

Header & Exhaust Systems

Getting Everything You Can (Out Of It)

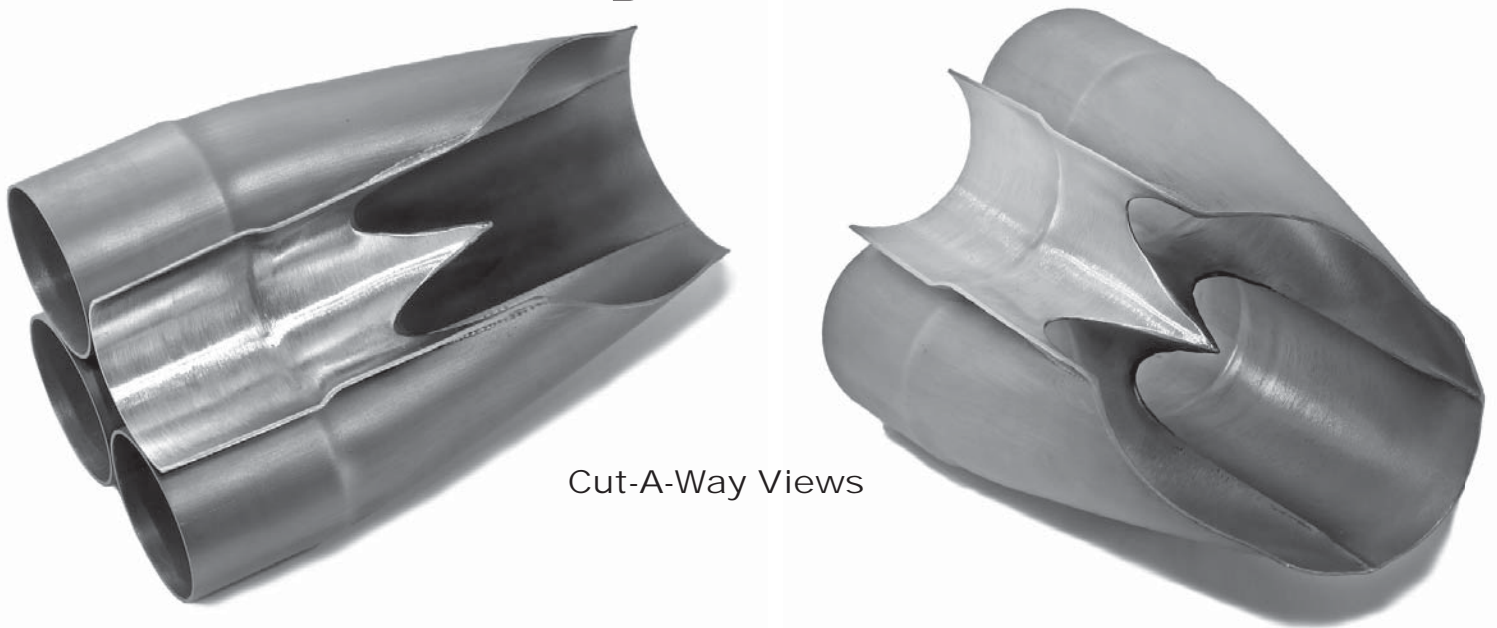
The exhaust systems role in increasing engine performance centers around improving volumetric efficiency. Volumetric efficiency (VE) refers to the ability of an engine to intake and expel gases (i.e.: air/fuel and exhaust gas), in relation to the actual pumping volume of the engine. Free flowing intake and exhaust systems help an engine to achieve this. Achieving greater than 100% VE is done in part by optimizing exhaust gas scavenging to draw out exhaust and bring in air fuel mixture during valve overlap. As the piston reaches the top of the exhaust stroke, it dwells as the crankshaft sweeps across the top of its stroke. This is where valve overlap occurs. Before the piston reaches Top Dead Center, the intake valve begins to open. The trick is to design the exhaust system so that the exhaust pulse (pressure wave) leaves behind a pressure drop or vacuum to take advantage of the valve overlap. If successful the combustion chamber will exchange residual exhaust gases for a fresh air/fuel mixture before the piston has any real effect on the intake charge.

To design a successful exhaust system or tuned header, the tube size and length are selected based on a list of engine specifications and application characteristics. The tube size controls the speed of the exhaust pulse, too big and the velocity (energy) is lost. The tube length is all about timing the pulse to synchronize with the cam in a specific RPM range.

