

VOLUME TWO



WWW.BURNSSTAINLESS.COM



RELENTLESS INNOVATION IN EXHAUST TECHNOLOGY

NEW PRODUCTS

Burns Stainless LLC is now US Distributor for Gill Sensors and Controls!

Gill have been producing high quality sensors in the UK for over 20 years, providing precision engineering with proven reliability in the harshest environments.



LIQUID LEVEL SENSOR

- Fuel, oil, water and more
- Lightweight
- Solid state capacitive sensor
- Various mounting configurations

GILL



FUEL FLOW SENSOR

- High precision, ultrasonic technology
- Solid state – no moving parts
- Compact, lightweight
- As used in Formula 1 (F1) and World Endurance Championship (WEC)



OIL DEBRIS SENSOR

- Real-time, continuous oil monitoring
- Monitors and removes ferrous debris
- Also measures water, oil presence or temperature

TERMS & CONDITIONS



SHIPPING

We ship by United Parcel Service, US Postal Service, or collect via your carrier, which may incur an additional charge. All orders will be shipped F.O.B. Costa Mesa, California, U.S.A.

ORDER SIZE

Our minimum order is \$25.00.

PRICING

As some of our products are affected by the changing price of metals, we reserve the right to change pricing at any time and without prior notice. Quantity pricing is available – please call for details.

PAYMENT

We accept Visa, Mastercard, Discover, American Express, PayPal, Wire Transfer, or C.O.D. If charging to a credit card, we need to know the name on the card, account number, type of card, expiration date, and billing address.

CREDIT

Credit is subject to management's approval. Until a charge account is established, all shipments will be shipped per terms above. All credit privileges are subject to a periodic review. Past due accounts will forfeit open account privileges.

WARRANTY

Since our products are intended for racing we offer or imply no warranty.

RETURNS

Returns must be requested within 30 days of receipt of order. All returns must have a return authorization number (RA#). Returns without the RA# clearly marked on the package will be refused. All returns must be freight prepaid; any freight collect shipments will be refused. All returns are subject to a 20% restocking fee.

304 Stainless Steel U-Bends	2
304 Stainless Steel U-Bends & J-Bends	3
304 Stainless Steel 90° & 45° Bends	4
304 Stainless Steel 15° Bends & Straight Tubing	5
321 Stainless Steel U-Bends & 90° Bends	6
321 Stainless Steel Straight Tubing & Services	7
6061 Aluminum U-Bends, 90° & 45° Bends	8
6061 Aluminum Straight Tubing	9
UltraLight Stainless Motorsports Mufflers	10
304 Stainless Oval Tubing, Bends, Transitions & Torca® Clamps	11
Adel Wiggins Flexible Tube Connectors	12
V-Band Clamps	13
Collector Tabs & Exhaust Hangers	14
Fabrication Accessories (<i>O2 Rings, Header Bolts, Pipe Bungs/Nipples, TIG Welding Rod, Solar Flux</i>)	15
Flanges - Turbo Inlet, Downpipe, Wastegate & 3-Bolt	16
Transitions & Megaphones	17
Racing Merge Collectors - General Information	18
X-Design™ Computer Analysis Service for Racing Exhaust Systems	19
Base Merge Collectors	20
Double-Slip Turbo Collectors	21
DynoSYS™ & B-TEC™ Adjustable Collectors	22
X-pipes, Y-pipes, Flat-Band Clamps & Harley NhB Exhaust Systems	23
C6 Corvette & Porsche 987 NhB Exhaust Systems & Crate Engine Header Kits	24
Inconel™, Head Flanges & Burns Stainless Merchandise	25
Exhaust Header Theory Article	26
Reference Tables	27
Stainless Steel & Aluminum Technical Articles	28-31
Race Engine Specification Form	32

304 STAINLESS STEEL U-BENDS

304 Stainless Steel tubing combines excellent physical properties with a remarkable resistance to corrosive agents found in automotive exhaust emissions. It is the most cost-effective grade of nonmagnetic stainless steel for general applications, but some professional racing teams use the higher heat-resistant properties of aircraft grade 321 stainless steel.



U-BENDS 304 STAINLESS - 16 GAGE (.065)			
O. D.	Part Number	Legs	Wt. lbs
3/4	UB-075-20-16-304	6 x 6	0.73
1	UB-100-25-16-304	6 x 6	1.08
1 1/4	UB-125-20-16-304	6 x 6	1.26
1 3/8	UB-138-25-16-304	6 x 6	1.50
1 1/2	UB-150-25-16-304	6 x 6	1.66
1 1/2	UB-150-40-16-304	6 x 6	1.99
1 5/8	UB-163-25-16-304	6 x 6	1.79
1 5/8	UB-163-40-16-304	6 x 6	2.17
1 3/4	UB-175-25-16-304	6 x 6	1.95
1 3/4	UB-175-30-16-304	6 x 6	2.09
1 3/4	UB-175-40-16-304	6 x 6	2.34
1 7/8	UB-188-30-16-304	6 x 6	2.24
1 7/8	UB-188-40-16-304	6 x 6	2.57
1 7/8	UB-188-60-16-304	5.5 x 5.5	3.13
2	UB-200-30-16-304	6 x 6	2.40
2	UB-200-40-16-304	6 x 6	2.75
2	UB-200-60-16-304	5.5 x 5.5	3.34
2 1/8	UB-213-30-16-304	6 x 6	2.55
2 1/8	UB-213-40-16-304	6 x 6	2.93
2 1/8	UB-213-60-16-304	5.5 x 5.5	3.56
2 1/4	UB-225-40-16-304	6 x 6	3.11
2 3/8	UB-238-30-16-304	6 x 6	2.91
2 1/2	UB-250-40-16-304	6 x 6	3.46
2 3/4	UB-275-40-16-304	6 x 6	3.82
3	UB-300-45-16-304	6 x 6	4.44
3 1/2	UB-350-45-16-304	6 x 6	5.19
4	UB-400-60-16-304	6 x 9	7.74

Use 308 filler rod to weld 304 to 304

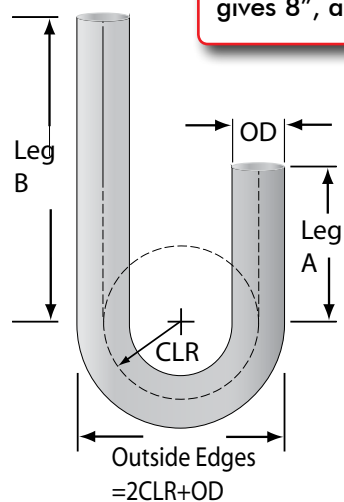
 Use 309 filler rod to weld 304 to mild steel

 Note: Tubing sizes are always described by outside diameter.

 Leg lengths are approximate, usually within +/- .25"

 Custom bending is available for quantities of 25 pieces or more.

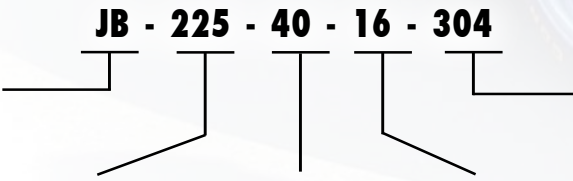
For U-Bends and J-Bends you can determine the Center Line Radius (CLR) by measuring across the outside edges of the bend, subtracting the tubing O.D., and dividing by 2. A JB-225-40-16-304, for example, measures 10 1/4" across the outside edges, and has an O.D. of 2 1/4". Subtracting 2 1/4" from 10 1/4" gives 8", and dividing by 2 equals 4"; so the CLR is 4 inches.



- UB:** equal leg 180°
- JB:** unequal leg 180°
- LB:** 90°
- 45:** 45°
- 15:** 15°
- ST:** straight

Outside Diameter of Tubing
 Example: 225 = 2 1/4"

PART NUMBER SYSTEM FOR BENDS



CLR: Center Line Radius
 Bend radius from center of bend to center of tube.
 Example: 40 = 4.0" CLR

Material:
304 Stainless
321 Stainless
6061 Aluminum
INCOnel

Gage, wall thickness
16 = .065" **14** = .083"
18 = .049" **17** = .058"
20 = .035"



WE HAVE YEARS OF
EXPERIENCE WITH STAINLESS
HEADER FABRICATION AND
WILL BE HAPPY TO ADVISE
OUR VALUED CUSTOMERS.

See our Stainless Tech Article
on page 28

U-BENDS		304 STAINLESS - 18 GAGE (.049)	
O. D.	Part Number	Legs	Wt. lbs
1 1/4	UB-125-20-18-304	6 x 6	0.96
1 3/8	UB-138-25-18-304	6 x 6	1.16
1 1/2	UB-150-25-18-304	6 x 6	1.27
1 1/2	UB-150-30-18-304	6 x 6	1.39
1 1/2	UB-150-40-18-304	6 x 6	1.59
1 5/8	UB-163-25-18-304	6 x 6	1.37
1 5/8	UB-163-30-18-304	6 x 6	1.51
1 5/8	UB-163-40-18-304	6 x 6	1.73
1 3/4	UB-175-25-18-304	6 x 6	1.48
1 3/4	UB-175-40-18-304	6 x 6	1.82
1 7/8	UB-188-30-18-304	6 x 6	1.71
1 7/8	UB-188-40-18-304	6 x 6	1.96
1 7/8	UB-188-60-18-304	5.5 x 5.5	2.38
2	UB-200-30-18-304	6 x 6	1.82
2	UB-200-40-18-304	6 x 6	2.09
2	UB-200-60-18-304	5.5 x 5.5	2.55
2 1/8	UB-213-30-18-304	6 x 6	1.94
2 1/8	UB-213-40-18-304	6 x 6	2.22
2 1/4	UB-225-30-18-304	6 x 6	1.51
2 1/4	UB-225-40-18-304	6 x 6	2.36
2 3/8	UB-238-30-18-304	6 x 5	2.19
2 3/8	UB-238-40-18-304	6 x 6	2.42
2 1/2	UB-250-30-18-304	6 x 6	1.68
2 1/2	UB-250-40-18-304	6 x 6	2.63



U-BENDS		304 STAINLESS - 20 GAGE (.035)	
O. D.	Part Number	Legs	Wt. lbs
1 1/2	UB-150-25-20-304	6 x 6	0.91
1 3/4	UB-175-30-20-304	6 x 6	1.16
2	UB-200-30-20-304	6 x 6	1.31
2	UB-200-40-20-304	6 x 6	1.50



J-BENDS		304 STAINLESS - 16 GAGE (.065)	
O. D.	Part Number	Legs	Wt. lbs
1 3/4	JB-175-25-16-304	6 x 12	2.52
1 3/4	JB-175-30-16-304	6 x 12	2.67
1 7/8	JB-188-30-16-304	6 x 12	2.87
2	JB-200-30-16-304	6 x 12	3.07
2 1/8	JB-213-30-16-304	6 x 12	3.27
2 1/4	JB-225-40-16-304	6 x 12	3.86
2 1/2	JB-250-40-16-304	6 x 12	4.30



J-BENDS		304 STAINLESS - 18 GAGE (.049)	
O. D.	Part Number	Legs	Wt. lbs
1 3/4	JB-175-30-18-304	6 x 12	2.03
1 7/8	JB-188-30-18-304	6 x 12	2.18
2	JB-200-30-18-304	6 x 12	2.33
2 1/8	JB-213-30-18-304	6 x 12	2.49
2 1/4	JB-225-40-18-304	6 x 12	2.93
2 3/8	JB-238-30-18-304	6 x 12	2.85
2 3/8	JB-238-40-18-304	6 x 12	3.03
2 1/2	JB-250-40-18-304	6 x 12	3.27



304 STAINLESS STEEL 90° & 45° BENDS



90° BENDS 304 STAINLESS - 16 GAGE (.065)

O. D.	Part Number	Legs	Wt. lbs
3/4	LB-075-20-16-304	4 x 12	0.76
1	LB-100-10-16-304	4 x 12	0.84
1	LB-100-25-16-304	4 x 12	1.08
1 1/4	LB-125-13-16-304	6 x 6	1.12
1 1/4	LB-125-20-16-304	4 x 12	1.31
1 3/8	LB-138-15-16-304	6 x 6	1.30
1 3/8	LB-138-25-16-304	4 x 12	1.51
1 1/2	LB-150-15-16-304	6 x 6	1.42
1 1/2	LB-150-25-16-304	4 x 12	1.65
1 5/8	LB-163-16-16-304	6 x 6	1.58
1 5/8	LB-163-25-16-304	4 x 12	1.80
1 3/4	LB-175-17-16-304	6 x 6	1.75
1 3/4	LB-175-30-16-304	4 x 12	2.02
1 7/8	LB-188-18-16-304	6 x 6	1.92
1 7/8	LB-188-30-16-304	4 x 12	2.17
2	LB-200-20-16-304	6 x 6	1.69
2	LB-200-30-16-304	4 x 12	2.32
2 1/8	LB-213-30-16-304	4 x 12	2.47
2 1/4	LB-225-22-16-304	6 x 6	1.57
2 1/4	LB-225-40-16-304	4 x 12	2.82
2 3/8	LB-238-30-16-304	4 x 12	2.77
2 1/2	LB-250-25-16-304	6 x 6	1.96
2 1/2	LB-250-40-16-304	4 x 12	3.14
3	LB-300-30-16-304	3 x 6	2.33
3	LB-300-40-16-304	6 x 12	3.78
3 1/2	LB-350-35-16-304	4 x 8	3.48
4	LB-400-40-16-304	4 x 8	4.39
4 1/2	LB-450-45-16-304	8 x 8	5.92
5	LB-500-52-16-304	6 x 9	6.66

Use 308 filler rod to weld 304 to 304

Use 309 filler rod to weld 304 to mild steel

Note: Tubing sizes are always described by outside diameter.

