: 1 hour per inch of wall thickness, or hold at temperature for a minimum of 2 hours once the tool comes to temperature. Check hardness between tempers. *For higher dimensional stability, cryo treatment can be done at -190 to -320F, before tempering. Care should be taken not to do on intricate shapes for risk of cracking.		
Stress Temper performed on hardened tools after EDM or after welding	Check hardness to confirm tool status. Temperature: Shall be 50°F below the lowest tempering temperature. Time: Soak 30 minutes per inch of maximum section with a minimum of 2 hours once tool comes to temperature. Cool in still air. Caution: Stress tempering in an unprotected atmosphere will oxidize the tool. For hot work applications, this can prove beneficial to protect the tooling surface during operation. However, in other applications where surface finish condition is a concern, consult your heat treater on options for protective atmospheres or finish the surface after stress tempering.		
Dimensional Stability	Average size change as a result of hardening and tempering may not exceed 0.003 inch/inch/maximum dimension if the tool has been stress relieved before finish machining. If stress relieving is not performed as recommended, dimensional stability may be inconsistent and cannot be guaranteed.		

Characteristics

- Excellent polishability
- Very good toughness and ductility at a high hardness
- Good wear resistance
- Good corrosion resistance
- High hardness of 55 to 58 HRC achievable

This information is based on our present state of knowledge and is intended to provide general notes on our products and their uses. It should not therefore be construed as a warranty of specific properties of the products described or a warranty for fitness for a particular purpose. It is your responsibility to confirm you have the latest revision of this document (verify on our website) and that you forward to your Heat Treatment service provider. Failure to do so may result in inferior material properties. Revision Date: August 15, 2024