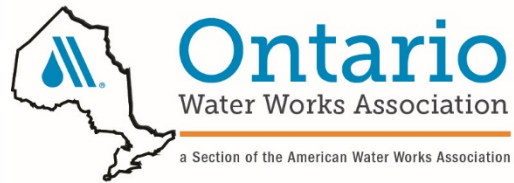


Ontario Water Works Association

A Section of the American Water Works Association



Frozen Water Services Information Document

August 2017



Disclaimer

This information document was assembled based on information shared by municipalities through a survey, subsequent conversations, and email exchanges. This report is presented solely for information purposes.

The mention of trade names for commercial products does not represent or imply the approval or endorsement for use.

It is recommended that municipalities develop their own Standard Operating Procedures and conduct training prior to using equipment to thaw frozen services.

Acknowledgements

This document was prepared by the OWWA Distribution Committee. Key contributors we would like to recognize are:

- Bryce McDonald
- Jamie Austin
- Cheryl Beam
- Alain Lalonde
- Rodney Bouchard
- Shelley McDonald

On behalf of the OWWA Distribution committee and the OWWA Management committee, we would like to thank all survey contributors and those who participated in detailed follow-up interviews. This survey was successful to bring forward information to share with a broader audience. It's hoped that municipalities can learn and continue to share experiences with and support one another through the many challenges that municipalities face.

In addition, the authors would like to acknowledge time and effort spent by the Executive of the OWWA, OWWA Board and members of the OWWA Distribution and Management committees.

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1. Introduction

Frozen water services are frequently a cause of concern for municipalities. Depending on the severity of the winter, residents can be out of water for hours or days. The methods of managing frozen services range dramatically across municipalities, but there is consensus that municipalities can and must allocate their resources in the most cost-effective ways.

At their June 23, 2014 meeting, the Board of Directors of the Ontario Water Works Association (OWWA) agreed that it would be beneficial to create a guidance document for municipalities regarding frozen water services. In October 2014, the OWWA Distribution and Management Committees were asked to collaborate and form a working group to develop a Frozen Water Service Guidance Document.

A survey was posted on April 9, 2015 with an email broadcast sent to OWWA members including the link to complete the survey. The email was forwarded to other municipal contacts to try and obtain as much feedback as possible. The initiative was also presented at the April 2015 National Water and Wastewater Benchmarking Initiative conference with the intent to share the survey link and collect as much information as possible.

The survey was closed in early November. In total, there were 40 complete responses and 8 partial responses. Detailed information was collected and many municipalities provided additional insight and clarification through subsequent emails and phone conversations. Many Ontario cities experienced an extremely severe winter in 2014-2015, unlike what had been experienced previously. During the timing of the survey, many were updating their policies and procedures based on what was experienced and learned from the 2014-2015 event. The following document is intended to provide an overview of best practices to ensure that municipalities are better positioned should a similar event take place in the future.

It is recognized that there are several approaches that municipalities use to address frozen services. This guidance document provides an opportunity to bring all ideas forward for consideration so that each municipality can select and choose options and find an approach, or combination of approaches, that best suits their needs. The document does not include Standard Operating Procedures, nor does it make specific equipment or manufacturer recommendations.

The document is divided into 4 technical sections, namely:

- Notification – methods of communication and active monitoring techniques used that would trigger notification to properties that have historically experienced freezing of their service lines.
- Billing – how billing practices are maintained or adjusted if there's a frozen service event and other considerations.
- Emergency response – the means and methods used by municipalities to deal with frozen services. Some examples include thawing using electricity, hot water, steam, and hot water hydro-excavation, all performed via excavation or remotely.
- Post Emergency Response – an opportunity to identify some of the post winter remediation strategies and long term repair options, including construction specification development and local improvements to provide long term fixes.

This document brings together insight and information on the measures that municipalities have in place to prevent or restore frozen water services. Specific examples of current documentation have been provided by those responding to the survey. Included in a series of appendices are examples of policy/Memos to Council, notification letters, waivers, and information regarding the types of equipment used to respond to a frozen service. The appendices are titled:

- Notification;
- Waiver and Billing;
- Equipment and Response; and
- Policy.

The format of the document is set out with the survey question identified in bold and a graph providing the response, including the number of municipalities choosing that option/item. In addition, there is general discussion provided to share specific information from the responses and subsequent contacts.

2. Notification

The initial part of the survey posed questions to understand the extent of historical frozen services and if there are standard processes or protocols in place. The goal was to ultimately understand whether or not frozen water services are a common issue, or something that impacts only a few.

Do you have a list of customers that are notified to “run water” when the weather warrants?

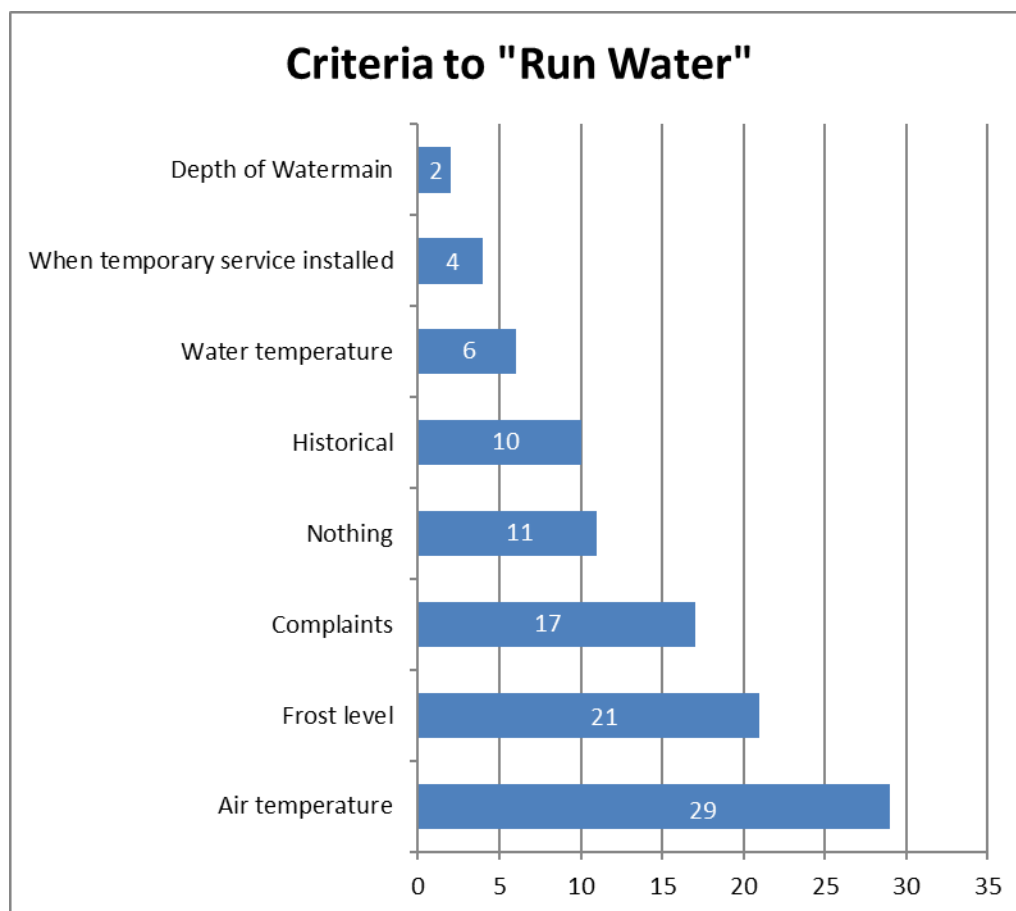
There is history of frozen water services and more than half of those responding (55%) indicate having a list. Granted, some indicate creating the list following the 2015 event and didn’t have this in place previously. Having a list in place provides flexibility to the municipalities to act more proactively to help avoid a service line freezing by providing notice to homeowner to run their water.

How many water services are there in your system and how many customers do you typically notify to “run water”?

A wide range of municipality sizes provided a response to this survey and this question. The smallest of systems have approximately 1,000 connections while the largest system has over 230,000 connections. All responses but 1 fall within the 0-3% range of those customers who are/were notified to run their water. The one municipality outside of that range experienced a dramatic increase in the notifications to run water in the winter of 2014-2015. This municipality’s notification level increased, going from 3% (prior to 2014) to 29%, as a result of the frozen water service event in the winter of 2014-2015.

Although the percentage of customers/connections that are notified to run water is low, tracking the volume of water used is important. Managing an efficient “Run Water” program can be tricky but necessary to avoid large numbers of service disruptions due to frozen water services.

What determines when customers are notified to “run water”?

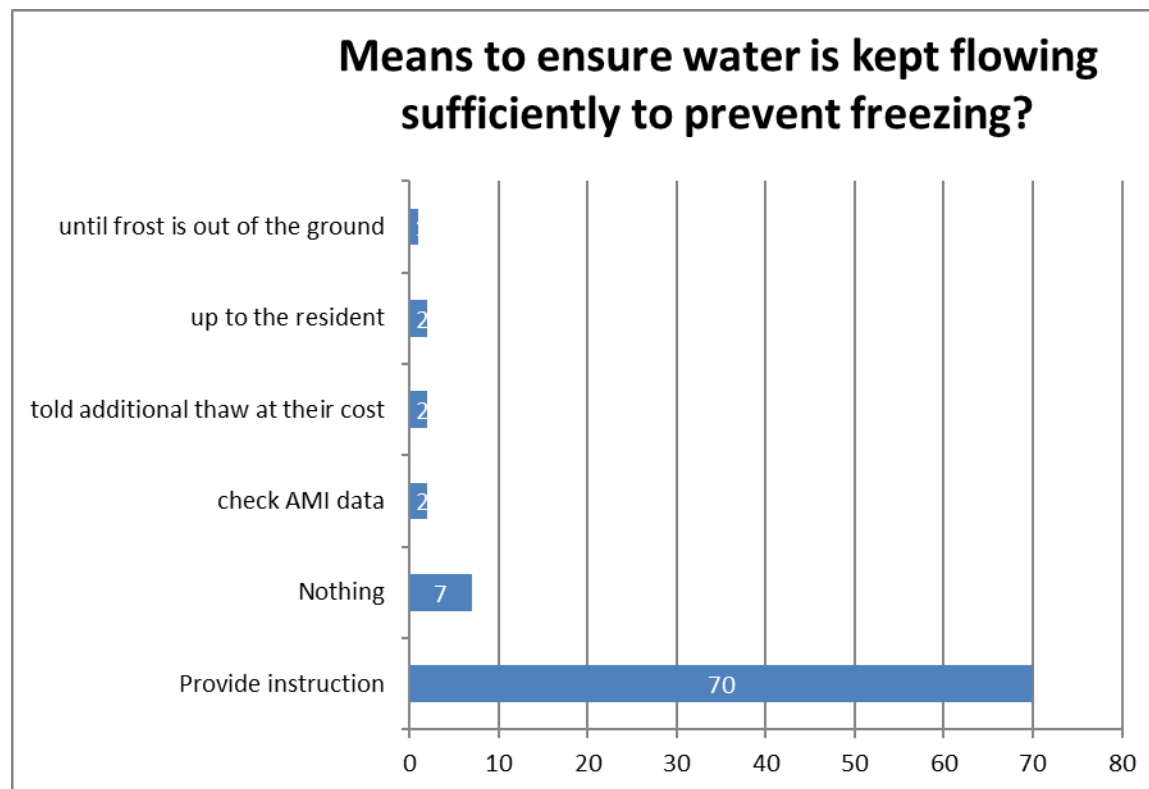


Many municipalities provided multiple responses for criteria or measures that are considered to trigger residents to run their water. The “who” is commonly addressed by creating and maintaining a detailed database of customers who have had frozen water services in the past and/or customers in areas with shallow services. Determining “when” customers should start running water is a little more complicated. Monitoring frost depths has long been thought to be the best indicator, but equipment is expensive and soil compositions change throughout a municipality, so that information might not be readily available for most utilities. Many municipalities use average cumulative degree days starting around November 1st to trigger their programs. Once the total hits -400 degree days, communications are sent out instructing customers to run water. The Government of Canada website can be helpful to find and export data from a weather station near you. Please refer to *Appendix A, Notification – Frozen Service Prevention-Cumulative.xlsx* for information.

One municipality has a model that uses degree days to predict the depth of frost penetration. This model was determined by field measurements of temperature collected for a number of locations with varying soil conditions around the municipality and profiled over a number of winters. This model has performed well as it provides notice to the municipality to issue letters to homeowners based on a phased system as the frost level drops. As an example of its effectiveness, less than 17% of the homes that were notified to run their water experienced a service line freeze in 2013-2014. The majority of homes (111 of 134) that experienced a frozen water service were those that were not part of the

notification list previously. The phased approach for sending notices attempts to limit the duration of the “run water” program.

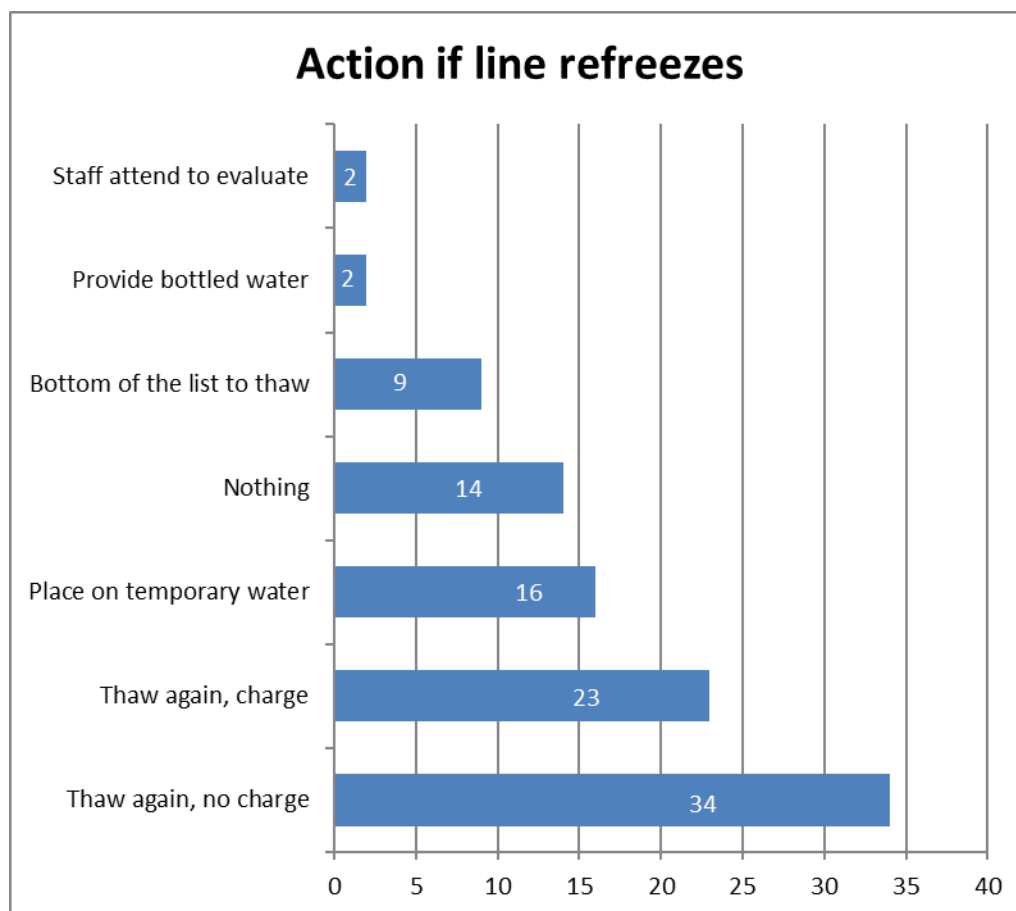
How do you ensure that running water is sufficient to prevent freezing?



Many municipalities commented that it’s a challenge to ensure water is kept flowing at the appropriate rate so that service lines or temporary lines don’t freeze. This is especially a concern for homes with multiple tenants, such as student houses or homes with young children, that don’t fully understand the reasoning for the running water or simply forget. Public education and instruction is the most common practice. Several municipalities with real time AMI metering technology can monitor these flows in real time, ensuring proper flows are maintained and minimizing water wasted.

Most municipalities provide guidance to the homeowner, indicating that a steady stream of water is required that is approximately the diameter of a pencil. Some have information on their website, including pictures to help ensure the message is received, while others provide written instructions including a diagram to the homeowners via a letter. Examples of letters that are sent are included in *Appendix A, Notification – Sample Letters*.

What actions are taken if the water is not kept flowing sufficiently and the service freezes?



The majority of municipalities will thaw the service either at no charge or for a fee. Some municipalities indicated that even though a fee could be applied for return visits, it isn't always used due to external pressure to ensure that the service is restored.

Do you have any standard communications that are provided to customers regarding frozen water services?

Approximately 54% of those responding to the survey indicate having standard communications material. Examples of materials that are used by municipalities to convey information (web content and a graphic) regarding frozen water services are part of the *Appendix A, Notification – Sample Communication Materials*.

3. Water Usage and Billing

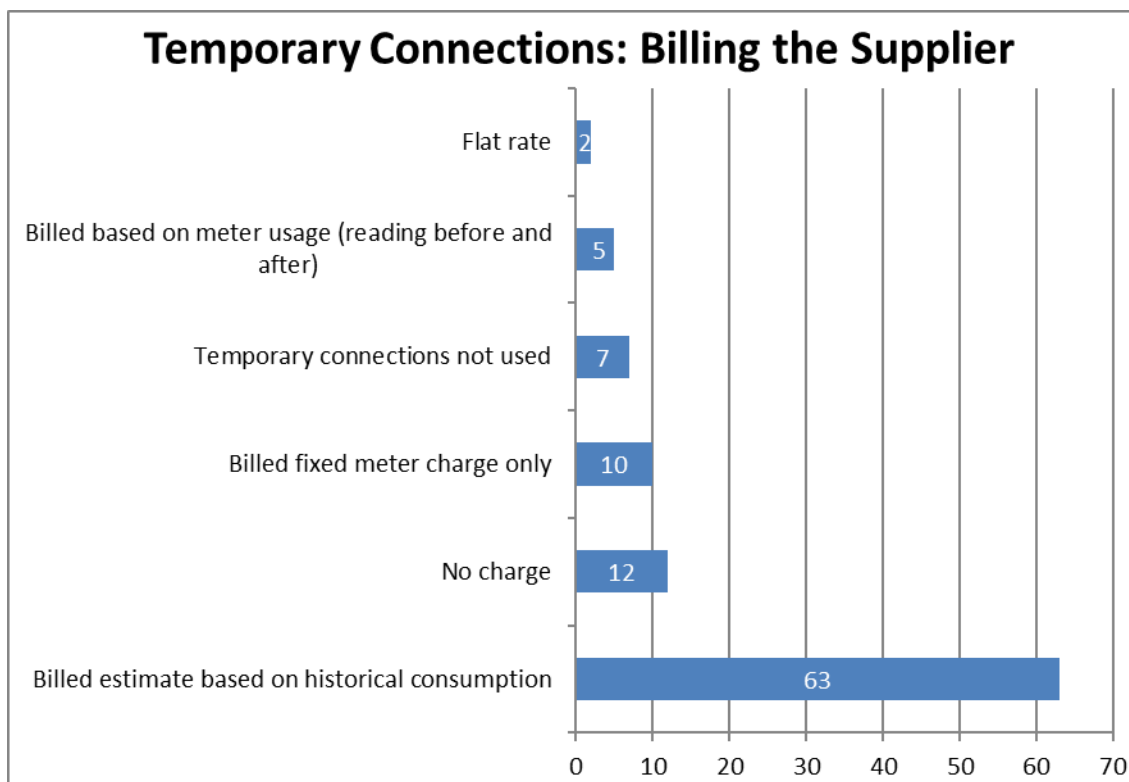
For many municipalities, having customers run their taps during extended periods of cold is an effective way to prevent temporary and permanent water services from freezing.

As Canadians continue to be educated on the value of water, and as municipal prices continue to increase, reconciliation for water used to prevent service lines from freezing becomes increasingly important. A single home who is asked to run their tap at a modest 1.5 L/min for 3 months to prevent

freezing will use 194,400 L or 194 m³. At a price of \$4/m³, this could result in an additional \$780 on a water bill.

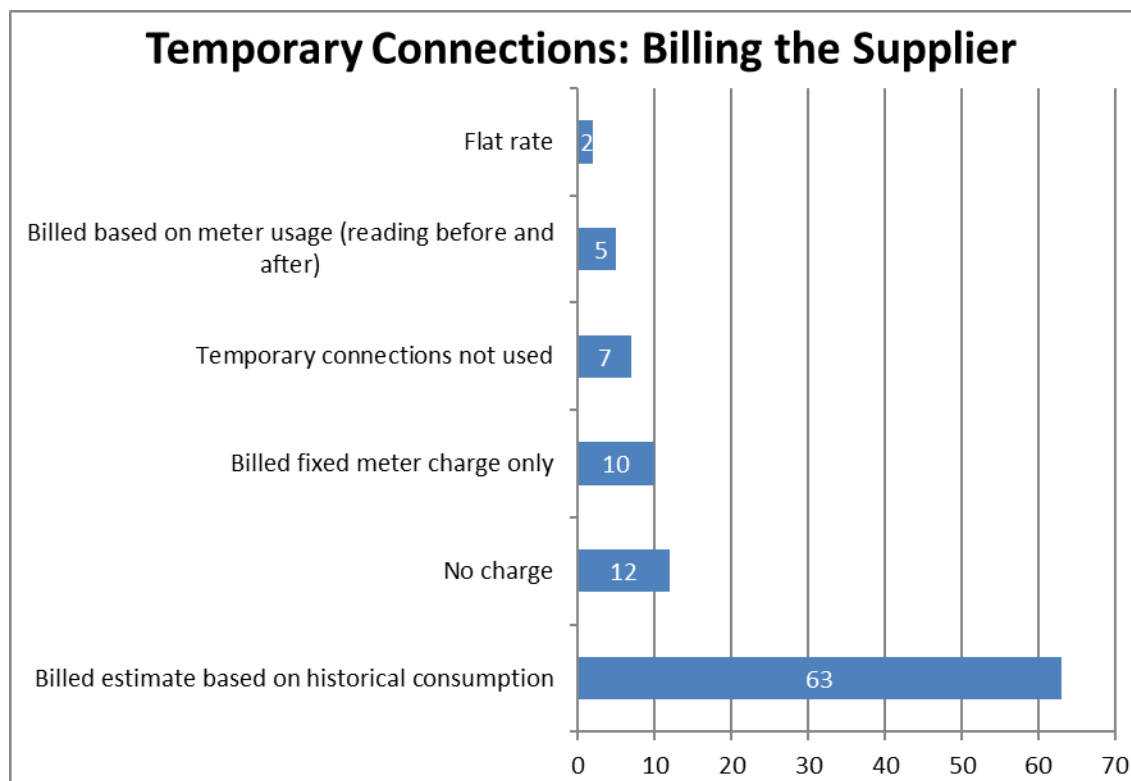
When placing temporary connections between two buildings, it is very important that both parties are made aware of the municipality's process for billing. Written notice is most effective, and made better when both parties formally acknowledge (i.e. signing a form) that billing processes were explained by staff and accepted. Examples of forms used by other municipalities are available in *Appendix B – Waiver and Billing*.

If you use temporary supply connections while a water service is frozen, how do you bill water consumption for: The home receiving the temporary supply?



Most municipalities use estimates to determine how much the receiver of the temporary water supply should be billed. This is usually a method that is accepted by the homeowner when it is based on the homeowner's typical usage. This can be a time-consuming process when compared to flat rate billing, which is also the least frequently used method.

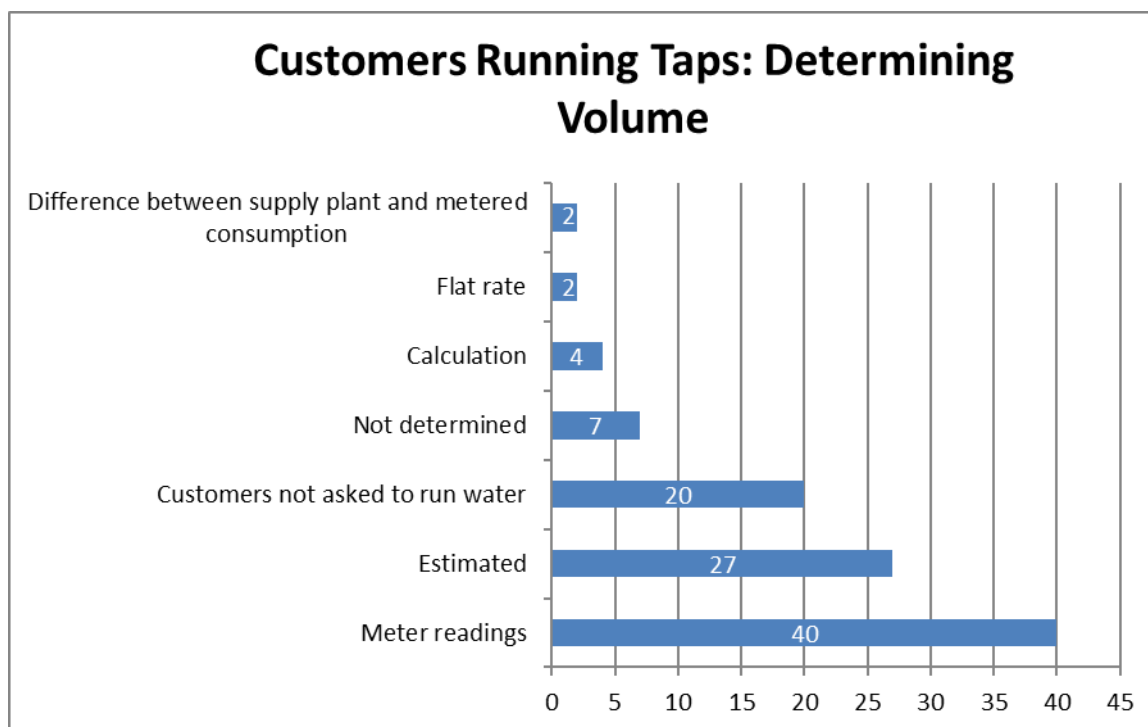
If you use temporary supply connections while a water service is frozen, how do you bill water consumption for the home providing the temporary supply?



The homeowner who allows a temporary supply connection from their home will typically see the consumption recorded by their meter double, as a minimum, as they are now supplying two homes.

Beyond higher meter readings, the temporary connection also results in decreased water flows for the supplying and receiving homes. It also potentially requires the supplier to by-pass their water softener, as salt consumption will be very high since they now soften the water used by their neighbor as well as the water that is running to prevent freezing. These are only two of the burdens that the supplying homeowner will face, and as can be seen from various responses, most municipalities put considerable effort into ensuring fair billing practises are in place.

If customers are asked to “run water”, how is the additional consumption determined?

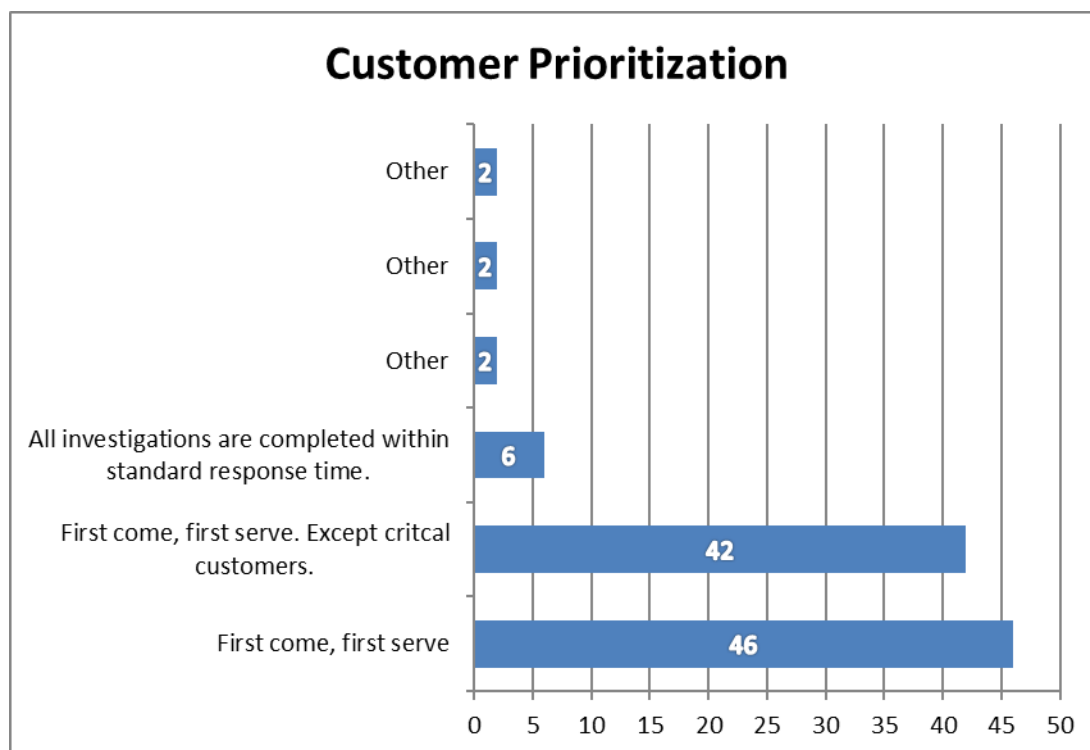


When customers are asked to run their water, it is very important that accurate volume usage be determined. This is needed for billing processes, but also helps the municipality quantify how much water is used to prevent services from freezing. This volume should be used as a part of the annual water loss calculations that municipalities should be doing as well.

