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- Furnaces
- Electric in air to 2000.c
- Vacuum
- Heat Treatment
- Controlled Atmosphere
- Melting
- Gas to 2300.c

ATMOSPHERE CONTROL

Control of the furnace atmosphere has become increasingly critical for successful heat treating with precise metallurgical specifications. The prevention of surface oxidation or scaling when metals are exposed to elevated temperatures remains the most important function of the furnace atmosphere.

The introduction of the inert gas into the furnace chamber must be carefully controlled to ensure that sufficient atmosphere gas is being admitted to the furnace to seal the mechanical leaks against air infiltration, and to purge the chamber of air. In common practice, a chamber is considered purged after 4-5 volume changes. The simple way to adjust atmosphere flow through a furnace is through a flow meter that can be read directly in M per hour.

Gases in an enclosed vessel or chamber are constantly moving about in the space in which they are contained. Gasses are like liquid in that they flow and are constantly exerting pressure upon the surfaces in which they are in contact with and contained by. Therefore, in operating a furnace that uses a controlled atmosphere, it is important to keep the inside of the furnace and the door seals in good repair.

The inert gasses of argon and helium are frequently used during the heat processing of reactive metals. Argon is cheaper than helium and is therefore preferred over helium. All gasses put into the furnace must be completely free from moisture because water will break down when heated to oxygen and hydrogen. The oxygen will attack the metal causing decarburisation and scaling of the parts being heat treated.

Nitrogen can also be used for atmosphere. Nitrogen is passive to ferrite and is entirely satisfactory for use in the annealing of low carbon steels. It also must be completely dry to be used as a protective atmosphere of high carbon steels because, as with argon, the water vapour will cause decarburisation.

At the higher heat treating temperature nitrogen is not a protective atmosphere because it combines with iron to form finely divided nitrides that import hardness to the surface. In the soaking periods for hardening tool steels this is not a problem.

Most oil and air hardening tool steels require bringing the parts to be hardened up slowly 650'C or 750'C for pre-heating.

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They are then taken up to the austenitizing temperature, where they will be held for a prescribed length of time. When the parts spend time in the furnace where temperatures are from 530'C and up, it should be either in an atmosphere or wrapped up in a stainless, bag to prevent scaling.In a recent test at our factory, using cold rolled die steels, a furnace equipped with an atmosphere package, performed extremely well. A nitrogen atmosphere was introduced into the chamber at 260'C, it took 2 minutes to purge the chamber of oxygen. The flow meter on the control panel set at approximately 20-25 CFH to maintain a positive pressure in the chamber with excellent results being established by testing.