Leg lengths are approximate, usually within +/- .25"

Custom bending is available for quantities of 25 pieces or more.

90° BENDS 304 STAINLESS - 18 GAGE (.049)

O. D.	Part Number	Legs	Wt. lbs
1 1/4	LB-125-20-18-304	4 x 12	1.00
1 3/8	LB-138-25-18-304	4 x 12	1.16
1 1/2	LB-150-25-18-304	4 x 12	1.26
1 5/8	LB-163-25-18-304	4 x 12	1.37

45° BENDS 304 STAINLESS - 16 GAGE (.065)

O. D.	Part Number	Legs	Wt. lbs
1 1/2	45-150-25-16-304	6 x 6	1.16
1 3/4	45-175-30-16-304	6 x 6	1.46
2	45-200-30-16-304	6 x 6	1.68
2 1/4	45-225-40-16-304	6 x 6	1.90
2 1/2	45-250-40-16-304	6 x 6	2.11
3	45-300-40-16-304	6 x 6	2.55
3 1/2	45-350-35-16-304	6 x 6	2.93
4	45-400-40-16-304	6 x 6	3.57



304 STAINLESS STEEL 15° BENDS & STRAIGHT TUBING

15° BENDS 304 STAINLESS - 16 GAGE (.065)

O. D.	Part Number	Legs	Wt. lbs
1 1/2	15-150-25-16-304	3 x 4	0.68
1 3/4	15-175-30-16-304	3.5 x 4.5	0.88
1 7/8	15-188-30-16-304	4 x 5	1.05
2	15-200-30-16-304	4 x 5	1.12
2 1/8	15-213-30-16-304	4 x 5	1.19
2 1/4	15-225-40-16-304	4 x 5	1.39
2 1/2	15-250-40-16-304	4 x 5	1.55
3	15-300-40-16-304	4 x 5	2.04



15° BENDS 304 STAINLESS - 18 GAGE (.049)

O. D.	Part Number	Legs	Wt. lbs
1 1/4	15-125-20-18-304	3 x 4	0.42
1 3/8	15-138-25-18-304	3.5 x 4	0.47
1 1/2	15-150-25-18-304	3 x 4	0.54
1 5/8	15-163-25-18-304	3.5 x 4.5	0.62
1 3/4	15-175-30-18-304	4 x 5	0.74
1 7/8	15-188-30-18-304	4 x 5	0.80
2	15-200-30-18-304	4 x 5	0.85
2 1/8	15-213-30-18-304	4 x 5	0.91
2 1/4	15-225-40-18-304	4 x 5	1.06
2 3/8	15-238-30-18-304	4 x 5	1.12
2 1/2	15-250-40-18-304	4 x 5	1.18



STRAIGHT 304 SS - 20 GAGE (.035)

O. D.	Part Number	Lbs / ft.
1 1/2	ST-150-20-304	0.55
1 3/4	ST-175-20-304	0.64
2	ST-200-20-304	0.73
2 1/8	ST-213-20-304	0.78
2 1/4	ST-225-20-304	0.85

STRAIGHT 304 SS - 18 GAGE (.049)

O. D.	Part Number	Lbs / ft.
1 1/4	ST-125-18-304	0.63
1 3/8	ST-138-18-304	0.70
1 1/2	ST-150-18-304	0.76
1 5/8	ST-163-18-304	0.82
1 3/4	ST-175-18-304	0.89
1 7/8	ST-188-18-304	0.96
2	ST-200-18-304	1.02
2 1/8	ST-213-18-304	1.09
2 1/4	ST-225-18-304	1.09
2 3/8	ST-238-18-304	1.15
2 1/2	ST-250-18-304	1.28
2 5/8	ST-263-18-304	1.34
2 3/4	ST-275-18-304	1.41
3	ST-300-18-304	1.54

STRAIGHT 304 SS - 16 GAGE (.065)

O. D.	Part Number	Lbs / ft.
3/4	ST-075-16-304	0.48
1	ST-100-16-304	0.65
1 1/4	ST-125-16-304	0.82
1 3/8	ST-138-16-304	0.91
1 1/2	ST-150-16-304	1.00
1 5/8	ST-163-16-304	1.08
1 3/4	ST-175-16-304	1.17
1 7/8	ST-188-16-304	1.26
2	ST-200-16-304	1.34
2 1/8	ST-213-16-304	1.43
2 1/4	ST-225-16-304	1.52
2 3/8	ST-238-16-304	1.60
2 1/2	ST-250-16-304	1.69
2 5/8	ST-263-16-304	1.78
2 3/4	ST-275-16-304	1.86
3	ST-300-16-304	2.04
3 1/4	ST-325-16-304	2.21
3 1/2	ST-350-16-304	2.39
4	ST-400-16-304	2.73
4 1/2	ST-450-16-304	3.08
5	ST-500-16-304	3.43



Straight tubing is sold by the foot, based on the total length of the tubing, and is cut to the length you specify.

Cut lengths are +/- 1/8". Lengths up to 8' can be shipped via UPS. Longer lengths can be shipped by other carriers. Call for information.

For quantities exceeding 15', please call for pricing.

321 STAINLESS STEEL U-BEND & 90° BENDS

321 Stainless exhibits superior resistance to fatigue and cracking at elevated temperatures compared to 304, and is highly recommended for turbo- and super-charged applications. 321 is frequently the material of choice for Sprint Cup and Pro Stock fabricators because it can be used more effectively in thinner gages than 304, reducing the weight of a set of headers by 25% or more.



U-BENDS		321 STAINLESS - 16 GAGE (.065)	
O. D.	Part Number	Legs	Wt. lbs
1 1/2	UB-150-25-16-321	6 x 6	1.66
1 5/8	UB-163-25-16-321	6 x 6	1.82
1 3/4	UB-175-25-16-321	6 x 6	1.95
1 3/4	UB-175-30-16-321	6 x 6	2.12
1 3/4	UB-175-40-16-321	6 x 6	2.34
1 7/8	UB-188-25-16-321	6 x 6	2.13
1 7/8	UB-188-30-16-321	6 x 6	2.28
1 7/8	UB-188-40-16-321	6 x 6	2.51
1 7/8	UB-188-60-16-321	5.5 x 5.5	3.14
2	UB-200-30-16-321	6 x 6	2.43
2	UB-200-40-16-321	6 x 6	2.69
2 1/4	UB-225-40-16-321	6 x 6	3.03
2 1/2	UB-250-40-16-321	6 x 6	3.38

Use 347 filler rod to weld 321 to 321

 Use 308 filler rod to weld 321 to 304

 Use 309 filler rod to weld 321 to mild steel

 Custom bending is available for quantities of 25 pieces or more.

 Leg lengths listed are typical and may vary



U-BENDS		321 STAINLESS - 18 GAGE (.049)	
O. D.	Part Number	Legs	Wt. lbs
1 3/4	UB-175-25-18-321	6 x 6	1.48
1 3/4	UB-175-30-18-321	6 x 6	1.63
1 3/4	UB-175-40-18-321	6 x 6	1.87
1 7/8	UB-188-25-18-321	6 x 6	1.62
1 7/8	UB-188-30-18-321	6 x 6	1.73
1 7/8	UB-188-40-18-321	6 x 6	1.91
1 7/8	UB-188-60-18-321	6 x 6	2.51
2	UB-200-30-18-321	6 x 6	1.85
2	UB-200-40-18-321	6 x 6	2.04
2	UB-200-60-18-321	5.5 x 5.5	2.55
2 1/8	UB-213-30-18-321	6 x 6	1.97



U-BENDS		321 STAINLESS - 20 GAGE (.035)	
O. D.	Part Number	Legs	Wt. lbs
1 3/4	UB-175-30-20-321	6 x 6	1.11
1 3/4	UB-175-40-20-321	6 x 6	1.28
1 7/8	UB-188-30-20-321	6 x 6	1.25
1 7/8	UB-188-40-20-321	6 x 6	1.38
2	UB-200-30-20-321	6 x 6	1.33
2	UB-200-40-20-321	6 x 6	1.54



90°-BENDS		321 SS - 16 & 20 GAGE (.065/.035)	
O. D.	Part Number	Legs	Wt. lbs
3	LB-300-40-20-321	4 x 6	2.06
3	LB-300-30-16-321	3 x 6	3.78



Straight tubing is sold by the foot, based on the total length of the tubing, and is cut to the length you specify.

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 Cut lengths are +/- 1/8". Lengths up to 8' can be shipped via UPS. Longer lengths can be shipped by other carriers. Call for information.

.....
 For quantities exceeding 15', please call for pricing.

See our Stainless Tech Article on page 28

STRAIGHT 321 SS-16 GAGE (.065)

O. D.	Part Number	Lbs / ft.
1 1/2	ST-150-16-321	1.00
1 5/8	ST-163-16-321	1.09
1 3/4	ST-175-16-321	1.17
1 7/8	ST-188-16-321	1.26
2	ST-200-16-321	1.34
2 1/4	ST-225-16-321	1.52
2 1/2	ST-250-16-321	1.69



STRAIGHT 321 SS-18 GAGE (.049)

O. D.	Part Number	Lbs / ft.
1 1/2	ST-150-18-321	0.76
1 5/8	ST-163-18-321	0.82
1 3/4	ST-175-18-321	0.89
1 7/8	ST-188-18-321	0.96
2	ST-200-18-321	1.02
2 1/8	ST-213-18-321	1.09
2 1/4	ST-225-18-321	1.15



STRAIGHT 321 SS-20 GAGE (.035)

O. D.	Part Number	Lbs / ft.
1 1/2	ST-150-20-321	0.55
1 3/4	ST-175-20-321	0.64
1 7/8	ST-188-20-321	0.69
2	ST-200-20-321	0.73
2 1/8	ST-213-20-321	0.78
2 1/4	ST-225-20-321	0.83
2 1/2	ST-250-20-321	0.92
3	ST-300-20-321	1.11
3 1/2	ST-350-20-321	1.30
4	ST-400-20-321	1.48



AVAILABLE FABRICATION SERVICES

Burns Stainless offers certain fabrication services such as cutting, welding, and expanding tubes. Please call us if you have a special project to be quoted.

- Welding including hand fitting
- Welding and cutting hole for O2 ring
- Welding stainless bracket to collector
- Special cutting on transition or megaphone
- Add reverse cone on megaphone
- Expand tubing for slip joint, up to 3"
- Expand tubing for slip joint, over 3", up to 5"
- Shop Labor Rate \$95.00/hour



U-BENDS		6061 ALUMINUM - 0 CONDITION	
O. D.	Part Number	Legs	Wt. lbs
3/4	UB-075-20-16-6061	4 x 4	0.20
1	UB-100-25-16-6061	4 x 4	0.30
1 1/4	UB-125-20-16-6061	4 x 4	0.34
1 3/8	UB-138-25-16-6061	4 x 4	0.42
1 1/2	UB-150-25-16-6061	4 x 4	0.46
1 5/8	UB-163-25-17-6061	4 x 4	0.44
1 3/4	UB-175-30-16-6061	4 x 4	0.59
1 7/8	UB-188-30-17-6061	4 x 4	0.57
2	UB-200-30-16-6061	4 x 4	0.67
2 1/8	UB-213-30-16-6061	4 x 4	0.72
2 1/4	UB-225-40-16-6061	4 x 4	0.90
2 1/2	UB-250-40-16-6061	5.5 x 5.5	1.17
2 3/4	UB-275-40-16-6061	5.5 x 5.5	1.11
3	UB-300-45-16-6061	6 x 6	1.54
3 1/2	UB-350-45-16-6061	6 x 6	1.80
4	UB-400-60-16-6061	8 x 5	2.53



90° BENDS		6061 ALUMINUM - 0 CONDITION	
O. D.	Part Number	Legs	Wt. lbs
3/4	LB-075-20-16-6061	4 x 12	0.26
1	LB-100-25-16-6061	4 x 12	0.37
1 1/4	LB-125-20-16-6061	4 x 12	0.45
1 3/8	LB-138-25-16-6061	4 x 12	0.52
1 1/2	LB-150-25-16-6061	4 x 12	0.57
1 5/8	LB-163-25-17-6061	4 x 12	0.56
1 3/4	LB-175-25-16-6061S	3 x 6	0.44
1 3/4	LB-175-25-16-6061	4 x 12	0.67
1 7/8	LB-188-30-17-6061	4 x 12	0.67
2	LB-200-30-16-6061	4 x 12	0.80
2 1/8	LB-213-30-16-6061	4 x 12	0.85
2 1/4	LB-225-40-16-6061	4 x 12	0.97
2 1/2	LB-250-40-16-6061	4 x 12	1.09
2 3/4	LB-275-40-16-6061	6 x 12	1.29
3	LB-300-30-16-6061	3 x 6	0.81
3	LB-300-40-16-6061	5.5 x 12	1.40
3 1/2	LB-350-35-16-6061	4 x 8	1.31
4	LB-400-40-16-6061	4 x 11	1.68
4 1/2	LB-450-45-16-6061	5 x 9	1.87
5	LB-500-60-16-6061	6 x 8	2.33



45° BENDS		6061 ALUMINUM - 0 CONDITION	
O. D.	Part Number	Legs	Wt. lbs
1 1/2	45-150-25-16-6061	5.5 x 5.5	0.37
1 3/4	45-175-25-16-6061	5.5 x 5.5	0.44
2	45-200-30-16-6061	5.5 x 5.5	0.50
2 1/4	45-225-40-16-6061	5.5 x 5.5	0.62
2 1/2	45-250-40-16-6061	5.5 x 5.5	0.69
3	45-300-40-16-6061	5.5 x 5.5	0.83

For intake and cooling systems 6061 aluminum is one of the least expensive and most versatile of the heat treatable alloys.