4. Emergency Response

The level of service customers expect from their water utility has never been higher. Many customers consider it an “emergency” if they are without running water for even a few hours. This is the reality most water utilities face, and their emergency response procedures are always being critiqued. When the temperatures plummet and frost begins to creep deeper the number of frozen water services can go from manageable to pandemic in a matter of days. Municipalities with comprehensive frozen service response policies are better equipped to deal with the escalating demand for service. Although these conditions are infrequent, the winters of 2014 and 2015 exposed many deficiencies in municipalities’ frozen service programs. This section will give an idea of how other utilities are dealing with emergency response during a frozen water service event.

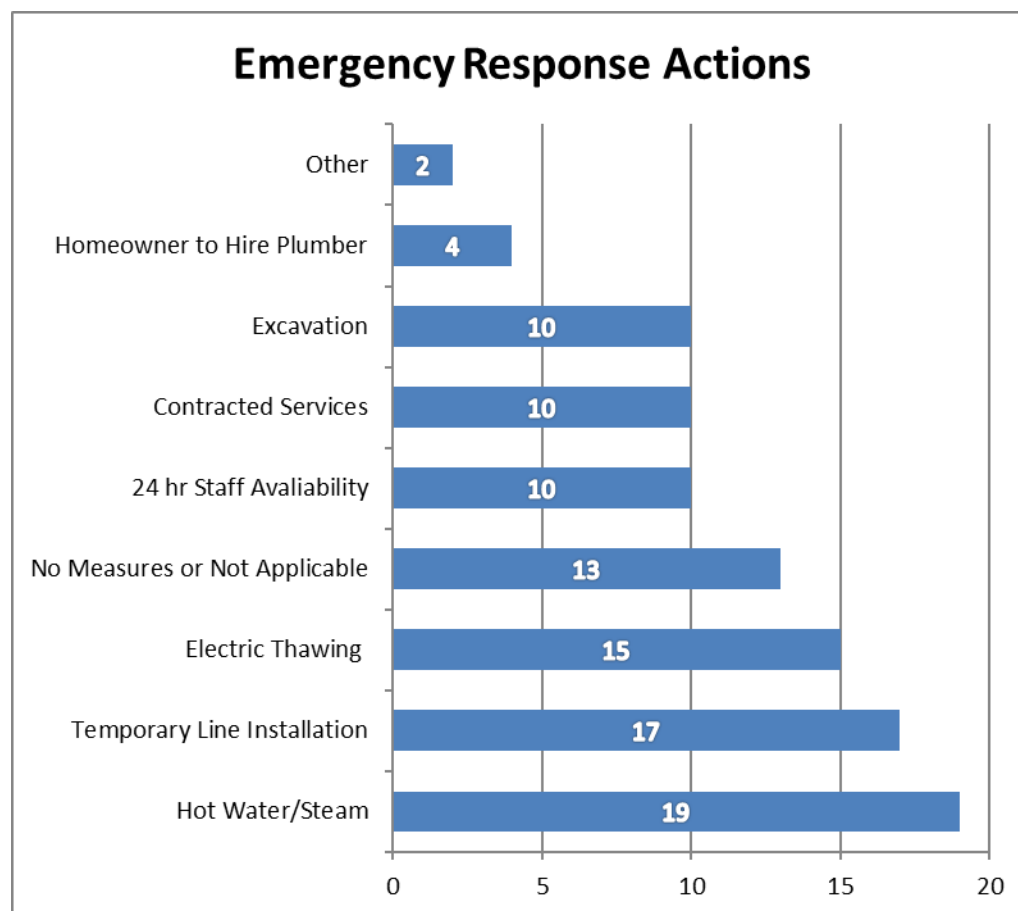
How does your municipality prioritize the order of call outs to investigate frozen water services?



Municipalities use a variety of criteria to prioritize call-outs. First come, first serve may be the most common response, but not always the most reasonable. Most municipalities have a vulnerable/critical customer component to their response protocol. Typically, those customers tend to have larger services and use larger volumes of water, and the likelihood of experiencing a frozen service is therefore low. Examples include hospitals, health centers/clinics, blood banks, campus facilities (educational, penal) and large industrial users. Some customers to consider as vulnerable/critical with smaller services and lower water turnover may include:

- Elderly residents;
- Home dialysis customers;
- Nursing homes;
- Businesses that require water through their operation; and
- Schools and day care centres.

What emergency responses are implemented to thaw frozen water services?

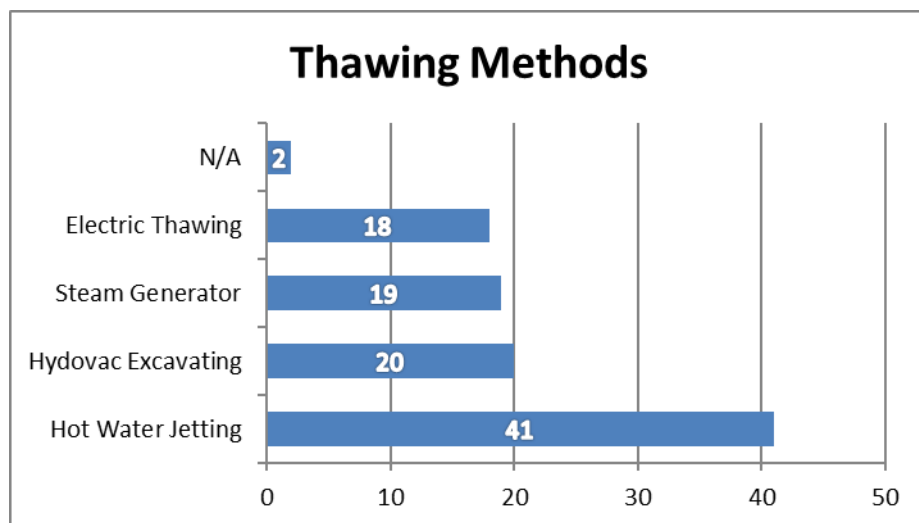


Emergency response actions vary between municipalities and even within a municipality when call volumes increase. During a typical winter when the number of frozen services is minimal, staff and resources can be deployed quicker and more time can be spent attempting to thaw a water service. Thawing a service line as soon as it is reported offers the best chance for success. Hot water jetting and electric thawing machines are the primary technologies used by survey respondents. Both techniques have factors limiting success. When frozen service calls begin to backlog, alternative measures often must be taken to quickly provide customers with running water. The provision of a temporary service line is common when thawing is not feasible. The installation of a temporary service line between homes often comes with its own challenges and limitations. Some to consider are:

- Proximity of the donor property (the longer the temporary line the greater chance of it freezing);
- Appropriate plumbing connections (outside hose bib connections, with no backflow preventer on frozen property);
- Meter reads (for municipalities tracking consumption during frozen service events);
- Potable or Non-potable (determining whether to deem supplied water potable or non-potable. This should be done in consultation with your location Health Department); and
- Liability (see *Appendix B – Waiver and Billing Agreements for Temporary Water Service*).

Excavation is another method commonly used. Whether this is done with your own equipment or a contracted service, both are expensive and time consuming. Some municipalities leave the thawing of water lines up to the property owner. Delegating this responsibility to the owner can be a very contentious and political issue.

What methods do you use to thaw services?



There are a number of devices currently used and a short description of each follows:

- Hot water jetting is the most popular type of equipment used by municipalities that responded to the survey. The process involves pushing a rigid, small diameter plastic line inside the frozen water service. The rigid plastic line is equipped with a tip that sprays pressurized hot water. This method can be effective but is time consuming and has many limitations. The most popular product used is Magikist, (*Appendix C – Equipment & Response_Magikist Thawing Machine*) but a number of similar products are available including a variety of modified hot water pressure washers. Many municipalities have taken it upon themselves to make modifications to hot water jetting machines including machined brass nozzles to get past fittings and burrs in copper pipe. The brass nozzle also increases thermal capacity to help cut through ice. Other modifications include more efficient heating elements, and replacement hoses which are more rigid and capable of handling higher temperatures.
- Hydovac excavation was another popular method to thaw frozen water services. This method has a very high success rate, but the equipment rental can be costly and may be limited by availability in some areas. There may be restoration costs related to the excavation that need to be taken into consideration. The process generally consists of the hydovac crew working alongside the municipal employees to excavate to expose the water line, then inserting a smaller water line inside the frozen



pipe and injecting pressurized hot water into the frozen pipe thawing the ice blockage. Most Hydrovac trucks are equipped with onboard water heating systems coupled to the pressure pumps.

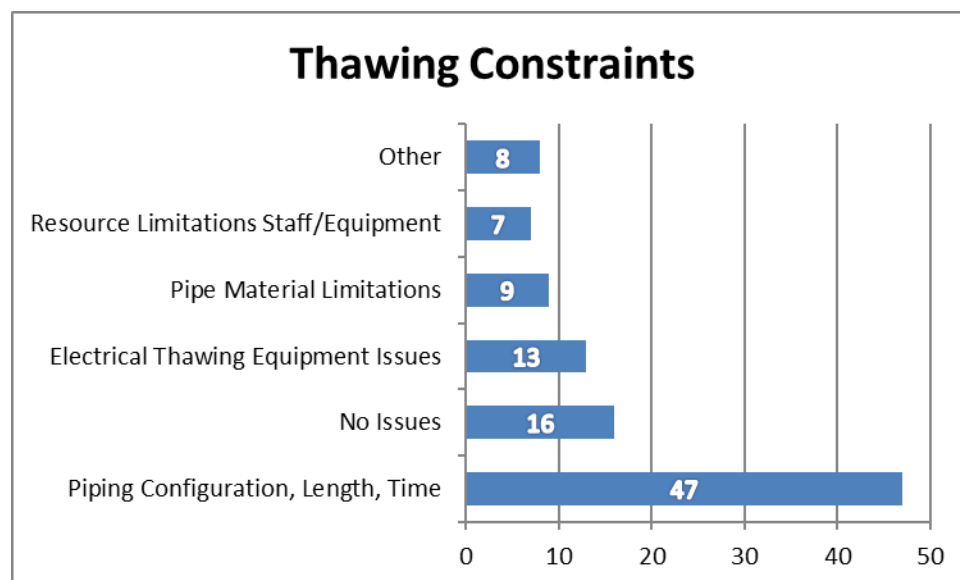
- Steam generators are similar to hot water jetting, in that you attempt to get steam into the pipe to thaw the ice block. The steam generator tends to be less aggressive than hot water jetting and can take more time. This equipment has similar limitations to hot water jetting and is generally used in larger diameter pipes or when the blockage is not far into the pipe. One example is the Sioux Thawing and De-icing equipment (*Appendix C– Equipment & Response_Dakota II Steam Thawer*).



- Electric Thawing passes low voltage, high current AC electricity through the frozen pipe creating low levels of heat that thaw a thin layer around the pipe. Once water is able to pass around the ice the warmer water thaws the remaining ice plug. This method is best used as soon as a service freezes and before the ice plug expands. This method can be used thaw iron or copper pipes buried in the ground. Popular electric thawing equipment includes Rigid's KT-190 and KT-200 (*Appendix C – Equipment & Response_Rigid KT-190& KT-200*) as well as some older DBH models that are becoming harder to find.



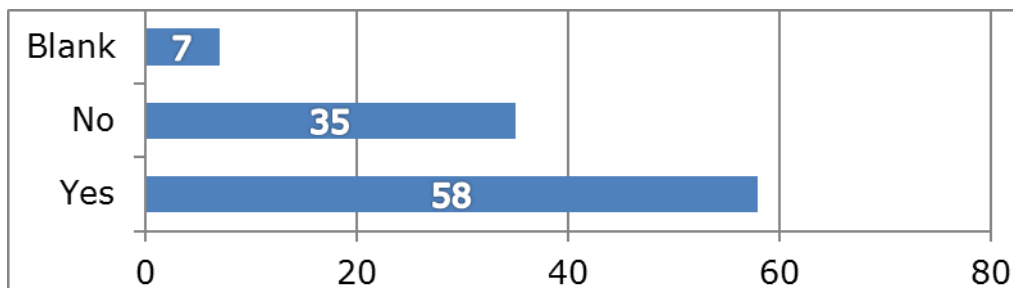
What constraints or limitations affect your ability to thaw frozen service pipe?



A number of additional comments were provided in response to this question. This added insight is presented below:

- **Piping configurations** can be a serious limitation with many thawing techniques. Hot water jetting is probably the most susceptible to piping configuration issues. The rigid plastic line that is fed into the frozen service cannot maneuver sharp bends or 90 degree angles, and often gets caught up on unions, valves and curb stops. Overcoming pipe friction over longer lengths can also be an issue, as well as maintaining thawing temperatures in the injected water over those longer lengths.
- The issues with **electric thawing** include achieving sufficient conductivity across the frozen section of pipe and safely thawing without risk of stray current causing damage or fire. These two challenges are often addressed by installing dedicated electrical connections to the pipe (“ground straps”) and using only equipment that is CSA certified.
- **Pipe materials and size** can limit the thawing methods that may be used and the likelihood of success. Common pipe materials used for service lines include plastic, copper, iron and lead.
 - Copper pipe is often a good candidate for hot water jetting and electrical thawing. When using hot water jetting, copper lines must be free of 90 degree and other sharp bends; even slight bends at further distances can be tricky to navigate with the added friction. Any valves that cannot be removed must be full port ball valves to allow the line to pass through. Mineral scaling burrs or even excessive solder on the inside of smaller diameter pipes can prevent the jetting line from being pushed past the ice.
 - Plastic pipes are limited to hot water jetting or excavation either by excavator or hydrovac. Before using water jetting, ensure that the pipe material is rated to handle the pressure and temperatures associated with the thawing machine. Electric thawing machines require the conductivity of metal pipes to create heat, so this is not an option for plastic pipes.
 - Iron and lead are typically much older pipe materials within the system and in many cases, are more fragile. If you can get good conductivity through the service, an electric thawing machines may be an option. The use of water jetting or excavation may cause damage to these older pipes.
- The **lack of resources and staffing** became a significant problem during recent winters. Both municipal workers and contracted help were becoming exhausted from many hours of continuous work in frigid conditions. This type of emergency staffing and resourcing is difficult to prepare for in advance. Many municipalities have attempted to address this with agreements with local contractors well in advance of freezing conditions.

Do you thaw frozen water services on private property?

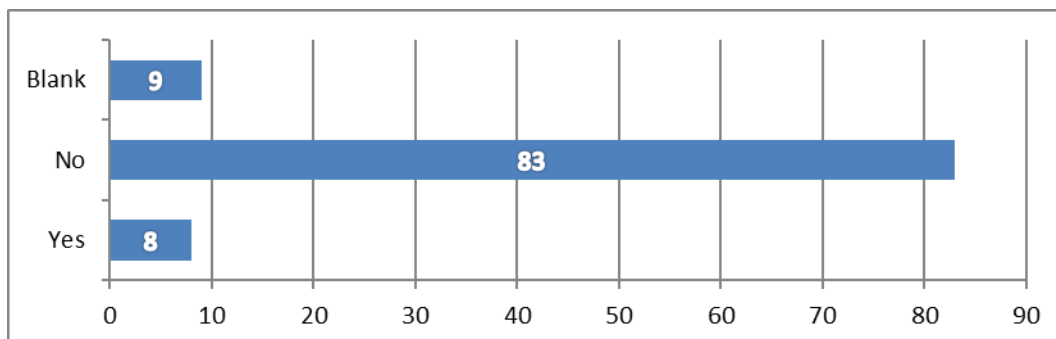


The majority of municipalities that responded do attempt to thaw services on private property. Obviously, this comes with additional work load, risk and liability that some municipalities may not be willing to assume. Once again, having a comprehensive frozen service policy would allow you to clearly define the level service you will provide and the responsibilities of the property owner such as:

- Ensure that their privately-owned water services and plumbing meet the building code standards in place to prevent freezing and that they take proactive actions to maintain their water service and plumbing to prevent freezing.
- Maintain adequate heat to premise plumbing to reduce threat to internal servicing line freezing.

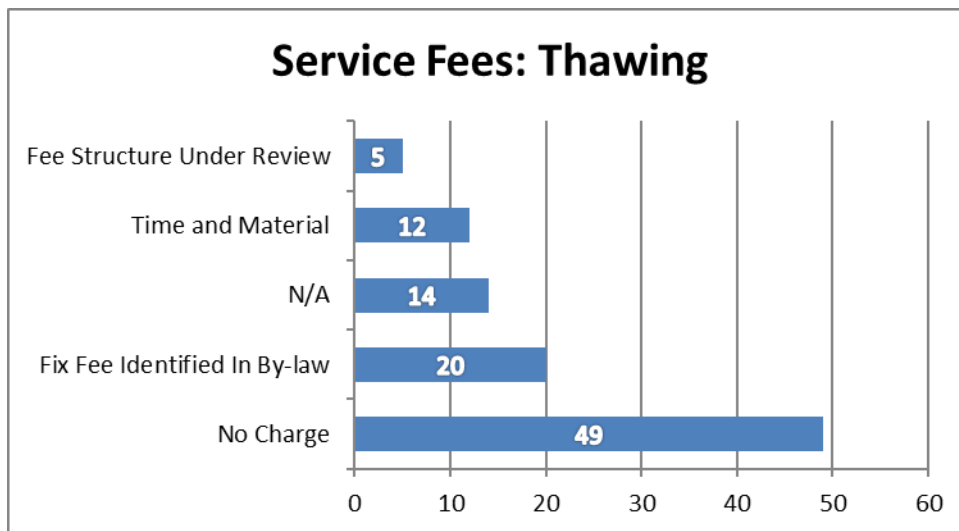
Ensuring the owner is doing their due diligence to protect their pipes from freezing can drastically reduce the number of private property frozen pipes.

Do you use a waiver when thawing services on private property?



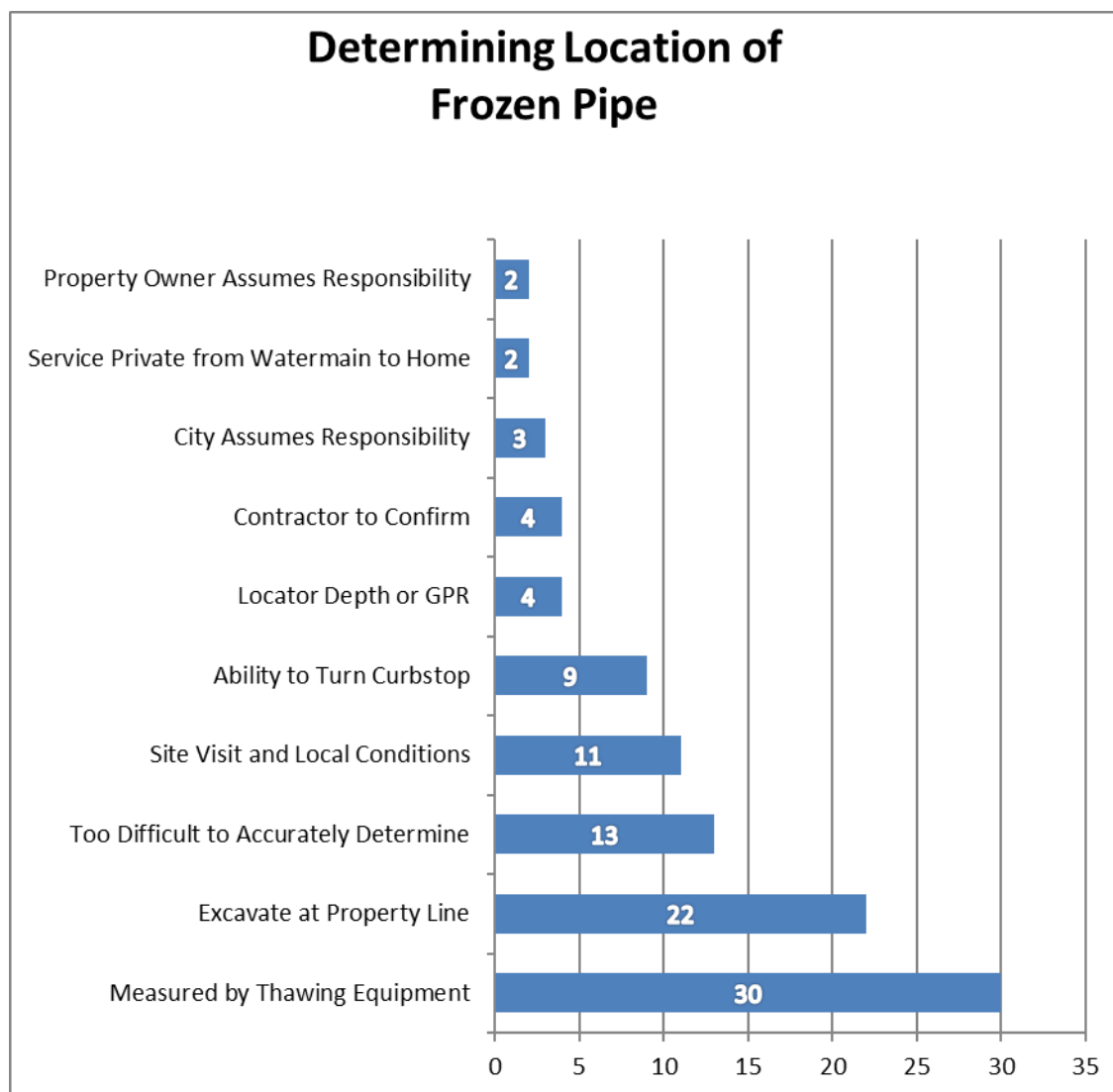
The vast majority of municipalities did not use waivers in the past. However, in follow-up discussions many municipalities indicated a strong desire to implement a waiver form for several services.

If you do thaw frozen water services on private property do you charge for this service and what charging process is used?



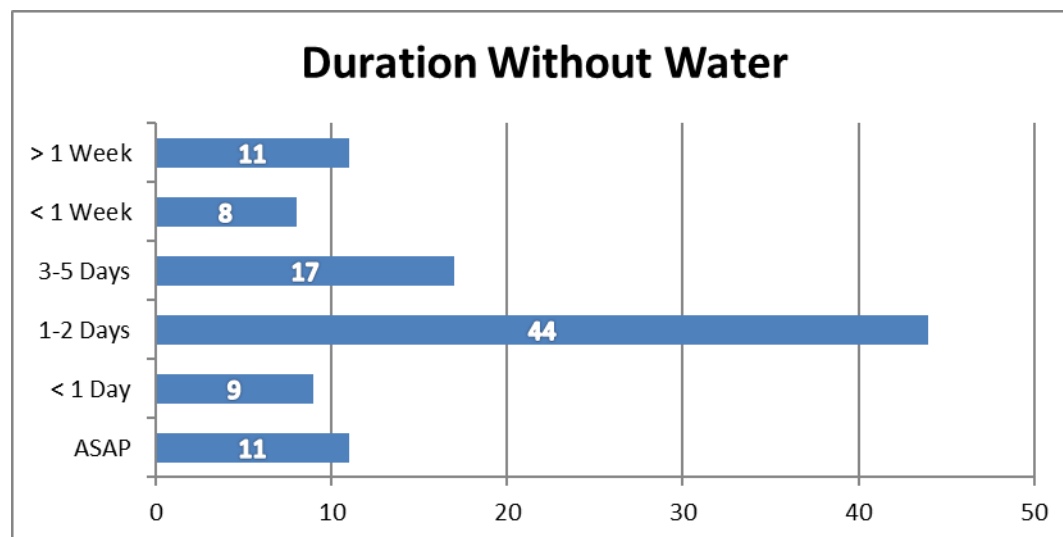
Charging customers for thawing frozen lines or re-installing frozen temporary lines has been inconsistent in the past. Many municipalities found it too resource intensive to accurately determine where and why the service froze to feel comfortable charging the customer. However, due to the severity of the winters in 2014 and 2015 many municipalities are revisiting this issue as they try to find fair ways to implement cost recovery measures.

How do you determine the location of the issue (e.g. private or public service)?



Methods of determining the location of where the service is frozen or where the service first began to freeze may not always be easy or limited to one approach. Once a service has frozen, the ice may migrate the entire length of the pipe. Timely investigation can help identify vulnerable points such as shallow goose necks or adjacent infrastructure allowing cold air closer to water pipes. Identifying these issues can help identify other potential problem areas in your system. Solutions for addressing these susceptible services will be addressed further in Post-emergency remediation.

When a water service has been deemed frozen and not usable, how long would a customer typically be left without any service, including temporary service?



The duration customers are left without water is something all municipalities try to minimize. However, unseasonably cold winters and limited resources can seriously affect response times. Secondly, just because the municipality is able to respond quickly doesn't always mean there is a quick solution. Common issues are proximity and permission from neighboring property for temporary service, lack of external plumbing connections, internal plumbing configurations, and pipe type.

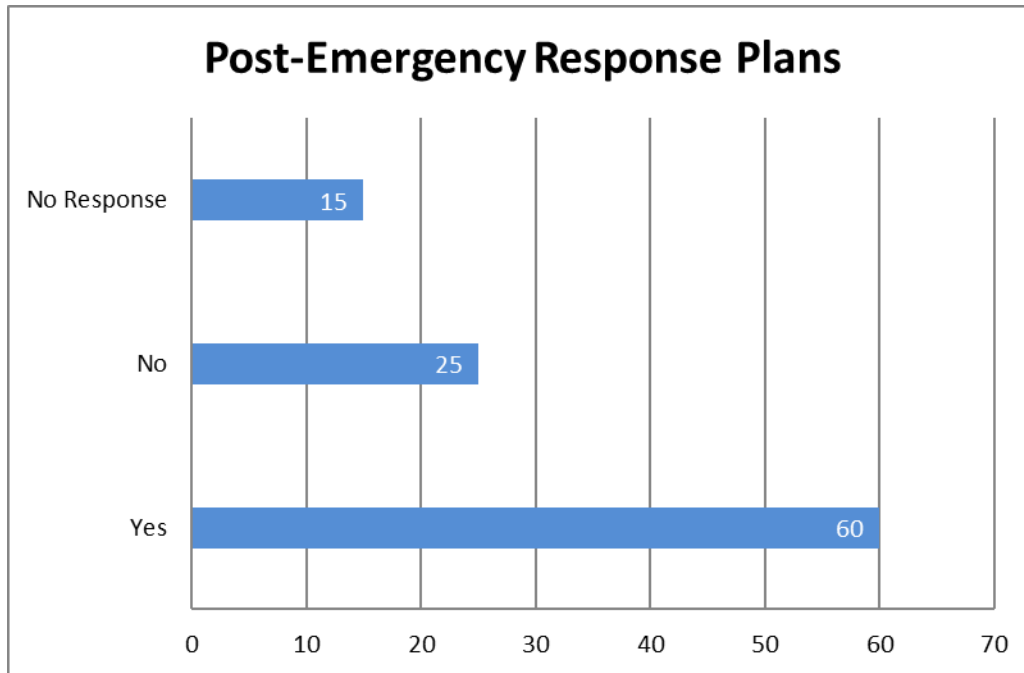
What human-resources do you use to thaw frozen services?

