



PRODUCT OPERATING MANUAL

PANBLAST™

TORNADO INTERNAL PIPE BLASTING TOOL

Manual Number: ZVP-PC-0068-00

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1.0 GENERAL INFORMATION

1.1 Panblast notice to purchasers and users

1.1.1 All products and equipment designed and manufactured by Panblast are intended for use by experienced users of abrasive blasting equipment and its associated operations and abrasive blasting media.

1.1.2 It is the responsibility of the user to:

- Determine if the equipment and abrasive media are suitable for the users' intended use and application.
- Familiarize themselves with any appropriate laws, regulations and safe work practices, which may apply within the users working environment.
- Provide appropriate operator training and a safe working environment including operator protective equipment such as, but not limited to, safety footwear, protective eyewear and hearing protection.

1.1.3 Panblast Standard Terms and Conditions of Sale apply. Contact your local Panblast office should you require any further information or assistance.

1.2 **⚠ ! WARNING! – READ THIS SECTION CAREFULLY BEFORE USING THIS EQUIPMENT/APPARATUS.**

1.2.1 Heavy metal paint, asbestos and other toxic material dusts will cause serious lung disease or death without the use of properly designed and approved supplied air respiratory equipment (SAR) by blast operators and all personnel within the work site area.

1.2.2 The compressor must have adequate output and the plumbing between the compressor and the point of attaching the air supply hose must have sufficient capacity to supply the volume of air at the pressure required.

1.3 Standard safety precautions

1.3.1 Approved safety eyewear, hearing and footwear protection should be worn at all times by the operator and anyone else in the immediate area that may be exposed to any hazards generated by the abrasive blasting process.

1.3.2 Suitably approved respiratory protection should also be worn when handling abrasive media, abrasive refuse dust and when carrying out any service/maintenance work where any dust may be present.

1.3.3 Any work performed on electrical wiring or components must only be carried out by suitably qualified and registered electrical trades personnel.

1.3.4 Under no circumstances should any safety interlocks / lockouts or features be altered or disabled in any way.

1.3.5 All equipment must be isolated from the compressed air supply and electrical power prior to any service or maintenance work being carried out.

1.3.6 All care must be taken by the operator(s) when lifting or moving equipment or components in order to prevent injury. Blast pots must always be emptied of abrasive media before any attempt is made to move them.

1.3.7 Any modification of the equipment and/or components or use of non-genuine PanBlast™ replacement parts will void warranty.

1.3.8 Always check the Material Safety Data Sheet (MSDS) on the abrasive media being used to ensure that it is free of harmful substances, in particular, free silica, cyanide, arsenic or lead.

1.3.9 Test the surface that is to be blasted for harmful substances, taking the appropriate measures to ensure the safety of the operator and others.

1.3.10 The operator should carry out a daily inspection of all related components prior to startup of all wearing and safety items to ensure they are in correct operating order. In particular check all hose couplings and nozzle holders, ensuring that all hose couplings are fitted correctly, the safety locking pins are engaged and in good order. Always install safety whip check cables at every hose connection. Ensure that the blast nozzle has been securely screwed into the nozzle holder and the nozzle holder has been secured to the blast hose correctly and all screws are engaged.

NOTE: UNDER OSHA 1915:34(c)(1)(iv) DEAD MAN CONTROL. A DEADMAN CONTROL DEVICE SHALL BE PROVIDED AT THE NOZZLE END OF THE BLAST HOSE EITHER TO PROVIDE DIRECT CUTOFF OR TO SIGNAL THE POT TENDER BY MEANS OF A VISUAL AND AUDIBLE SIGNAL TO CUT OFF THE FLOW, IN THE EVENT THE BLASTER LOSES CONTROL OF THE HOSE. THE POT TENDER SHALL BE AVAILABLE AT ALL TIMES TO RESPOND IMMEDIATELY TO THE SIGNAL.

2.0 INTRODUCTION

2.1 The Tornado Internal Pipe Blasting Tool Set is designed to clean the internal surfaces of pipes from 200mm (8") to 900mm (36") I.D. The tool is connected to a pipe lance that is coupled to a standard blast hose in place of the blast nozzle.

