

SERVICE BULLETIN

Compliance Will Enhance Safety, Maintenance or Economy of Operation

SB 04-11

TECHNICAL PORTIONS
FAA APPROVED

SUBJECT: VALVE GUIDE APPLICATION, INSTALLATION AND REAMING PROCEDURES

PURPOSE: PROVIDE VALVE GUIDE APPLICATION BY CYLINDER PART NUMBER AND DIMENSIONAL FITS AND LIMITS FOR VALVES, PRE-FINISHED AND REAM IN PLACE VALVE GUIDES

COMPLIANCE: AT ENGINE MAJOR OVERHAUL, CYLINDER OVERHAUL OR CYLINDER REPAIR

MODELS

AFFECTED: C-75, C-85, C-90, O-200, O-240 Rolls-Royce, O-300, G0-300, IO-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, TSIO-550 AND TSIOL-550 SERIES ENGINES.

GENERAL INFORMATION

Teledyne Continental Motors has utilized pre-finished intake and exhaust valve guides in production cylinders and as service replacement parts for many years. This service bulletin announces the release of replacement ream in place valve guides. Dimensional specifications for ream in place and pre-finished valve guides are provided in tabular form in Table 1 and Table 3.

Ream in place valve guides may be installed as a replacement for pre-finished valve guides. However, pre-finished valve guides must not be installed as replacements for ream in place valve guides.

NOTE:

Refer to the applicable engine overhaul manual for valve guide removal and installation instructions and specifications.

All measurements must be made using properly calibrated and certified precision measuring devices.

IN SERVICE VALVE AND VALVE GUIDE MEASUREMENTS

1. Refer to 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. When measuring valve guide inside diameter during cylinder repair, take valve guide measurements at locations in the upper 1/3 and center 1/3 of the valve guide length, reference Figure 1 and Table 1. Measurements taken at the bottom of the intake and exhaust valve guide are not indicative of the overall serviceability of the valve guide.

ISSUED			REVISED			 Teledyne Continental Motors, Inc. P.O. Box 90 Mobile Alabama • 251-438-3411	PAGE NO	REVISION
MO	DAY	YEAR	MO	DAY	YEAR		1 of 11	
11	02	2004					SB04-11	

3. 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 3 as applicable will require replacement.

PRE-FINISHED VALVE GUIDE MEASUREMENTS:

1. Pre-finished valve guides must be measured before installation to insure they conform with the new parts dimensions specified in Tables 1 and 3.
2. Measure valve guide inside diameter at three equally spaced locations along the length of the valve guide. Reference Figure 2 and Table 1.
3. Measure the outside diameter of the valve guide below the flange, reference Figure 2. Record these readings on the repair work order.
4. Measure valve stem diameter between the valve keeper annulus and the face of the valve. Record this reading on the repair work order.

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 the valve guide bore inside diameter must be within the dimensional specification provided in Tables 1 and 3 for the applicable engine and cylinder combination.
3. A. (Pre-finished Guides) After installing new valve guides allow the cylinder to cool and stabilize at room temperature before taking any dimensional measurements. Measure valve guide inside diameter at three equally spaced locations along the length of the valve guide. Reference Figure 2. If inside diameter is not within the specific new minimum and maximum dimensional limits, the guide will require finish reaming to size or replacement.
 B. (Ream-in-place Guides) Post installation measurements are only required on ream-in-place guides after reaming procedures have been completed. Allow the cylinder to cool and stabilize at room temperature before taking any dimensional measurements. Measure valve guide inside diameter at three equally spaced locations along the length of the valve guide, reference Figure 2. If inside diameter is not within specifications, the guide will require refinishing or replacement.

ISSUED			REVISED			 Teledyne Continental Motors, Inc. P.O. Box 90 Mobile Alabama • 251-438-3411	PAGE NO	REVISION
MO	DAY	YEAR	MO	DAY	YEAR		2 of 11	
11	2	2004					SB04-11	

VALVE GUIDE REAMING PROCEDURES

WARNING

Do not attempt this procedure with hand held power tools. Valve guides that are reamed with hand held power tools must be replaced.

