

JM50 Build Guide

Combustor

WEAR GLOVES AND EYE PROTECTION.

Cut out front and rear combustor end caps using sharp metal shears. Use a bench grinder to remove excess edges and make as round as possible while leaving 90 deg. lip. Determine the best method with the tools you have available to remove centers. Make sure to not over cut vapor tube ring center where it sits on NGV. As a decent seal is necessary.

Use hose clamps to hold outer liner and endcaps together. Using an electric spot welder tack outer shell and front cap first. With NGV attached to vapor tube ring as if final, set the appropriate length on the inner liner making sure it slides INTO center recessed hole in the NGV. NOT around the outside of the center hole. Use vapor ring to mock up combustor and tack areas together. **DO NOT TACK VAPOR RING YET.**

Drill vapor tube ring separate. Once cut out, the ring will be fragile so start your drill holes small and work your way up. Insert vapor tubes and braze tubes to ring.

The inner (center) combustor liner will determine the flushness of the vapor ring face onto the NGV. The inner (center) combustion liner will need to be trimmed at the front slightly. Adjust inner liner length into NGV hole so that face of the vapor ring and NGV edge are flush and check that outer combustor liner is correctly placed. Braze inner liner to front end cap and secure. Dremel off the front of the inner (center) combustor liner once basket is tacked together and completed.

The NGV outer edge should match up with the inner face of the vapor tube ring and provide a smooth transition for exhaust gases to exit without turbulence. Did we mention to WEAR GLOVES AND EYE PROTECTION?

Hightemp silver solder can be used to tack front cap to inner and outer liner and vaportubes to vapor ring as well as fuel manifold. An electric spot welder works well for tacking liners together (round) and rear vapor tube ring to outer liner. As long as areas brazed are impinged with air, high temp (1200deg) silver solder can help finalize the last steps as spot welding tight areas of the combustor can be difficult.

JM50 Build Guide

Start Up

Mix oil with kero or diesel at 4% oil to fuel ratio.

Always wear proper PPE.

Mobile Jet Oil II is a good choice of lubricant. Do not use 2 cycle oil or standard oil. Very high temps will cause standard lubricants to fail.

Diesel fuel is recommended for your first run.

Pre lube bearings by adding a little fuel with throttle prior to running. **Do not pool fuel in engine. Blow air to clear residual fuel prior to starting process.**

Set engine up in a secure stand. Use an air compressor to spool engine up to RPM. A leaf blower may not put out enough air and you could potentially overheat your engine.

Use a 12v RC fuel pump and an voltage attenuator for throttle.

Use a propane valve for propane start throttle control. Open propane valve with low RPM and light rear of engine using a torch. Once lit open propane more and slowly bring RPMs up with compressed air while heating engine with propane for aprox 45-60 secs. Be sure to add liquid fuel soon as that is your bearing lubrication.

Once liquid fuel is added engine should spool up RPMs. SHUT OFF PROPANE & KEEP BLOWING AIR into engine until engine is at running temp and rpms. Find the sweet spot of compressor wheel for max rotation. Listen to engine and get those RPMs up. Too much flame out the back is a sign of too much fuel or not enough RPMs.

JM50 BUILD GUIDE START UP (CONT)

Once your engine is running feel engine for vibration. Engine may be hot so be careful. Keep your fingers away from compressor wheel. It can easily remove a finger tip. If there is vibration (lots) try rotating compressor wheel from turbine wheel 90 degrees.

Shut off engine by decreasing voltage supply to throttle. ADD SUFFICIENT COOL AIR while engine is spooling down to allow engine to cool.

To ensure success take a scientific approach to your jet engine project. Take your time and do it right. And you will experience the joy of a successful first run.

Wear GLOVES AND EYE PROTECTION and keep a fire extinguisher close.

If at anytime you are experiencing issues STOP AND FIX THE PROBLEM! This is very important.

The problem is not going to magically go away. And repeating the same thing while getting the same results will not increase your chances of success. Infact it lowers them.

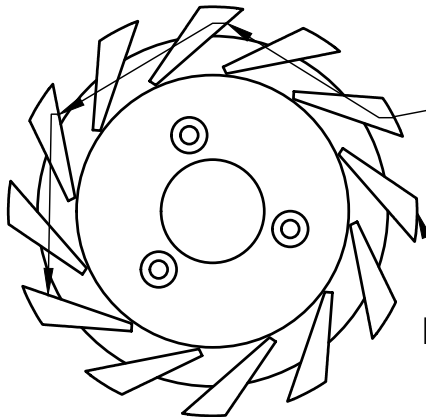
Questions?