A carriage fitted to the tool supports the tool and centers it within the pipe, the tool is positioned at the far end of the pipe and slowly withdrawn, as the tool travels down the pipe abrasive media is thrown from a twin nozzle rotating blast head. The speed of the rotating head is controlled by a centrifugal speed limiter. There are three types of centering carriages available to suit small, medium and large diameter pipes.

Refer to the charts below for the centering carriage assemblies, blast nozzles and air requirements to suit various applications.

2.2 Application table

Pipe I.D.	Nozzle Sizes	Rotating Head	Carriage Selection	Compressed Air Requirement
200 mm (8") 300 mm (12")	ATN-4S 6.4 mm (1/4")	Small	Small Range scissor	6.37 m ³ /min 225 cfm
300 mm (12") 500 mm (20")	ATN-5T 8 mm (5/16")	Small	Mid Range	10.6 m ³ /min 375 cfm
600 mm (24") 915 mm (36")	ATN-6T 9.5 mm (3/8")	Small	Mid Range	15.3 m ³ /min 540 cfm
1015 mm (40") 1525 mm (60")	ATN-6 9.5 mm (3/8")	Large	Large Range	15.3 m ³ /min 540 cfm

Table 2.2

NOTE: FOR PRATICAL PURPOSES WE RECOMMEND A MINIMUM COMPRESSED AIR SUPPLY OF AT LEAST 50% HIGHER THAN THE NOZZLE REQUIREMENT LISTED ABOVE.

⚠ ! WARNING ! - ENSURE THAT THE BLAST NOZZLE SELECTION IS MATCHED TO THE COMPRESSED AIR VOLUME AS PER TABLE 2.2 - THE USE OF UNDERSIZED NOZZLES WILL SEVERELY DAMAGE THE TORNADO TOOL.

2.3 Abrasive recommendations

The following list recommends the maximum abrasive sizes to be used with the Tornado Internal Pipe Blasting Tool Set

Garnet	#20/40
Steel Grit	SAE G25
Steel Shot	SAE S230
Chilled Iron Grit	BSS G34

Table 2.3

3.0 INITIAL SET UP INSTRUCTIONS

3.1 The Tornado Internal Pipe Blasting Tool Set requires the same basic blast equipment as any other abrasive blast blasting operation, utilizing an air compressor and abrasive blast pot system, the difference being that the blast nozzle is replaced by the Tornado tool, carriage system and pipe lance. The lance (customer supply) should be the same length as the pipe to be blast cleaned. Two (2) PanBlast™ STC-1 Threaded Couplings (BAC-HC-PB-0009) are supplied to fit the lance to the Tornado tool and an existing blast hose coupling.

3.2 Check the compressed air requirement for the appropriate blast nozzles to suit your application, the standard Tornado tool is supplied with 2 x ATN-4S 6.4 mm (1/4") tungsten carbide blast nozzles as standard, ensure you have adequate compressed air capacity for your application.

⚠ ! WARNING ! - NEVER EXCEED THE MAXIMUM OPERATING PRESSURE OF 150PSI

(10.4BAR), AS THIS MAY RESULT IN SERIOUS INJURY OR DEATH.

3.3 The Tornado tool is also supplied standard with the 19mm 3/4" small BSP/NPSM Rotating Head (BAC-BA-0134-00) that suits the PanBlast™ Fine Thread Series ATN-S Nozzles. Should it be necessary to run the coarse thread long venturi ATN blast nozzles it is necessary to run these nozzles with the 2" Tornado Large Rotating Head Assembly, BAC-BA-0206-00.

NOTE: IN ORDER TO RUN THE LONG VENTURI COARSE THREAD BLAST NOZZLES WITH THE LARGE ROTATING HEAD A MINIMUM PIPE INTERNAL DIAMETER OF 1015 MM (40") IS RECOMMENDED.

⚠ ! WARNING ! - THE ROTATING HEADS ARE DESIGNED TO BE USED WITHOUT RUBBER NOZZLE WASHERS. ONLY USE THREAD SEALANT FOR THREAD SEALING BETWEEN THE NOZZLE THREADS AND THE ROTATING HEAD THREADS. THE USE OF NOZZLE WASHERS, OR MODIFICATIONS TO THE ROTATING HEAD, MAY RESULT IN TOOL MALFUNCTION OR SHORTENED TOOL LIFE.