Most municipalities tend to use small crews of two or three workers to thaw services. Crews of two seem to work well for hot water jetting and electrical thawing while Hydrovac excavation generally requires contracted equipment with two equipment operators and two municipal workers. The number of crews is generally limited by the number of thaw machines the municipality has available, and the number of staff that can be pulled from legislated operational duties.

5. Post Emergency Response

When spring finally sprung and the frost was out of the ground, municipalities were bombarded with calls asking what they were doing to prevent water pipes from freezing in the future. Those in the industry know there is no simple answer, but rather a question we must begin to address. There really are only a few options to address susceptible infrastructure. One is to replace the pipe at a depth and/or location not as susceptible to freezing, two is to protect existing pipe from freezing with some form of insulation or other technology, and the third is to maintain flow in the pipes to reduce the chance of freezing. This section will review survey participants' responses to a few questions to better understand how others are dealing with post-emergency response.

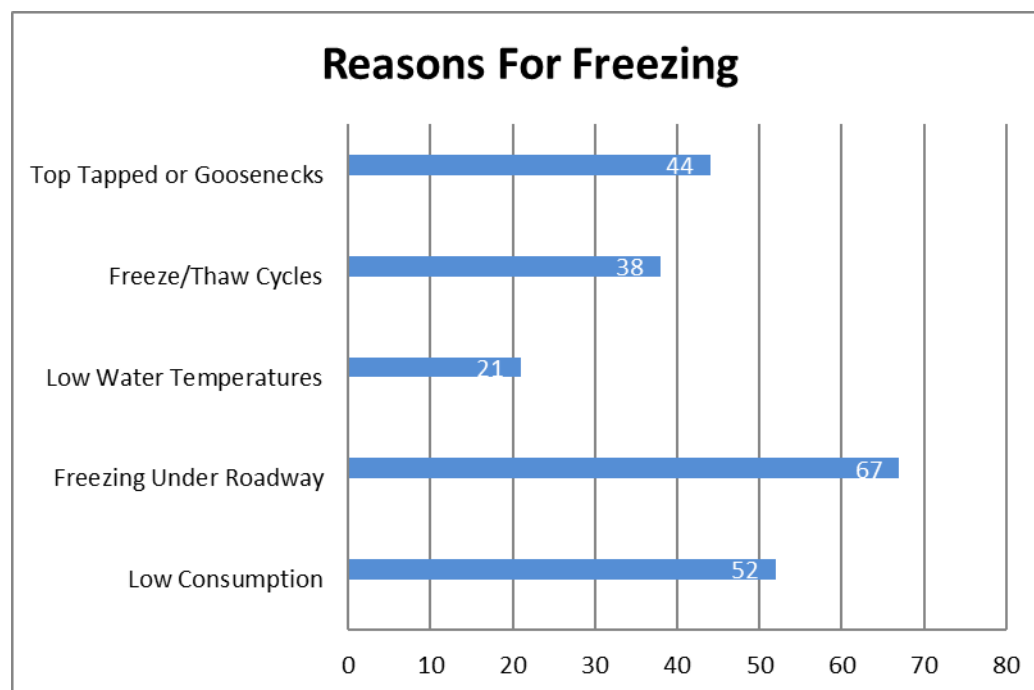
Do you have any post-emergency practices to help prevent frozen services from reoccurring?



Sixty percent of responders indicated they do have practices in place to help reduce the number of reoccurring frozen pipes. The methods used and the amount of pipe addressed varies greatly depending on the municipalities' resources. Some of the susceptible areas municipalities are looking to address in their post-emergency response plans include:

- Shallow services and mains;
- Mains and services with low flow or consumption;
- Services that are top tapped or have high goosenecks;
- Mains and services in close proximity to other buried infrastructure providing conduits for cold air; and
- Other known problem areas.

Indicate all suspected reasons for pipe freezing in your system?



Understanding where and why the pipe froze is the key to permanently solving the problem. Some situations may have relatively inexpensive and quick solutions, while others may require substantial investment and planning.

The following provides additional comments provided by the survey respondents:

- **Top tapped or high goosenecks** have been identified as being prone to freezing. Solutions to address these issues are relatively simple and effective. If the depth of the service line and/or the water main is generally below the frost line, simply re-tapping the water main at a lower angle and insulating the connection has proven to be an effective solution. This work is generally done at relatively shallow depths, and the area of the excavation can remain small, minimizing the cost of restoration.
- **Freeze/thaw cycles** tend to drive frost deeper into the ground more quickly than steady temperatures, making it more difficult to predict frost depths. Cumulative degree days have been used to monitor temperatures and assist in predicting frost depths. Cumulative degree day calculations are described in the “Run Water” section below.
- **Low water temperature** has been cited as a reason for pipe freezing. Many municipalities have noticed a direct correlation between distribution and/or water tower temperatures and frozen services. Whether it is simple daily checks by operators or trending temperatures on SCADA, this can be an effective way to monitor when to initiate running water programs or frozen service prevention tactics.
- Water services and mains **freezing under roadways** are very common due to the vehicular traffic pushing the frost deeper and the absence of snow cover as insulation. These conditions are nearly impossible to avoid, so depth of bury or running water are really the only ways to address these issues. Another common scenario that can cause pipes to freeze within the road allowance is

adjacent utilities such as storm sewers acting as a conduit for cold air. Water services that are installed directly under or over a storm sewer may be affected by the colder air entering the storm sewer. Some common remedies include insulating the section of water pipe and/or adding baffling to storm catch basins to deflect the cold air.

- Areas or customers with **low consumption** are generally best addressed by running water. Larger areas of low consumption or flow can be addressed by running water from a hydrant, bleeder or specialized flushing systems such as #9800 Eclipse, Automatic flushing device (*Appendix C – Equipment & Response_Automatic Flushing Device 9800 Eclipse*). Customers with low consumption that are at risk of freezing are generally asked to run water from a faucet in their home. Other options include technologies such as Arctic Trace that are installed directly into the water service (*Appendix C – Equipment & Response_Arctic Trace*).

6. Lessons learned from 2015 event

A number of Ontario municipalities have invested time to review and reformat their frozen water service response policies (*Appendix D – Policy*) based on the events of 2015. London and Guelph, for example, have issued memos to their Council outlining the expected response. Others have adjusted their processes that determine the method of thaw, their Standard Operating Procedures for work activities, and notifications. These documents and examples of waivers used by the City of Ottawa and Guelph are provided in *Appendix B – Waiver & Billing* for review and use.

The Winter of 2015 was an extreme event that tested and stretched Municipal staff and financial resources in response to a large number of frozen water services. Through this survey it was observed that there were many ways that municipalities deal with frozen services. There is not a one-size fits all solution. One of the goals of this information document is to provide insight to the current works and processes in place and to share example documentation attached in the appendices.

Appendix A Notification

Frozen Service Prevention - Cumulative Temperature Tracking Instruction

- 1) Go to Government of Canada Website - Navigate to Environment and Natural Resources/ Weather/Weather/Local Forecasts/Ontario/Your City
- 2) OR follow link: http://climate.weather.gc.ca/climateData/dailydata_e.html?StationID=45407

Station Name: **Closest to you**
Climate ID: **123456**

- 3) Select the year of interest from the drop down field and Click the "Go" toggle button
- 3) Under "Download Data" box - Click the "Download Data" toggle button

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Daily Data Report for October 2015

Notices:

Metadata including Station Name, Province, Latitude, Longitude, Elevation, Climate ID, WMO ID, TC ID

GUELPH TURFGRASS ONTARIO			
Latitude:	43°33'00.000" N	Longitude:	80°13'00.000" W
Elevation:	325.00 m	Climate ID:	6143089
WMO ID:	71833	TC ID:	TGT

Related Data: No related data is available for this station

Additional Search Options: Nearby Stations with Data, Advanced Search

Download Data: Daily Data (2015), CSV, XML, Download Data, Get More Data

Previous Month

2014 | October | Go

Daily Data Report for October 2015

	Max Temp °C	Min Temp °C	Mean Temp °C	Heat Deg Days	Cool Deg Days	Total Rain mm	Total Snow cm	Total Precip mm	Snow on Grnd cm	Dir of Max Gust 10's deg	Spd of Max Gust km/h
DAY											
01	13.9	3.2	8.6	9.4	0.0	M	M	M		4	37
02	11.5	4.0	7.8	10.2	0.0	M	M	M		7	44
03	9.4	4.4	6.9	11.1	0.0	M	M	M		7	56
04	13.1	7.7	10.4	7.6	0.0	M	M	M		8	43

- 4) An Excel file will open up showing data from the year requested.
- 5) Select the "Date/Time" and "Mean Temp (°C)" columns - COPY
- 6) Open a NEW Tab in the FreezePreventionTrigger_DailyMeanTemps.xls workbook and PASTE
- 7) Copy and Paste all required data (from Nov 1st to about April 30th) and rename Tab to indicate the year (i.e
- 8) Create a new heading of "Cumulative Temp (°C)" in column C to the Right of the pasted values
- 9) Enter formula "=SUM(\$B\$2:B2)" under the "Cumulative Temp (°C)" heading and drag down to show cumulat
- 8) The Freeze Prevention Trigger is set at -400°C
- 9) HIGHLIGHT the date in which the Freeze Prevention Trigger of -400°C was reached for quick reference.



A.J. Tyler Operations Centre
663 Bathurst Street
London, ON
N5Z 1P8

London
CANADA

Insert address here

Insert Contact Name here

Insert Phone # here

Dear **RESIDENT**,

Within the past two years, the City of London Water Operations Division visited your residence to deal with a frozen water service, which left you temporarily out of water. To help prevent this inconvenience from reoccurring, London City Council has endorsed a proactive Frozen Services Strategy. This strategy includes a 4-year plan to remediate all the frozen services that have been encountered.

We have posted London's Frozen Services Strategy on our website. We encourage you to visit it for more details and for other information related to frozen water services:

<http://www.london.ca/residents/Water/Water-System/Pages/Frozen-Services.aspx>

The Frozen Services Strategy contains preventive actions which will only be implemented if the City believes that there is a high probability of your service freezing. In such cases, you will be notified by telephone. If your contact information listed above is incorrect, please call 519-661-4739 to update us.

The enclosed information pamphlet lists the preventive actions that you may be asked to follow to prevent your water service from freezing. Remember, these actions are only to be taken if we call to inform you that we are implementing this aspect of the Frozen Services Strategy.

We appreciate your attention to this information, and your help in ensuring that we have correctly identified you as our contact for this address.

If you would appreciate any clarification regarding this letter and information pamphlet, please call us at 519-661-4739.

Thank you,

City of London - Water Operations Division



A.J. Tyler Operations Centre
663 Bathurst Street
London, ON
N5Z 1P8

January 2016

Information at a Glance: Frozen Water Services

- The Water Operations Division will be monitoring temperatures, frost penetration depths, and watermain break activity to determine if the potential for frozen water services is developing.
- If a threat develops, at-risk customers like you will be notified by the Water Operations Division staff to continuously run a pencil-sized stream of water, usually from a laundry tap. It is very important to let the stream of water flow continuously (24/7). Please **DO NOT TURN IT OFF**, otherwise refreezing of your water service is possible.
- We ask that you keep an eye on the running faucet to ensure that it is running and draining properly. If you fail to run your faucet, or turn it off after being notified to run it, you will be responsible for the costs to thaw your water service if it freezes.
- You will be notified to stop the flow once the threat subsides, which could be many weeks after the onset of flowing water.
- If you are instructed to leave a tap running, you will only be charged the minimum monthly water and sewer bill. You will not be responsible for consumptive charges during the period in which you have been instructed to run your water.
- **Only those customers specifically notified by the City's Water Operations Division will be granted this exemption.**
- Your regular monthly water and sewer billing process will resume to normal once you have been instructed to cease continuous flow.
- For inquiries, please contact the Water Operations Division at 519-661-4739.



Frozen Water Service Warning

Run Water Advisory – Public Property

January XX 2016 to April 30 2016

Attention: <Address>

The City of Ottawa's records indicate the water service at the above address has frozen on public property in the past. To keep your water pipes from freezing, please:

- ◆ **Turn on one cold water tap immediately** in the building and run it continuously – 24 hours a day.
 - The steady stream should be about the diameter of your thumb (1/4"/0.5 cm).
 - You will not be charged extra for the cost of running this water. Your water bill will be calculated based on your previous consumption pattern.
- ◆ **Turn off the tap on April 30** or earlier if you receive notice. Visit ottawa.ca/en/seasonal-notifications to inquire about the status of the run water advisory.
- ◆ **Have an emergency water kit/supply available**, in case your water service freezes.

To report a frozen service, receive additional information, or to inquire about the status of the run water notification, please call 3-1-1 or visit Ottawa.ca/FrozenServices.

Frozen Water Service Warning

Run Water Advisory – Public Property

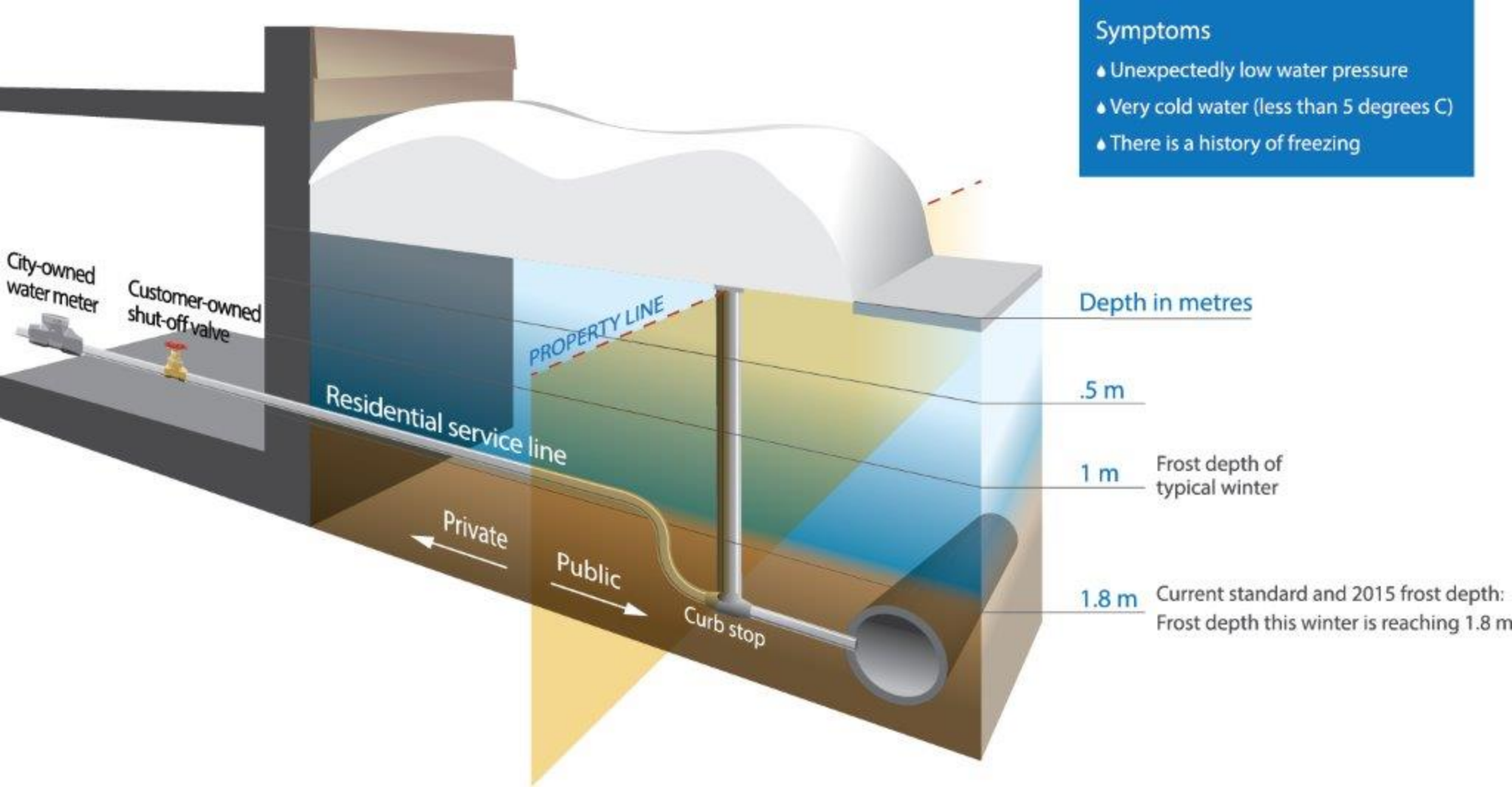
January XX 2016 to April 30 2016

Attention: <Address>

The City of Ottawa's records indicate the water service at the above address has frozen on public property in the past. To keep your water pipes from freezing, please:

- ◆ **Turn on one cold water tap immediately** in the building and run it continuously – 24 hours a day.
 - The steady stream should be about the diameter of your thumb (1/4"/0.5 cm).
- ◆ **Turn off the tap on April 30** or earlier if you receive notice. Visit ottawa.ca/en/seasonal-notifications to inquire about the status of the frozen services' run water advisory.
- ◆ **Follow these steps to avoid being charged for the cost of running your tap:**
 1. Initiate the process by calling 613-580-2727 and reporting your water meter reading
 2. Repeat step one at the beginning of each water billing period
 3. Call in your water meter reading when the tap is turned off at 613-580-2727.
- ◆ **Have an emergency water kit/supply available**, in case your water service freezes.

To report frozen service, receive additional information, or to inquire about the status of the run water notification please, call 3-1-1 or visit Ottawa.ca/FrozenServices.



🔍 Search for location or keyword

Guelph, ON +

Fog

≡ 3°C

FEELS LIKE 0



Wind
8 km/h S



Humidity
97%



Sunrise
7:44 AM



Sunset
4:43 PM



Pressure
101.2 kPa



When will it Rain or Snow?



No precipitation
expected.

[More Details >>](#)

Updated on Thu Dec 10 8:25 AM

Guelph Short Term Forecast

Thu Afternoon
Mainly cloudy

☁ 9°C

Feels like: 6°
ROP: 30%

Thu Evening
Cloudy with showers

☁ 8°C

Feels like: 4°
ROP: 40%

Thu Overnight
Cloudy with showers

☁ 7°C

Feels like: 3°
ROP: 40%

Fri Morning
A mix of sun and clouds

☀ 6°C

Feels like: 2°
ROP: 20%

 **#FROZEN PIPES**
Are you ready for winter?



Help protect yourself from frozen pipes with some simple preparation



Get tips at guelph.ca/frozenwater and don't forget to get your 72-hour emergency kit ready!

CONNECT WITH US

Appendix B Waiver & Billing

AUTHORIZATION

By the undersigned temporary water service donor under the frozen water pipe policy of The Corporation of the City of Guelph (the "City")

In consideration of the City (through its own forces and/or outside contractors):

1. Installing, maintaining and eventually removing, at no cost to me, a Temporary Water Service Line from my property to one or more nearby properties, and affecting other property or properties (if any), all as indicated below;
2. Taking water meter readings before the installation and after the removal;
3. Charging my property's water service account for water and wastewater based only on the average historical account consumption for similar annual periods;
4. Giving my property's water service account a full volumetric credit for all water and wastewater used during the donation period; and
5. Complying with its Frozen Water Pipe Policy;

I hereby:

1. Authorize the City to install, maintain, and eventually remove, at no cost to me, the Temporary Water Service Line;
2. Certify that I am a recipient of water service from the City at this property;
3. Undertake that:
 - a) If I am a tenant at the property, I shall immediately notify the landlord of the property about this arrangement, or
 - b) If I am a landlord at the property, I shall immediately notify the tenant of the property about this arrangement;

4. Acknowledge that the Temporary Water Service Line will cause some inconvenience to me and my property; and
5. Agree:
 - a) To prepare for the installation by:
 - i) Providing clear walkways and clear access to exterior unfrozen and undamaged hose bibs for the installation,
 - ii) Turning off and on the internal water supply to external hose bibs upon instruction by the City, and
 - iii) Coordinating necessary plumbing modifications to support water servicing through the Temporary Water Service Line, where appropriate,
 - b) To ensure that my property is safe and accessible for the City to attempt to install, maintain, and eventually remove the Temporary Water Service Line,
 - c) To allow the City safe entry to my property to install, maintain, and eventually remove the Temporary Water Service Line,
 - d) To maintain the active supply of water to the Temporary Water Service Line until directed by the City,
 - e) To run water in the Temporary Water Service Line continuously to prevent freezing, as instructed by the City,
 - f) Not to interfere with the Temporary Water Service Line,
 - g) To retain or de-install the Temporary Water Service Line as instructed by the City, and
 - h) To comply with the City's Frozen Water Pipe Policy and instructions given by the City under it.

 My property address

 Recipient property address(es)

 Other affected property address(es)

 Signature of witness

 Signature of donor

 Date

 Print name

 Contact information

Personal information, as defined under the *Municipal Freedom of Information and Protection of Privacy Act (MFIPPA)*, is collected under the authority of the *Municipal Act, 2001*, and in accordance with the provisions of *MFIPPA*. Personal information on this form will be used for the purpose of the Frozen Water Pipe Policy. If you have any questions regarding that policy, please contact Water Services at **519-837-5627** or waterworks@guelph.ca. If you have questions about the collection, use or disclosure of this information, contact the Access, Privacy and Records Specialist at **519-822-1260 x 2349** or privacy@guelph.ca.

AUTHORIZATION

By the undersigned temporary water service recipient under the frozen water pipe policy of The Corporation of the City of Guelph (the "City")

In consideration of the City (through its own forces and/or outside contractors):

1. Attempting to install, maintain and eventually remove, at no cost to me, a Temporary Water Service Line to my property from a nearby property, and affecting other property or properties (if any), all as indicated below;
2. Taking water meter readings before the installation and after the removal; and
3. Complying with its Frozen Water Pipe Policy;

I hereby:

1. Authorize and request the City to attempt to install, maintain and eventually remove, at no cost to me, the Temporary Water Service Line;
2. Certify that I am a recipient of water service from the City at this property;
3. Undertake that:
 - a) If I am a tenant at the property, I shall immediately notify the landlord of the property about this arrangement, or
 - b) If I am a landlord at the property, I shall immediately notify the tenant of the property about this arrangement;
4. Acknowledge that, depending on the particular circumstances, the City might be unable to provide Potable water, or even any water at all, through a Temporary Water Service Line to my property; and
5. Agree:
 - a) To identify, and obtain approval from, the Temporary Water Service Donor and the owners and/or

occupants of all other properties (if any) impacted by the installation or routing of the Temporary Water Service Line to my property, and to provide this information to the City in a timely fashion,

- b) To prepare for the installation by:
 - i) Providing clear walkways and clear access to exterior unfrozen and undamaged hose bibs for the installation,
 - ii) Turning off the internal water supply, and
 - iii) Coordinating necessary plumbing modifications to support water servicing through the Temporary Water Service Line, including, but not limited to, removal of backflow prevention devices at outdoor hose bibs where appropriate,
- c) To ensure that my property is safe and accessible for the City to attempt to install, maintain, and eventually remove the Temporary Water Service Line,
- d) To allow the City safe entry to my property to install, maintain, and eventually remove the Temporary Water Service Line,
- e) To maintain and monitor the active supply of water from the Temporary Water Service Line until directed by the City,
- f) To run water continuously to prevent freezing of the Temporary Water Service Line as instructed by the City,
- g) Not to interfere with the Temporary Water Service Line,
- h) To retain or de-install the Temporary Water Service Line as instructed by the City, and
- i) To comply with the City's Frozen Water Pipe Policy and instructions given by the City under it.

 My property address

 Donor property address

 Other affected property address(es)

 Signature of witness

 Signature of water service recipient

 Date

 Print name

 Contact information

AUTHORIZATION

By the undersigned temporary water service impacted person under the frozen water pipe policy of The Corporation of the City of Guelph (the "City")

In consideration of the City (through its own forces and/or outside contractors):

1. Installing, maintaining and eventually removing, at no cost to me, a Temporary Water Service Line from one property to one or more nearby properties, which Temporary Water Service Line crosses or otherwise impacts my property, all as indicated below; and
2. Complying with its Frozen Water Pipe Policy;

I hereby:

1. Authorize the City to install, maintain, and eventually remove, at no cost to me, the Temporary Water Service Line;
2. Undertake that:
 - a) If I am a tenant at the property, I shall immediately notify the landlord of the property about this arrangement, or
 - b) If I am a landlord at the property, I shall immediately notify the tenant of the property about this arrangement;
3. Acknowledge that the Temporary Water Service Line will cause some inconvenience to me and my property; and
4. Agree:
 - a) To ensure that my property is safe and accessible for the City to attempt to install, maintain, and eventually remove the Temporary Water Service Line,
 - b) To allow the City safe entry to my property to install, maintain, and eventually remove the Temporary Water Service Line,
 - c) Not to interfere with the Temporary Water Service Line, and
 - d) To comply with the City's Frozen Water Pipe Policy and instructions given by the City under it.

My property address

Donor property address(es)

Recipient property address(es)

Signature of witness

Signature of impacted person

Date

Print name

Contact information

Personal information, as defined under the *Municipal Freedom of Information and Protection of Privacy Act (MFIPPA)*, is collected under the authority of the *Municipal Act, 2001*, and in accordance with the provisions of *MFIPPA*. Personal information on this form will be used for the purpose of the Frozen Water Pipe Policy. If you have any questions regarding that policy, please contact Water Services at **519-837-5627** or waterworks@guelph.ca. If you have questions about the collection, use or disclosure of this information, contact the Access, Privacy and Records Specialist at **519-822-1260 x 2349** or privacy@guelph.ca.

AUTHORIZATION

By the undersigned temporary water service recipient under the frozen water pipe policy of The Corporation of the City of Guelph (the "City")

In consideration of the City (through its own forces and/or outside contractors):

1. Attempting to install, maintain and eventually remove, at my cost, a Temporary Water Service Line to my property from a nearby property, and affecting other property or properties (if any), all as indicated below;
2. Taking water meter readings before the installation and after the removal; and
3. Complying with its Frozen Water Pipe Policy;

I hereby:

1. Authorize and request the City to attempt to install, maintain and eventually remove, at my cost, the Temporary Water Service Line;
2. Certify that I am a recipient of water service from the City at this property;
3. Undertake that:
 - a) If I am a tenant at the property, I shall immediately notify the landlord of the property about this arrangement, or
 - b) If I am a landlord at the property, I shall immediately notify the tenant of the property about this arrangement;
4. Acknowledge that:
 - a) The City Water Pipe supplying water to my property is not frozen,
 - b) A Water Pipe on my property is frozen, and therefore my water supply has been interrupted,
 - c) I am not eligible under the City's Frozen Water Pipe Policy to have the City thaw my frozen Water Pipe at the City's cost, and
 - d) Depending on the particular circumstances, the City might be unable to provide Potable water, or even any water at all, through a Temporary Water Service Line to my property; and
5. Agree:
 - a) To identify, and obtain approval from, the Temporary Water Service Donor and the owners and/or occupants of all other properties (if any) impacted by the installation

or routing of the Temporary Water Service Line to my property, and to provide this information to the City in a timely fashion,

- b) To prepare for the installation by:
 - i) Providing clear walkways and clear access to exterior unfrozen and undamaged hose bibs for the installation,
 - ii) Turning off the internal water supply, and
 - iii) Coordinating necessary plumbing modifications to support water servicing through the Temporary Water Service Line, including, but not limited to, removal of backflow prevention devices at outdoor hose bibs where appropriate,
- c) To ensure that my property is safe and accessible for the City to attempt to install, maintain, and eventually remove the Temporary Water Service Line,
- d) To allow the City safe entry to my property to install, maintain, and eventually remove the Temporary Water Service Line,
- e) To maintain the active supply of water from the Temporary Water Service Line until directed by the City,
- f) To run water continuously to prevent freezing of the Temporary Water Service Line as instructed by the City,
- g) Not to interfere with the Temporary Water Service Line,
- h) To retain or de-install the Temporary Water Service Line as instructed by the City,
- i) To pay all the City's costs in carrying out all work under this authorization, which costs are based on actual labour costs, payroll burden costs, overhead and administration costs, vehicle, equipment, materials and all property restoration costs,
- j) To indemnify the City and all its representatives against all losses arising from my actions or omissions in respect of the subject matter of this Authorization, and
- k) To comply with the City's Frozen Water Pipe Policy and instructions given by the City under it.

