

Submerged Arc Welding Definition:

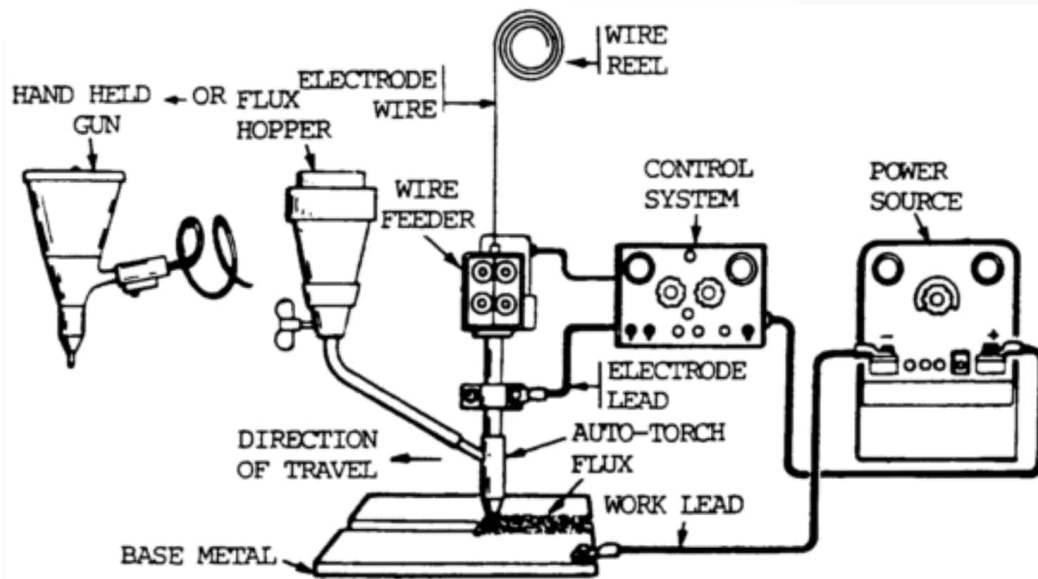
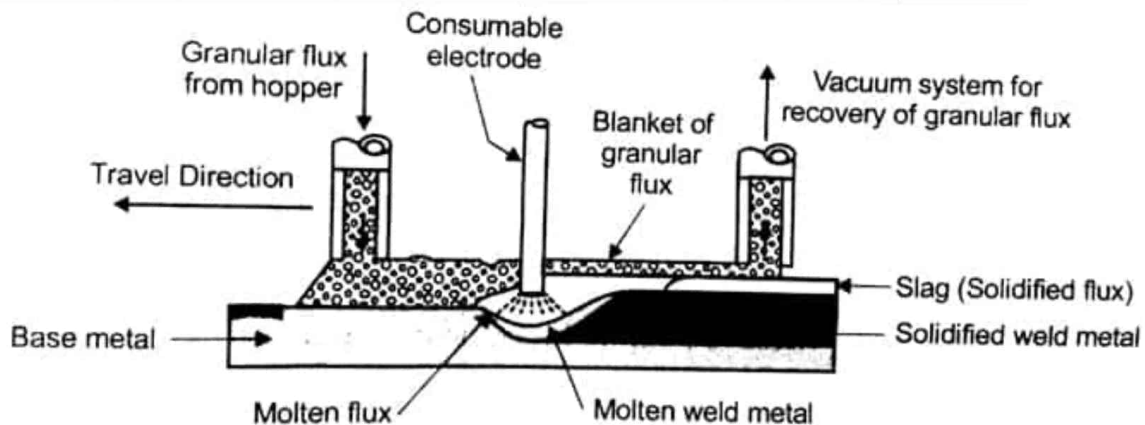


Figure 10-59. Block diagram - SAW.



Submerged Arc Welding (SAW):

Before going to study Submerged arc welding in details let's also have some overview of Arc Welding.

Arc Welding Definition:

Arc welding is a welding process that is used to join metal to metal by using electricity to create enough heat to melt metal, and the melted metals when the cool result in a binding of the metals. Or

Arc welding is one of several fusion processes for joining metals.

By applying intense heat, metal at the joint between two parts is melted and caused to intermix directly, or more commonly, with an intermediate molten filler metal.

Upon cooling and solidification, a metallurgical bond is created. Since the joining is an intermixture of metals the final weldment potentially has the same strength properties as the metals of the parts.

A problem that arises in arc welding is contamination of the metal with elements in the atmosphere (O, H, N, etc). There can also be a problem with the surface that is not clean.

The solution to this Includes,

1. **Gas shields:** An inert gas is blown into the weld zone to drive away other atmospheric gases.
2. **Flux:** A material that is added to clean the surface this may also give off a gas to drive away unwanted gases.

