

OPERATOR'S MANUAL

BLASTMASTER® TORNADO INTERNAL PIPE BLASTING TOOL



**BUILT MARCO
TOUGH**
MARCO MANUFACTURED

⚠ WARNING

Before using this equipment, read, understand and follow all instructions in the Operator's Manuals provided with this equipment. If the user and/or assistants cannot read or understand the warnings and instructions, the employer of the user and/or assistants must provide adequate and necessary training to ensure proper operation and compliance with all safety procedures pertaining to this equipment. If Operator's Manuals have been lost, please visit www.marco.us, or contact Marco at 563.324.2519 for replacements. Failure to comply with the above warning could result in death or serious injury.

Marco®

Company Profile

Since 1944, Marco has developed a strong tradition of providing innovative and reliable products and services to the surface preparation and protective coatings industries. We are the world's premier provider of Abrasives, Blasting Equipment, Coating and Painting Equipment, Engineered Systems, Rental Equipment, Safety Equipment, Service, and Repair.

Through innovative designs and a total commitment to quality, Marco manufactures products that increase production rates, create a safer workplace, and reduce maintenance costs. Marco's industry experience, manufacturing capabilities, legendary customer service, product availability, logistics services, and technology leadership is your assurance that we deliver high quality products and services, providing the best value to you, our customer.

The Marco Difference

- **Industry Experience** – With Marco on your team, you have access to expertise which can only come from decades of industry leadership. We have organized our engineering department, production specialists, customer operations, and safety support into a “Center of Competence.” As a Marco customer, you have access to hundreds of years of cumulative experience related to your operations.
- **Manufacturing Excellence** – Marco is a U.S. based, ISO 9001:2008 certified manufacturer of equipment for the Surface Preparation and Protective Coatings industries. Marco's engineers benchmark the industry to ensure that we design and manufacture superior products that set the “Gold Standard” for performance, safety, and quality.
- **Legendary Customer Service** – Marco's legendary customer service team is staffed by friendly, highly-trained individuals who are focused on providing the highest level of product support, order accuracy, and customer satisfaction.
- **Product Availability** – We stock over 10,000 SKU's and have over 45 shipping locations to serve North American and International markets for all major brands of blasting and painting equipment. As the largest provider of surface preparation and protective coatings equipment in the world, our inventory levels and product availability are unmatched.
- **Logistics Services** – Marco's in-house logistics team is dedicated to moving your shipment anywhere in the world. We move over 14,000 truckloads every year, allowing you to save on freight costs by leveraging our buying power. Lower your process costs with a single invoice, which includes product and freight.
- **Technology Leadership** – Our website provides: Operator's Manuals, Part Numbers and Schematics Guides, MSDS information, and Features, Advantages, and Benefits Guides, providing access to information 24/7. Our Extranet application allows you to receive quotes and place orders online. Our Intranet maintains a complete record of your purchase history to assist with ongoing support of your existing equipment and future purchasing decisions.

Vision Statement

Marco is the world's premier provider of Abrasives, Blasting Equipment, Coating and Painting Equipment, Engineered Systems, Rental Equipment, Safety Equipment, Service, and Repair.

Mission Statement

Marco provides strong leadership and innovation to the surface preparation and protective coatings industries. We dedicate our efforts to the continuous improvement of our products, services, processes, people, and most importantly, the quality of our customer's experience.

Quality Policy

Marco is committed to providing superior quality in the design, manufacturing, distribution, rental, service, and repair of our products. Our ISO 9001:2008 certification extends throughout all operations in all locations. Continuous improvement of our processes and supply chain Integration comprise the core of our business strategy for delivering exceptional quality and value in all Marco products and services.

Management Philosophy

We are a company dedicated to the success of every customer and associate. We discuss, debate, challenge, measure, and test our ideas. We will be boundless and limitless in our passion to improve. Through sound leadership and dedicated associates, we will ensure a long term, profitable future for Marco, our associates, customers, and suppliers.

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DEFINITION OF TERMS

DANGER

This is an example of danger. This indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

CAUTION

This is an example of a caution. This indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It can also be used to alert against unsafe practices.

WARNING

This is an example of a warning. This indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

NOTICE

This is an example of a notice. This indicates policy or practice directly related to safety of personnel or protection of property.

HAZARD IDENTIFICATIONS

WARNING

Failure to comply with ANY WARNING listed below could result in death or serious injury.

- ▶ OSHA sets exposure limits to protect workers from exposure to respirable crystalline silica, 29 CFR 1910.1053. Airborne dust could increase the exposure levels beyond permissible limits. Breathing dust containing silica could cause silicosis, a fatal lung disease. Breathing dust during abrasive blasting operations, post-blast cleaning operations, and/or servicing equipment within the abrasive blasting area may expose an individual to conditions that could cause asbestosis, lead poisoning and/or other serious or fatal diseases. Harmful dust containing toxic material from abrasives or surfaces being abrasive blasted can remain suspended in the air for long periods of time after abrasive blasting has ceased. A NIOSH-approved, well-maintained, respirator designed for the specific operation being performed must be used by anyone abrasive blasting, handling or using the abrasive, and anyone in the area of the dust.
- ▶ Contact NIOSH and OSHA offices to determine the proper respirator for your specific application. The air supplied to the respirator must be at least Grade D quality as described in Compressed Gas Association Commodity Specification G-7.1 and as specified by OSHA Regulation 1910.134. Ensure air filter and respirator system hoses are not connected to non-air sources or in-plant lines that may contain nitrogen, oxygen, acetylene or other non-breathable gases. Before removing respirator, use an air monitoring instrument to determine if the atmosphere is safe to breathe.
- ▶ You must comply with all OSHA, local, City, State, Province, Country and jurisdiction regulations, ordinances and standards, related to your particular work area and environment. Keep unprotected individuals out of the work area.
- ▶ Abrasive blasting operators must receive thorough training on the use of abrasive resistant attire which includes: supplied-air respirator, abrasive blasting suit, safety shoes, gloves, ear protection and eye protection. Protect the operator and bystanders by complying with NIOSH and OSHA Safety Standards.
- ▶ Inspect all equipment for wear or damage before and after each use. Failure to use Original Equipment Manufacturer repair parts and failure to immediately replace worn or damaged components could void warranties and cause malfunctions.
- ▶ OSHA requires abrasive blasting nozzles be equipped with an operating valve, which shall be designed to be held open only by continuous hand pressure and shall close immediately upon release of hand pressure (i.e., a “deadman” control). The valve shall not be modified in any manner that would allow it to remain open without the application of continuous hand pressure by the operator. Failure to comply with the above warning could result in release of high speed abrasive and compressed air resulting in death or serious injury. OSHA 29CFR 1910.244(b)
- ▶ Point the abrasive blasting nozzle only at the surface being abrasive blasted. Never point the abrasive blasting nozzle or abrasive stream at yourself or others.
- ▶ Unless otherwise specified, maximum working pressure of abrasive blasting pots and related components must not exceed 150 psi. Exceeding maximum working pressure of 150 psi could cause the abrasive blasting pot and components to burst. Failure to comply with the above warning could result in death or serious injury.
- ▶ Never weld, grind or drill on the abrasive blasting pot (or any pressure vessel). Doing so will void ASME certification and manufacturer’s warranty. Welding, grinding or drilling on the abrasive blasting pot (or any pressure vessel) could weaken the vessel causing it to burst. Failure to comply with the above warning could result in death or serious injury. (ASME Pressure Vessel Code, Section VIII, Division 1)
- ▶ This equipment is not intended for use in any area that might be considered a hazardous location, as described in the National Electric Code NFPA 70, Article 500. Use of this equipment in a hazardous location could cause an explosion or electrocution.
- ▶ Never attempt to move an abrasive blasting pot containing abrasive. Never attempt to manually move abrasive blasting pots greater than 6.5 cubic foot capacity. Always use at least two capable people to manually move an abrasive blasting pot on flat, smooth surfaces. A mechanical lifting device must be used if an abrasive blasting pot is moved in any other manner.

HAZARD IDENTIFICATIONS

WARNING

Failure to comply with ANY WARNING listed below could result in death or serious injury.