In the annealed "0" condition it has good formability for bending. The full-temper T6 properties may be obtained by solution heat treating and artificial aging after welding. If you need advice about working with aluminum, please give us a call.

See our Aluminum Tech Article on page 30



Use 5356 rod for maximum strength.

 Use 4043 rod for max corrosion resistance.

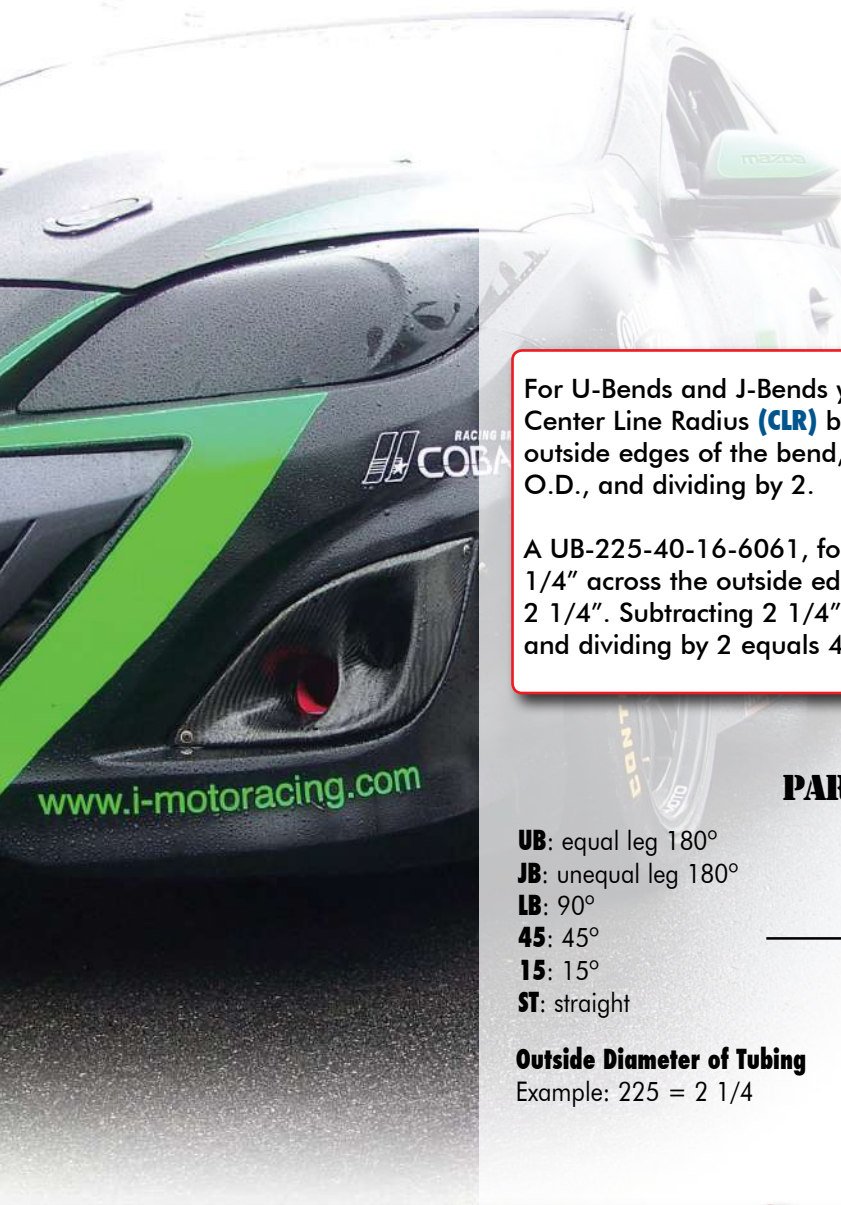
Straight tubing is sold by the foot, based on the total length of the tubing, and is cut to the length you specify.

Cut lengths are +/- 1/8". Lengths up to 8' can be shipped via UPS. Longer lengths can be shipped by other carriers. Call for information.

Aluminum is not recommended as an exhaust system material

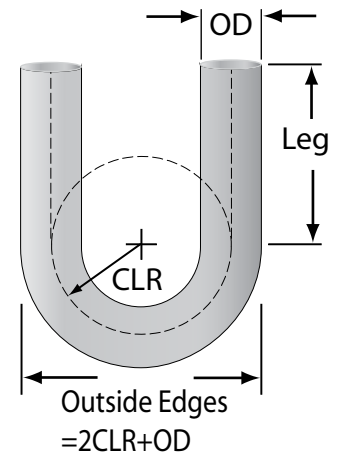
STRAIGHT 6061 ALUMINUM - T 6

O. D.	Part Number	Lbs / ft.
3/4	ST-075-16-6061	0.16
1	ST-100-16-6061	0.22
1 1/4	ST-125-16-6061	0.28
1 3/8	ST-138-16-6061	0.31
1 1/2	ST-150-16-6061	0.34
1 5/8	ST-163-17-6061	0.34
1 3/4	ST-175-16-6061	0.40
1 7/8	ST-188-17-6061	0.39
2	ST-200-16-6061	0.46
2 1/8	ST-213-16-6061	0.50
2 1/4	ST-225-16-6061	0.52
2 1/2	ST-250-16-6061	0.58
2 3/4	ST-275-16-6061	0.64
3	ST-300-16-6061	0.70
3 1/2	ST-350-16-6061	0.82
4	ST-400-16-6061	0.95
4 1/2	ST-450-16-6061	1.06
5	ST-500-16-6061	1.18



For U-Bends and J-Bends you can determine the Center Line Radius (**CLR**) by measuring across the outside edges of the bend, subtracting the tubing O.D., and dividing by 2.

A UB-225-40-16-6061, for example, measures 10 1/4" across the outside edges, and has an O.D. of 2 1/4". Subtracting 2 1/4" from 10 1/4" gives 8", and dividing by 2 equals 4"; so the **CLR** is 4 inches.



PART NUMBER SYSTEM FOR BENDS

- UB:** equal leg 180°
- JB:** unequal leg 180°
- LB:** 90°
- 45:** 45°
- 15:** 15°
- ST:** straight

Outside Diameter of Tubing
 Example: 225 = 2 1/4

JB - 225 - 40 - 16 - 304



CLR: Center Line Radius
 Bend radius from center of bend to center of tube.
 Example: 40 = 4.0" CLR

Material:
304 Stainless
321 Stainless
6061 Aluminum
INCOnel

Gage, wall thickness
16 = .065" **14** = .083"
18 = .049" **17** = .058"
20 = .035"

ULTRALIGHT STAINLESS MOTORSPORTS MUFFLER

Burns Stainless offers the greatest value in a race muffler available to the motorsports community.

- New 2-stage mufflers add sound attenuation designated -2S
- New "floating" core is replaceable and allows for easier and faster rebuilds
- Remarkably lightweight, yet extremely durable
- 100% stainless steel construction and completely TIG welded
- Easily replaceable high temperature glasmat packing
- Stainless steel scrubble packing available for extreme applications
- Inside diameters from 2" all the way to 5"
- Can be built to custom length
(call for quote)

SM-400-550-12



SM-350-450-12 with new outlet design

Reverse Cone Megaphone Mufflers are made from **TIG welded 304SS** and packed with **durable stainless steel scrubble**. These mufflers have a constant diameter core and are not re-packable.



Lightweight tuned collector-muffler assemblies can be made by combining a lightweight muffler with a **merge collector**.



* packed with scrubble
** packed with scrubble/glasmat
XX - Select from listed size to complete PN

ULTRALIGHT STAINLESS MUFFLERS

Part Number	ID	OD	Length	Weight (lb)
SM-200-350-12	2	3.5	12	1.76
SM-200-350-17	2	3.5	17	2.61
SM-200-450-14	2	4.5	14	2.79
SM-225-450-XX	2.25	4.5	14/17/22	2.83/3.0/4.6
SM-250-350-XX	2.5	3.5	12/17*	1.77/2.49
SM-250-450-17	2.5	4.5	17	3.48
SM-250-625-17**	2.5	6.25	17	5.70
SM-300-450-XX	3	4.5	6/12/17	1.1/2.32/3.29
SM-300-625-17**	3	6.25	17	5.59
SM-350-450-XX	3.5	4.5	6/12/17	1.09/2.28/3.21
SM-350-625-17**	3.5	6.25	17	5.71
SM-400-550-XX	4	5.5	6/12/17	1.57/3.02/4.27
SM-400-625-17**	4	6.25	17	4.62
SM-450-600-XX	4.5	6	6/12/17	1.78/3.29/4.89
SM-500-600-XX	5	6	6/12/17	1.54/3.25/5.01

REVERSE CONE MEGAPHONE MUFFLERS **NEW PRODUCT!**

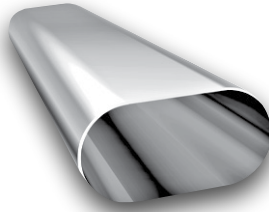
Part Number	ID/OD	Outlet	Length	Weight (lb)
SMRC-200-400	2.00/4.00	3.50	20.5	3.4
SMRC-250-400-XX	2.50/4.00	3.50	14/16	2.8/3.1
SMRC-250-450	2.50/4.50	4.00	17.5	3.7
SMRC-300-450	3.00/4.50	4.00	14.0	3.5
SMRC-300-500	3.00/5.00	4.50	17.5	4.4
SMRC-350-500	3.50/5.00	4.50	14.0	3.9

2-STAGE MUFFLERS

Part Number	ID	OD	Length	Weight (lb)
SM-225-450-17-2S	2.25	4.5	17	3.60
SM-250-450-17-2S	2.5	4.5	17	3.83
SM-300-450-17-2S	3	4.5	17	3.80
SM-300-625-17-2S	3	6.25	17	6.38
SM-350-450-17-2S	3.5	4.5	17	3.48
SM-350-625-17-2S	3.5	6.25	17	6.34
SM-400-550-17-2S	4	5.5	17	6.29
SM-REPACK 1				
SM-REPACK 2		See website for		
SM-REPACK 3		application information		
SM-SCRUBBLE				
SM-SCREWS		Replacement screws		

OVAL TUBING, BENDS AND TRANSITIONS

304 Stainless oval tubing is available in three sizes.



"Size"	Height	Width
3	2 1/8"	3 1/2"
3 1/2	2 3/8"	4 1/8"
4	2 1/2"	4 3/4"

STRAIGHT OVAL 304 SS - 16 GA (.065)

Size	Part Number	Lbs / ft.
3	ST-300-304OVAL	2.21
3 1/2	ST-350-304OVAL	2.39
4	ST-400-304OVAL	2.73

The "size" listed in the tables indicates that the oval tubing area is roughly equal to that diameter round tubing.

Oval Bends



TRANSITIONS ROUND TO OVAL

Size (Round)	Size (Oval)	Part Number Short (6")	Part Number Long (12")
3	3	ROV-300-300-S	ROV-300-300-L
3 1/2	3 1/2	ROV-350-350-S	ROV-350-350-L
4	4	ROV-400-400-S	ROV-400-400-L
2 1/2	3	ROV-250-300-S	ROV-250-300-L
3	3 1/2	ROV-300-350-S	ROV-300-350-L
3 1/2	4	ROV-350-400-S	ROV-350-400-L

*Please add a -S to part number for an optional "Slip."

NEW!

NEW!

NEW!

Transitions from round to oval are available in 304 short (6") or long (12") lengths in either butt-weld or slip-over configurations. Optional round slip-over rings also available.

Round to Oval Shown with Optional Slip



NEW PRODUCT!

OVAL BENDS

OVAL 304 SS - 16 GAGE (.065)

Size	Part Number	Angle	CLR	Legs	Wt. (lbs)
3	304OVAL-45-300-S	45°	4.5	6 x 10	3.53
3	304OVAL-60-300-S	60°	4.5	6 x 10	3.78
3	304OVAL-90-300-S	90°	4.5	6 x 10	4.32
3	304OVAL-45-300-L	45°	7.5	6 x 10	3.80
3	304OVAL-60-300-L	60°	7.5	6 x 10	4.15
3	304OVAL-90-300-L	90°	7.5	6 x 10	4.82
3 1/2	304OVAL-45-350-S	45°	5.5	6 x 10	4.12
3 1/2	304OVAL-60-350-S	60°	5.5	6 x 10	4.43
3 1/2	304OVAL-90-350-S	90°	5.5	6 x 10	5.05
3 1/2	304OVAL-45-350-L	45°	9	6 x 10	4.82
3 1/2	304OVAL-60-350-L	60°	9	6 x 10	5.37
3 1/2	304OVAL-90-350-L	90°	9	6 x 10	6.46

TORCA ACCUSEAL CLAMPS

The 1" wide **Torca Accuseal® Clamp** provides a simple, effective way to connect exhaust system components such as the Burns Ultralight Motorsports Muffler. The patented "reaction block" provides a full 360 degree equal distribution of stretching force, minimizing pipe distortion while completing a seal around the joined exhaust components. They are made from 400-series polished stainless steel and available in sizes from 2" through 5". See page 23 for Flat Band Clamps (T-Bolts).

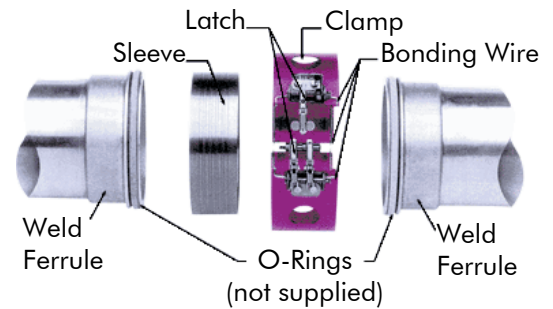


NEW PRODUCT!