3.4 Fitting of the small range scissor carriage

3.4.1 Slide the back end of the Tornado tool into the expanded carriage, through the front collar and into the rear collar, the rear collar should be located in front of the breather vent holes on the seal retainer body, **do not block** the vent holes. Now tighten the two (2) set screws on the rear collar.

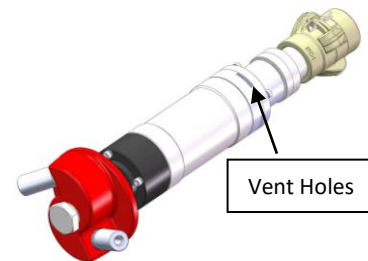


Figure A

⚠ ! WARNING ! - IF THE REAR COLLAR BLOCKS OR OBSTRUCTS THE VENT HOLES, IT WILL CAUSE SEVERE WEAR ON THE FLANGE WEAR SLEEVE AND DAMAGE THE INTERNAL SEAL AND BEARINGS.

3.4.2 Adjust the carriage to suit the internal diameter of the pipe by expanding the carriage scissor mechanism and tighten the two (2) socket set screws on the front collar.

3.4.3 Check that the rotating head spins freely.

3.5 Fitting the large and mid range carriages

3.5.1 The large and medium range carriages are each supplied with a front carriage body, a rear lance carriage body and appropriate leg assemblies for varying pipe I.D.'s.

3.5.2 Slide the back end of the Tornado tool into the larger front carriage body, position the front of the body flush with the front face of the centrifugal speed limiter housing, ensure that

the body is located in front of the breather vent holes on the seal retainer body, **do not block** the vent holes. Now tighten the two (2) screws on the body to fix the body to the tool.

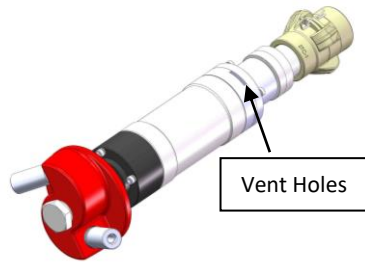


Figure B

⚠ ! WARNING ! - IF THE BODY OF THE CARRIAGE BLOCKS OR OBSTRUCTS THE VENT HOLES, IT WILL CAUSE SEVERE WEAR ON THE FLANGE WEAR SLEEVE AND DAMAGE THE INTERNAL SEAL AND BEARINGS.

3.5.3 Fit the smaller rear lance carriage body to the lance pipe which should be positioned to prevent excess bowing of the lance pipe and angular misalignment of the coupled connections.

3.5.4 Now fit the appropriate leg assemblies to the front carriage body and rear lance carriage body, adjust so that the Tornado tool and the lance are centered within the pipe, and also check that the wheel assemblies are in line with the direction of travel.

NOTE: THE LARGE AND MID-RANGE CARRIAGES TRACK BEST WHEN SET UP IN A "Y" CONFIGURATION, ONE LEG POINTING DOWN.

3.6 Fitting of the pipe lance to the tool

3.6.1 Fit the STC-1 nylon threaded pot coupling (BAC-HC-PB-0009) to the rear entry nozzle of the Tornado tool.

3.6.2 Fit the second STC-1 threaded coupling to the end of the pipe lance. Ensure that the lance has 32mm 1-1/4" BSP (T) threads cut on both ends.

3.6.3 Couple the lance to the Tornado tool ensuring that the coupling safety pins are properly connected and secure.

3.6.4 Fit the third STC-1 threaded coupling to the other end of the lance.

3.6.5 Now couple the blast hose to the supply end of the pipe lance, the blast hose will require the removal of the nozzle holder and the fitting of an appropriate nylon blast hose coupling to suit the blast hose. Ensure that the coupling safety pins are properly connected and secure.

4.0 OPERATING INSTRUCTIONS

4.1 Push the Tornado tool and lance assembly to the far end of the pipe to be abrasive blasted.

4.2 Now start the blast operation, a rich abrasive feed is preferable to a lean abrasive feed.

4.3 Retract the lance back at a steady and even speed; the speed of the retrieval determines the surface finish and coverage achieved.