At the collector, the timing of the pulses is crucial to scavenging. Imagine a four lane freeway on ramp merging into one lane. If you get the timing and speed right, the pulses draft each other like stock cars at Daytona, increasing their speed. This is where the Merge Collector comes in. It makes that transition from primary tube to collector as smooth as possible. This reduction in turbulence helps maintain velocity through the collector, thus increasing the scavenging power of the header system.

If you are not sure of your header and collector design please fill out the **vehicle specification sheet** available online and send it to us.

Merge Collectors

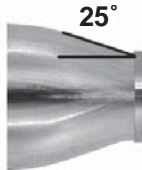

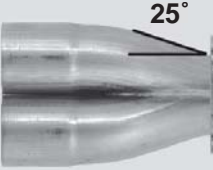

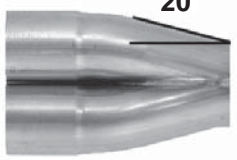
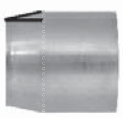
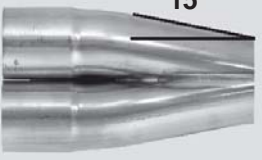



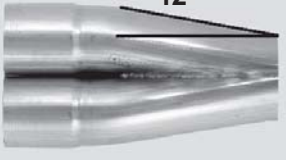



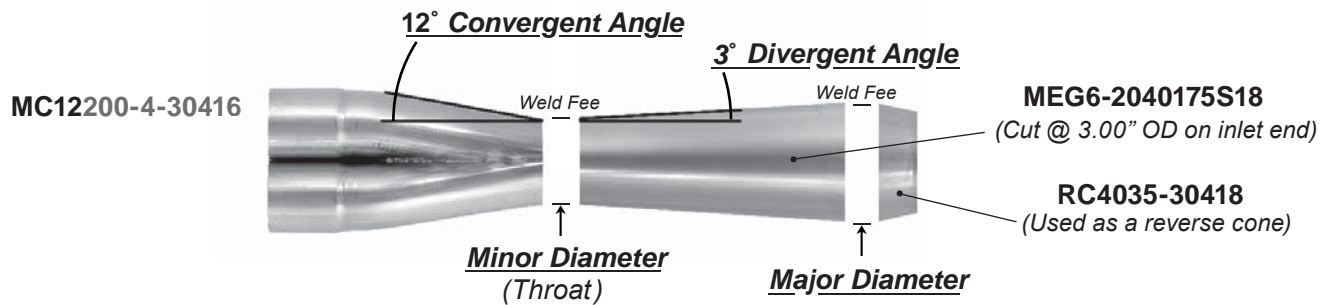
Cut-A-Way Views

Merge Collectors have been used for many years in F-1 and Indy cars. The technology has trickled down into almost all forms of professional racing. Today they have become common place. In competition, merge collectors are used wherever rule books allow.

On pages 3 through 11 you will find information on merge collectors to help you decide what type is for you. If you need more help give us a call or fill out the **vehicle specification sheet** available online.

Merge Collectors Configurations

WMC25200-4-30416			VBK300S (V-Band Clamp)
MC25200-4-30416			TF041813 (T4 Turbo Flange)
MC20200-4-30416			CT300-350S16
MC15200-4-30416			CT3007-350S16
MC12200-4-30416			CT3003-350S16
MC12200-4-30416			ST30016-304 (Straight Tubing)



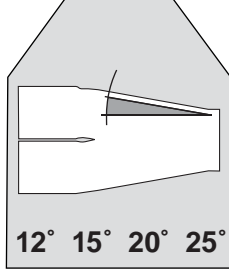
- ▶ 12 & 15 degree convergent angles offer the greatest performance gains.
- ▶ 20 & 25 degree convergent angles are used where space constraints are the primary concern.
- ▶ Call for recommendations on transitions.

How to Order Merge Collectors

Style Options

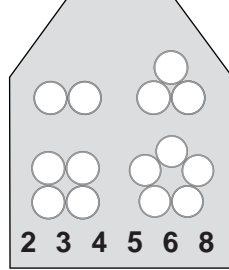
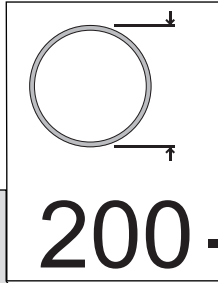
MC
DSMC
WMC
FMC
BMC

MC 12



12° 15° 20° 25°
Convergent Angle

Tube O.D.



