

## TIME WORK STUDY – BURNING BARS

Burning Bars are an Oxygen-Fueled cutting system. The position of the cut will dictate performance, as well as the operator's experience. An operator standing on the ground and cutting material in a flat position will outperform an operator trying to cut overhead or reaching out of a man basket- cutting horizontal.

Direction of cutting and flow of the slag is important. Vertical cuts will cut faster if you are cutting down hill and the slag can run out of the cut. The better the slag can flow out of the cut, the faster a cut can be completed.

All Exothermic Burning Bars have the same tip temperature of around 7400 degrees F. The difference between bars is the volume of oxygen and the volume of fuel in the bar. The larger the bar the more oxygen it will flow, and the more fuel contained in the Burning Bar.

Burning Bars are an Oxygen-Fueled cutting process that will rapidly cut material that will oxidize. Non-Ferrous materials and concrete cut slower and are more of a melting process than a cutting process. Copper, brass, bronze, aluminum bronze and concrete act as a large heat sink and will draw heat from the burning bar and take longer to heat up to their melting temperature. Very large sections of these materials will take longer to melt than small sections.

**Aluminum Bronze** (ship propellers) can be cut with burning bars, but the speed of the cut will depend on the chemistry and the melting temperature of the material. Concrete can be melted with burning bars, but the cut speed is very unpredictable. The speed of melting depends upon the aggregate in the concrete, re-bar, moisture content and the age of the concrete.

**Stainless Steel** can also be cut with burning bars. Speed of the cut depends on the chemistry of the stainless. Stainless Steel that develops some surface rust will cut much faster than very high grade.

**Cast Iron:** It is not possible to give an accurate time and cut distance for Cast Iron. Due to different slag pattern and sparks, but they can be cut. We have seen cast iron that a burning bar would barely melt the material and some cast iron that melts like mild steel. There is such a wide range of chemistry in cast iron & the only way to know if the material can be cut is with a test cut. We do recommend that the same thickness ranges for steel be used as a guide for selecting the size burning bar.

**OXYGEN SYSTEMS:** Pressure and Volume of oxygen are critical to the performance of burning bars. Restrictions such as too small of a hose, small port regulators, hose length, and the oxygen supply can have a drastic effect on burning bars. Single Liquid Oxygen Dewar's will not supply the volume of oxygen required to run burning bars. You **must** have an **external vaporizer** of adequate size to run burning bars. See the volume requirements in cubic feet to determine the size vaporizer required.

54B1050A .540" od Burning Bars can be used for lite demolition on **material up to 3/8"**, gouging and removing frozen pins from heavy equipment. .540" burning bars are very good for cutting things like duct work out of power plants. (Oxygen 25 cfm @ 100 psi)

**\*\* NOTE; cf IN THE OXYGEN COLUMN IS CUBIC FEET OF OXYGEN USED.**

Bar Size	Position	Operator	Material	Time	Length	Oxygen
54B1050	Flat	Standing	3/8" flat plate	4 min	12 to 14'	100 cf
54B1050	Horizontal	Standing	3/8" horizontal plate	4 min	8 to 10'	100 cf
54B1050	Vertical	Standing	3/8" vertical plate	4 min	10 to 12'	100 cf
54B1050	Pin Removal	Standing	3" to 6" dia. X 12" pin	2 min	Pierce	50 cf

62B1050A .625" od Burning Bars can be used for demolition on **material up to 3/4" thick**, gouging and removing larger frozen pins from heavy equipment. Pins ranging from 3" od up to 6" od. Also, can be used to pierce starter holes in plate for plate cutting machines. (Oxygen 30 cfm @ 100 psi)

Bar Size	Position	Operator	Material	Time	Length	Oxygen
62B1050A	Flat	Standing	3/4" flat plate	4 min	Up to 14'	120 cf
62B1050A	Horizontal	Standing	3/4" flat plate	4 min	Up to 10'	120 cf
62B1050A	Vertical	Standing	3/4" flat plate	4 min	Up to 12'	120 cf
62B1050A	Pin Removal	Standing	3' to 6" dia X 12" pin	2 min	Pierce	60 cf
62B1050A	Plate Piercing	Standing	6" thick	30 sec	Pierce	30 cf
62B1050C	Flat	Standing	2" X 24" Alum.	2 min	24"	60 cf

67B1050A .675" Burning Bars can be used for heavier demolition on **material up to 2" thick**, removing large frozen pins from heavy equipment and articulated bridges. We have had customers remove 12" diameter X 24" long hinge pins from bridges. Plate piercing for plate cutting machines on plate 10" and thicker. Large SS and copper heat exchangers. (Oxygen 40 cfm @ 125 psi)

Bar Size	Position	Operator	Material	Time	Length	Oxygen
67B1050A	Flat	Standing	1" flat plate	4 min	16 to 20'	160 cf
67B1050A	Horizontal	Standing	1 1/2" Aluminum *	4 min	16'	160 cf
67B1050A	Horizontal	Standing	2" Aluminum (RR tank car)	4 min	12'	160 cf
67B1050A	Flat	Standing	48" dia SS Heat Exchanger	4 min	Complete	160 cf
67B1050A	Flat	Standing	6" thick SS	4 min	4'	160 cf
67B1050A	Horizontal	Man Basket	2" curved plate	4 min	7 to 8'	160 cf
67B1050A	Vertical	Man Basket	2" curved plate	4 min	8 to 10'	160 cf
67B1050A	Flat	Standing	3/4" flat plate	4 min	20'	160 cf
67B1050A	Flat	Standing	6" X 16" pin	4 min	16"	160 cf
67B1050A	Flat	Standing	10" dia. Shaft	2 min	10"	80 cf

\*Military Personnel Carrier made of high strength aluminum.

84B1050A 840" od Burning Bars can be used for heavier demolition. Longer cuts on thicker material and can be used to remove much larger pins. Good for cleaning up spills in steel mills and aluminum processing plants. (Oxygen 55 cfm @ 125 psi)

Bar Size	Position	Operator	Material	Time	Length	Oxygen
84B1050A	Flat	Standing	Aluminum Spill 12" thick	4 min	16"	220 cf
84B1050A	Horizontal	Standing	Piercing a 6" X 24" pin	2 min	24"	110 cf
84B1050A	Flat	Standing	Cutting 16" shaft (4 bars)	16 min	16"	880 cf
84B1050A	Flat	Standing	5" Steam Turbine Housing	4 min	20"	220 cf

92B1050A .922" od Burning Bars can be used for heavy demolition. A side by side, comparison cutting a 24" high carbon steel shaft with the .675" burning bars was completed. The 67B1050A burning bars required 16 bars with a burn time of 64 minutes and consumed 2880 cubic feet of oxygen. With the .922" burning bars the same cut took 8.5 bars with a total burn time of 34 minutes and consumed 2550 cubic feet of oxygen. In the table below the Steam Turbine Housing and the Generator Housing were all very high carbon steel castings in a nuclear power plant. (Oxygen 75 cfm @ 125 psi)

Bar Size	Position	Operator	Material	Time	Length	Oxygen
92B1050A	Horizontal	Standing	12" Turbine Blade Housing	4 min	14"	300 cf
92B1050A	Vertical	Standing	12" Turbine Blade Housing	4 min	16"	300 cf
92B1050A	Flat	Standing	6.5" Steam Turbine Housing	4 min	32"	300 cf
92B1050A	Vertical	Standing	4" thick Generator Housing	4 min	60"	300 cf
92B1050A	Flat	Standing	12" pump shaft (one cut)	4 min	12"	300 cf

10B1050A 1.05" od Burning Bar is the largest burning bar available. These bars are used for thick sections of material and have been used successfully to cut 9' in diameter ladles of solidified stainless steel in a mill. Cuts on material up to 72" in slag pits in steel mills and large diameter shafts as well as thick plates up to 36" thick on injection mold machines and forging dies. (Oxygen 100 cfm @ 150 psi)

Bar Size	Position	Operator	Material	Time	Length	Oxygen
10B1050A	Horizontal	Standing	20" Injection Mold Plate *	4 min	14"	400 cf
10B1050A	Horizontal	Standing	30" Injection Mold Plate *	4 min	10"	400 cf
10B1050A	Flat	Standing	24" Forge die support plate *	4 min	20"	400 cf
10B1050A	Flat	Standing	36" SS clad cast steel roll **	20 min	36"	2000 cf
10B1050A	Flat	Standing	36" X 30" Casting ***	40 min	36"	4000 cf
10B1050A	Flat	Standing	44" Steam Turbine Shaft ****	36 min	44"	3600 cf

\* Shows the difference in cutting thick sections Horizontal versus down flat

\*\* Paper mill roll was 1" SS, 4" Cast Steel and Center Shaft was 16" cast iron shaft

\*\*\* Tundish Skull from steel mill was mixed high carbon steel, slag and some refractory material

\*\*\*\* Turbine Blade Shaft from nuclear power plant. High Strength solid shaft that had been in operation for years and had gone through many heat cycles. First attempt to cut this shaft was with .675" burning bars and after 20 bars we convinced the customer to change to 1.05" bars. This cut was completed with 9 bars in 36 minutes of burn time.