4.4 Continue with the blasting process until the lance has been fully retracted, we recommend the use of a docking pipe section to ensure the full length of the pipe can be cleaned and the lance safely extracted, docked and then turned off.

5.0 MAINTENANCE INSTRUCTIONS

5.1 Flanged wear sleeve

5.1.1 Uncouple the Tornado tool and carriage assembly from the lance.

5.1.2 Remove the Tornado tool from the carriage.

5.1.3 Remove the four (4) screws holding the rear base assembly to the body.

5.1.4 Remove the rear base assembly from the Tornado tool body.

5.1.5 Check the front wearing face of the flanged wear sleeve for heavy grooving and abrasive particles embedded in the face, change if either is evident.

5.1.6 Check that the sleeve moves freely in and out in the base housing recess, remove and blow out any dust that may have built up.

5.1.7 Visually check the spring to ensure it is in working order.

5.2 Entry nozzle

5.2.1 Follow steps 5.1.1-5.1.3

5.2.2 Untighten the rear 32mm (1-1/4") lock nut and then unscrew the entry nozzle from the base.

5.2.3 Inspect the entry nozzle for wear at the discharge end, and change if worn to less than a 2mm (3/32") wall thickness.

5.2.4 Check the condition of the rear sealing washer, replace if damaged.

5.2.5 Reassemble.

5.3 Rear seal assembly

5.3.1 Follow steps 5.1.1-5.1.3

5.3.2 Remove the seal retainer.

5.3.3 The rear U seal and felt seal are located in the seal retainer.

5.3.4 Remove both seals, it is advisable to change both seals if either is worn.

5.3.5 Clean the outer face of the rear bearing of any dust residue before reassembly.

5.4 Centrifugal speed limiter housing assembly

5.4.1 Using a spanner to hold the spindle tube at the two flats located behind the rotating head, unscrew the rotating head from the spindle tube.

5.4.2 Unscrew the four (4) retaining screws holding the centrifugal speed limiter housing.

⚠ ! WARNING ! - THE CENTRIFUGAL SPEED LIMITER HOUSING CAN BECOME VERY HOT IF THE UNIT HAS BEEN RUNNING FOR ANY LENGTH OF TIME, USE HEAT RESISTANT GLOVES WHEN WORKING ON THE CENTRIFUGAL SPEED LIMITER.

⚠ ! WARNING ! - IT IS REQUIRED TO REPLACE THE BRAKES AT THREE YEARS INTERVALS OR IF THERE ARE ANY SIGNS OF BRAKE WEAR.

5.4.3 Remove the centrifugal speed limiter housing.

5.4.4 Inspect the centrifugal speed limiter brake shoe linings for wear and ensure that both brake shoes pivot freely, replace the brake shoes if worn.

5.4.5 Inspect the internal braking surface of the housing for grooving and machine or replace if badly grooved.

5.4.6 Check the front U seal and felt seal while the centrifugal speed limiter assembly is dismantled, it is advisable to change both seals if either is worn.

5.4.7 Clean the outer face of the front bearing of any dust residue.

5.4.8 Reassemble.

5.5 Spindle tube and bearings

5.5.1 Remove both the rear base and seal retainer assembly and the centrifugal speed limiter housing assembly.

5.5.2 Remove the rear circlip.

5.5.3 Drive or press the spindle tube forward through the body.

5.5.4 Extract or pull the bearings from the body.

5.5.5 Reassemble.

6.0 TROUBLE SHOOTING GUIDE

6.1 Rotating nozzle head will not rotate or rotates slowly.

6.1.1 Insufficient air pressure, check supply.

6.1.2 Blocked blast nozzles, inspect and clear obstruction.

6.1.3 Flanged wear sleeve has abrasive particles embedded, remove and replace.

6.1.4 Damaged bearings, replace bearings.

6.1.5 Check rear compression spring, if damaged replace.

6.2 Rotating nozzle head rotates too fast.

6.2.1 Centrifugal speed limiter brake shoes are worn out, replace.

6.2.2 Check rear compression spring, if damaged replace.

6.3 Vibration

6.3.1 One blast nozzle is plugged, inspect and clear.

6.3.2 Blast nozzles out of balance, i.e. one nozzle has worn more than the other or blast nozzles are not of the same type, inspect and replace.

