

Brazing vs. Soldering: Can You Tell The Difference?

Brazing and soldering are the two most widespread methods of joining and bonding a number of materials using a heating method and a filler material that does the work without melting the base materials.

The basic process of brazing and soldering is pretty much the same. The filler metal melts and subsequently wets the base material and flows by capillary action, usually being enabled by a suitable flux or vibrations.

This article explains the differences between the two joining processes to help you find out which joining method would be better suited to your circumstances.

Soldering and Brazing Process Highlights

Well, your choice of the joining process will mostly depend on the type of metal you are working with. Conventional wisdom tells us that brazing is done with brass, soldering with lead and, of course you weld with steel! But in reality, the difference is that of temperatures above everything else.

1. Melting Temperature

The big difference between soldering and brazing is in the temperature achieved during the heating process.

- Solders occur at temperatures lower than 450°C.
- Brazes happen at temperatures higher than 450°C.

The filler metal can be heated using various methods such as a hot plate, torch, or even a furnace.

2. Cleanliness Requirements

Brazing surfaces need to be clean but soldering surfaces even more so! Since the heat generated during both the processes isn't enough to burn out all the contaminants, it is important that the surface be clean enough otherwise the residue will mix in with the molten metal and prevent strong bonding.

3. Joint Design

The joining is done over the entire surface of the two pieces. There a lap joint and a butt joint and both of these are applicable to brazing and smoldering processes. A good lap joint is designed to be at least three times as long as the thickness of the other joint member. While the butt joint joins two ends of a metal together without any over lapping.

4. Strength Requirements

Brazed joints are stronger than soldered joints. Tests have shown brazing to make joints that are 3 to 10 times the strength of soldered ones.

5. Corrosion Resistance

Soldered joints are usually more susceptible to oxidation, corrosion and degradation from chemicals and salt. This can be blamed on the fillers that are often Tin, Zinc and Lead based.

6. Thermal Expansion

Soldering at lower temperatures works well with CTE assembly materials. These materials suffer less distortion, cool quicker, and work well together despite mismatches!

7. Costs Involved

Soldering generally costs less because the filler metals are less expensive and the lower temperatures reduce post joining clean-up, making the process more affordable.

The Last Word

Brazing and smoldering are two very similar processes that are used for diverse purposes. It is important to choose them in accordance with their suitability to your assemblies, expected services temperatures, and the scope for a possible thermal expansion of the joining materials. The working technician should be familiar with the local codes related to both the processes.