

ATS 34 AND 154 CM STAINLESS HEAT TREAT PROCEDURE

This is an oil hardening grade of steel which will require oil quenching. The oil should be a warm, thin quenching oil that contains a safe flash point. Olive oil has been used as a substitute. As a rule of thumb, there should be a gallon of oil for each pound of steel. For warming the oil before quenching, you may heat a piece of steel and drop it in the oil.

- 1.) Wrap blades in stainless tool wrap and leave an extra two inches on each end of the package. (This will be for handling purposes going into the quench as described below.) We suggest a double wrap for this grade. The edges of the foil should be double crimped, being careful to avoid having even a pin hole in the wrap.
- 2.) Place in the furnace and heat to 1900°F. After reaching this temperature, immediately start timing the soak time of 25-30 minutes.
- 3.) After the soak time has elapsed, very quickly and carefully pull the package out with tongs, place over the quench tank and snip the end of the package allowing the blades to drop into the oil. You should have a wire basket in the quench tank for raising and lowering the blades rather than have them lie still. Gases are released in the quench and would form a "trap" around the steel unless you keep them moving for a minute or so.
*IMPORTANT--It is very important that the blades enter the oil quench as quickly as possible after leaving the furnace! Full hardness would not be reached if this step is not followed.
- 4.) After the blades are quenched down to near room temperature (preferably around 125°F.) they must re-enter the furnace at 300°F. After they reach 300°F. allow them to remain for two hours.
- 5.) Remove the blades and place them aside for room temperature cooling.
- 6.) After they have cooled to room temperature, place them back in the furnace at 275°F. for two hours. Remove and check hardness. You should have apprx. 60 Rc.
- 7.) For extra stability and a point higher hardness you may pack the blades in dry ice for one hour.

Note: All the above procedure is based on our own experience, realizing there are others using their own trial-error method. All equipment must be calibration checked periodically. (We offer pyrometers for sell for checking furnace temperature.) There are no "short-cuts" for proper heat treating. Always exercise care and precaution.

AISI O-1 TOOL STEEL HEAT TREAT PROCEDURE
(AISI O-6 ALSO)

This is an oil hardening grade which will require oil quenching. The oil should be a warm, thin type of quenching oil with a safe flash point. Olive oil has been used as a substitute. As a rule of thumb, a gallon of oil is required for each pound of steel. For warming the oil before the quench takes place, drop in a piece of heated steel.

- 1.) There are two ways of giving O-1 a protective atmosphere before hardening. (a) You may use our non-scaling compound. It works very well for temperatures up to 1650°F. Heat the blades to 500°F., remove from furnace and roll them in a tray of compound. It will adhere to the steel and form an air tight blade. Replace in furnace and continue hardening steps. (b) The other choice is to wrap in tool wrap. When wrapping this grade allow an extra two inches on each end for handling purposes. Step 3 will describe further.
- 2.) Place the blades in the furnace and stand up on edge. (special rack optional available). Heat to 1450°F. as soon as this temperature is reached, then begin soak time of 15-20 minutes. (soak means to "remain at heat").
- 3.) At this time the blades need to go into the oil very quickly. You should have a wire basket inside the quench tank. If the blades are wrapped in tool wrap, hold one end up and snip the other end of the foil, allowing the blades to drop into the basket and into the oil. Raise and lower the basket for a minute or so for good oil circulation. (*This step is very important*).
- 4.) While the blades remain cooling, set the furnace at 375°F. After the blades have cooled to approx. 125°F., place them in the furnace (at 375°F.). Allow them to remain (draw) for two hours.
- 5.) Remove the blades, check hardness after they are cool enough to handle. You should have approx. 60-62 Rc.

NOTE: All of the above data is based on our own experience, realizing that others may have developed their own trial-error methods. All equipment should be calibration checked periodically. (We have pyrometers available for calibrating furnaces.) There are no "short-cuts" for proper hardening. Always use care to insure having a good job of hardening.