- (1) Install a suitable cylinder holding fixture (Borroughs 5221B or equivalent) into a drill press or vertical mill to hold the cylinder. Index the fixture to the proper angle and install the cylinder into the fixture.
- (2) Zero in the guide with a dial indicator
- (3) Select a proper size high-speed steel or carbide-tip spiral reamer. Ream the valve guide at 400 RPM for high-speed steel reamers and 700 RPM for carbide-tip reamers. Use a high quality cutting oil for all valve guide reaming operations.

CAUTION

Reamers are made to cut right hand only. Do Not turn backwards even a partial turn.

- (4) Check the valve guide final dimensions using precision measuring equipment.
- (5) 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 VALVE GUIDES

Guide P/N	Material	Length ± .01	Reamer Cutting Diameter	Reamer Pilot Diameter	Finished I.D.	Replaces Guide Pre-finished P/N
655166	Aluminum-Bronze	2.17	.4354	.4220	.4350 - .4362	643766
655523	Aluminum-Bronze	2.03	.3750	.3630	.3745 - .3755	646681
655525	Aluminum-Bronze	1.81	.3750	.3630	.3745 - .3755	653802
655527	Aluminum-Bronze	2.22	.3440	.3310	.3432 - .3442	643422

EXHAUST VALVE GUIDES

Guide P/N	Material	Length ± .01	Reamer Cutting Diameter	Reamer Pilot Diameter	Finished I.D.	Replaces Guide Pre-finished P/N
636242	Ni-resist	2.36	.4374	.4220	.4370 - .4380	643767
639282	Ni-resist	2.22	.3750	.3630	.3745 - .3755	653214
655526	Ni-resist	2.12	.3750	.3630	.3745 - .3755	653726
656011	Aluminum-Bronze	2.36	.4375	.4220	.4370 - .4380	649177
655166	Aluminum-Bronze	2.17	.4354	.4220	.4350 - .4362	643766

ISSUED			REVISED			 Teledyne Continental Motors, Inc. P.O. Box 90 Mobile Alabama • 251-438-3411	PAGE NO	REVISION
MO	DAY	YEAR	MO	DAY	YEAR		3 of 11	
11	2	2004					SB04-11	