 My property address

 Donor property address

 Other affected property address(es)

 Signature of witness

 Signature of water service recipient

 Date

 Print name

 Contact information

AUTHORIZATION

By the undersigned water service recipient under the frozen water pipe policy of The Corporation of the City of Guelph (the "City")

In consideration of the City (through its own forces and/or outside contractors):

1. Acknowledging that:
 - a) The City Water Pipe supplying water to my property, as indicated below, froze,
 - b) As a result, a Water Pipe on my property froze,
 - c) My water supply has been interrupted, and
 - d) I am eligible under the City's Frozen Water Pipe Policy to have the City thaw the frozen Water Pipe on my property at no cost to me;
2. Attempting, at no cost to me, to thaw the frozen Water Pipe on my property; and
3. Complying with its Frozen Water Pipe Policy;

I hereby:

1. Authorize and request the City to attempt to thaw the frozen Water Pipe on my property at the City's cost;
2. Certify that I am a recipient of water service from the City at this property;
3. Undertake that:
 - a) If I am a tenant at the property, I shall immediately notify the landlord of the property about this arrangement, or
 - b) If I am a landlord at the property, I shall immediately notify the tenant of the property about this arrangement;
4. Acknowledge that, depending on the particular circumstances, the City may be unable to thaw the frozen Water Pipe on my property; and
5. Agree:
 - a) To ensure that my property is safe and accessible for the City to attempt to carry out the thawing activity,
 - b) To allow the City safe entry to my property to attempt to thaw my frozen Water Pipe,
 - c) If my frozen Water Pipe is successfully thawed, to run water continuously to prevent re-freezing of the Water Pipe on my property, as instructed by the City, and
 - d) To comply with the City's Frozen Water Pipe Policy and instructions given by the City under it.

My property address

Signature of witness

Date

Signature of water service recipient

Print name

Contact information

AUTHORIZATION

By the undersigned water service recipient under the frozen water pipe policy of The Corporation of the City of Guelph (the "City")

In consideration of the City (through its own forces and/or outside contractors):

1. Attempting, at my cost, to thaw the frozen Water Pipe on my property, as indicated below; and
2. Complying with its Frozen Water Pipe Policy;

I hereby:

1. Authorize and request the City to attempt to thaw the frozen Water Pipe on my property at my cost;
2. Certify that I am a recipient of water service from the City at this property;
3. Undertake that:
 - a) If I am a tenant at the property, I shall immediately notify the landlord of the property about this arrangement, or
 - b) If I am a landlord at the property, I shall immediately notify the tenant of the property about this arrangement;
4. Acknowledge that:
 - a) The City Water Pipe supplying water to my property is not frozen,
 - b) A Water Pipe on my property is frozen, and therefore my water supply has been interrupted,

- c) I am not eligible under the City's Frozen Water Pipe Policy to have the City thaw my frozen water Pipe at the City's cost, and
 - d) Depending on the particular circumstances, the City may be unable to thaw the frozen Water Pipe on my property; and
5. Agree:
- a) To ensure that my property is safe and accessible for the City to attempt to carry out the thawing activity,
 - b) To allow the City safe entry to my property to attempt to thaw my frozen Water Pipe,
 - c) If my frozen Water Pipe is successfully thawed, to run water continuously to prevent re-freezing of the Water Pipe on my property, as instructed by the City,
 - d) To pay all the City's costs in carrying out all work under this authorization, which costs are based on actual labour costs, payroll burden costs, overhead and administration costs, vehicle, equipment, materials and all property restoration costs,
 - e) To indemnify the City and all its representatives against all losses arising from my actions or omissions in respect of the subject matter of this Authorization, and
 - f) To comply with the City's Frozen Water Pipe Policy and instructions given by the City under it.

My property address

Signature of witness

Date

Signature of water service recipient

Print name

Contact information

AUTHORIZATION

By the undersigned temporary water access recipient under the frozen water pipe policy of The Corporation of the City of Guelph (the "City")

In consideration of the City (through its own forces and/or outside contractors):

1. Acknowledging that:
 - a) The water supply to my property, as indicated below, has been interrupted due to a frozen Water Pipe,
 - b) This interruption might have been caused (at least partially) by a frozen City Water Pipe,
 - c) No Temporary Water Service is currently supplying Potable water to my property, and
 - d) I am eligible under the City's Frozen Water Pipe Policy for the Temporary Water Access Program;
2. Providing access to program resources under the City's Temporary Water Access Program; and
3. Complying with its Frozen Water Pipe Policy;

I hereby:

1. Authorize and request the City to register me under its Temporary Water Access Program;
2. Certify that I am a recipient of water service from the City at this property;
3. Undertake that:
 - a) If I am a tenant at the property, I shall immediately notify the landlord of the property about this arrangement, or
 - b) If I am a landlord at the property, I shall immediately notify the tenant of the property about this arrangement;
4. Acknowledge that there are limitations on program resources available under the City's Temporary Water Access Program; and
5. Agree:
 - a) To obtain my own water containers for use at City fill stations,
 - b) To obtain my own transportation to and from the water access facilities provided by the City,
 - c) To notify the City within 48 hours after normal water supply is restored to my property, and
 - d) To comply with the City's Frozen Water Pipe Policy and instructions given by the City under it.

My property address

Signature of witness

Date

Signature of water access recipient

Print name

Contact information

AUTHORIZATION

By the undersigned temporary water access recipient under the frozen water pipe policy of The Corporation of the City of Guelph (the "City")

In consideration of the City (through its own forces and/or outside contractors):

1. Providing, at my cost, access to program resources under the City's Temporary Water Access Program; and
2. Complying with its Frozen Water Pipe Policy;

I hereby:

1. Authorize and request the City to register me under its Temporary Water Access Program;
2. Certify that I am a recipient of water service from the City at this property;
3. Undertake that:
 - a) If I am a tenant at the property, I shall immediately notify the landlord of the property about this arrangement, or
 - b) If I am a landlord at the property, I shall immediately notify the tenant of the property about this arrangement;

4. Acknowledge that:
 - a) The City Water Pipe supplying water to my property, as indicated below, is not frozen,
 - b) A Water Pipe on my property is frozen, and therefore my water supply has been interrupted,
 - c) I am not eligible under the City's Frozen Water Pipe Policy for the free Temporary Water Access Program, and
 - d) There are limitations on program resources available under the City's Temporary Water Access Program; and
5. Agree:
 - a) To pay the full cost of participating in the Temporary Water Access Program,
 - b) To obtain my own water containers for use at City fill stations,
 - c) To obtain my own transportation to and from the water access facilities provided by the City,
 - d) To notify the City within 48 hours after normal water supply is restored to my property,
 - e) To indemnify the City and all its representatives against all losses arising from my actions or omissions in respect of the subject matter of this Authorization, and
 - f) To comply with the City's Frozen Water Pipe Policy and instructions given by the City under it.

My property address

Signature of witness

Date

Signature of water access recipient

Print name

Contact information

Setting up your temporary water line

The City has confirmed that you have a frozen water pipe and are eligible for support as per the City's Frozen Water Pipe Policy (available online at guelph.ca/frozenwater). The City will attempt to install a temporary water line from a neighbouring property to restore running water to your home. Once connected, the water will be tested to confirm that it can be used for drinking and cooking. If this cannot be confirmed, you will be provided with a voucher to purchase bottled water for drinking and cooking use.

To connect a temporary water line, please complete the following steps:

- 1) Make arrangements with a neighbour (closest property in proximity to yours is preferred) to act as a donor for a temporary water line from their home to yours. Both homes must have an accessible and working outside hose bib and homeowners must be present for installation.
- 2) Ensure all necessary forms are completed by you, your donor, and, if the water line will run across any other properties (i.e. if there are properties between you and your confirmed donor), impacted property owner(s) (Forms 3, 5 and 6).
- 3) Work with your neighbour to find a mutually agreeable date and time window (Monday to Friday, 8 a.m. to noon or noon to 4 p.m.) for the installation of the temporary water line. The City will do its best to accommodate your schedule. You may want to identify more than one date and time that will work for you and your donor. Access to both properties is mandatory for both the installation and removal of the temporary line.
- 4) To schedule your appointment, submit your signed agreements via email (scanned PDF) to frozenwater@guelph.ca along with your name, address and phone number, donor name and address, and preferred installation date and time window(s), or in person at 29 Waterworks Place, Monday to Friday, 8 a.m. to 4 p.m.

Once the temporary water line is installed:

- 5) You will be required to leave **one tap running at a pencil-width at all times** to ensure the temporary water line does not freeze. This tap will need to run continually until your temporary water line has been removed and regular water service restored. It is your responsibility to ensure the tap is not turned off. You should mark the tap with a reminder to yourself and others in your household that the tap is to be left on at all times. You can still use the tap as long as you leave it running at the pencil-width stream between uses. If the temporary water line freezes due to the tap being turned off, you may be charged for subsequent visits.

As weather warms and pipes thaw, we will be in touch with next steps which may include scheduling a temporary water line removal and/or thaw verification appointment.

Billing

As per the City's Frozen Water Pipe Policy, you will be charged basic daily charges, and volume charges based on your average historic water use over similar past billing periods while you are connected to a temporary water line. Your donor will be charged basic daily charges but will receive a credit for volume charges for the period in which they are acting as a temporary water line donor to thank them for their assistance to you and the City. This credit will be reflected on their Guelph Hydro account.

Water Services
29 Waterworks Place
Guelph, ON
Canada
N1E 6P7

As per the *Accessibility for Ontarians with Disabilities Act*, this notice is available in an alternate format by contacting 519-837-5627.

519-837-5627
waterservices@guelph.ca

guelph.ca/water

Appendix C Equipment & Response

DAKOTA II Series® Steam Cleaners and Pressure Washers

Reliability, Value, Safety and Performance

**RUGGED, EFFICIENT
EQUIPMENT FOR DEMANDING
CLEANING APPLICATIONS**



Model H4D2750
High Pressure Hot Water Washer
7.5 HP, 4 GPM, 2750 PSI, Oil-Fired



**DAKOTA II
SERIES®**

WHY SIOUX...

- **Reliability** – Sioux doesn't just promise reliable products. We put it in writing with our 6 point Reliability Guarantee that addresses equipment parts, frames, performance and support.
- **Value** – Sioux won't make you guess if you are getting the best value. We provide the tools so you can see the value for yourself with our online cost calculator and free report.
- **Return on Investment** – Sioux equipment is guaranteed reliable. That means your capital investment is safe and secure for years to come. Sioux equipment pays for itself before you will ever replace it.
- **Safety** – Sioux implements stringent safety standards. Sioux equipment is ETL Listed, CETA Performance Certified, meets all OSHA regulations and is third-party certified.
- **Customer-Driven** – Sioux works hard to provide exceptional customer service and to ensure customers get the best value for their investment. Our success is measured in satisfied customers.

PRODUCT FEATURES & BENEFITS

- Certified to UL1776 and CAN/CSA-B140.11-M89. Complies with OSHA 1910.399 regulations. Third-party certified by a Nationally Recognized Testing Laboratory.
Protect your employees, your company, and yourself. Certified equipment helps protect against OSHA fines and possible litigation.
- Approved for indoor and outdoor use.
Gives greater flexibility for all your applications.
- Improved coil design.
High efficiency, lower fuel usage, saves you money.
- Easy-access NEMA 4 electrical enclosure.
Quick, easy troubleshooting, and maintenance.
- Strong structural steel frame.
Built to last. Protects your investment.
- GFCI on single-phase machines.
Reduces the chance of electrical shock.
- Low CO emissions, significantly below the present UL-1776 allowable CO emission levels. Efficient coil design.
Improves air quality, less fuel usage, less smoke, and lower emissions.
- Wide range of options and accessories. Customize machines to your specific needs and application requirements.
You get the exact machine your specific application requires.



Model S1.5D250 Steam Cleaner
0.75 HP, 1.5 GPM, 250 PSI, Oil Fired

- 320°F (160°C) pressurized water temperature before exiting nozzle (steam cleaners, and steam option on hot water pressure washers) compared to other brands at only 250°F (121°C) or 290°F (143°C).
Produces 58% to 338% more cleaning impact. Faster, more efficient cleaning.
- Steam option with detergent capability.
Ability to use detergent in all operating modes.
- Sioux Corporation has been in business since 1939. Our designs are based on many years of experience.
We will be here to support you today, tomorrow and into the future. If you need a custom machine, we probably have already designed it.
- Our Technical Services Department is only a toll-free phone call away. 90% of parts orders are shipped within 24 hours.
Sioux helps keep your machines up and running.

OTHER STANDARD FEATURES

- Stainless steel coil wrap
- Ceramic, multi-plunger water pump with forged bronze heads
- Quick connects on hose, gun, and wash tips
- Adjustable detergent system
- Totally enclosed fan cooled (TEFC) motor
- Solid molded-rubber casters
- Dual or quad lift eyes
- Shut-off gun and 50' (15.2m) hose

WHEN SAFETY IS IMPORTANT...

SIoux'S DAKOTA II SERIES®

is the Answer

OSHA regulation 1910.399 requires that electrical equipment be third-party certified for safety by a Nationally Recognized Testing Laboratory such as ETL*.

Dakota II Series® machines are third-party certified by a Nationally Recognized Testing Laboratory, ETL, and meet OSHA regulations.

All Dakota II Series® units meet the following nationally recognized standards:

- Underwriters Laboratory Standard for Safety for High-Pressure Cleaning Machines, UL 1776
- Canadian Standards Association Standard for Safety for Oil/Gas Commercial/Industrial Pressure Washers and Steam Cleaners, CAN/CSA-B140.11-M89.

In addition, these machines meet the following:

- National Electric Code (NEC),
- Canadian Electric Code (CEC), and
- For gas fired Dakota II Series® machines, the requirements of the American Gas Association, and the Canadian Gas Association, which are now specified in CAN/CSA-B140.11-M89.



Third-party certification is an important benefit and protection for you and your company. Buying only third-party certified equipment should be an important part of your purchasing decision.

- It is the law in the workplace (OSHA regulation 1910.399) that electrical equipment be third-party certified*. Failure to comply could result in penalties of \$5,000 or more. **All standard models in the Dakota II Series® by Sioux are third-party certified.**

- Employees depend on their company to provide a safe working environment. Insisting on third-party-certified equipment is an important part of providing a safe working environment. **All standard models in the Dakota II Series® by Sioux are third-party certified.**
- Accidents due to unsafe equipment can lead to costly litigation. Minimize this possibility by purchasing only third-party certified equipment. **All standard models in the Dakota II Series® by Sioux are third-party certified.**

Protect your employees, your company, and yourself.
Insist on third-party certified equipment.

**Unless the equipment is custom designed, fabricated and intended for use by a particular customer, and the equipment complies with OSHA 1910.399 (iii).*

SIoux DAKOTA II SERIES® Machines

ARE PERFORMANCE CERTIFIED

In 1998 the Cleaning Equipment Trade Association (CETA) implemented a new performance standard for the industry. This standard, developed by the Technical Standards Committee of CETA, in conjunction with engineering representatives from manufacturers and suppliers in the industry, specifies the



performance criteria required for CETA certification. **All Dakota II Series® machines meet these requirements, and are CETA Performance Certified.** This certification assures the buyers of Dakota II Series® machines that the performance promised in the literature will be the performance delivered.

Which is Best...

A HIGH PRESSURE HOT WATER WASHER OR A STEAM CLEANER?

Myth: Steam cleaners are outdated.

Reality: There are **many** applications where a steam cleaner is better than a high pressure hot water washer.

At Sioux, we have been building both types of machines for 70 years. There are some advantages to using hot water washers and some advantages to using steam cleaners. Each cleans in a different way. Determining which machine is best depends on the application.

- With pressure washers, dirt and grime are blasted away, under pressure. Heat will improve the result if melting is required, and use of the proper detergent will enhance cleaning.
- Steam cleaners are used when the substance to be removed melts, softens, or dissolves with the application of heat. This is the case with grease, oil, tar, many petrochemicals, ice, wax, food products, and similar materials. The substance is melted or dissolved, rather than pushed around the surface. Use of proper detergent will enhance steam cleaning performance.

With a Dakota II Series® steam cleaner, when heated water at a temperature of 320°F (160°C) and a pressure of 250 PSI (17.2 BAR) flashes into vapor as it passes through the steam nozzle, there is tremendous expansion, **producing about the same impact as a 1,000 PSI (69 BAR) pressure washer, with 86% more heat transferred for cleaning.**

If heat is what is really needed for cleaning, a steam cleaner is the better choice. In addition, a steam cleaner (vs. a hot water washer) offers the following benefits:

- Steam Cleaners use less power, **reducing your electric bill**
- Requires a smaller electric circuit for installation, and therefore, **may be used in more locations in your facility**
- Uses less water during operation, **reducing your water and sewer bills, and reducing the volume of wastewater to be processed**
- Produces less splattering and splash-back, **protecting the operator and your facility**



Model H4D2750
High Pressure Hot Water Washer
7.5 HP, 4 GPM, 2750 PSI, Oil-Fired

All steam cleaners are not the same. At comparable flow rates, a 320°F (160°C) steam cleaner produces approximately **40% more steam** and will transfer approximately **13% more heat** to the surface than the 290°F (143°C) steam cleaner. The increased heat and steam also **significantly increase the cleaning impact**, as illustrated in the chart below:

Pressurized Water Temperature Before Exiting Nozzle as Steam	% Increase in Cleaning Impact of 320°F vs. Lower Temperature
320°F (160°C) vs. 300°F (149°C)	+34%
320°F (160°C) vs. 290°F (143°C)	+58%
320°F (160°C) vs. 280°F (138°C)	+118%
320°F (160°C) vs. 265°F (129°C)	+167%
320°F (160°C) vs. 250°F (121°C)	+338%

WHAT IS MORE IMPORTANT, PRESSURE OR FLOW?

For a given cleaning application there are many flow/pressure combinations from which to choose. Here are some criteria you can use to select the best flow and pressure combination for your application.

1. Consider the capacity of your water source. If you have a limited water supply, then you would choose high pressure vs. high flow.
2. Consider how important heat is in your cleaning application. If heat is critical to your cleaning application, then higher flow is better. The more hot water you can move across the surface, the faster you can heat it and clean it. If additional heat would help, a steam cleaner should be considered.
3. For a given horsepower there may be several flow and pressure combinations available. Higher flow and lower pressure for a given horsepower will result in more impact and more work. The example below compares two different 10 hp (7.5 kw) machines. You can see that the higher flow rate option results in 23% more work and 32% more cleaning force.

Example	Rating	% Additional Work	% Additional Cleaning Force
High Pressure	5 GPM @ 3000 PSI (19 LPM @ 207 BAR)	—	—
High Flow	6 GPM @ 2500 PSI (23 LPM @ 172 BAR)	23%	32%

4. It is commonly believed that lower flow and higher pressure will produce less runoff, and less wastewater to process. This may be true in some applications. But if a higher flow machine can perform the same job faster, then the total amount of water used may be less. Temperature should also be considered to reduce water consumption. It may be better to use a higher temperature rather than increase flow or pressure in order to minimize your wastewater.

BELT DRIVE vs. DIRECT DRIVE vs. FLEXIBLE-COUPLED DRIVE

One important factor to consider in comparing belt vs. direct or flexible-coupled drive is the motor and pump speed. It is commonly thought in the industry that belt drive will last longer than direct drive. This is not necessarily correct, as explained below.

Our line uses all 1750 RPM motors, and all of our pumps run between 1400 RPM and 1750 RPM. In this RPM range there is not much difference in life expectancy of pumps when comparing belt drive to direct or flex-coupled drive. There is a huge difference in pump life between a direct driven pump running at 3400 RPM and a belt driven pump at 1000 RPM. Some pump designs work better for direct drive and others work better for belt drive. Where we are offering a direct or flex-coupled design as our standard, we are using a pump that has been designed and tested and matched for this use.

It is also untrue to make the generalization that one is always better than the other. For example, if properly maintained and running at the same RPM, a belt drive system may have a longer life. However, if the belt drive system is not maintained properly and the motor and pump become misaligned, the belt tension changes, or belt(s) wear, the direct or flex- coupled system may last longer.

The general rule for Sioux designs is that small models have a direct drive while medium models are flex-coupled, and large models have a belt drive. Sioux can customize drive systems, so contact the factory for specific applications.

DAKOTA II SERIES®

Steam Cleaners and Pressure Washers

Steam Cleaner Ratings - 60 Hz

- 320°F (160°C) pressurized water temperature before discharge

Model	Standard Electricals Volt/Phase/Hz	Operating Current AMPS	Recommended Circuit Rating AMPS	GPM (LPM)	PSI (BAR)	HP (KW)	BTU/Hr (KW)
S1.5*250	115/1/60	14	15	1.5 (5.7)	250 (17.2)	0.75 (0.56)	250,000 (73)
S2*250	115/1/60	14	15	2 (7.6)	250 (17.2)	0.75 (0.56)	340,000 (100)
S4*250	115/1/60	19	20	4 (15.1)	250 (17.2)	1 (0.75)	640,000 (188)
S6*250	230/1/60	17	20	6 (22.7)	250 (17.2)	1.5 (1.12)	898,000 (263)
S8*250	230/1/60	18	20	8 (30.3)	250 (17.2)	1.5 (1.12)	1,200,000 (352)

* L for LP Gas N for Natural Gas D for Fuel Oil (Diesel)

Specifications listed are for diesel models and may vary slightly, depending on fuel type.

- Standard with float tank and upstream detergent metering

Steam Cleaner Ratings - 50 Hz

- 320°F (160°C) pressurized water temperature before discharge

Model	Standard Electricals Volt/Phase/Hz	Operating Current AMPS	Recommended Circuit Rating AMPS	GPM (LPM)	PSI (BAR)	HP (KW)	BTU/Hr (KW)
S1.2*250	220/1/50	9	15	1.2 (4.5)	250 (17.2)	0.5 (0.37)	200,000 (59)
S1.7*250	220/1/50	9	15	1.7 (6.4)	250 (17.2)	0.5 (0.37)	280,000 (82)
S3.3*250	220/1/50	13	15	3.3 (12.5)	250 (17.2)	0.75 (0.56)	524,000 (154)
S5*250	220/1/50	15	20	5 (18.9)	250 (17.2)	1 (0.75)	750,000 (220)

* L for LP Gas N for Natural Gas D for Fuel Oil (Diesel)

Specifications listed are for diesel models and may vary slightly, depending on fuel type.

- Standard with float tank and upstream detergent metering

High Pressure Hot Water Washer Ratings - 60 Hz

- 200°F (93.3°C) water temperature

Model	Standard Electricals Volt/Phase/Hz	Operating Current AMPS	Recommended Circuit Rating AMPS	GPM (LPM)	PSI (BAR)	HP (KW)	BTU/Hr (KW)
H2.1*1000†	115/1/60	18	20	2.1 (7.9)	1,000 (68.9)	1.5 (1.12)	180,000 (53)
H3*750†	115/1/60	18	20	3 (11.4)	750 (51.7)	1.5 (1.12)	250,000 (73)
H3*1500	230/1/60	17	20	3 (11.4)	1,500 (103.4)	3 (2.24)	250,000 (73)
H3.8*2000	230/1/60	26	30	3.8 (14.4)	2,000 (137.9)	5 (3.73)	320,000 (94)
H3.8*2000	230/3/60	15	20	3.8 (14.4)	2,000 (137.9)	5 (3.73)	320,000 (94)
H4*2750	230/3/60	26	30	4 (15.1)	2,750 (189.6)	7.5 (5.60)	340,000 (100)
H5*3000	230/3/60	34	40	5 (18.9)	3,000 (206.8)	10 (7.46)	408,000 (120)
H6*2500	230/3/60	34	40	6 (22.7)	2,500 (172.4)	10 (7.46)	490,000 (144)
H8*2750	460/3/60	25	30	8 (30.3)	2,750 (189.6)	15 (11.19)	650,000 (192)
H10*2000	460/3/60	27	30	10 (37.9)	2,000 (137.9)	15 (11.19)	810,000 (237)
H10*3000	460/3/60	34	40	10 (37.9)	3,000 (206.8)	20 (14.92)	810,000 (237)

* L for LP Gas N for Natural Gas D for Fuel Oil (Diesel)

Specifications listed are for diesel models and may vary slightly, depending on fuel type.

- Standard with downstream detergent injection system and float tank unless otherwise noted.

† Standard upstream detergent metering value and float tank.

DAKOTA II SERIES®

Steam Cleaners and Pressure Washers

High Pressure Hot Water Washer Ratings - 50 Hz

- 200°F (93.3°C) water temperature

Model	Standard Electricals Volt/Phase/Hz	Operating Current AMPS	Recommended Circuit Rating AMPS	GPM (LPM)	PSI (BAR)	HP (KW)	BTU/Hr (KW)
H1.8*800†	220/1/50	10	15	1.8 (6.8)	800 (55.2)	1 (0.75)	152,000 (45)
H2.5*600†	220/1/50	10	15	2.5 (9.5)	600 (41.34)	1 (0.75)	210,000 (62)
H2.5*1200	220/1/50	18	20	2.5 (9.5)	1,200 (82.7)	2 (1.49)	210,000 (62)
H3.2*1400	220/1/50	21	30	3.2 (12.1)	1,600 (110.3)	3 (2.24)	270,000 (79)
H3.3*2200	380/3/50	12	20	3.3 (12.5)	2,200 (151.7)	5 (3.73)	280,000 (82)
H4.2*2600	380/3/50	19	30	4.2 (15.9)	2,600 (179.3)	7.5 (5.60)	346,000 (101)
H5*2000	380/3/50	19	30	5 (18.9)	2,000 (137.9)	7.5 (5.60)	408,000 (120)
H6.7*2200	380/3/50	22	30	6.7 (25.4)	2,200 (151.7)	10 (7.46)	545,000 (160)
H8.3*1750	380/3/50	24	30	8.3 (31.4)	1,600 (110.3)	10 (7.46)	672,000 (197)
H8.3*2400	380/3/50	32	40	8.3 (31.4)	2,600 (179.3)	15 (11.19)	672,000 (197)

*L for LP Gas N for Natural Gas D for Fuel Oil (Diesel)

Specifications listed are for diesel models and may vary slightly, depending on fuel type.

- Standard with downstream detergent injection system and float tank unless otherwise noted.

† Standard upstream detergent metering value and float tank.

All models come standard with a manual, 50' (15.24m) hose and gun (Shut off gun is standard on combination and hot water units and steam cleaners S1.5, S2 and S4. Open Walters gun is standard for S6 and S8 models.) Pressure washers come standard with three pressure wash tips - 0, 15, 25 degree and quick coupler. Steam Cleaners come standard with steam nozzle.

Steam Option Available on all Hot Water Pressure Washers

Steam Option — Produces pressurized water temperature of 320°F (160°C) before exiting nozzle.

Other Electricals Available — Please Contact Factory. Options include 380V, 415V, 50 or 60 Hz, and nearly any standard voltage used worldwide.

Other Mountings Options — Pneumatic Casters, Skid or Stationary. (Solid molded-rubber casters are standard)

Accessories

AVAILABLE TO CUSTOMIZE YOUR DAKOTA II SERIES® STEAM CLEANER AND PRESSURE WASHER

Accessory	Description
Shutdown Timer	Shuts down machine after two minutes of unloading to protect pump from overheating.
Belt Drive	Converts machine from direct drive or flex coupled to belt drive.
Turbo Nozzles	Used with pressure washers. Not for steam cleaners or combination units in steam option.
Steam Option	320°F (160°C) Steam (includes float tank and upstream detergent metering).
Pneumatic Casters	8" (20cm) pneumatic casters.
Hose Reel	Holds 175' (53m) of 3/8" (1cm) or 150' (46m) of 1/2" (1.25cm) hose.
LP Gas Bottle Rack	Rack bolts onto machine frame and includes LP gas hose and two-stage regulator.
Dual LP Gas Bottle Rack	Rack bolts onto machine frame and includes LP gas hose and two-stage regulator.
One-Wire-Braid Hose	For steam cleaners and pressure washers with steam option up to and including 4 GPM (1.5 LPM) and up to and including 2,000 PSI (138 BAR). Available in 3/8" (1cm) in 50' (15.24m) or 100' (30.48m) or 1/2" (1.25cm) in 50' (15.24m or 100' (30.48m).
One-Wire-Braid Hose (without steam)	For pressure washers without steam option operating up to and including 2,000 PSI (138 BAR). Available in 3/8" (1cm) x 50' (15.24m).
Two-Wire-Braid Hose	For pressure washers with or without steam option operating up to and including 3,500 PSI (241 BAR). Available in 3/8" (1cm) x 50' (15.24m) or 100' (30.48m).
Quick Coupler - Brass	MPT or FPT brass body. Available in 3/8" (1cm) rated at 2,700 PSI (186 BAR) or 1/2" (1.25cm) rated at 2,200 PSI (151 BAR).
Quick Coupler - Brass	MPT or FPT brass nipple. Available in 3/8" (1cm) rated at 2,700 PSI (186 BAR) or 1/2" (1.25cm) rated at 2,200 PSI (151 BAR).
Quick Coupler - Steel	MPT or FPT steel body. Available in 3/8" (1cm) rated at 10,000 PSI (690 BAR).
Quick Coupler - Steel	MPT or FPT steel nipple. Available in 3/8" (1cm) rated at 10,000 PSI (690 BAR).
Sand Grit Injector	Must be sized to fit output of machine. Only for high pressure hot water not in steam option mode.

