

ORIGINATOR:

SAL 7-2-04

CHECKED:

RLF 7-2-04

APPROVAL:

ENGINEERING SPECIFICATIONS OR INSTRUCTIONS

ESN- 0043



415 EAST DUNDEE STREET
OTTAWA, KANSAS 66067
PHONE: (785) 242-2200
FAX: (785)-242-6117

SHEET

1 OF 2

TITLE:

TOLERANCES FOR TUBING (EXHAUST & AIR INTAKE)

GENERAL CONSIDERATIONS

1. Manufacturing limits are expressed in maximum terms and should not be construed as being the normal or average condition. In most cases, the actual feature will fall well within the maximum limit.
2. When a combination of controls exists, the more restrictive value should be applied.
3. If the size tolerance of a part is more restrictive than this ESN the drawing tolerance shall apply.
4. Unless otherwise noted, all dimensions in inches.

FINISHED PART TOLERANCES

Linear - $\pm 1/8$ "

Angular - $\pm 1/2^\circ$

Angular rotation - $\pm 1^\circ$

Overall length - $\pm 3/16$ "

End diameter - $\pm 1/32$

Hole diameter - $\pm 12\%$ up to $1/8$ "

Centerline bend radii - $\pm 25\%$

Maximum distortion in bent area - $\pm 5\%$

Hose bead Height - $\pm 1/64$

STANDARDS

Hose bead – $1/8$ " from end of tube to start of bead, $1/4$ " wide, $1/16$ " high

Hole diameter for couplings – In between ID and OD of specified coupling

End slots – $1/8$ " wide, 1" long, 2 slots up to 2" OD, 3 slots up to 3" OD, 4 slots above 3" OD all equidistant around tube.

Air tube welds – Airtight, $1/4$ " wide.

Water tube welds – Water tight, $1/4$ " wide.

STANDARD MATERIAL CHOICES

Air Intake – 16 gauge Aluminized Steel or 6063 Aluminum

Exhaust – 16 gauge Aluminized Steel, Stainless Steel 304, or Stainless Steel 304L

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**TYPICAL MANDREL TUBE BENDING DIE CAPABILITIES
(AMPCO'S ARE LISTED BELOW)**

O.D. Tube Size	Wall Thickness		Center Line Radius	Minimum Straight Between Bends Without a Weld	
1/2"	.065		1 1/2"	7/8"	
5/8"	.065		1 1/4", 1 1/2"	1.82", 1 3/4"	
3/4"	.065		2", 6"	1 1/2"	
7/8"	.065		2 1/2"	1"	
1"	.065		2 7/16", 3", 6"	3 1/2"	
1 1/8"	.065		2 1/4", 3"	3"	
1-1/4"	.065		2", 3"	2 1/2"	
1-1/2"	.065	.120	1 3/4", 2 3/4"	3"	
1-5/8"	.065		2 1/2"	3 1/4"	
1-3/4"	.065		3", 9"	3 1/2"	
1-7/8"	.065		3 3/4"	3 3/4"	
2"	.065	.083	2 3/4", 4"	4"	
2-1/4"	.065		2 1/2", 3"	4 1/2"	
2-1/2"	.065	.250	2 1/2", 3", 5"	3 1/2", 4 1/2"	
3"	.065	.250	3", 3 1/2", 6"	4 1/2", 6", 8"	
3-1/2"	.065		4", 6"	7"	
4"	.065	.083	4", 4 1/2", 5", 6", 10 1/2"	6"	
4-1/2"	.065		6"	9"	
5"	.065	.074	.083	5 1/2", 7"	7 1/2"
6"	.065	.074		7"	12"