

Hypertherm[®]

PowerDredge™

Abrasive Removal System



Instruction Manual

808990 | Revision 0 | English

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One of Hypertherm's long-standing core values is a focus on minimizing our impact on the environment. Doing so is critical to our, and our customers', success. We are always striving to become better environmental stewards; it is a process we care deeply about.

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PowerDredge

Instruction Manual

808990
Revision 0

English

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Hypertherm Inc.
Hanover, NH 03755 USA
www.hypertherm.com

North America

USA and Canada

Technical service

800-643-9878 Toll-free

TechnicalService-Hanover@Hypertherm.com

Customer service

800-737-2978 Toll-free

Return materials

866-643-7711 Toll-free

Asia Pacific

TechnicalService-Asia@Hypertherm.com

Singapore

65 6841 2489

65 6841 2490 Fax

China

86-21-60740003

86-21- 60740393 Fax

Japan

+81-6-6225-1183

+81-6-6225-1184 Fax

India

+91-11-40521201/ 2/ 3/

+91 7838908053 Mobile

+91-11 40521204 Fax

Korea

+82-51-747-0358

+82-51-701-0358 Fax

Australia and New Zealand

+61 (0) 7 3103 1695

+61 (0) 4 3760 6995 Mobile

+61 (0) 7 3219 9012 Fax

Europe, Middle East, and Africa

Technical service

00 800 4973 7843 Toll-free

+31(0) 165 596900

+31(0) 165 596906 Fax

TechnicalService-HyperthermEurope@Hypertherm.com

Customer service

00 800 3324 9737 Toll-free

+31 (0) 165 526156

00 800 4973 7329 Toll-free fax

+31 (0) 165 596948 Fax

Return materials

+31 (0) 165 596936

+31 (0) 165 596906 Fax

South America

TechnicalService-SA@Hypertherm.com

Brazil

55 11 2409 2636

55 11 2408 0462 Fax

Argentina

+54 (11) 5199-4668

Peru

+51 (1) 718-5090

Chile

+56 (2) 495-7369

Venezuela

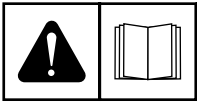
+58 (212) 335-7522

México

52 55 5681 8109

52 55 5681 7978

52 55 5683 2127 Fax



ENGLISH

WARNING! Before operating any Hypertherm equipment, read the safety instructions in your product's manual. Failure to follow safety instructions can result in personal injury or in damage to equipment.

Copies of the manuals may accompany the product in electronic and printed formats. You can also obtain copies of the manuals, in all languages available for each manual, from the "Downloads library" at www.hypertherm.com.

DEUTSCH / GERMAN

WARNUNG! Bevor Sie ein Hypertherm-Gerät in Betrieb nehmen, lesen Sie bitte die Sicherheitsanweisungen in Ihrer Bedienungsanleitung. Das Nichtbefolgen der Sicherheitsanweisungen kann zu Verletzungen von Personen oder Schäden am Gerät führen.

Bedienungsanleitungen und Handbücher können dem Gerät in elektronischer Form oder als Druckversion beiliegen. Sie können alle Handbücher und Anleitungen in den jeweils verfügbaren Sprachen eines bestimmten Handbuchs auch in der „Download-Bibliothek“ unter www.hypertherm.com herunterladen.

FRANÇAIS / FRENCH

AVERTISSEMENT! Avant d'utiliser tout équipement Hypertherm, lire les consignes de sécurité dans le manuel de votre produit. Le non-respect des consignes de sécurité peut engendrer des blessures physiques ou des dommages à l'équipement.

Des copies de ces manuels peuvent accompagner le produit en format électronique et papier. Vous pouvez également obtenir des copies de chaque manuel dans toutes les langues disponibles à partir de la « Bibliothèque de téléchargement » sur www.hypertherm.com.

ESPAÑOL / SPANISH

¡ADVERTENCIA! Antes de operar cualquier equipo Hypertherm, leer las instrucciones de seguridad del manual de su producto. No cumplir las instrucciones de seguridad podría dar lugar a lesiones personales o daño a los equipos.

Pueden venir copias de los manuales en formato electrónico e impreso junto con el producto. También se pueden obtener copias de los manuales, en todos los idiomas disponibles para cada manual, de la "Biblioteca" en www.hypertherm.com.

ITALIANO / ITALIAN

AVVERTENZA! Prima di utilizzare le attrezzature Hypertherm, leggere le istruzioni di sicurezza nel manuale del prodotto. Il mancato rispetto delle istruzioni sulla sicurezza può causare lesioni personali o danni all'attrezzatura.

Il prodotto può essere accompagnato da copie elettroniche e cartacee del manuale. È anche possibile ottenere copie del manuale, in tutte le lingue disponibili per ogni manuale, da "Archivio download" all'indirizzo www.hypertherm.com.

NEDERLANDS / DUTCH

WAARSCHUWING! Lees voordat u Hypertherm-apparatuur gebruikt de veiligheidsinstructies in de producthandleiding en in de *Veiligheids- en nalevingshandleiding* (80669C). Het niet volgen van de veiligheidsinstructies kan resulteren in persoonlijk letsel of schade aan apparatuur.

De handleidingen kunnen in elektronische en gedrukte vorm met het product worden meegeleverd. De handleidingen, elke handleiding beschikbaar in alle talen, zijn ook verkrijgbaar via de "Downloadbibliotheek" op www.hypertherm.com.

DANSK / DANISH

ADVARSEL! Inden Hypertherm udstyr tages i brug skal sikkerhedsinstruktionerne i produktets manual gennemlæses. Følges sikkerhedsvejledningen ikke kan det resultere i personskade eller beskadigelse af udstyret.

Kopier af manualerne kan ledsage produktet i elektroniske og trykte formater. Du kan også få kopier af manualer, på alle sprog der er til rådighed for hver manuel, fra "Download-biblioteket" på www.hypertherm.com.

PORTUGUÊS / PORTUGUESE

ADVERTÊNCIA! Antes de operar qualquer equipamento Hypertherm, leia as instruções de segurança no manual do seu produto. Não seguir as instruções de segurança pode resultar em lesões corporais ou danos ao equipamento.

Cópias dos manuais podem acompanhar os produtos nos formatos eletrônico e impresso. Também é possível obter cópias dos manuais em todos os idiomas disponíveis para cada manual na "Biblioteca de downloads" em www.hypertherm.com.

日本語 / JAPANESE

警告! Hypertherm 機器を操作する前に、この製品説明書にある安全情報をお読みください。安全情報に従わないと怪我や装置の損傷を招くことがあります。

説明書のコピーは、電子フォーマット、または印刷物として製品に同梱されています。各説明書は、www.hypertherm.com の「ダウンロードライブラリ」から各言語で入手できます。

简体中文 / CHINESE (SIMPLIFIED)

警告! 在操作任何海宝设备之前，请阅读产品手册中的安全操作说明。若未能遵循安全操作说明，可能会造成人员受伤或设备损坏。

随产品提供的手册可能提供电子版和印刷版两种格式。您也可从“Downloads library”（下载资料库）中获取每本手册所有可用语言的副本，网址为 www.hypertherm.com。

NORSK / NORWEGIAN

ADVARSEL! Før du bruker noe Hypertherm-utstyr, må du lese sikkerhetsinstruksjonene i produktets håndbok. Unnlattelse av å følge sikkerhetsinstruksjoner kan føre til personskade eller skade på utstyr.

Eksemplarer av håndbøkene kan medfølge produktet i elektroniske og trykte utgaver. Du kan også få eksemplarer av håndbøkene, i alle tilgjengelige språk for hver håndbok, fra "nedlastningsbiblioteket" på www.hypertherm.com.

SVENSKA / SWEDISH

VARNING! Läs säkerhetsinstruktionerna i din produktmanual försiktigt innan du använder din någon Hypertherm-utrustning. Underlåtenhet att följa dessa säkerhetsinstruktioner kan resultera i personskador eller skador på utrustningen.

Kopior av manualen kan medfölja produkten i elektronisk och tryckform. Du hittar även kopior av manualerna i alla tillgängliga språk i "nedladdningsbiblioteket" (Downloads library) på www.hypertherm.com.

한국어 / KOREAN

경고! Hypertherm 장비를 사용하기 전에 제품 설명서에 나와 있는 안전 지침을 읽으십시오. 안전 지침을 준수하지 않으면 신체 부상이나 장비 손상을 초래할 수 있습니다.

전자 형식과 인쇄된 형식으로 설명서 사본이 제품과 함께 제공될 수 있습니다. www.hypertherm.com 의 'Downloads library' (다운로드 라이브러리) 에서도 모든 언어로 이용할 수 있는 설명서 사본을 얻을 수 있습니다.

ČESKY / CZECH

VAROVÁNÍ! Před uvedením jakéhokoliv zařízení Hypertherm do provozu si přečtěte bezpečnostní pokyny v příručce k produktu. Nedodržování bezpečnostních pokynů může mít za následek zranění osob nebo poškození majetku.

Kopie příruček a manuálů mohou být součástí dodávky produktu, a to v elektronické i tištěné formě. Kopie příruček a manuálů ve všech jazykových verzích, v nichž byly dané příručky a manuály vytvořeny, naleznete v „Knihovně ke stažení“ na webových stránkách www.hypertherm.com.

POLSKI / POLISH

OSTRZEŻENIE! Przed rozpoczęciem obsługi jakiegokolwiek systemu firmy Hypertherm należy się zapoznać z instrukcjami bezpieczeństwa zamieszczonymi w podręczniku produktu. Nieprzestrzeganie instrukcji bezpieczeństwa może skutkować obrażeniami ciała i uszkodzeniem sprzętu.

Do produktu mogą być dołączone kopie podręczników w formie elektronicznej i drukowanej. Kopie podręczników, w każdym udostępnionym języku, można również znaleźć w „Bibliotece materiałów do pobrania” pod adresem www.hypertherm.com.

РУССКИЙ / RUSSIAN

БЕРЕГИСЬ! Перед работой с любым оборудованием Hypertherm ознакомьтесь с инструкциями по безопасности, представленными в руководстве, которое поставляется вместе с продуктом. Невыполнение инструкций по безопасности может привести к телесным повреждениям или повреждению оборудования.

Копии руководств, которые поставляются вместе с продуктом, могут быть представлены в электронном и бумажном виде. Копии руководств на всех языках, на которые переведено то или иное руководство, можно также загрузить из раздела «Библиотека документов» на веб-сайте www.hypertherm.com.

SUOMI / FINNISH

VAROITUS! Ennen minkään Hypertherm-laitteen käyttöä lue tuotteen käyttöoppaassa olevat turvallisuusohjeet. Turvallisuusohjeiden laiminlyönti voi aiheuttaa henkilökohtaisen loukkaantumisen tai laitevahingon.

Käyttöoppaiden kopiot voivat olla tuotteen mukana elektronisessa ja tulostetussa muodossa. Voit saada käyttöoppaiden kopiot kaikilla kielillä "latauskirjastosta" osoitteessa www.hypertherm.com.

БЪЛГАРСКИ / BULGARIAN

ПРЕДУПРЕЖДЕНИЕ! Преди да работите с оборудване Hypertherm, прочетете инструкциите за безопасност в ръководството на вашия продукт. Неспазването на инструкциите за безопасност би могло да доведе до телесно нараняване или до повреда на оборудването.

Копия на ръководствата може да придружават продукта в електронен и в печатен формат. Можете да получите копия на ръководствата, предлагани на всички езици, от "Downloads library" (Библиотека за теглене) на адрес www.hypertherm.com.

ROMÂNĂ / ROMANIAN

AVERTIZARE! Înainte de a utiliza un echipament Hypertherm, citiți instrucțiunile privind siguranța din manualul de utilizare a produsului. Nerespectarea instrucțiunilor de siguranță pot rezulta în vătămare personală sau în avarierea echipamentului.