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WWW.MINIJETENGINE.COM**

ALIGNMENT

For accurate alignment of diffuser, compressor wheel and nozzle, Invert diffuser and nozzle into shell when marking holes. (hint: The entire assembly can be inserted into shell with nozzle facing exhaust hole and will give you a visual on where you may need to center your compressor wheel.)

Mark 6 holes every other diffuser vane being careful not to drill outside the diffuser vane edges. Once holes are drilled in diffuser, insert diffuser and nozzle inverted into shell and mark where you will drill your holes on nozzle.

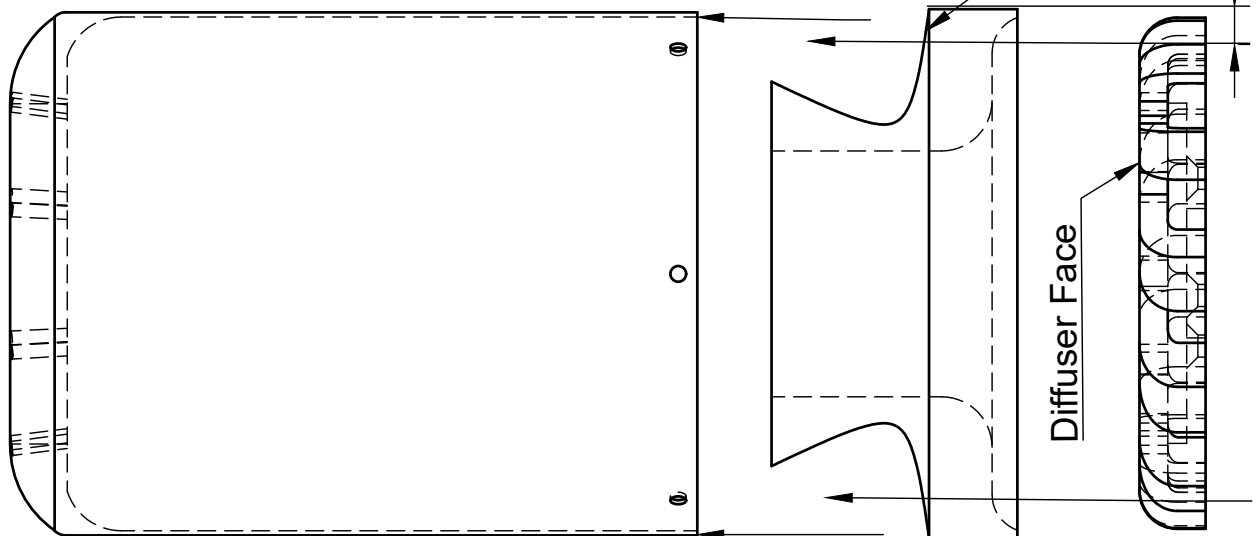


Drill 6 Holes every other diffuser vane. Aproximately 5mm [measure] in from the edge. Tap hole with the appropriate tap.

Screw holes should be aproximately 5mm (measure) away from diffuser edge and centered in diffuser vane.

Make sure screw heads are centered and sit well within flat area of nozzle.

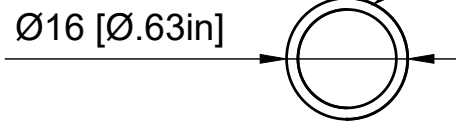
±5mm [.19in]



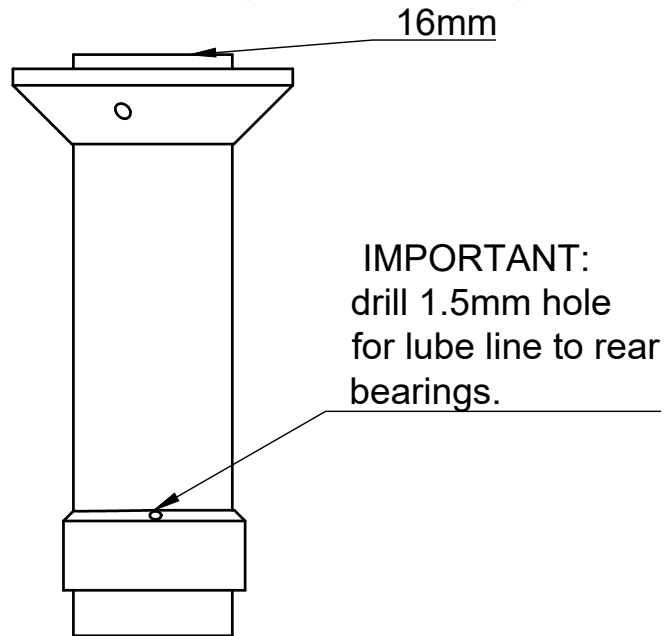
Dept. Design	Technical reference Jm50Kit Align	Created by Minijets	Approved by cp	3/2021	3/2021
		Document type build	Document status Active		
		Title j50 nozzle Align	DWG No.		
		Rev.	Date of issue	Sheet 1/1	