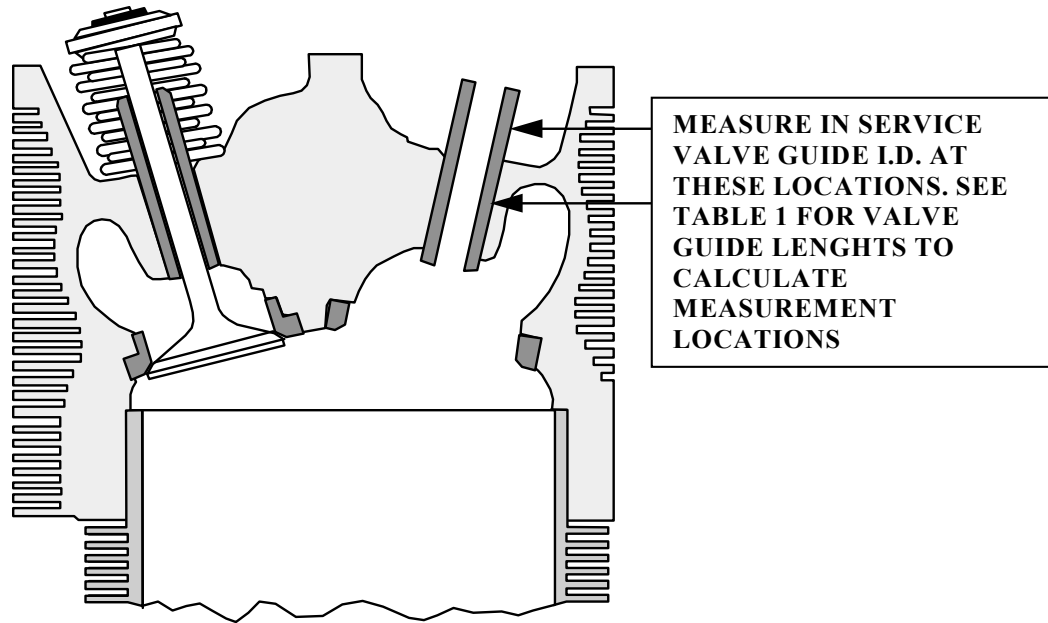


FIGURE 1
IN SERVICE VALVE GUIDE DIMENSIONAL MEASUREMENTS

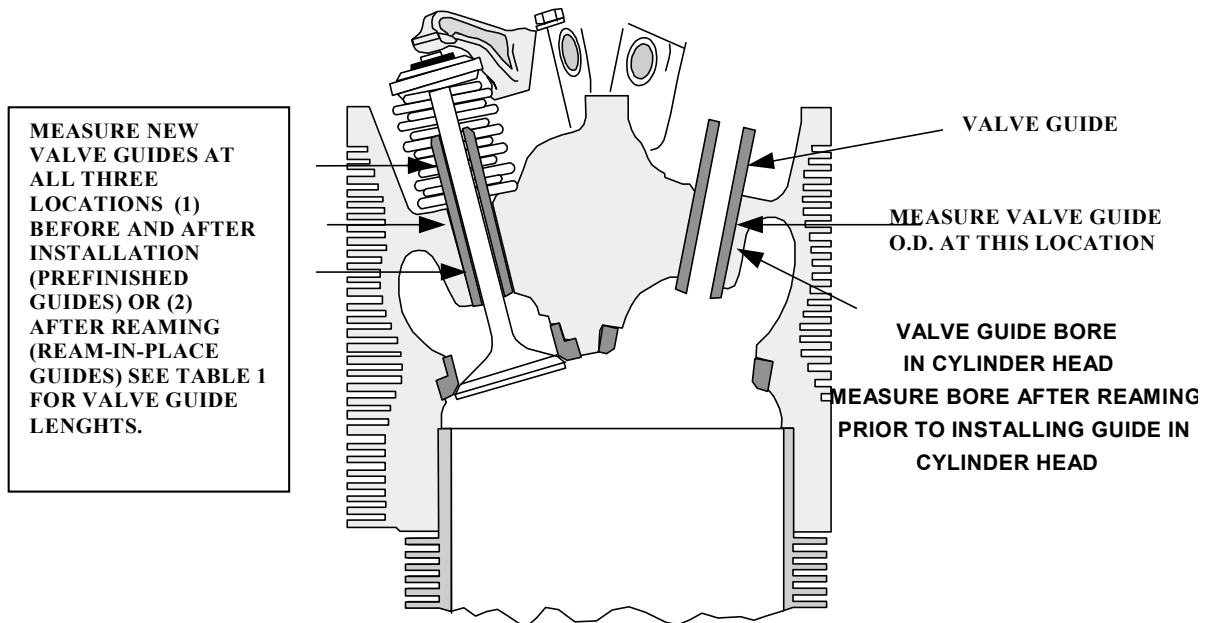



FIGURE 2
INSTALLATION CRITICAL MEASUREMENT LOCATIONS

ISSUED			REVISED			 Teledyne Continental Motors, Inc. P.O. Box 90 Mobile Alabama • 251-438-3411	PAGE NO	REVISION
MO	DAY	YEAR	MO	DAY	YEAR		4 of 11	
11	2	2004				SB04-11		

**TABLE 2
VALVE GUIDE APPLICATIONS**

ENGINE	CYLINDER ASSEMBLY	INTAKE VALVE GUIDE	INTAKE VALVE	EXHAUST VALVE GUIDE	EXHAUST VALVE
C-75, C-85	655483A14 Original Style	655527	655968	655166	655969
C-75, C-85 C-90, O-200 O-300	655482A6 New Style	655525	655970	655526	655971
O-200, O-300	655483A10	655527	655968	655166	655969
GO-300	655483A16	655527	655968	655166	655969
E-165, E-185 E-225	655480A3	655166	655783	656011	655771
IO-346	655481A3	655166	655783	636242	655771
360 Series Except as noted below	655478A4	655523	655867	639282	655866
IO-240-A,B IOF-240-B IO-360-ES TSIO-360-MB RB,SB LTSIO-360-RB	655479A11	655523	655867	639282	655866
O-470-A,E,J	655475A6	655166	655783	636242	655771
O-470-G,K,L, R,S [Except G(7), G(10) and GCI]	655467A5	655166	655783	636242	655771
O-470-U	655468A5	655166	655783	636242	655771
O-470-G(7) (10) O-470-GCI, O-470-M, IO-470-C	655467A6	655166	655783	636242	655771
IO-470-J,K	655475A5	655166	655783	636242	655771
IO-470-D,E, F, H,L,M,N,S, U,V	655468A7	655166	655783	636242	655771
IO-520 Series Except as noted	655469A6	655166	655783	636242	655771
IO-520-P LIO-520-P	655476A3	655166	655783	636242	655771

Note: Consult the latest version of the applicable parts manual for part number information. TCM provides parts history and application data on line via FBO Services and Information Services. Visit TCM's website at www.tcmlink.com for full details.