Produsul poate fi însoțit de copii ale manualului în format tipărit și electronic. De asemenea, dumneavoastră puteți obține copii ale manualelor, în toate limbile disponibile pentru fiecare manual, din cadrul secțiunii "Librărie de descărcare" aflată pe site-ul www.hypertherm.com.

TÜRKÇE / TURKISH

UYARI! Bir Hypertherm ekipmanını çalıştırmadan önce, ürün kullanımı kılavuzunda yer alan güvenlik talimatlarını okuyun. Güvenlik talimatlarına uyulmaması durumunda kişisel yaralanmalar veya ekipman hasarı meydana gelebilir.

Kılavuzların kopyaları, elektronik ve basılı formatta ürünle birlikte verilebilir. Her biri tüm dillerde yayınlanan kılavuzların kopyalarını www.hypertherm.com adresindeki "Downloads library" (Yüklemeler kitaplığı) başlığından da elde edebilirsiniz.

MAGYAR / HUNGARIAN

VIGYÁZAT! Mielőtt bármilyen Hypertherm berendezést üzemeltetne, olvassa el a biztonsági információkat a termék kézikönyvében. A biztonsági utasítások betartásának elmulasztása személyi sérüléshez vagy a berendezés károsodásához vezethet.

A termékhez a kézikönyv példányai elektronikus és nyomtatott formában is mellékelve lehetnek. A kézikönyvek példányai (minden nyelven) a www.hypertherm.com weboldalon a „Downloads library” (Letöltési könyvtár) részen is beszerezhetők.

ΕΛΛΗΝΙΚΑ / GREEK

ΠΡΟΕΙΔΟΠΟΙΗΣΗ! Πριν θέσετε σε λειτουργία οποιονδήποτε εξοπλισμό της Hypertherm, διαβάστε τις οδηγίες ασφαλείας στο εγχειρίδιο του προϊόντος. Η μη τήρηση των οδηγιών ασφαλείας μπορεί να επιφέρει σωματική βλάβη ή ζημιά στον εξοπλισμό.

Αντίγραφα των εγχειριδίων μπορεί να συνοδεύουν το προϊόν σε ηλεκτρονική και έντυπη μορφή. Μπορείτε, επίσης, να λάβετε αντίγραφα των εγχειριδίων σε όλες τις γλώσσες που διατίθενται για κάθε εγχειρίδιο από την ψηφιακή βιβλιοθήκη λήψεων (Downloads library) στη διαδικτυακή τοποθεσία www.hypertherm.com.

繁體中文 / CHINESE (TRADITIONAL)

警告！操作任何 Hypertherm 設備前，請閱讀產品手冊中的安全說明。不遵守安全指示可能會導致人身傷害或設備損壞。

手冊複本可能以電子和印刷格式隨附產品提供。您也可以在此 www.hypertherm.com 的「下載資料庫」內獲取所有手冊的多語種複本。

SLOVENŠČINA / SLOVENIAN

OPOZORILO! Pred uporabo katerekoli Hyperthermove opreme preberite varnostna navodila v priročniku vašega izdelka. Neupoštevanje navodil za uporabo lahko povzroči telesne poškodbe ali materialno škodo.

Izdelku so lahko priloženi izvodi priročnikov v elektronski ali tiskani obliki. Izvode priročnikov v vseh razpoložljivih jezikih si lahko prenesete tudi iz knjižnice prenosov "Downloads library" na naslovu www.hypertherm.com.

SRPSKI / SERBIAN

UPOZORENJE! Pre rukovanja bilo kojom Hyperthermovom opremom pročitajte uputstva o bezbednosti u svom priručniku za proizvod. Oglašavanje o praćenje uputstva o bezbednosti može da ima za posledicu ličnu povredu ili oštećenje opreme.

Može se dogoditi da kopije priručnika prate proizvod u elektronskom i štampanom formatu. Takođe možete da pronadete kopije priručnika, na svim jezicima koji su dostupni za svaki od priručnika, u "Biblioteci preuzimanja" ("Downloads library") na www.hypertherm.com.

SLOVENSKÝ / SLOVAK

VÝSTRAHA! Pred použitím akéhokoľvek zariadenia od spoločnosti Hypertherm si prečítajte bezpečnostné pokyny v návode na obsluhu vášho zariadenia. V prípade nedodržania bezpečnostných pokynov môže dôjsť k ujme na zdraví alebo poškodeniu zariadenia.

Kópia návodu, ktorá je dodávaná s produktom, môže mať elektronickú alebo tlačенú podobu. Kópie návodov, vo všetkých dostupných jazykoch, sú k dispozícii aj v sekcii "Downloads library" na www.hypertherm.com.

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The end user is responsible for the safe operation of this equipment.

The safety precautions in this manual are general and can not anticipate every situation. Hypertherm Inc. acknowledges that unforeseen situations due to equipment failure, site variability, insufficient maintenance, failure of control equipment, and other events can cause equipment damage, injuries, or death. It is the user's responsibility to identify hazards and take the steps necessary to minimize risks.

Keep these instructions near the equipment. This manual is intended to familiarize the user with the equipment and its parts, operation, and maintenance.

All people who operate or are exposed to this equipment must know this information:

- Applicable safety standards
- The use, limitations, and care of personal protective equipment
- The location of the written hazard communication program and safety data sheets
- How to recognize hazardous energy sources
- The correct methods for isolating and controlling energy, including lock out–tag out procedures

User qualification and training






All users must read and understand these instructions before installing, operating, or doing maintenance on this equipment.

Do not permit an untrained person to operate this equipment. Operators must be qualified to install, operate, and maintain this equipment. Training should include this information:

- How to start and stop the system during routine operation and in an emergency situation
- The conditions and actions that can lead to injuries to people and damage to the system
- How to operate all controls
- How to identify and respond to problems
- How to do maintenance procedures
- A copy of this manual

This list is not all-inclusive.

Self-tipping hopper safety



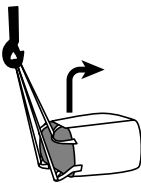

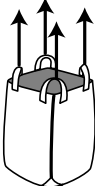


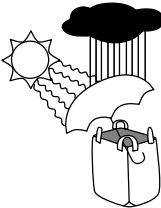
	WARNING! CRUSH HAZARD
	Read the instruction manual.
	Stay clear of the self-tipping hopper when transporting or dumping.
	
	

- Make sure that the self-tipping hopper handle is in the locked position with safety latch engaged except when dumping.
- When you stack self-tipping hoppers, nest self-tipping hoppers correctly.
- When you store self-tipping hoppers, do not stack empty self-tipping hoppers over 3 high.
- When you store self-tipping hoppers, do not stack loaded self-tipping hoppers over 2 high.
- Do not exceed the capacity of the forklift vehicle, self-tipping hopper, or operator.
- Never use a self-tipping hopper that needs repairs.
- A rod or pole can be used to assist with tripping the release from heights.

Abrasive bag safety

These symbols appear on the label on the abrasive bag.

	WARNING!		
	The forks of the forklift vehicle must be the same width as the bag.		Do not lift the bag from the side with only 2 loops.
	Do not lift more than one bag at a time.		Do not lift the bag by only one loop.
	Do not lift the bag by bringing all of the loops to the center.		Avoid sharp edges. The forklift vehicle forks must be dulled or protected.
	Do not position the bag so that you cannot see and operate the forklift vehicle.		Do not stand under the bag. Do not open the bottom of the bag while standing under the bag. Do not cut the bottom of the bag while standing under the bag.

	HANDLING RECOMMENDATIONS		
	The forks on the forklift vehicle must be at the same width as the bag.		Use all 4 loops and extensions to lift the bag from the side.
	Use extensions with a crane to lift the bag.		Lift vertically with all 4 loops.
	When you empty the bag, stay clear of the bag.		Position the bag so that you can see when you operate the forklift vehicle.
	Avoid ultraviolet (UV) light exposure or inclement weather.		


Emergency medical information and treatment

The use of high-pressure equipment exposes the operator and other people in the area to high-pressure water. Potential harms include eye injuries, lacerations, infections, and amputations. Do not put ice or heat on a waterjet injury. Support injured limbs and extremities above heart level if possible.

A high-pressure injection injury is a surgical emergency. Seek immediate medical treatment for all high-pressure waterjet injuries. Delayed treatment can lead to serious injuries or death.

Waterjet operators should carry a waterproof emergency medical tag or card that describes the nature of high-pressure waterjet injuries and the recommended treatment.

Give this card to emergency responders and medical professionals. It can be copied, cut out, laminated, and folded.

<div></div> <div>MEDICAL INFORMATION</div> <p>A high-pressure injection injury is a surgical emergency.</p> <p>Seek immediate medical treatment for all high-pressure waterjet injuries.</p> <p>Delayed treatment can lead to serious injuries or death.</p>	<p>The person carrying this card has been exposed to a waterjet of up to 4,137 bar (60,000 psi) and a velocity of 609 m/s (2,000 feet/second). The waterjet can contain abrasive materials.</p> <p>Skin can appear intact or show a minor pinhole-sized puncture wound. The injured area can become swollen, painful, and pale over the next 4 to 6 hours. Tissue becomes ischemic and necrotic within 12 hours.</p> <p>Consult a surgical specialist immediately for decompression, removal of foreign materials, and debridement.</p> <p>Administer broad-spectrum, intravenous antibiotics for Gram-negative and Gram-positive organisms.</p> <p>X-ray is the imaging of choice.</p> <p>Acute compartment syndrome is possible.</p> <p>Leave the wound open.</p>	<p>Do not use solvents other than isotonic sodium chloride solution for irrigating the wound.</p> <p>Do not use digital or local nerve blocks. Give analgesics by mouth or injection.</p>
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Hypertherm maintains a global Regulatory Management System to ensure that products comply with regulatory and environmental requirements.

National and local safety regulations

National and local safety regulations shall take precedence over instructions supplied with the product. The product shall be imported, installed, operated and disposed of in accordance with national and local regulations applicable to the installed site.

Certification test marks

Certified products are identified by one or more certification test marks from accredited testing laboratories. The certification test marks are found on or near the data plate.

Each certification test mark means that the product and its safety-critical parts conform to the relevant national safety standards as reviewed and determined by that testing laboratory. Hypertherm puts a certification test mark on its products only after that product is manufactured with safety-critical parts that have been authorized by the accredited testing laboratory.

Once the product has left the Hypertherm factory, the certification test marks are invalidated if any of these events occur:

- The product is modified in a manner that creates a hazard or nonconformance with the applicable standards.
- Safety-critical parts are replaced with unauthorized spare parts.
- Assembly is unauthorized.
- An accessory that uses or generates a hazardous voltage is added.
- There is tampering with a safety circuit or other feature that is designed into the product as part of the certification, or otherwise.

A Conformité Européene (CE) mark constitutes a manufacturer's declaration of conformity to applicable European directives and standards. Only those versions of Hypertherm products with a CE mark found on or near the data plate have been tested for compliance with the European Low Voltage Directive and the European Electromagnetic Compatibility Directive.

Differences in national standards

Nations can apply different performance, safety, or other standards. National differences in standards include, but are not limited to:

- Voltages
- Plug and cord ratings
- Language requirements
- Electromagnetic compatibility requirements

These differences in national or other standards can make it impossible or impractical for all certification test marks to be put on the same version of a product. For example, the Canadian Standards Association (CSA) versions of Hypertherm's products do not comply with European electromagnetic compatibility requirements and therefore do not have a CE mark on the data plate.

Countries that require a CE mark or have compulsory electromagnetic compatibility regulations must use CE versions of Hypertherm products with the CE mark on the data plate. These include, but are not limited to:

- Australia
- New Zealand
- Countries in the European Union
- Russia

It is important that the product and its certification test mark be suitable for the end-use installation site. When Hypertherm products are shipped to one country for export to a different country, the product must be configured and certified properly for the end-use site.