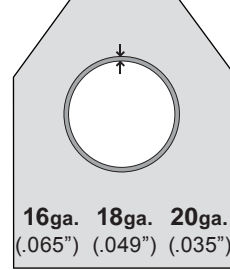
of Tubes

Material Type

For Stainless Steel
use -304 or -321

For Mild Steel
Leave blank

-4 -304



Gauge
(Wall Thickness)

Minor Diameter

(Throat Size)
Specify throat
size when you
place your order

16

Merge Inlet Tube Size	2 into 1	3 into 1	4 into 1	5 into 1	6 into 1	8 into 1
1.250	MCxx125-2	MCxx125-3	MCxx125-4	S/O	S/O	S/O
1.375	MCxx138-2	MCxx138-3	MCxx138-4	S/O	S/O	S/O
1.500	MCxx150-2	MCxx150-3	MCxx150-4	MCxx150-5	MCxx150-6	MCxx150-8
1.625	MCxx163-2	MCxx163-3	MCxx163-4	MCxx163-5	MCxx163-6	MCxx163-8
1.750	MCxx175-2	MCxx175-3	MCxx175-4	MCxx175-5	MCxx175-6	MCxx175-8
1.875	MCxx188-2	MCxx188-3	MCxx188-4	MCxx188-5	MCxx188-6	MCxx188-8
2.000	MCxx200-2	MCxx200-3	MCxx200-4	MCxx200-5	MCxx200-6	MCxx200-8
2.125	MCxx213-2	MCxx213-3	MCxx213-4	MCxx213-5	MCxx213-6	MCxx213-8
2.250	MCxx225-2	MCxx225-3	MCxx225-4	MCxx225-5	MCxx225-6	MCxx225-8
2.375	MCxx238-2	MCxx238-3	MCxx238-4	S/O	S/O	S/O
2.500	MCxx250-2	MCxx250-3	MCxx250-4	S/O	S/O	S/O
2.625	MCxx263-2	S/O	MCxx263-4	S/O	S/O	S/O
2.750	MCxx275-2	S/O	MCxx275-4	S/O	S/O	S/O
3.000	MCxx300-2	S/O	S/O	S/O	S/O	S/O
3.500	MCxx350-2	S/O	S/O	S/O	S/O	S/O

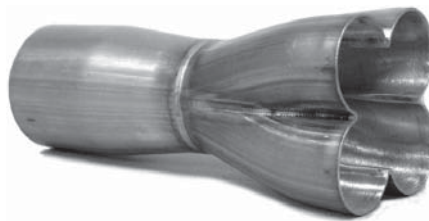
Ordering Options

Part Only



6 Way MC

With Transition



4 Way WMC
w/ 7° transition

Finished Assembly

Optional:
flanges, tabs, or bungs



2 Way DSMC's
w/ transitions &
T4 tangential flange

Merge Collectors Styles

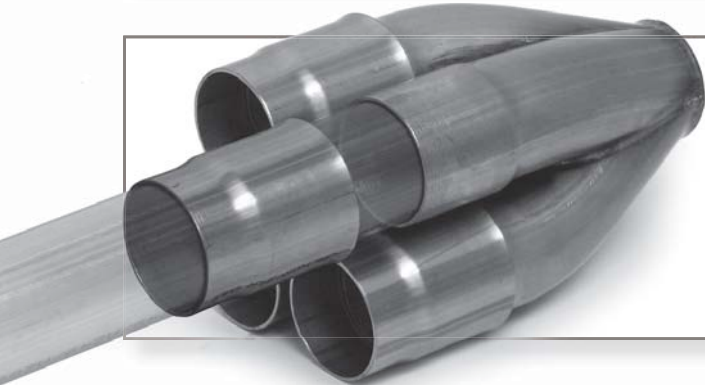
(MC) Merge Collector

The traditional merge collector can be used as a removable piece or welded. Pre-bent tubes are machine cut and hand fit to form a pyramid inside each collector for proper airflow management.



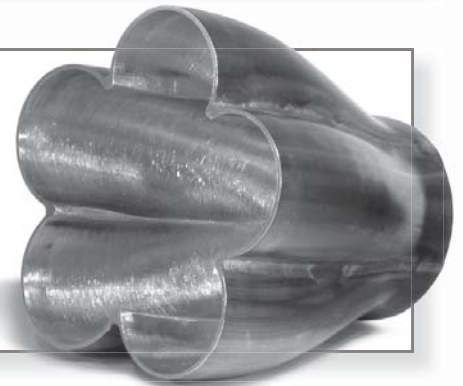
(DSMC) Double Slip Merge Collector

DSMC's are used primarily in turbo applications where the benefits of a true merge are needed and a removable collector offers the best design solution. The double slip receivers provide the extra seal necessary to prevent the loss of exhaust manifold pressure.