- ▶ This product is not for use in wet environments. Always use a Ground Fault Interrupter Circuit (GFIC) for all electrical power source connections. Use of this product in wet environments could create a shock or electrocution hazard.
- ▶ Frozen moisture could cause restrictions and obstructions in pneumatic control lines. Any restriction or obstruction in the pneumatic control lines could prevent the proper activation and deactivation of the remote control system, resulting in the release of high speed abrasive and compressed air. In conditions where moisture may freeze in the control lines an antifreeze injection system approved for this application can be installed.
- ▶ Do not cut, obstruct, restrict or pinch pneumatic control lines. Doing so could prevent the proper activation and deactivation of the remote control system, resulting in the release of high speed abrasive and compressed air.
- ▶ Use of Marco remote control switches with other manufacturer's remote control systems could cause unintended activation of remote control systems resulting in the release of high speed abrasive and compressed air. Only Marco remote control switches should be used with Marco remote control systems.
- ▶ Always be certain to have secure footing when abrasive blasting. There is a recoil hazard when abrasive blasting starts that may cause user to fall and misdirect the abrasive stream at operator or bystander.
- ▶ Never use an abrasive blasting pot or attachments as a climbing device. The person could slip and fall. The abrasive blasting pot could become unstable and tip over.
- ▶ For equipment manufactured by entities other than Marco, you must consult the Original Equipment Manufacturer operator's manuals, information, training, instructions and warnings, for the proper and intended use of all equipment.
- ▶ Flammable fumes, such as solvent and paint fumes in the work area can present an ignition or explosion hazard if allowed to collect in adequate concentrations. To reduce conditions that could result in a fire or an explosion, provide adequate ventilation, eliminate all ignition or spark sources, keep the work area free of debris, store solvents and solvent contaminated rags in approved containers, follow proper grounding procedures, do not plug/unplug power cord or turn on/off power switches when flammable fumes are present, keep a working fire extinguisher or provide another fire suppression system in the work area. Cease all operations and correct condition if a spark or ignition source is identified during operation.
- ▶ Always depressurize the entire system, disconnect all power sources and lockout/tagout all components before any maintenance or troubleshooting is attempted. Failure to comply with the above warning could cause electrical shock and inadvertent activation of equipment resulting in death or serious injury.
- ▶ Moving parts can present an area where crushing, pinching, entanglement or amputation may occur. Do not place body parts or foreign objects in any area where there are moving parts.
- ▶ Surfaces of heated supply tanks, drums and/or lines as well as the adjoining plumbing may become hot during normal use. Do not touch these heated surfaces without proper protection. Deactivate and allow sufficient time for all surfaces to cool before attempting any maintenance.
- ▶ High-pressure fluid from gun, hose leaks, or ruptured components can pierce skin and can cause a serious injury that may result in amputation. Do not point gun or spray tip at anyone or at any part of the body. Keep clear of any leaks or ruptures. Depressurize the entire system before attempting cleaning, inspecting, or servicing equipment.
- ▶ Exposure to toxic fluids or fumes may occur during the normal operation of this system. Before attempting to fill, use, or service this system, read SDS's to know the specific hazards of the fluids you are using. Always use proper Personal Protective Equipment when attempting to fill, use, or service this system.
- ▶ The use of this product for any purpose other than originally intended or altered from its original design is prohibited.
- ▶ Never hang objects from the abrasive blasting pot handle. Doing so may cause the abrasive blasting pot to become unstable and tip over.

HAZARD IDENTIFICATIONS

⚠ CAUTION

Failure to comply with ANY CAUTION listed below may result in minor or moderate injury.

- ▶ Static electricity can be generated by abrasive moving through the abrasive blasting hose causing a shock hazard. Prior to use, ground the abrasive blasting pot and abrasive blasting nozzle to dissipate static electricity.
- ▶ High decibel noise levels are generated during the abrasive blasting process which may cause loss of hearing. Ensure appropriate Personal Protective Equipment and hearing protection is in use.

NOTICE

Failure to comply with ANY NOTICE listed below could pose a hazard to personnel or property.

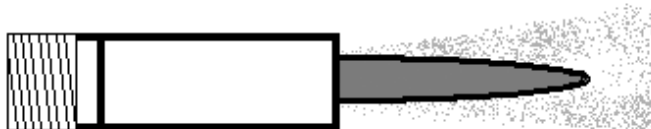
- ▶ See Air & Abrasive Consumption Chart for estimated abrasive consumption rates and required air flow (cubic feet per minute). Your system must meet these minimum requirements to ensure proper function and performance.
- ▶ Always use abrasive that is dry and properly screened. This will reduce the potential for obstructions to enter the remote control system, abrasive metering valve and abrasive blasting nozzle.
- ▶ Moisture build-up occurs when air is compressed. Any moisture within the abrasive blasting system will cause abrasive to clump, clogging metering valves, hoses and nozzles. Install an appropriately sized moisture separator at the inlet of the abrasive blasting system. Leave the moisture separator petcock slightly open to allow for constant release of water. If insufficient volume of air exists and petcock is unable to be left open (at all times) petcock should be opened frequently to release water.
- ▶ To reduce abrasive intrusion in the air supply hose, depressurize the abrasive blasting pot before shutting off air supply from compressor.
- ▶ Inspect abrasive blasting nozzle before placing into service. Damage to abrasive blasting nozzle liner or jacket may occur during shipping. If you receive a damaged abrasive blasting nozzle, contact your distributor immediately for replacement. Abrasive blasting nozzles placed into service may not be returned. Abrasive blasting nozzle liners are made of fragile materials and can be damaged by rough handling and striking against hard surfaces. Never use a damaged abrasive blasting nozzle.
- ▶ Abrasive blasting at optimal pressure for the abrasive used is critical to productivity. Example: For an abrasive with an optimal abrasive blasting pressure of 100 psi at the abrasive blasting nozzle, one pound per square inch of pressure loss will reduce abrasive blasting efficiency by 1.5%. A 10 psi reduction in air pressure will cause a 15% loss of efficiency. Use a Needle Pressure Gauge to identify pressure drops in your system. Consult with your abrasive supplier for the requirements of your abrasive.
- ▶ Replace abrasive blasting nozzle if liner or jacket is cracked or damaged. Replace abrasive blasting nozzle if original orifice size has worn 1/16" or more. Determine abrasive blasting nozzle wear by inserting a drill bit 1/16" larger than original size of abrasive blasting nozzle orifice. If the drill bit passes through abrasive blasting nozzle, replacement is needed.

AIR & ABRASIVE CONSUMPTION CHART

NOTICE

Failure to comply with ANY NOTICE listed below could pose a hazard to personnel or property.

- ▶ See Air & Abrasive Consumption Chart for estimated abrasive consumption rates and required air flow (cubic feet per minute). Your system must meet these minimum requirements to ensure proper function and performance.
- ▶ When it comes to air & abrasive mixtures, more is not necessarily better. Optimum abrasive blasting efficiency takes place when a lean air & abrasive mixture is used. To correctly set the abrasive metering valve, begin with the valve fully closed and slowly increase the amount of abrasive entering the airstream. As you increase the abrasive flow, watch for a “blue flame” at the exit of the abrasive blasting nozzle. Faster cutting, reduced abrasive consumption and lower clean up costs, are benefits of the “blue flame”.
- ▶ Abrasive blasting at optimal pressure for the abrasive used is critical to productivity. Example: For an abrasive with an optimal abrasive blasting pressure of 100 psi at the abrasive blasting nozzle, one pound per square inch of pressure loss will reduce abrasive blasting efficiency by 1.5%. A 10 psi reduction in air pressure will cause a 15% loss of efficiency. Use a Needle Pressure Gauge to identify pressure drops in your system. Consult with your abrasive supplier for the requirements of your abrasive.



“Blue Flame”

NOTICE

Inspect abrasive blasting nozzle before placing into service. Damage to abrasive blasting nozzle liner or jacket may occur during shipping. If you receive a damaged abrasive blasting nozzle, contact your distributor immediately for replacement. Abrasive blasting nozzles placed into service may not be returned. Abrasive blasting nozzle liners are made of fragile materials and can be damaged by rough handling and striking against hard surfaces. Never use a damaged abrasive blasting nozzle.

