

SERVICE BULLETIN

Compliance Will Enhance Safety

SB19-05TECHNICAL PORTIONS
FAA APPROVED

- SUBJECT:** Valve Guide Application, Installation, and Reaming Procedures
- PURPOSE:** To provide valve guide application (by cylinder part number), and dimensional fits & limits for valves and valve guides.
- COMPLIANCE:** At engine major overhaul, cylinder overhaul or cylinder repair

MODELS

AFFECTED: New and rebuilt Continental Aerospace Technologies C-75, C-85, C-90, O-200, O-300, GO-300, IO-240, IOF-240, IO-360, TSIO-360, LTSIO-360 E-SERIES, O-470, IO-470, TSIO-470, IO-520, TSIO-520, LTSIO-520, GTSIO-520, IO-550, IOF-550, TSIO-550, TSIOF-550 and TSIO-550 aviation gasoline (AvGas) engines.

I. GENERAL INFORMATION

Continental Aerospace Technologies™ (Continental®) valve guides are reamed-in-place after installation. Dimensional specifications for valve guides are provided in Table 1 and Tables 3 through 7. All measurements must be made using properly calibrated and certified precision measuring devices.

Reference the current Illustrated Parts Catalog (IPC) for the most current replacement part (see Parts Supersedure History at: <http://continental.aero/support/parts-supersedure-history.aspx>).

II. IN SERVICE VALVE AND VALVE GUIDE MEASUREMENTS

1. Reference the applicable engine Maintenance or Overhaul Manual for specific inspection criteria for intake and exhaust valves. Valve stems must conform to specified new parts dimensions.
2. During cylinder repair, measure the valve guide inside diameter in the upper 1/3 and center 1/3 areas of the valve guide length, reference Figure 1 and Table 1. Measurements taken at the bottom (lower 1/3 area) of the intake and exhaust valve guide are not indicative of the overall serviceability of the valve guide.
3. The valve guide inside diameter must not exceed the “Service Limit” dimension for the specific engine and cylinder combination. Valve guides exceeding the “Service Limit” dimensions specified in Tables 1 and Tables 3 through 7, as applicable, will require replacement.

III. VALVE GUIDE INSTALLATION

CAUTION: When installing valve guides in cylinders, verify that the valve guide is correct for the cylinder and engine application (reference Table 1).

1. Refer to the applicable engine Overhaul Manual for specific installation instructions and specialized equipment and tooling required.
2. Before installing a replacement valve guide, the valve guide bore in the cylinder head must be reamed to the proper oversize dimension. The difference between the valve guide outside diameter and bore inside diameter must be within the dimensional specification provided in Tables 1 and Tables 3 through 7 for the applicable engine and cylinder combination.

ISSUED
2019/10/24

REVISED

DOC NO REVISION
SB19-05PAGE
1 of 6

3. Post installation measurements are required on Ream-In-Place valve guides after reaming procedures have been completed. Allow the cylinder to cool and stabilize to room temperature before taking any dimensional measurements. Measure the valve guide inside diameter at three equally spaced locations along the length of the valve guide (reference Figure 2). If the inside diameter is not within specifications, the guide will require refinishing or replacement.

IV. VALVE GUIDE REAMING PROCEDURES

- a. Install a suitable cylinder holding fixture (Borroughs 5221B or equivalent) into a drill press or vertical mill to secure the cylinder. Index the fixture to the proper angle (where shown) and install the cylinder in the cylinder holding fixture.
- b. Zero the tool holder to the guide with a dial indicator in accordance with good machining practices.

WARNING

Do not attempt this procedure with hand held power tools. This procedure requires measurable accuracy and precision. Valve guides reamed with hand held power tools must be replaced.

CAUTION: Reamers are made to cut right-hand only. Do Not turn backwards (even a partial turn).

- c. Consult reamer manufacture to select an appropriate high-speed steel or carbide-tip spiral reamer (reference Table 1). Use reamer manufacturer's recommendations for appropriate reaming RPM and feed rate. Use a high quality cutting oil for all valve guide reaming operations.

NOTE: Do not exceed 400 RPM when using high-speed steel reamers or 700 RPM for carbide-tip reamers.

- d. Check the valve guide final dimensions using precision measuring equipment.
- e. Inspect the surface finish of valve guide inner bore after final reaming. The surface finish of the intake valve guide must not exceed 63 Ra, the surface finish of the exhaust valve guide must not exceed 125 Ra.