ISSUED			REVISED			 Teledyne Continental Motors, Inc. P.O. Box 90 Mobile Alabama • 251-438-3411	PAGE NO	REVISION
MO	DAY	YEAR	MO	DAY	YEAR		5 of 11	
11	2	2004				SB04-11		

TABLE 2 (Con't)

ENGINE	CYLINDER ASSEMBLY	INTAKE VALVE GUIDE	INTAKE VALVE	EXHAUST VALVE GUIDE	EXHAUST VALVE
IO-550-G Platinum Series	655891A1	655166	646283	636242	652956
IO-550-G TSIO-520-BE	655474A18	655166	655783	636242	655771
IOF-550-G	656094A1	655166	655783	636242	655771
IO-550-A,B,C IOF-550-B,C	655469A6	655166	655783	636242	655771
IO-550-B,C Platinum Series	655472A3	655166	655868	636242	655771
IO-550-B, C Special Edition	655484A4	655166	655868	636242	655771
IO-550-D,E,F,L IOF-550-D,E,F,L	655471A3	655166	655783	636242	655771
IO-550-D,F,L Platinum Series	655485A3	655166	655868	636242	655771
IO-550-N,P,R Except Platinum Series	655465A3	655166	655783	636242	655771
IO-550-N Platinum Series	655932A3	655166	655783	636242	655771
IOF-550-N,P,R	656093	655166	655783	636242	655771
TSIO-520-UB(17) Special Edition	655484A4	655166	655868	636242	655771
TSIO-520-AF, CE,UB [Except UB(17)]	655469A6	655166	655783	636242	655771
TSIO-520-B,BB, C,D,DB,E,EB,G, H,J,JB,K,KB,L, LB,M,N,NB,P,R,T,V B,WB	655470A3	655166	655783	636242	655771
TSIO-550-A,B,C,E	655477A5	655166	655783	636242	655771
TSIOL-550-A,B, C	655466A3	655166	655783	636242	655771
GTSIO-520-C,D, H	655473A3	655166	655783	636242	655771
GTSIO-520-F,K	655474A16	655166	655783	636242	655771
GTSIO-520-H(7),(8), L,M,N,R	655474A8	655166	655783	636242	655771

Note: Consult the latest version of the applicable parts manual for part number information. TCM provides parts history and application data on line via FBO Services and Information Services. Visit TCM's website at www.tcmlink.com for full details.

ISSUED			REVISED			 Teledyne Continental Motors, Inc. P.O. Box 90 Mobile Alabama • 251-438-3411	PAGE NO	REVISION
MO	DAY	YEAR	MO	DAY	YEAR		6 of 11	
11	2	2004					SB04-11	

**TABLE 3A
VALVE GUIDE FITS and LIMITS
O-240 Rolls-Royce, IO/IOF240A&B, IO-360-Series, L/TSIO360-Series
PRE-FINISHED GUIDES**

Description	Minimum	Maximum	Service Limits
Intake Valve Guide In Cyl. Head	.0010 T	.0025 T	
Intake Valve In Guide Pre-Finished Guides	.0010 L	.0040 L	.006 L
Intake Guide Bore (New) Pre-finished Guides	.3760	.3770	
Intake Guide Bore (installed in cylinder) Pre-Finished Guides	.3745	.3770	
Intake Valve Stem Diameter	.3725	.3733	
Exhaust Valve Guide In Cylinder Head	.0010 T	.0025 T	
Exhaust Valve in Guide Pre-Finished Guides	.0025 L	.0057 L	.008 L
Exhaust Guide Bore (New) Pre-Finished Guides	.3760	.3770	
Exhaust Guide Bore (installed in cylinder) Pre-Finished Guides	.3745	.3770	
Exhaust Valve Stem Diameter	.3712	.3720	