6.3.3 Tornado tool is loose in the carriage, inspect and tighten.

7.0 ASSEMBLIES, PARTS LISTING & EXPLODED VIEW

7.1 Tornado Internal Pipe Blasting Tool Set Assembly

Stock Code	Description	Weight
BAC-BA-0170-00	Tornado Internal Pipe Blasting Tool Set	6.15 kg (13.5 lbs)

7.1.1 Tornado Internal Pipe Blasting Tool Set Parts Listing

Item	Stock Code	Description	Qty
1	YAC-BA-0195-00	Tube	1
2	YAC-BA-0217-00	Limiter Housing	1
3	YAC-FN-0366-00	Screw	2
4	YAC-BA-0218-00	Limiter Shoe	1 pr
5	YAC-BA-0219-00	Support Ring	1
6	YAC-BA-0191-00	Bearing	2
7	YAC-BA-0192-00	Body	1
8	YAC-FN-0321-00	Circlip	2
9	YAC-BA-0189-00	Trnd Spin Tool - Felt Seal 48ODX34IDX3	2
10	YAC-BA-0208-00	U Seal	2
11	YAC-BA-0207-00	Seal Retainer	1
12	YAC-BA-0228-00	Base	1
13	YAC-FN-0365-01	Dowel Pin	1
14	YAC-BA-0184-01	Lock Ring	1
15	YAC-BA-0196-01	Entry Nozzle	1
16	YAC-BA-0197-00	Sealing Washer	1
17	YAC-BA-0199-00	Wear Sleeve	1
18	YAC-BA-0198-00	Spring	1
19	YAC-FN-0367-00	Screw	2
20	YAC-BA-0238-00	Thin Seal	2
21	YAC-PF-0352-00	NPT Plug	1
22	BAC-NZ-PB-0055	Blast Nozzle ATN-4S Alum/Tungsten Short	2
23	BAC-BA-0134-00	19mm 3/4" Small BSP/NPSM Rotating Head	1
24	YAC-FN-0368-00	Screw	4
25	YAC-FN-PB-0038	Flat Washer	8
26	YAC-FN-PB-0051	Spring Washer	8
27	YAC-FN-0369-00	Screw	4
28	BAC-HC-0080-00	STC-1 Steel Threaded Pot Coupling	2
29	BAC-BA-0151-00	Tornado Small Range Scissor Carriage (Optional)	1
30	BAC-BA-0164-00	Tornado Mid Range Carriage Set (Optional)	1
31	BAC-BA-0165-00	Tornado Large Range Carriage Set (Optional)	1
32	BAC-BA-0206-00	2" Tornado Large Rotating Head Assembly (Optional)	1
33	BAC-NZ-0478-01	Blast Nozzle ATN-5T Aluminum/Tungsten (Optional)	2
34	BAC-NZ-0482-01	Blast Nozzle ATN-6T Aluminum/Tungsten (Optional)	2
35	BAC-NZ-PB-0008	Blast Nozzle ATN-6 Aluminum/Tungsten (Optional)	2

7.1.2 Tornado Internal Pipe Blasting Tool Set Service Kit

Stock Code	Description
BAC-BA-0220-00	Tornado Front End Service Kit - Includes Items: 3(2 Off), 4, 5, 9, 10, 19(2 Off), 24(4 Off), 25(4 Off), 26(4 Off)
BAC-BA-0221-00	Tornado Rear End Service Kit - Includes Items: 9, 10, 16, 17, 18, 25(4 Off), 26(4 Off), 27(4 Off)