Axle hub and wave spring

Make sure wave spring fits snug into hole.
 If wave spring is smaller than axle hub hole diameter, slightly bend outwards until outer wave spring measurement is 16mm



Wave spring goes on the front of axle hub and must be inserted FIRST into axle hub prior to inserting FRONT bearing.



IMPORTANT:
 Bearings will bind under heat/stress without a wave spring and damage will occur!

Dept. Design	Technical reference JM50 AXLEHUB	Created by Carlos Perez	3/27/2021	Approved by CP1411	03/21
		Document type BUILDGUIDE	Document status ACTIVE		
		Title JM50AxleHUB	DWG No. 1119		
		Rev.	Date of issue	Sheet 1/1	

Bearings

IMPORTANT:

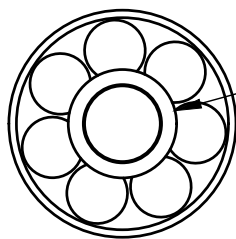
FAILURE TO FOLLOW THESE INSTRUCTIONS WILL DAMAGE BEARINGS. DO NOT APPLY PRESSURE ON INNER RACE FROM THE THIN SIDE OF BEARING!

The bearings included in this kit are angular bearings so they must be inserted a specific way or damage to bearing will occur.

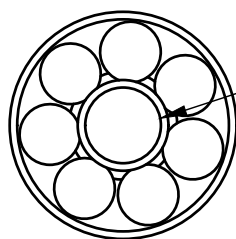
Each bearing has a thick center race on one side and a thin center race on the other side.

The thick side must face outwards towards turbine/compressor wheel. And the thin side must face inwards towards center of engine. An improperly inserted bearing will not rotate freely and cause drag.

Excessive pressure on thin side of bearing while assembling your engine may cause inner chase and ceramic balls to disassemble.



Thick center race side faces outwards away from center of engine.

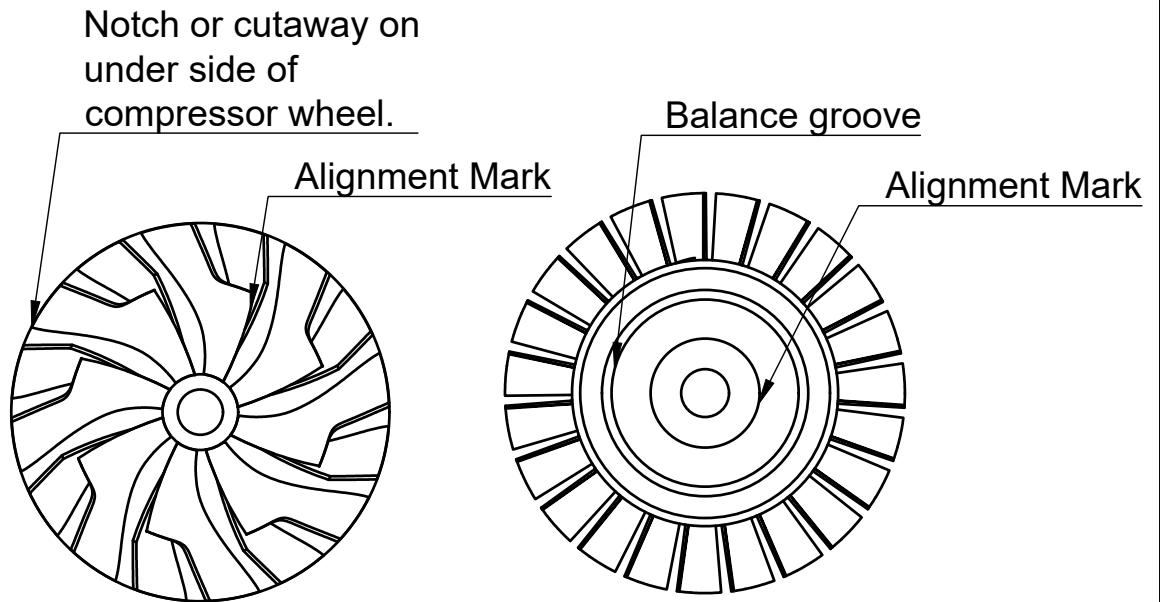


Thin center race side faces inwards toward center of engine.