Let's understand by an Arc welding circuit or Working diagram:

Arc welding working or circuit diagram:

An AC or DC power sources, fitted with whatever controls may be needed, is connected by work cable to the workpiece and by an electrode cable to electrode holder of some type, which makes electrical contact with the welding electrode.



An arc is created across the gap when the energized circuit and the electrode tip touches the workpiece and is withdrawn yet still within close contact.

The arc produces a temperature of about 6500-degree centigrade at the tip.

This heat melts both the base metal and the electrode producing a pool of molten metal sometimes called a creator.

The creator solidifies behind the electrode as it is moved along the joint. This result is a fusion bond.

Basic Equipment of Arc Welding:

From the Diagram Some equipment or parts used in the Arc welding process you can see and Some are not shown in the diagram which also I am going to explain. So,

1. Welding Machine (Power Supply)
2. Electrode Cable
3. Electrode Holder

4. Cable
5. Hand Gloves
6. Goggles
7. Aprons
8. Chipping Hammers
9. Wire Brush



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Continue readings on Arc Welding...

This is an Arc welding process. Discovered in 1935 by Jones, Kennedy, and Rothermund.

This welding is defined as the joining of metals with the application of heat and also granular flux.

Welding process used in long pipe welding, Electrical poles and Turbines and extra.

Submerged Arc Welding Set-up Parts or Equipment:

The main parts of Submerged Arc Welding:

1. **Consumable Electrode**
2. **Power Sources**
3. **Granular Flux**
4. **Base Metal**
5. **Electrode Holder**

The above 4 figure in a row explains the following:

- Electrode touches with the workpiece
- 2nd and 3rd Granular flux and electrode moving toward and
- The last shows the final welding (after removing Granular from it).

1. Consumable Electrode:

The consumable electrode is the electrode which is having current on it and when it's touching to the workpiece it gets melt there.

2. Power source:

For the operation of welding Power required, to generate a good amount of heat so that workpiece and electrode can melt easily (Spark produces between them)

3. Granular Flux:

The main function of Granular flux is to avoid the exceeding heat, which is generated when electrodes touch to the workpiece.

4. Base Metal:

The base metal is metal on which have to weld it might be:

- Carbon steels (structural and vessel construction)
- Low alloy steels
- Stainless steels
- Nickel-based alloys



5. Electrode Holder:

The main works of this are to hold the electrode. This device is a non-conductor device.

Submerged Arc Welding Working Process:

The working process of submerg arc welding is,

Submerged Arc Welding

The above diagram submerged arc welding, the machine is installed carefully.

The base metal is connected to -ve energy sources whereas the electrode is connected with the positive sources.

In some device, the granular flux is fixed with the electrode holder or it might not be. Now,

Power is on, so we will bring the electrode near the base metals where have to start the welding with the help electrode holder.

When it touches to the base metal the spark produces between them and the same time granular is also provided.

When the operation is finished we remove the electrode holder and also we remove that granular flux So,

That the welding operation which is done will be seen from the naked eye as shown in the figure.

Submerged Arc Welding

Submerged Arc Welding Application:

The main **application of Submerged Arc welding** is,

1. Carbon steels (structural and vessel construction)
2. Low alloy steels
3. Stainless steels

4. Electrical Poles
5. Wind turbine
6. Pipes
7. Nickel-based alloys
8. Surfacing applications (wear-facing, build-up, and corrosion-resistant overlay of steels)

Submerged Arc Welding Advantages:

The main **advantages of Submerged Arc welding** are,

1. High deposition rates (over 45 kg/h (100 lb/h) have been reported).
2. High operating factors in mechanized applications.
3. Deep weld penetration.
4. Sound welds are readily made (with good process design and control).
5. High-speed welding of thin sheet steels up to 5 m/min (16 ft/min) is possible.
6. Minimal welding fume or arc light is emitted.
7. Practically no edge preparation is necessary depending on joint configuration and required penetration.
8. The process is suitable for both indoor and outdoor works.
9. Welds produced are sound, uniform, ductile, corrosion-resistant and have good impact value.
10. Single-pass welds can be made in thick plates with normal equipment.
11. The arc is always covered under a blanket of flux, thus there is no chance of spattering of the weld.
12. 50% to 90% of the flux is recoverable, recycled and reused.

Submerged Arc Welding Disadvantages:

The main **disadvantages of Submerged Arc welding** are,

1. Limited to ferrous (steel or stainless steels) and some nickel-based alloys.
2. Normally limited to long straight seams or rotated pipes or vessels.
3. Flux and slag residue can present a health and safety concern.
4. Requires inter-pass and post-weld slag removal.
5. Requires backing strips for proper root penetration.
6. Restricted to high thickness materials.



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