Air & Abrasive Consumption Chart*

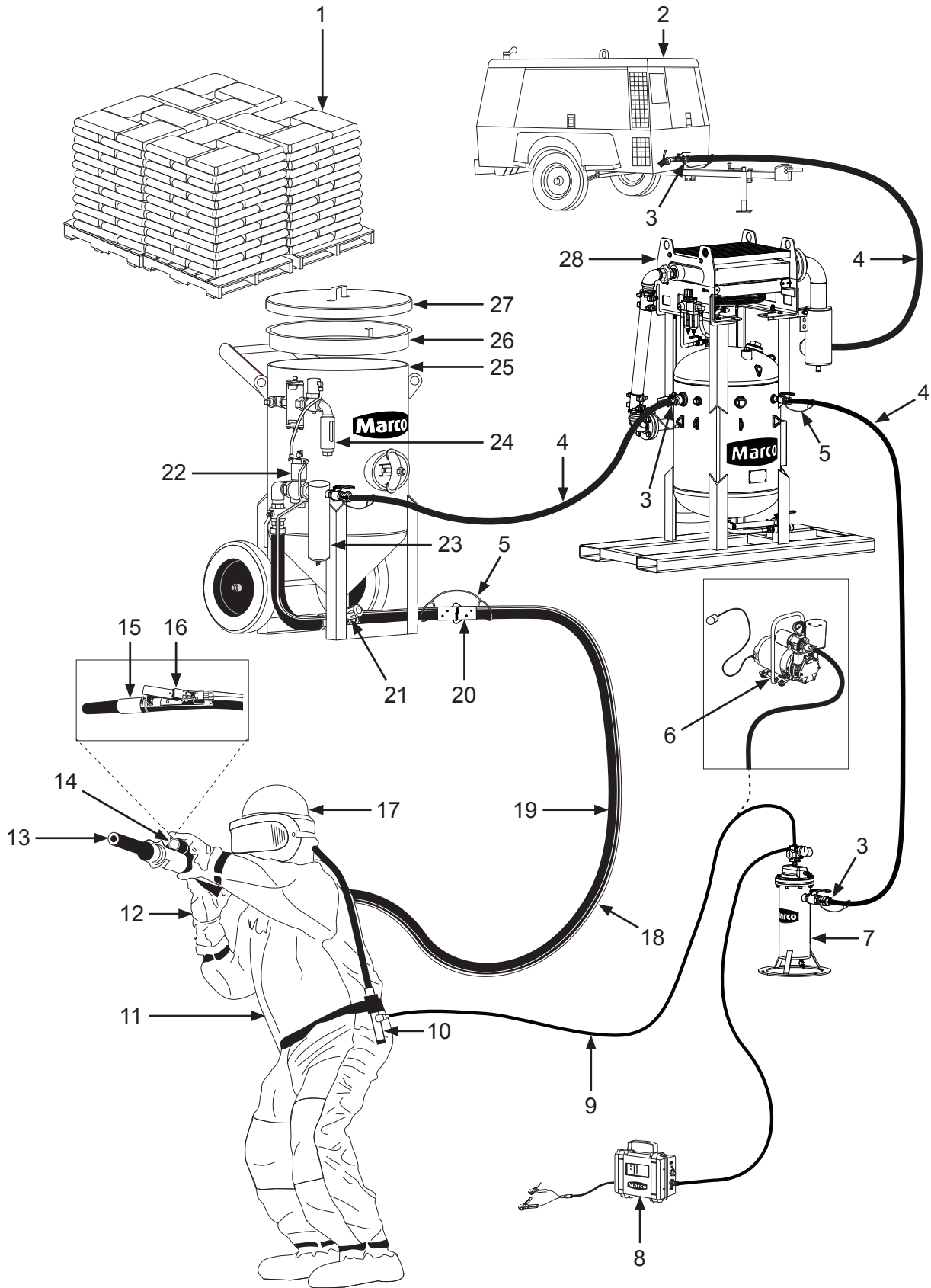
Nozzle Orifice	Pressure at the Nozzle (PSI)								Air (in cfm), Abrasive & Compressor Requirements
	50	60	70	80	90	100	125	140	
No. 2 (1/8")	11	13	15	17	18	20	25	28	Air (cfm)
	67	77	88	101	112	123	152	170	Abrasive (lbs/hr)
	2.5	3	3.5	4	4.5	5	5.5	6.2	Compressor Horsepower
No. 3 (3/16")	26	30	33	38	41	45	55	62	Air (cfm)
	150	171	196	216	238	264	319	357	Abrasive (lbs/hr)
	6	7	8	9	10	10	12	13	Compressor Horsepower
No. 4 (1/4")	47	54	61	68	74	81	98	110	Air (cfm)
	268	312	354	408	448	494	608	681	Abrasive (lbs/hr)
	11	12	14	16	17	18	22	25	Compressor Horsepower
No. 5 (5/16")	77	89	101	113	126	137	168	188	Air (cfm)
	468	534	604	672	740	812	982	1100	Abrasive (lbs/hr)
	18	20	23	26	28	31	37	41	Compressor Horsepower
No. 6 (3/8")	108	126	143	161	173	196	237	265	Air (cfm)
	668	764	864	960	1052	1152	1393	1560	Abrasive (lbs/hr)
	24	28	32	36	39	44	52	58	Compressor Horsepower
No. 7 (7/16")	147	170	194	217	240	254	314	352	Air (cfm)
	896	1032	1176	1312	1448	1584	1931	2163	Abrasive (lbs/hr)
	33	38	44	49	54	57	69	77	Compressor Horsepower
No. 8 (1/2")	195	224	252	280	309	338	409	458	Air (cfm)
	1160	1336	1512	1680	1856	2024	2459	2754	Abrasive (lbs/hr)
	44	50	56	63	69	75	90	101	Compressor Horsepower
No. 10 (5/8")	308	356	404	452	504	548	663	742	Air (cfm)
	1875	2140	2422	2690	2973	3250	3932	4405	Abrasive (lbs/hr)
	68.5	79.5	90	100.5	112	122	146	165	Compressor Horsepower
No. 12 (3/4")	432	504	572	644	692	784	948	1062	Air (cfm)
	2672	3056	3456	3840	4208	4608	5570	6238	Abrasive (lbs/hr)
	96	112	127	143	154	174.5	209	236	Compressor Horsepower

*Abrasive consumption is based on abrasive with a bulk density of 100 lbs per Cubic Foot

NOTICE

Replace abrasive blasting nozzle if liner or jacket is cracked or damaged. Replace abrasive blasting nozzle if original orifice size has worn 1/16" or more. Determine abrasive blasting nozzle wear by inserting a drill bit 1/16" larger than original size of abrasive blasting nozzle orifice. If the drill bit passes through abrasive blasting nozzle, replacement is needed.

"THE BIG PICTURE"



DAILY PRE-OPERATION CHECKLIST

Daily Pre-operation Checklist

- 1. Abrasive
- 2. Air Compressor
- 3. Air Hose Couplings & Gaskets
- 4. Air Hose
- 5. Safety Cable
- 6. Ambient Air Pump*
- 7. Breathing Air Filter
- 8. CO Monitor
- 9. Breathing Line
- 10. Climate Control Device
- 11. Abrasive Blasting Suit
- 12. Gloves
- 13. Abrasive Blasting Nozzle
- 14. Lighting System*
- 15. Abrasive Blasting Nozzle Holder
- 16. Remote Control Switch
- 17. Supplied-Air Respirator
- 18. Control Line
- 19. Abrasive Blasting Hose
- 20. Abrasive Blasting Hose Couplings & Gaskets
- 21. Abrasive Metering Valve
- 22. Remote Control System
- 23. Moisture Separator
- 24. Abrasive Blasting Pot Exhaust Muffler
- 25. Abrasive Blasting Pot
- 26. Abrasive Blasting Pot Screen
- 27. Abrasive Blasting Pot Lid
- 28. Aftercooler*

* *Optional or alternative device. Ask your Marco Representative for more details.*

Abrasive – Select the correct Abrasive (1) for the application. Review the SDS (*Safety Data Sheet*) to ensure the correct PPE (*Personal Protective Equipment*) and Environmental Controls have been selected and are in place.

Air Compressor – Select an Air Compressor (2) of adequate size to support all equipment requirements. Refer to “Air & Abrasive Consumption Chart” for Abrasive Blasting Nozzle (13) air consumption requirements. Before connecting Air Hose (4), sample the air being produced by the air compressor (2) to ensure it is free of petroleum contaminants.

Air Hose, and Air Hose Couplings & Gaskets – Select Air Hoses (4) of sufficient size to support all subsequent volumetric requirements and with a sufficient PSI (*pound per square inch*) rating. Inspect all Air Hoses (4), and Air Hose Couplings & Gaskets (3) for damage or wear. Repair or replace damaged or worn components.

Abrasive Blasting Hose, Abrasive Blasting Hose Couplings & Gaskets, and Abrasive Blasting Nozzle Holder – Select an Abrasive Blasting Hose (19) that has an inner diameter 3 to 4 times larger than your Abrasive Blasting Nozzle (13). Inspect Abrasive Blasting Hose (19), Abrasive Blasting Hose Couplings & Gaskets (20), and Abrasive Blasting Nozzle Holder (15) for damage or wear. Repair or replace damaged or worn components.

Safety Cables – Install a Safety Cable (5) at each Abrasive Blasting Hose (19), and Air Hose (4) connection points.

Aftercooler and Moisture Separator – Ensure Aftercooler (28) is positioned on stable ground. Keep petcock drain of Moisture Separator (23) slightly open during use. Drain both devices after each use.

Supplied-Air Respirator, Breathing Line, Breathing Air Filter, Climate Control Device, CO Monitor, Ambient Air Pump – You MUST consult the Operator’s Manual supplied with your Respiratory Equipment (6, 7, 8, 9, 10, 17) for ALL applicable instructions and warnings. Inspect all Respiratory Equipment components for damage or wear. Repair or replace damaged or worn components.

Abrasive Blasting Suit and Gloves – Select an abrasive-resistant Abrasive Blasting Suit (11) that is slightly oversized to allow ease of movement and allows air to flow around your body. Select abrasive-resistant Gloves (12) with a tight fit and a long cuff that overlaps the sleeve of the Abrasive Blasting Suit (11).

Abrasive Metering Valve and Abrasive Blasting Pot – Confirm Abrasive Blasting Pot (25) is positioned on stable ground. Inspect Abrasive Blasting Pot (25) and Abrasive Metering Valve (21) for damage or wear. Repair or replace damaged or worn components.

Abrasive Blasting Pot Screen and Abrasive Blasting Pot Lid – Always use an Abrasive Blasting Pot Screen (26) when filling Abrasive Blasting Pot (25) with Abrasive (1) to prevent debris from entering the Abrasive Blasting Pot (25). Remove Abrasive Blasting Pot Lid (27) before operating the Abrasive Blasting Pot (25). Install Abrasive Blasting Pot Lid (27) after use to protect the Abrasive Blasting Pot’s (25) interior.

Remote Control System, Remote Control Switch, Control Line, – Inspect Remote Control System (22) and Control Line (18) for damage or wear. Repair or replace damaged or worn components. Ensure Control Line (18) fittings connected to the Remote Control System (22) are tight and free of leaks. Ensure Remote Control Switch (16) is functioning properly. Consult Remote Control Switch Operator’s Manual for applicable instructions.

Abrasive Blasting Pot Exhaust Muffler – Inspect Abrasive Blasting Pot Exhaust Muffler (24) at start and end of daily use. Replace element of Abrasive Blasting Pot Exhaust Muffler (24) per Operator’s Manual instructions.

Lighting System – Ensure the Lighting System (14) is connected to a proper power supply before use.

OPERATING INSTRUCTIONS

WARNING

^{W-594}
Read, understand, and follow the Original Equipment Manufacturer operator's manuals, information, training, instructions, and warnings, for the proper and intended use of all equipment. Failure to comply with the above warning could result in death or serious injury.