DAKOTA II SERIES®

Steam Cleaners and Pressure Washers **Designed for Reliability, Value,** **Safety and Performance**

- Third-party certified to UL-1776 and CAN/CSA-B140.11-M89 by ETL
- Meets National Electric Code and Canadian Electric Code
- Gas fired machines meet requirements of American Gas Association and Canadian Gas Association
- Performance Certified to Cleaning Equipment Trade Association Performance Standards
- Designed for easy maintenance and operation
- Efficient coil design lowers fuel usage. Saves you money.

**Sioux is the industry leader in application-specific designs.
Call us today to quote your specific application.**

Performance ratings are based on 60°F (15.5°C) inlet water temperature and 70°F (20°C) air temperature at sea level. Performance and continuous operating current may vary +/- 5%. Sioux Corporation reserves the right to make such changes as deemed advisable, which represent improvement of performance and/or reliability. This product is covered by one or more U.S. patents and/or U.S. patents pending. For warranty specifications and limitations of Sioux Corporation, see Limited Warranty. The information contained in this brochure does not constitute a warranty.

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CALL US TOLL-FREE AT (888) 763-8833
or (605) 763-3333 or visit us at www.sioux.com



SIoux CORPORATION

One Sioux Plaza • Beresford, SD 57004-1500

Toll-free: (888) 763-8833 • Tel: (605) 763-3333 • Fax: (605) 763-3334

E-mail: email@sioux.com • www.sioux.com



KT-190
KT-200

OPERATOR'S
MANUAL

• Castellano – pág. 11

Pipe Thawing Units



⚠ WARNING!

Read this Operator's Manual carefully before using this tool. Failure to understand and follow the contents of this manual may result in electrical shock, fire and/or serious personal injury.

RIDGID[®]

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KT-190 and KT-200 Pipe Thawing Units



KT-190 and KT-200 Pipe Thawing Units	
Record Serial Number below and retain product serial number which is located on nameplate.	
Serial No.	

General Safety Information

WARNING! Read and understand all instructions. Failure to follow all instructions listed below may result in electric shock, fire, and/or serious personal injury.

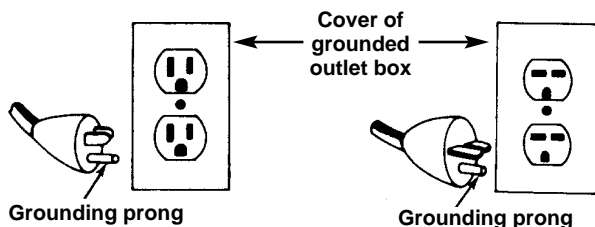
SAVE THESE INSTRUCTIONS!

Work Area Safety

- **Keep your work area clean and well lit.** Cluttered benches and dark areas invite accidents.
- **Do not operate these tools in explosive atmospheres, such as in the presence of flammable liquids, gases, or dust.** Electrical switches may create sparks which may ignite dust or fumes.
- **Keep bystanders, children, and visitors away while operating a Pipe Thawing Unit.** Distractions can cause you to lose control.

Electrical Safety

- **Grounded tools must be plugged into an outlet, properly installed and grounded in accordance with all codes and ordinances. Never remove the grounding prong or modify the plug in any way. Do not use any adapter plugs. Check with a qualified electrician if you are in doubt as to whether the outlet is properly grounded.** If the tool should electrically malfunction or break down, grounding provides a low resistance path to carry electricity away from the user.



- **Avoid body contact with grounded surfaces such as pipes, radiators, ranges and refrigerators.** There is an increased risk of electrical shock if your body is grounded.
- **Do not expose power tools to rain or wet conditions.** Water entering an electrical tool will increase the risk of electrical shock.
- **Do not abuse cord. Never use the cord to carry the tools or pull the plug from an outlet. Keep cord away from heat, oil, sharp edges, or moving parts.** Replace damaged cords immediately. Damaged cords increase the risk of electrical shock.
- **When operating an electrical tool outside, use an outdoor extension cord marked "W-A" or "W".**

These cords are rated for outdoor use and reduce the risk of electrical shock.

- **Use only three-wire extension cords which have three-prong grounding plugs, and three-pole receptacles which accept the tools plug.** Use of other extension cords will not ground the tool and increases the risk of electrical shock.
- **Use proper extension cords.** (See chart.) Insufficient conductor size will cause excessive voltage drop, loss of power, and overheating.

Minimum Wire Gauge for Cord Set	
Total Length (in feet)	
0 – 25	14 AWG
26 – 50	12 AWG
Over 50 ft.	NOT RECOMMENDED

- **Keep all electric connections dry and off the ground. Do not touch plugs or tool with wet hands.** Reduces the risk of electrical shock.

Personal Safety

- **Stay alert, watch what you are doing and use common sense when operating a tool. Do not use tool while tired or under the influence of drugs, alcohol or medications.** A moment of inattention while operating tools may result in serious personal injury.
- **Avoid accidental starting. Be sure switch is OFF before plugging in.** Plugging in machines that have the switch ON invites accidents.
- **Do not over-reach. Keep proper footing and balance at all times.** Proper footing and balance enables better control of the tool in unexpected situations.
- **Use safety equipment. Always wear eye protection.** Dust mask, non-skid safety shoes, hard hat, or hearing protection must be used for appropriate conditions.

Tool Use and Care

- **Do not use tool if switch does not turn it ON or OFF.** Any tool that cannot be controlled with the switch is dangerous and must be repaired.
- **Store idle tools out of the reach of children and other untrained persons.** Tools are dangerous in the hands of untrained users.
- **Maintain tools with care.** Properly maintained tools are less likely to cause injury.
- **Check for breakage of parts, and any other condition that may affect the tool's operation. If damaged, have the tool serviced before using.** Many accidents are caused by poorly maintained tools.

- **Use only accessories that are recommended by the manufacturer for your tool.** Accessories that may be suitable for one tool may become hazardous when used on another tool.
- **Inspect tool and extension cords periodically and replace if damaged.** Damaged cords increase the risk of electrical shock.
- **Keep handles dry and clean; free from oil and grease.** Allows for better control of the tool.
- **Disconnect the plug from the power source before making any adjustments, changing accessories, or storing the unit.** These preventative safety measures reduce the risk of accidentally starting the unit.

Service

- **Tool service must be performed only by qualified repair personnel.** Service or maintenance performed by unqualified repair personnel could result in injury.
- **When servicing a tool, use only identical replacement parts. Follow instructions in the Maintenance Section of this manual.** Use of unauthorized parts or failure to follow maintenance instructions may create a risk of electrical shock or injury.
- **Disconnect all power from the unit before servicing.** Eliminates the risk of electrical shock and accidental starting.

Specific Safety Information

⚠ WARNING

Read this operator's manual carefully before using the Pipe Thawing Tools. Failure to understand and follow the contents of this manual may result in electrical shock, fire and/or serious personal injury.

Call the Ridge Tool Company, Technical Service Department at (800) 519-3456 if you have any questions.

Tool Safety

- **Tool is made to thaw frozen iron or copper water pipes. Follow the instructions on proper use.** Other uses may increase the risk of injury.
- **Do not leave the unit unattended while thawing.** Such preventive measures reduce the risk of injury or fire.
- **Do not touch the clamp tips or cable connections.** Reduces the risk of burns.
- **Do not operate unit with housing removed.** Exposure to internal parts may result in injury.

- **Make both pipe connections before plugging in unit.** Prevents electrical arcing between the clamps and the pipe.
- **Use cable and clamps provided with unit.** Incorrect cables may result in overheating of the wires.
- **Keep clamps away from combustible materials or articles that can be damaged by heat.** Clamp tips become hot during use.

Description and Specifications:

Description

The RIDGID Pipe Thawing Machines are easy-to-use, and versatile for thawing 1/2" to 1 1/2" copper or steel/iron pipe up to 150 feet (KT-200). Both the KT-190 and KT-200 use low voltage and high amperage to quickly thaw frozen tap water lines and frozen heating systems.

This method does not require that you know exactly where the frozen section is nor do you have to have direct access to the area. The KT-190 and KT-200 will thaw copper or steel pipe that is underground, beneath the floor or behind walls. Multiple voltage settings on the KT-200 allow for maximum amperage to provide the shortest thawing time. Vinyl coated clamps with 25 foot cables, standard with both units, permit thawing of a 50' section of pipe. Additional 25' cable extensions are available for longer runs.

Specifications

Line Capacity:

Primarily recommended for all indoor copper or steel pipes from 1/2" to 1 1/2". Thawing units will not work with plastic pipe or lines containing plastic or rubber couplings.

Thawing Unit:

Input115 Volts, 15 Amps

	KT-190	KT-200
Output.....	6.0 Volts	4.5 - 7.6 Volts
Output.....	300 Amps	300 Amps
Minimum Reach	15'	4'
Maximum Reach	75'	150'
Weight	25 lbs	29 lbs
Weight	11.4 kgs	13.2 kgs

Standard Equipment

Qty. Item

- 1Thawing Unit, Model KT-190 or KT-200. 115 volts, 15 Amps.
- 2Cables, 25 feet in length, with a vinyl coated spring clamp on one end and a mounting loop on the other.

Accessories

- Extension Cable, 25 feet, # 1/0 AWG c/w nut & bolt. Catalog No. 62772
- Series Cable, 3 feet, # 1/0 AWG Catalog No. 62812



Figure 1 – KT-200 Pipe Thawing Tool

Cables and Clamps

25 feet in length with vinyl coated clamp.

	KT-190	KT-200
Size	#2 AWG	#1/0 AWG
Weight	19 lbs/Pair (8.6 kgs)	23 lbs/Pair (10.5 kgs)

Problem Diagnostics

Main Service Lines

If there is no running water anywhere in the house, the main service from the curb valve to the house is frozen. The service can be thawed by placing one clamp on a tap water line in the basement and the other on the curb key attached to the curb valve. Make sure there is contact between the curb key and valve. Extension Cables are required if runs exceed 50 feet. Additional thawing units may be required to reduce thawing time. Refer to Special Application Procedure for Series Set-Up.

Tap Water Lines

Locate the frozen line by opening faucets and checking for water flow. The frozen section will normally be in an outside wall or in a crawl space with poor insulation. If one faucet does not have running water and the next faucet does, frozen section is between faucets. Place clamps on either hot or cold water lines, not on faucets.

Refer to **Thawing Tap Water Lines** for procedure.

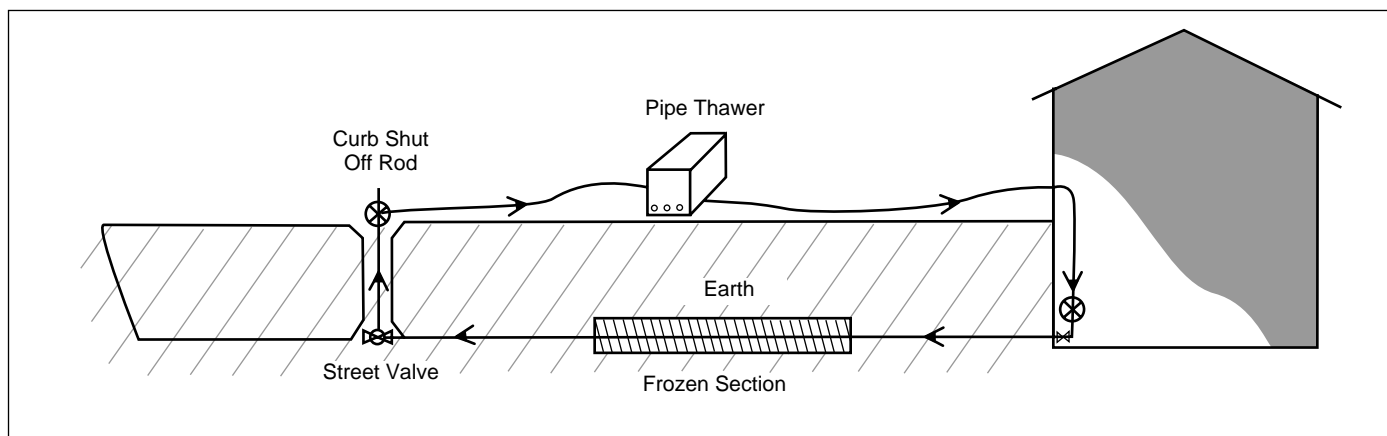


Figure 2 – Thawing Main Service Lines

Tool Assembly

⚠ WARNING

To prevent serious injury, proper assembly of the Thawing Tool is required. The following procedures should be followed:



Figure 3 – Thawing Tool with Cables Installed

Installing Cables with Clamps

1. Remove retaining nut from one of the lugs on back of unit.
2. Slip looped end of cable onto lug bolt with flat side towards unit.
3. Reinstall lug nut and secure tightly.
4. Ensure looped end of cable does not contact housing.
5. Repeat steps 1 and 2 for remaining lug.

NOTE! If cable leads are not securely fastened to thawing unit, thawing time may be extended and/or unit may not function properly.

Tool Inspection

⚠ WARNING



To prevent serious injury, inspect your Pipe Thawing Tool. The following procedures should be followed.

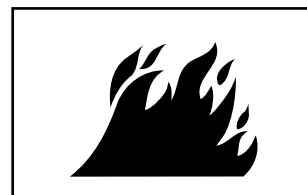
1. Make sure Pipe Thawing Tool is unplugged and the control switches are in the OFF position.
2. Inspect the power cord and plug for damage. If the plug has been modified, is missing the grounding prong or if the cord is damaged, do not use the Thawing Tool until the cord has been replaced.
3. Inspect the cables and clamps for damage. Be sure

cable leads are securely fastened to thawing unit. If cable or clamps are damaged, do not use the Thawing Tool until they are replaced. Only use cable and clamps provided with the unit.

4. Clean any oil, grease or dirt from handles, controls and clamps.
5. Inspect the Thawing Tool for any broken or missing parts as well as damage to the metal enclosure. If any of these conditions are present, do not use the Thawing Tool until any problem has been repaired.

Tool Set-Up

⚠ WARNING



To prevent serious injury, proper set-up of the tool and work area is required. The following procedures should be followed to set-up the Pipe Thawing Tool.

1. Check work area for:
 - Adequate lighting
 - 15 Amp grounded electrical outlet
 - Clear path to the electrical outlet that does not contain any sources of heat or oil, sharp edges or moving parts that may damage electrical cord.
 - Dry place for tool and operator. Do not use the tool while standing in water.
 - Flammable liquids, vapors or dust that may ignite.
2. Position KT-190 or KT-200 Pipe Thawer near the area suspected of having a frozen section of pipe.
3. Make sure unit is unplugged and turned OFF. (Switch on KT-190 is in the down (OFF) position. Center switch on KT-200 is in the middle (OFF) position).
4. Uncoil both cables completely and insure they are not overlapping or in contact.
5. Follow instructions on proper placement of clamps.

⚠ WARNING Making pipe connections before plugging in unit prevents arcing between clamp and pipe.

NOTE! Whenever making connections, clean pipe of paint, scale rust, etc. to ensure good amperage flow from the clamps to the pipe. Poor connections will cause the clamps to get much hotter than normal.

- When plugging the Pipe Thawing Tool into the electrical outlet, making sure to position the power cord along the clear path selected earlier. If the power cord does not reach the outlet, use an extension cord in good condition.

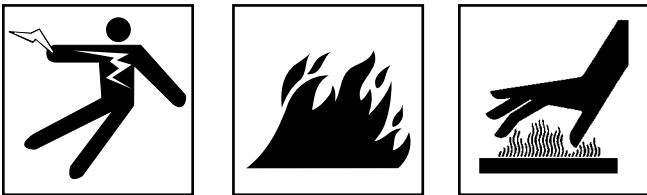
⚠ WARNING To avoid electric shock and electrical fires, never use an extension cord that is damaged or does not meet the following requirements:

- The cord has a three-prong plug similar to shown in Electrical Safety section.
- The cord is rated as "W" or "W-A" if being used outdoors.
- The cord has sufficient wire thickness (14 AWG below 25'/12 AWG 25' - 50'). If the wire thickness is too small, the cord may overheat, melting the cord's insulation or causing nearby objects to ignite.

⚠ WARNING To reduce risk of electrical shock, keep all electrical connections dry and off the ground. Do not touch plug with wet hands.

Operating Instructions

⚠ WARNING



To reduce risk of electrical shock, keep all electrical connections dry and off the ground. Do not touch plug with wet hands.

Be very careful when thawing frozen pipes. Clamp tips and cable connections become hot during use. Avoid contact with skin as burns can result.

Keep clamps away from combustible materials or articles that can be damaged by heat.

Do not leave the unit unattended while thawing.

Thawing Tap Water Lines

NOTE! It is recommended that there be standard water pressure on one side of the frozen section of pipe and an open faucet on the other side of the frozen section (*Figure 4*). As the pipe warms to above freezing point, the water, with pressure behind it, will seep along the inside walls melting and flushing the remaining ice out of the faucet.

- Make sure unit is unplugged and turned OFF and cables are completely uncoiled.
- Place one clamp on each side of the frozen section of pipe. Open the faucet where no water flows.

⚠ WARNING Making pipe connections before plugging in unit prevents arcing between clamps and pipe.

- Plug unit into a grounded 15 amp outlet making sure to position the power cord along the clear path selected earlier.
- Move switch to ON (up position on KT-190. Center switch down to low position, left switch to A on KT-200).
- If current is below 15 amps on KT-200, switch to B. If current is still below 15 amps, switch to high position on center switch and right switch up to C.
- Continue until 15 amps is reached but not exceeded, D switch setting is used with long runs.

Thawing time may vary from a few seconds to several hours depending on length and diameter of pipe being thawed. If time seems unreasonable, check clamps for proper placement.

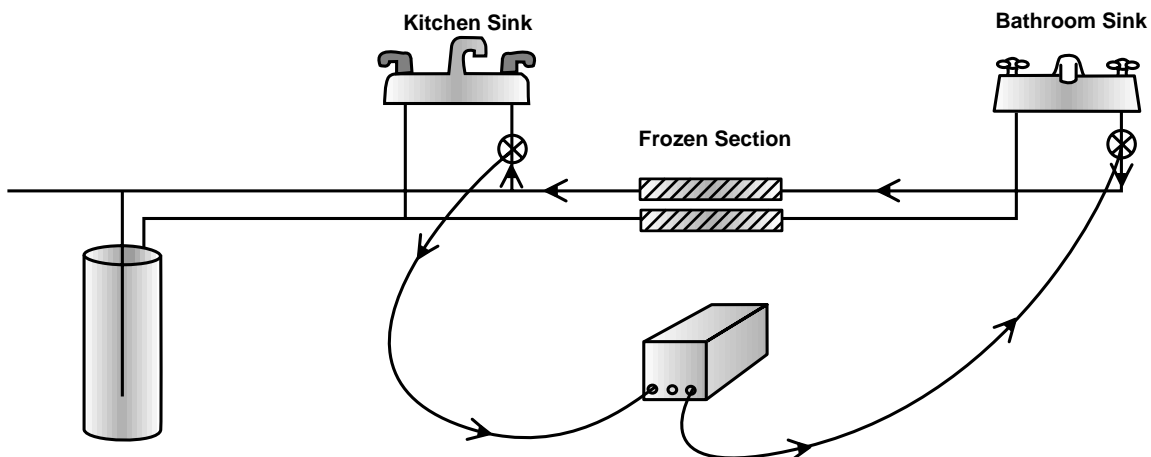


Figure 4 – Thawing Tap Water Lines

NOTE! This tool is equipped with a thermal overload for added safety. If thawing for long periods of time at maximum current, the unit may shut down automatically. Unit will resume operations automatically after approximately 3 minutes.

Tool Removal

1. When water lines have thawed, turn switch to the OFF position and unplug power cord from the electrical outlet.
2. Remove clamps from the pipe.

⚠ WARNING Clamp tips are hot and can cause burns.

3. Allow clamps to cool before coiling cables and placing the unit in storage. While the clamps are hot, keep them away from combustible materials or articles that can be damaged by heat.

Thawing Frozen Hydronic Systems

NOTE! Hydronic systems are harder to thaw due to the lower pressure produced by the circulating pump and the greater lengths of pipe required in a single or multi-zone system.

NOTE! The electrical output current of both the KT-190 and KT-200 can take two paths. The shortest distance between the clamps, or the long path around the pipe loop. Therefore, in some systems it is required to break the pipe to eliminate the short path (*Figure 7*).

Single Zone System

1. Circulating pump must be operating.
2. Make sure unit is unplugged and OFF and cables are completely uncoiled.
3. Place one clamp near the furnace and the second clamp next to a radiator.

⚠ WARNING Making pipe connections before plugging in unit prevents arcing between clamps and pipe.

4. Plug unit into a grounded 15 amp outlet, making sure to position the power cord along the clear path selected earlier.
5. Position switch to ON. (Up position on KT-190. Center switch down to low and left switch to lower A position on KT-200).

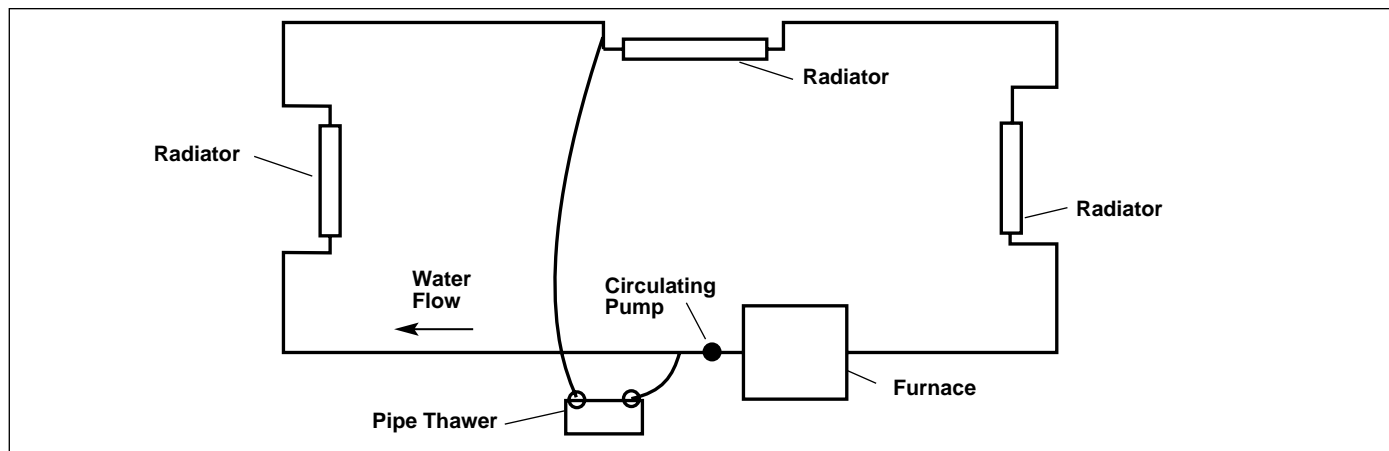


Figure 5 – Single Zone System

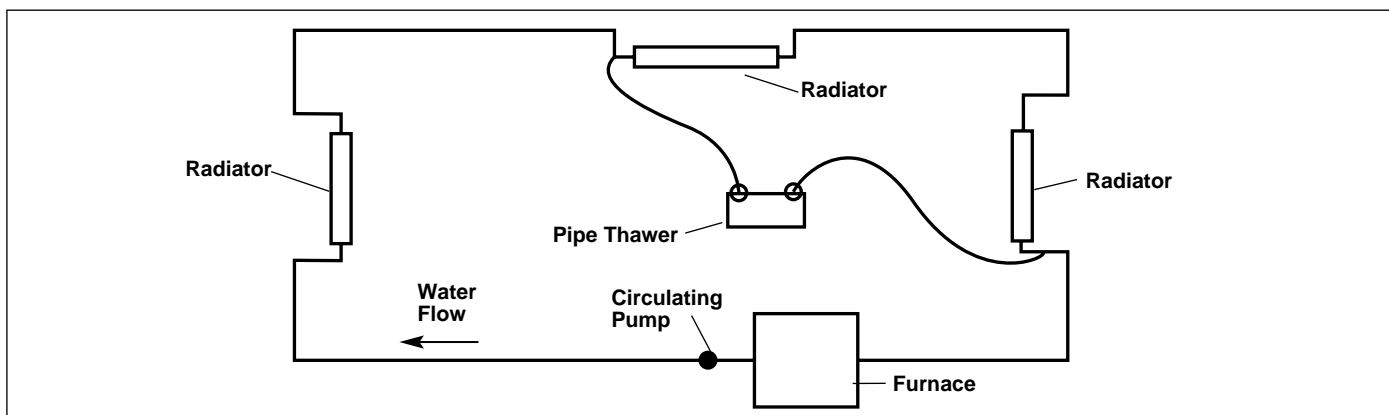


Figure 6 – Single Zone System

6. If current is below 15 amps on KT-200, switch to B. If current is still below 15 amps, switch to high position on center switch and right switch up to C.
7. Continue until 15 amps is reached but not exceeded; D switch setting is used with long runs.

Multi-Zone System

If you are dealing with multi-zones it will be necessary to break the electric current flow to specific zones.

1. Make sure unit is unplugged and switch is in the OFF position and cables are completely uncoiled.
2. Place the pipe clamps several feet apart.
- ⚠ WARNING** Making pipe connections before plugging in unit prevents arcing between clamp and pipe.
3. Maintain a minimum of 15 feet between clamps when using the KT-190, 4 feet for KT-200, to prevent excessive amp draw.
4. Plug unit into a grounded 15 amp outlet making sure to position the power cord along the clear path selected earlier.
5. Move switch to ON (Up position on KT-190. Center switch to low and left switch down to A on KT-200.) If current draw is below 15 amps, select switch B, C, or D to maximize amp draw and reduce thaw time. (Do not exceed 15 amps)

NOTE! If the heat is not restored to piping in 10 minutes, change the location of the clamps to heat a different section of the system. If the above steps have been tried without success, the entire zone is frozen and will need to be thawed by following the Isolating Multi-Zone Steps.

Isolating Multi-Zone Systems

1. Break and cap pipe at point B. This prevents current flow through the second zone and allows for 100% of the current to be used in Zone #1. Do not let pipe ends contact one another.
2. Break the pipe at Point A and place pipe clamps as shown in *Figure 7*. This forces the current to flow through Zone #1. Use a container to collect the water.
3. Once Zone #1 is thawed, turn the unit and circulating pump OFF. If Zone #2 is frozen, cap the pipe at Point A. Remove the cap from Point B and place a container at Point B to collect the water.
4. Place the clamps of the opposites sides of the break at Point B. Once Zone #2 is thawed, turn circulating pump and thawing unit OFF.
5. Reconnect all pipes and check both Zone #1 and #2 for heat.

Special Applications Procedure

Increasing Thawing Capacity on KT-200 Only

⚠ WARNING Failure to follow the procedures below for parallel and series operation of the thawing units can result in electrical shock or damage to the equipment.

Series Operation

Units arranged in series work best for long pipe lengths.

1. Position units near the frozen section of pipe and next to one another such that cable lugs are toward pipe.
2. Make sure the units are unplugged and center switch is in the OFF position.