The bearings are 8x16x6mm hybrid ceramic angular bearings with steel chase and silicon nitride ceramic balls.

Dept. DESIGN	Technical reference JM50BEARINGS	Created by CP1411	3/2021	Approved by CP1411	03/21
		Document type	Document status ACTIVE		
		Title JM50bearing	DWG No. 11115		
		Rev.	Date of issue	Sheet 1/1	

Compressor And Turbine wheel Alignment



Our turbine wheels and compressor wheels are pre-balanced. Make sure contact areas are clean and there is no debris present when mounting to the shaft with bearings.

Align the markings on the compressor wheel with the turbine wheel.

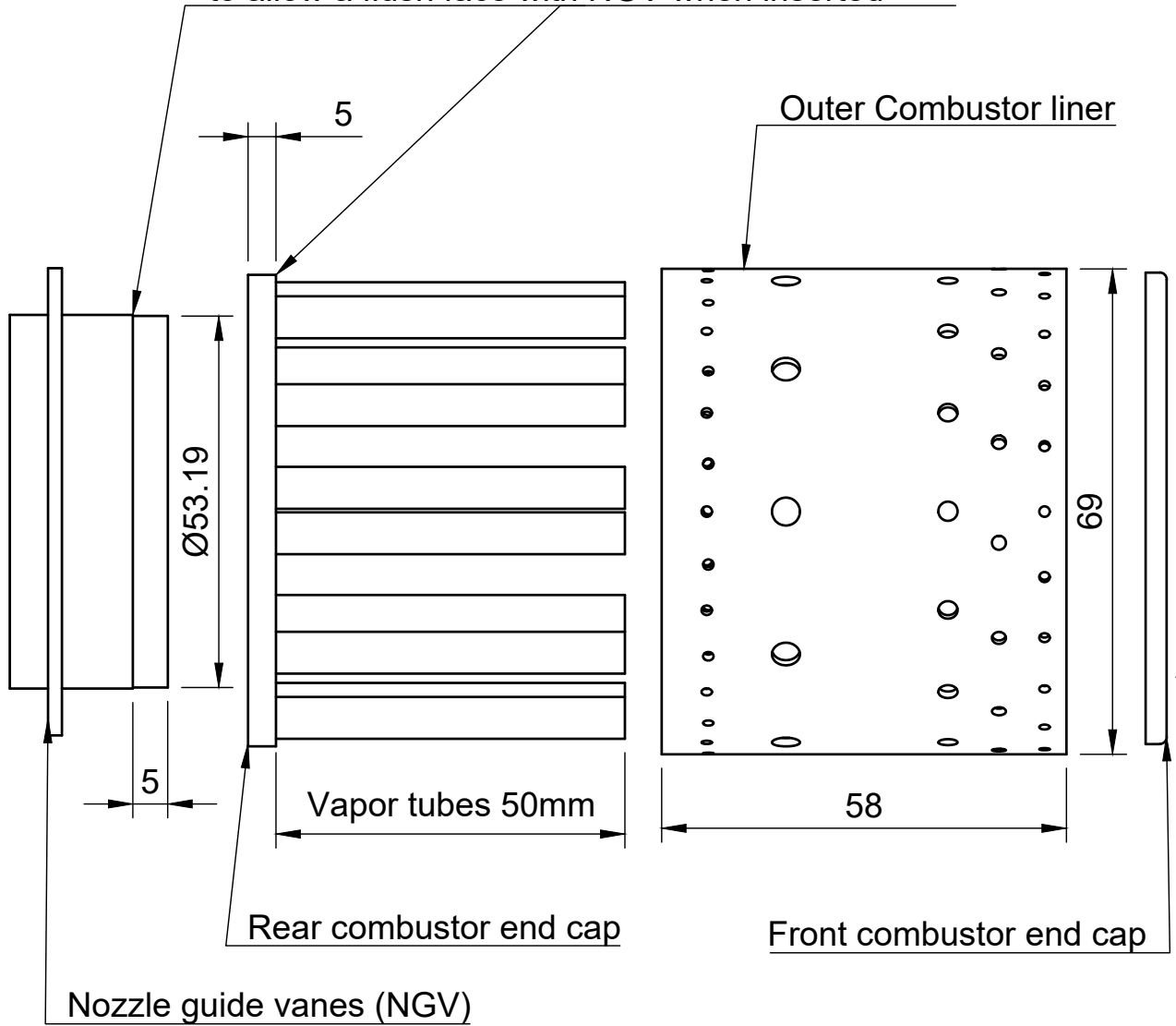
If the alignment marks have worn away, align the balance-cut area of the turbine wheel with the balance-cut (or notch) area of the compressor wheel.