Table 1. Intake and Exhaust Valve Guides

Intake Valve Guides					
Guide P/N	Material	Length ± .01	Reamer Cutting Diameter	Reamer Pilot Diameter	Finished I.D.
655166	Aluminum-Bronze	2.17	0.4354	0.4220	0.4350 - 0.4362
655523	Aluminum-Bronze	2.03	0.3750	0.3630	0.3745 - 0.3755
655525	Aluminum-Bronze	1.81	0.3750	0.3630	0.3745 - 0.3755
655527	Aluminum-Bronze	2.22	0.3440	0.3310	0.3432 - 0.3442
Exhaust Valve Guides					
Guide P/N	Material	Length ± .01	Reamer Cutting Diameter	Reamer Pilot Diameter	Finished I.D.
636242	Ni-resist	2.36	0.4374	0.4220	0.4370 - 0.4380
639282	Ni-resist	2.22	0.3750	0.3630	0.3745 - 0.3755
655526	Ni-resist	2.12	0.3750	0.3630	0.3745 - 0.3755
656011	Aluminum-Bronze	2.36	0.4375	0.4220	0.4370 - 0.4380
655166	Aluminum-Bronze	2.17	0.4354	0.4220	0.4350 - 0.4362

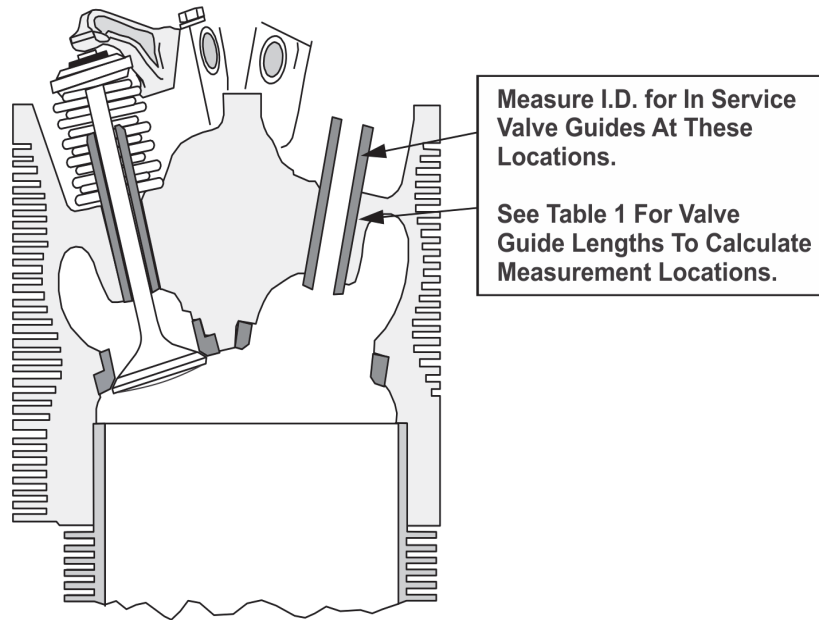


Figure 1. Dimensional Measurements, In Service Valve Guide

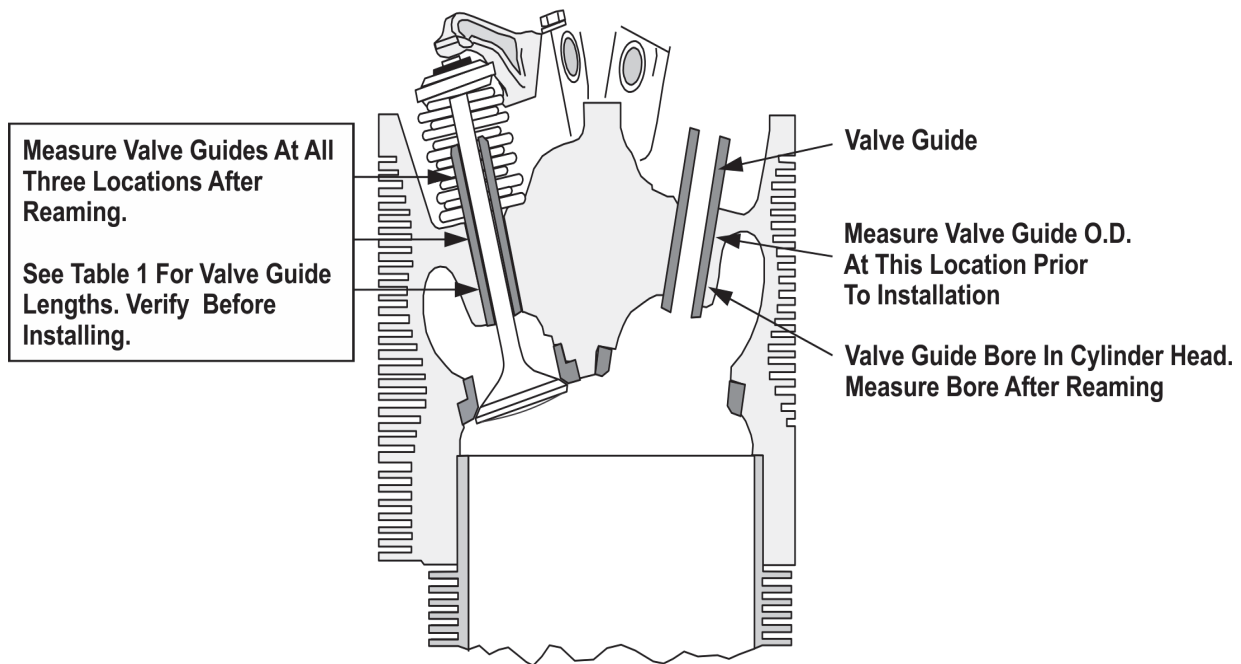


Figure 2. Critical Measurement Locations, Valve Guide Installation

Table 2. Valve Guide Applications

Engine	Cylinder Assembly	Intake Valve Guide	Intake Valve	Exhaust Valve Guide	Exhaust Valve
C-75, C-85	658319A5 Swage Push Rod Tubes	655527	655968	655166	655969
C-75, C-85 C-90, O-200-A, B (except as noted) O-300	658188A1 Loose Push Rod Tubes	655525	655970	655526	655971
O-200-A, B O-300	658319A1	655527	655968	655166	655969
O-200-D, X	657417A1	655525	655970	655526	655971
GO-300	658319A7	655527	655968	655166	655969
E-165, E-185 E-225	658819A1	655166	655783	656011	655771
IO-346	658593A1	655166	655783	636242	655771
360 Series (except as noted)	658603A7	655523	655867	639282	655866
IO-240-A, B IOF-240-B IO-360-ES TSIO-360-MB, RB, SB LTSIO-360-RB	658601A1	655523	655867	639282	655866
O-470-A, E, J	658599A2	655166	655783	636242	655771
