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Install Valve Guides for Peak Race Performance

The E-Z Bore valve guide installation kit revolutionized the Kart performance industry over 20 years ago. In the early days of building performance flathead engines the only replacement guides and tooling came from Briggs and Stratton, which was fine for the small engine service market, but was lacking in the performance market.

Our E-Z Bore Valve Guide Installation Kit offers some unique features:

- A rigid and accurate valve seat centering fixture for reamer.
- Ease of installation with minimal final sizing.
- Patented bronze/alloy guide material for maximum guide life - tighter clearances and relief step for ease of installation and removal during engine service work.

INSTRUCTIONS FOR VALVE GUIDE INSTALLATION:

Preparing materials:

Remove any carbon or build up on the inside and top of valve seat.

Place support in seat and move side to side, if movement is present simply flip support over and the other side will have a .002 larger diameter to obtain a tighter fit with seat.

After establishing fit to seat, remove support and insert reamer through center hole. Place the support back onto seat. The pilot portion of reamer will enter the top of valve guide bore and the support will rest onto top of seat.

Using thumb screws on locking strap, thread into the head bolt location between seats and outer bolt location (See figure below). Tighten thumb screws slowly and ensure that strap lies squarely and securely across top of upper supports. Note: Valve seats are installed at an angle in the engine block and not flush with gasket surface. This angle can cause locking strap to sit unevenly on the support; care should be used to ensure the strap locks securely to the top of upper support. Locking straps have been machined and use a special

washer to aid in pivoting strap for a secure lock at this angle. Tighten thumb screws finger tight. Turn reamer to check alignment and to ensure that tooling isn't in a bind.

Machining counter bore for guide:

Start by placing a guide on the hold down strap and marking reamer with a felt tip pin at the top of guide (approximately 1 ¼" above the hold down strap). This mark will be used later to determine depth needed for valve guide. We recommend using a dark thread cutting oil. Look for an oil that has a sulfur blend. A sulfur blend helps to prevent softer metals such as aluminum from bonding to the reamer cutting edge.

Reamer can be powered with any hand held low speed drill. Reamers need to be operated between 500 to 600 RPM in a clockwise direction. Please check your equipment to ensure proper RPM range. Proper lubrication and cutting speed are critical in keeping reamer cutting edge sharp.

Cut counter bore to previously-marked depth and continue just slightly past desire depth. This will ensure that the guide doesn't bottom out before the top edge is flush with inside of port area.

Installing guide:

Examine new guide closely -- One end of guide is .005 smaller than the other end. These guides have been ground with a ¼" long undercut relief step. This step allows the guide to be installed with very little distortion. These relief steps eliminate the need to finish ream after installation.

Guide fit can be easily checked by inserting relief end into counter bore. The first ¼" will enter the counter bore, but the next ¼" which is the press fit size will not. If for some reason a larger portion of the guide goes into the counter bore we offer an oversize guide which will give a tight press fit for the oversize counter bore. Oversize counter bores occur from previous guide work, a stretched counter bore from removing a worn guide, or reamer cutting oversize from dull condition, incorrect cutting fluid and/or drill speed.

We recommend freezing valve guides. This can be achieved by simply placing guides in the freezer for 24 hours prior to installation. For convenience we also offer an aerosol spray quick freeze which will cool guides down to -50 degrees.

Install guide onto driver with the .005 undersize portion facing down and insert into counter bore. Drive guide in using a standard size 12 to 16oz hammer. Fully seating guide in place should only take approximately 4 to 5 hits with a hammer. Once seated in place, remove driver and check fit with a new valve. If installed properly, a new stock valve (with a .2465 diameter) should enter guide with very little drag or binding.

The E-Z Bore guides are made from a bronze magnesium material which allows a much tighter guide-to-valve-stem fit. This guide after installation should provide a .0015 -.002 clearance fit. With this clearance these guides provide peak sealing between valve and guide, and no sticking or material transfer from the exhaust during normal air cooled race engine temps (375 to 410 degrees).

For final sizing and cross hatch finish use the Flex-Hone provided in kit. See our Guide for using Flex-Hones to improve engine performance. For the exhaust guide we recommend honing approximately 30 to 60 seconds to add additional stem clearance and 15 to 30 seconds on the intake guide for deburring and cross hatch finish.

A couple of performance tips on the Raptor Race engines

On stock factory blocks the intake will not have any guide material. These aluminum guide bores are easily machined. If a block has some type of guide material on the intake side, most likely a guide has been previously installed by another engine builder. Caution should be used: bronze alloy materials cannot be machined by a high speed steel reamer. We recommend replacing the guide with a quality performance product.

In the case of a previously-installed E-Z Bore guide, once removed a new guide can simply be driven back into this counter bore, using the fit procedure explained above to determine the best fit for the current counter bore.

The same precaution applies to the exhaust guides, with the exception that all blocks from Briggs and Stratton have a .375 guide installed on the exhaust side. This guide goes ¾" deep and usually is made from a cast iron material. Cast iron as a guide material usually has very poor durability in race application and can be reamed using the tooling in this kit. After reaming the .375 guide, there will be a shell remaining in which the E-Z Bore guide will fit.

Some engine builders remove the stock guide and pre-ream in a lathe, reinstalling the reamed shell. After installing shell set-up fixture, skim through shell and cut an additional ¾" below shell for full length E-Z Bore guide.

If the shell guide appears to be longer than ¾" deep, most likely it will not be a stock guide. If in doubt as to what type of material or guide, always pull the valve guide out and examine, to determine the best replacement method.

E-Z Bore offers a valve guide removal kit that ensures minimal stretch of counter bores and many times allows installation of the same size guide.

After any valve guide installation we strongly recommend cutting and lapping valve seats. See our Guide for using Neway products to improve small engine performance. Keep in mind that valve seat accuracy is going to be more important due to the fact that now the valve stem to guide clearance is tighter. In other words, there isn't as much play for the valve to move over to seal.

That same movement is what causes a brand new guide to wear after only a couple races: the valve is literally pounding the guide in order to sit down on the seat. To check for this misalignment of guides and seats, open the motor and roll the valves open and closed. Watch what the valve does as it is closing. If you see the valve come down straight, then wobble to one side you have a sealing problem. Cut the seat to conform to the valve and we guarantee that motor will start making power!

Pictured: Neway Speed Handle (top)

Neway 45° Valve Seat Cutter (bottom)

As always THANKS for your time and business

Remember ***"The Real Speed is in the Details"***