if you feel there is excessive vibration when the engine is running turn wheels 180 degrees with alignment marks opposite of each other. If there is still some vibration present rotate the front or rear wheel 90 degrees in either direction.

Dept.	Technical reference	Created by MiniJets	Approved by	
		8/2021		
		Document type	Document status ACTIVE	
		Title JM50 Balance	DWG No.	
			Rev.	Date of issue
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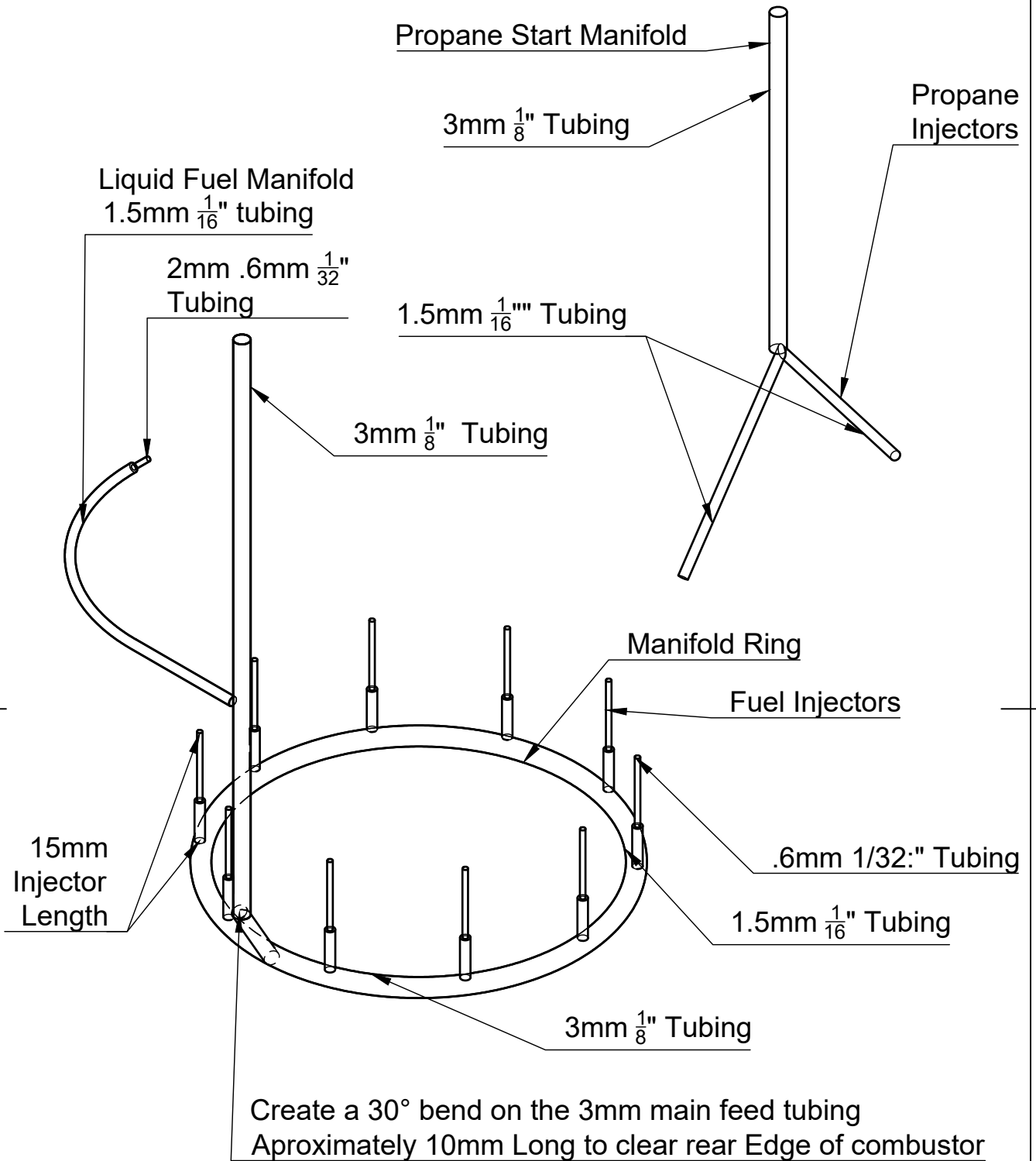
Combustor

