

Borates in wire drawing

To make wire, metal rods are drawn through dies of successively decreasing diameter. Lubricant is necessary to reduce friction between the rod and the die. Because the lubricant, normally a soap, does not adhere well to the rod, a lubricant carrier is necessary. The carrier must form a tenacious coating on the rod to which the lubricant will readily adhere.



Formulation

Either *Neobor*® or borax decahydrate can be used to produce a lubricant carrier layer which ensures adhesion of the lubricant to the rod. Aqueous borax solutions of 5-30 wt % are typically used.

Benefits

- Effective lubricant carriers
- Residual acid neutralizers
- Corrosion prevention during storage

How borate is applied

1. The ferrous rods or wire coils are cleaned of mill scale and rust by submersion in a dilute bath of sulphuric or hydrochloric acid.
2. Next they are dipped into cold water rinse tanks to remove acid residue.
3. The rods or wire coils are then submerged in a hot bath, the 'borax bath,' to acquire a protective coating.
4. To ensure that the coating which forms is borax pentahydrate, the bath temperature is maintained at about 90°C (194°F). The residence time should be kept sufficiently long to allow the rod to heat thoroughly.
5. The borate coating is either air dried or flash baked at operating temperatures of around 290°C (550°F).

The borax bath

The objective of the bath is to form a layer of borax pentahydrate on the coils or rods. Aqueous borax solutions in strengths of around 5-30 wt % are prepared and maintained at 88°-93°C (190°-199.4°F). The bath strength is normally monitored with a hydrometer which measures the density of the mixture. Acid residues can transfer over from the cleaning process, and build up in the bath eventually reducing its effectiveness. The bath therefore needs changing periodically. Operational advantages of borates *Neobor* or borax decahydrate offers these additional benefits

- Ease of solubility in hot water
- Dust free operation
- Long borate bath life and decreased need for agitation
- Compatibility with electric resistance heat units
- Easy air drying
- Compatibility with calcium and sodium soaps
- Longer life than achieved with lime
- Superior performance on high carbon steel; eg spring steel
- Enhanced phosphate coatings
- Ease of removal from the rod or wire if desired



About U.S. Borax

U.S. Borax, part of Rio Tinto, is a global leader in the supply and science of borates—naturally-occurring minerals containing boron and other elements. We are 1,000 people serving 500 customers with more than 1,700 delivery locations globally. We supply 30% of the world's need for refined borates from our world-class mine in Boron, California, about 100 miles northeast of Los Angeles. We pioneer the elements of modern living, including:

- **Minerals that make a difference:** Consistent product quality secured by ISO 9001:2015 registration of its integrated quality management systems
- **People who make a difference:** Experts in borate chemistry, technical support, and customer service
- **Solutions that make a difference:** Strategic inventory placement and long-term contracts with shippers to ensure supply reliability

About 20 Mule Team® products

20 Mule Team borates are produced from naturally occurring minerals and have an excellent reputation for safety when used as directed. Borates are essential nutrients for plants and key ingredients in fiberglass, glass, ceramics, detergents, fertilizers, wood preservatives, flame retardants, and personal care products.

20 Mule Team Borax products in wire drawing:

