

# Cut Charts and Marking Charts

## WARNING



### EXPLOSION HAZARD – CUTTING WITH ALUMINUM NEAR WATER

Do not cut aluminum alloys underwater or on a water table unless you can prevent the accumulation of hydrogen gas. Never cut aluminum-lithium alloys in the presence of water.

Aluminum can react with water to produce hydrogen, resulting in a potentially explosive condition that can detonate during plasma cutting operations. Refer to the *Safety and Compliance Manual (80669C)* for more information.

## WARNING



### EXPLOSION HAZARD – CUTTING WITH FUEL GASES

Do not use combustible fuel gases or oxidizing gases with Powermax systems. These gases can result in explosive conditions during plasma cutting operations.

## WARNING



### TOXIC FUMES CAN CAUSE INJURY OR DEATH

Some metals, including stainless steel, may release toxic fumes when cut. Make sure your work site has adequate ventilation to ensure that the air quality level meets all local and national standards and regulations. Refer to the *Safety and Compliance Manual (80669C)* for more information.

## Using the cut charts

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The cut charts in this section are intended to provide a good starting point. Adjust the variables in the cut charts as needed to achieve optimal results for your cutting equipment and environment.

Cut charts are provided for each set of mechanized cutting and marking consumables. A consumable diagram with part numbers precedes each cut chart.

Cut charts are included for:

- Cutting mild steel, stainless steel, and aluminum at 45 A with air using shielded consumables
- Cutting mild steel and stainless steel with air using FineCut consumables
- Cutting stainless steel at 45 A with F5 using shielded consumables
- Marking and dimpling at 10 – 25 A with air and argon using Marking consumables

Each cut chart may contain the following information:

- **Amperage setting** – The amperage setting at the top of the page applies to all the settings given on that page. In FineCut charts, the amperage setting for each thickness is included in the cut chart.
- **Material Thickness** – Thickness of the workpiece (metal plate being cut).
- **Torch-to-Work Distance** – For shielded consumables, the distance between the shield and the workpiece during cutting. For unshielded consumables, the distance between the nozzle and the workpiece during cutting. This is also known as cut height.
- **Initial Pierce Height** – Distance between the shield (shielded) or the nozzle (unshielded) and the workpiece when the torch is fired, prior to descending to the cut height. In marking charts, this is referred to as *Initial Marking Height*.
- **Pierce Delay Time** – Length of time the triggered torch remains stationary at the pierce height before the torch starts the cutting motion. In marking charts, this is referred to as *Delay Time*.
- **Best Quality Settings** (cut speed and voltage) – Settings that provide the starting point for finding the best cut quality (best angle, least dross, best cut-surface finish). Adjust the speed for your application and table to obtain the desired result.
- **Production Settings** (cut speed and voltage) – 70% to 80% of the maximum speed ratings. These speeds result in the greatest number of cut parts, but not necessarily the best possible cut quality.



The arc voltage increases as the consumables wear, so the voltage setting may need to be increased to maintain the correct torch-to-work distance. Some CNCs monitor the arc voltage and adjust the torch lifter automatically.

- **Kerf Width** – Width of material removed by the cutting process. The kerf widths were obtained with the “Best Quality” settings and are for reference only. Differences between installations and material composition may cause actual results to vary from those shown in the tables.
- **Width and Depth** – The marking and dimpling cut charts list the profile dimensions of the mark or dimple.

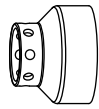
Each cut chart lists hot and cold gas flow rates.

- **Hot flow rate** – Plasma is on, the system is operating at running current, and the system is in a steady state at the default system pressure (cutflow, or automatic mode).
- **Cold flow rate** – Plasma is off and the system is in a steady state with gas flowing through the torch at the default system pressure (postflow).

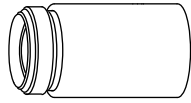


Hypertherm collected the cut chart data under laboratory test conditions using new consumables.

### Marking and Dimpling – Air – Shielded



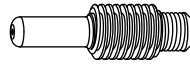
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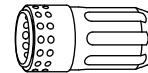
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#### Mild steel

Current A	Torch-to-Work Distance		Initial Marking Height		Delay Time seconds	Marking Speed		Arc Voltage volts	Width		Depth	
	mm	in	mm	in		mm/min	in/min		mm	in	mm	in
<b>Light marking</b>												
10	6.4	0.25	6.4	0.25	0	2540	100	134	2.79	0.11	<0.02	<0.001
<b>Heavy marking</b>												
10	4.6	0.18	4.6	0.18	0	2540	100	111	2.79	0.11	0.09	0.0035
<b>Dimpling</b>												
10	6.4	0.25	—	—	0.05	—	—	—	1.98	0.078	0.25	0.01

#### Stainless steel

Current A	Torch-to-Work Distance		Initial Marking Height		Delay Time seconds	Marking Speed		Arc Voltage volts	Width		Depth	
	mm	in	mm	in		mm/min	in/min		mm	in	mm	in
<b>Light marking</b>												
10	5.1	0.2	5.1	0.2	0	5080	200	98	2.03	0.08	<0.02	<0.001
<b>Heavy marking</b>												
10	6.4	0.25	6.4	0.25	0	3175	125	133	2.54	0.1	0.08	0.003
<b>Dimpling</b>												
10	6.4	0.25	—	—	0.05	—	—	—	2.03	0.08	0.23	0.009

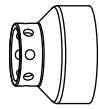
#### Aluminum

Current A	Torch-to-Work Distance		Initial Marking Height		Delay Time seconds	Marking Speed		Arc Voltage volts	Width		Depth	
	mm	in	mm	in		mm/min	in/min		mm	in	mm	in
<b>Marking</b>												
11	2.5	0.1	5.1	0.2	0	5080	200	98	0.89	0.035	<0.02	<0.001
<b>Dimpling</b>												
10	3.2	0.125	—	—	0.1	—	—	—	0.89	0.035	0.09	0.0035

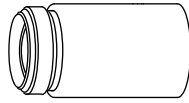
#### Gas flow rate – slpm / scfh

137 / 290	Hot (cutflow)
141 / 300	Cold (postflow)

### Marking and Dimpling – Argon – Shielded



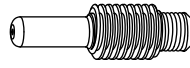
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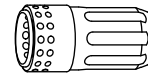
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#### Mild steel

Current A	Torch-to-Work Distance		Initial Marking Height		Delay Time seconds	Marking Speed		Arc Voltage volts	Width		Depth	
	mm	in	mm	in		mm/min	in/min		mm	in	mm	in
<b>Light marking</b>												
10	2.0	0.08	2.0	0.08	0	3175	125	44	1.22	0.048	<0.02	<0.001
<b>Heavy marking</b>												
15	1.5	0.06	1.5	0.06	0	3175	125	44	1.22	0.048	<0.02	<0.001
<b>Dimpling</b>												
20	3.2	0.125	—	—	0.2	—	—	—	0.99	0.039	<0.02	<0.001

#### Stainless steel

Current A	Torch-to-Work Distance		Initial Marking Height		Delay Time seconds	Marking Speed		Arc Voltage volts	Width		Depth	
	mm	in	mm	in		mm/min	in/min		mm	in	mm	in
<b>Light marking</b>												
12	2.5	0.1	2.5	0.1	0	3175	125	46	1.40	0.055	<0.02	<0.001
<b>Heavy marking</b>												
15	2.5	0.1	2.5	0.1	0	2540	100	46	2.16	0.085	0.02	0.001
<b>Dimpling</b>												
10	3.2	0.125	—	—	0.2	—	—	—	0.94	0.037	0.18	0.007

#### Aluminum

Current A	Torch-to-Work Distance		Initial Marking Height		Delay Time seconds	Marking Speed		Arc Voltage volts	Width		Depth	
	mm	in	mm	in		mm/min	in/min		mm	in	mm	in
<b>Marking</b>												
16	0.5	0.02	0.5	0.02	0	4445	175	42	0.63	0.025	<0.02	<0.001
<b>Dimpling</b>												
20	0.5	0.02	—	—	0.4	—	—	—	0.66	0.026	0.04	0.0015

#### Gas flow rate – slpm / scfh

120 / 255	Hot (cutflow)
123 / 260	Cold (postflow)