Tube OD	Part Number
2	TB-200
2 1/4	TB-225
2 1/2	TB-250
3	TB-300
3 1/2	TB-350
4	TB-400
5	TB-500

ADEL WIGGINS FLEXIBLE TUBE CONNECTORS

Adel Wiggins Flexible Tube Connectors, or **Wiggins Clamps**, provide an ideal method for quickly and efficiently connecting and sealing two tubes. They are available in aluminum with a stainless two-finger latch, and are frequently used for vacuum lines, water lines, and turbo intake plumbing. All are qualified to AS1650 and MIL-C-22263 specs., and are tested to greater than 125 psi. operating pressure, at temperatures up to 450° F depending mainly on the o-ring material.



Our **Wiggins Complete Coupling Assembly** is comprised of **one Clamshell Assembly** (clamp and sleeve), and **two Weld Ferrules**. O-rings are available separately.

ADEL WIGGINS FLEXIBLE TUBE CONNECTORS

Tube OD	Complete Assm	Clamshell Assm	Weld Ferrule	Use O-Ring AS568A	Viton	Flourosilicone
1/2	W991-8DE-050-A	W991-8DE-050	W903B8D-050	-015	ORV-015	ORFS-015
5/8	W991-10DE-063-A	W991-10DE-063	W903B10D-063	-017	ORV-017	ORFS-017
3/4	W991-12DE-075-A	W991-12DE-075	W903B12D-075	-117	ORV-117	ORFS-117
1	W991-16DE-100-A	W991-16DE-100	W903B16D-100	-214	ORV-214	ORFS-214
1 1/4	W991-20DE-125-A	W991-20DE-125	W903B20D-125	-218	ORV-218	ORFS-218
1 1/2	W991-24DE-150-A	W991-24DE-150	W903B24D-150	-222	ORV-222	ORFS-222
1 3/4	W991-28DE-175-A	W991-28DE-175	W903B28D-175	-224	ORV-224	ORFS-224
2	W991-32DE-200-A	W991-32DE-200	W903B32D-200	-226	ORV-226	ORFS-226
2 1/2	W991-40DE-250-A	W991-40DE-250	W903B40D-250	-230	ORV-230	ORFS-230
3	W991-48DE-300-A	W991-48DE-300	W903B48D-300	-234	ORV-234	ORFS-234
3 1/2	W991-56DE-350-A	W991-56DE-350	W903B56D-350	-238	ORV-238	ORFS-238
4	W991-64DE-400-A	W991-64DE-400	W903B64D-400	-242	ORV-242	ORFS-242

O-RING COMPATIBILITY

	Buna-N	Viton	Flourosilicone
Alcohols	NR	Poor	Exc
Gasoline	Good	Exc	Exc
Hydraulic Fluid	Good	Good	Poor
Synthetic Lubes	Good	Exc	NR
Water	Good	Fair	Exc
Glycol	Exc	Exc	Exc
Min Temp	-20	0	-75
Max Temp	212	392	400
Abrasion	Good	Fair	Poor

Wiggins Clamps **use industry standard O-rings**, defined by the SAE. In the reference table above, the O-ring size code is AS568A followed by the dash number indicating the part's dimensions. Burns Stainless offers O-rings in **Viton** and **Flourosilicone** (special order) materials. Please carefully consider material compatibility before purchasing O-Rings.



For a close tolerance, gasketless tube coupling, **V-Band clamps** are the high-tech alternative to the standard 3-bolt flange. Aluminum V-Band flanges are now available from Burns Stainless LLC. These flanges are a cost-effective alternative to the Wiggins Clamp for applications where joint flexibility is not required. These 6061 flanges have machined O-ring groove for optimum sealing. O-rings available separately.

Burns Stainless now offers CNC-machined, V-band flanges made from 304SS. These flanges are designed with a "male-female" step to help align the tubes when clamping. V-Band Kits Include 2 flanges and 1 clamp.

STAINLESS STEEL, CLAMPS & FLANGES

Tubing Size	Flange OD	Clamp	321 SS Formed Flange	304 Machined Flange (M-Male/F-Female)	321 Formed Flange Assembly	304 Machined Flange Assembly
1 3/4	2 1/2	-	VFLANGE175	-	VB-175-KIT	-
2	2 3/4	VCLAMP200	VFLANGE200	V(M/F)FLANGE-200*	VB-200-KIT	VBM-200-KIT*
2 1/4	3	VCLAMP225	VFLANGE225	V(M/F)FLANGE-225*	VB-225-KIT	VBM-225-KIT*
2 1/2	3 1/4	VCLAMP250	VFLANGE250	V(M/F)FLANGE-250	VB-250-KIT	VBM-250-KIT
2 3/4	3 1/2	VCLAMP275	VFLANGE275	V(M/F)FLANGE-275*	VB-275-KIT	VBM-275-KIT*
3	3 3/4	VCLAMP300	VFLANGE300	V(M/F)FLANGE-300	VB-300-KIT	VBM-300-KIT
3 1/2	4 1/4	VCLAMP350	VFLANGE350	V(M/F)FLANGE-350	VB-350-KIT	VBM-350-KIT
4	4 3/4	VCLAMP400	VFLANGE400	V(M/F)FLANGE-400*	VB-400-KIT	VBM-400-KIT*
5	5 3/4	VCLAMP500	VFLANGE500	V(M/F)FLANGE-500*	VB-500-KIT	VBM-500-KIT*

*Special order.

ALUMINUM V-BAND ASSEMBLIES

Tubing Size	Flange OD	Clamp	6061 Al Flange	6061 Al Flange W/O-Ring Groove	6061 Al Flange Assembly	O-Ring Size AS568A	Viton O-Ring
2 1/2	3 1/4	VCLAMP250	VAL-FLNG250	VAL-O-FLNG250	VBAL-250-KIT	39	ORV-039
3	3 3/4	VCLAMP300	VAL-FLNG300	VAL-O-FLNG300	VBAL-300-KIT	42	ORV-042
3 1/2	4 1/4	VCLAMP350	VAL-FLNG350	VAL-O-FLNG350	VBAL-350-KIT	44	ORV-044
4	4 3/4	VCLAMP400	VAL-FLNG400	VAL-O-FLNG400	VBAL-400-KIT	46	ORV-046
5	5 3/4	VCLAMP500	VAL-FLNG500	VAL-O-FLNG500	VBAL-500-KIT	50	ORV-050

*Please specify non-grooved (VAL-FLNG) or grooved (VAL-O-FLNG). O-ring not included.



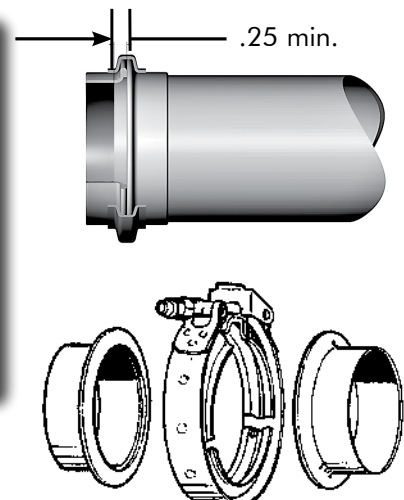
Aluminum V-Band flanges available with O-ring groove.



Machined Flanges

Included are two V-Band weld-on flanges and one V-Band clamp per assembly. Flange or clamp available separately - see parts list.

 To achieve close tolerance alignment between the tubes being joined, let one of the tubes protrude about 1/4" when welding the flange. It will register nicely into the opposing flange.



COLLECTOR TABS

Part Number	Description	Dim A	Dim L	Bolt
TAB-UTAB	U-Bracket Tab	0.63	0.76	5/16"
TAB-SO-A-SS	Overlapping Tab A (tall)	0.38	1.5	1/4"
TAB-SO-B-SS	Overlapping Tab B (short)	0.32	1.5	1/4"
TAB-LUG1	Cast Lug	0.58	0.63	1/4"
TAB-LUG2A	CNC Lug Tab Flanged A (tall)	0.40	0.64	1/4"
TAB-LUG2B	CNC Lug Tab Flanged B (short)	0.34	0.64	1/4"
TAB-LUG3	CNC Lug Tab	0.52	0.64	1/4"
TAB-WIRE	Wire Tab	n/a	0.7	n/a
TAB-SPRING	Beehive Spring	n/a	n/a	n/a

*Dim A - Bolt Hole Center Height

Lug Tabs

- Stainless steel for heavy duty
- Ideal for turbos and other extreme duty applications
- Three styles available.
- Type 1 and type 3 "A-frame" can be angle ground
- Type 2 design with integrated weld pad to distribute load.



U Bracket Tabs

- Precision stamped and formed from 304 Stainless.
- Light-weight design looks good and resists warping and breaking.
- 5/16" Hole diameter.

Overlapping A-B Tabs

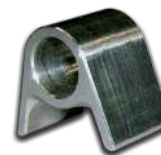
- Fabricated from .109" thick 304 stainless, to align and affix the collector slips to your header tubes.
- Step heights of .156 (Type "A") or .094 (Type "B").



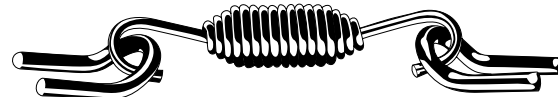
Type 1



Type 2



Type 3



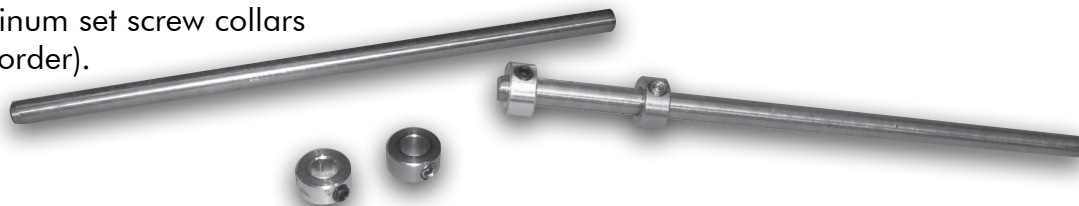
Wire Tabs and Beehive Springs

- Durable stainless steel springs, 2-3/8" loose length (3/8" preload required).
- Spring action minimizes cracking.
- Wire loops are 11g (0.120") diameter stainless steel wire.
- Easy installation and removal

EXHAUST HANGERS

Ever try removing your exhaust after the rubber bushing mounts get hard/dry? With the modular exhaust hanger system, you can simply loosen the collar set screw and slip the hanger out of the bushing. The system is comprised of 3/8" 300-series solid rod (12" long) and aluminum set screw collars (stainless available as special order). Pieces sold separately.

Part Number	Description
HN-375-ROD	3/8" solid 300-series stainless steel rod
HN-COLLAR-AL	Set screw collar aluminum
HN-COLLAR-SS	Set screw collar stainless steel

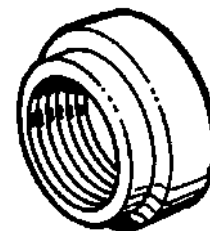


O₂ SENSOR RINGS & O₂ PLUGS

- O₂ sensor rings are precision machined 304SS with 18 x 1.5mm thread for standard Bosch-type Lambda Sensors.
- Flanged O₂ sensor rings distribute stress over a large area. Ideal for thin wall applications.
- Plugs for O₂ sensor rings come with a thick copper washer.



Flanged O₂ Sensor Ring



O₂ Sensor Ring



Radiused O₂ Sensor

Part Number	Description
O2-RING-SS	O ₂ Sensor Ring
O2-RAD	Radiused O ₂ Sensor Ring
O2-RING-FL	Flanged O ₂ Sensor Ring
O2-PLUG-MS	Plug w/ washer (Mild Steel)
O2-PLUG-SS	Plug w/ washer (SS)

304 STAINLESS BOLTS

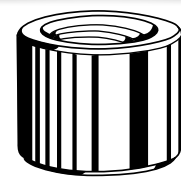
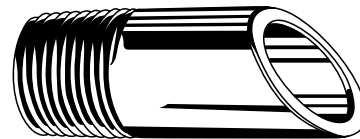
Part Number	Comment	Size	Length (in)
B1420-200SS	Ideal for U-Tabs	1/4-20	2"
B1420-250SS	Close Spaced Lugs	1/4-20	2.5"
B1420-300SS	Medium Spaced Lugs	1/4-20	3"
B1420-400SS	Wide Spaced Lugs	1/4-20	4"
B1420-SSAT	All-thread 12" long	1/4-20	12"
BNL1420C	Locking Nut – Cad Plating	1/4-20	Lock Nut
BN1420S	1/2 height locking nut. Ideal for use as jam nut.	1/4-20	SS 1/2 Nut
HB-75-312SS	SS 12 Point Shoulder Header Bolt	5/16-18	3/4"
HB-75-375SS	SS 12 Point Shoulder Header Bolt	3/8-16	3/4"

1/4-20 Bolts and locking-nuts are available in 316 stainless steel. These bolts can be used with either lugs or U-Tabs. We recommend using steel locking nuts to minimize galling.