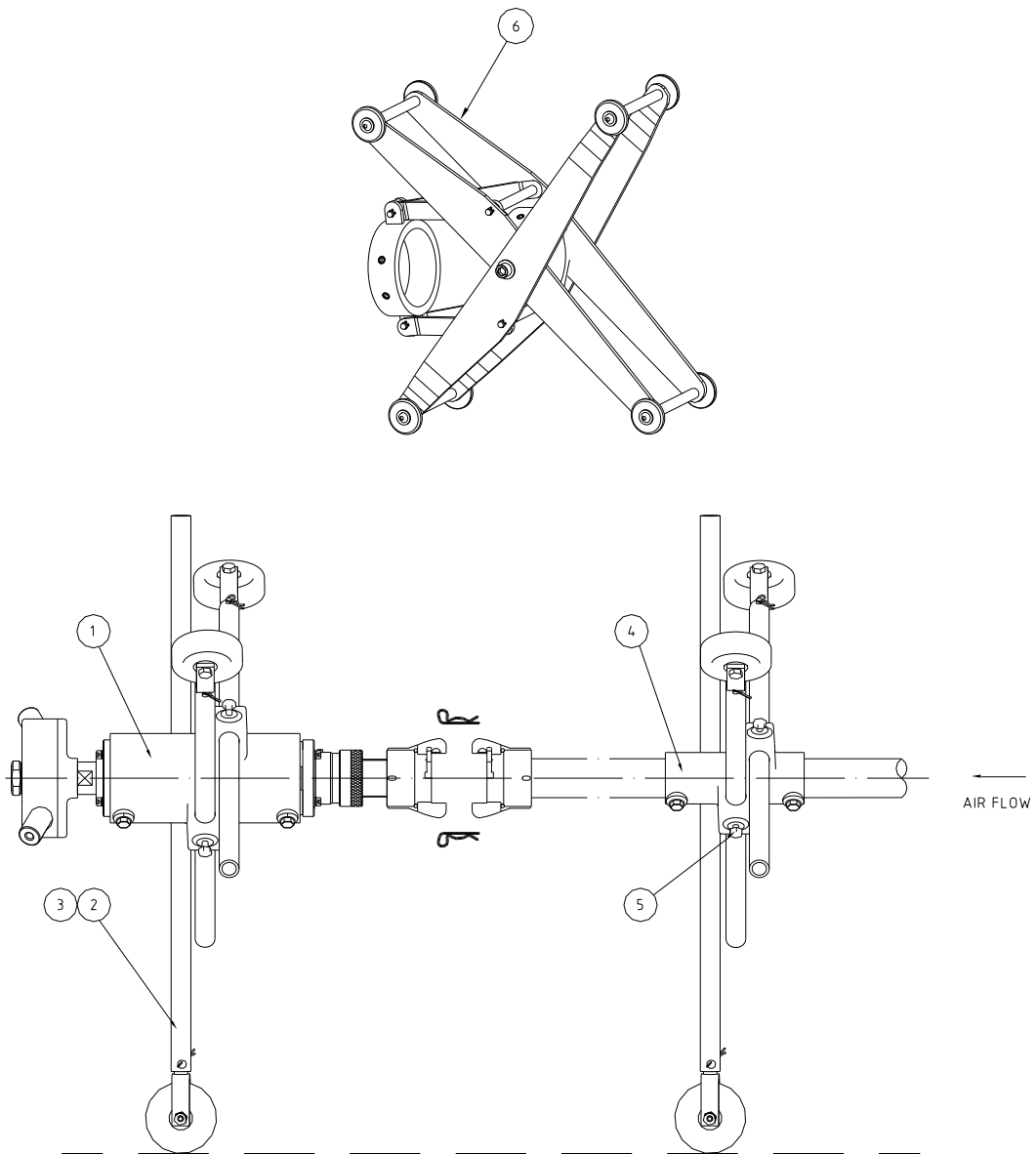
7.2 Tornado Internal Pipe Blasting Tool Set - Carriage Set Assemblies

Stock Code	Description	Weight
BAC-BA-0151-00	Tornado Small Range Scissor Carriage (Item 6)	3.15 kg (7.0 lbs)
BAC-BA-0164-00	Tornado Mid Range Carriage Set (Items 1, 2, 4, 5)	9.10 kg (20.0 lbs)
BAC-BA-0165-00	Tornado Large Range Carriage Set (Items 1, 3, 4, 5)	9.60 kg (21.16 lbs)

7.2.1 Tornado Internal Pipe Blasting Tool Set - Carriage Set Part List

Item	Stock Code	Description	Qty
1	YAC-BA-0168-00	Front Body	1
2	BAC-BA-0166-00	Tornado Mid Range Legs Set	1 set
3	BAC-BA-0167-00	Tornado Large Range Legs Set	1 set
4	YAC-BA-0169-00	Rear Body	1
5	YAC-FN-PB-0225	Screw	10