Higher-level systems

When an original equipment manufacturer (OEM) or system integrator adds equipment such as cutting tables, motor drives, motion controllers, or robots to a Hypertherm Waterjet cutting system, the combined system can be considered a higher-level system. A higher-level system with hazardous moving parts can constitute industrial machinery or robotic equipment, in which case the system integrator or end-use customer could be subject to more regulations and standards than those relevant to the waterjet cutting system as manufactured by Hypertherm.

It is the responsibility of the end-use customer and the OEM or system integrator to do a risk assessment for the higher-level system, and to supply protection against hazardous moving parts. Unless the higher-level system is certified when the OEM or system integrator incorporates Hypertherm products into it, the installation also can be subject to approval by local authorities. Seek advice from legal counsel and local regulatory experts if you are uncertain about compliance.

External interconnecting cables between parts of the higher-level system must be suitable for contaminants and movement as required by the final end-use installation site. When the external interconnecting cables are subject to oil, dust, water, or other contaminants, hard usage ratings could be required.

When external interconnecting cables are subject to continuous movement, constant flexing ratings could be required. It is the responsibility of the end-use customer or the OEM or system integrator to ensure the cables are suitable for the application. Since there are differences in the ratings and costs that can be required by local regulations for higher-level systems, it is necessary to verify that external interconnecting cables are suitable for the end-use installation site.

Proper disposal of Hypertherm products

Hypertherm waterjet cutting systems, like all products with electronics, can contain materials or parts, such as printed circuit boards, that can not be discarded with ordinary waste. It is your responsibility to dispose of Hypertherm product or part in an environmentally suitable manner and in compliance with national and local codes.

In the United States, check all federal, state, and local laws. In the European Union (EU), check the EU directives, national, and local laws. For more information, go to www.hypertherm.com/weee. In other countries, check national and local laws. Consult with legal or other compliance experts when applicable.

Proper handling and safe use of chemicals

Material safety data sheets (MSDS) and safety data sheets (SDS) are part of a hazard communication plan that supplies detailed information about hazardous chemicals. The information includes the chemical's toxicity and reactivity, first aid for exposure, approved storage and disposal, recommended protective equipment, and spill-handling procedures.

The Occupational Safety and Health Administration (OSHA) has presented new hazardous chemical labeling requirements as a part of its recent revision of the Hazard Communication Standard (29 CFR 1910.1200), to align with the United Nations' Globally Harmonized System of Classification and Labelling of Chemicals (GHS). The GHS is an international system for standardizing chemical classification and labeling.

Chemical regulations in the USA, Europe, and other locations require that Material Safety Data Sheets (MSDS) and Safety Data Sheets (SDS) be made available for chemicals that are supplied with the product and chemicals used in or on the product. The list of chemicals is supplied by Hypertherm. To see MSDS and SDS, go to the Hypertherm web site at www.hypertherm.com.

1. Click **Downloads library**.
2. Select **Material Safety Data Sheets** from the **Category** dropdown list.
3. Click on the **Material Safety Data Sheets** folder that is shown below the search fields.
4. Click on the **MSDS** folder.



These navigation instructions are subject to change without notice.

Particle emission and wastewater quality

Hypertherm does not manufacture or supply the materials that are cut and has no knowledge whether the particles released from materials that are cut will pose a physical hazard or health risk. Please consult with your supplier or other technical advisor if you need guidance concerning the properties of the material you will cut using a Hypertherm product.

If you are not fully aware of and up to date on all applicable government regulations and legal standards for the installation site, consult a local expert before purchasing, installing, and operating the equipment.

Waterjet product warranty coverage

Product	Parts coverage
HyPrecision pumps	27 months from the ship date, or 24 months from the date of proven installation, or 4,000 hours, whichever occurs first
PowerDredge abrasive removal system	15 months from the ship date or 12 months from the date of proven installation, whichever occurs first
Abrasive metering devices	15 months from the ship date or 12 months from the date of proven installation, whichever occurs first
On/off valve air actuators	15 months from the ship date or 12 months from the date of proven installation, whichever occurs first
Diamond orifices	600 hours of use with the use of a thimble filter and compliance with Hypertherm's water quality requirements

Consumable parts are not covered by this warranty. Consumable parts include, but are not limited to, high-pressure water seals, check valves, cylinders, bleed-down valves, low-pressure seals, high-pressure tubing, and low- and high-pressure water filters, and abrasive collection bags.

All third-party pumps, pump accessories, hoppers, hopper accessories, dryer boxes, dryer box accessories and plumbing accessories are covered by the respective manufacturers' warranties and not covered by this warranty.

Section 1

Specifications

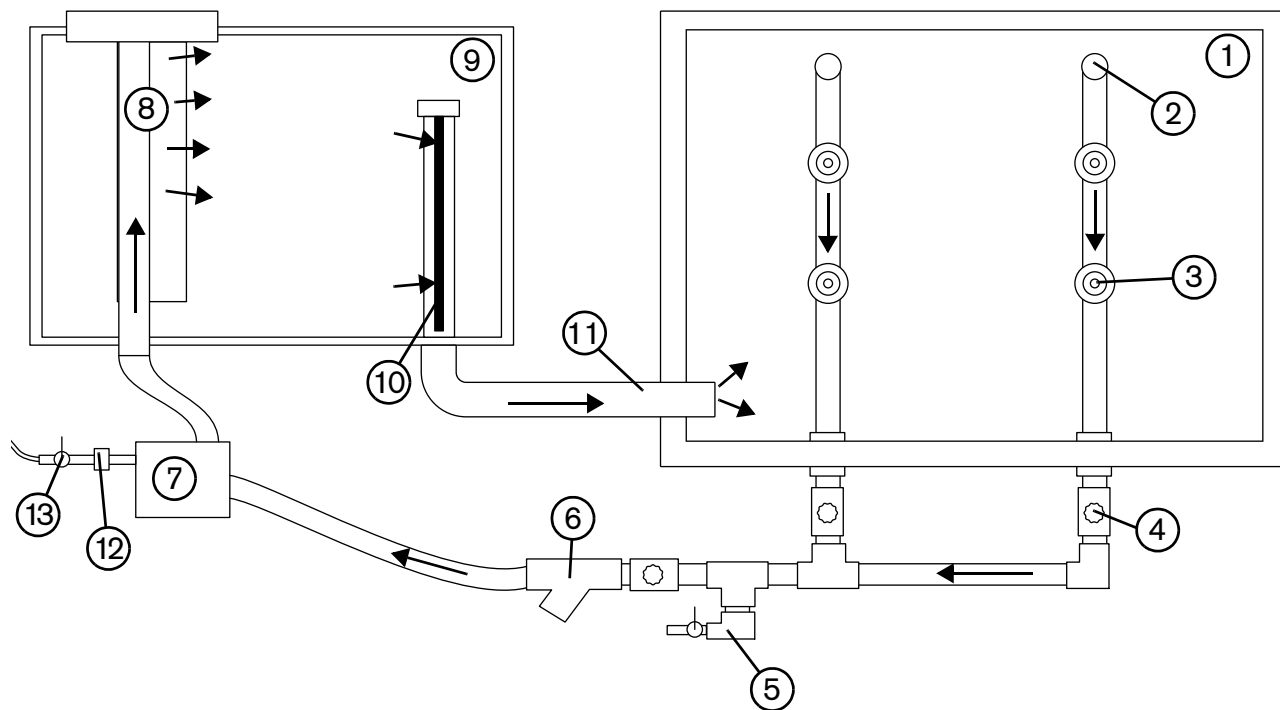
Overview

The PowerDredge™ abrasive removal system is designed to remove abrasive from any waterjet tank. This system reduces tank shoveling costs and associated downtime.

A single compressed air hose connected to a pump powers the system. The pump uses suction to pull water and abrasive into the nozzles from the bottom of the waterjet tank. Then, the water and abrasive go through a strainer and dispersion tube. The dispersion tube removes some of the energy from the water so that the abrasive can fall into the abrasive-collector bag in the self-tipping hopper. The bag holds the abrasive but allows water to flow into the overflow tube and back to the waterjet tank. (See *Figure 1*.)

To remove used abrasive from the self-tipping hopper, remove the bag from the self-tipping hopper.

Figure 1



← Direction of water flow

- | | |
|--|--|
| 1 Waterjet tank | 7 Pump |
| 2 Upright pipe with a cap | 8 Dispersion tube |
| 3 Nozzle | 9 Self-tipping hopper |
| 4 Gate valve | 10 Overflow tube |
| 5 Air quick-disconnect | 11 PVC overflow (shown) or flexible overflow |
| 6 Standard strainer (shown) or heavy-duty strainer | 12 Regulator |
| | 13 Pump air valve |

Self-tipping hopper

- Self-tipping hopper dimensions: 1,981 mm X 1,093 mm X 1,220 mm (78 inch X 43 inch X 48 inch)
- Self-tipping hopper empty weight: 420 kg (1,085 lb)
- Allow space in front of the self-tipping hopper for forklift vehicle access to remove the bag from the self-tipping hopper.
- Install the self-tipping hopper so that the end of the overflow that goes into the waterjet tank is at least 76 mm (3 inches) lower than the water height in the self-tipping hopper.

Pump

- Pump dimensions: 368 mm X 429 mm X 308 mm (14.5 inch X 16.9 inch X 12.1 inch)
- Pump weight: 22 kg (49 lb)
- The air requirement is a minimum of 2 bar at 140 slpm (30 psi at 5 scfm).
- The maximum distance between the pump and the cutting table is 600 mm (2 feet).

Abrasive removal bag

- Maximum capacity: 1,360.8 kg (3,000 lbs)
- The bag is for one-time use only.

Receive and unpack the system

Unload the system



WARNING!

A crane or forklift vehicle must be used to lift components weighing more than 25 kg (55 lb). Lifting must be done by an operator trained in accordance with local regulations. Position slings, ropes and other lifting gear where they cannot slip and where the load is balanced. The angle between slings or ropes used for lifting must not exceed 60 degrees.

Lift components or assemblies above their center of gravity to prevent them from turning over.

Unload boxes, crates and pallets, or cartons with forklift vehicles or slings, depending on their size and construction.

To unload the self-tipping hopper:



Move only one self-tipping hopper at a time.

1. Insert the forklift vehicle forks into the opening in the base with forks spread as wide as possible. Make sure that the forks do not go past the front of the base.
2. Tilt the mast of the forklift vehicle back to prevent the self-tipping hopper from falling off of the forks.
3. Lift the self-tipping hopper to the minimum practical height and move at a safe speed.

Unpack the system

- Make sure that you received all items in good condition. Contact your original equipment manufacturer (OEM) if any items are damaged or missing.



Boxes and parts are sometimes packed inside the self-tipping hopper.

- Inspect the system for damage that may have occurred during shipment. If you find evidence of damage, see *Claims*.
- Before you set up and operate this system, read the *Safety* section in the front of this manual.

Claims

- **Claims for damage during shipment** – If your unit was damaged during shipment, you must file a claim with the carrier.
- **Claims for defective or missing merchandise** – If any component is missing or defective, contact your OEM within 10 days of receipt of equipment. If you need additional assistance, call the nearest Hypertherm office listed in the front of this manual.

Install the system

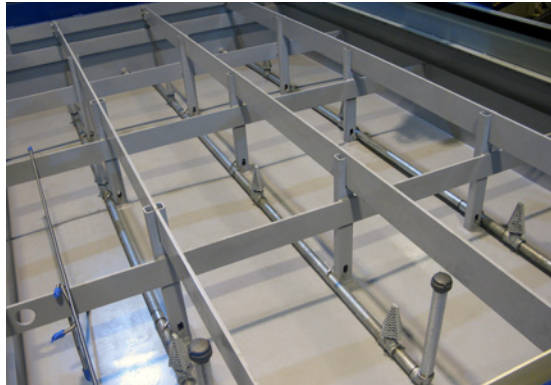
Your OEM will work with you to design the plumbing layout for your tank.