(WMC) Weld-On Merge Collector

WMC's are primarily used in turbo applications where space constraints are the biggest concern. The WMC's form is like that of a formed collector but, is constructed like a merge collector to provide the material strength necessary to withstand the stresses of a turbo application. WMC's also allow for the use of a smaller outlet size than is possible with a formed collector.



(FMC) Flat Merge Collector

This FMC style collector allows for maximum ground clearance. Applications include street rods and transverse mounted inline 4 cylinders and flat opposed 4 or 6 cylinders.



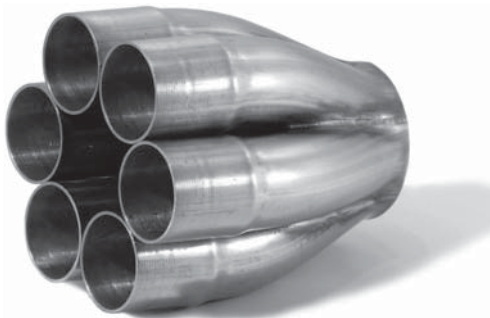
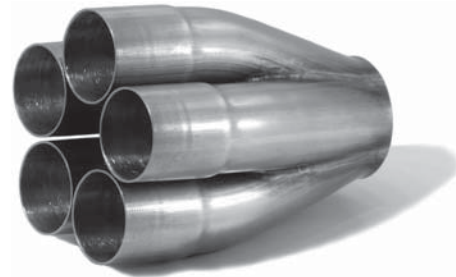
(BMC) Bent Merge Collector

Building a tuned header in a confined space can present some real challenges. The BMC is designed to help solve some of those problems that can arise when building a Tri-Y system. Rather than compromise tube length, this part allows you to place the primary or secondary 2 way collector while changing direction.



Merge Collectors

Merge Collectors are a common choice of professional engine builders and race teams. Pre-bent tubes are machine cut and hand fit to form a pyramid inside each collector. Merge Collectors are TIG welded to ensure professional performance and appearance. SPD Merge Collectors are cleaned and polished inside for maximum flow.



Collector shown
with: Megaphone
Reverse Cone
Wing-Tabs
Vac-U-Pan

Available Options

- ▶ 12°, 15°, 20°, 25° convergent angle
- ▶ 1.25" to 3.50" tube size
- ▶ 2 way - 8 way
- ▶ 304, 321, 1008
- ▶ .065", .049", (.035" SST only) wall thickness

When Ordering Specify

- ▶ Throat Size (*Minor Diameter*)
- ▶ Outlet Options
(*Flanges, Transition, Tubing*)
- ▶ Custom Finish Work
(*Tabs, Bungs, Wastegate Tube*)