REAM-IN-PLACE GUIDES

Description	Minimum	Maximum	Service Limits
Intake Valve Guide In Cyl. Head	.0010 T	.0025 T	
Intake Valve In Guide Ream-In-Place Guides	.0012 L	.0030 L	.006 L
Intake Valve Stem Diameter	.3725	.3733	
Exhaust Valve Guide In Cylinder Head	.0010 T	.0025 T	
Exhaust Valve in Guide Ream-In-Place Guides	.0025 L	.0043 L	.008L
Exhaust Valve Stem Diameter	.3712	.3720	

NOTE

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

ISSUED			REVISED			 Teledyne Continental Motors, Inc. P.O. Box 90 Mobile Alabama • 251-438-3411	PAGE NO	REVISION
MO	DAY	YEAR	MO	DAY	YEAR		7 of 11	
11	2	2004					SB04-11	

TABLE 3B
O/IO470-Series, O-470 4,11 and 13, IO/TSIO/LTSIO520-Series,
IO/IOF/GIO/TSIO/TSIOF/TSIOL550-Series, GTSIO520-Series
VALVE GUIDE FITS AND LIMITS

PRE-FINISHED GUIDES

Description	New Minimum	New Maximum	Service Limits
Intake Valve Guide In Cyl. Head	.0010 T	.0025 T	
Intake Valve In Guide Pre-Finished Guides	.0010 L	.0042 L	.0065 L
Intake Guide Bore (New) Pre-Finished Guides	.4367	.4377	
Intake Guide Bore (installed in cylinder) Pre-Finished Guides	.4350	.4377	
Intake Valve Stem Diameter	.4335	.4340	
Exhaust Valve Guide In Cylinder Head	.0010 T	.0025 T	
Exhaust Valve in Guide Pre-Finished Guides	.0035 L	.0062 L	.0085 L
Exhaust Guide Bore (New) Pre-Finished Guides	.4385	.4395	
Exhaust Guide Bore (installed in cylinder) Pre-Finished Guides	.4375	.4395	
Exhaust Valve Stem Diameter	.4334	.4341	

REAM-IN-PLACE GUIDES

	New Minimum	New Maximum	Service Limits
Intake Valve Guide In Cyl. Head	.0010 T	.0025 T	
Intake Valve In Guide Ream-In-Place Guides	.0010 L	.0032 L	.0065 L
Intake Valve Stem Diameter	.4335	.4340	
Exhaust Valve Guide In Cylinder Head	.0010 T	.0025 T	
Exhaust Valve in Guide Ream-In-Place Guides	.0029 L	.0046 L	.0085 L
Exhaust Valve Stem Diameter	.4334	.4341	

NOTE

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

ISSUED			REVISED			 Teledyne Continental Motors, Inc. P.O. Box 90 Mobile Alabama • 251-438-3411	PAGE NO	REVISION
MO	DAY	YEAR	MO	DAY	YEAR		8 of 11	
11	2	2004					SB04-11	

TABLE 3C
C-75, C-85, C-90, O-200-Series, O/GO300-Series
With P/N 655482 New Style Cylinders
VALVE GUIDE FITS and LIMITS

PRE-FINISHED GUIDES

Description	New Minimum	New Maximum	Service Limits
Intake Valve Guide In Cyl. Head	.0010 T	.0025 T	
Intake Valve In Guide Pre-Finished Guides	.0010 L	.0040 L	.006 L
Intake Guide Bore (New) Pre-Finished Guides	.3760	.3770	
Intake Guide Bore (installed in cylinder) Pre-Finished Guides	.3745	.3770	
Intake Valve Stem Diameter	.3730	.3735	
Exhaust Valve Guide In Cylinder Head	.0010 T	.0025 T	
Exhaust Valve in Guide Pre-Finished Guides	.0025 L	.0057 L	.008 L
Exhaust Guide Bore (New) Pre-Finished Guides	.3760	.3770	
Exhaust Guide Bore (installed in cylinder) Pre-Finished Guides	.3745	.3770	
Exhaust Valve Stem Diameter	.3713	.3720	

REAM-IN-PLACE GUIDES

Description	New Minimum	New Maximum	Service Limits
Intake Valve Guide In Cyl. Head	.0010 T	.0025 T	
Intake Valve In Guide Ream-In-Place Guides	.0012 L	.0030 L	.006 L
Intake Valve Stem Diameter	.3730	.3735	
Exhaust Valve Guide In Cylinder Head	.0010 T	.0025 T	
Exhaust Valve in Guide Ream-In-Place Guides	.0025 L	.0043 L	.008 L
Exhaust Valve Stem Diameter	.3713	.3720	