WARNING

^{W-562}
Always depressurize the entire system, disconnect all power sources and lockout/tagout all components before any maintenance or troubleshooting is attempted. Failure to comply with the above warning could cause electrical shock and inadvertent activation of equipment resulting in death or serious injury.

WARNING

^{W-506}
OSHA requires blast cleaning nozzles be equipped with an operating valve, which shall be designed to be held open only by continuous hand pressure and shall close immediately upon release of hand pressure (i.e., a "deadman" control). The valve shall not be modified in any manner that would allow it to remain open without the application of continuous hand pressure by the operator. Failure to comply with the above warning could result in release of high speed abrasive and compressed air resulting in death or serious injury. OSHA 29CFR 1910.244(b)

Description

The Blastmaster® Tornado Internal Pipe Blasting Tool is used as part of an abrasive blasting system to clean internal surfaces of pipe and tubing ranging in size from 8" to 60" I.D. An internal pipe blasting tool replaces a standard abrasive blasting nozzle for cleaning the inner surface of pipe and tube. The tool is designed to accelerate and direct the air and abrasive mixture through two blast nozzles attached to a rotating work head. As the head rotates, the air and abrasive mixture is propelled to the inner surface of the pipe or tube, efficiently removing containments, rust, and coating. Typical applications include blast booths, blast yards, offshore platforms, oil refineries, pipelines, storage tanks, and water towers.

Operational Requirements

- Proper air supply to provide from 225 CFM — 540 CFM at a maximum of 150 psi (See Application Table).
- Well screened dry abrasive (See Abrasive Recommendation Table).

The following may cause safety hazards or reduced performance:

- Improper installation and/or maintenance of components.
- Improper air supply pressure.

Initial Setup

- Blastmaster® Tornado Internal Pipe Blasting Tool requires a customer supplied connecting tube. The connecting tube is a length of 1-1/4" pipe that is positioned between the blasting hose and the Blastmaster® Tornado Internal Pipe Blasting Tool. It is always recommended that connecting tube length is same length as pipes that are being abrasive blast cleaned. Threads at both ends of longer pipe tube must be 1-1/4-11.5 NPT. Two NTC-1 threaded couplings are supplied to fit the connecting tube to the Tornado tool and an existing blast hose coupling.
- Blastmaster® Tornado Internal Pipe Blasting Tool comes with two 1/4" tungsten carbide Blast Nozzles (1). It is also supplied with the 3/4" small Rotating Head (2). Should it be necessary to run the coarse thread long venturi blast nozzles, use the 2" Tornado Large Rotating Head Assembly.

Note: In order to run the long venturi coarse thread blast nozzles with the large rotating head, a minimum pipe internal diameter of 40" is recommended.

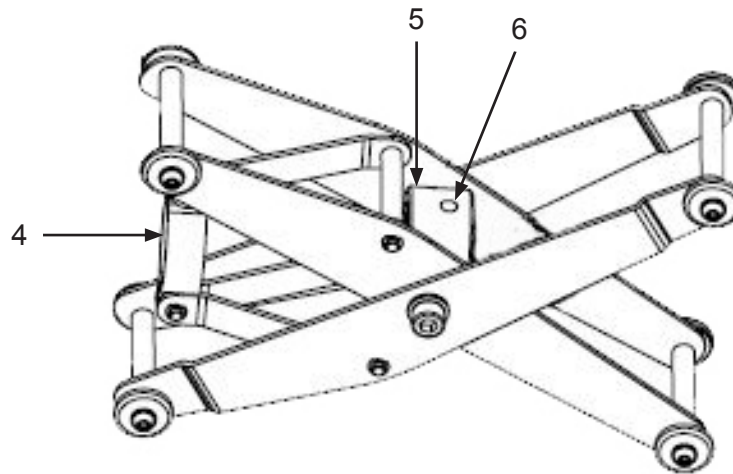
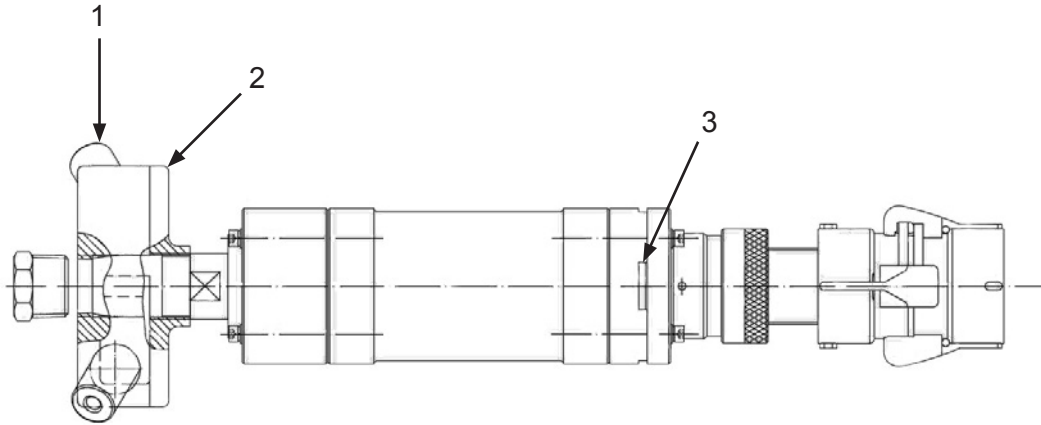
Note: The rotating heads are designed to be used without rubber nozzle washers. Only use thread sealant for thread sealing between the nozzle threads and the rotating head threads. The use of nozzle washers, or modifications to the rotating head, may result in tool malfunction or shortened tool life.

- To fit the Tornado assembly in the optional adjustable scissor carriage:
 - Slide the back end of the Tornado tool into the expanded carriage, through the Front Collar (4) and into the Rear Collar (5).

Note: The rear collar should be located in front of the Breather Vent Holes (3) on the seal retainer body, DO NOT block the vent holes.

- Tighten the two Set Screws (6) on the rear collar.
- Adjust the carriage to suit the internal diameter of the pipe by expanding the carriage scissor mechanism and tighten the two set screws on the front collar.
- Check that the Rotating Head (2) spins freely.

OPERATING INSTRUCTIONS



OPERATING INSTRUCTIONS

WARNING

W-562

Always depressurize the entire system, disconnect all power sources and lockout/tagout all components before any maintenance or troubleshooting is attempted. Failure to comply with the above warning could cause electrical shock and inadvertent activation of equipment resulting in death or serious injury.

WARNING

W-586

Moving parts can present an area where crushing, pinching, entanglement or amputation may occur. Do not place body parts or foreign objects in any area where there are moving parts.

Initial Setup (Cont.)

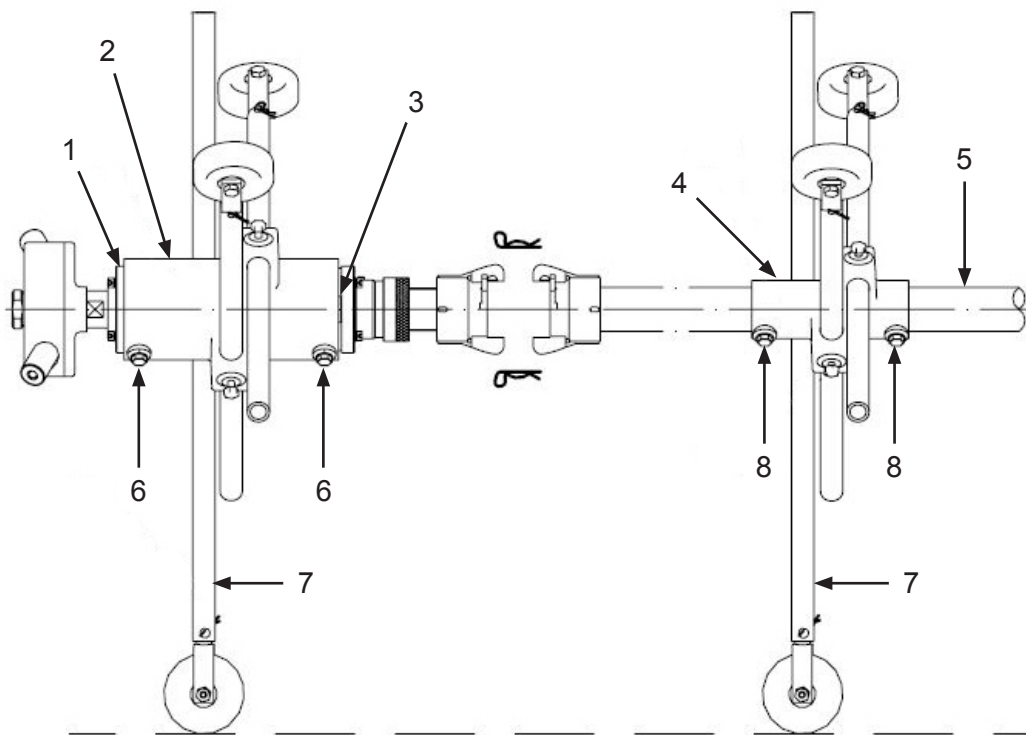
- To fit the Tornado assembly in the large and medium range carriages:
 - Slide the back end of the Tornado tool into the larger Front Carriage Body (1).
 - Position the front of the body flush with the front face of the centrifugal speed limiter housing (2).