PIPE BUNGS & NIPPLES

Part Number	Description
1/2NPTNIP	1/2" Pipe Nipple, 45° angle cut*
1/8NPTBUNG	1/8" Pipe Bung - 304 Stainless



*For use with Pan-Evac systems

WELDING ROD & SOLAR FLUX

TIG WELDING ROD

Type	Dia. x Length
308, 309, 347 SS	.035 x 36"
5356 Aluminum	.062 x 36"
Silicone-Bronze	.062 x 36"



To avoid forming strength-weakening oxides, stainless steel should be back-purged while welding. When back-purging is not convenient, Solarflux B can be used to form a protective barrier. Simply mix the Solarflux B powder with ethyl- or methyl alcohol, brush it on the backside of the weld before tacking, and then weld as usual. Comes in a 1 lb can.

See page 27 for a Welding Rod Compatibility Table

FLANGES - TURBO INLET, DOWNPIPE, WASTEGATE & 3-BOLT

TURBO INLET FLANGES - CNC MACHINED 304 STAINLESS

TURBO INLET FLANGES 304 STAINLESS

Type	Part Number	ID Height (A)	ID Width (B)	Bolt Center Width (C)	Bolt Center Height (D)	Tang. Flange Port Width (E)	Thickness
T25	T25-RECT-304	1.50	2.00	2.85	1.58	N/A	3/8"
T03	T3F-RECT-304	1.94	2.31	3.40	1.75	N/A	3/8"
T04	T4F-RECT-304	1.94	2.94	3.25	2.75	N/A	1/2"
T04 Divided (1.88")	T4T-188-304	2.06	N/A	3.25	2.75	1.45"	1/2"
T04 Divided (2.00")	T4T-200-304	2.15	N/A	3.25	2.75	1.52"	1/2"
T6/T100 (88-106mm)	T100-RECT-304	2.45	3.65	4.45	2.75	N/A	1/2"

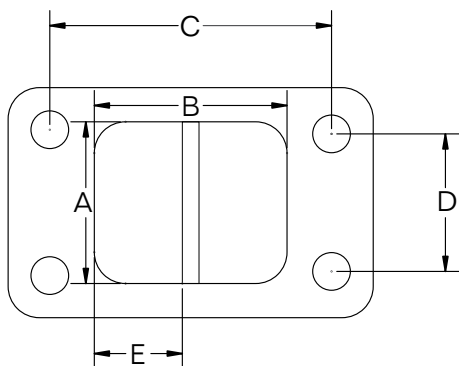
DOWNPIPE FLANGES 304 STAINLESS

Type	Part Number	Bolt Center Height (A)	Bolt Circle (B)	Tube Outside Diameter (C)	Thickness
HKS 100 mm, 3"	DPF-HKS-300-304	2.78	3.92	3	1/2"
T04 Rnd 2.75"	DPF-T4-275-304	3.04	4.30	2.75	1/2"
T04 Rnd 3"	DPF-T4-300-304	3.04	4.30	3	1/2"

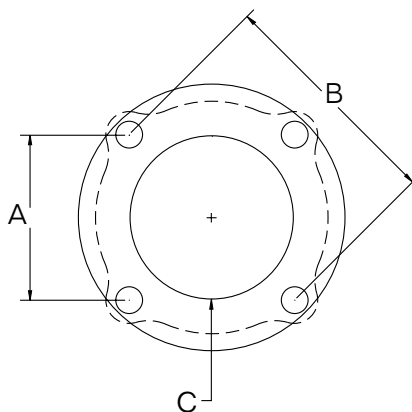
WASTEGATE FLANGES 304 STAINLESS

Type	Part Number	Bolt Center Width (A)	Tube Outside Diameter (B)	Thickness
Deltagate	WDF-150-304	2.79	1.50	3/8"
Racegate	WRF-175-304	2.89	1.75	3/8"

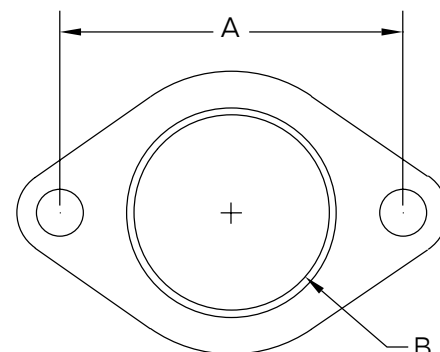
Turbo Inlet Flanges



Downpipe Flanges



Wastegate Flanges



Our turbo flanges are CNC machined inside and out, with a radius or generous chamfer on the outside edge. Downpipe flanges are 1/2" thick. Wastegate flanges are 3/8" thick.

See page 13 for V-Band Clamps

3 BOLT FLANGES - 304 STAINLESS, CNC MACHINED



These high quality flanges are CNC machined from 3/8 thick, 304 stainless plate.

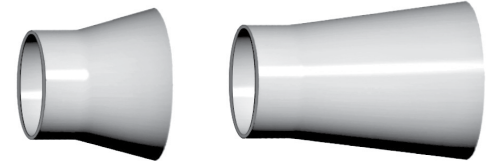
With a radiused edge all around the perimeter, they look good and are nice to your knuckles.

3 BOLT FLANGES 304 STAINLESS

Tube OD	Part Number	Bolt Center
2	3BF-200-304	2.68
2 1/4	3BF-225-304	2.68
2 1/2	3BF-250-304	3.03
3	3BF-300-304	3.43
3 1/2	3BF-350-304	3.87

TRANSITIONS

Transitions are swaged tubes that taper from a small diameter to a larger diameter. We make them with either **14° (Long taper)** or **30° (Short taper)** included angles, and normally provide a 2" long straight section at the small end. Quantity discounts may apply.



TRANSITIONS MILD, 304, 321 S.S., 6061 ALUM

Small Dia.	Part Number	Max Big End	
		MS, 304, 321	Aluminum
1 1/4*	RD-125-	1 3/4	1 3/4
1 3/8*	RD-138-	2	1 7/8
1 1/2	RD-150-	2 1/4	2
1 5/8	RD-163-	2 3/8	2 3/8
1 3/4	RD-175-	2 1/2	2 1/2
1 7/8	RD-188-	2 3/4	2 3/4
2	RD-200-	3	3
2 1/8	RD-213-	3	3
2 1/4	RD-225-	3	3
2 3/8	RD-238-	3 1/4	-
2 1/2	RD-250-	3 1/2	3 1/2
2 5/8	RD-263-	3 1/2	-
2 3/4	RD-275-	3 1/2	3 1/2
3	RD-300-	4	4
3 1/4	RD-325-	4	-
3 1/2	RD-350-	4 1/2	4 1/2
4*	RD-400-	5	5
4 1/2*	RD-450-	5 1/2	5 1/2

In the table here, the Small Dia. is the outside diameter of the tubing the transition is made from, and the Max Big End is the largest diameter to which it can be swaged. The large diameter of your transition can be anything up to the Max Big End.

To calculate the length of the tapered section, subtract the small diameter from the large diameter and multiply by 4.07 (Long) or 1.87 (Short). Typically, the tapered section of a Long Transition is around 3", and a Short one is about 1.4".

Transitions are made to order and available in your choice of large diameters (up to Max Big End shown in table.)

To order, pick your small diameter and a large diameter not larger than the "max big end", and specify either Long or Short taper by adding L or S to the part number. Example: RD-250-325-16-304-L is a 16g, 304SS transition with a 2-1/2" small end, a 3-1/4" big end, and a long taper.

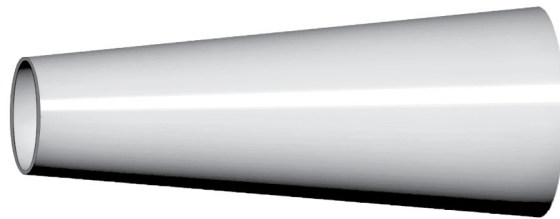
* only available as a short taper

MEGAPHONES

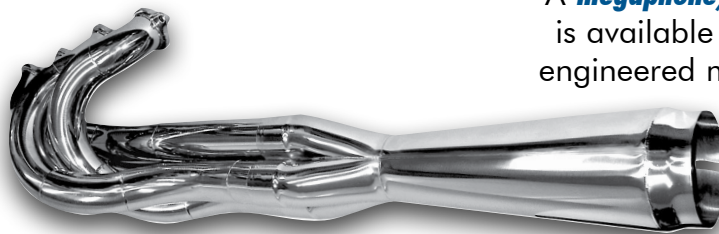
Megaphones are recommended for most applications that do not use tailpipes. They frequently augment the entire power curve, and enhance power above the peak rpm. Our Megaphones are rolled and seam welded, in mild steel or 20 gage 304 Stainless.

MEGAPHONES MILD STEEL, 304 STAINLESS

Part Number	Small dia.	Large dia.	Length	Angle
MEG-15035	1 1/2	3 1/2	17.5	6.5°
MEG-24175	2	4	17.5	6.5°
MEG-25045	2 1/2	4 1/2	14.5	8°
MEG-35145	3	5	14.5	8°



This is our typical drag race setup - merge collector / megaphone / reverse-cone, and it's very successful in all kinds of competition, from Pro Stock to Truck Pulling to Air Racing.



A **megaphone/reverse-cone welded unit** is available as part of a complete, engineered merge collector system.

Burns Stainless Merge Collectors are extremely popular with NHRA racers and NASCAR engine builders, and are widely used in NHRA, ALMS, FIA-GT, and Grand Am as well.

Burns Stainless Merge Collectors (Header Collectors) are custom engineered for each application using our proprietary X-design parametric custom exhaust design computer program. Merge Collectors combine high flow and high velocity to increase and broaden an engine's torque curve all the way to the horsepower peak and beyond.

Our products feature the highest quality fabrication and TIG-welding. Each is completely hand finished inside for proper flow.

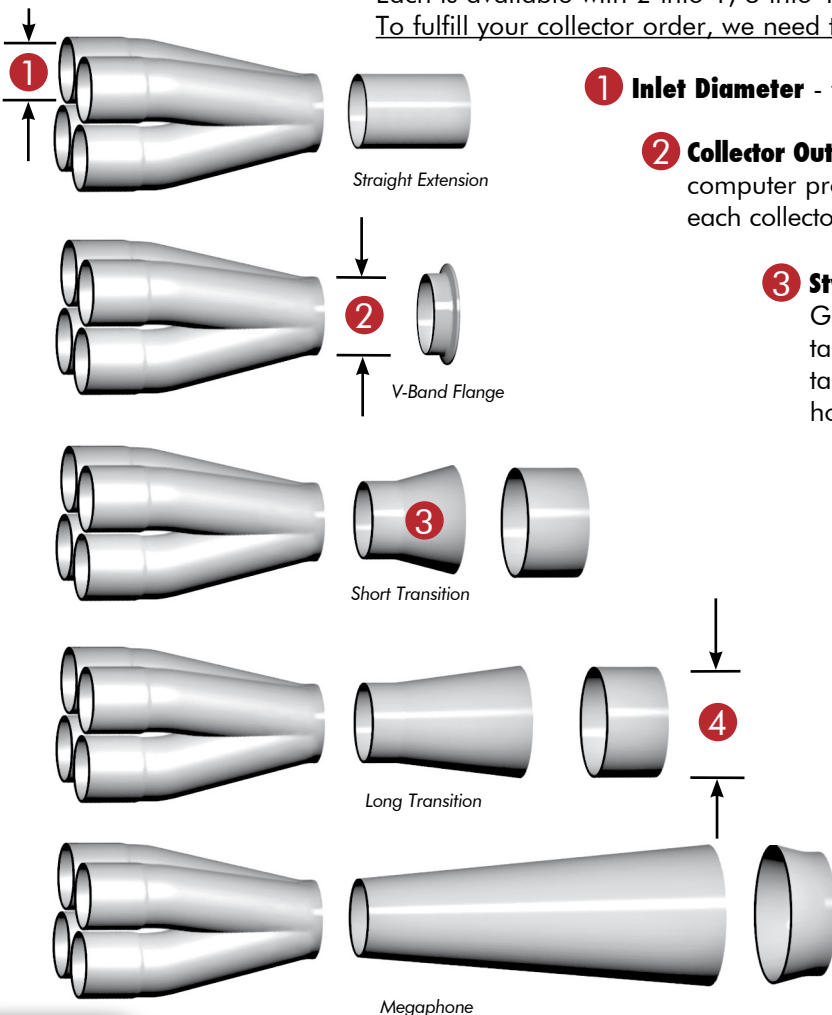
For drag racing and similar applications where a tailpipe is not required, megaphones fitted with reverse cones are invariably the best option. They produce maximum horsepower and maintain the highest and smoothest torque curve. Megaphones also offer the highest potential power past the peak without compromising the lower end of the power band on well-developed engine combinations with optimally short-header tube lengths and a well-chosen collector outlet diameter. For applications which require tailpipes, a NASCAR-style transition (long or short) and ring is normally recommended. If you are unsure which style is best for you, please call to discuss your specific application.



(5 into 1 and 6 into 1 collectors are special order items; please call for price and info)

Here are our five common collector outlet options

Each is available with 2 into 1, 3 into 1, 4 into 1, 5 into 1, and 6 into 1 collectors. To fulfill your collector order, we need to determine 4 basic dimensions.



1 Inlet Diameter - the outside diameter of your final header tubes.

2 Collector Outlet Diameter - normally determined by our X-design computer program (see page 19). There is no standard outlet size; each collector system is based on your engine's specs.

3 Style of Outlet - Long or Short Transition, or Megaphone. Generally, if your vehicle uses a tailpipe, a transition and tailpipe ring will be needed. If you don't have to run a tailpipe, we recommend using a megaphone for maximum horsepower and powerband.

4 Final Outlet Diameter and Configuration - usually a tailpipe ring for use with a transition. A tailpipe ring is described by its outside diameter; it slips inside your tailpipe, and is normally 2" long. If you plan on a megaphone, a reverse cone is highly recommended.

