

HEAT CARB CN-120**BATH PREPARATION**

HEAT CARB CN-120 bath is initially made up by using HEAT TREAT-660 and HEAT CARB CN-120 as under:

Two parts by weight of HEAT TREAT-660
One parts by weight of HEAT CARB CN-120

HEAT TREAT-660 is first melted in a furnace post vocered with a layer of HEAT TREAT ADDITIVE, and the temperature of the pot is raised to 900`C. The required quantity of HEAT CARB CN-120 should then added. The molton quantity of HEAT TREAT-660 and HEAT CARB CN-120 should not exceed 2/3 volume of pot capacity. Componants should be thoroughly dried by pre heating and then immersed in HEAT CARB-120 bath. Immersion of components lowers the salt bath temperature and therefore, heating must be continued until the bath temperature and components reach required carburising temperature.

PROCESS CONTROL

Externally heated salt bath can be held within closer temperature limit (+ or - 8`C or \pm 14`C F). When a proportional control system employing electronic instrumentation is used. Control by means of valves requires mechanical instrumentation and is less accurate. Although for a majority of application it is entirely adequate.

Internally heat salt baths may be regulated through \pm 50`C (\pm 90`F) with either mechanical or electronic or off controllers. In either type, the temperature control instrument operates a relay that actuates a large circuit braker that in turn connects or disconnects the 440 volts power to stepdown transformer. Welded thermocouples may be used in installation that employ electrode heating. For safty, two thermocouples are recommended one for temp. control and one for excess temp. cutoff.

BATH CONTROL

The control of Sodium Cyanide Content is the most important factor in maintaining the effectiveness of HEAT CARB bath. The Sodium Cyanide content in the bath can be determined by the Two following methods.

1. Nickel Ammonium Sulfate Method:

The molten bath is sampled by holding back HEAT TREAT ADDITIVE covering with a ladle, then momentarily immersion and withdrawing warm dry steel rod and collecting the sample adhering salt. This sample is ground to powder in dry mortar and one gram is weighed out and transferred a batery jar. About 300ml of tape or distilled water is added and the solution is stirred until as much solid as will dissolved has gone into solution. Approx. 5 ml of solution of Dimethyl Glyoxime

Indicator is added into the solution and titrated with Nickel Ammonium Sulfate solution (20.14 gr. NISO₄ (NH₄)₂ SO₄ - 6H₂O per ltr)

End point is approaching is given by green tinge being imparted to the contents of battery jar. A distinct Pink colour indicates the end of titration.

Since 1 ml of Nickel Ammonium Sulphate Solution is equal to 1% Sodium Cyanide in the original sample, the strength of the bath is readily calculated.

2. Silver Nitrate Method:

The molten bath is sampled by holding back HEAT TREAT ADDITIVE covering with a ladle then momentarily immersion and withdrawing a warm dry steel rod and collecting the sample of adhering salt. The sample is ground to powder in dry mortar and 1 gm weighed out and transferred to breaker. About 50 ml of tap or distilled water is added followed by about 0.25 gm of lead carbonate. The later serves to remove sulfid, which otherwise might interfere with the end point. The whole is stirred until as much solids as will dissolve has gone into the solution.

Now pass the solution through a filter paper (No. 4 whatman) into the battery charge. Wash the residue two or three times with water and then make up the solution to approx. 300 ml with water.

Titrate with N/10 AgNO₃ soln. (17 gm. AgNO₃ per ltr) with continuous stirring.

A whitish colouration will form at first, but this will disappear on stirring. Stop the addition of Silver Nitrate immediately the white colour becomes permanent.

Since 1 ml of Silver Nitrate is equivalent to 1% Sodium Cyanide the strength of the bath can be readily calculated.

Although testing of the cyanide content is recommended in all cases to ensure the highest efficiency, it has been found possible with small furnaces, where the user prefer not to test, to replenish both heat carb as follows:

Pot Size Dia x Depth (cm)	Weight of the Heat Carb to be added to the bath per 9 hours day.
20 x 25	1.1/1.4 kg
26.5 x 37.5	2.7/3.2 kg

HEAT TREAT-660 recommended only for initial bath making, the required Sodium Cyanide is maintain by adding Heat Carb Salt daily.

DAILY MAINTANANCE ROUTINE FOR HEAT CARB BATH:

Check temperature control system, an auxiliary pyrometer and thermocouple and indicating

potiometer with a long extension wire can be mounted near the salt bath, and will provide accurate temp. checks faster than laboratory instrument.

Check colour of the exhaust smoke from the combustion chamber of fuel fire salt bath. A bluish white or white smoke indicates salt leakage.

Remove sludge from bottom of the pot while furnace is still at idling temperature, which normally is 705 to 730°C (1300 - 1350). The electrode of internally heated salt bath should be scraped clean and electric power should be shut off during the sludging and cleaning operation.

To help maintain bath composition and reduce surface heat loss add Heat Treat Additive Cover.

Check bath activity by testing cyanide content or by quenching and bending a steel wire.

If possible, rotate the pot of fuel fire salt bath atleast once a week to minimise the effects of flame impingement and thus extend pot life.