Note: The body should be located in front of the Breather Vent Holes (3) on the seal retainer body, DO NOT block the vent holes.

- Tighten the two Screws (4) to fix the Front Carriage Body (1) to the tool.
- Fit the smaller Rear Carriage Body (8) to the Connecting Tube (5) which should be positioned to prevent excess bowing of the connecting tube and angular misalignment of the coupled connections.
- Tighten the two Screws (7) to fix the Rear Carriage Body (8) to the tool.
- Fit the appropriate Leg Assemblies (6) to the Front Carriage Body (1) and Rear Carriage Body (8). Adjust so that the Tornado tool and the Connecting Tube (5) 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, with one leg pointing down.

OPERATING INSTRUCTIONS



OPERATING INSTRUCTIONS

WARNING

^{W-562}
Always depressurize the entire system, disconnect all power sources and lockout/tagout all components before any maintenance or troubleshooting is attempted. Failure to comply with the above warning could cause electrical shock and inadvertent activation of equipment resulting in death or serious injury.

WARNING

^{W-505}
Inspect all equipment for wear or damage before and after each use. Failure to use Original Equipment Manufacturer repair parts and failure to immediately replace worn or damaged components could void warranties and cause malfunctions. Failure to comply with the above warning could result in death or serious injury.

WARNING

^{W-605}
For proper operation, maintenance should be performed with the assistance of a qualified serviceman.

CAUTION

^{C-504}
Release of high speed abrasive and compressed air occurs during depressurization of the abrasive blasting pot. Ensure appropriate Personal Protective Equipment is in use. Failure to comply with the above caution may result in minor or moderate injury.

Operating Instructions

Operating Instructions are limited to instructions found in Original Equipment Manufacturer's Operator's Manuals. Please refer to all literature included with your Blastmaster® Tornado Internal Pipe Blasting Tool at time of delivery. If this literature is unavailable, please contact Marco for a replacement before use.

Before use:

- Inspect components for damage. Replace any damaged components before use.
- Ensure all connections are tight and secure before use.

After use:

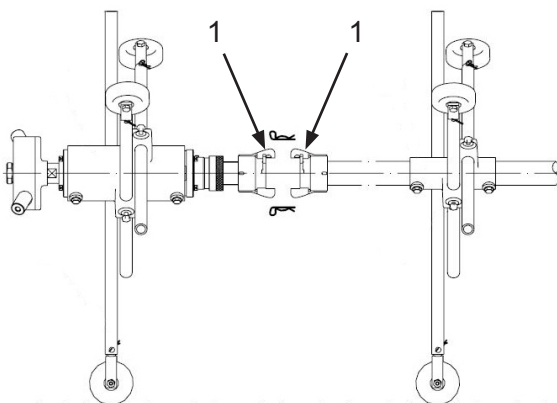
- When abrasive blasting is concluded, inspect components for wear or damage. Replace as necessary.

- 1) Connect the connecting tube to Tornado tool using two Threaded Tank Couplings (1).
- 2) Connect blast hose to tool assembly.
- 3) Place complete tool assembly inside entrance of pipe; avoid any impact on deflection tip against pipe wall.
- 4) Pressurize blast pot and begin a test blast to ensure abrasive to air mixture is set to maximum performance via abrasive metering valve.

Note: A rich mixture of abrasives to air ratio will result in premature wear to tool components.

- 5) While tool is at pipe entrance, determine that you have optimum abrasive flow setting and perform a small test blast to observe how fast tool assembly should travel within pipe for desired cleaning result.
- 6) To commence production, push complete tool assembly to end of pipe that is to be blast cleaned. Start blast cleaning process and slowly retract tool towards pipe entrance point. Do not start blasting process from pipe entrance as this will create a build-up of abrasive media which can create tool and collars to jam within pipe.
- 7) Pipes that require an extensive blast cleaning process may need multiple passes. If after examination of the pipe it is determined a second blast is required it is recommended that any excessive spent abrasives be cleaned and removed from the pipe ID.

Note: If it is necessary to remove the tool from the entrance of the pipe being blasted, ensure the blasting process has stopped and that the pressure blast pot has been depressurized.



APPLICATION TABLE

Pipe ID	Nozzle Size	Rotating Head	Carriage Type	Compressed Air Volume
8" — 12"	1/4"	Small	Small Range Scissor	225 CFM
12" — 20"	5/16"	Small	Mid Range	375 CFM
24" — 36"	3/8"	Small	Mid Range	540 CFM
40" — 60"	3/8"	Large	Large Range	540 CFM

Note: We recommend a minimum compressed air supply of at least 50% higher than the nozzle requirement listed above.

Note: Ensure that the blast nozzle selection is matched to the compressed air volume. The use of undersized nozzles will severely damage the Tornado tool.

ABRASIVE RECOMMENDATIONS TABLE

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

Garnet	#20/40
Steel Grit	SAE G25
Steel Shot	SAE S230

TROUBLESHOOTING

WARNING

W-562

Always depressurize the entire system, disconnect all power sources and lockout/tagout all components before any maintenance or troubleshooting is attempted. Failure to comply with the above warning could cause electrical shock and inadvertent activation of equipment resulting in death or serious injury.

WARNING

W-505

Inspect all equipment for wear or damage before and after each use. Failure to use Original Equipment Manufacturer repair parts and failure to immediately replace worn or damaged components could void warranties and cause malfunctions. Failure to comply with the above warning could result in death or serious injury.

WARNING

W-520

The use of this product for any purpose other than originally intended or altered from its original design is prohibited. Failure to comply with the above warning could result in death or serious injury.

If Blastmaster® Tornado Internal Pipe Blasting Tool does not function properly, check following:

SYMPTOM (Cause)

ACTION

No Air or Abrasive exits Blast Tool

(Improper Air Supply, Blastmaster® Tornado Internal Pipe Blasting Tool obstructed, Remote Control System, Damaged Blastmaster® Tornado Internal Pipe Blasting Tool components)

Insufficient air supply. Ensure minimum of 225 CFM is supplied to Blastmaster® Tornado Internal Pipe Blasting Tool.

Ensure Blastmaster® Tornado Internal Pipe Blasting Tool is clear of obstructions. Clean area and ensure abrasive is free of debris, properly screened and free of moisture.

Refer to remote control system Operator's Manual.

Inspect Blastmaster® Tornado Internal Pipe Blasting Tool for damaged components.

Rotating Nozzle will not rotate or rotates slowly

(Improper Air Supply, Blastmaster® Tornado Internal Pipe Blasting Tool obstructed, Flanged wear sleeve, Damaged bearings, Rear Compression Spring)

Insufficient air supply. Ensure minimum of 225 CFM is supplied to Blastmaster® Tornado Internal Pipe Blasting Tool.

Ensure Blastmaster® Tornado Internal Pipe Blasting Tool is clear of obstructions. Clean area and ensure abrasive is free of debris, properly screened and free of moisture.

Check Flanged Wear Sleeve for abrasive particles embedded, remove and replace.

Check bearings for damage. Replace damaged bearings.

Check rear compression spring, if damaged replace.

Rotating Nozzle rotates too fast

(Worn brake shoes, Rear Compression Spring)

Brake shoes in brake housing are worn out, replace.

Check rear compression spring, if damaged replace.

Vibration

(Blast Nozzle obstructed, Blast Nozzle unbalanced)

One blast nozzle is plugged, inspect and clear.

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.

MAINTENANCE SCHEDULE QUICK REFERENCE CHART

TORNADO MAINTENANCE SCHEDULE				
Perform inspections at the intervals specified. Repair or replace damaged parts as needed.				
Item	Maintenance Required	Daily	Weekly	Monthly
Gaskets, Washers and Seals	Inspect all gaskets, washers and seals, it is important to replace these items prior to excessive wear.	X		
Flange Wear Sleeve	Inspect the front wearing face of the Flanged Wear Sleeve for heavy grooving and abrasive particles embedded in the face, replace if either is evident. Inspect that the sleeve moves freely in and out in the base housing recess, remove and blow out any dust that may have built up.		X	
Entry Nozzle	Inspect the entry nozzle for wear at the discharge end, and change if worn to less than a 3/32" wall thickness.	X		
Centrifugal Speed Limiter	Inspect the centrifugal speed limiter brake shoe linings for wear and ensure that both brake shoes pivot freely, replace the brake shoes if worn. Inspect the internal braking surface of the housing for grooving and machine or replace if badly grooved.			X
Threaded Parts	Carefully check that all threaded parts are securely tightened to avoid gaps and voids, which will create internal turbulence within tool assembly.	X		

MAINTENANCE

Disassemble and Assemble Flange Wear Sleeve

WARNING

W-562
Always depressurize the entire system, disconnect all power sources and lockout/tagout all components before any maintenance or troubleshooting is attempted. Failure to comply with the above warning could cause electrical shock and inadvertent activation of equipment resulting in death or serious injury.

- 1) Depressurize the system.
- 2) Uncouple the Tornado tool and carriage assembly from the connecting tube.
- 3) Remove the Tornado tool from the carriage.
- 4) Remove the four Screws, Spring Washers and Washers (1).
- 5) Remove the Rear Base Assembly (2) from the Tornado tool body.
- 6) Inspect the front wearing face of the Flanged Wear Sleeve (3) for heavy grooving and abrasive particles embedded in the face, change if either is evident.
- 7) Inspect that the sleeve moves freely in and out in the base housing recess, remove and blow out any dust that may have built up.
- 8) Visually check the Spring (4) to ensure it is in working order.
- 9) Install parts in reverse order.