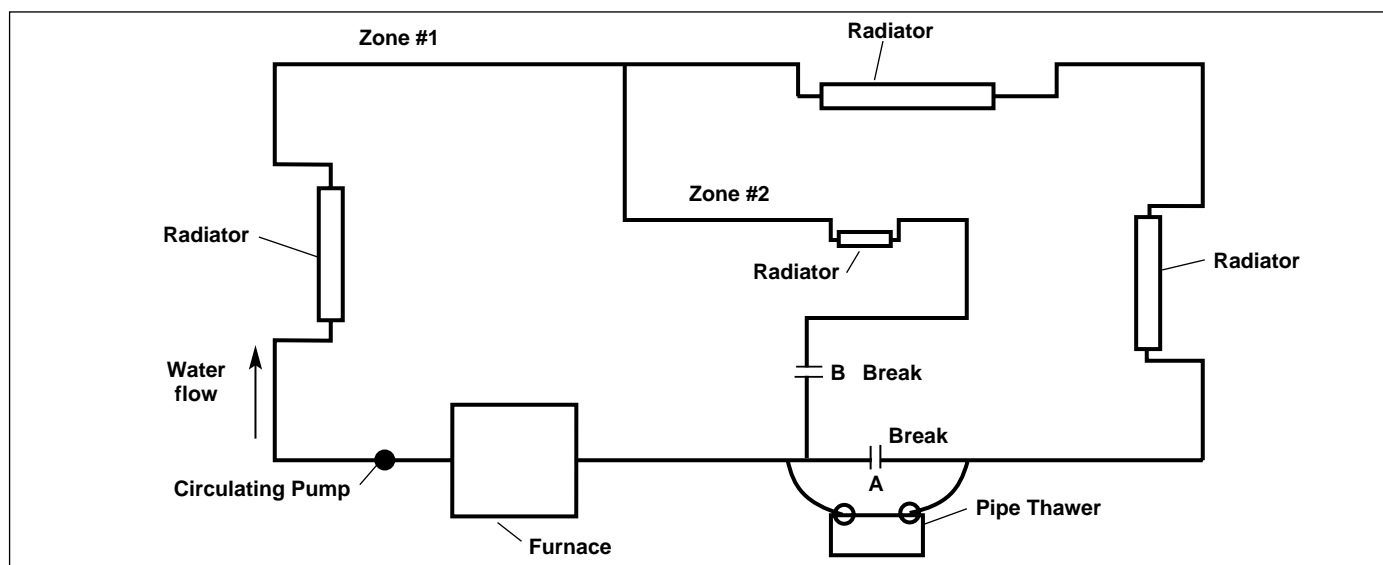


Figure 7 – Multi Zoned System

3. Connect one end of the pigtail (Ridge Catalog #62812) on the right lug of the left unit, and the other end on the left lug of the right unit.
4. Attach pipe thawing leads to remaining lugs.
5. Place one clamp on either side of the frozen section of pipe.

⚠ WARNING Making pipe connections before plugging in unit prevents arcing between clamps and pipe.

6. Plug the units into outlets that are NOT on the same circuit. (Protected by separate fuses).

⚠ WARNING Both thawing units must be plugged into electrical outlets before switching unit ON. Failure to follow the procedure can result in electrical shock.

7. With two units connected in series, seven power settings are available with the KT-200 by using the switches on both units. The combinations are AA, AB, BB, BC, CC, CD, DD.

NOTE! A circuit will not be completed until the switch of both units is in the ON position.

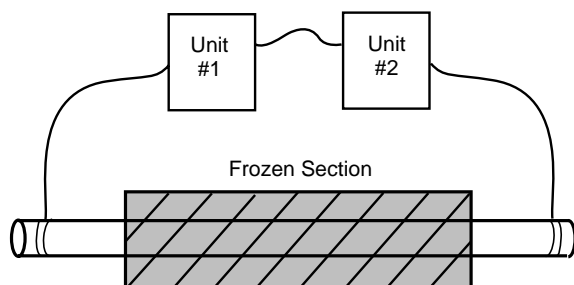


Figure 8 – Series Set-Up

Parallel Operation

Units arranged in parallel work best for larger pipes diameters.

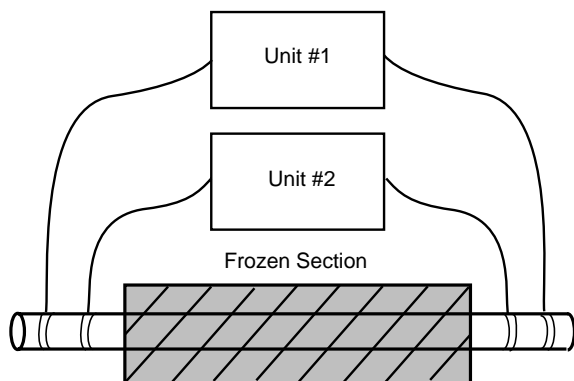


Figure 9 – Parallel Set-Up

1. Position units near frozen section of pipe.

2. Make sure units are unplugged and switches are in the OFF position and cables are completely uncoiled.
3. Attach cables and clamps to lugs.
4. Place clamps on either side of the frozen section of pipe.

⚠ WARNING Making pipe connections before plugging in unit prevents arcing between clamp and pipe.

5. Plug units into outlets that are NOT on the same circuit. (protected by different fuses).

⚠ WARNING Both thawing units must be plugged into electrical outlets before switching unit ON. Failure to follow the procedure can result in electrical shock.

6. The power settings available are AA, BB, CC, and DD with the KT-200.

NOTE! With both units on the same setting both KT-200 amp. meters should read approximately the same. If this does not occur, turn both units OFF and exchange the cables on one unit. The correct polarity is achieved by the cable hook-up that produces the lowest amp. meter reading.

IMPORTANT: Failure to follow above set-up will result in most current flowing through the adjacent clamps and not the pipe.

Maintenance Instructions

⚠ WARNING

Make sure unit is unplugged from power source before performing maintenance or repairs.

Tool Maintenance

1. Replace damaged, frayed, broken or worn cables.
2. Periodically clean lugs with steel wool and emery cloth.
3. Replace damaged, frayed, broken or worn cords.
4. Keep clamps dry and clean.

Tool Storage

⚠ WARNING Electrical equipment must be kept indoors or well covered in rainy weather. Store the tool in a locked area that is out of reach of children and people unfamiliar with Pipe Thawing tools. This tool can cause serious injury in the hands of untrained users.

Service and Repair

⚠ WARNING



Service and repair work on this tool must be performed by qualified repair personnel. Thawing unit should be taken to a RIDGID Independent Authorized Service Center or returned to the factory. All repairs made by Ridge service facilities are warranted against defects in material and workmanship.

When servicing this tool, only identical replacement parts should be used. Failure to follow these instructions may create a risk of electrical shock or other serious injury.

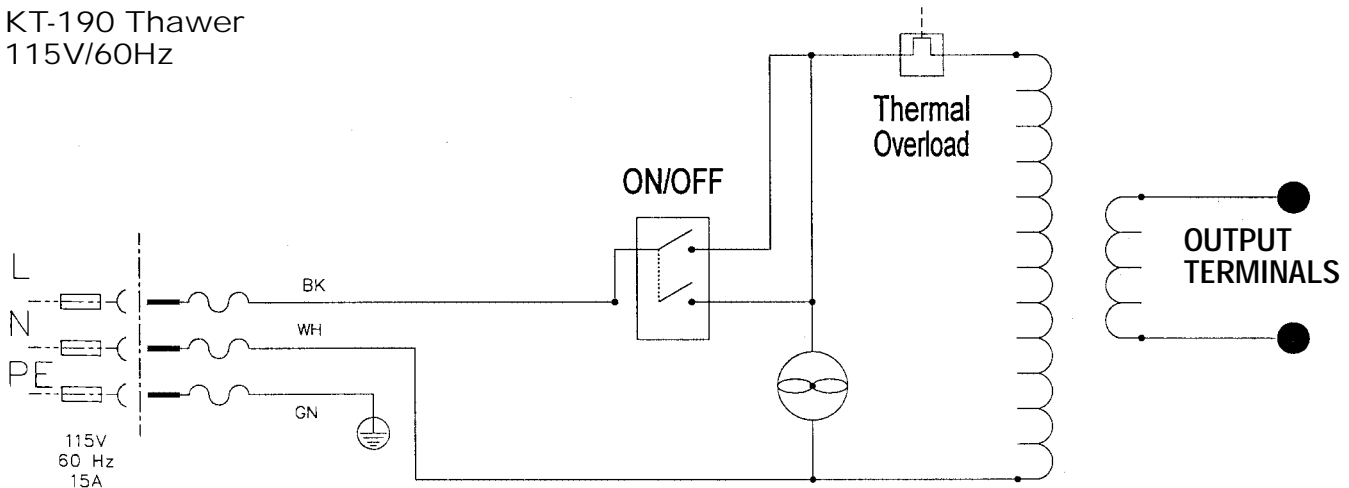
If you have any questions regarding the service or repair of this machine, call or write to:

Ridge Tool Company
 Technical Service Department
 400 Clark Street
 Elyria, Ohio 44035-6001
 Tel: (800) 519-3456
 E-mail: TechServices@ridgid.com

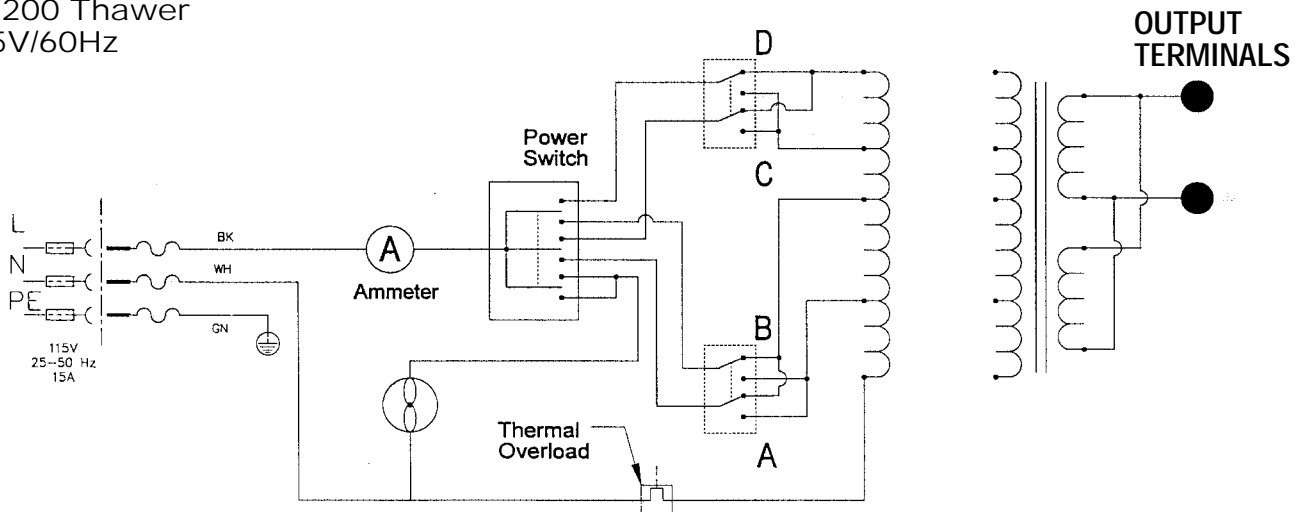
For name and address of your nearest Independent Authorized Service Center, contact the Ridge Tool Company at (800) 519-3456 or <http://www.ridgid.com>

Electrical Schematics

KT-190 Thawer
 115V/60Hz



KT-200 Thawer
 115V/60Hz



Hot-Shot™

Operating Instructions

Model 400, 320, and 300
(For use with Copper and Iron Pipe)



Your Hot-Shot is designed to give you years of trouble-free, profitable service. However, no machine is better than its operator.

Read, understand and follow all safety warnings and instructions provided with the product. Failure to follow the warnings and instructions may result in electric shock and/or serious injury. Save all warnings and instructions for future reference.

SAVE THESE INSTRUCTIONS!

General

PIPE CLEANERS

GENERAL SAFETY RULES



WARNING
Read and understand operator's manual before using this machine. Failure to follow operating instructions could result in death or serious injury.

WARNING! Read and understand all instructions. Failure to follow all instructions listed below may result in electric shock, fire and/or serious personal injury. Replacement manuals are available upon request at no charge, or may be downloaded from our website, www.drainbrain.com. Instructional videos are available for download on our website, and may be ordered. If you have any questions or problems, please call General's customer service department at 412-771-6300.

SAVE THESE INSTRUCTIONS!

These instructions are intended to familiarize all personnel with the safe operation and maintenance procedures for the Hot-Shot.



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

DANGER

DANGER indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.

WARNING

WARNING indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.

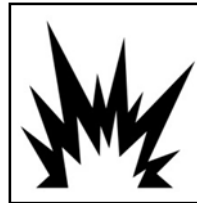
CAUTION

CAUTION indicates a hazard with a low level of risk which, if not avoided, will result in minor or moderate injury.

WARNING



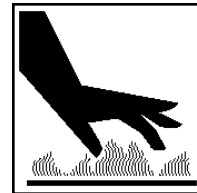
Electric shock resulting in death can occur if you plug this machine into an improperly wired outlet. If the ground wire is electrified, you can be electrocuted by just touching the machine, even when the power switch is off. A ground fault circuit interrupter will not protect you in this situation. Use a UL approved tester to determine if the outlet is safe.



Do not operate power tools in explosive atmospheres, such as in the presence of flammable liquids, gases, or dust. Power tools create sparks which may ignite the dust or fumes.



Always wear safety glasses and rubber soled, non-slip shoes. Use of this safety equipment may prevent serious injury.



Be very careful when thawing frozen pipes. Clamp tips and cable connections become hot during use. Avoid contact with skin as burns can result. Keep clamps away from combustible materials or articles that can be damaged by heat.

GENERAL SAFETY RULES

Work Area

1. **Keep work area clean and well lit.** Cluttered benches and dark areas invite accidents.
2. **Do not operate these tools in explosive atmospheres, such as in the presence of flammable liquids, gases, or dust.** Power tools create sparks which may ignite the dust or fumes.
3. **Keep bystanders, children, and visitors away while operating a power tool.** Distractions can cause you to lose control.

Electrical Safety

1. **Grounded tools must be plugged into an outlet, properly installed and grounded in accordance with all codes and ordinances. Never remove the grounding prong or modify the plug in any way. Do not use any adapter plugs. Check with a qualified electrician if you are in doubt as to whether the outlet is properly grounded.** If the tool should electrically malfunction or break down, grounding provides a low resistance path to carry electricity away from the user.
2. **Avoid body contact with grounded surfaces such as pipes, radiators, ranges and refrigerators.** There is an increased risk of electric shock if your body is grounded.
3. **Do not expose power tools to rain or wet conditions.** Water entering a power tool will increase the risk of electric shock.
4. **Do not abuse the cord. Never use the cord to carry the tools or pull the plug from an outlet. Keep cord away from heat, oil, sharp edges or moving parts. Replace damaged cords immediately.** Damaged cords increase the risk of electric shock.
5. **When operating a power tool outside use an outdoor extension cord marked "W-A" or "W".** These cords are rated for outdoor use and reduce the risk of electric shock.
6. **Use only three-wire extension cords which have three-prong grounding plugs, and three-pole receptacles which accept the tool's plug.** Use of other extension cords will not ground the tool and increases the risk of electrical shock.
7. **Use proper extension cords.** Insufficient conductor size will cause excessive voltage drop, loss of power, and overheating.
8. **Keep all electric connections dry and off the ground.** Reduces the risk of electric shock.
9. **Do not touch plugs or tools with wet hands.** Reduces the risk of electric shock.

Personal Safety

1. **Stay alert, watch what you are doing and use common sense when operating a tool. Do not use tool while tired or under the influence of drugs, alcohol, or medication.** A moment of inattention while operating power tools may result in serious personal injury.
2. **Dress properly. Do not wear loose clothing or jewelry. Contain long hair. Keep your hair, clothing, and gloves away from moving parts.** Loose clothes, jewelry, or long hair can be caught in moving parts.
3. **Avoid accidental starting. Be sure switch is off before plugging in.** Plugging in tools that have the switch on invites accidents.
4. **Do not overreach. Keep proper footing and balance at all times.** Proper footing and balance enables better control of the tool in unexpected situations.

5. **Always wear safety glasses and rubber soled, non-slip shoes.** Dust mask, non-skid safety shoes, hard hat, or hearing protection must be used for appropriate conditions.

Tool Use and Care

1. **Do not use tool if switch does not turn it on or off.** Any tool that cannot be controlled with the switch is dangerous and must be repaired.
2. **Disconnect the plug from the power source before making any adjustments, changing accessories, or storing the tool.** Such preventative safety measures reduce the risk of starting the tool accidentally.
3. **Store idle tools out of reach of children and other untrained persons.** Tools are dangerous in the hands of untrained users.
4. **Maintain tools with care.** Properly maintained tools are less likely to cause injury.
5. **Check for breakage of parts, and any other condition that may affect the tool's operation. If damaged, have the tool serviced before using.** Many accidents are caused by poorly maintained tools.
6. **Only use accessories that are recommended by the manufacturer for your model.** Accessories that may be suitable for one tool may become hazardous when used on another tool.
7. **Inspect tool and extension cords periodically and replace if damaged.** Damaged cords increase the risk of electrical shock.
8. **Keep handles dry and clean; free from oil and grease.** Allows for better control of the tool.

Service

1. **Tool service must be performed only by qualified repair personnel.** Service or maintenance performed by unqualified repair personnel could result in injury.
2. **When servicing a tool, use only identical replacement parts. Follow instructions in the Maintenance section of this manual.** Use of unauthorized parts or failure to follow Maintenance Instructions may create a risk of electric shock or injury.
3. **Disconnect all power from the unit before servicing.** Eliminates the risk of electrical shock and accidental starting.

SPECIFIC SAFETY RULES

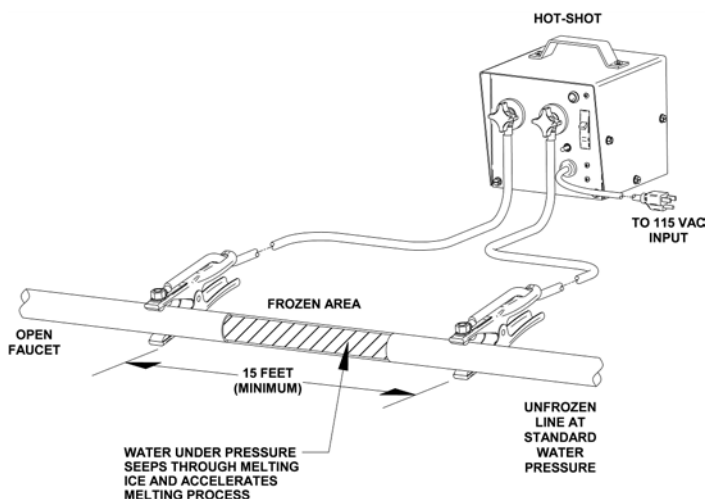
1. **Be sure that the unit is plugged into a properly grounded receptacle.** If in doubt, check receptacle before plugging in machine. Check the power cord to see that there are no cuts or frays, and that the grounding prong on the plug is still in place.
2. **The Hot-Shot 300 and 320 require a 120 volt AC grounded 15 amp circuit. The Hot-Shot 400 requires either a 15 amp 120 volt AC outlet when on the "low" setting, and a 20 amp outlet when on the "high" setting.** Using an inadequate power supply will cause the unit to underperform.
3. **If the power cord supplied with the machine is not long enough, be sure to use a 16 gauge heavy duty extension cord no more than 50 feet long and in good condition.** Using lighter cords can result in severe power loss and overheating.
4. **All grounds (i.e. electric service, telephone, and cable TV grounds) must be disconnected, both at the house being thawed and all houses on the same distribution transformer.** There is a possibility that the output current of the unit may be transferred into the electrical service, either at the house being thawed, or at a remote location.

5. **Do not leave unit unattended while thawing.** It is dangerous to leave any tool unattended during operation.
6. **Do not touch the clamp tips or cable connections.** Reduces the risk of burns.
7. **Do not operate machine if operator or machine is standing in water.** Will increase risk of electrical shock.
8. **Do not operate unit with the housing removed.** Exposure to internal parts may result in injury.
9. **Wear safety glasses and rubber soled, non-slip shoes.** Use of this safety equipment may prevent serious injury.
10. **Use cable and clamps provided with unit.** Incorrect cables may result in overheating of the wires.
11. **Keep clamps away from combustible materials or articles that can be damaged by heat.** Clamp tips become hot during use.
12. **Tool is made to thaw frozen iron or copper pipes. Follow the instructions on proper use.** Other uses or may increase risk of injury.

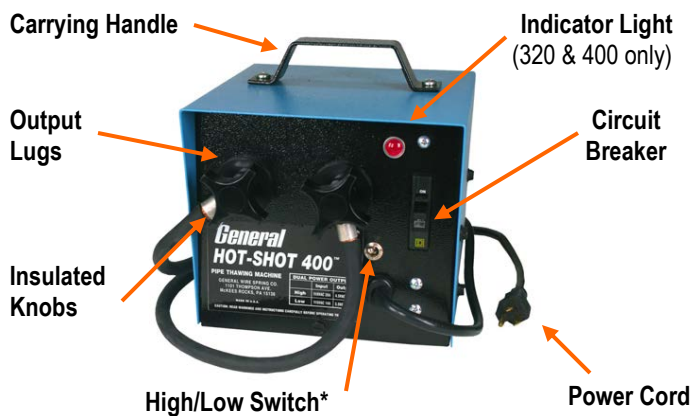
INTRODUCTION

A frozen water pipe can be thawed very quickly by passing low voltage high current electricity through the frozen pipe. **Plastic pipe will not conduct electricity so this method will not work on plastic pipe.** There must be unfrozen water under standard water pressure on one side of the frozen part of the pipe, and an open faucet on the other.

When thawing a frozen section of water pipe, heat the pipe only enough to melt a thin film of ice in the inside of the pipe. **A faucet must be opened** in the unfrozen part of the line down stream from the frozen section. The warmer water above the ice will seep through the melted film and very quickly melt the rest of the ice. The water will start to flow in about 10 minutes if the connections are properly made. Since copper pipe will not heat as fast as steel pipe, allow about a 30 percent longer thawing time. (See chart on page 7.)



FEATURES



*High/Low Switch is only on the Hot-Shot 400.

- The Hot-Shot 300 puts out 300 amps, yet pulls only 10 amps. It can clear 1/2" to 1-1/2" pipes up to 100 ft. long.
- The Hot-Shot 320 puts out 320 amps, yet pulls only 13 amps. It can clear 1/2" to 1-1/2" pipes up to 100 ft. long.
- The Hot-Shot 400 can clear 1/2" to 1-1/2" pipes up to 175 ft. long.
- The Hot-Shot 400 features a "High/Low" switch to allow the unit to be used on either a 15 amp or a 20 amp outlet. When the High/Low switch is in the **Low** position, the unit will draw 14 amps and supply 320 amps of thawing power. When in the **High** position, it will draw up to 20 amps and supply 400 amps of thawing power.
- Both units have a built-in thermal protector. If the internal temperature reaches a critical level, the Hot-Shot will automatically shut down.

SPECIFICATIONS

	CHS-300	HS-320	HS-400
Input Voltage	120v	120v	120v
Phase	Single	Single	Single
Frequency	50/60 Hz	50/60 Hz	50/60 Hz
Input Current	10 amp	13 amp	14 amp Low 20 amp High
Circuit Breaker	15 amp	20 amp	20 amp
Output Voltage	4 volt	3.5 volt	3.5 volt Low 4.3 volt High
Output Current	300 amp	320 amp	320 amp Low 400 amp High
Thawing Capacity	1/2" - 1-1/2" x 100 ft. Max.	1/2" - 1-1/2" x 100 ft. Max	1/2" - 1-1/2" x 175 ft. Max
Recommended Cables*	2 - 20 ft. #1 AWG	2 - 20 ft. #2 AWG 2 - 50 ft. #2/0 AWG	2 - 20 ft. #1 AWG 2 - 50 ft. #2/0 AWG
Height	12"	8"	8"
Width	12"	8"	8"
Depth	12"	8"	8"
Weight	60 lbs.	31 lbs.	31 lbs.

*Note: Longer cables must also be larger in AWG size.

ACCESSORIES

CAT. #	DESCRIPTION	WT.
20-2	20 Ft. #2 Cable w/Pipe Clamp & Lug	6 LBS.
50-2	50 Ft. #2 Cable w/Pipe Clamp & Lug	16 LBS.
20-1	20 Ft. #1 Cable w/Pipe Clamp & Lug	8 LBS.
20-2/0	20 Ft. #2/0 Cable w/Pipe Clamp & Lug	13 LBS.
50-2/0	50 Ft. #2/0 Cable w/Pipe Clamp & Lug	30 LBS.
100-2/0	100 Ft. #2/0 Cable w/Pipe Clamp & Lug	50 LBS.
50-4/0	50 Ft. #4/0 Cable w/Pipe Clamp & Lug	50 LBS.
100-4/0	100 Ft. #4/0 Cable w/Pipe Clamp & Lug	96 LBS.

OPERATION

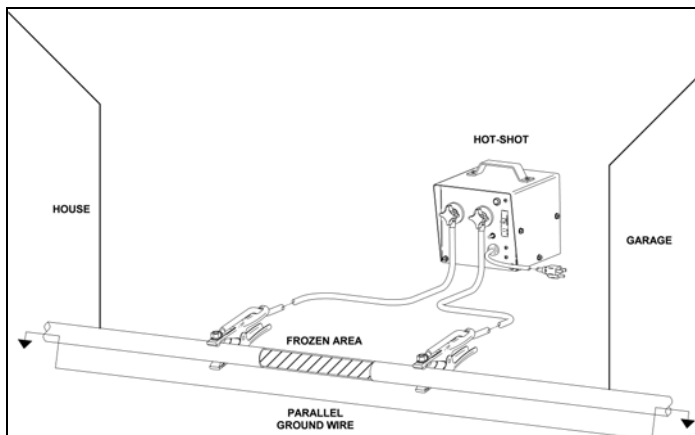


MAKE SURE MACHINE IS DISCONNECTED FROM POWER SOURCE BEFORE CONNECTING CABLES!

1. Isolate the frozen section of pipe. Inside a house, this is done by opening faucets and back tracking the pipes. The frozen section will usually be in the outside walls, near doors, windows, and in crawl spaces under floors. If all the water outlets in the house fail to operate, the line from the curb valve to the house is frozen.
2. House service pipes usually have to be thawed by connecting one cable to the exposed pipe in the kitchen or basement, and the other cable to the curb service. At the curb, make the connection to the valve at the bottom of the service riser, using the curb key. Do not connect the cable to the adjustable ground level cover, as it is a poor connection to the valve.
3. Connect the cables on either side of the frozen section so that they complete an electric circuit. The cable clamps must be at least 15 ft. apart. Keep clamps away from combustible materials or articles that can be damaged by heat. Cables and clamp tips become hot during use.



CLAMPS AND CABLES GET HOT! KEEP CABLES CLEAR OF COMBUSTIBLE MATERIALS OR ARTICLES THAT CAN BE DAMAGED BY HEAT.



All grounds (i.e. electric service, telephone, and cable TV grounds) must be disconnected, both at the house being thawed and all houses on the same distribution transformer. There is a possibility that the output current of the unit may be transferred into the electrical service, either at the house being thawed, or at a remote location.

4. Good connections are required. **Clean all pipes before connecting the cables.** Remove all material touching or near the pipe, including insulation, pipe heating tape, etc. Make both pipe connections before plugging unit into receptacle. Ensure all connections are tight to prevent arcing at the clamps. Loose connections also get hot and reduce current flow.



REMOVE ALL MATERIAL TOUCHING OR NEAR PIPE, INCLUDING INSULATION, PIPE HEATING TAPE, ETC. BEFORE TURNING ON MACHINE AS THEY CAN BECOME A FIRE HAZARD!

Note: Uncoil the cables. Do not leave any cable coiled up or placed on steel objects or the heating in the pipe will be reduced.