Full Splayed



Half Splayed



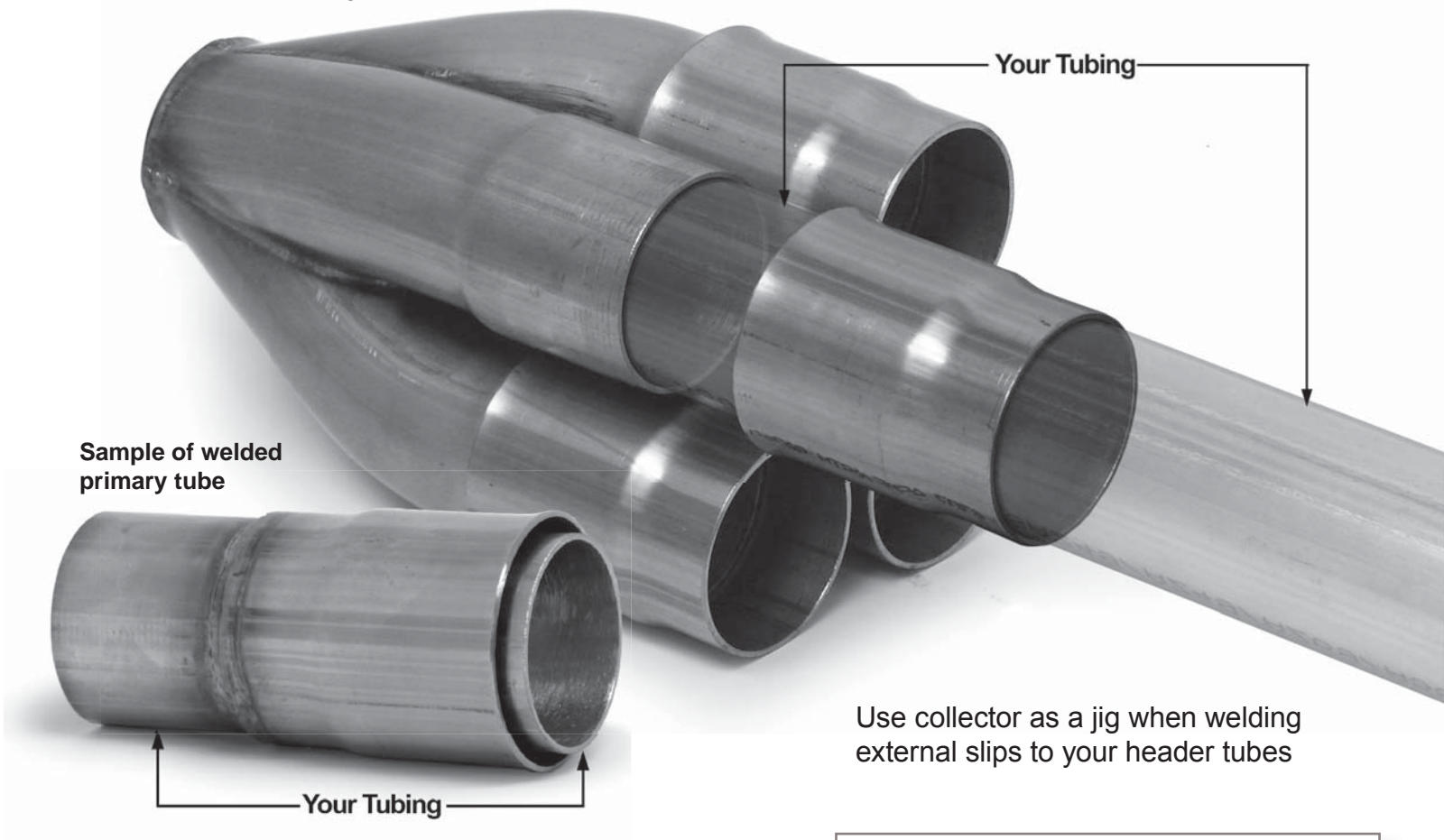
Parallel



See page 4 for part numbering system

Double Slip Merge Collectors

Double Slip Merge Collectors are used primarily in turbo applications where the benefits of a true merge are required and a removable collector offers the best design solution. The double slip receivers provide the extra seal necessary to prevent the loss of exhaust manifold pressure. The slip connection allows the system to expand and contract under the extreme temperature swings seen in turbo headers, reducing the potential for cracking.



Use collector as a jig when welding external slips to your header tubes

Available Options

- ▶ 12°, 15°, 20°, 25° convergent angle
- ▶ 1.25" to 2.50" (2 ways up to 3.50") tube size
- ▶ 2 way - 8 way
- ▶ 304, 321, 1008
- ▶ .065", .049", (.035" SST only) wall thickness

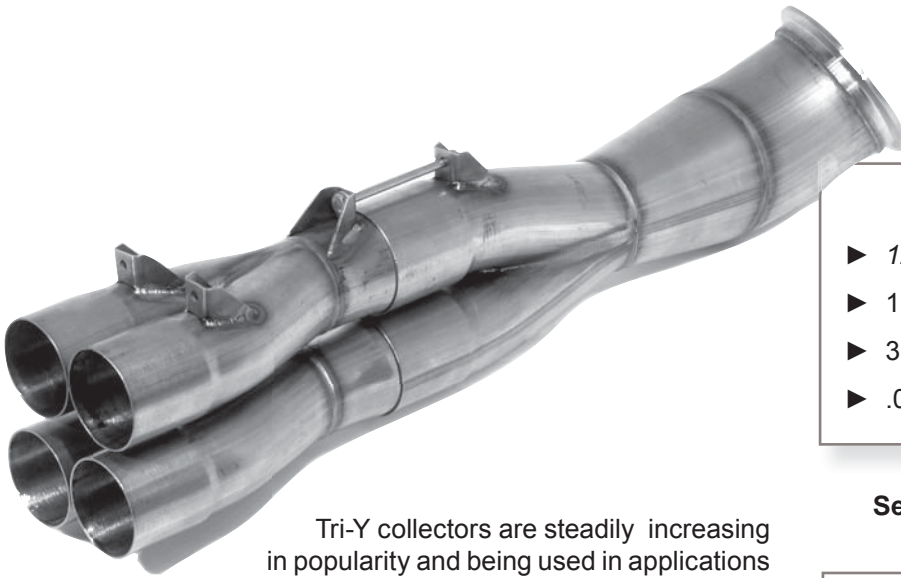
See page 4 for part numbering system

When Ordering Specify

- ▶ Throat Size (Minor Diameter)
- ▶ Outlet Options
(Flanges, Transition, Tubing)
- ▶ Custom Finish Work
(Tabs, Bungs, Wastegate Tube)