If you are retrofitting this system to a previously installed cutting table, go to *Inside the waterjet tank* on page 29. Your OEM provides a detailed layout drawing, gate valves, pipes, and fittings.

If your OEM has already installed the plumbing in your tank, go to *Outside the waterjet tank* on page 32.



The plumbing inside the waterjet tank will look similar to this.




Your system can be different from the one shown in this manual. See the layout drawing provided with your system for specific details.


Inside the waterjet tank

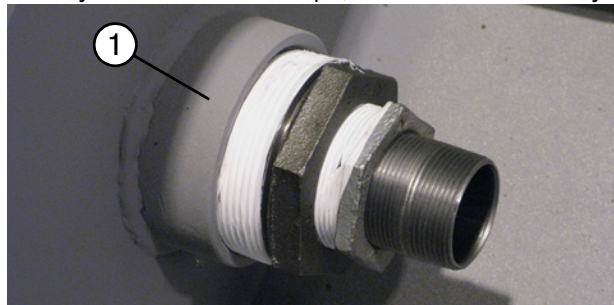
1. If the waterjet tank is not empty, drain the tank, and remove the abrasive.




 Each branch of the plumbing must have a 40-mm (1.5-inch), NPT, female coupling in the waterjet tank wall. Your layout drawing specifies where these are located.

2. If the tank does not have a coupling, go to *step a*. If the coupling in the tank is too large, go to *step b*.
 - a. Install the coupling provided in the tank wall where specified in your layout drawing.
 - b. Use the reducers to decrease the coupling ① to the size specified on your layout drawing.

 You must use PTFE tape on the first fitting that connects to the coupling. On the remaining fittings inside the waterjet tank you can use PTFE tape, but it is not necessary.



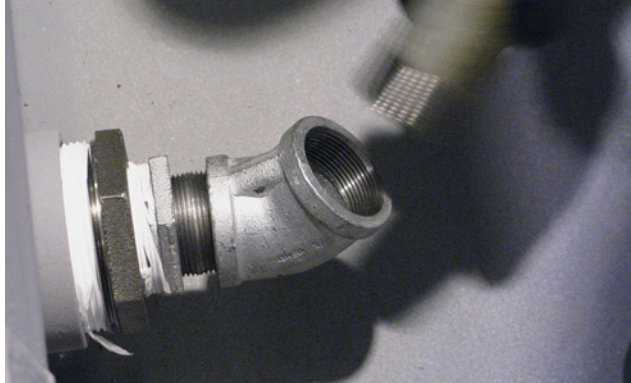
3. Use a pipe wrench to tighten these connections.

 It can be helpful to support the pipes with wooden blocks when you tighten the fittings.



2 – Installation

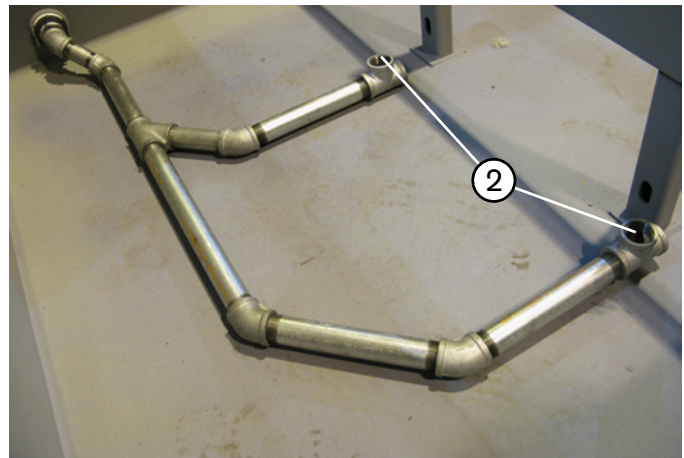
4. Start at the couplings in the tank wall, and install the plumbing according to your layout drawing.



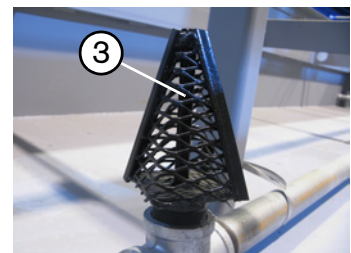
The plumbing must be flat on the floor of the tank.



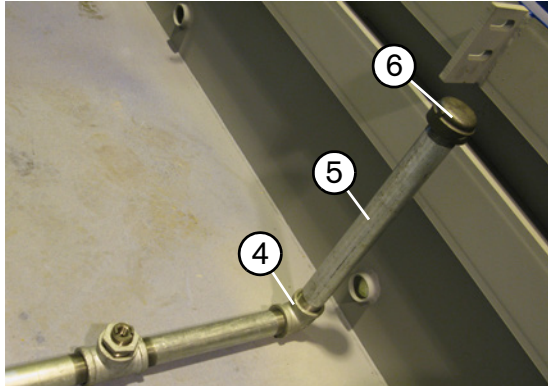
5. Make sure that the open holes in the T-fittings ② and 90-degree elbows point up.



6. Tighten a nozzle ③ into each of the T-fittings.



7. At the end of each pipe, attach a 90-degree NPT elbow (4), a 457-mm (18-inch) piece of pipe (5), and cap (6). Hand tighten the cap.

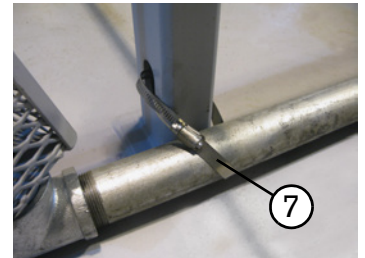


Make sure that the cap can be removed. This allows the waterjet to push water into the system if it becomes clogged.


8. Attach one of the hose clamps (7) around each of the supports in the tank.



If you do not have supports in your tank, continue to the next step.




Outside the waterjet tank

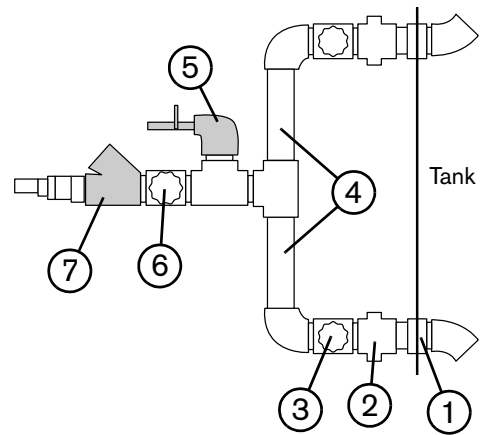
 Use PTFE tape on all connections outside the tank.

1. For each coupling ①, install the reducers (if necessary), a union ②, and a gate valve ③.

2. Install the plumbing manifold.

 The plumbing manifold on the outside of the tank can require pipes ④ to be cut to size and then threaded.

3. Where all of the branches come together, install the air quick-disconnect ⑤.
4. Install a gate valve ⑥.
5. Install the standard strainer ⑦ (shown) or heavy-duty strainer (not shown).



Install the self-tipping hopper and pump

1. Put the self-tipping hopper and pump into position. Follow the specifications in *Self-tipping hopper* on page 24 and *Pump* on page 25.
2. Put an empty abrasive bag in the self-tipping hopper.
3. Attach the carrying loops to the 4 shackles on the self-tipping hopper. This prevents the bag from falling into the self-tipping hopper.

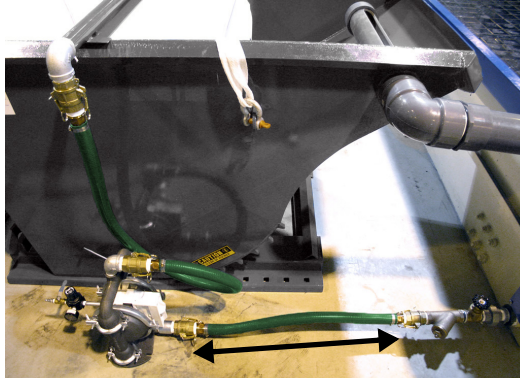


4. Put the dispersion tube on the self-tipping hopper over the abrasive bag.



Use 2 people to lift the dispersion tube.

5. Attach the 40-mm (1.5-inch) green inlet hose from the pump to the strainer.



- a. Cut the hose to the correct length.
- b. Install the barbed end of the quick connect fittings into the hose.

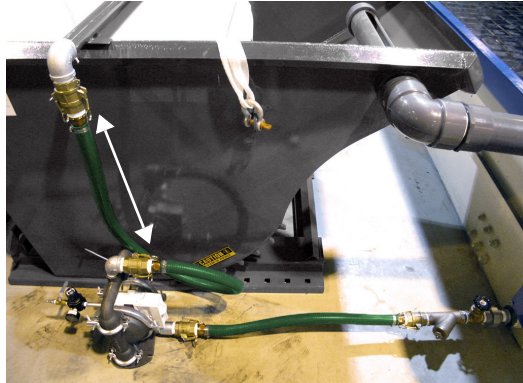


To make the assembly of the hoses onto the barbed end of the fittings easier, heat the end of the hose with a heat gun and lubricate the barbed end of the fitting with penetrating oil. Twist the fitting as you push it on.

- c. Attach the hose to the barbed fitting with a hose clamp.

2 – Installation

6. Attach the 40-mm (1.5-inch) green outlet hose from the pump to the dispersion tube.



- a. Cut the hose to the correct length.
- b. Install barbed end of the quick connect fittings into the hose.



To make the assembly of the hoses onto the barbed end of the fittings easier, heat the end of the hose with a heat gun and lubricate the barbed end of the fitting with penetrating oil. Twist the fitting as you push it on.

- c. Attach the hose to the barbed end of the fitting with a hose clamp.

7. Connect the air supply to the pump. (See *Pump* on page 25 for minimum air supply requirements.)



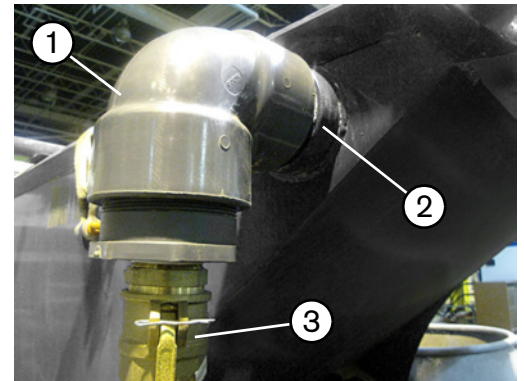
CAUTION!

The pump must sit on the same level as the cutting table. Do not elevate it.

8. Use the following steps, if you have the PVC overflow option. If you have the flexible overflow option, go to *step 9*.
- a. Attach the overflow assembly to the coupling outside the self-tipping hopper.
 - b. Make sure that the end of the overflow that goes into the waterjet tank is at least 76 mm (3 inches) lower than the water height in the self-tipping hopper.
 - c. If necessary, cut the overflow to the correct length.

9. Use the following steps to install the flexible overflow.

- a. Attach the overflow assembly ① to the coupling ② outside the self-tipping hopper.
- b. Make sure that the quick-disconnect ③ points down.
- c. Use the quick-disconnect to attach the flexible overflow to the overflow assembly.



- d. Cut the hose to the correct length.
- e. Attach the U-shaped assembly to the other end.
- f. Hang the U-shaped assembly over the edge of the waterjet tank.
- g. Make sure that all connections are tight.



10. Fill the waterjet tank with water.

11. Open the air valve on the pump to start the flow of water and abrasive into the self-tipping hopper.

12. Fill the self-tipping hopper with water.



13. Adjust the regulator so that the gray water flows over the opening in the overflow tube ④ but does not fill the overflow tube.