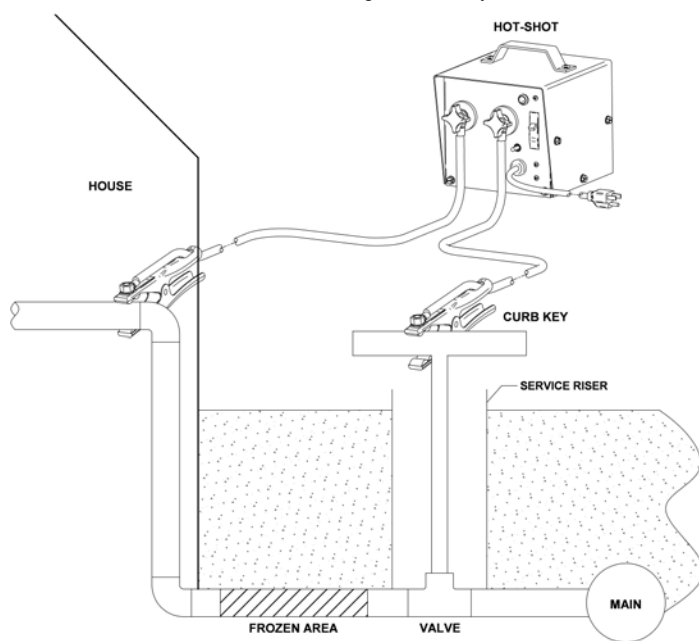
5. If a good connection is made, the pipe and cables will vibrate with a 60 cycle hum that you can feel with your hand. After all connections are made and the unit is plugged in, switch the circuit breaker on.
6. Monitor the equipment during pipe thawing operation. Use standard AC clamp-on Amprobe meter to check heating current. Current should be between 200 and 400 amps. If the current is less than 200 amps, a second Hot-Shot can be used to increase current. (See Thawing Pipes with two Hot-Shots.)



MONITOR THE PIPE TEMPERATURE. SMALL, EMPTY PIPES WILL GET HOTTER BEFORE A LARGER PIPE WILL THAW, AND COULD MELT THE SOLDER IN THE COPPER FEEDER LINE.

THAWING A HOUSE SERVICE PIPE

1. Connect one cable to the exposed pipe in the kitchen or basement.
2. Connect the other cable to the curb service at the valve at the bottom of the service riser using a Curb Key.



Note: Make sure the Curb Key is clean and makes a tight connection to the pipe, otherwise the only result will be to heat the Curb Key.

SPECIAL OPERATIONS

THAWING HOT WATER HEATING SYSTEMS

(Winter/Summer Hook up)

The Hot-Shot is intended for use on a direct pipeline with an unfrozen high pressure area upstream of the blockage and an open faucet downstream. **USE OF THIS SYSTEM ON A HOT WATER HEATING SYSTEM MAY BE INEFFECTIVE.**

NOTE: Hot water heating systems use low pressure pumps. More heat will be required before the warm water can seep past the ice and continue the thawing process.

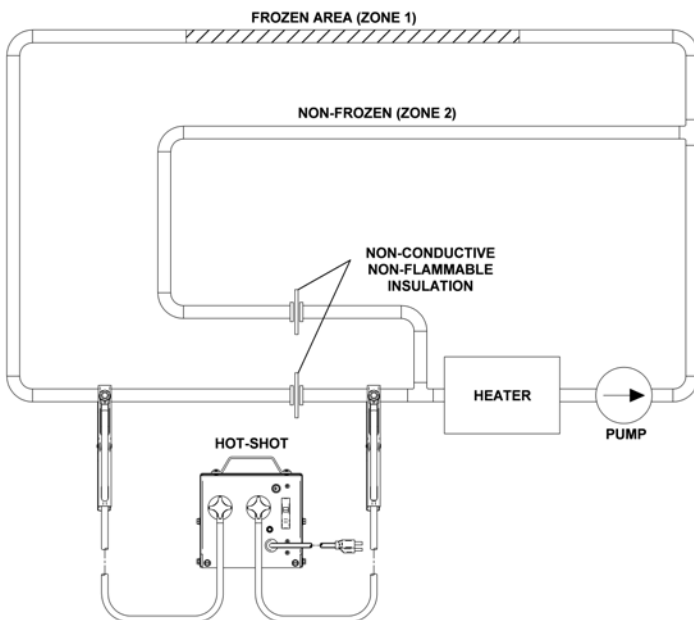
NOTE: Heat developed in the frozen section may only be 1/3 to 1/2 of the heat produced by the Hot-Shot and may not be sufficient to thaw the pipe. The current in the frozen section is reduced as the pipes in the hot water heating system are interconnected and offer alternative electrical paths, reducing the concentrated effect of the Hot-Shot.

NOTE: Systems using cast iron radiators, large iron pipes, and gravity circulation can not be thawed using the Hot-Shot.



MAKE SURE MACHINE IS DISCONNECTED FROM POWER SOURCE BEFORE CONNECTING CABLES!

1. Separate and cap all unfrozen zones.
2. Separate frozen zone of the system.
3. Put a non-conductive, non-flammable insulator between pipe ends.
4. Turn on heater, pump, and Hot-Shot (connected as shown below).
5. Collect thawing water in a container.
6. When thawed, shut of Hot-Shot, heater, and system pump.
7. Quickly reconnect all pipes.
8. Check heat in all zones.

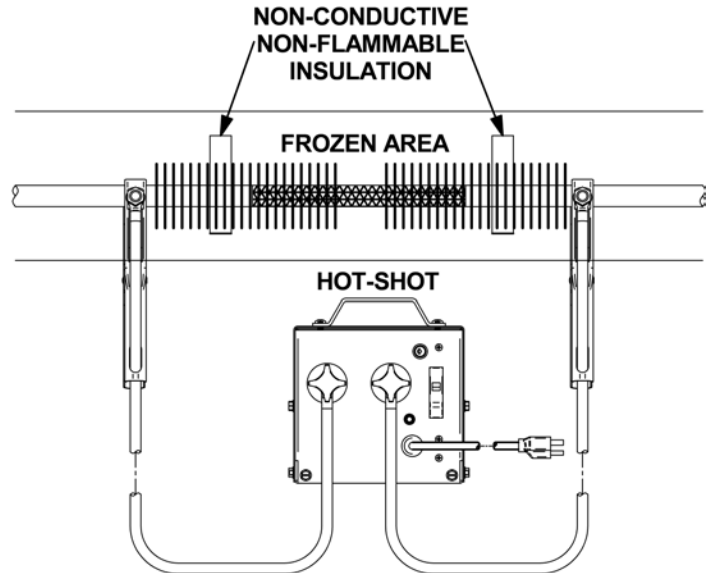


THAWING COPPER BASEBOARD SYSTEMS



MAKE SURE MACHINE IS DISCONNECTED FROM POWER SOURCE BEFORE CONNECTING CABLES!

1. Lift or remove any sheet metal pipe covers so that they are not touching the pipe.
2. Make sure the copper pipe is separated from any metal hangers or supports by a non-conductive, non-flammable insulator.
3. Attach the Hot-Shot clamps directly to the copper pipe (see figure below).



PREVENT REFREEZING OF PIPES

A pipe will freeze when it cools below 32 degrees F. Take the following steps to prevent freezing:

1. Insulate all cracks and openings.
2. Wrap pipes with thermostatically controlled heating tape.
3. Let water trickle through the pipe on cold nights. A flow of one gallon per hour is enough to prevent freezing.

THAWING PIPES WITH TWO HOT-SHOTS

Whenever using the Hot-Shot it is important to monitor the equipment during the thawing operation. Use a standard AC clamp on Amprobe meter to check the heating current. Current should be between 200 and 400 amps. If the current is less than 200 amps, a second Hot-Shot can be used to increase the current.

Note: The second Hot-Shot will require a second 20 amp 120 volt AC power supply. (The Hot-Shot 300 requires a 15 amp 120 volt AC power supply.)

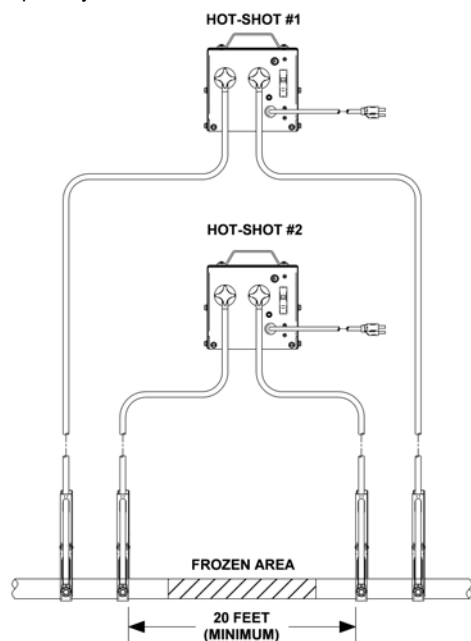
MAKE SURE THAT THE POLARITY OF THE SECOND UNIT IS CORRECT AND HAS BEEN TESTED PRIOR TO USE.



REMOVE ALL FLAMMABLE MATERIALS, GASES, ETC. FROM THE IMMEDIATE AREA. WEAR HEAVY GLOVES AND EYE PROTECTION.

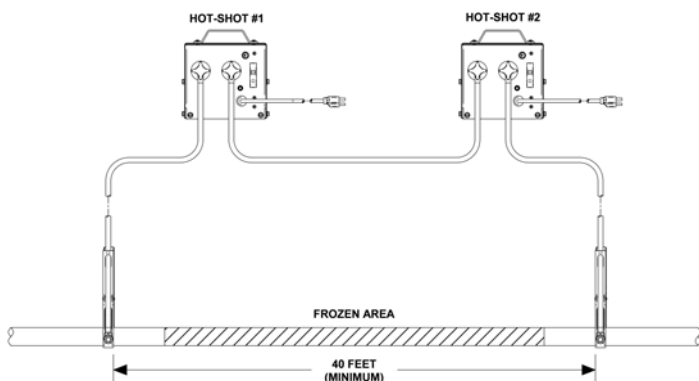
SET-UP #1 (PARALLEL) - BEST FOR LARGE DIAMETER PIPES

1. Make the two pipe connections on one side of the pipe, and plug in both units.
2. Touch the other two clamps together for an instant. Observe the amount of spark.
 - A. None or weak spark - Polarity is correct.
 - B. Strong spark - Polarity is incorrect. To correct the polarity: Turn over one of the 115v plugs, **OR** interchange the cable leads on one of the Hot-Shot units.
3. Repeat the test until no spark is seen.
4. When polarity is determined to be correct, attach the clamps.



SET-UP #2 (SERIES) - BEST FOR LONG LENGTHS OF PIPE

1. Make all connections EXCEPT leave the clamp on one end of the pipe free.
2. Touch the free clamp to the pipe for an instant. Observe the amount of spark.
 - A. Strong spark - Polarity is correct.
 - B. None or weak spark - Polarity is incorrect. To correct the polarity: Turn over one of the 115v plugs, **OR** interchange the cable leads on one of the Hot-Shot units.
4. Repeat the test until no spark is seen.
5. When polarity is determined to be correct, attach the clamps.



NOTE: Two correctly connected Hot-Shots will double the thawing action. If more heat is required, a larger Hot-Shot unit and qualified operator must be used.

THAWING TIMES

The times in the charts below are approximate and under ideal conditions. Actual times will vary depending upon type of pipe, diameter, gauge, and length of cable, etc.

Note: Copper pipe will not heat up as fast as iron pipe, so allow about a 30 percent longer thawing time.

Note: Longer cables must also be a larger gauge. If smaller diameter cables are used, current will be reduced.

300 & 320 AMP OUTPUT

Pipe Length (in feet)	Thawing Time (in minutes)	
	Iron Pipe	Copper Pipe
20	9	12
40	12	16
50	14	19
60	17	23
80	24	32
100	30	40

Note: Pipe thawing times can vary significantly.

400 AMP OUTPUT

Pipe Length (in feet)	Thawing Time (in minutes)	
	Iron Pipe	Copper Pipe
20	8	11
40	10	13
50	12	17
60	15	20
80	20	27
100	25	33

Note: Pipe thawing times can vary significantly.

MAINTENANCE



DISCONNECT MACHINE FROM POWER SOURCE BEFORE PERFORMING MAINTENANCE ON MACHINE!

1. Replace damaged, frayed, or worn cables.
2. Periodically clean terminal blocks, lugs, and clamps with steel wool and emery cloth.
3. Replace damaged, frayed, or worn power cord.
4. Store Hot-Shot indoors, in a dry location.

DO'S AND DON'TS

- **DO** - make sure there is water pressure at one side of the frozen section.
- **DO** - open faucets so moving water can help thaw the pipes.
- **DO** - disconnect all electrical grounds attached to the thawing area.
- **DO** - disconnect other appliances while using the Hot-Shot.
- **DO** - use only heavy-duty extension cords.
- **DO** - unwind the cables.
- **DO** - use short cables.
- **DO** - clean the pipe to ensure a good connection.
- **DO** - connect clamps to the pipe on either side of the frozen section.
- **DO** - attach the clamps to the pipe correctly.
- **DO** - make all connections to the pipe BEFORE plugging in the Hot-Shot.
- **DO** - watch for overheating and possible fires.
- **DO** - prevent refreezing.
- **DO NOT** - leave cables wound up.
- **DO NOT** - make quick connections to a dirty pipe.
- **DO NOT** - move the clamps while an electrical current is flowing.
- **DO NOT** - leave the Hot-Shot unattended.
- **DO NOT** - leave the Hot-Shot switched to the "ON" position overnight.

TROUBLESHOOTING GUIDE

Problem	Cause	Solution
Cables stay cold; pipe does not thaw.	No power	Plug unit into 120 volt, 20 amp AC outlet. (CHS-300 requires a 120 volt, 15 amp AC outlet.)
		Reset breaker on unit.
		Check if thermal protector has tripped.
	Poor connection to pipe	Clean pipes and clamps to ensure a good connection.
	Circuit not complete	Check to make sure both clamps are on the same pipe.
		Check to make sure there is no plastic pipe in the line.
		Check for a rubber coupling in the line.
		Check to see if ice has pushed pipe connections apart.
Cables get warm; pipe does not thaw.	Poor connection to pipe.	Clean pipes and clamps to ensure a good connection.
		Check to make sure clamp is on pipe, not curb cover.
	Undersize cables	Use shortest cables possible. Longer length cables must be heavier gauge wire.
	Long or undersize extension cord used.	Use either no extension cord or appropriate heavy duty cord.
Cables get hot; pipe does not thaw.	No water pressure in pipe.	There must be water pressure to thaw the ice. Open a faucet so the water can flow as it melts.
		Check to see if the source of water pressure is not frozen.
		Check to see if the source water pump is operating.
	Clamps improperly placed	Check to make sure the clamps cover the frozen area.
	Circuit bypassing through another pipe.	Check to make sure the circuit does not go more than one way from clamp to clamp.
	Cables coiled together	Stretch out cables. Do not operate with cables coiled.

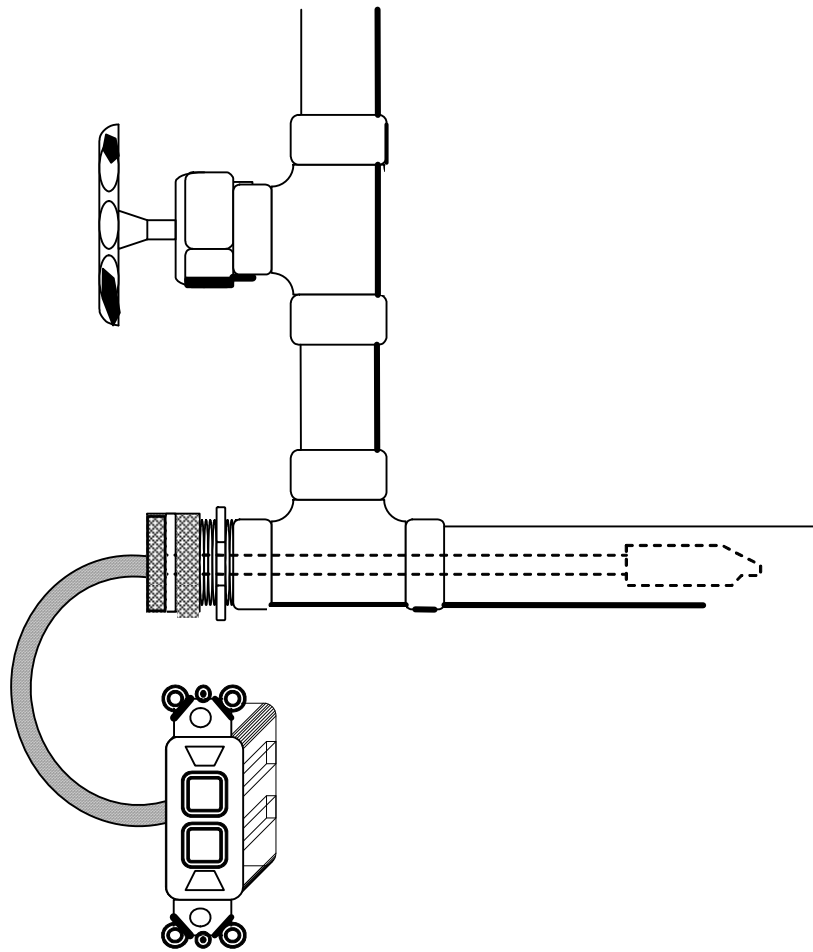
General Wire Spring Co,
1101 Thompson Avenue
McKees Rocks, PA 15136

412-771-6300 www.drainbrain.com

ARCTIC TRACE®

TL Series

***Installation Information
Operation and Maintenance***



Submersible Heat Trace Freeze Protection System

du ***Alaska Incorporated***

Product Information Introduction

As plastic began to emerge as a suitable material to carry water and wastewater, it was discovered that the freeze protection of pipes and vessels could not be done easily using traditional heat cable placed on the pipe or vessel surface. du Alaska decided that if the heat cable itself could be placed inside the pipe in contact with the liquid there would be many advantages.

du Alaska began to introduce heat cables to be used inside pipes or vessels for freeze protection. These cables incorporated a Tefzel jackets, which is a suitable waterproof food grade material. The product was further enhanced with the introduction of parallel resistance heaters, made from power limiting resistance wire. The heat cable was now able to limit its temperature and was suitable for inside the pipe application. Testing confirmed that this new combination of materials offered superior product performance in the area of heat transfer with small or non-existent heat cable in-rush during cold starting. The new materials also extended cable life outlasting other cables 3 to 1 and added greater abrasion resistant quality for all commercial and industrial applications.

The Arctic Trace heat cable system was additionally improved with the introduction of our exclusive heat fused waterproof end cap and butt splice which stopped water infiltration into the cable allowing the heat trace to be placed in pressurized waterlines. The Arctic Trace product in its present form has been used for over 20 years successfully for waterline freeze protection, deep well heat tracing, harbors, agriculture, watering points, roof drains, snow melting systems, sewer outfall lines, food product, and pharmaceutical.

Additional cost savings of Arctic Pipe fabrication is also realized, because no special channel or modified insulation area needs to be added when Arctic Trace heat trace is placed directly inside the pipe in contact with the system water. Retrofit or the replacement of failed heat trace in buried insulated lines now becomes simple and tremendous cost savings are achieved when excavation is not required for replacement of existing heating cables.

Our design also offers cut-to-length cable and completely waterproof field components used in deep well tracing, water tanks, or other applications.

CAUTION

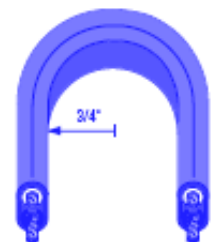
This product must only be installed by qualified personnel, who fully understands electrical equipment placement, and must never under any circumstance be placed in service without the use of an adequate ground fault circuit interrupter to protect personnel from shock or injury.

After this equipment has been placed in service, it must be tested to ensure all wiring and safety devices are working.

All National, State, and Local Electrical Codes must be followed.

Canada - Internal heating of plastic pipes and vessels need to be installed in accordance with the Canadian Electrical Code Part I (CEC Part I) section 62-312 (2)

- **De-energize all power circuits before installation or servicing.**
- **Keep ends of heating devices and bit components dry before and during installation.**
- **-40F Minimum installation temperature.**
- **The conductive covering (or metal sheath or metal braid) of this heating device must be connected to a suitable grounding/earthing terminal.**
- **The presence of the heating devices shall be made evident by the posting of caution signs or markings at appropriate locations and/or at frequent intervals along the circuit.**
- **Bond the metallic braid, metallic or sheath or conductive covering of the heating device to a suitable earth terminal.**
- **Maximum heating cable length to be 1000 feet not to exceed 25 amp for any single circuit.**
- **3/4" Minimum bending radius.**

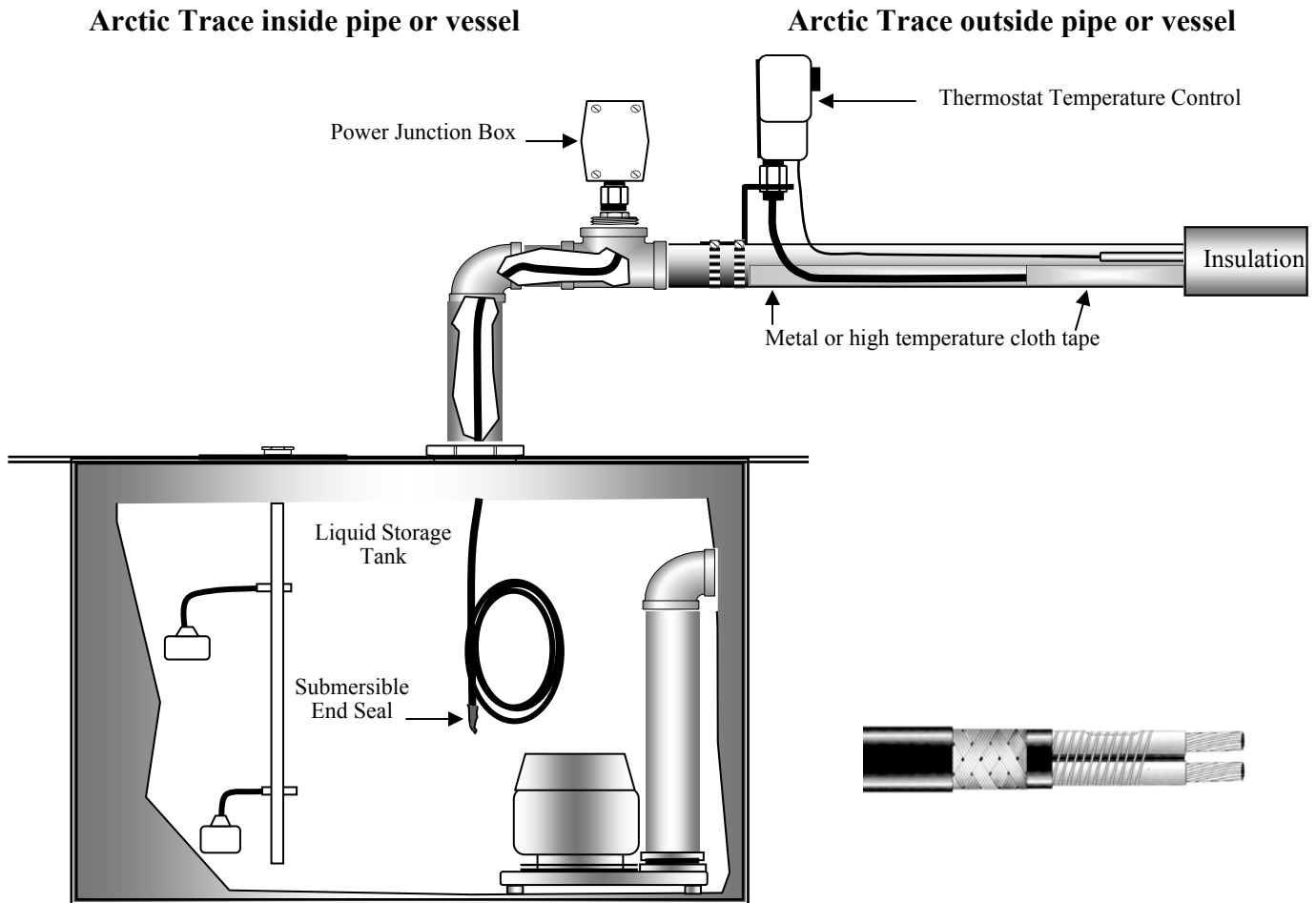


If this product is not installed properly, fire, death, or injury may result.

Important: All information, including illustrations, is believed to be reliable. Users, however, should independently evaluate the suitability of each product for their application. Arctic Trace makes no warranties as to the accuracy of completeness of the information, and disclaims any liability regarding its use. Arctic Trace only obligations are those in the Arctic Trace Standard Terms and Conditions of Sales for this product, and in no case will Arctic Trace or its distributors be liable for any incidental, indirect, or consequential damages arising from the sale, resale, use or misuse of the product. Specifications are subject to change without notice. In addition, Arctic Trace reserves the right to make changes—without notification to Buyer—to processing or materials that do not affect compliance with any applicable specification.

ARCTIC TRACE[®]

Typical Equipment Layout for Industrial Heating Cable in Ordinary Location



- A. Heat trace applications for long or short runs of buried or insulated liquid filled plastic or metal pipe, drains, watering points, or sewer and water outfall with minimum valve closure, we would suggest the use of TL Tefzel coated submersible cable inside the pipe.
- B. Runs of piping with numerous valve connection pumping equipment of less than 700' create a challenge for the heat trace installation, for those applications we suggest the use of type TL Temperature Limiting applied to the equipment or pipe surface.
- C. High temperature steam cleaning, sanitary, special O.E.M., or factory assembled heaters as specified with fitting and accessories we may suggest the use of TL or CW depending on the application. Consult Factory.

INSTALLATION INFORMATION

This information will provide a general overview of the procedures involved in the installation of The Arctic Trace heat cable systems.

• Inspection

Check all material received to insure that the proper voltage, AMP output, and the cable jacket are suitable for your application.

DO NOT install heat cable that shows any type of damage.

CAUTION:

DO NOT connect power to the heating cable while it is on a reel or in the shipping carton.

Installation Inside the Pipe

After Arctic Trace heat cable has been cut to length attach the waterproof end cap #305C as listed in these instructions and then test the cable per instructions.

Pull heat cable through pipe to be heat traced as you would any other electrical wire. Care should be taken to assure heat cable is not damaged by abrasions in the line. Do not place heat cable in any unsafe way such as valve closures, or any mechanical device that may cut or damage the cable.

Exit pipe from a 1/2" FNPT fitting (supplied by others) through 1/2" MNPT Pressure connector / strain relief #206C, as listed in these instructions. Run heat cable to a NEMA 4X junction box using #206C strain relief.

OR connect a pigtail or suitable flexible power cord as specified by the Project Engineers.

Power Connection

Before considering a connection to a voltage source, the circuit fabrication instruction for the specific cable type should have been carefully followed. Power connection, GFCI and pilot lights kits are available for various cable and should not be substituted, unless they conform to National, State, and Local Electrical Codes.

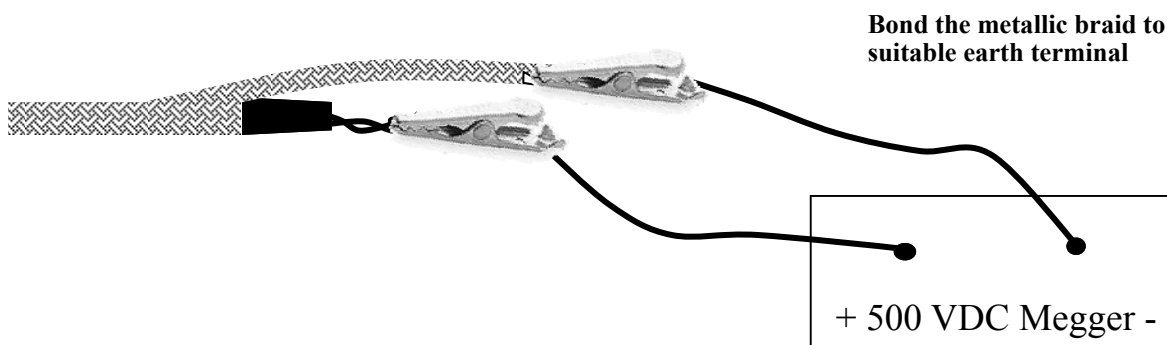
Before removing the cable from the reel, perform a dielectric resistance test with a 500 VDC meg-ohm meter (Megger) between the bus wires and ground. The minimum resistance reading should be 20 meg-ohms. Be sure all piping and equipment to be traced is completely installed and pressure tested. Equipment surfaces should be reasonably clean. Any loose scale, oil or rust should be removed.

Over-current protection device needs to be sized at 20% greater than the load.