The best way to order merge collectors:

- 1.** Fill out the Race Engine Spec. Form on the last page of the catalog, or on our web-site, and fax, mail or email it to us.
- 2.** We'll analyze your engine with X-design and call you with the results and our recommendation.
- 3.** Your custom collector order can then be completed to your specs and shipped, usually within 14 days.

X-design™ - Burns Stainless' unique exhaust system computer analysis program.

X-design has evolved from our extremely successful DesignSYS program in response to a growing need in the community of motorsports racers and engine builders to effectively manage the incredible amount of information and data essential to a competitive effort.

Our core business of designing and building racing merge collectors and header systems has demonstrated that current race engines respond dramatically to small variations in the exhaust tract when volumetric efficiency exceeds 100%.

The most critical area is the outlet of the merge collector - its shape and diameter. In a highly developed racing engine, the collector outlet interacts strongly with elements as far removed as the intake valve and camshaft and all the way to the tailpipe.

In a typical mass-produced drag header, for instance, the header tubes are frequently about 10 to 20% longer than necessary and joined into a large, straight, "canister" style collector. This setup can produce good horsepower in a relatively narrow rpm range, and is usually sized to maximize the horsepower peak.

Assuming you can live with a relatively narrow power band, you can win races with headers like this, but



The one thing that X-design doesn't take into account is the changing conditions during your day or weekend at the races. When track or atmospheric factors call for a change of tune, our B-TEC adjustable race collectors are the answer. See page 22.

conditions have to be just right, and you may need to play around with 2 or 3 different sets of headers during a weekend of racing.

Merge collectors change the game fundamentally. When properly designed, they keep or augment the horsepower peak, and fill in the power curve from the torque peak on up. It is not uncommon to see gains of 15 to 25 hp with a good merge collector system, compared to a mass-produced "canister" style setup.

The rub is that the merge collector must be designed for your particular engine. Your camshaft and valves, your combustion chamber, compression ratio, exhaust port, and your header configuration, all communicate intimately with the merge collector, especially when your motor is working at greater than 100% volumetric efficiency. If the basic collector parameters are not designed with these factors in mind, your motor won't realize its potential.

X-design, used in conjunction with our *Race Engine Specification Form*, virtually assures you (and us at Burns Stainless) that our merge collectors will provide you with state-of-the-art performance. We are constantly refining and updating the program, and based on feedback each week from our customers, the success rate is very high. In a community where the state of the art changes at a dizzying pace, X-design is an essential tool in the quest to compete.

Please take a look at the ***Race Engine Specification Form on page 32***. If you think there might be some more ponies hiding in your race engine, fill out the form and email, fax or mail it to us. We'll get back to you, usually within 48 hours, and help you decide how to get the best results for your competitive effort.

BASE MERGE COLLECTORS & SPLAYED COLLECTORS

Base Collectors are available in 304 Stainless, 321 Stainless and Mild Steel.

Collectors are made to order. Please call for lead time on collectors.

The standard wall thickness is .065" (16 gage), and we can supply thinner wall thickness in some sizes. Call for more information.

Inconel collectors are available by special order in some sizes. Please call for details. 5 into 1 and 6 into 1 merge collectors are special orders.

If you're considering a 6 into 1, please call to discuss the options. We build lots of 6 into 1 collectors, especially for turbo applications, but the performance of a 6-2-1 system is far superior to a 6-into-1 in almost all cases. If horsepower and power bandwidth are your primary goals, think about a 6-2-1 setup.

BASE COLLECTORS

Primary OD	4-Into-1	3-Into-1	2-Into-1
1 1/4	MC4-125	MC3-125	MC2-125
1 3/8	MC4-138	MC3-138	MC2-138
1 1/2	MC4-150	MC3-150	MC2-150
1 5/8	MC4-163	MC3-163	MC2-163
1 3/4	MC4-175	MC3-175	MC2-175
1 7/8	MC4-188	MC3-188	MC2-188
2	MC4-200	MC3-200	MC2-200
2 1/8	MC4-213	MC3-213	MC2-213
2 1/4	MC4-225	MC3-225	MC2-225
2 3/8	MC4-238	MC3-238	MC2-238
2 1/2	MC4-250	MC3-250	MC2-250
2 5/8	MC4-263	-	MC2-263
2 3/4	MC4-275	-	MC2-275
3	-	-	MC2-300
3 1/2	-	-	MC2-350

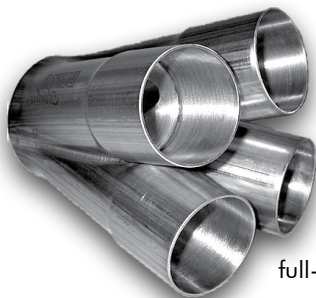


SPLAYED COLLECTOR OPTIONS

All of our merge collectors are available with splayed inlets at no extra cost.

Splayed inlets allow the header builder an additional degree of freedom in routing the tubes, and are often necessary for high rpm, short-length designs, as well as turbo headers with tight space requirements.

2-into-1 configurations can be full-splayed (with a 30° included angle), or half-splayed, with one splayed leg and one conventional leg (15° included angle).



full-splayed 4-1



full-splayed 2-1



half-splayed 2-1

Double-Slip Turbo Collectors achieve a tight, weld-free seal at the header-collector junction by providing exterior slip tubes, which are welded to your existing header tubes.

The slip tubes provide an extra seat and sealing surface for the collector, and allow the header system to grow and shrink over a wide temperature range while greatly reducing the potential stress and cracking which is typical of welded stainless turbo headers. Both the collector, and the header tubes in this system are spaced 1/8" farther apart to accommodate the additional slip tubes. Weld the slips to your existing header tubes using the collector as a jig.

DOUBLE-SLIP COLLECTORS		321 STAINLESS	
Inlet Size	4-Into-1	3-Into-1	2-Into-1
1 1/2	MC4-150-DST	MC3-150-DST	MC2-150-DST
1 5/8	MC4-163-DST	MC3-163-DST	MC2-163-DST
1 3/4	MC4-175-DST	MC3-175-DST	MC2-175-DST
1 7/8	MC4-188-DST	MC3-188-DST	MC2-188-DST
2	MC4-200-DST	MC3-200-DST	MC2-200-DST
2 1/8	MC4-213-DST	MC3-213-DST	MC2-213-DST
2 1/4	MC4-225-DST	MC3-225-DST	MC2-225-DST
2 3/8	MC4-238-DST	MC3-238-DST	MC2-238-DST
2 1/2	MC4-250-DST	MC3-250-DST	MC2-250-DST



3-1 Double Slip Merge Collectors

321 Stainless is the standard material for our Double-Slip Turbo Collectors. Contact us for different materials in applications such as naturally aspirated road race cars.

TURBO COLLECTORS

In addition to our standard, high-velocity 15° merge collectors, we offer a shorter, 25° turbo collector for applications where space is limited. They're about 2/3 the length of our standard collectors.

We recommend our 15° turbo collectors for extreme output, high rpm use.

T3, T4, and V-band flanges are in stock. We can usually fabricate a collector for your particular inlet flange. These services are an additional cost.



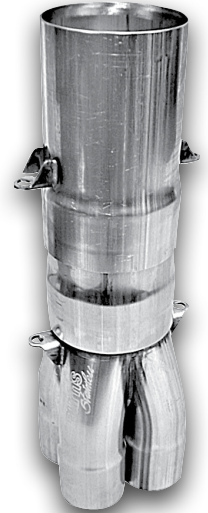
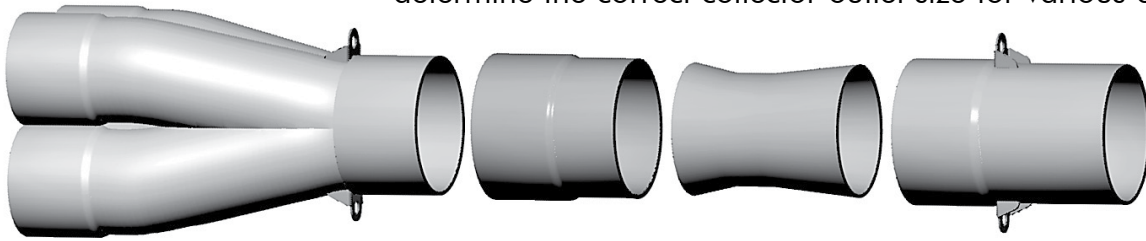
Turbo Collectors

V-Band Collectors



DYNOSYS™

DynoSYS™ is a unique adjustable venturi stainless steel merge collector system that simplifies dyno testing, enabling you to quickly and painlessly tune your header dimensions and determine the correct collector outlet size for various engine combinations.



DynoSYS offers these distinct advantages

- Saves cost when compared to buying separate collectors for back to back testing.
- Allows easier, simpler R&D testing when tuning header system to new engine configurations.
- Eliminates the hassle of changing hot collectors on dyno headers - just slide out one venturi group and slide in another - leaving the collectors in place.
- Custom built to your primary and outlet size specifications.
- Venturi angles, both convergent and divergent, have been extensively tested.
- Venturi sized to your specification (your choice, but please consider X-design recommendation).
- Exhaust system design consulting using our X-design parametric software (see page 19 for details).
- Price quote on request



B-TEC™ ADJUSTABLE COLLECTORS



B-TEC™, the *Burns Tunable Exhaust Collector*, is the on-track evolution of our *DynoSYS™* adjustable merge collector, originally designed to assist in the dyno testing of collectors on different engine combinations.

In the last couple of years, our B-TEC adjustable collector system has established its reputation as an indispensable tool for serious drag racers. It is used by many of the fastest NHRA Pro Stock Cars and is becoming increasingly popular in Competition and Sportsman classes.

Available in 2, 3, 4, and 5 into 1 configurations, B-TEC adds about 8 to 10 ounces of extra weight to each collector. The minimum set consists of a merge collector with adapter neck, one venturi insert, and a special slip megaphone with reverse cone.

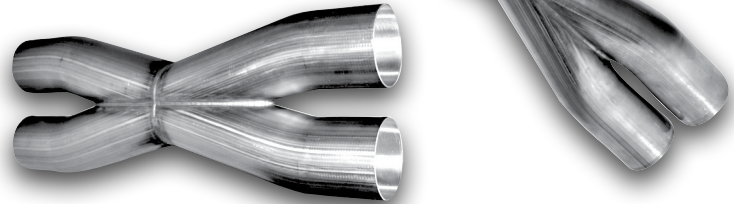
This setup can usually accommodate 3 different venturi diameters, but sometimes the smaller venturi selections need extra length, and an extension collar is needed.

You gain the ability to quickly and precisely tune your torque curve based on track and atmospheric conditions, and to fine-tune the header system to mechanical changes at the track on race day.



X-PIPES & Y-PIPES

X-Pipes are produced using the same techniques as our 2-1 merge collectors. They are available with parallel inlets, splayed inlets, or a combination of the two. In addition, you can specify the center to center distance for both the inlet and outlet pipes, and the leg lengths can be staggered if necessary.



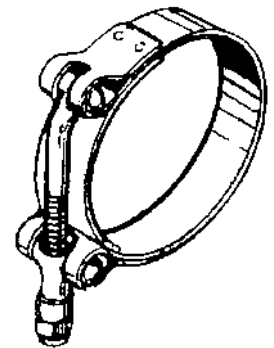
Y-Pipes are nearly identical to our 2-1 merge collectors, and are available with parallel, splayed, or half-splayed inlets. The center to center distance is your option, but the choice of outlet (neck-down) diameter is very important for peak performance. A transition and tailpipe ring are the usual outlet options.

FLAT-BAND CLAMPS (T-BOLT)

FLAT-BAND CLAMPS 304 STAINLESS

Size	Part Number	Min. dia.	Max dia.	Sil. Hose
1 3/4	FB-175	1.75	2.00	SH-150
2	FB-200	2.00	2.25	SH-175
2 1/4	FB-225	2.25	2.56	SH-200
2 1/2	FB-250	2.50	2.81	SH-225
2 3/4	FB-275	2.75	3.00	SH-250
3	FB-300	3.00	3.31	SH-275
3 1/4	FB-325	3.25	3.56	SH-300
3 1/2	FB-350	3.50	3.81	SH-325
3 3/4	FB-375	3.75	4.06	SH-350
4	FB-400	4.00	4.31	SH-375
4 1/4	FB-425	4.25	4.56	SH-400
4 1/2	FB-450	4.31	4.62	SH-400

T-bolt flat-band clamps are an alternative to U-bolt muffler clamps for clamping close tolerance slip connections on tubing. Flat-band clamps do not permanently crimp the slit tubing, allowing easier removal after assembly. Stainless steel strap, plated steel T-bolt and nut.



“NO HOLDS BARRED” EXHAUST SYSTEMS – HARLEY BIG-INCH V-TWIN



This system is a 3-step near equal-length primary exhaust with merge collector and reverse cone megaphone muffler. The merge collector and 3-step design provide a nice broad power band without sacrificing top-end power. The system is available in two sizes, one for 107 – 117 cid builds and one for 117+ cid builds. The primary length is adjustable to optimize torque and power. Options include an adaptable header mount and 12mm and/or 18mm O2 bungs. NhB Systems are constructed from ASTM269 304 stainless steel tubing for best combination of weight savings and durability.