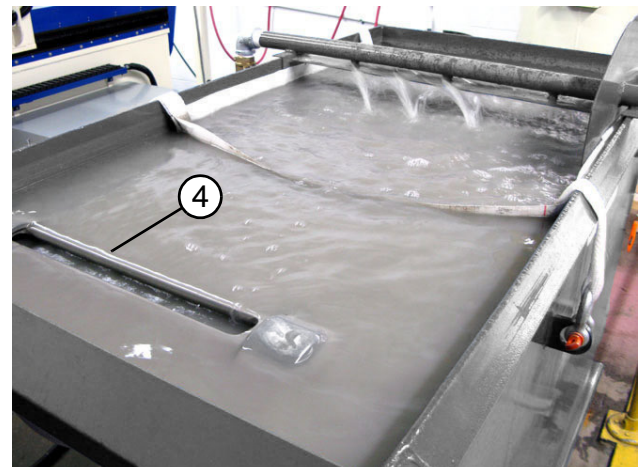
The pressure for each system will be different. A good starting point is 0.83 bar (12 psi).



Make sure that water flows out of the dispersion tube without water splashing out of the self-tipping hopper.



If the pump is running too fast, only water will be pumped into the hopper.



Section 3

Operation

Operation guidelines

- Do not cut with materials that float such as plastic bricks or wood. These materials can clog the system.
- Operate the PowerDredge continuously while cutting. Start the system when you start cutting. Stop the system 30 minutes after the last cut or at the end of the cutting shift. The energy from the cutting process mixes the water and abrasive in the tank. This allows the system to use suction to remove the used abrasive from the tank.
- When the system operates correctly, the amount of abrasive in the bottom of a waterjet tank will be approximately 127 mm (5 inches). The system does not remove all of the abrasive from the tank but mixes any abrasive in the tank.
- You can adjust the gate valves on the side of the tank for the system depending on where the cutting happens. If you close a branch of nozzles, it adds suction to the nozzles that remain open that are connected to the same pump.

Start the system

1. Open the gate valves on the side of the waterjet tank.
2. Open the air valve on the pump to start the flow of water and abrasive through the system.
3. Adjust the regulator so that the gray water flows over the opening in the overflow tube ① but does not fill the overflow tube.



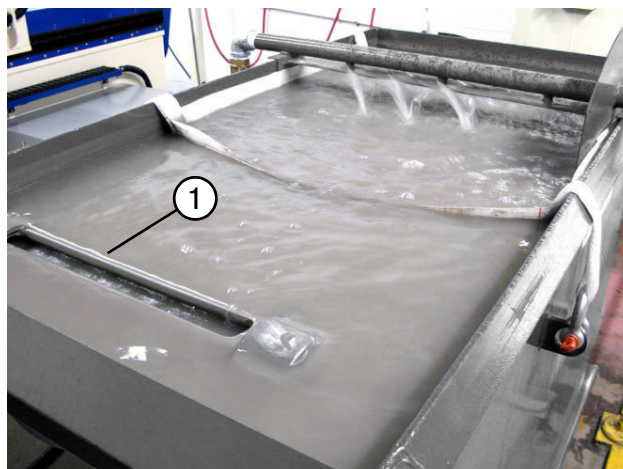
The pressure for each system will be different. A good starting point is 0.83 bar (12 psi).



Make sure that water flows out of the dispersion tube without water splashing out of the self-tipping hopper.

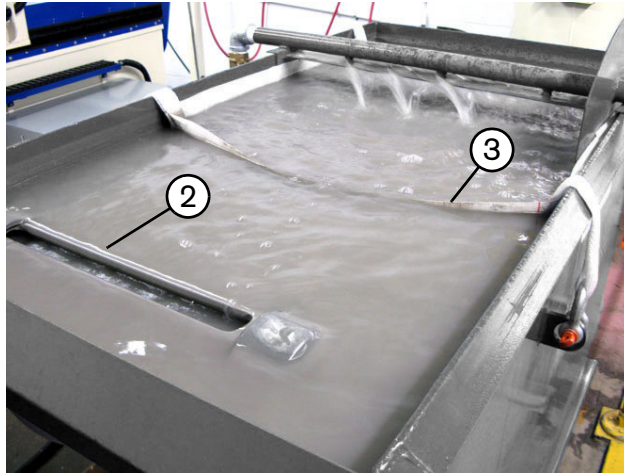


If the pump is running too fast, only water will be pumped into the hopper.



3 – Operation

4. After the self-tipping hopper is full, the overflow tube ② can easily keep up with the flow into the self-tipping hopper.



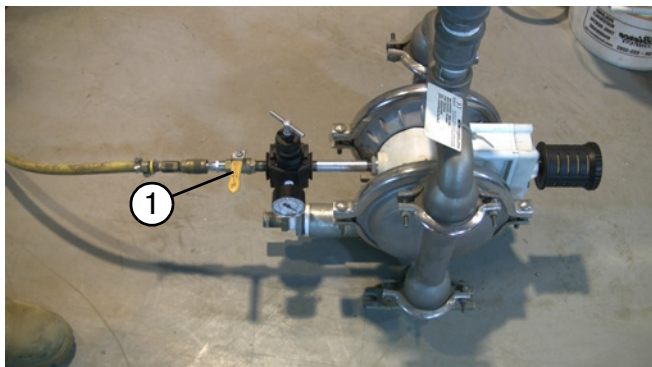
5. The edge of the bag ③ acts like a filter to keep solids in the bag.



Over time, fine particles of abrasive accumulate outside of the bag and must be removed from the self-tipping hopper. (See *Clean the self-tipping hopper annually* on page 52.)

Stop the system

Close the air valve ① on the pump.



Run a sweeping program

Abrasive collects in the corners and along the edges of the tank away from where the cutting happens. The best way to control the level of abrasive in the tank is to run a sweeping program cycle during downtime or once every second day while running the system. This program pushes abrasive away from the walls and into the center of the tank.



Make sure that there are no obstructions on the table before running the program.

Use the following guidelines to create your program:

- This program must be water-only at 1,270 mm (50 inches) per minute.
- The height of the cutting head must be 13 mm (0.5 inch) above the cutting surface.
- If applicable, the height sensor foot must be tethered or inoperable.
- The program moves the cutting head around the perimeter of the table then back and forth every 305 mm (12 inches) along the longest side of the table.

Replace the bag

Look in the self-tipping hopper daily to see how much abrasive is in the abrasive bag. When the bag is 3/4 full, replace the bag.



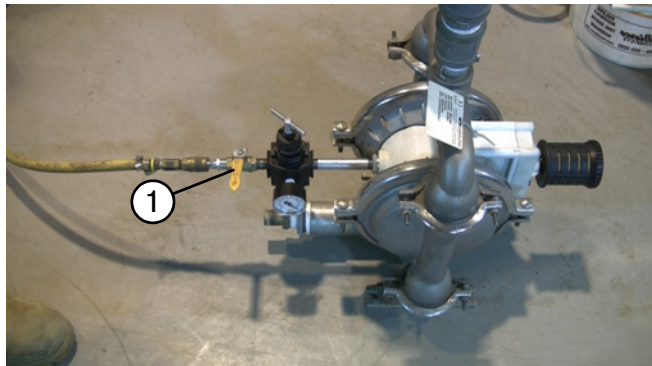
WARNING!

Turn OFF and lockout/tagout the air supply to the pump according to your company's lockout/tagout procedure before you do any maintenance.

The water in the self-tipping hopper and bag contains waste material. The water is not potable and may be hazardous to your health if contact is made.

Remove the bag

1. Close the air valve ① on the pump.



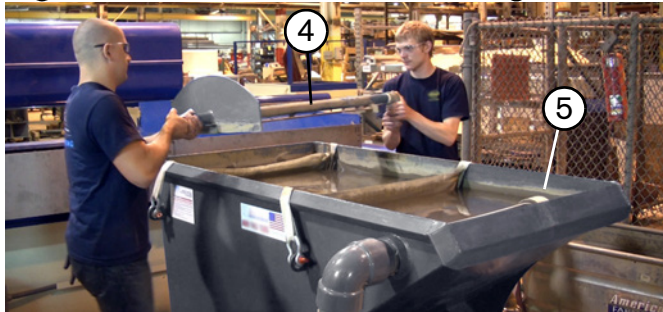
2. Close the gate valves ② on the side of the waterjet tank.




3. Disconnect the hose ③ that goes into the dispersion tube from the pump.

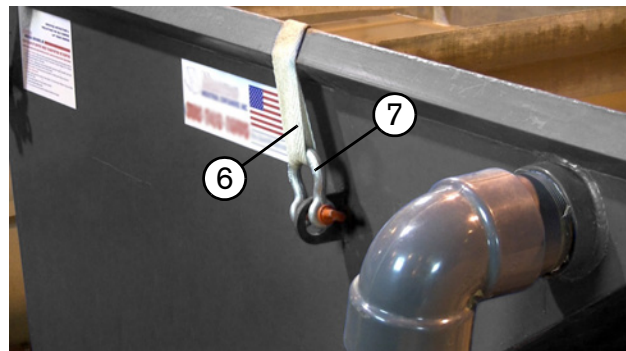


4. Remove the dispersion tube ④ from the top of the self-tipping hopper ⑤.





 Use 2 people to lift the dispersion tube.

5. Remove the carrying loops ⑥ from the shackles and replace the shackles ⑦ in the metal tabs.




4 – Maintenance

6. Use the following steps to use a fork lift vehicle to lift the bag. If you have a crane, go to *step 7*.

	WARNING!
Follow your company's forklift vehicle and/or crane safety procedures while moving the bag.	
	The abrasive bag can be up to 1,360.8 kg (3,000 lbs). Use lifting equipment that can safely lift and move the bag.

- a. Set the forks on the vehicle to the same width as the self-tipping hopper.


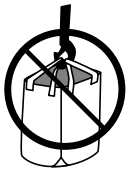
	CAUTION!
To prevent the carrying loops from tearing, the forklift vehicle forks must be dulled or protected. The bag must be lifted vertically, using all four carrying loops.	

- b. With the vehicle forks parallel to and approximately 50.8 mm (2 inches) above the top of the self-tipping hopper, slowly move the forklift vehicle toward the self-tipping hopper.
- c. As the forks approach the first set of carrying loops, put the forks through the respective loops.
- d. As the forks approach the second set of carrying loops, put the loops on the forks. Make sure that the carrying loops are not twisted.





7. Use the following steps to use a crane to lift the bag.

- a. Align the crane over the bag.
- b. Use a frame or similar device to keep the carrying loops aligned vertically with the corners of the bag.

	CAUTION!
	To prevent the carrying loops from tearing, do not pull the carrying loops to the center. The bag must be lifted vertically, using all four carrying loops.

- c. Attach the carrying loops to the frame or similar device. Make sure that the carrying loops are not twisted.

8. Take the bag to the disposal area immediately.

	<p>WARNING! WET FLOOR</p>
	<p>The floor can become slippery when wet. The bag will leak water onto the floor.</p>

9. Discard of the bag and contents. You can separate the bag from the contents, if necessary. See *Empty the bag* on page 47.

	<p>WARNING!</p>
<p>Always follow your company and local regulations for proper disposal of the bag, abrasive, and water that contains waste material.</p>	

Install the bag

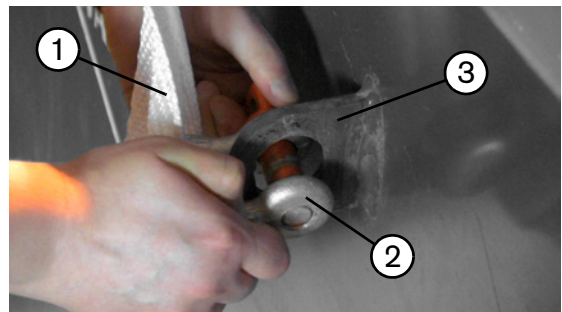
1. Put an empty bag into self-tipping hopper.



Make sure that the bag is pushed down into the self-tipping hopper.



2. Insert the carrying loops ① into the shackles ②, and put shackles in the metal tabs ③ on the self-tipping hopper.



3. Put the dispersion tube ④ on the top of the self-tipping hopper ⑤.



Use 2 people to lift the dispersion tube.