NOTE

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


ISSUED			REVISED			 Teledyne Continental Motors, Inc. P.O. Box 90 Mobile Alabama • 251-438-3411	PAGE NO	REVISION
MO	DAY	YEAR	MO	DAY	YEAR		9 of 11	
11	2	2004				SB04-11		

TABLE 3D
C-75, C-85, C-90, O-200-Series, O/GO300-Series
With P/N 655483 Old Style Cylinders
VALVE GUIDE FITS AND LIMITS

PRE-FINISHED GUIDES

	New Minimum	New Maximum	Service Limits
Intake Valve Guide In Cyl. Head	.0010 T	.0025 T	
Intake Valve In Guide Pre-Finished Guides	.0010 L	.0045 L	.006 L
Intake Guide Bore (New) Pre-Finished Guides	.3447	.3457	
Intake Guide Bore (installed in cylinder) Pre-Finished Guides	.3432	.3457	
Intake Valve Stem Diameter	.3413	.3421	
Exhaust Valve Guide In Cylinder Head	.0010 T	.0025 T	
Exhaust Valve in Guide Pre-Finished Guides	.0035 L	.0057 L	.008 L
Exhaust Guide Bore (New) Pre-Finished Guides	.4367	.4377	
Exhaust Guide Bore (installed in cylinder) Pre-Finished Guides	.4360	.4377	
Exhaust Valve Stem Diameter	.4320	.4325	

REAM-IN-PLACE GUIDES

Description	New Minimum	New Maximum	Service Limits
Intake Valve Guide In Cyl. Head	.0010 T	.0025 T	
Intake Valve In Guide Ream-In-Place Guides	.0011 L	.0029 L	.006 L
Intake Valve Stem Diameter	.3413	.3421	
Exhaust Valve Guide In Cylinder Head	.0010 T	.0025 T	
Exhaust Valve in Guide Ream-In-Place Guides	.0025 L	.0042 L	.008 L
Exhaust Valve Stem Diameter	.4320	.4325	

NOTE

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

ISSUED			REVISED			 Teledyne Continental Motors, Inc. P.O. Box 90 Mobile Alabama • 251-438-3411	PAGE NO	REVISION
MO	DAY	YEAR	MO	DAY	YEAR		10 of 11	
11	2	2004				SB04-11		

TABLE 3E
O470-4, 11 and 13, E-Series
With P/N 654761 or P/N 654947 Cylinders
VALVE GUIDE FITS and LIMITS

PRE-FINISHED GUIDES

Description	New Minimum	New Maximum	Service Limits
Intake Valve Guide In Cyl. Head	.0010 T	.0025 T	
Intake Valve In Guide Pre-Finished Guides	.0010 L	.0042 L	.0065 L
Intake Guide Bore (New) Pre-Finished Guides	.4367	.4377	
Intake Guide Bore (installed in cylinder) Pre-Finished Guides	.4350	.4377	
Intake Valve Stem Diameter	.4335	.4340	
Exhaust Valve Guide In Cylinder Head	.0010 T	.0025 T	
Exhaust Valve in Guide Pre-Finished Guides	.0026 L	.0053 L	.0076 L
Exhaust Guide Bore (New) Pre-Finished Guides	.4376	.4386	
Exhaust Guide Bore (installed in cylinder) Pre-Finished Guides	.4366	.4386	
Exhaust Valve Stem Diameter	.4333	.4340	

REAM-IN-PLACE GUIDES

Description	New Minimum	New Maximum	Service Limit
Intake Valve Guide In Cyl. Head	.0010 T	.0025 T	
Intake Valve in Guide Ream-In-Place Guides	.0010 L	.0027 L	.0065 L
Intake Valve Stem Diameter	.4335	.4340	
Exhaust Valve Guide In Cylinder Head	.0010 T	.0025 T	
Exhaust Valve in Guide Ream-In-Place Guides	.0030 L	.0047 L	.0076 L
Exhaust Valve Stem Diameter	.4333	.4340	

NOTE

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

ISSUED			REVISED			 Teledyne Continental Motors, Inc. P.O. Box 90 Mobile Alabama • 251-438-3411	PAGE NO	REVISION
MO	DAY	YEAR	MO	DAY	YEAR		11 of 11	
11	2	2004				SB04-11		