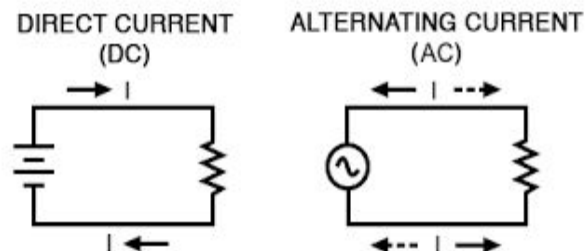


## Direct Current and Alternating Current

- The direction of current depends on polarity
- Polarity refers to having a positive or negative charge
- Current always flows from negative to positive
- In DC, polarity remains the same because current flows only in one direction
- In AC, polarity constantly switches back and forth, causing current to rapidly switch directions, back and forth 120 times per second



## Using AC VS DC

### Out of Position Welding (Vertical and Overhead)

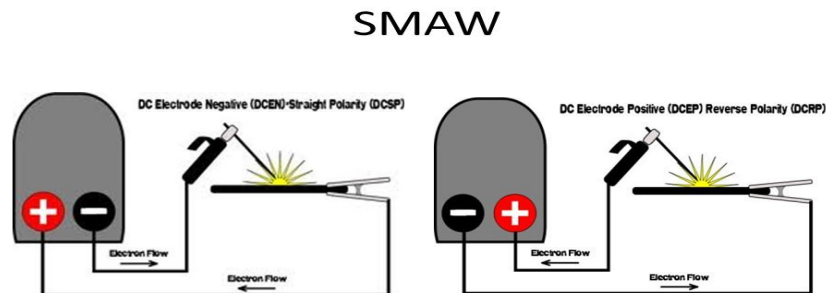
- DC generally allows for a smoother arc and better arc control because it does not fluctuate like AC
  - However, sometimes arc blow, which is a condition that happens when the arc does not follow its desired path from the electrode to the workpiece resulting in poor quality weld, can occur with DC
- GMAW (mig) and FCAW (flux-cored) typically use DC
- DC is preferred when high travel speeds are required for out-of-position welding (vertical and overhead)

## Powder-coated Electrodes (Ex. 7018 we use in shop)

- AC does not give as smooth an arc as DC. But it cost less and doesn't experience arc blow
- AC is preferred when welding heavy plate steel in flat position and when using electrodes that have high deposition rates
- AC can also be used to weld stainless steel but DC is preferred

## Polarity

- Determines direction of current flow in welding circuits and only applies to DC power because DC flows in one direction
- Since current only flows from negative to positive, welders can change a circuits polarity to change the currents direction for different applications
- In a DC electrode negative current circuit (DCEN), the workpiece has a positive polarity and the electrode has a negative polarity, meaning the current flows from the electrode to the workpiece



- Most large applications using low carbon steel or bare or lightly coated electrodes use DCEN
- In a DC electrode positive polarity circuit (DCEP), the electrode is positive and the workpiece is negative, so current flows from the workpiece to the electrode

- DCEP (also called reverse polarity) is often used to weld in the overhead position and on nonferrous base metals such as bronze and aluminum