Make sure that the bag is between the dispersion tube and the side of the self-tipping hopper.



4. Attach the hose ⑥ to the dispersion tube.




Make sure that the hose is latched.



5. Open the gate valves on the side of the waterjet tank.
6. Open the air valve on the pump to start the flow of water and abrasive through the system.

Empty the bag

1. Put the bag over the abrasive disposal area.

 The bag has 3 ties on the bottom.

2. Use pliers to release the 2 side ties.



WARNING!

Keep the area near the bag clear of people and tools. The abrasive and any water in the bag will immediately fall into the disposal area when you release the last tie.

3. Use pliers to release the middle tie.
4. Discard of the bag.



WARNING!

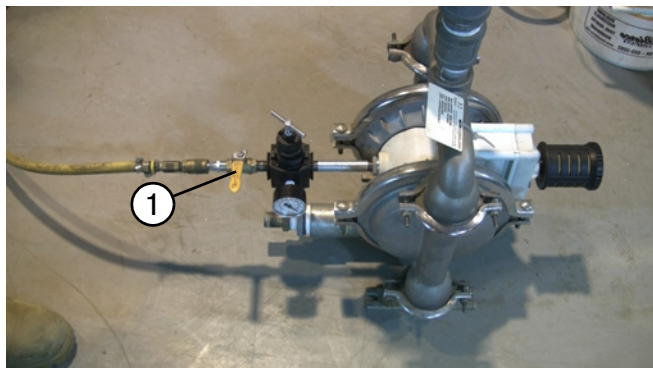
Do not reuse the bag. The bag is for one-time use only.

Always follow your company and local regulations for proper disposal of the bag, abrasive, and water that contains waste material.

Clean the strainer weekly

Clean the standard strainer

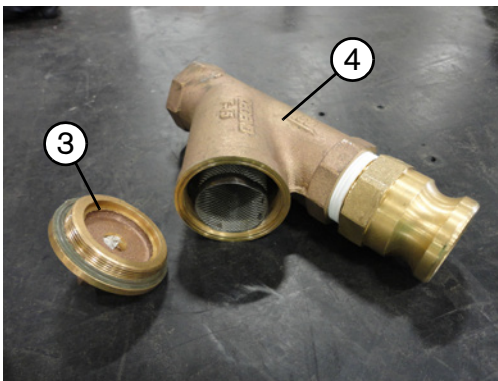
1. Close the air valve ① on the pump.



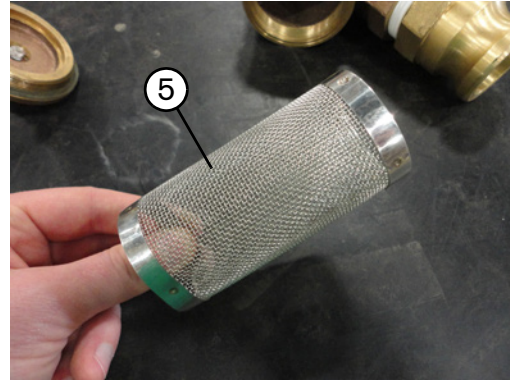
2. Close the gate valves ② on the side of the waterjet tank.



3. Remove the cover ③ from the short end of the standard strainer ④.



4. Remove the intake filter ⑤.



5. Discard the contents.



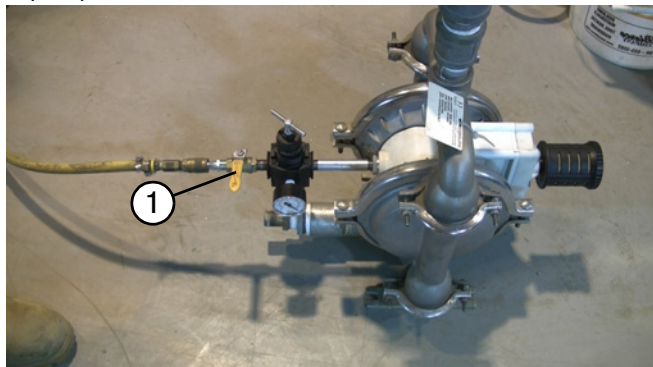
WARNING!

Always follow your company and local regulations for proper disposal of the bag, abrasive, and water that contains waste material.

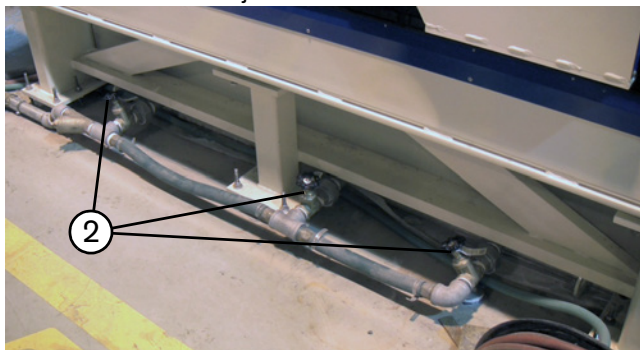
6. Flush the filter with water.
7. Install the clean filter into the standard strainer.
8. Tighten the cover onto the end of the standard strainer.
9. Open the gate valves on the side of the waterjet tank.
10. Open the air valve on the pump to start the flow of water and abrasive through the system.

Clean the heavy-duty strainer

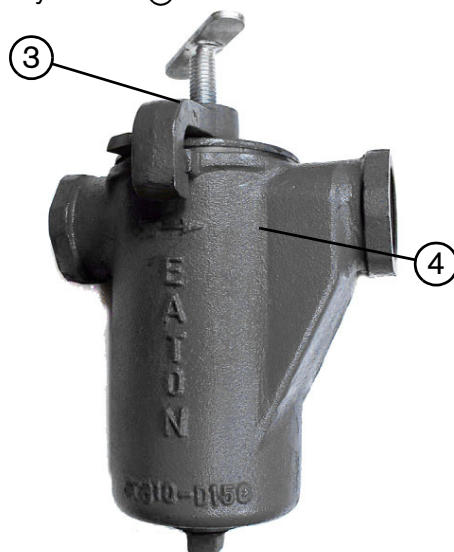
1. Close the air valve ① on the pump.



2. Close the gate valves ② on the side of the waterjet tank.



3. Remove the cover ③ from the heavy-duty strainer ④.



4. Remove the intake filter.


5. Discard the contents.

**WARNING!**

Always follow your company and local regulations for proper disposal of the bag, abrasive, and water that contains waste material.

6. Flush the filter with water.
7. Install the clean filter into the heavy-duty strainer.
8. Tighten the cover onto the end of the heavy-duty strainer.
9. Open the gate valves on the side of the waterjet tank.
10. Open the air valve on the pump to start the flow of water and abrasive through the system.

Clean the self-tipping hopper annually

	WARNING!
Follow your company's forklift vehicle and/or crane safety procedures while moving the self-tipping hopper.	
Stay clear of the self-tipping hopper.	
Always follow your company and local regulations for proper disposal of the bag, abrasive, and water that contains waste material.	

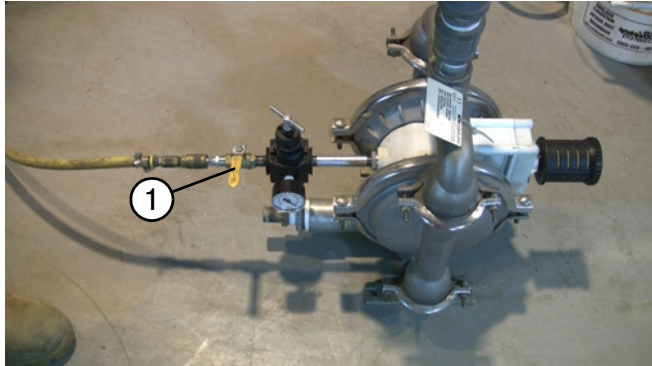
1. Remove the bag from the self-tipping hopper. (See *Remove the bag* on page 42.)
2. Remove the overflow from the self-tipping hopper.
3. Use a forklift vehicle to move the self-tipping hopper to the disposal area.
 - a. Insert the forklift vehicle forks into the opening in the base with forks spread as wide as possible. Make sure that the forks do not go past the front of the base.
 - b. Tilt the mast of the forklift vehicle back to prevent the self-tipping hopper from falling off of the forks.
 - c. Lift the self-tipping hopper to the minimum practical height and move at a safe speed.
4. Remove the safety cable ties on the self-tipping hopper.
5. Release the handle on the self-tipping hopper.
6. Tilt the mast of the forklift vehicle slightly forward to remove the water and abrasive from the self-tipping hopper.
7. Tilt the mast of the forklift vehicle back.
8. Put the handle on the self-tipping hopper into the locked position.
9. Install new safety cable ties on the self-tipping hopper.
10. If necessary, put the self-tipping hopper on the ground and use a shovel to remove the remaining abrasive.
11. Use a forklift vehicle to move the self-tipping hopper back into its original position.
12. Install the overflow on the self-tipping hopper. (See *step 8* on page 34.)
13. Install a bag in the self-tipping hopper. (See *Install the bag* on page 46.)

Pump maintenance

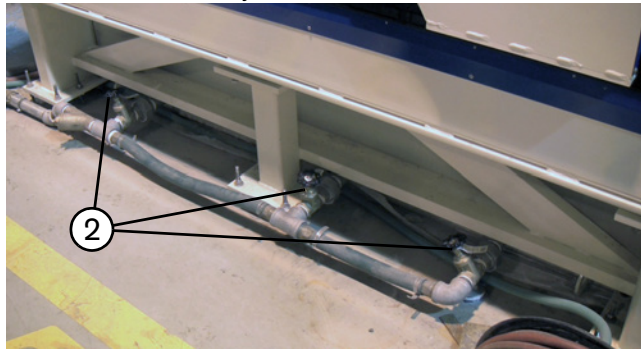
See the pump manufacturer's manual for more detailed information on pump maintenance.

Replace the ball valves and seats

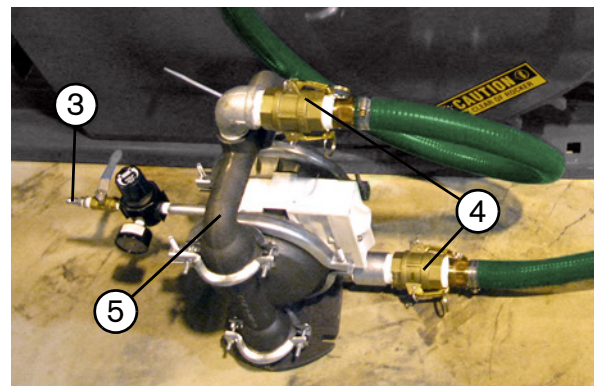
1. Close the air valve ① on the pump.



2. Close the gate valves ② on the side of the waterjet tank.

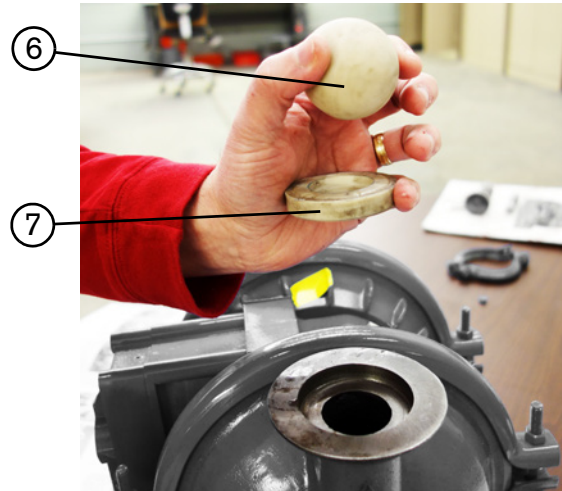


3. Disconnect the air supply ③ from the pump.
4. Disconnect the water hoses ④ from the pump.
5. Remove the small clamps from the top of the pump.
6. Remove the discharge manifold ⑤.