440 C STAINLESS STEEL HEAT TREAT PROCEDURE

- 1.) Wrap blades in tool wrap. Double crimp all edges of the foil, being careful to avoid having even a pin hole in the foil. You may double wrap for extra assurance of locking out all oxygen. You may wrap the blades with 5-6 stacked side by side or individually wrap and place them in our optional furnace rack. This rack will hold the blades in an upright position for minimizing warpage.
- 2.) After placing the blades in the furnace, heat to 1850°F. After reaching 1850°F., start timing the soak time of 20-25 minutes.
- 3.) After the soak time has elapsed, carefully slide the blades onto a steel grate or heavy wire mesh for room temperature cooling. (This is the air quench). Place aside for cooling. The grate or wire mesh will allow air to circulate under the blades as well as around them for uniform quenching.
- 4.) While the blades are cooling, leave the furnace door open and allow it to come down to 220°F. Sometimes the blades will be cooled before the furnace comes down. In this case keep the blades warm (place near the furnace door) or you may use the kitchen oven for drawing. It is important on all grades that they do not cool much below the 125°F. temperature before drawing. (There are furnaces for tempering or drawing also available).
- 5.) After placing the blades in the 220°F. temperature, they should remain at this heat for two hours.
- 6.) Pull the blades out for cooling and place them back at 200°F. again for two hours.
- 7.) Check hardness. You should have approx. 59 Rc.

For extra stability, you may freeze the blades in dry ice for one hour. This will also increase the hardness a point or two.

NOTE: All the above procedure is based on our own experience, realizing that other people use some of their own trial-error methods. The equipment must be accurate and periodically calibration checked. (We offer pyrometers for sell for calibrating the furnace controls.) There are no "short-cuts" for proper heat treating. Always exercise care and precaution to insure a good quality job!

AISI D-2 HEAT TREATING PROCEDURE

- 1.) Wrap blades in tool wrap. Double crimp all of the folded edges, being careful to avoid having even a pin hole in the foil. The blades may be wrapped individually or stacked side by side (stack no more than 5 or 6 per pack for ease of handling). If they are wrapped individually you may consider placing them in our optional furnace rack that will hold the blades in an upright position for minimizing warpage.
- 2.) After placing the blades in the furnace, heat to 1850°F. After reaching 1850°F. immediately start timing the soak time of 15-20 minutes.
- 3.) After the soak time has elapsed, carefully slide out the package onto a steel grate or wire mesh for cooling in room temperature. (This is known as the "air quench").
- 4.) While the blades are cooling, allow the furnace to cool down to 950°F.
- 5.) When the package has cooled enough for handling, remove the foil. The blades should be warm (approx. 125°F.). At this time place them back in the furnace at the 950°F. temperature. After the blades have reached this temperature, allow them to remain (draw) for two hours.
- 6.) Remove the blades for cooling down to room temperature and place them back in the furnace at 900°F. again for 2 hours. (This is a double temper we suggest for D-2).
- 7.) After removing and cooling, then check hardness. You should have 58-60 Rc. For extra stability and $1\frac{1}{2}$ points higher hardness, you may pack the blades in dry ice for one hour.

NOTE: All the above procedure is based on our own experience, realizing that other people use some of their own trial-error methods. The equipment must be accurate by periodically calibrating and maintaining the instruments being used. (We offer pyrometers for sell for calibrating the furnace controls). There are no "short-cuts" for proper heat treating. Always use care to insure having a good job of hardening.

AISI A-2 HEAT TREATING PROCEDURE

- 1.) Wrap blades in tool wrap. Double crimp all of the folded edges being careful to avoid having even a pin hole in the foil. The blades may be wrapped individually or stacked side by side (no more than 4 or 5 per stack) for ease of handling. Many prefer the individual wrap method.
- 2.) Place the blades in the furnace in an upright position and heat to 1750°F. After reaching 1750°F, immediately start timing the soak time of 20-25 minutes.
- 3.) After the soak time has elapsed, carefully slide out the package (packages) on a steel grate or sturdy wire mesh for cooling in room temperature. (This is called the "air quench").
- 4.) While the blades are cooling down, allow the furnace to cool down to 400°F.
- 5.) When the package has cooled down enough for hand handling, you may remove the foil. The blades should cool to approx. 125°F. (warm enough for holding in your hand but not completely room temperature). At this time place them in the 400°F. temperature. After the blades reach this temperature allow them to remain (draw) for 2 hrs.
- 6.) Remove the blades for cooling to room temperature. The hardness now should be 60-62 Rockwell C. Should you desire a lower hardness increase the temperature of step 4, 75°F. for each point of lower hardness.

Note: All the above procedure is based on our own experience, realizing that other people use their own trial-error methods. The equipment must be accurate by periodically calibrating and maintaining the instruments being used. There are no "short-cuts" for proper heat treating. Please exercise care and precaution to insure a good quality job!