HEAT TREATMENT SALTS
(HEAT TEMP-150 & HEAT TEMP-220)
NEUTRAL SALTS FOR TEMPERING, AUSTEMPERING AND MARTEMPERING)

TEMPERING

SCOPE : Steel parts which have been hardened by quenching are subjected to tempering to lesson or eliminate entirely internal stresses, to soften the hardened steel and to increase its ductility. Tempering consist of heating the hardened steel below lower limit of the critical range and then cooled either slowly or quickly.

Salt bath ideally suited for tempering have following advantages.

- Due to rapid heating of the charge by conduction, the tempering cycle is less than that of convection type furnaces for the same size of charge.
- Close control of time and temp enables unskilled labours to produce excellent results.
- Components are of uniform temper because uneven heating of work is avoided.
- The smoke associated with hot oil tempering is eliminated and there is no need for degreasing after tempering.

Bath is prepared by melting HEAT TEMP-150 or HEAT TEMP-220 salt at required temp. The dry components are immersed for sufficient time to enable the complete structural changes in the steel.

Holding time depends on the type of the components, the composition of the steel and the temp. Generally 30 to 60 minutes time is adequate. After tempering parts are air cooled or if there is no danger of cracking they may be cooled in water.

AUS TEMPERING

AUS TEMPERING is an osothermal process applied to thin sections of medium to height carbon steel, or to low alloy steels of thicker section. High alloy steels, are not generally Austempered, but either oil hardened or martempered.

In Austempering the steel parts are heated to the required temp and then quenched medium having temp range from 250`C to 300`C where it is held for as long time as required for isothermal transformation of the Austenite and then air cooled to room temp.

The main advantage of Austempering are that the residual stress in the metal are substantially reduced. There is a less danger of hardening cracks being found and less warpage.

Holding time can vary from 5 minutes at 350`C to 380`C to 30 minutes at 250`C i.e. higher the Austempering temp, shorter is the holding time required per complete transformation and the lower hardness of final product conversely longer holding time required a lower transformation temp with final hardness obtained is higher.

MAR TEMPERING

In Martempering, oil or air hardening steels are quenched from the Austenitising temp into a salt bath maintained at 10`C above the temp at which Martensite formation starts on continuous cooling. After holding into it for definite time the work is removed from the bath still hot and allowed to cool further in air to room temp. The martensitic transformation takes place under conditions of lower cooling rate and therefore, internal stresses are reduced and destoration and quench cracking is also reduced to a great extent.

Type of parts Martempered :

Punches	Plastic Moulds
Gears	Diecastings dies
Dies	Pinions
Shafts	Bearing races

MARTEMPERING is applicable to oil hardening steel (including case hardening alloy steels), heat treating alloy steel or oil hardening tools steels. It is not applicable to water hardening tools steels or case hardening mild steel unless components are of very thin cross sections. Satisfactory martempering in HEAT TEMP-150 will depend upon the alloy content of the steel and cross section slower will it cool and the greater will be the need of alloy additions to improve hardenability. Oil hardening steel can be given a similar hardness by quenching into HEAT TEMP-150 bath although will lower alloy steels this may need a variation from the true martempering, procedure for the following reasons:

- Low alloy steels held for a few minutes above their MS will transform isothermally with consequent reduction in hardness.
- Martensite formed at the temp above 250`C will be tempered by the residual heat in the component, resulting in loss in hardness.

To overcome these difficulties it is useful to employ martempering bath at 200-250`C for these type of steels but reduction in destoration and danger of cracking are still obtained compared with oil quenching even though the quenching bath is below Ms. Point of the steel.

The Ms points for the case are core of alloy case hardening steels differ, that in the carburised case being lower than that of uncarburised core. Where parts in these steels are being given core and case refining treatment, martempering in HEAT TEMP-150 bath to 200 -250`C can be used instead of oil quenching in many cases, the core

refining treatment is depensed with, and the carburised parts are reached in a bath HEAT TREAT-660. Regenerator-PR to 760/800`C and martempwered by quenching in HEAT TEMP-150 at 230`C followed by air cooling.

Gears, shafts etc., in alloy case hardening steels of B.S. En 235-363 variety with controlled grains size frequently hardened by quenching direct from carburising without seusequent core or case refining treatment. In such cases 8 to 10% cyanide as NaCN strength is used for carburising. Carburising can be carried out in Cyanide followed by swill in HEAT TREAT-660 or HEAT TREAT-720 plus 2 - 5% NaCN bath and subsequent quenching in HEAT TEMP-150.

Punches, Dies, Plastic Moulds etc., are made in alloy steel are frequently hardened by Martempering. The parts are first preheated at 300-400`C and then heated to the appropriate hardening temp in HEAT TREAT-660/REGENERATOR - PR or HEAT TREAT-720/REGENERATOR-PR. The parts are then quenched into a agitated bath of HEAT TEMP-150 at 200` - 300`C soaked for a few minutes for uniform temp and then air cooled. The lower alloy steel are quenched into HEAT TEMP-150 at the lower and of the range given, while highly alloyed steels can be quenched at around 300`C. This is particularly suitable for complicated shapes likely to distort.

PRECAUTIONS TO BE OBSERVED WHILE USING HEAT TEMP-150 & HEAT TEMP-220.

HEAT TEMP-150 and HEAT TEMP-220 are very powerful oxidising agents and react with explosion with combustible material and therefore they should be stored in a dry place away from acid, cyanide and other organic matter. Where it is necessary to quench from a cyanide containing bath into HEAT TEMP-150 or HEAT TEMP-220 care must be taken to ensure that the cyanide content of the bath should not exceed 8-10% NaCN.

Articles should be thoroughly dried before immersion in the salt otherwise there will be serious splashing.

HEAT TEMP -150 and HEAT TEMP-220 should not be used above 500`C and baths should be frequently dredged.

PACKING : HEAT TEMP-150 and HEAT TEMP-220 repacked in easily handled 25 kgs bag fitted with a inner alkathene liner. Partially used salts should be stored in a dry place.

NON WARRANTY

THE INFORMATION IN THIS TECHNICAL DATE SHEET IS BASED ON OUR SKILL, EXPERIENCE AND TESTS WHICH WE BELIEVE TO BE RELIABLE BUT PROTOCHEM INDUSTRIES OFFER NO GUARANTEE AND CANNOT ACCEPT RESPONSIBILITY FOR OPERATION NOT UNDER THEIR DIRECT CONTROL

Protochem Industries Pvt. Ltd
A-737/5, TTC MIDC Area, Mahape, Navi Mumbai 400710, India
Tel. +91 22 23917 5024/ 27 Fax. +91 22 2778 0717
▪ marketing@protochem.co.in ▪ www.protochemindustries.com