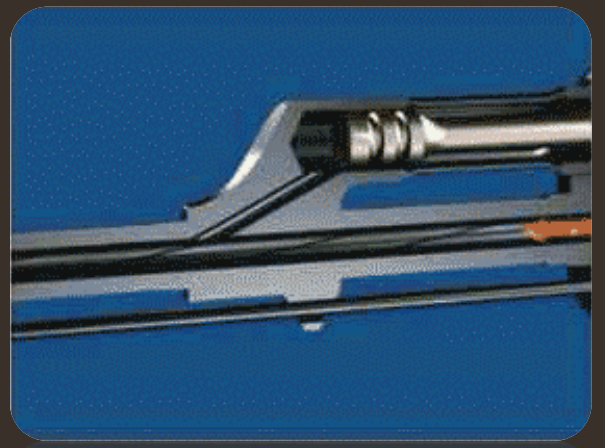
Cartridge Brass and Ammunition



Isaac Russell ~ Dayton Clark ~ Drew McHugh

Introduction ~ C26000 Alloy

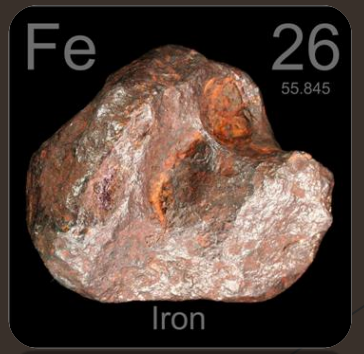
- Known by many names, such as 70/30 brass and Cartridge Brass.
- Used for many applications and products, especially plumbing.
- Very malleable, with many various properties.

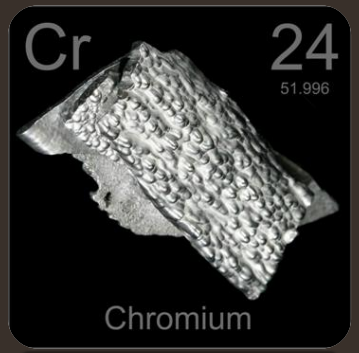
C26000 Naming System

Shortened to C260 in the CDA Naming System

Alloying Elements ~ Percent Composition

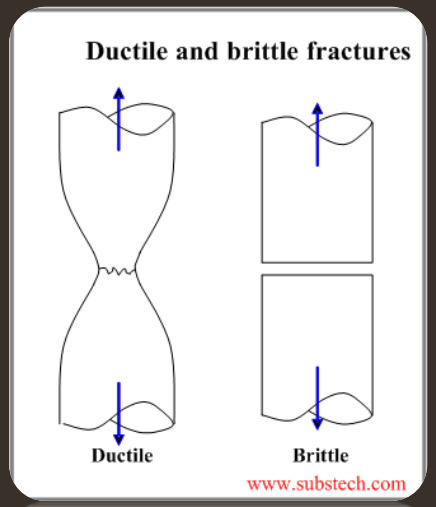
1. Copper (Cu)
   A. About 70-80%, 70% is nominal.
2. Zinc (Zn)
   A. Approximately 20-35%, 30% is nominal.
3. Silicon (Si)
   A. Up to 0.53%
4. Iron (Fe)
   A. Up to 0.17%
5. Chromium (Cr)
   A. Up to 0.19%