Disassemble and Assemble Entry Nozzle

- 1) Depressurize the system.
- 2) Uncouple the Tornado tool and carriage assembly from the connecting tube.
- 3) Remove the Tornado tool from the carriage.
- 4) Remove the four Screws, Spring Washers and Washers (1) holding the rear base assembly to the body.
- 5) Loosen the rear Lock Nut (5) and unscrew Entry Nozzle (6) from Base (2).
- 6) Inspect the entry nozzle for wear at the discharge end, and change if worn to less than a 3/32" wall thickness.
- 7) Inspect the condition of the Bearing Seal (7), replace if damaged.
- 8) Install parts in reverse order.

Disassemble and Assemble Rear Seal Assembly

- 1) Depressurize the system.
- 2) Uncouple the Tornado tool and carriage assembly from the connecting tube.
- 3) Remove the Tornado tool from the carriage.
- 4) Remove the four Screws, Spring Washers and Washers (1) holding the rear base assembly to the body.
- 5) Remove the Seal Retainer (8).
- 6) The rear U Seal (9) and Felt Seal (10) are located in the seal retainer.
- 7) Remove both seals, it is advisable to change both seals if either is worn.
- 8) Clean the outer face of the rear bearing of any dust residue before reassembly.
- 9) Install parts in reverse order.

Disassemble and Assemble Spindle Tube and Bearings

- 1) Depressurize the system.
- 2) Remove the four Screws, Spring Washers and Washers (1).
- 3) Remove the Rear Base Assembly (2).
- 4) Remove the Seal Retainer (8).
- 5) Remove the four Screws, Spring Washers and Washers (16).
- 6) Remove the Brake Housing (11).
- 7) Remove the rear Locking Ring (12).
- 8) Drive or press the Tube (13) forward through the Body (15).
- 9) Extract or pull the Bearings (14) from the Body (15).
- 10) Install parts in reverse order.

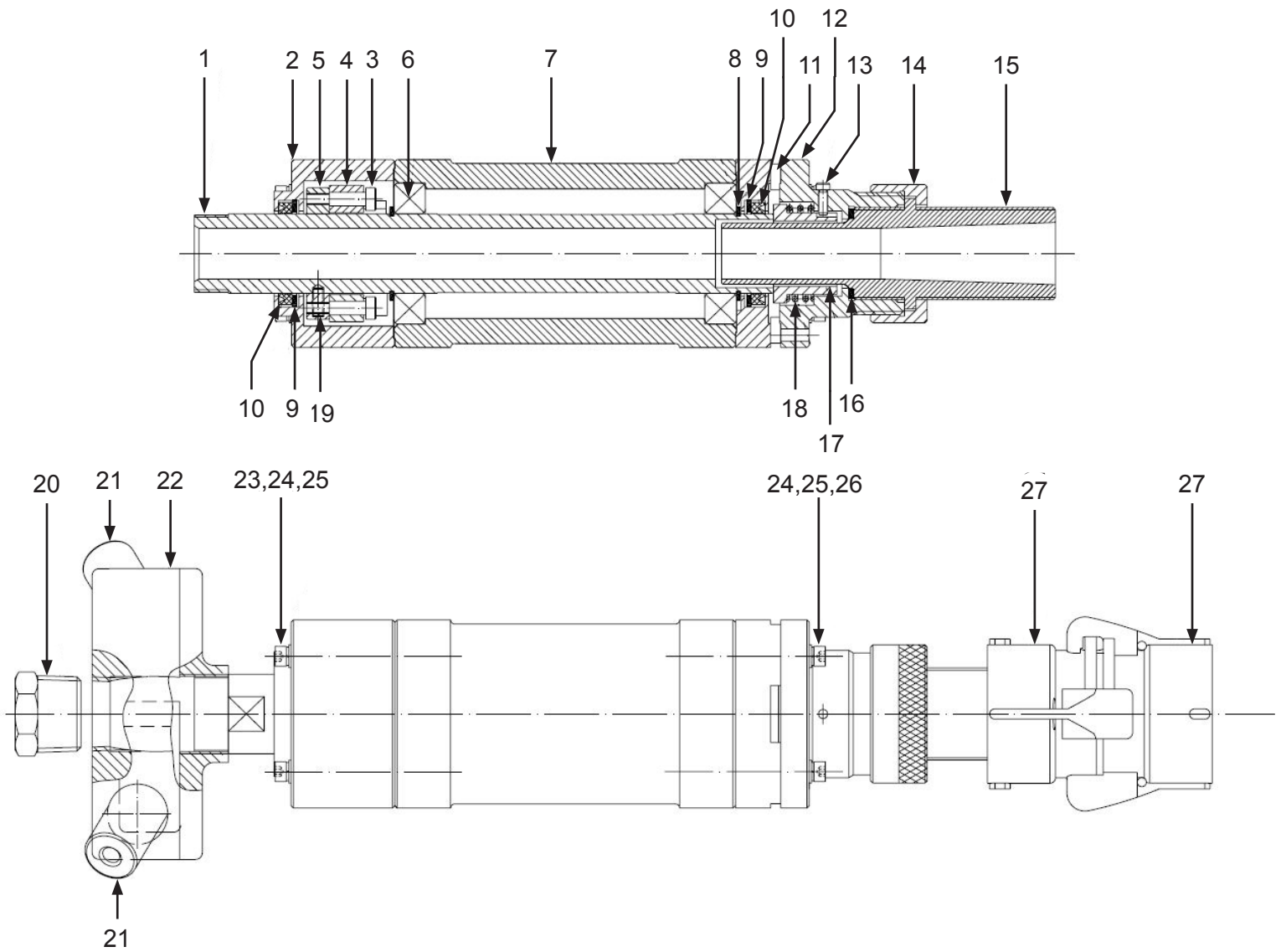
PART NUMBERS AND SCHEMATICS GUIDE

Blastmaster® Tornado Internal Pipe Blasting Tool

Item #	Part #	Description
Fig. 1		
—	1084070	Blastmaster® Tornado Internal Pipe Blasting Tool
1	1084082	Tube Casting
2	1084086	Brake Housing
3	1084089	Locking Pin (<i>Quantity of Two</i>)
4	1084087	Specialty Brake with Lining
5	1084093	Support Ring
6	1084080	Double Seal Light Bearing (<i>Quantity of Two</i>)
7	1084081	Main Body
8	1084088	Locking Ring (<i>Quantity of Two</i>)
9	1084094	Felt Seal (<i>Quantity of Two</i>)
10	1084095	U Seal (<i>Quantity of Two</i>)
11	1084085	Seal Retainer
12	1084096	Base
13	1084097	Dowel Pin
14	1084078	End Locking Nut
15	1084083	Entry Nozzle
16	1084084	Bearing Seal
17	1084098	Wear Sleeve
18	1084099	Spring
19	1084100	Screw (<i>Quantity of Two</i>)
20	1084101	NPT Plug
21	10AT4	#4 Straight Bore Nozzle, Tungsten Carbide Liner, Aluminum Jacket, 1/4" Orifice
—	10AT5	#5 Straight Bore Nozzle, Tungsten Carbide Liner, Aluminum Jacket, 5/16" Orifice
—	10AT6	#6 Straight Bore Nozzle, Tungsten Carbide Liner, Aluminum Jacket, 3/8" Orifice
22	1084071	Rotating Nozzle Head
—	1084109	2" Tornado Large Rotating Head Assembly (<i>Optional</i>) (<i>See Fig. 5</i>)
23	1084090	2-1/2" Round Head Screw (<i>Quantity of Four</i>)
24	1084090	Flat Washer (<i>Quantity of Eight</i>)
25	1084104	Spring Washer (<i>Quantity of Eight</i>)
26	1084105	Screw (<i>Quantity of Four</i>)
27	1084106	NTC-1 Nylon Threaded Tank Coupling (<i>Quantity of Two</i>)
—	101V614	Brochure – Blastmaster® Tornado Internal Pipe Blasting Tool
—	105M614	Features and Specifications Guide – Blastmaster® Tornado Internal Pipe Blasting Tool
—	106M614	Part Numbers & Schematics Guide – Blastmaster® Tornado Internal Pipe Blasting Tool
—	1090614	Operator's Manual – Blastmaster® Tornado Internal Pipe Blasting Tool

