METALLURGY

Aluminum Extrusion
Aluminum extrusion is a method used to transform aluminum alloy into various objects that have a definitive cross-sectional profile for numerous uses. The process of aluminum extrusion consists of the following: After the shape of the die has been designed & created, a cylindrical billet of aluminum is heated. Once the billet is heated to 800 - 925 deg. F it is then moved to a loader. At this time a lubricant is applied to the aluminum billet which will prevent it from sticking to the ram; handle, or the die itself. Pressure is then added to a dummy block via a ram, which forces the aluminum billet through the die. Nitrogen is then introduced to prevent the formation of oxides, creating an inert atmosphere and increasing die life. Once the extruded part passes through the die opening it is then put on a cooling table which has fans to cool the aluminum extrusion. Once cooled, the aluminum extrusion is moved to a stretcher for straightening and hardening. The extrusion is now ready for the age ovens where it is heated, hardening the aluminum by speeding the aging process.

Brazing
Most HVAC installation instructions require flowing nitrogen through the copper tube during brazing. This is an important step in producing a quality HVAC system.
To prevent oxidation, flow dry nitrogen through the tube during brazing. Nitrogen is inert, (non- reactive), and will displace the oxygen to prevent scale formation.

Why nitrogen purge?
Oxygen in the air combines with copper to form surface copper oxide. We see this on copper tube as a light to dark brown discoloration. You've probably seen ACR/medical gas copper tube supplied from the tube mill nitrogen charged and capped. This is designed to prevent this oxide formation inside the tube. Once the caps are removed and the tube is cut for installation, the nitrogen protection is lost.

Heat Treatment
Metals and alloys can be heat treated to enhance their strength as well as resistance to wear and corrosion. These attributes are particularly important for the production of high quality parts at competitive prices.
Several heat treatment techniques utilize nitrogen for blanketing to reduce oxidation and absorb hydrogen. Some applications are outlined here:

Carburizing and Carbonitriding
A hardening process that involves heating in a controlled atmosphere furnace to the point where alloys absorb carbon and nitrogen. Controlled cooling produces the desired hardened surface characteristics. This controlled reaction normally occurs at around 1250°F (950°C) and uses a hydrocarbon such as natu- ral gas or cracked methanol while nitrogen accelerates the absorption of carbon into the treated metal. The nitrogen to cracked methanol ratio is typically 50:50 or 40:60.

Tempering and annealing
These stress relieving processes condition stainless steels, carbon steels and non-ferous metals for further hardening processes. Metals are heated in a controlled atmosphere batch or continuous furnace to avoid oxidation. Nitrogen provides a suitably inert atmosphere that will help prevent exothermic reactions and dangerously overheated furnaces that would otherwise result in distorted components.
A nitrogen, hydrogen or hydrocarbon gas mixture can also be used. Hydrogen acts as a reducing agent to ensure a bright surface, while carbon controls decarburization.

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