Tri-Y (Slip Together)



Available Options

- ▶ 12°, 15°, 20°, 25° convergent angle
- ▶ 1.25" and up tube size
- ▶ 304, 321, 1008
- ▶ .065", .049", (.035" SST only) wall thickness

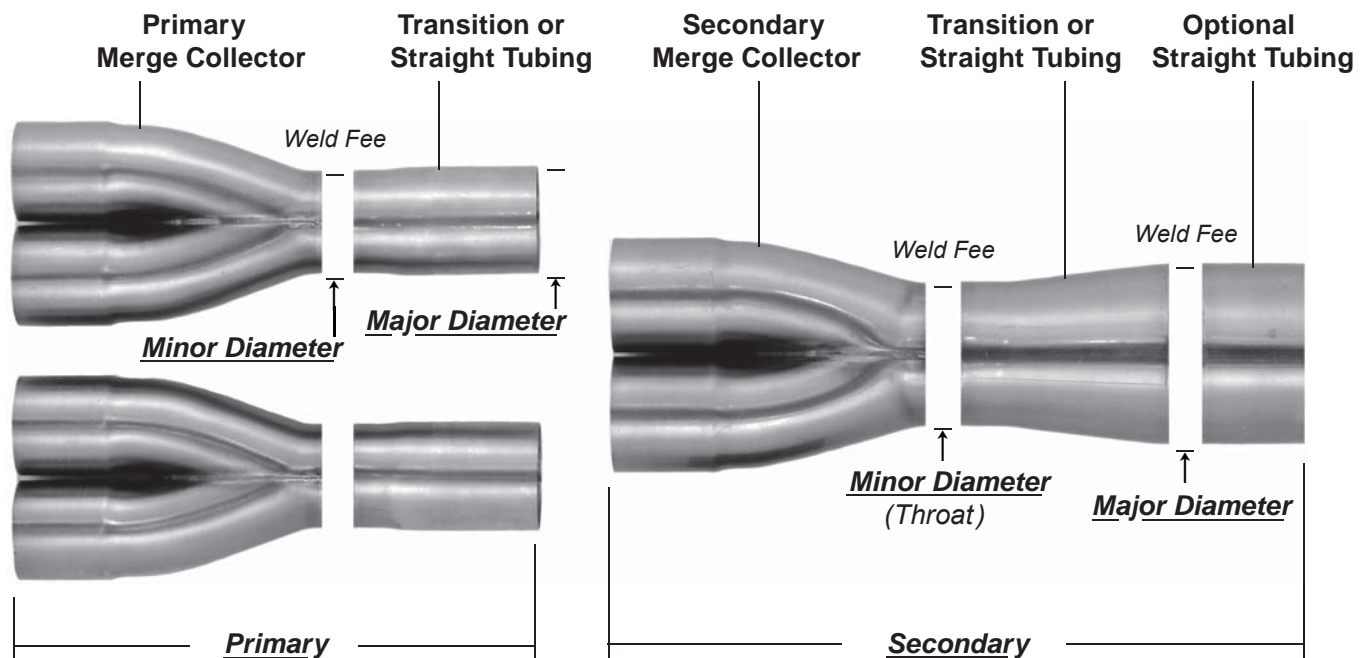
See page 4 for part numbering system

Tri-Y collectors are steadily increasing in popularity and being used in applications where 4 into 1 collectors were previously the only way to go. The attraction is a broader, less "peaky" power band. Most are used in applications with wide RPM swings and part throttle situations, such as street cars, road racing, late model stocks, and off-road racing. The Tri-Y stereotype of only low end torque applications continues to be erased as Tri-Y's break into new arenas like the NHRA and IHRA.

Adjustability is another selling point for the 4-2-1 design. You can change primary or secondary collector sizes, lengths and tube sizes between the Y's or even convert back to 4 into 1 to alter the engines power band. This allows you to keep up with ever changing track and/or weather conditions.