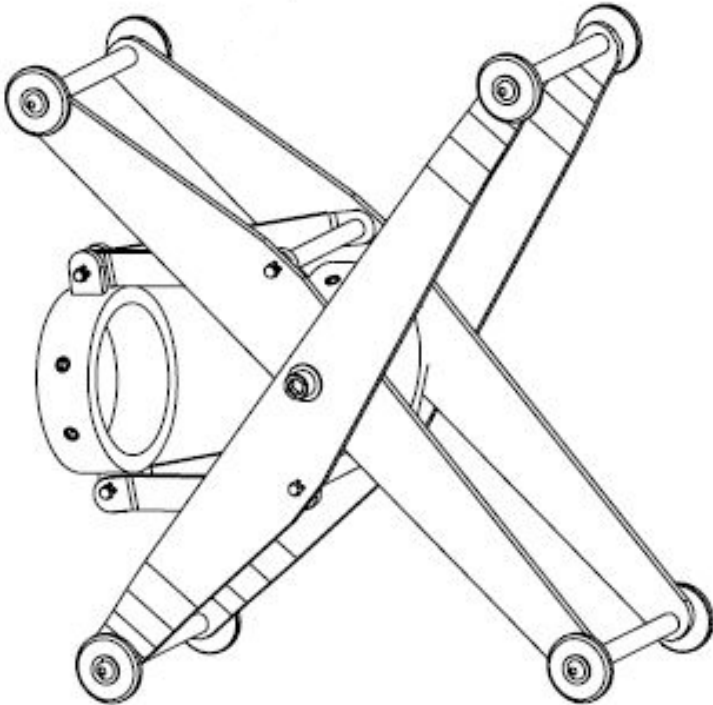
PART NUMBERS AND SCHEMATICS GUIDE

Figure 1: Blastmaster® Tornado Internal Pipe Blasting Tool



OPTIONAL ACCESSORIES

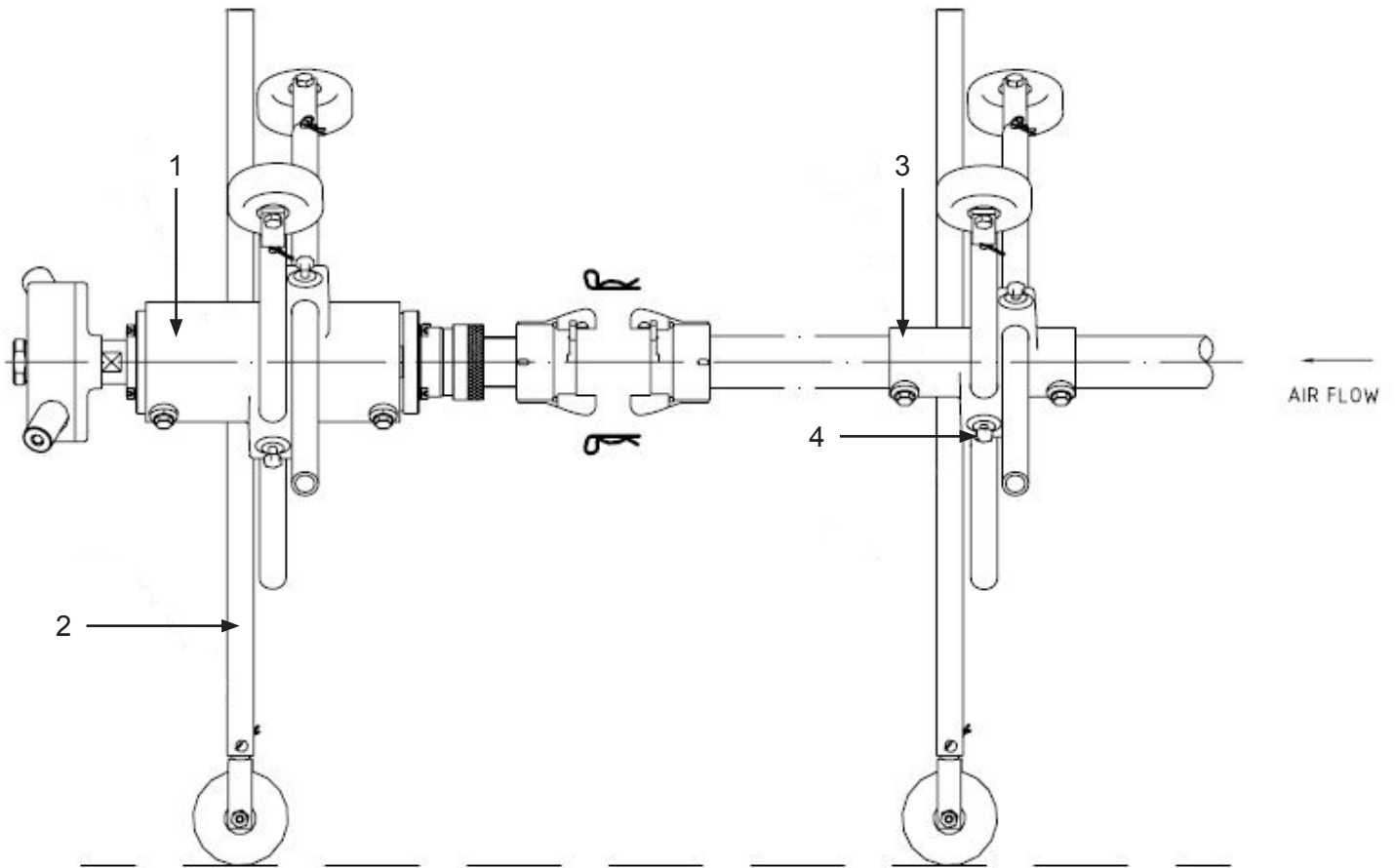
Figure 2: Tornado Scissor Carriage for 8" – 17" I.D. Pipe



Item#	Part#	Description
Fig. 2		
—	1084072	Tornado Scissor Carriage for 8" – 17" I.D. Pipe

OPTIONAL ACCESSORIES

Figure 3: Tornado Pipe and Wheel Carriage for 12" – 36" I.D. Pipe



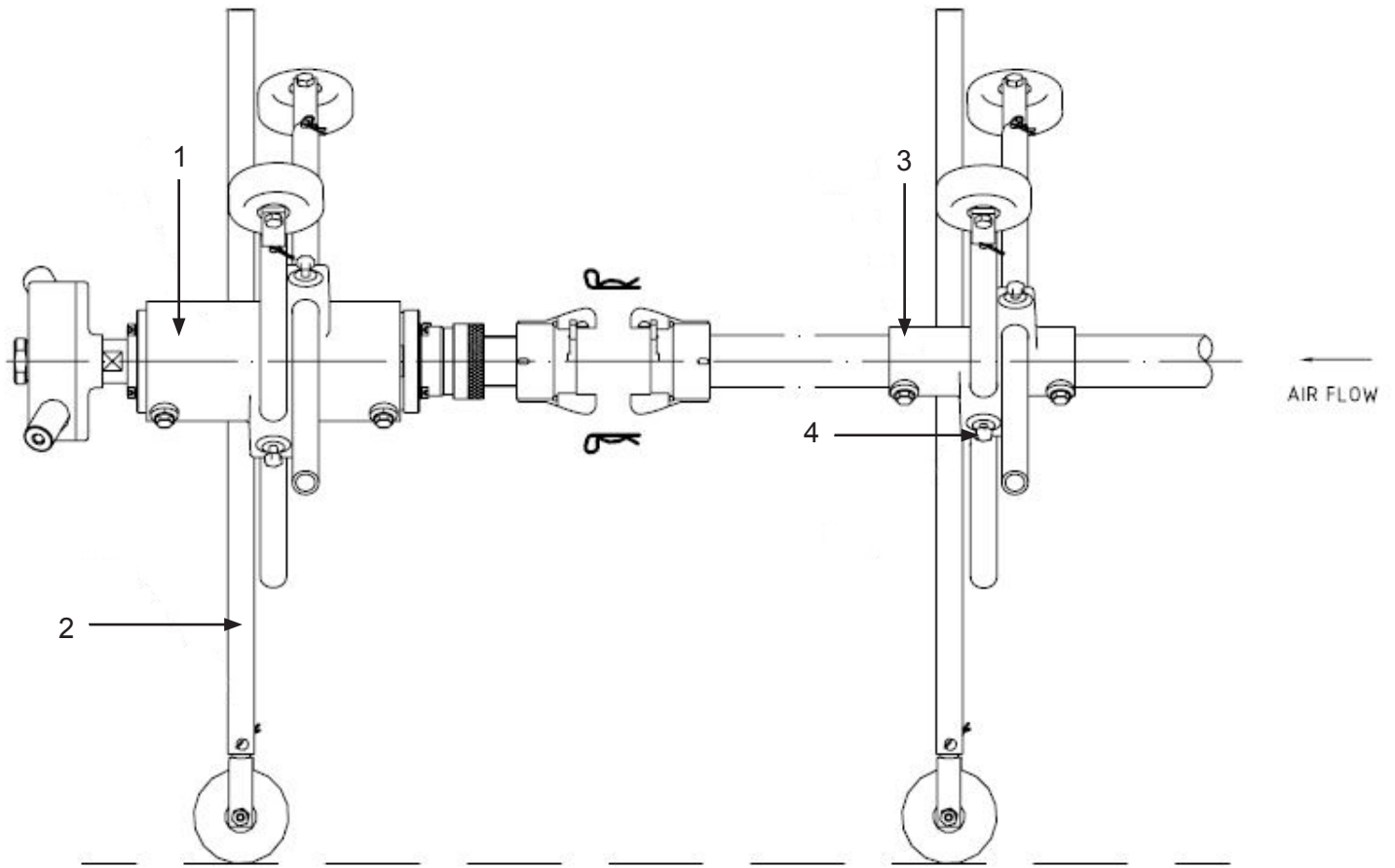
Item#	Part#	Description
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Fig. 3

—	1084073	Tornado Pipe and Wheel Carriage for 12" – 36" I.D. Pipe
1	1084076	Front Body Collar
2	1084074	Medium Leg Set
3	1084077	Rear Body Collar
4	1084107	5/16" x 26mm Machine Screw Hex Head (<i>Quantity of Ten</i>)