Combustor should only go back to this line (5mm) to allow a flush face with NGV when inserted



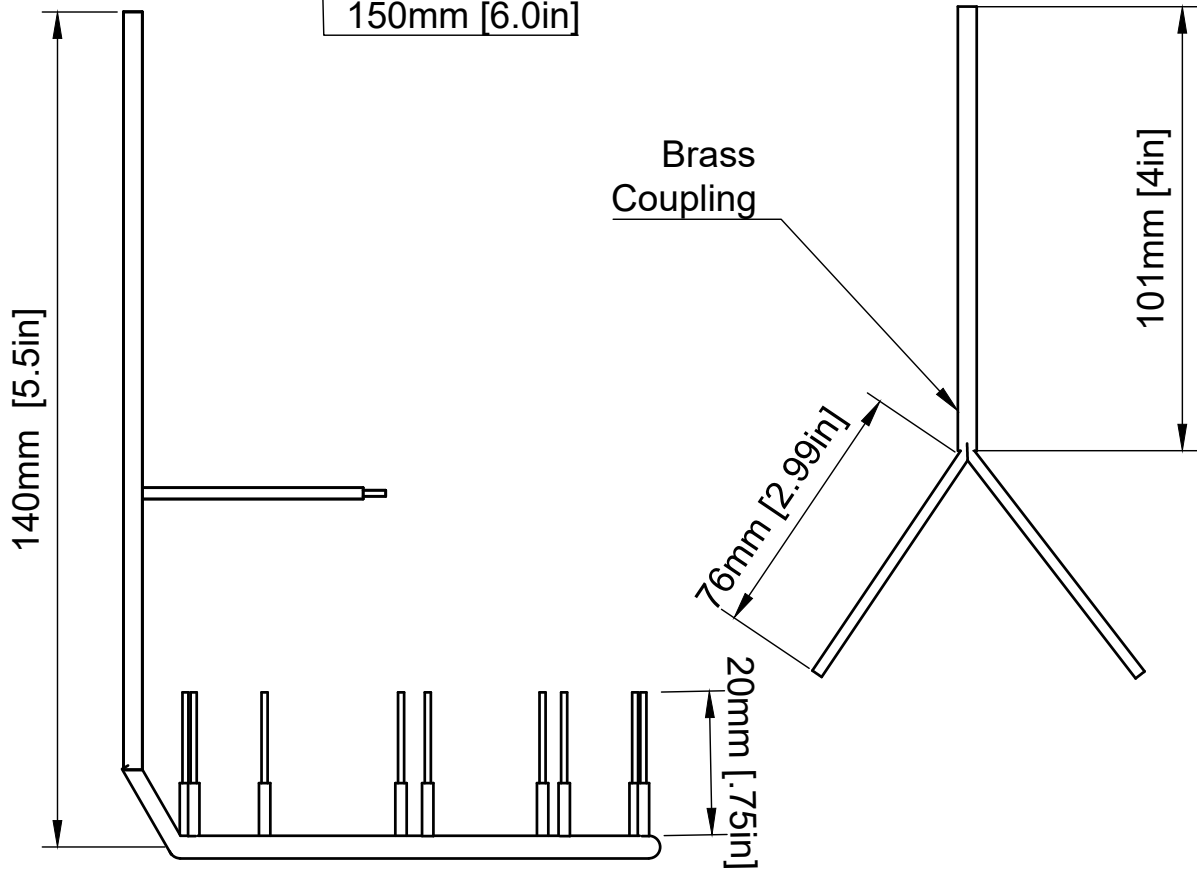
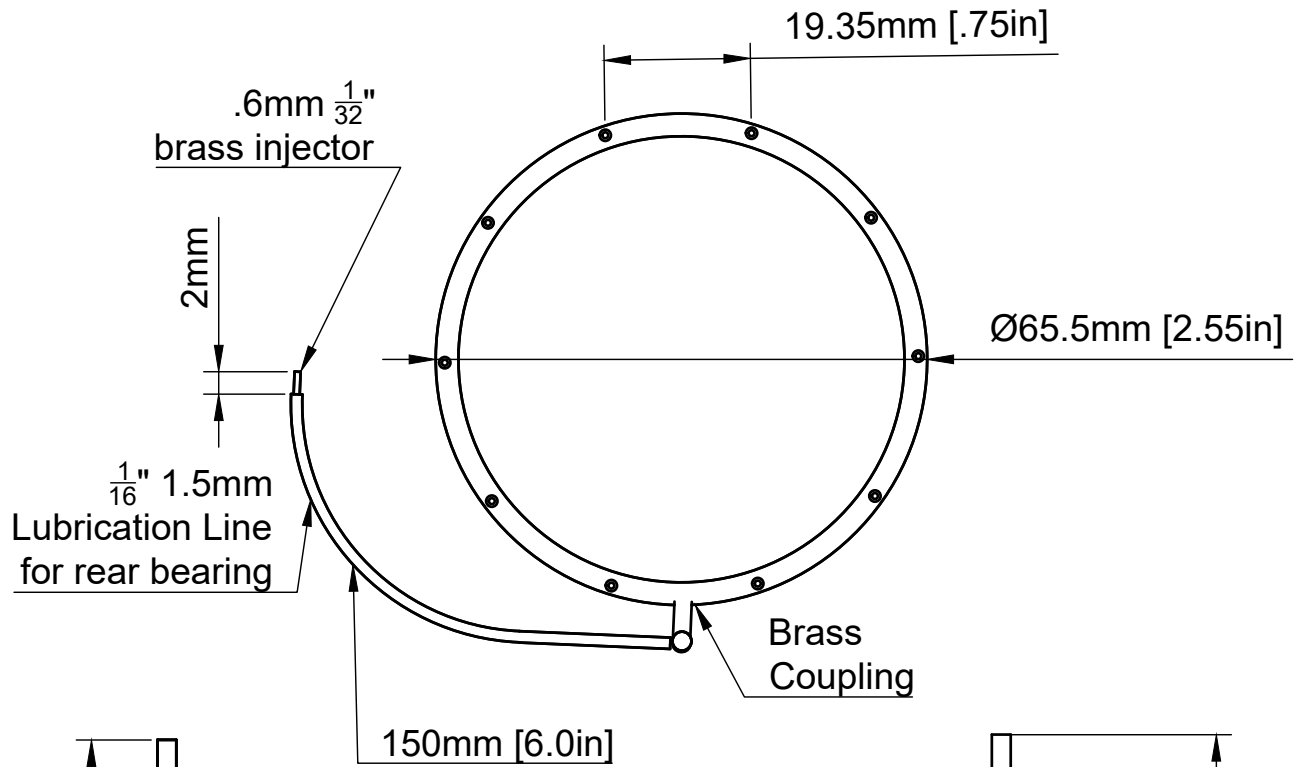
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		Document type JM50buildguide	Document status ACTIVE		
		Title jm50combustor build	DWG No. 11116		
		Rev.	Date of issue	Sheet 1/1	