When Ordering Specify

- ▶ Throat Size (*Minor Diameter*)
- ▶ Outlet Options
(*Flanges, Transition, Tubing*)
- ▶ Custom Finish Work
(*Tabs, Bunges, Flanges*)



Tri-Y (Welded)

Available Options

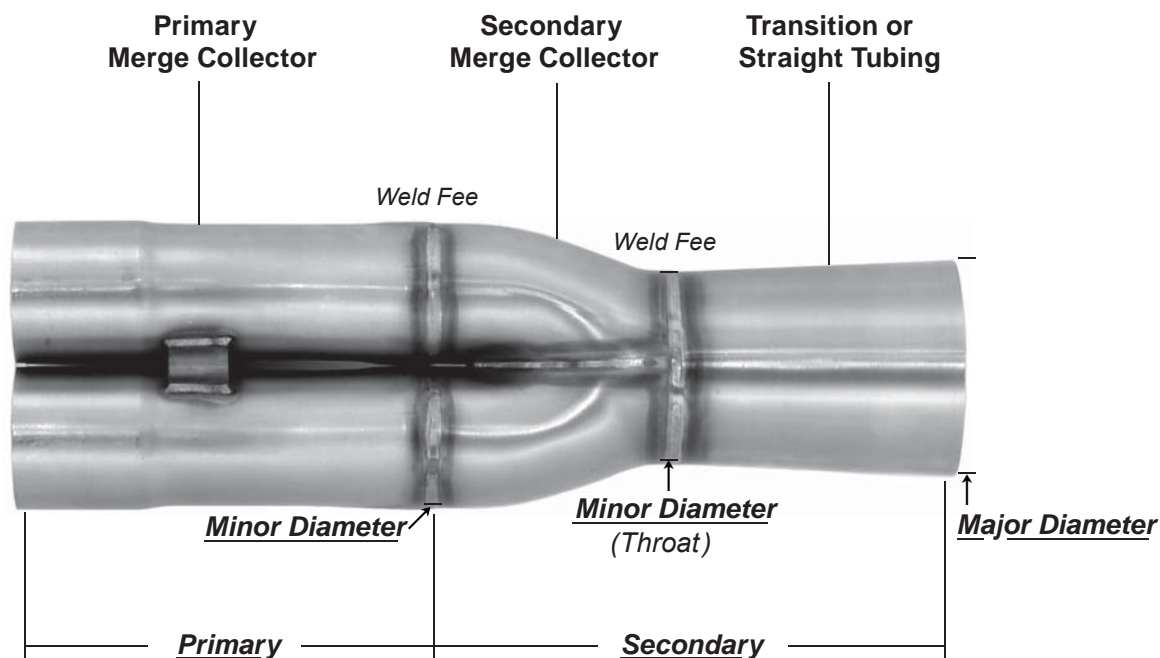
- ▶ 12°, 15°, 20°, 25° convergent angle
- ▶ 1.25" and up tube size
- ▶ 304, 321, 1008
- ▶ .065", .049", (.035" SST only) wall thickness

See page 4 for part numbering system

When Ordering Specify

- ▶ Assembled or Parts Only
- ▶ Throat Size (*Minor Diameter*)
- ▶ Outlet Options
(*Flanges, Transition, Tubing*)
- ▶ Custom Finish Work
(*Tabs, Bungs, Flanges*)

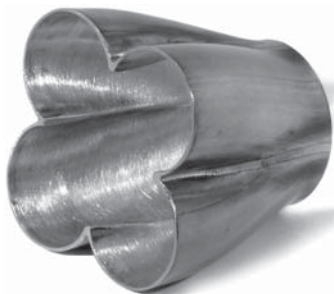
Welded Tri-Y headers offer the same benefits as the slip-together but without the adjustability. Once you have settled on a design, a welded Tri-Y can be built to the same specifications as a slip together. The advantage is reduction in weight and/or space. For applications such as midgets and motorcycles, these are huge concerns.



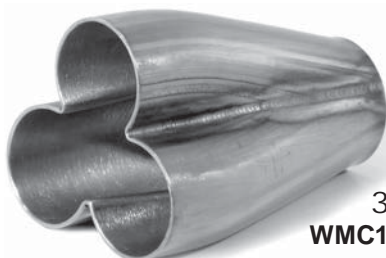
Weld-On Merge Collectors



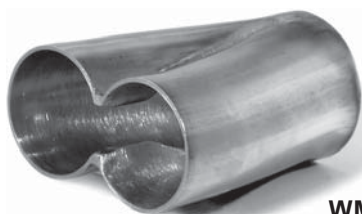
5 Way
WMC25188-5-30416



4 Way
WMC25188-4-30416



3 Way
WMC15150-3-30416



2 Way
WMC20163-2-30416

The advantage of a Weld-On Merge Collector is its size/length compared to a standard Merge Collector (see example below). The **WMC's** design is like that of a formed collector but, it is constructed like a merge collector to provide the material strength necessary to withstand the stresses of a turbo application. Its construction allows for smaller outlet sizes than are possible with a formed collector.