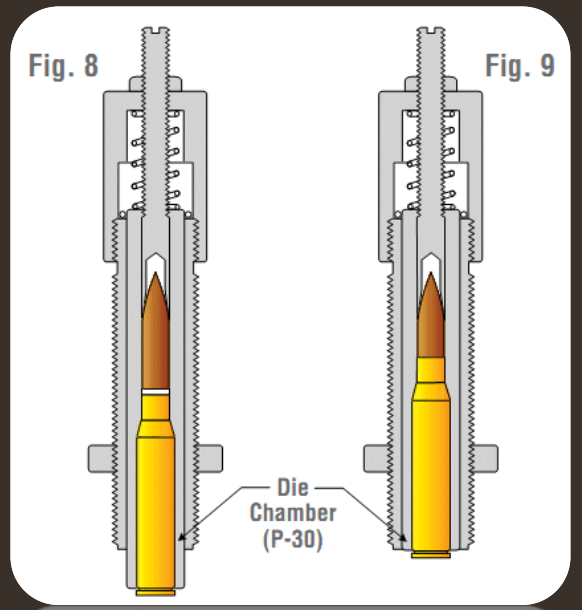




Alloying Elements ~ Importance of Zinc

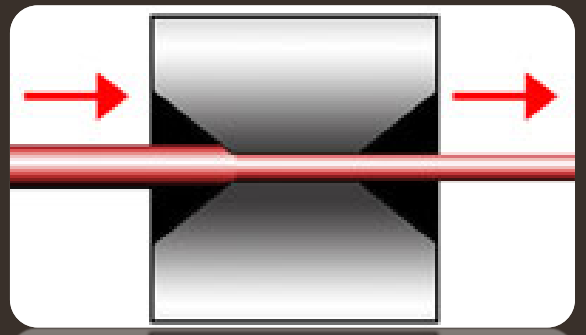
- Zinc is what makes cartridge brass perfect for ammunition cases.
- Zinc allows the alloy to resist many forms of corrosion, and gives the most important properties when combined with copper, right amounts of ductility and malleability.

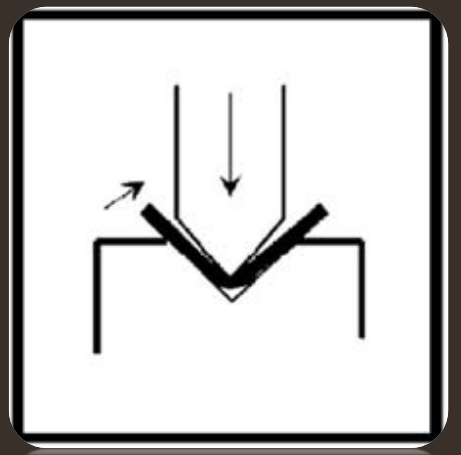




Important Properties ~ Ductility

- The property cartridge brass is well known for.
- The ductility added by the combination of Zinc and Copper allow for excellent cold-workability.
- Cold workability is crucial for ammunition cases, primarily in the manufacturing process.





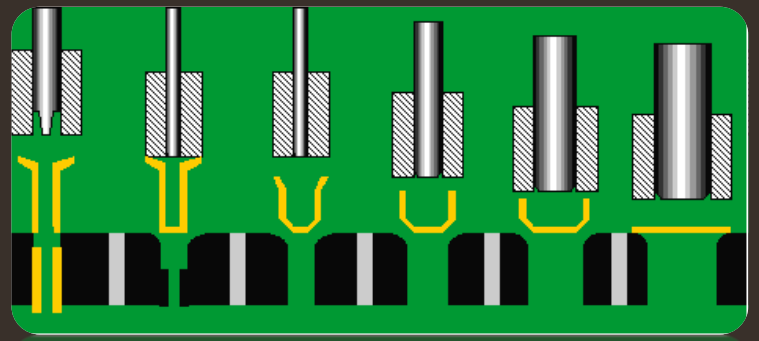
Why Cartridge Brass?

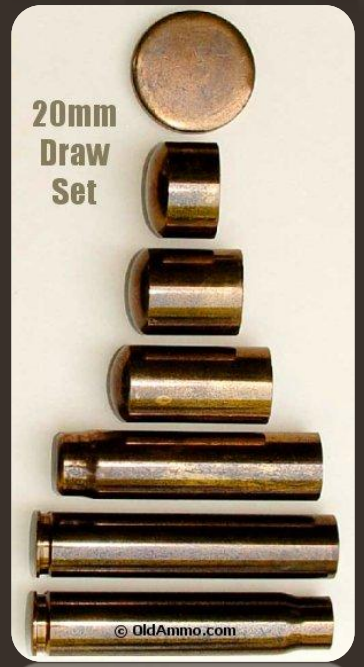
- This alloy provides properties needed for a functional ammunition case.
- The alloy's ductility allows for it to be shaped with various forces while retaining its workability.
- The added corrosion resistance allows for finished ammunition to last for years without change.