4 – Maintenance

7. Remove the ball valve ⑥ and seat ⑦ from the top of each liquid chamber.



8. Remove the small clamps from the bottom of the pump.

9. Lift the pump off of the intake manifold ⑧.

10. Remove the ball valve ⑨ and seat ⑩ from each side.

11. Install the new seats and ball valves in the intake manifold.

12. Put the pump on the intake manifold.

13. Install the small clamps on the bottom of the pump.

14. Install the new seats and ball valves in the top of each liquid chamber ⑪.



15. Put the discharge manifold on top of the pump.

16. Install the small clamps on the top of the pump.

17. Connect the water hoses to the pump.

18. Connect the air supply to the pump.

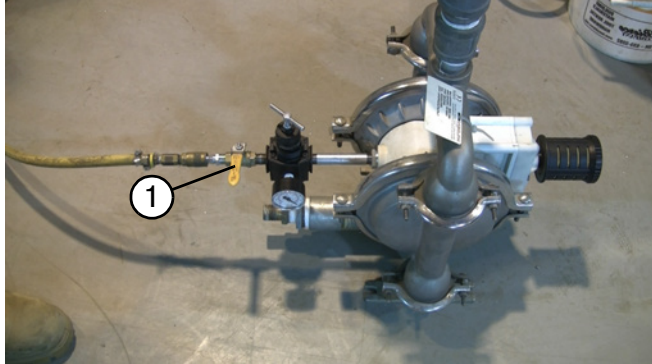
19. Open the gate valves on the side of the waterjet tank.

20. Open the air valve on the pump to start the flow of water and abrasive through the system.

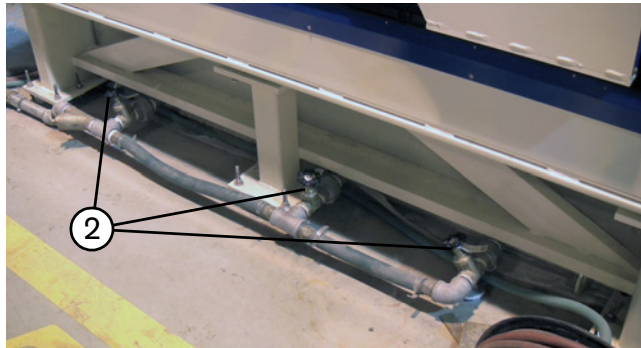
Replace the diaphragms

Remove the diaphragm assemblies

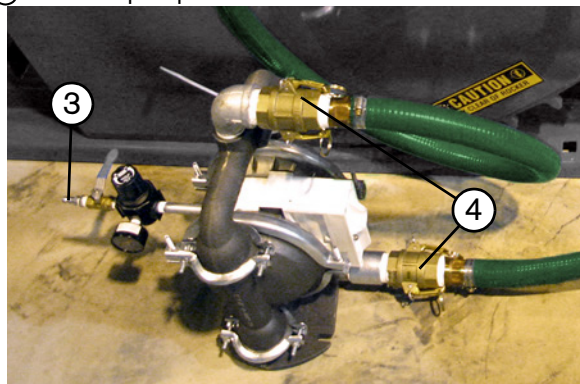
1. Close the air valve ① on the pump.



2. Close the gate valves ② on the side of the waterjet tank.

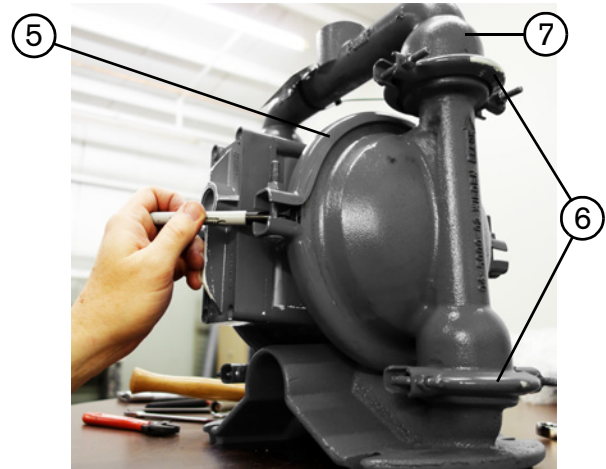


3. Disconnect the air supply ③ from the pump
4. Disconnect the water hoses ④ from the pump.



4 – Maintenance

5. Put a mark on the pump between the large clamps ⑤ to help with assembly.
6. Remove the small clamps ⑥ from the top of the pump.
7. Remove the discharge manifold ⑦.
8. Set the ball valves aside.
9. Remove the small clamps from the bottom of the pump.



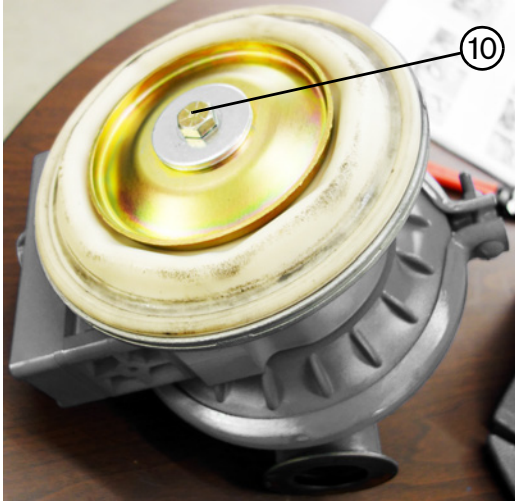
10. Lift the pump off of the intake manifold ⑧.



11. Remove one of the large clamps.
12. Remove the liquid chamber ⑨.



- 13.** Use a wrench to remove the center bolt ⑩ from the diaphragm assembly.



- 14.** Remove the remaining large clamp.
- 15.** Remove the remaining liquid chamber.
- 16.** Pull the diaphragm assembly with the center shaft out of the pump.



- 17.** If you are replacing the diaphragms, continue with this procedure. If you are replacing the air end kit, go to *step 1* in *Replace the air end kit* on page 61.

4 – Maintenance

Assemble the new diaphragms

1. Put the diaphragm assembly with the center shaft into a vise with wood blocks and tighten the vise.
2. Use a wrench to remove the bolt from the center shaft.
3. Remove the washer.
4. Replace the diaphragm and assemble the washer and bolt.
5. Use the bolt to install the diaphragm assembly onto the center shaft.
6. Remove the diaphragm assembly from the vise.
7. For the other diaphragm assembly that does not have the shaft, remove the washer.
8. Replace the diaphragm and assemble the washer and bolt.



Install the diaphragm assemblies

1. Install the diaphragm assembly with the center shaft into the center of the pump.



2. Install the liquid chamber on the same side.



Use the mark you made in *step 5* on page 56 to correctly align the liquid chamber.

3. Install a large clamp to hold this part of the diaphragm assembly in place.
4. Install the remaining diaphragm assembly on the other side of the pump.



5. Install the liquid chamber.

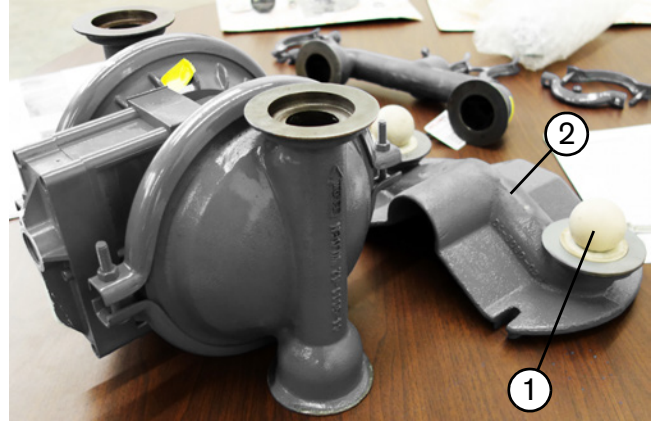


Use the mark you made in *step 5* on page 56 to correctly align the liquid chamber.

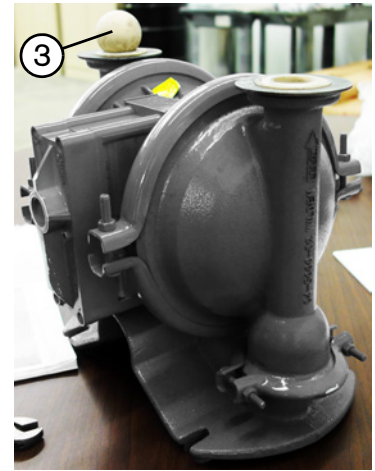
6. Install the large clamp.

4 – Maintenance

7. Put the ball valves ① in place.
8. Put the pump on the intake manifold ②.
9. Install the small clamps on the bottom of the pump.



10. Put the ball valves ③ in place.
11. Put the discharge manifold on top of the pump.
12. Install the small clamps on top of the pump.
13. Connect the water hoses to the pump.
14. Connect the air supply to the pump.
15. Open the gate valves on the side of the waterjet tank.
16. Open the air valve on the pump to start the flow of water and abrasive through the system.



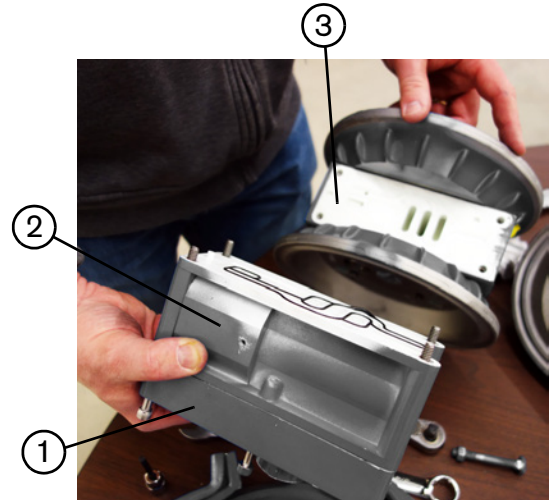
Replace the air end kit

Replace the muffler plate and air valve assembly components

1. Loosen the screws on the muffler plate.



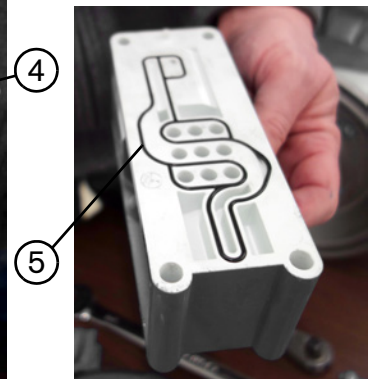
2. Remove the muffler plate ① and air valve assembly ② from the center section ③.
3. Remove the muffler plate from the air valve assembly.



4. Replace the muffler plate gasket ④ and air valve assembly gasket ⑤.

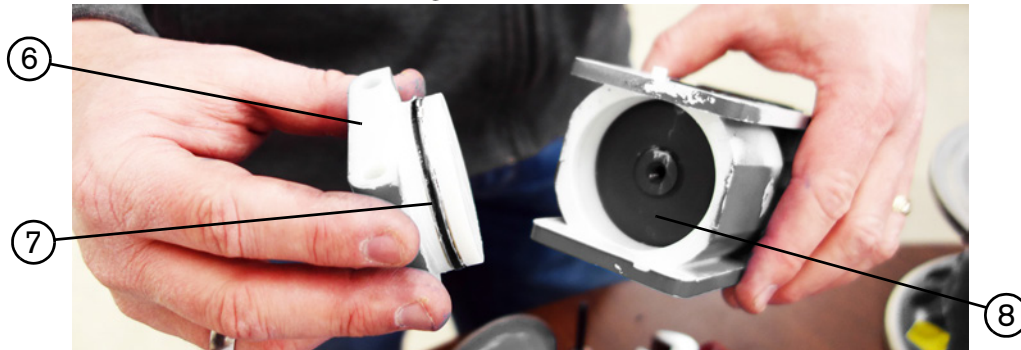


To help position the gaskets, use a small amount of the NLGI grade 2 white EP bearing grease.