O-470-G, K, L, R,S [except G(7), (10), and GCI]	658816A1	655166	655783	636242	655771
O-470-U	658598A1	655166	655783	636242	655771
O-470-G(7), (10), O-470-GCI, O-470-M, IO-470-C	658816A2	655166	655783	636242	655771
IO-470-J, K	658599A1	655166	655783	636242	655771
IO-470-D, E, F, H, L, M, N, S, U, V	658817A2	655166	655783	636242	655771
IO-520 Series (except as noted)	658810A1	655166	655783	636242	655771
IO-550-G TSIO-520-BE	658603A1	655166	655783	636242	655771
IO-550-A, B, C IOF-550-B, C	658810A1	655166	655783	636242	655771
IO-550-D, E, F, L	658592A1	655166	655783	636242	655771
IO-550-N, P, R	658815A1	655166	655868	658736	655771
IOF-550-N, P, R	658594A1	655166	655868	636242	655771
TSIO-520-UB(17) Special Edition	658810A1	655166	655868	636242	655771
TSIO-520-AF, CE, UB (except UB(17))	658810A1	655166	655783	636242	655771

Table 2. Valve Guide Applications

Engine	Cylinder Assembly	Intake Valve Guide	Intake Valve	Exhaust Valve Guide	Exhaust Valve
TSIO-520-B, BB, C, D, DB, E, EB, G, H, J, JB, K, KB, L, LB, M, N, NB, P, R,T,VB,WB	658810A1	655166	655783	636242	655771
TSIO-550-B, C, E	658603A1	655166	655783	636242	655771
TSIO-550-G, K, N	658815A1	655166	655868	658736	655771
TSIOF-550-D, J, K	658594A1	655166	655868	636242	655771
TSIOL-550-A, B, C	658596A1	655166	655783	636242	655771
GTSIO-520-C, D, H (except as noted)	658591A1	655166	655783	636242	655771
GTSIO-520-F, K	658603A3	655166	655783	636242	655771
GTSIO-520-H(7), (8), L, M, N, R	658603A2	655166	655783	636242	655771

NOTE: Visit the Continental website at www.Continental.aero for the latest production product numbers, applicable illustrated parts catalog, a listing of the latest manual revisions, Service Documents, and Instructions for Continued Airworthiness (ICAs) for Standard Practices.