JM50 Fuel Manifold sheet A



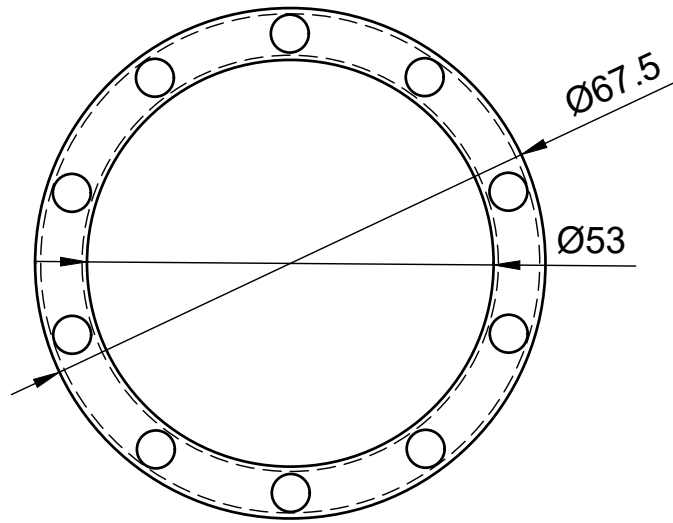
Dept. Design	Technical reference Jm50Combustor	Created by Minijets	2021	Approved by CP	03/21
		Document type Public	Document status Active		
		Title Fuel Manifold A Specsheet	DWG No. 21010		
		Rev.	Date of issue	Sheet 1/1	