4 – Maintenance

5. On the air valve assembly, remove the end cap ⑥.



6. Replace the O-ring ⑦ on the end cap.

7. Tighten one of the long screws that you removed from the muffler plate into the top of the air valve spool ⑧.

8. Pull on the screw to remove the spool.

9. Lubricate the bore with NLGI grade 2 white EP bearing grease or equivalent.

10. Install the new spool.

11. Install the end cap.

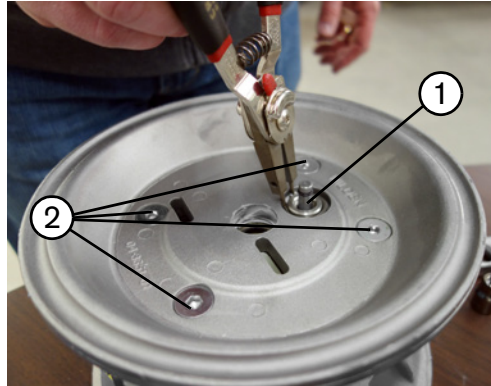
12. Assemble the muffler plate and air valve assembly.

13. Install the muffler plate and air valve assembly and tighten the screws.



Replace the air chamber components

1. Complete *Remove the diaphragm assemblies* on page 55 before you continue.
2. Use snap ring pliers to remove the snap ring on both sides of pilot spool ①.



3. Use 2 hex wrenches to remove the air chamber screws ②.



4. Remove the pilot spool.



4 – Maintenance

5. Remove one of the air chambers ③ from the center section.



6. Remove the other air chamber from the center section.

7. Replace the shaft seal ④ on both sides of the center section.



8. Clean the center hole of the center section.

9. Lubricate the center hole of the center section with NLGI grade 2 white EP bearing grease.

10. Replace the center block gaskets ⑤.

11. Install both air chambers onto the center section.

12. Lubricate the new pilot spool with NLGI grade 2 white EP bearing grease.

13. Install the new pilot spool.

14. Install the new snap rings on the pilot spool.



15. Use 2 wrenches to install the air chamber screws.



16. Install the diaphragm assemblies. (See *Install the diaphragm assemblies* on page 59.)

Section 5

Troubleshooting

Troubleshooting guide

Problem	Cause	Solution
The system pumps only water into the self-tipping hopper.	The pump is left on for too long after the cutting head is turned off.	Turn ON the pump at the start of cutting and off 30 minutes after stop.
	There is not enough abrasive in the waterjet tank (less than 5 inches from the bottom of the tank) to pump into the self-tipping hopper.	
	The cutting is happening in a small area of the waterjet tank. The mixing of the water and abrasive is isolated to a small area in the tank.	Run a sweeping program during downtime or once every second day. See <i>Run a sweeping program</i> on page 41. Adjust the gate valves on the tank to make the flow stronger where the cutting happens. If you close a group of nozzles, the suction will be stronger on the ones that remain open.
Abrasive returns to the waterjet tank.	The pressure on the regulator on the pump is too high.	Decrease the pressure on the regulator to approximately 0.83 bar (12 psi). For more information, see <i>Start the system</i> on page 37.
	The abrasive-collector bag is full.	Replace the bag. See <i>Replace the bag</i> on page 42.
	The abrasive does not sink to the bottom of the self-tipping hopper because the water flows too quickly.	Decrease the pressure on the regulator to approximately 0.83 bar (12 psi). For more information, see <i>Start the system</i> on page 37.

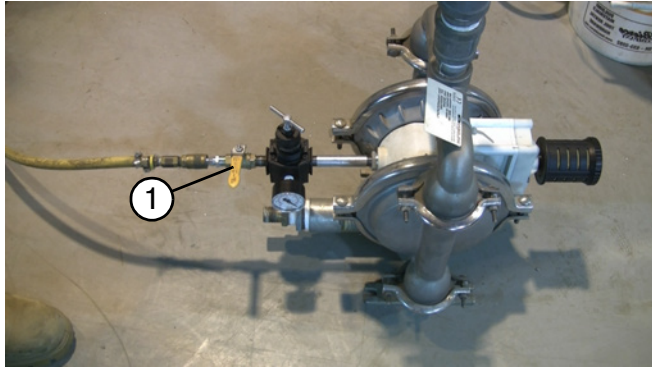
5 – Troubleshooting

Problem	Cause	Solution
The flow is slow.	Abrasive has built up past the nozzles and clogged the system (14 inches maximum).	See <i>Reverse the flow of the system</i> on page 70 or <i>Push air into the tank</i> on page 69.
	Sweeping is not happening often enough.	Run a sweeping program during downtime or once every second day. See <i>Run a sweeping program</i> on page 41.
	Abrasive solidifies in the bottom of the waterjet tank.	Run a sweeping program during downtime or once every second day. See <i>Run a sweeping program</i> on page 41.
	Foreign materials clog the nozzles.	Do not cut with plastic bricks or other materials that can clog the nozzles. Clear the nozzles. See <i>Reverse the flow of the system</i> on page 70, <i>Manually flush the system</i> on page 72, or <i>Push air into the tank</i> on page 69.
	Foreign materials clog the strainer.	Clean the strainer. See <i>Clean the strainer weekly</i> on page 48 or <i>Clean the heavy-duty strainer</i> on page 50.
	Foreign materials clog the dispersion tube.	Clear the dispersion tube. See <i>Manually flush the system</i> on page 72.
	The regulator is set too low.	Increase the pressure on the regulator to approximately 0.83 bar (12 psi). For more information, see <i>Start the system</i> on page 37.
	The regulator is defective.	Inspect the regulator. Replace it if necessary.
	The air supply is not sufficient.	Make sure the air supply meets the minimum recommended setting. See <i>Pump</i> on page 25.
Flow is slow and water comes out of the pump muffler.	A pump diaphragm is defective.	Replace the diaphragms. See <i>Replace the diaphragms</i> on page 55.
Flow is slow but the regulator pressure is high.	A pump ball valve or seat is defective.	Replace the ball valves and seats. See <i>Replace the ball valves and seats</i> on page 53.

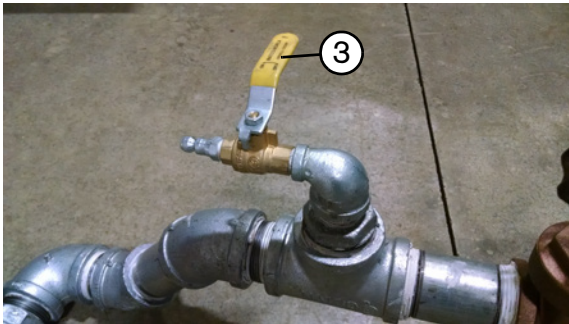
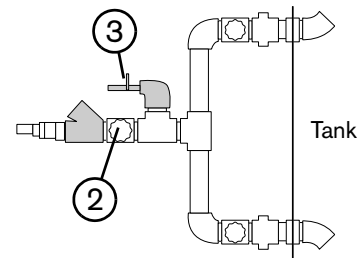
Push air into the tank

Use this procedure to push air back into the waterjet tank and unclog the nozzles.

1. Close the air valve ① on the pump.



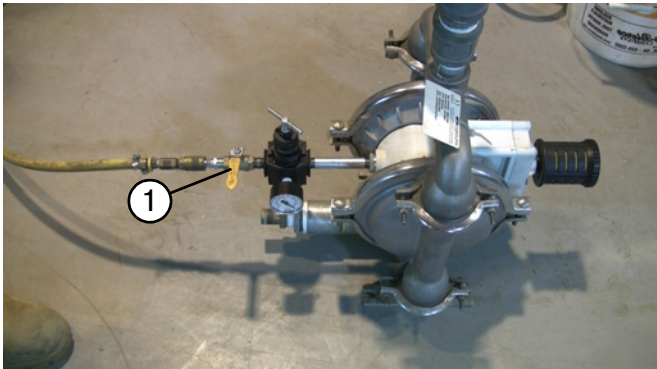
2. Close the gate valve ② immediately after the quick-disconnect.
3. Connect the air supply.
4. Open the air valve ③ on the air quick-disconnect to let air go through the nozzles.



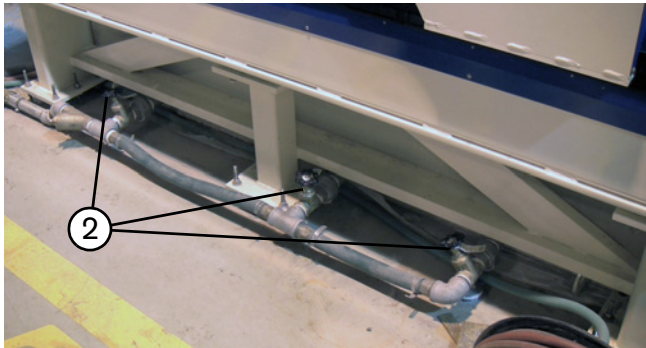
Reverse the flow of the system

Use this procedure to reverse the flow of the system to help unclog the system. This procedure cannot unclog the dispersion tube.

- 1. Close the air valve ① on the pump.



- 2. Close the gate valves ② on the side of the waterjet tank.

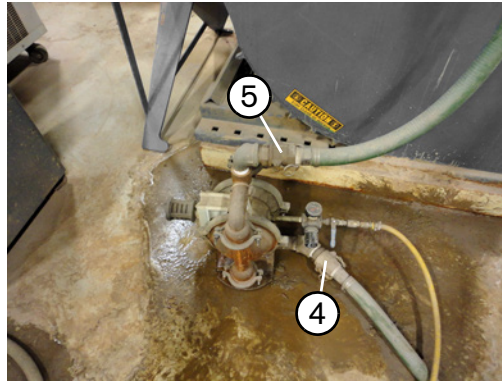


- 3. Disconnect the hose ③ leading into the dispersion tube from the pump.



	WARNING! WET FLOOR
	The floor can become slippery when wet. The hose will leak water onto the floor.

4. Hang the open end over the side of the waterjet tank to let it pull clear water from the top of the tank.
5. Interchange the intake hose ④ and discharge hose ⑤.

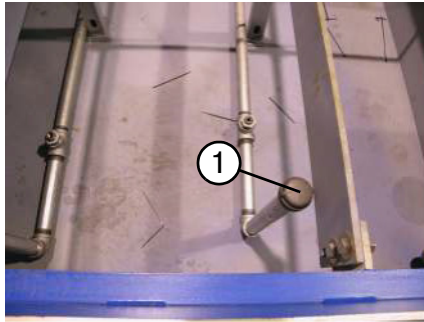


6. Open the gate valves on the side of the waterjet tank.
7. Open the air valve on the pump to start the flow of water and abrasive through the system.

Manually flush the system

Use this procedure to push water through the system with the waterjet cutting head and help unclog the system.

1. Turn OFF the water to the cutting head.
2. Remove the caps ① from the vertical pipes in the waterjet tank.



3. Move the waterjet cutting head over the opening.
4. Manually turn ON the water to the cutting head to flush the system.



CAUTION!

Do not let the water run longer than 5 minutes. You will cut a hole in the plumbing or floor of the system.

5. Turn OFF the water to the cutting head.
6. Install the caps on the pipes.

Pump kits

Kit number	Description
16152	Pump
16139	Kit: Pump - Air end
16138	Kit: Pump - Wet end
16155	Kit: Hoses

Self-tipping hopper kits

Kit number	Description
16133	Kit: Abrasive bags (200)
16181	Abrasive bag (1)
16156	Self-tipping hopper
16153	Kit: Overflow tube inside hopper

Strainer kits

Kit number	Description
16134	Standard strainer
16135	Heavy-duty strainer

Overflow kits

Kit number	Description
16136	PVC overflow
16137	Flexible overflow

Other kits

Kit number	Description
16154	Air quick-disconnect
16132	Nozzle