Table 3. IO/IOF-240, IO-360, L/TSIO-360-Series

Description	Minimum	Maximum	Service Limits
Intake Valve Guide In Cylinder Head	0.0010 L	0.0025 L	0.006 L
Intake Valve In Guide Ream-In-Place Guides	0.0012 L	0.0030 L	0.006 L
Intake Valve Stem Diameter	0.3725	0.3733	
Exhaust Valve Guide In Cylinder Head	0.0010 T	0.0025 T	
Exhaust Valve in Guide Ream-In-Place Guides	0.0025 L	0.0043 L	0.008L
Exhaust Valve Stem Diameter	0.3712	0.3720	

NOTE: See Table 1 for intake and exhaust valve guide finished dimensions and recommended reamer sizes.

Table 4. O/IO-470, O-470 (4, 11, & 13), IO/TSIO/LTSIO-520 Series, IO/IOF/TSIO/TSIOF/TSIOL-550, GTSIO-520 Series

Ream-In-Place Guides			
Description	New Minimum	Maximum	Service Limits
Intake Valve Guide In Cylinder Head	0.0010 T	0.0025 T	
Intake Valve In Guide Ream-In-Place Guides	0.0010 L	0.0032 L	0.0065 L
Intake Valve Stem Diameter	0.4335	0.4340	
Exhaust Valve Guide In Cylinder Head	0.0010 T	0.0025 T	
Exhaust Valve in Guide Ream-In-Place Guides	0.0029 L	0.0046 L	0.0085 L
Exhaust Valve Stem Diameter	0.4334	0.4341	

NOTE: See Table 1 for intake and exhaust valve guide finished dimensions and recommended reamer sizes.

**Table 5. C-75, C-85, C-90, O-200, O/GO-300 Series,
with Loose Push Rod Tubes**

Ream-In-Place Guides			
Description	New Minimum	New Maximum	Service Limits
Intake Valve Guide In Cylinder Head	0.0010 T	0.0025 T	
Intake Valve In Guide Ream-In-Place Guides	0.0012 L	0.0030 L	0.006 L
Intake Valve Stem Diameter	0.3730	0.3735	
Exhaust Valve Guide In Cylinder Head	0.0010 T	0.0025 T	
Exhaust Valve in Guide Ream-In-Place Guides	0.0025 L	0.0043 L	.008L0
Exhaust Valve Stem Diameter	0.3713	0.3720	

NOTE: See Table 1 for intake and exhaust valve guide finished dimensions and recommended reamer sizes.

**Table 6. C-75, C-85, C-90, O-200, O/GO300 Series,
with Swage/Swedged Push Rod Tubes**

Ream-In-Place Guides			
Description	New Minimum	New Maximum	Service Limits
Intake Valve Guide In Cylinder Head	0.0010 T	0.0025 T	
Intake Valve In Guide Ream-In-Place Guides	0.0011 L	0.0029 L	0.006 L
Intake Valve Stem Diameter	0.3413	0.3421	
Exhaust Valve Guide In Cylinder Head	0.0010 T	0.0025 T	
Exhaust Valve in Guide Ream-In-Place Guides	0.0025 L	0.0042 L	0.008L
Exhaust Valve Stem Diameter	0.4320	0.4325	

NOTE: See Table 1 for intake and exhaust valve guide finished dimensions and recommended reamer sizes.

Table 7. O-470 (4, 11 & 13), E Series

Ream-In-Place Guides			
Description	New Minimum	New Maximum	Service Limits
Intake Valve Guide In Cylinder Head	0.0010 T		
Intake Valve In Guide Ream-In-Place Guides	0.0010 L		0.0065 L
Intake Valve Stem Diameter	0.4335	0.4340	
Exhaust Valve Guide In Cylinder Head	0.0010 T		
Exhaust Valve in Guide Ream-In-Place Guides	0.0030 L		0.0076 L
Exhaust Valve Stem Diameter	0.4333		

NOTE: See Table 1 for intake and exhaust valve guide finished dimensions and recommended reamer sizes.