JM50 Fuel Manifold Sheet B



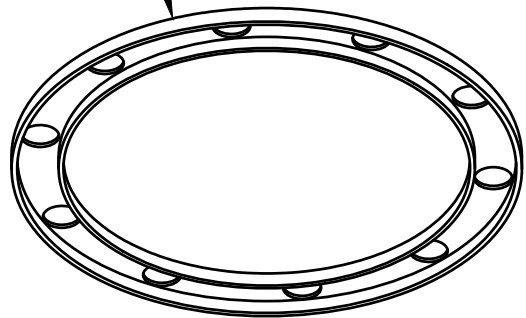
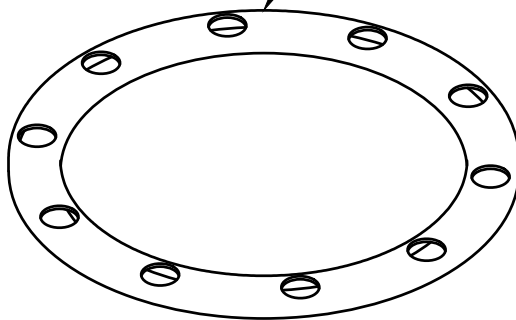
Dept. Design	Technical reference	Created by Minijets	Approved by cp
		03/2021	03/21
		Document type Jm50 build guide	Document status Active
		Title Fuel Manifold B Specsheet	DWG No. 1112
		Rev.	Date of issue 03/21
			Sheet 1/1

Rear end cap (Vapor tube ring)



Smooth side
faces inwards into
combustion chamber.

Recessed side
faces outwards
towards NGV

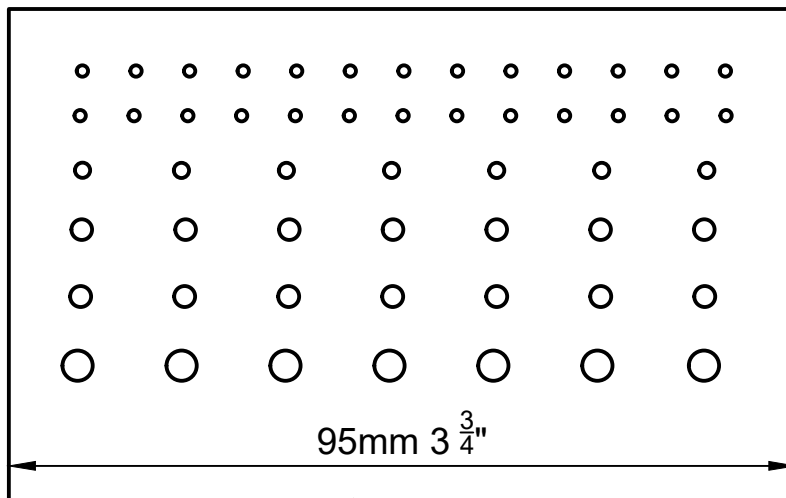


Dept. DESIGN	Technical reference	Created by MINIJETS	3/21	Approved by CP1411	03/21
		Document type JM50BUILDGUIDE	Document status ACTIVE		
		Title Rear combustor insert	DWG No. 1117		
		Rev. 1	Date of issue 03/21	Sheet 1/1	

JM50 Inner Combustor Liner

Leave $\frac{3}{8}$ " for overlap when cutting sheet metal liner.

Front
(Towards
compressor
wheel)



Drill hole sizes:

- 1.5mm
- 1.5mm
- 2mm
- 2.75mm
- 2.75mm
- 4mm

REAR
(Towards
NGV)

when drilling holes, rear edge of template must line up with rear of sheet metal tube (inner liner) you created.

Excess material of inner liner tube should be trimmed off of the front. Once combustor is *fully* completed trim any excess sheet metal from *front* of inner liner.

Dept. Design	Technical reference JM50 inner liner	Created by Carlos Perez	3/2021	Approved by c445	03/21
		Document type	Document status Active		
		Title JM50 Inner combustor liner	DWG No. 11113		
		Rev.	Date of issue	Sheet 1/1	

59mm $2\frac{3}{8}$ "

Holes front to rear.

1.5mm

2mm

2.75mm

4mm

1.5mm

**Make sure to leave
sheet**

**metal overlap for
tacking combustor
together**

**Front/
Intake**

**Rear/
Exhaust**

222mm $8\frac{3}{4}$ "