Application	Year	Engine Size	Primary Size	Muffler Core
Harley-Davidson Touring	1999 - 2016	107 - 117 cid	1-3/4" + 1-7/8" + 2"	2.5"
Harley-Davidson Touring	1999 - 2016	117 + cid	1-7/8" + 2" + 2-1/8"	3"

“NO HOLDS BARRED” EXHAUST SYSTEMS – C6 CORVETTE & PORSCHE 987



C6 Corvette



Porsche 987

Application	Year	Muffler Option	Part Number
Chevrolet Corvette C6	2007 - 2015	4.5" OD	SY-CORV-C6-450
Chevrolet Corvette C6	2007 - 2015	6.25" OD	SY-CORV-C6-625
Chevrolet Corvette C6	2007 - 2015	Muffler Delete	SY-CORV-C6-DEL
Porsche Cayman 987	2006 - 2007	4.5" OD	SY-POR-CAY987-450
Porsche Cayman 987	2006 - 2007	6.25" OD	SY-POR-CAY987-625
Porsche Cayman 987	2006 - 2007	Muffler Delete	SY-POR-CAY987-DEL
Porsche Cayman 987.2	2008 - 2012	4.5" OD	SY-POR-CAY987.2-450
Porsche Cayman 987.2	2008 - 2012	6.25" OD	SY-POR-CAY987.2-625
Porsche Cayman 987.2	2008 - 2012	Muffler Delete	SY-POR-CAY987.2-DEL

Standard Features:

- Construction from US-made lightweight ASTM 269 18g 304 stainless steel tubes for considerable weight savings
- Argon back-purged TIG welding for high strength and precision fitment
- Ultra-lightweight motorsports mufflers that are repackable for extended durability

CRATE ENGINE HEADER KITS

Designed using the proprietary DesignSys exhaust design program, Burns Stainless offers header kits for popular GM and Ford crate engines. Kits include all the items you need to fabricate your custom header including flanges, mandrel bends, collectors and tabs. Header design sheet specifying the primary size, length and other necessary specifications is included. The standard header kits are supplied with NASCAR-style collectors with transition and tailpipe ring. For drag race or other open-header applications, we recommend a collector with reverse-cone megaphone.



HEADER KITS

304 STAINLESS

MFG	Engine	1-Step Primaries	OD (in)	Tailpipe OD (in)	2-step Primaries	OD (in)
GM	LS1	HK-GMLS1-1	1-3/4"	2.5"	HK-GMLS1-2	1-5/8" + 1-3/4"
GM	LS3	HK-GMLS3-1	1-3/4"	3"	N/A	N/A
GM	LS7	HK-GMLS7-1	2"	3.5"	HK-GMLS7-2	1-7/8" + 2"
GM	LSX454	HK-LSX454-1	2"	3.5"	HK-LSX454-2	1-7/8" + 2"
GM	ZZ502	HK-GMZZ502-1	2"	3.5"	N/A	N/A
FORD	Coyote 5.0	HK-FDC50-1	1-7/8"	3"	HK-FDC50-2	1-3/4" + 1-7/8"

INCONEL 625

Inconel 625 excels in applications such as Rotary engines and extreme duty turbocharger exhausts. It maintains its strength at temperatures greater than 1800° F, where 321 SS is unsuitable. Inconel can be used in thinner gages in header systems, compared to 304 or 321 stainless, resulting in a lighter weight product with equal or better mechanical properties. **The Inconel parts are normally special order items. We may have stock on some items from time to time. Please call for price and availability.**

HEAD FLANGES FOR RACE APPLICATIONS

Burns Stainless offers an extensive line of head flanges for domestic and import applications including Ford, Chevrolet, Oldsmobile, Chrysler, Porsche, Honda, and Toyota. The 3/8" flanges are CNC machined from 304SS or 1018 cold-rolled steel (other thicknesses also available).



BURNS STAINLESS BANNERS, CAPS, T-SHIRTS & STICKERS



Banners

Shop banners now available from Burns. 3' x 6' digitally printed banners made from sturdy reinforced vinyl will let your customers know that you use the best exhaust products available.

Caps

Checked flag pattern with flames around the bill. Burns Stainless logo embroidered on the front, and burnsstainless.com embroidered on the back. One size fits all.

T-Shirts

Black or Ash, 100% cotton crew neck, short sleeve. Silk-screened Burns Stainless logo on left front and right sleeve. Header/collector/megaphone graphic on back. M, L, XL, and XXL sizes.

Stickers

High quality vinyl stickers available in large and small sizes.

Tailpipe OD (in)	3-step Primaries	OD (in)	Tailpipe OD (in)
2.5"	N/A	N/A	N/A
N/A	N/A	N/A	N/A
3.5"	HK-GMLS7-3	1-3/4" + 1-7/8" + 2"	3.5"
3.5"	N/A	N/A	N/A
N/A	N/A	N/A	N/A
3"	HK-FDC50-3	1-5/8" + 1-3/4" + 1-7/8"	3"

Burns Stainless can also provide you with custom exhaust design for modified engines. See page 19.

In order to explain the effect of exhaust tuning on performance, let's take a quick look at the 4-stroke engine cycle. The first step in the 4-stroke process is the intake stroke. With the intake valve open, the piston travels down the cylinder pulling a fresh air and fuel mixture into the cylinder (intake stroke). After the piston reaches bottom dead center, the intake valve closes and the piston travels up the cylinder compressing the air/fuel charge (compression stroke). When the piston approaches the top of the stroke, the spark plug fires and ignites the compressed mixture causing essentially a closed explosion. The pressure of the ignited fuel pushes the piston down the cylinder transferring power to the piston, rod and finally the crankshaft (power stroke). After bottom dead center, the exhaust valve opens and the piston is pushed up the cylinder forcing the exhaust gases out the exhaust port and manifold (exhaust stroke).

As the exhaust valve opens, the relatively high cylinder pressure (70 – 90 psi) initiates exhaust blow-down and a large pressure wave travels down the exhaust pipe. As the valve continues to open, the exhaust gases begin flowing through the valve seat. The exhaust gases flow at an average speed of over 350 ft/sec, while the pressure wave travels at the speed of sound of around 1,700 ft/sec.

As one can see, there are two main phenomenon occurring in the exhaust, gas particle flow and pressure wave propagation. The objective of the exhaust is to remove as many gas particles as possible during the exhaust stroke. The proper handling of the pressure waves in the exhaust can help us to achieve this, and even help us "supercharge" the engine.

As the exhaust pressure wave arrives at the end of the exhaust pipe, part of the wave is reflected back towards the cylinder as a negative pressure (or vacuum) wave. This negative wave, if timed properly to arrive at the cylinder during the overlap period, can help scavenge the residual exhaust gases in the cylinder and also can initiate the flow of intake charge into the cylinder. Since the pressure waves travel at near the speed of sound, the timing of the negative wave can be controlled by the primary pipe length for a particular rpm.

The strength of the wave reflection is based on the area change compared to the area of the originating pipe. A large area change such as the end of a pipe will produce a strong reflection, whereas a smaller area change, as occurs in a collector, will produce a less-strong wave. A 2-1 collector will have a smaller area change than a 4-1 collector producing a weaker pressure wave. Also, a merge collector will have a smaller area change than a standard formed collector producing a weaker wave.

So, the trick to proper exhaust tuning is to tune an exhaust system to produce a negative wave of the proper strength timed to occur at cylinder overlap. Various exhaust designs have evolved over the years from theory, but the majority are still being built from 'cut & try' experimenting. Only lately have computer programs like the Burns **X-design** or high end engine simulation programs been able to help in this process. Practical tools like adjustable length primary pipes and our B-TEC and DynoSYS adjustable collectors allow quicker design changes on the dyno or in the car. When considering a header design, the following points need to be considered:

- 1. Header primary pipe diameter (also whether constant size or stepped pipes).**
- 2. Primary pipe overall length.**
- 3. Collector package including the number of pipes per collector and the outlet sizing.**
- 4. Megaphone/tailpipe package.**

Our revolutionary **X-design** parametric exhaust modeling program provides you with the perfect starting point for any header project. Just fill out the Race Engine Specification Form, send it to us, and we will do the rest.



RECOMMENDED TOOL LIST

Felt tip pen with rounded point
 Tape measure, 1/4" wide, 3 feet long
 Vise, 6" with soft jaws
 Machinist vise
 T-dolly
 Metal forming hammer

Deburring tools

Die grinder with sanding drum
 Half round file
 Belt sander
 Small vise grips with needle nose jaws

Cutting Tools

Band saw
 Abrasive cut-off saw
 Cold saw
 Hack saw

Die grinder with abrasive disc
 Welder - TIG is preferred
 Tubing expander
 Tubing cutter (for marking)
 T-square



PROPERTIES OF METALS USED IN MOTORSPORTS APPLICATIONS

Material Property	Units	Aluminum 6061 "0" condition	Aluminum 6061-T6	Mild Steel 1010 CREW	304 Stainless Annealed ASTM A269	321 Stainless Annealed	Titanium CP-2 Grade 2 ASTM B 338	Inconel 625
Tensile Strength	lb/in ² (@70 F)	18,000	45,000	55,000	85,000	90,000	50,000	140,000
Yield Strength	lb/in ² (@70 F)	8,000	40,000	40,000	35,000	35,000	40,000	77,000
Elongation	percent	25	12	20	55	55	20	47
Density	lb/in ³	0.098	0.098	0.283	0.290	0.290	0.163	0.305
Modulus of Elasticity	x 10 ⁶ lb/in ²	10	10	29.5	28	28	15	30
Coefficient of Thermal Expansion	in/in-F x 10 ⁻⁶ (@70 F)	13.1	13.1	7.228	9.9	9.6	4.8	5.5
Coefficient of Thermal Conductivity	BTU/ft-hr-F (@70F)	104.00	96.50	26.98	9.40	9.30	12.00	5.65

WELDING ROD COMPATIBILITY TABLE

	Aluminum	Mild Steel	304 SS	321 SS	Titanium CP-2	Inconel 625
Aluminum	5356 ¹ or 4043 ²	X	X	X	X	X
	Mild Steel	MS	309	309	X	625
		304 SS	308	308	X	625
			321 SS	347	X	625
				Titanium CP-2	CP Grade 2	X
					Inconel 625	625

X - not recommended

Note 1: maximum strength

Note 2: maximum corrosion resistance

Stainless steel is a material that we wish never was labeled "stainless" because it can do so much more than simply resist rust. Technically, "Stainless Steel" is strictly a trade name applied to what are known as corrosion-resistant steels. It is a fabulous material that outperforms mild and alloy steels in so many different applications in racing that no other material can match it, and I think all racers should consider it as a vital element in their fabricating efforts. However, stainless steel does have some unique properties that the fabricator needs to know about before launching into a project. An interesting characteristic of many types of stainless steel is that they are non-magnetic, a quality that makes them very important in the aerospace industry. Compared to mild steel, stainless steel has superior high temperature characteristics. It is an excellent material for headers and exhaust systems, or any application where high heat is encountered.

Stainless steel is an iron alloy that contains at least 12% chromium and low carbon content, usually less than .15%. This high chromium content retards corrosion giving the steel its "stainless" quality. There are many stainless steel alloys that fall into two basic categories:

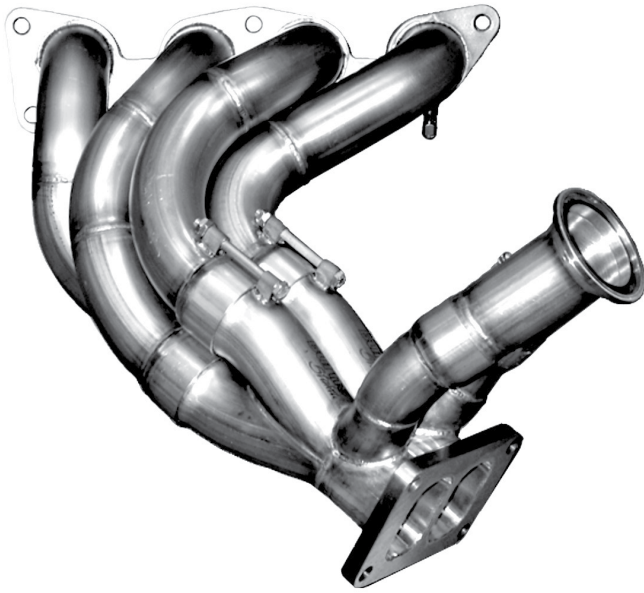
- 1. High-nickel grades (austenitic)**
- 2. Low-Nickel grades (martensitic, ferritic and duplex)**

The high nickel, austenitic grades (300 series) are the most commonly used in race car fabrication due to the nickel content which provides excellent weldability and corrosion resistance. Also, nickel improves mechanical properties such as fatigue strength, toughness and ductility. Austenitic stainless steels are normally non-magnetic. Stainless steels are often referred to by their chromium and nickel content: for instance, 18-8 stainless has 18% chromium and 8% nickel. 400-series stainless steels contain little or no nickel and are often used in production automobile exhausts. These are also magnetic.

As mentioned, stainless steels have a rather low carbon content. Some carbon is needed for hardness, but it also causes the stainless to become susceptible to corrosion at high temperatures. When heated to a temperature range of 800° to 1590°F, the carbon in the steel combines with chromium to form chromium carbides. This transformation is called carbide precipitation and reduces the corrosion resistance of the steel by allowing intergranular corrosion to occur. Some stainless steels are known as low carbon grades to minimize this carbide precipitation; others, such as 321, are special alloys that reduce carbide precipitation by combining and stabilizing the chromium at elevated temperatures.

Another great property of stainless steel is low thermal conductivity, 219% less than 1010 steel. You may recall Smokey Yunick talk about increasing the scavenging effect of headers by covering headers with a thermal wrap. Also, thermal ceramic coatings for headers have become popular for this purpose. The low coefficient of thermal conductivity inherent to stainless steel provides the same effect. More importantly, it protects the car and the driver from excessive, fatiguing high temperatures and lower air induction temperatures. It should be noted that wrapping mild steel headers can lead to premature failure due to high temperatures.