Manufacturing ~ Cold Working Process

- The cold working begins with brass disks punched from sheets.

1. • Cup Formed From Disk
2. • 1st Draw
3. • 2nd to 5th draw
4. • Cutting and Sizing
5. • Head Pressing (Neck Formation)
6. • Final Necking
7. • Trimming of Neck
8. • End Flattened
9. • Primer Pocket Punched Out





Manufacturing ~ Controlling Hardness

- Cold working creates internal stresses, and results in increased hardness.
- Hardness is a property that must be kept at a minimum to retain cold-workability.

Manufacturing ~ Heat Treating

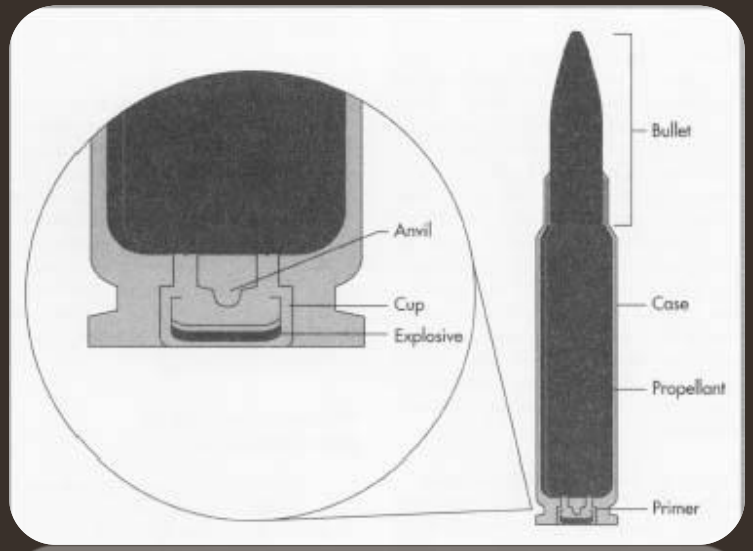
- Another benefit to cartridge brass is its ability to be softened with heat treating.
- Ductility and softness lost from cold working can be regained during multiple annealing processes.
- Values desired after the process are a yield strength of 21 ksi, a tensile strength of 45-61 ksi, and a typical hardness of B77.

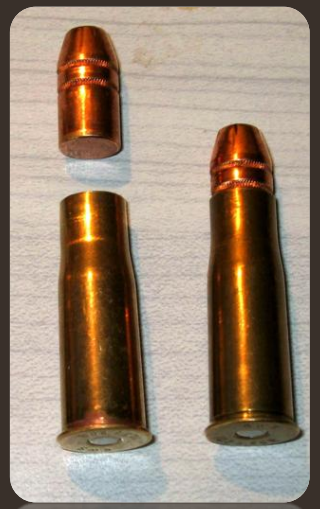
Manufacturing ~ Neck Annealing

- Some manufacturers have an extra annealing step, called Neck Annealing. This is to allow for more effective reloading.
- This softens the neck area of the case more than the surrounding area.

Manufacturing ~ Final Steps

- These steps lead to a completed round of ammunition.
- Ductility is important during these steps, to be able to shape to the form of the bullet pressed into the case.





Alternate Materials ~ Steel

- Brass is not always used for ammunition cases, an alternate material is steel.
- Steel is usually used to reduce price at the cost of losing reloading ability, due to their inability to be reformed.

Alternate Materials ~ Aluminum

- Aluminum is far less common than brass cases, and is usually used simply as an alternative.
- Manufacturers advise not to reload Aluminum cases, due to fatigue and stress the material receives during firing.


Blank
Cup
1st Draw
2nd Draw
Cut wire for core
Final draw and trim
Swage core to weight
Seat core into jacket
Form ogive (open tip)
Form ogive (lead tip)
Finish lead tip