If the salt is leaking and the salt is still active, remove the salt and place it in steady steel containers. This salt may be broken up and reused in starting another pot.

Prior to replacement of pot in the resistance heated or fuel fired salt bath, the combustion chamber should be rebuilt if contaminated with salt, to avoid repeat pot failure.

Consult operating and maintenance instructions provided by furnace manufacturers.

SHUTDOWN & RESTARTING:

For a shutdown of two days or more, the externally heated furnaces need not be idle, the heat may be shut off completely. During the cooling and reheating. However, the pot should be guarded against violent expulsion of salt. The cover recommended by the manufacturer should be used.

It is generally advisable to maintain electrode furnaces at 705°C to 730°C. (1300 - 1350°F) even over shut periods of one or two weeks. This simplifies restarting and damage to power transformer from condensation of moisture on the windings.

Remelting of a frozen cyanide bath in a furnaces of otherthan the immersed - electrode type is potentially hazardous because of the expansion of gases as the salts are heated. This hazard is not encountered with immersed-electrode furnaces because the salts melt from top to down. If remelting is done in oil fire/gas fire furnaces, however, the following precautions should be observed:

A cast iron wedge should be inserted at the centre of the bath before bath solidifies. One end of the wedge should be in contact with the bottom of the pot and other end should extent atleast 6 inches above the surface of the bath. Before the bath is remelted, the wedge should be tapped

with a hammer, loosened and removed. The space previously occupied by the wedge will provide a vent for expanding gases during remelting. No attempt should be made to remove a wedge from a bath that is not completely solidified, because molten salt may forcibly be blown out through the opening created.

SAFETY PRECAUTIONS

Since all cyanide salts are poisonous, care should be taken not to handle them with bare hands :-

Operator should be equipped with long protective gloves, protective aprons, safety glass or face shields.

Work material must be clean and dry otherwise sparging of salt will occur.

Carburising places should be well ventilated.

Before turning off furnaces, employing an externally heated pot, always reduce the level of the salts to leave the pot not more than 2 - 3rd full (depending on the position of the burner), to avoid the risk of sparging on remelting. Place the lid on the pot during cooling and remelting.

Never mix salts containing nitrates with salts containing cyanide, otherwise an explosion will occur on heating HEAT TEMP-150, HEAT TEMP-220, HEAT TEMP-330 and HEAT TEMP-155 contain nitrates. HEAT CARB contain Cyanide. Never heat salt containing nitrates above 550`C.

Dry out electrically heated brick lines furnaces of the H.S. type with an electric heater before restarting to avoid spurts due to moisture entrapped in the brick work.

When Heat Carb salts are removed from the packing container the container should be open in the room in which HEAT CARB is to be used. The salts should be removed from the container with a metal scoop or gloved hands or by dumping out as required. When not in use, container should be covered with its original cover or with a metal substitute cover.

Keep the cyanide container free from the presence of acids as it produces fatally poisonous fumes when it comes in contact with Acid or Acid fumes.

No food should be stored, handled or eaten in the vicinity of cyanide salt.

In case any irritation of the skin develops as a result of handling cyanide, immediately consult a physician.

FIRST AID FOR CYANIDE POISONINGS

Appliances; Cyanide antidote. It contains equal quantities of 'A and 'B'.

- A) 158 g.B.P. ferrous sulphate crystal ($\text{FeSO}_4, 7\text{H}_2\text{O}$) and 3 g B.P. citric acid crystals dissolved in a litre of cold distilled water and
- B) 60 g Anhydrous Sodium Carbonate dissolved in a litre of distilled water.

Dose: Swallow a tumbler full of the mixture. If worker suspects that he may have had cyanide in his mouth, he must at once swallow a dose of antidote.

FIRST AID INSTRUCTION

A doctor must be summoned at once.

If the patient has swallowed cyanide and is conscious, give him one dose of antidote.

Give nothing by mouth to an unconscious patient.

Remove any clothing splashed with molten cyanide or Cyanide solution.

Keep the patient warm and do not in any circumstances allow him to walk about.

IF BREATHING

Break a capsule of Amyl nitrite and allow the patient to inhale the vapour.

Administer oxygen through a face mask.

IF NOT BREATHING

Start artificial respiration at once and continue until breathing is restored or a doctor has pronounced life extinct.

A capsule of Amyl nitrite may be crushed and held close to the patient's nose while artificial respiration is being performed.

TREATMENT OF BURNS FROM SALTS CONTAINING CYANIDE

Floor the affected area with a large volume of water or NaHCO₃ solution (Sodium Bicarbonate).

Soak the affected area in sodium bicarbonate solution for a prolonged period.

Apply a sterile dressing and report to a doctor.

DISPOSAL OF CYANIDE SALTS

It is always safer to treat the cyanide salts before disposal.

Break such waste salts into small pieces and soak in water for a few days until the salt dissolves, after this add a 20% FeSO₄ solution till a green to blue black precipitate appears which does not disappear on stirring. This precipitate is harmless and can be dumped underground and covered with mud.