These many characteristics, such as superior heat retention properties, high temperature fatigue resistance, and to a lesser extent, the cosmetic value of a non-rusting finish, combine to make stainless steel an ideal choice for headers and exhaust systems. Such a system will produce more horsepower and last "til the cows come home." It is an excellent solution.

Now that you are sold on the merits of stainless steel, there are a number of things you need to know about the different types available before you launch into a header and exhaust system project.

A three-digit numerical classification system is used throughout the industry. The racer needs to be familiar with only one of these three-digit series within the system - the 300 series. They offer the fabricator a wide array of choices, from ornamental quality up through the highest-temperature and closest-tolerance aircraft quality. Within the 300 series of stainless steels, there are four types that are suitable, available and cost effective for the racer. These are 304, 316L, 321, and 347.

Stainless steels come in both tubing and pipe sizes. Since certain pipe sizes are almost identical in dimension to tubing sizes, pipe may sometimes be substituted for tubing, and vice versa. Numerous wall thicknesses are available, but for headers, normally .049" (18 gage) to .065" (16 gage) is used.

304 is the most inexpensive and available stainless in the 300 series. It is suitable for normally-aspirated header applications, and has been successfully used by many racing teams. It does not have the high temperature fatigue resistance that 321 does, but is easier on the budget.

316L is an extra low carbon (ELC) grade of stainless that has only .03% carbon, making less carbon available to precipitate with the chromium. It is recommended for marine exhausts where salt water corrosion mixed with diesel exhaust particulates and electrolysis create such a hostile environment that even other grades of stainless have difficulty coping with it.

321 and 347 are known as stabilized grades of stainless and are alloyed with either titanium (321) or columbium (347), both of which have a much stronger affinity for carbon than does chromium at elevated temperatures. This minimizes intergranular corrosion due to carbide precipitation. Both 321 and 347 are top choices for exhaust headers, especially turbocharger systems and rotary engines.

Different specifications are used to meet particular requirements for the military (MIL), the American Society of Testing Materials (ASTM), and the Society of Automotive Engineers (SAE). Burns Stainless offers these grades:

ASTM A-269 304 stainless is a general service commercial specification that is higher quality and is fully annealed for better ductility. It is available in both welded seam and seamless, and is a good spec for the racer to use. In our experience, both, seamless and welded seam tubing are very durable in header applications, but seamless tubing is considerably more expensive.

MIL-T-8808/8606\MIL-T-6737 321 stainless are military specifications for aircraft tubing. Suffice it to say that some MIL-specs are not necessarily better or even as good as some ASTM standards. There is no particular magic here.

Aluminum is widely used in racing to make radiators, pistons, intake manifolds and more (However, we would never recommend aluminum for exhaust systems!). The light weight, strength, fabricability and corrosion resistance of aluminum makes it such a versatile material. Aluminum is approximately 1/3 the weight of steel, yet some aluminum alloys exhibit tensile strengths greater than some low carbon steels. Many alloys can be heat treated to improve strength properties. Aluminum is available in many wrought forms such as tubing, extruded shapes, sheet and bar. Aluminum can also be cast and forged.

There are many wrought and cast alloys available for use by the racing fabricator. Wrought aluminum alloys are designated using a four-digit system, with the first digit specifying the primary alloying element. The following table lists the major series including the alloying elements and general uses for each series.

Some of the more common aluminum alloys used by racing fabricators include 3003, 2024, 6061 and 7075. 6061 is the least expensive and most versatile of the heat-treatable alloys. It is a favorite alloy of many fabricators as it is a weldable alloy with moderate to high strength in tempered condition. It also has good formability in the annealed condition. It is the best choice for intake manifold and inter-cooler plumbing due to the weldability and formability of the alloy.

Heat-treating improves the strength of aluminum alloys through a process known as "precipitation hardening." In simple terms, precipitation hardening is a process that occurs during the heating and cooling of an aluminum alloy in which minute particles or "precipitates" are formed in the aluminum matrix. These particles reduce slippage between "grains" which in turn increases material hardness and strength.

Alloy Series	Major Alloying Elements	General Properties	General Uses
1xxx	None	Excellent corrosion resistance, high thermal and electrical conductivities, low mechanical properties, excellent workability	Chemical Equipment, reflectors, heat exchangers, electrical conductors
2xxx	Copper	Heat treatable, high strength to weight ratio, limited corrosion resistance, limited weldability	Truck wheels, truck suspension components, aircraft fuselage
3xxx	Manganese	Moderate strength without heat treating	Beverage cans, cooking utensils, heat exchangers, storage tanks
4xxx	Silicon	Low thermal expansion, high wear resistance	Forged engine pistons, welding rod, brazing alloys, architectural products
5xxx	Magnesium	Good weldability, good corrosion resistance	Ornamental trim, cans, household appliances, boats and ships
6xxx	Magnesium and Silicon	Heat treatable, good formability, moderate-strength, good weldability, good machinability, good corrosion resistance	Architectural applications, bridge railings, welded structures, racecar components
7xxx	Zinc	Heat treatable, moderate to very high strength	Airframe structures, high-strength forgings
8xxx	Other elements	N/A	N/A
9xxx	Unused series	N/A	N/A



Another method for increasing the strength of aluminum alloys is by work hardening. Work hardening occurs during forming processes including forging, stamping and tube bending. During these forming processes, the alloy undergoes plastic deformation and the metallic grains are broken and become smaller. The tighter grain structure prevents inter-granular slippage thereby increasing the strength of the alloy.

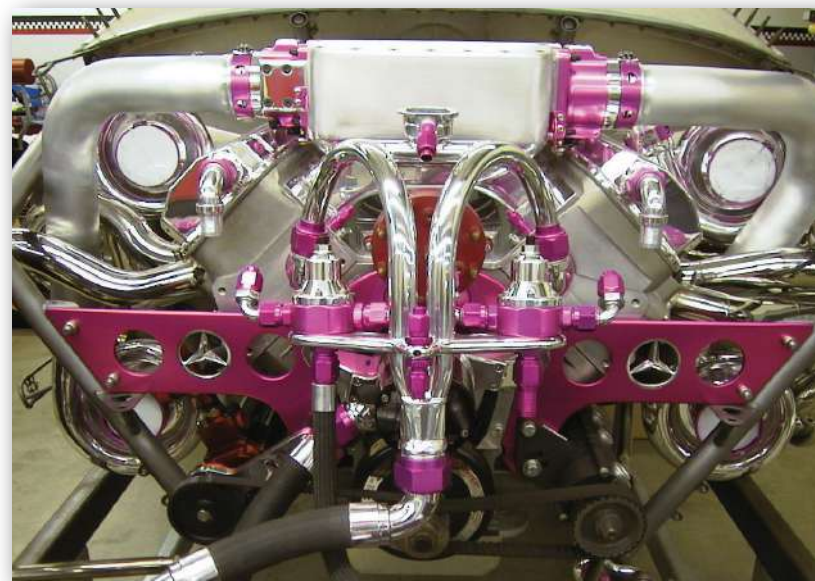
Annealing is a process that imparts the “softest” or most ductile condition to a heat-treatable aluminum alloy. For annealing, the alloy is heated to above its solution temperature and then slowly cooled to room temperature. During the cooling processes, the alloying elements fall out of solution and form large unevenly distributed crystals, which do not effectively prevent granular slippage. The result is a soft, low strength alloy condition. Burns Stainless anneals all aluminum tubing prior to bending.

The temper designation system is used to specify the condition, or temper, of a heat treatable alloy. The most common designations include O , F, T4 and T6. O refers to soft or annealed condition and is the preferred temper for forming processes such as tube bending. F refers to the condition of the material following a forming, and is the

designation of tubing bends. T4 designates that the alloy was solution heat treated and naturally aged. T6 is sometimes referred to as fully “heat treated” and is the result of solution heat treating and artificial aging.

Burns Stainless carries drawn seamless 6061 aluminum tubing for straight tubing and bends. The tubing specification is ASTM B-210 and/or Federal General Specification WW-T-700/6. Burns Stainless sells straight 6061 aluminum tubing in the T6 condition. It is important to note that welding will affect the temper of a tube since it locally heats up the metal. If

the strength of a T6 temper is necessary for your welded assembly, it is important that the assembly be heat treated after welding. It is also important to note that the aluminum bends are annealed and through the bending process achieve a certain level of work hardening. Again, if heat treated properties are required, the assembly must be heat treated. Burns Stainless recommends extra care when polishing aluminum in the O condition, because the softness of the material tends to make it pick up and gouge if the polishing medium is not kept extremely clean.



RACE ENGINE SPECIFICATION FORM

Name _____ Company _____
Address _____ Phone _____
City & Zip code _____ Fax _____
Country _____ Email _____

Vehicle and type of racing _____ Racing class or category _____

Engine manufacturer _____ Configuration / # cylinders _____
Useable RPM range _____ Kind of gain you want _____
Maximum RPM _____

Peak horsepower _____ @ rpm
Peak torque _____ @ rpm

If you are able to send a copy of a current dyno sheet,
flow data, or information abstract, please do so.

Displacement _____ Additional comments: _____
Bore _____
Stroke _____
Compression ratio _____

Cylinder head manufacturer _____ Cylinder head model _____
of camshafts & location _____ Type of fuel system _____
Valves / cylinder _____
Manifold type _____ Carburetor or throttle size _____

Intake valve head diameter _____ Intake port dimensions _____
Exhaust valve head dia. _____ Exhaust port dimensions _____

Cam manufacturer & model # _____ Lifter type (roller, flat, hyd.) _____

Intake lift at valve _____ Intake rocker arm ratio _____

Int. duration @ .050 lift _____ degrees* Intake lobe centerline _____

Intake opens @ _____ ° BTDC Intake closes @ _____ ° ABDC

Exhaust lift at valve _____ Exhaust rocker arm ratio _____

Exh. duration @ .050 lift _____ degrees* Exhaust lobe centerline _____

Exhaust opens @ _____ ° BBDC Exhaust closes @ _____ ° ATDC

* if duration @ .050 is unknown, specify lift at which it is measured

Header Configuration (4-1, tri-y, etc) _____

Primary length _____ Primary OD (or step diameters) _____

Secondary length _____ Step lengths _____

Collector outlet diameter _____ Secondary OD _____

Collector type _____ Step lengths _____

Collector type _____ Tailpipe diameter _____

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FROM OUR TEAM TO YOURS

Thanks to all our priceless customers, the champions and the guys that outrun them, the record setters and the ground breakers, and especially all the geniuses and lunatics who hear what their race engine is telling them.



Jack Burns
Partner/Member



Rick Popovits
Partner/Member



Vince



David



Koren



Spoons



Fernando



Corey



Bob



John



Phillip

A close-up photograph of a stainless steel pipe with the "BURNS Stainless" logo engraved on it. The pipe is part of a larger engine assembly.

BURNS
Stainless

CUSTOMER SPOTLIGHT:

“What do you believe is your company’s greatest achievement?”



ROUSH YATES ENGINES, CEO Doug Yates

“Building Ford engines that have earned five championships in five different series and over 140 wins to date.”

Roush Yates Engines (RYE) is an exclusive supplier of Ford racing engines for NASCAR’s top series. RYE designs and builds engines that prove themselves race after race, not only in Sprint Cup, but in Nationwide, Craftsman Truck, ARCA RE/Max, Grand Am Rolex, Grand Am Koni Challenge, European FIA-GT3, European FIA-GT4, Brazilian FIA-GT3, ALMS, German ADAC, USAC Silver Crown, USAC Ford Focus Midget, World Series of Off Road Racing, and Championship Off Road Racing Series. They use Burns Stainless products because of their consistency in creating quality collector products. RYE can count on receiving header components to their exact specifications for their custom needs for all of their racing engine applications.



DAN GURNEY’S ALL AMERICAN RACERS, Owner Dan Gurney

“Teamwork...” Dan is a man of few words.

There are few names in racing with the recognition of Dan Gurney and All American Racers (AAR). From the same location since 1965, AAR has provided race cars, race car components, aeronautical engineering services and innovative motorcycles to the motor sports industry. AAR chooses Burns Stainless products because they receive “quality products with fast service.”



PRATT AND MILLER ENGINEERING, Owners Jim Miller and Gary Pratt

“Winning Daytona overall is probably the greatest achievement, but winning Le Mans 5 times makes it hard to choose.”

Since 1989, Pratt and Miller Engineering supplies race engineering services to customers in ALMS, FIA GT, NASCAR, Grand Am, Speed World Challenge. They have also recently introduced their own C6RS street cars. They choose Burns Stainless because they get the products that they can trust to go the whole way. Additionally, when they order it they know what they are going to get, the best! And it helps that everything is made in the USA.



CPR FABRICATION, Owner Chris Parker

“I would say our customer loyalty. We wouldn’t exist without them and we continually strive to give them the best in quality, craftsmanship, and assistance to bring their project to fruition.”

When asked what market segments does CPR Fabrication service, owner Chris Parker says “All of them really. At any given time I may have a 900 HP Trophy Truck being built for the Baja 1000 on our lift or a Vintage Ferrari 250 Tour De France, someone’s dream hot rod, or even a 4000 HP funny car. Sometimes we even do projects for industrial companies and the US government.” Why does Chris choose Burns Stainless products? “That’s easy. Quality and overall customer care. Burns stainless offers a package to the customer that I have not yet seen anywhere else. They not only sell high quality exhaust parts, but continue where others leave off with their X-Design header construction support and a valuable mass of information available to their customers regarding exhaust tuning technology. They also have an impressive client list that is undoubtedly a testament to their persistence in pushing the boundaries of exhaust gas technology.”