7.2.2 Tornado Internal Pipe Blasting Tool Set - Carriage Set Exploded View



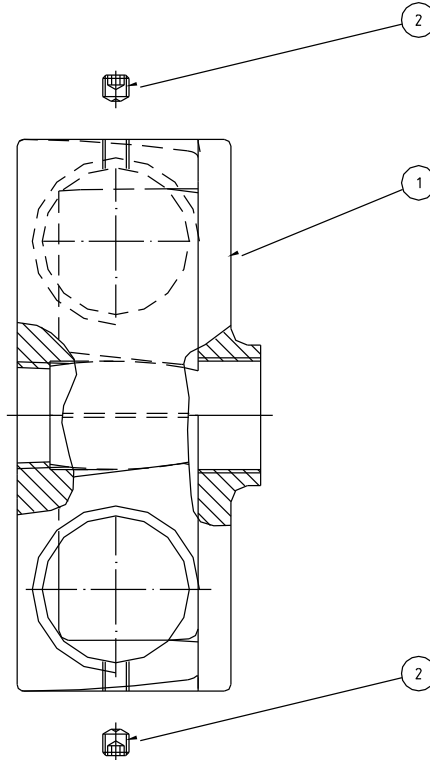
7.3 Tornado Internal Pipe Blasting Tool Set- Large Rotating Head Assembly

Stock Code	Description	Weight
BAC-BA-0206-00	2" Tornado Large Rotating Head Assembly	0.80 kg (1.76 lbs)

7.3.1 Tornado Internal Pipe Blasting Tool Set- Large Rotating Head Parts List

Item	Stock Code	Description	Qty
1	BAC-BA-0133-00	50mm 2" Contractor Large Rotating Head	1
2	YAC-FN-0319-00	Screw	2

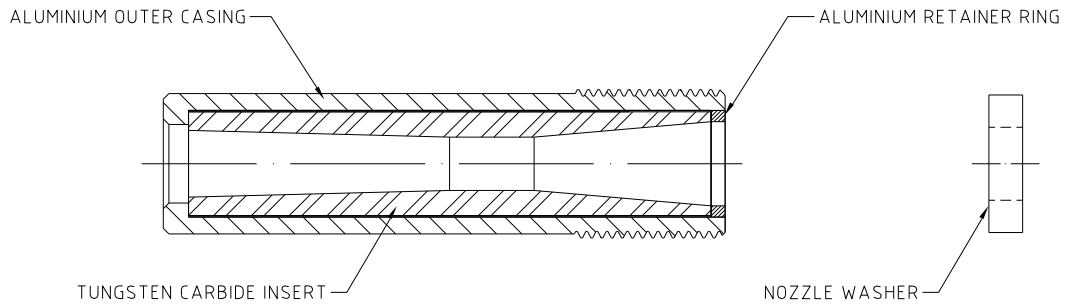
7.3.2 Tornado Internal Pipe Blasting Tool Set Large Rotating Head Exploded View



7.4 ATN-T Blast Nozzle Assemblies

Stock Code	Description	Orifice	Length	Weight
BAC-NZ-0478-01	Blast Nozzle ATN-5T Aluminum/Tungsten	8 mm (5/16")	75 mm (3")	0.24 kg (0.93 lbs)
BAC-NZ-0482-01	Blast Nozzle ATN-6T Aluminum/Tungsten	9.5 mm (3/8")	100 mm (4")	0.36 kg (0.80 lbs)

7.4.1 ATN-T Blast Nozzle Exploded View



7.5 ATN-6 Blast Nozzle Assembly

Stock Code	Description	Orifice	Length	Weight
BAC-NZ-PB-0008	Blast Nozzle ATN-6 Aluminum/Tungsten	9.5 mm (3/8")	175 mm (6 7/8")	0.82 kg (1.81 lbs)

7.5.1 ATN-6 Blast Nozzle Parts List

Item	Stock Code	Description	Qty
1	YAC-NZ-PB-0035	Nozzle Tungsten Carbide ATN-6	1
2	BAC-NZ-PB-0031	RNW-32 Nozzle Washer - 10 Pcs	1

7.5.2 ATN-6 Blast Nozzle Exploded View

