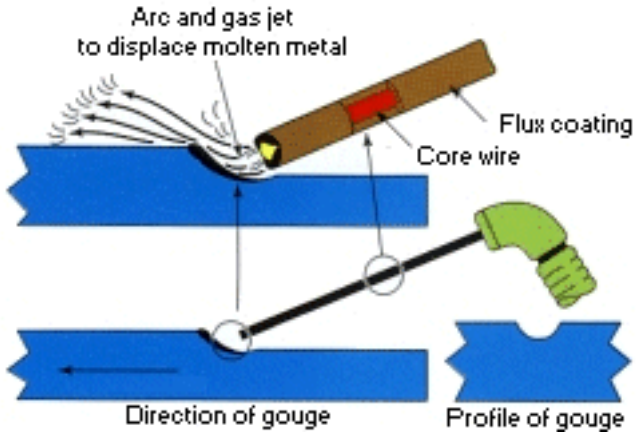
MANUAL METAL ARC GOUGING

The main advantage of manual metal arc (MMA) gouging is that the same power source can be used for welding, gouging, or cutting, simply by changing the type of electrode [and the polarity*].

Process description

As in conventional MMA welding, the arc is formed between the tip of the electrode and the workpiece. MMA gouging differs because it requires special purpose electrodes with thick flux coatings to generate a strong arc force and gas stream. Unlike MMA welding where a stable weld pool must be maintained, this process forces the molten metal away from the arc zone to leave a clean cut surface.



The gouging process is characterised by the large amount of gas which is generated to eject the molten metal. However, because the arc/gas stream is not as powerful as a gas or a separate air jet, the surface of the gouge is not as smooth as an oxyfuel gouge or air carbon arc gouge.

Electrode

According to the size of gouge specified, there is a wide range of electrode diameters available to choose from. These grooving electrodes are also not just restricted to steels, and the same electrode composition may be used for gouging stainless steel and non-ferrous alloys.

[Electrodes are commonly called “gouge rod” or “chamfer rod.”]*

Power source

MMA gouging can be carried out using conventional DC and AC power sources. In DC gouging, **electrode polarity is normally negative** but electrode manufacturers may well recommend electrode polarity for their brand of electrodes and for gouging specific materials. When using an AC power source, a minimum of 70V open circuit (OCV) is required to stabilise the arc.
Although most MMA welding power sources can be used for gouging, the current rating and OCV must be capable of accommodating current surges and longer arc lengths.

* Parts in brackets [ ] added by A. Stampe

Operational characteristics

Photo from YouTube video on chamfering to show proper angle & electrode position in stinger.
Always wear gloves when welding/gouging.

The arc is struck with an electrode which is held at a normal angle to the workpiece (15 degrees backwards from the vertical plane in line with proposed direction of gouging). Once the arc is established, the electrode is immediately inclined in one smooth and continuous movement to an angle of around 15-20 degrees to the plate surface. With the arc pointing in the direction of travel, the electrode is pushed forward slightly to melt the metal. It should then be pulled back to allow the gas jet to displace the molten metal and slag. This forward and backward motion is repeated as the electrode is guided along the line to complete the gouge.

To produce a consistent depth and width of gouge, a uniform rate of travel must be maintained, together with the angle of electrode: 10-20 degrees. If the electrode angle becomes too steep, in excess of about 20 degrees, the amount of slag and molten metal will increase. This is a result of the arc penetrating too deeply. Digging the electrode into the metal causes problems in controlling the gouging operation and will produce a rough surface profile. For gouging in positions other than vertical, the electrode is always pushed forward. With vertical surfaces, the electrode is directed and pushed vertically downwards.

Application

MMA gouging is used for localised gouging operations, removal of defects for example, and where it is more convenient to switch from a welding electrode to a gouging electrode rather than use specialised equipment. Compared with alternative gouging processes, metal removal rates are low and the quality of the gouged surface is inferior.

When correctly applied, MMA gouging can produce relatively clean gouged surfaces. For general applications, welding can be carried out without the need to dress by grinding. However when gouging stainless steel, a thin layer of higher carbon content material will be produced - this should be removed by grinding.

Source: TWI Global https://www.twi-global.com/technical-knowledge/job-knowledge/manual-metal-arc-gouging-010 , apart from above photo.