WMC's are made using a tube one size larger than the primary tubes on your application, allowing them to seat just inside the collector. After assembly the straight section is removed as well as the center.

NEW! SWMC (Slip-On Weld-On Merge Collectors)

We now offer WMC's with swaged slip-over tubes on the inlet. These collectors allow for the largest possible outlet sizes on our shortest collectors.

(Available for primary tube sizes up to 2.75")

SWMC

*No Internal Pyramid
(As found in MC)*



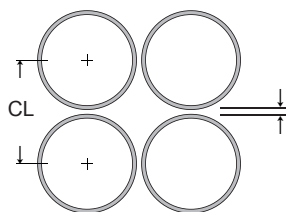
Available Options

- ▶ 12°, 15°, 20°, 25° convergent angle
- ▶ 1.25" - 3.50" tube size
- ▶ 2 way - 6 way
- ▶ 304, 321, 1008
- ▶ .065", .049", (.035" SST only) wall thickness

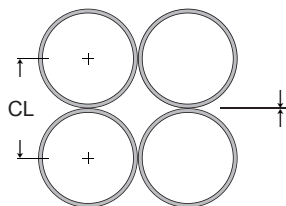
See page 4 for part numbering system

When Ordering Specify

- ▶ Turbo or Street Style
- ▶ Throat Size (*Minor Diameter*)
- ▶ Outlet Options
(*Flanges, Transition, Tubing*)
- ▶ Custom Finish Work
(*Tabs, Bungs, Wastegate Tube*)



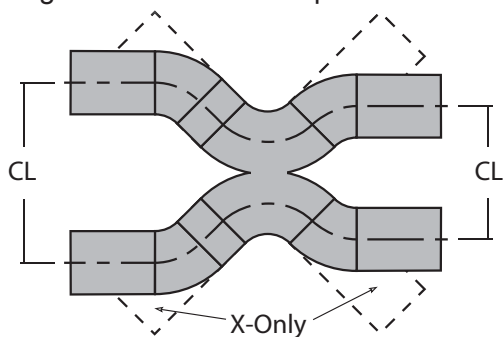
Turbo Style WMC's are built with a slightly wider centerline. This leaves a gap between each of the header pipes allowing for expansion. Use shims to maintain this spacing when welding the collected header tubes together.



Street Style WMC's are designed for header tubes that are collected together with a net fit (no clearance). This makes them easy to assemble.

Y & X Collectors

SPD Merge X Collectors are made from 1D Radius 90 degree bends. The bends are welded together around a common port. This helps to equalize the pressure between the left and right banks of an exhaust system without sacrificing volume. A stiffener plate is added to each side to help support the weld around the merge.



Shown as X-Only

Example:
MXC300-30416XO



Custom Merge X's can be special ordered finished to your specifications.
Call for recommendations and assistance.

SPD Y-Collectors are essentially 25 degree 2 way Merge Collectors with wider spacing between the inlet legs.
On the table at the bottom of the page you will find the standard **inlet center lines**

When Ordering Specify	Splayed "Y" Special Order	
▶ Throat Size (Minor Diameter)	Full Splayed	Half Splayed
▶ Outlet Options (Flanges, Transition, Tubing)		
▶ Inlet Options (Swedging, Flanges)		
▶ Custom Centerline		
▶ Custom Finish Work (Tabs, Bunges, Wastegate Tube)		

Weld Fee Applies ▶



I.D. I.D.
Standard
Both Legs Swedged



O.D. I.D.
SPD Sportsman
One Leg Swedged



O.D. O.D.
Straight Inlets
No Swedging



I.D. I.D.
X-Pipe

Inlet Tube Size (ID)	SPD Part #	Inlet Center Line	Outlet Sizes (OD)
(2) 2.00"	YC200	3.00	2.00" - 2.50"
(2) 2.25"	YC225	3.25	2.25" - 3.00"
(2) 2.50"	YC250	3.50	2.50" - 3.50"
(2) 2.75"	YC275	3.75	2.75" - 3.50"
(2) 3.00"	YC300	4.25	3.00" - 4.00"
(2) 3.50"	YC350	5.00	3.50" - 4.50"

YC 200 - 304 16

For Stainless Steel use 304 or 321
For Mild Steel leave blank

16ga. 18ga. 20ga.

Style Inlet Tube O.D. Material Type Gauge (Wall Thickness)