OPTIONAL ACCESSORIES

Figure 4: Tornado Pipe and Wheel Carriage for 40" – 60" I.D. Pipe



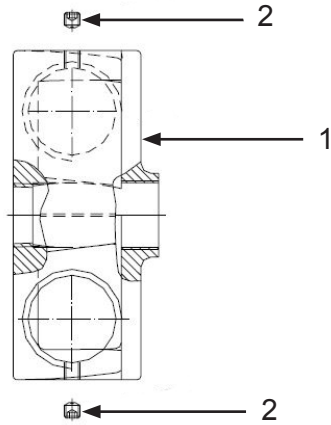
Item#	Part#	Description
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Fig. 4

—	1084108	Tornado Pipe and Wheel Carriage for 40" – 60" I.D. Pipe
1	1084076	Front Body Collar
2	1084074	Long Leg Set
3	1084077	Rear Body Collar
4	1084107	5/16" x 26mm Machine Screw Hex Head (<i>Quantity of Ten</i>)

OPTIONAL ACCESSORIES

Figure 5: 2" Tornado Large Rotating Head Assembly



Item#	Part#	Description
Fig. 5		
—	1084102	2" Tornado Large Rotating Head Assembly <i>(For use when blasting 40"–60" pipe)</i>
1	1084110	50mm 2" Contractor Large Rotating Head
2	1084111	Screw <i>(Quantity of Two)</i>
—	10SN650UN	Blastmaster® Silicon Carbide All Poly Nozzles – #6, 3/8" Orifice <i>(Two Required) (Optional)</i>

ADDITIONAL TECHNICAL DATA

The associations listed below offer information, materials and videos pertaining to abrasive blasting and safe operating practices.

- **American Society for Testing and Materials (ASTM)**
100 Barr Harbor Drive
West Conshohocken, PA 19428-2959

Phone: (610) 832-9585
FAX: (610) 832-9555
www.astm.org
- **Occupational Safety & Health Administration (OSHA)**
United States
Department of Labor
200 Constitution Avenue
Washington, DC 20210

Phone: (800) 321-OSHA
(800) 321-6742
www.osha.gov
- **The National Board of Boiler & Pressure Vessel Inspectors**
1055 Crupper Avenue
Columbus, Ohio 4322

Phone: (614) 888-8320
FAX: (614) 888-0750
www.nationalboard.org
- **National Association of Corrosion Engineers (NACE)**
1440 South Creek Drive
Houston, TX 77084-4906

Phone: (281) 228-6200
FAX: (281) 228-6300
www.nace.org
- **The Society for Protective Coatings (SSPC)**
40-24th Street, 6th Floor
Pittsburgh, PA 15222-4656

Phone: (412) 281-2331
FAX: (412) 281-9992
www.sspc.org
- **American National Standards Institute (ANSI)**
1899 L Street, NW, 11th Floor
Washington, DC 20036

Phone: (202) 293-8020
FAX: (202) 293-9287
www.ansi.org

LIMITED WARRANTY

Seller warrants to the original purchaser that the Product covered by this Limited Warranty will remain free from defects in workmanship or material under normal commercial use and service for a period of one year from the date of shipment to the original Purchaser. This Warranty shall not apply to defects arising, in whole or in part, from any accident, negligence, alteration, misuse or abuse of the Product, operation of the Product which is not in accordance with applicable instructions or manuals or under conditions more severe than, or otherwise exceeding, those set forth in the written specifications for the Product, nor shall this Warranty extend to repairs or alterations of the Product and/or any maintenance part by persons other than Seller or Seller's authorized representatives. This warranty does not apply to accessory items. Further, this Warranty does not apply to damage or wear to the surface finish or appearance of the Product or normal wear and tear to the Product. This Warranty is limited to a purchaser who purchases the Product either directly from the Seller or from one of Seller's "Authorized Distributors". An Authorized Distributor is a Seller approved distributor that purchases the Product directly from the Seller for the sole purpose of re-selling the Product at retail, without any use or modifications whatsoever, to an end-purchaser. This warranty is specifically non-assignable and non-transferable.

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The foregoing Limited Warranty is exclusive and is in lieu of all other warranties, whether oral or written and whether express, implied, or statutory. SELLER HEREBY DISCLAIMS ALL OTHER WARRANTIES, INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY AND/OR FITNESS FOR A PARTICULAR PURPOSE AND ALL SUCH OTHER WARRANTIES ARE HEREBY EXCLUDED AND ARE INAPPLICABLE TO THE PRODUCT. Seller makes no warranties or representations of any kind concerning respirators, or equipment made by other manufacturers. Seller's agents and representatives are not authorized to offer any further warranties.

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THE SOLE AND EXCLUSIVE REMEDY UNDER THE FOREGOING LIMITED WARRANTY, AND TO THE EXTENT PERMITTED BY LAW, ANY WARRANTY OR CONDITION IMPLIED BY LAW, COVERING THIS PRODUCT SHALL BE, AT THE SELLER'S OPTION, THE REPAIR OR REPLACEMENT, FREE OF CHARGE, F.O.B. POINT OF MANUFACTURE, OF ANY DEFECTIVE PART OR PARTS OF THE PRODUCT THAT WERE MANUFACTURED BY SELLER, AND WHICH ARE RETURNED TO SELLER AT SELLER'S PRINCIPAL PLACE OF BUSINESS, POSTAGE PREPAID BY THE PURCHASER. THIS SOLE AND EXCLUSIVE REMEDY IS CONDITIONED UPON PURCHASER'S PROMPT WRITTEN NOTICE TO SELLER AT SELLER'S PLACE OF BUSINESS THAT A DEFECT HAS BEEN DISCOVERED, TOGETHER WITH A REASONABLY DETAILED DESCRIPTION OF THE DEFECT IN THE PRODUCT, PROOF OF PURCHASE OF THE PRODUCT, AND THE MODEL AND IDENTIFICATION NUMBER OF THE PRODUCT WITHIN THIRTY (30) DAYS AFTER DISCOVERY OF THE DEFECT, OTHERWISE SUCH CLAIMS SHALL BE DEEMED WAIVED. NO ALLOWANCE WILL BE GRANTED FOR ANY REPAIRS OR ALTERATIONS MADE BY PURCHASER OR OTHERS WITHOUT SELLER'S PRIOR WRITTEN CONSENT. IF SUCH NOTICE IS TIMELY GIVEN, SELLER WILL HAVE THE OPTION TO EITHER MODIFY THE PRODUCT OR COMPONENT PART THEREOF TO CORRECT THE DEFECT, REPLACE THE PRODUCT OR PART WITH COMPLYING PRODUCTS OR PARTS, OR REFUND THE AMOUNT PAID FOR THE DEFECTIVE PRODUCT, ANY ONE OF WHICH WILL CONSTITUTE THE SOLE LIABILITY OF SELLER AND FULL SETTLEMENT OF ALL CLAIMS. IN NO EVENT SHALL SELLER BE LIABLE FOR ANY OBLIGATION GREATER THAN THE ORIGINAL PURCHASE PRICE OF THE PRODUCT UNDER THIS WARRANTY. PURCHASER SHALL AFFORD SELLER PROMPT AND REASONABLE OPPORTUNITY TO INSPECT THE PRODUCT FOR WHICH A CLAIM IS MADE. THE SOLE PURPOSE OF THE FOREGOING STIPULATED EXCLUSIVE REMEDY SHALL BE TO REPAIR OR REPLACE DEFECTIVE PRODUCTS OR COMPONENTS THEREOF, OR TO REFUND PURCHASER THE PURCHASE PRICE THEREOF. THIS STIPULATED EXCLUSIVE REMEDY SHALL NOT BE DEEMED TO HAVE FAILED OF ITS ESSENTIAL PURPOSE SO LONG AS SELLER IS WILLING AND ABLE TO REPAIR OR REPLACE THE DEFECTIVE PARTS OR REFUND THE PURCHASE PRICE IN ACCORDANCE WITH THE TERMS HEREOF. PRODUCTS THAT HAVE BEEN REPAIRED OR REPLACED UNDER THIS WARRANTY DO NOT RECEIVE A NEW WARRANTY AND ARE ONLY COVERED BY THE REMAINING PORTION OF THE ORIGINAL WARRANTY.

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The foregoing stipulated exclusive remedy is in lieu of all other remedies for breach of contract, warranty, and/or tort or otherwise. Seller shall not be liable, either directly or indirectly, for any consequential, incidental or special losses or damages of Purchaser, including but not limited to the Purchaser's expenses for downtime or for making up downtime, damages for which the Purchaser may be liable to other persons and/or entities, damages to property, and injury to or death of any persons and/or any claims for incidental or consequential damages, including but not limited to loss of profits, regardless of whether Seller has been informed of the possibility of such damages. Seller neither assumes, nor authorizes any person to assume for it, any other liability in connection with the sale or use of any Products covered by the foregoing Warranty and Disclaimers, and there are no oral agreements relating to remedies which are collateral to or which affect this limitation.

GLOBAL HEADQUARTERS

- 3425 East Locust Street
Davenport, IA 52803

ph: 800.BLAST.IT (800.252.7848)

ph: 563.324.2519

fax: 563.324.6258

GULF STATES HEADQUARTERS

- 701 East Boulevard
Deer Park, TX 77536

ph: 800.BLAST.IT (800.252.7848)

ph: 281.930.0905

fax: 281.542.0736

REGIONAL BRANCH OFFICES

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Gonzales
Lafayette
- **Ohio**
Youngstown
- **Texas**
Beaumont
Corpus Christi
Deer Park



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