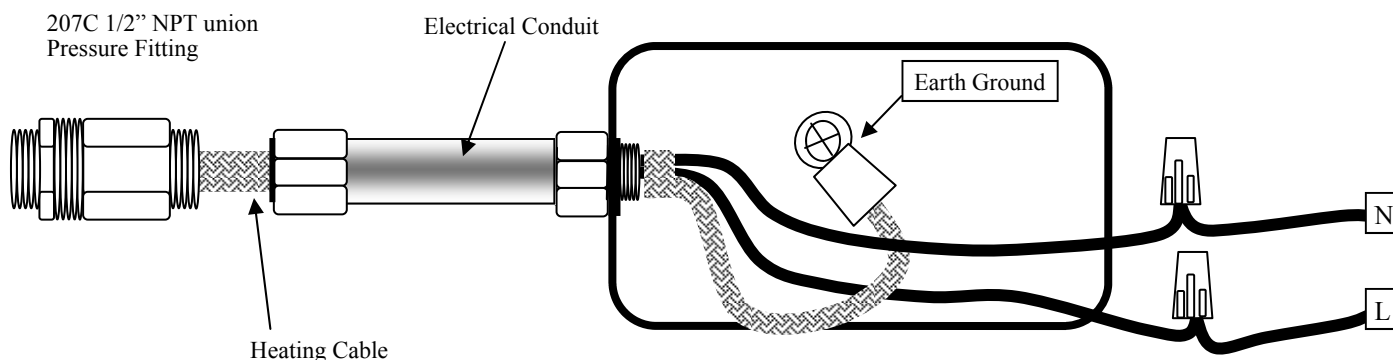
Heat cable must only be installed by a qualified electrician and all National, State, and Local Electrical Codes need to be followed.

Connect power with a suitable GFCI as required by National Electric Code.

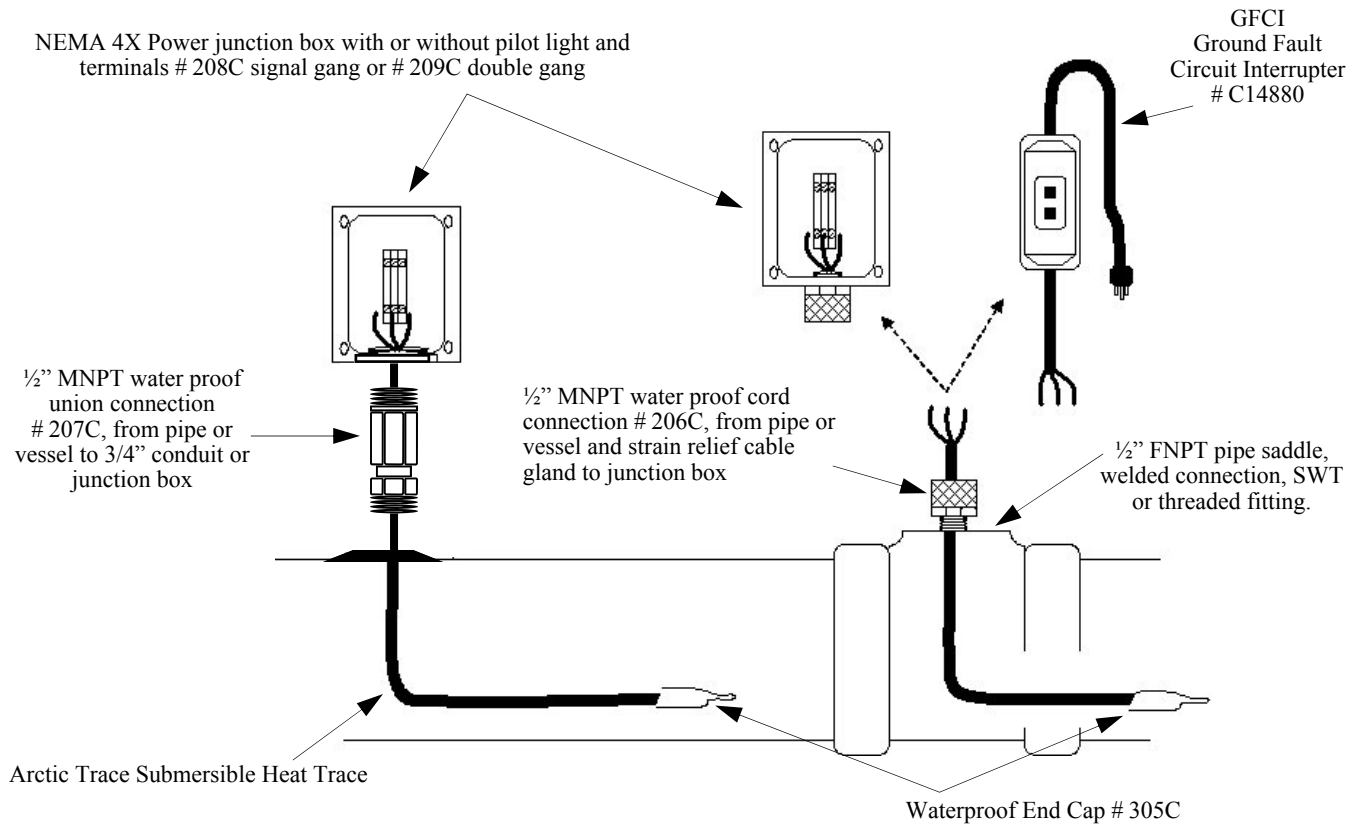
Dielectric Resistance Test



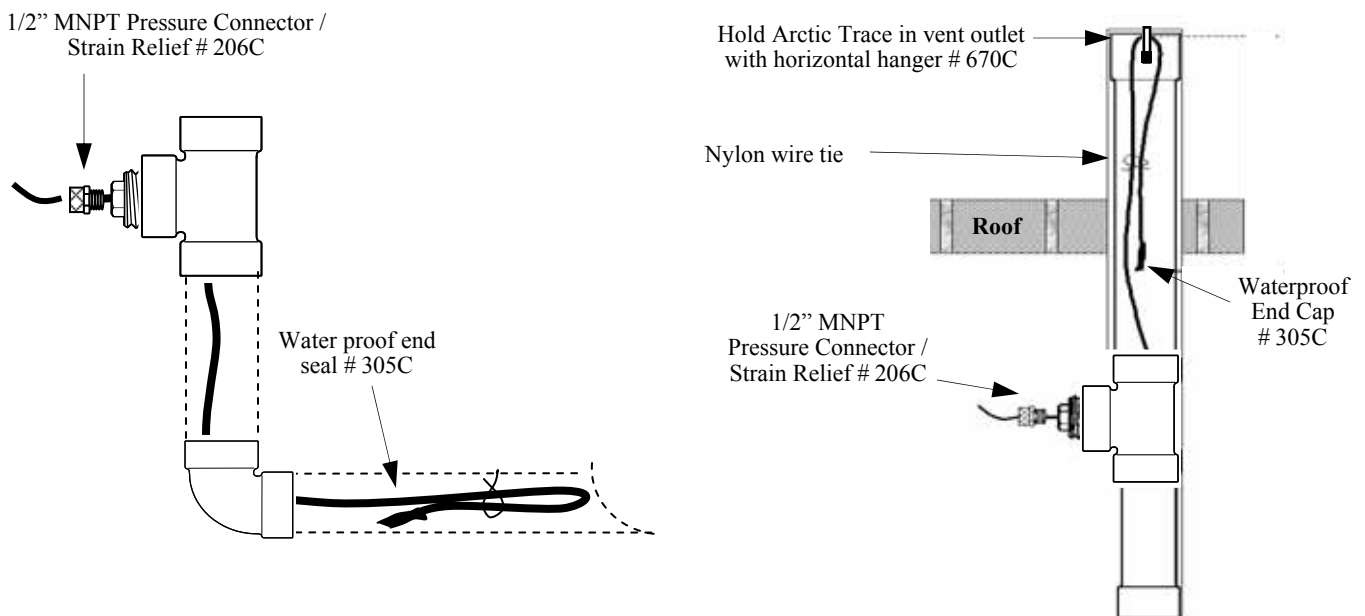
Power Connection



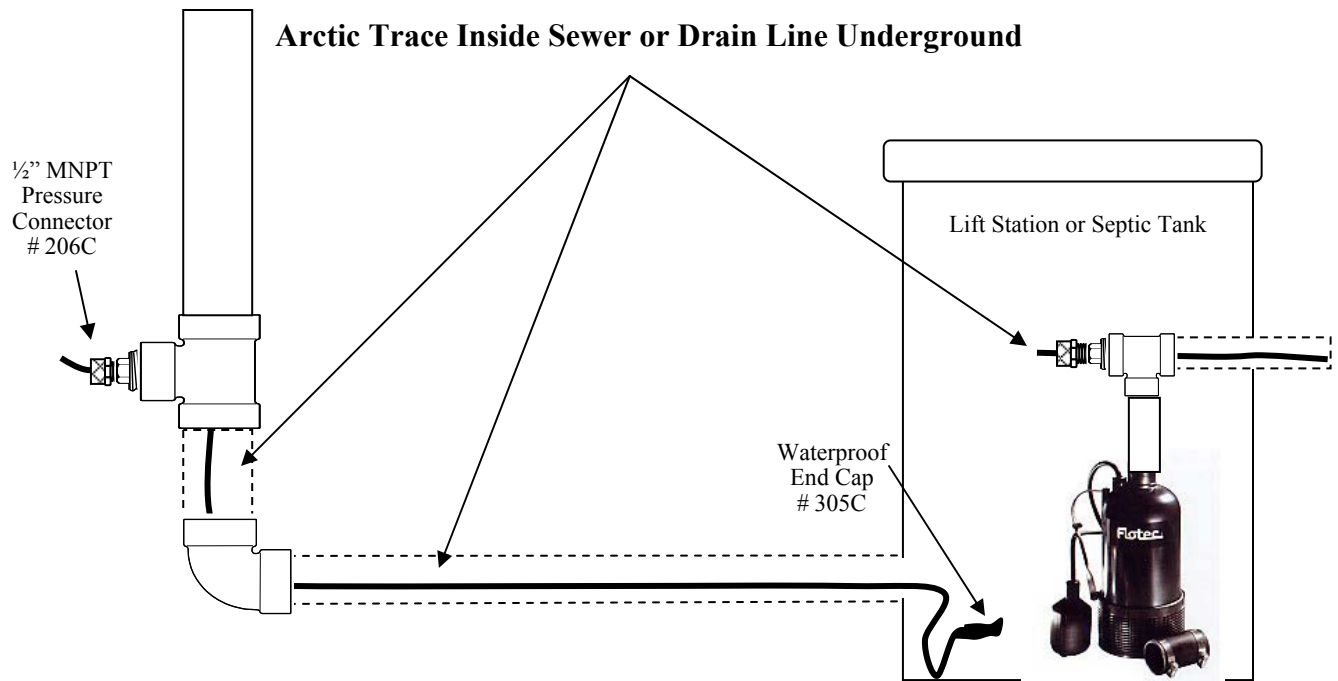
Arctic Trace Heat Cable Inside Pipe or Vessel



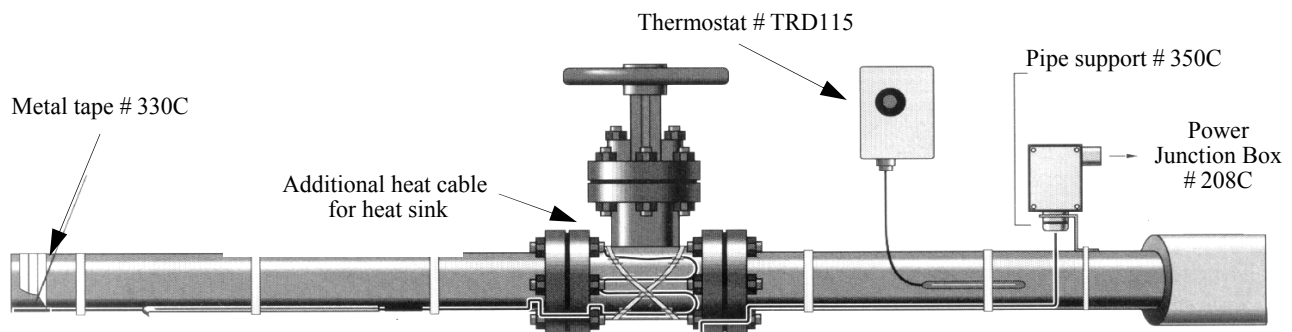
In drains and downspout to prevent freezing and in vent to prevent frost plugging



- Install cleanout with 1/2" female NPT connection.
- Loop Arctic Trace at the outlet of vent or drain pipe over itself for a minimum of a 3' loop.
- Hold loop in place with nylon wire ties on downspout application only.
- Push or pull Arctic Trace into position as shown in vent or drain pipe.
- Connect GFCI to heat cable and operate as needed to prevent vent freezing of vent opening.

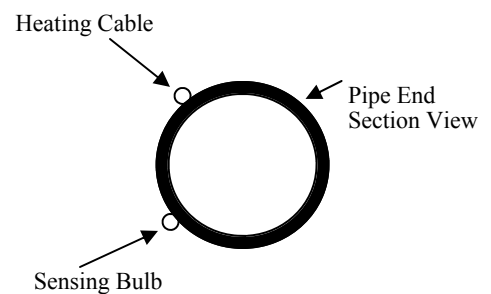


Arctic Trace Heat Cable Surface Mounted On Pipe or Vessel

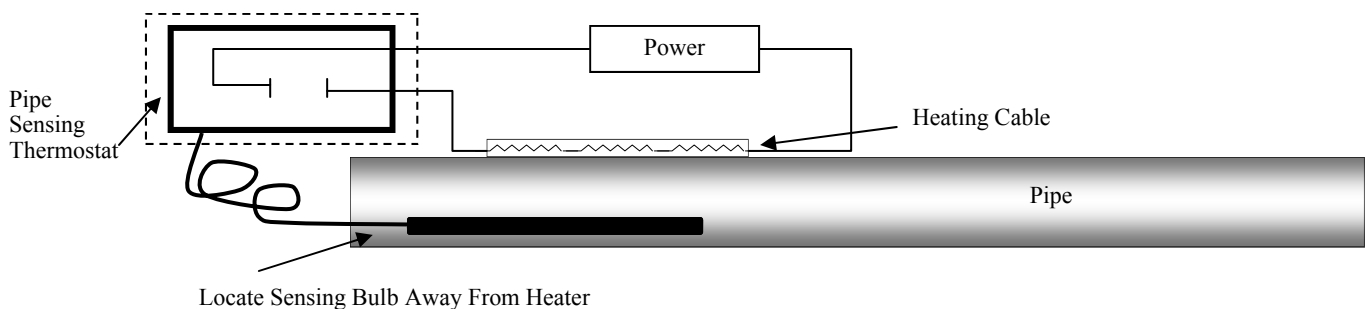


Installation on surface of pipe

Cable should be run straight or spiraled along pipe as required to provide for proper watt requirement output for the demand needed. Cable should be attached to pipe by the use of 2" metal tape # 330C allowing full heat transfer and equal heat distribution. Since surface mounting is not as efficient as inside the pipe mounting, additional cable must be applied to heat sinks like valves, pipe supports and flanges. When attaching temperature sensor, if required, attach to pipe with metal tape at 90° off set for multiple or single passes never on top or bottom of pipe.



Arctic Trace Heat Cable Control Option



Surface Mounting or Inside the Pipe or Vessel Installation Hazardous Locations

Arctic Trace maybe installed inside pipe or vessel or on the pipe or vessel surface for freeze protection or viscosity control of process fluids or gases.

Arctic Trace Installation:

Cut the Arctic Trace cable to length and install on pipe or vessel surface or inside pipe or vessel. Refer to Arctic Trace installation instructions.

Power Connection:

Connect heat trace to power using a GUATU26C hazardous location power connection kit. Install as shown in Fig G for heat tracing application inside the pipe or vessel. Install as shown in Fig H for heat tracing application on pipe or vessel surface.

Heat Trace End Seal:

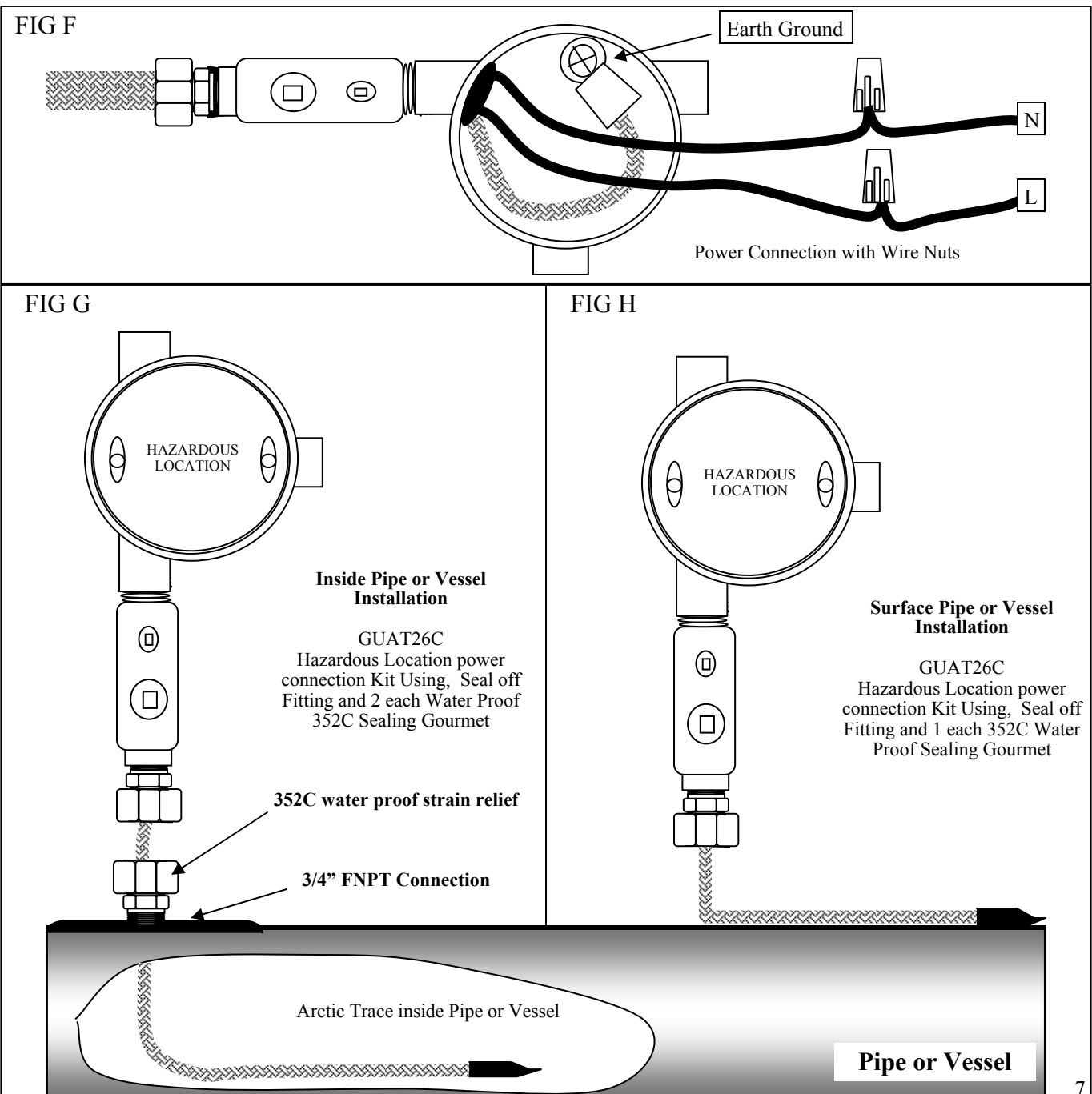
Install # 305C water proof end seal to any exposed heat trace end of line in accordance with end seal kit insulation. The kit will provide the required electrical insulation, braid coverage and stop and water liquid or gas infiltration into heating cable.

Code Compliance:

All wiring and safety devices need to be installed in accordance with State and Local codes.

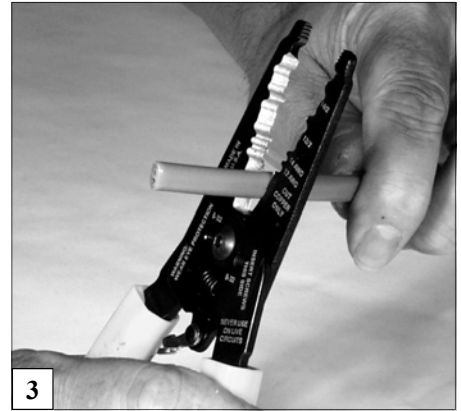
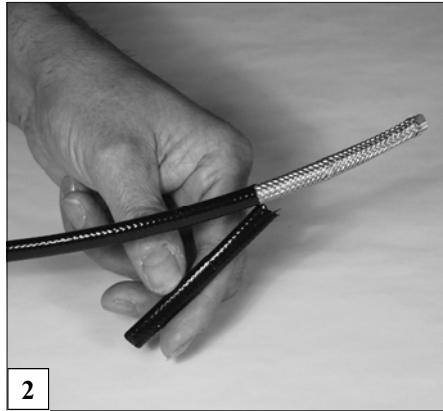
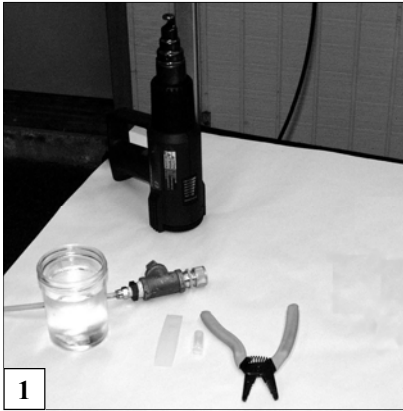
Heat Trace wiring:

Power connection should be connected in the junction box using wire nuts and crimp ground fitting shown in Fig F.

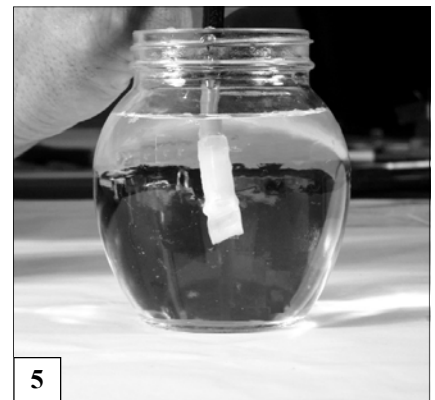
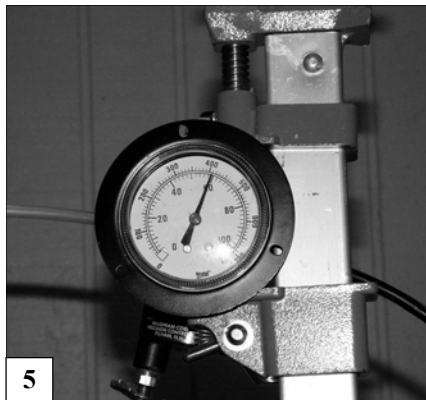
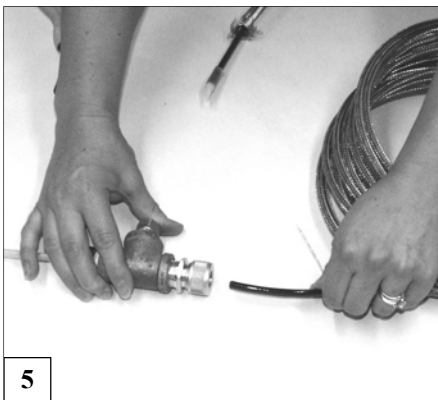
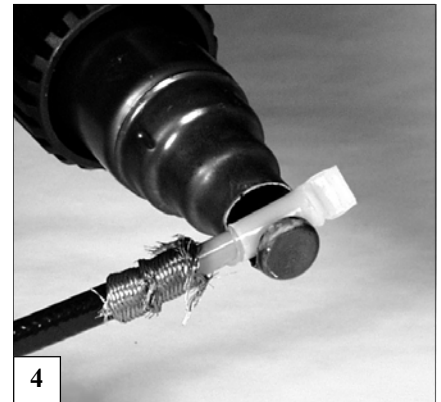


Instruction Sheet P/N 305C Tefzel End Cap

Package to include: 1 each Tefzel End Cap and 1 each Heat Shrink Braid Guard

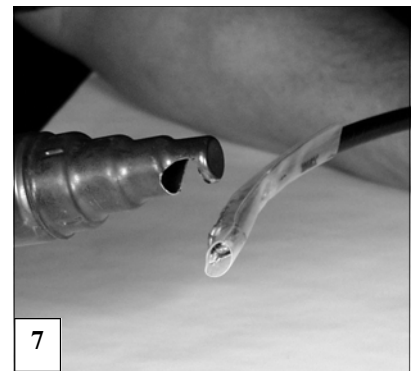
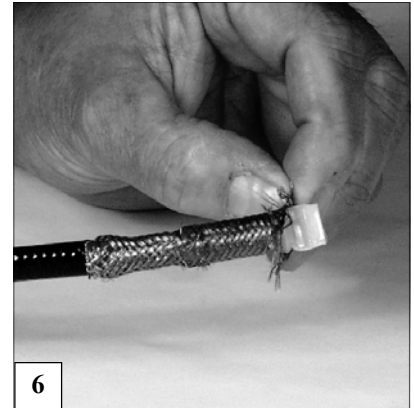


1. Tools needed - High temperature hot air heat gun, sharp clean wire cutting tool, 25 psig shop air supply, 206C or 207C pressure connector.
2. Cut heat trace to desired length. If your heater has an over jacket, with a sharp blade carefully remove 6" of ETFE over jacket from end to be sealed. Take care not to cut or damage the braid during this operation.
3. Move the braid so that it does not interfere and cut heat trace 3" back at a 45° angle with using a sharp wire cutting tool. Inspect cut to insure that the carrier wires do not make contact. If they do, perform step 3 again
4. Place Tefzel End Cap over wire end to be sealed, hold metal braid away from operation, and heat with high temperature hot air heat gun (part # 907). Do not use open flame. As End Cap is heated it will turn transparent and wire color will show though clearly. Continue to move heat around the End Cap until all sides are uniform and cable coating begins to ooze out from open end of End Cap. Allow End Cap to cool before step 5.
5. End Cap integrity test should now be done by pressurizing opposite end of heat trace with 25 psig air supply using pressure connector 206C or 207C. Now submerging Tefzel End assembly in clean water. If no bubbles are present cap has been installed correctly. If bubbles are present repeat steps 2 through 5.



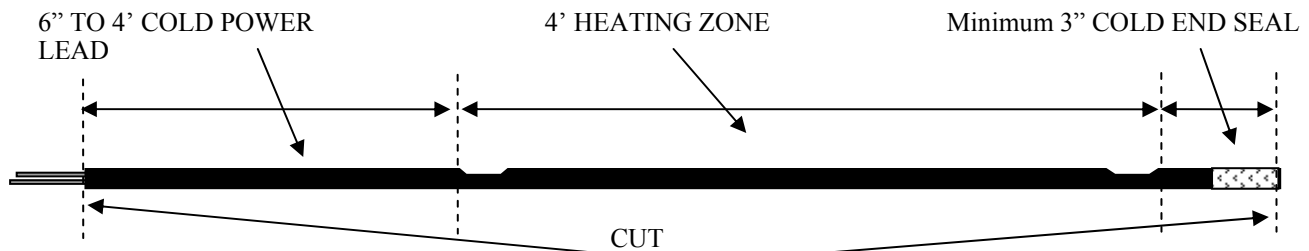
Instruction Sheet P/N 305C Tefzel End Cap Continued

6. Slip the metal braid back over End Cap so it extends about 1". Fold the excess braid back so when the braid guard is attached it will hold the braid in place at the end of the wire.
7. Place the braid guard over the end cap and metal braid. Heat shrink to braid guard until it firmly holds the braid in place.
8. An insulation resistance test is recommended between the 2 buss wires and the braid. Test with 500 VDC megger minimum acceptable reading should be 20 megohms per circuit tested. Do not use a megger with an excess of 2500 VDC. If test fails check for faulty end cap installation or any heating cable damage.
9. When wire passes electrical test it may then be installed. Take care not to damage End Cap during installation.
10. After installation check for a leak at wire termination point beyond pressure fitting (# 206C or 207C) and replace End Cap if a leak is found allowing water to drip from inside of the wire.
11. If problem cannot be corrected do not use or connect wire to voltage.



Arctic Trace® heating cables are constructed with multiple heating zones of various lengths depending on the voltage and watt per foot output. During assembly when a heating zone is cut, that length of heat cable becomes a cold lead and will not have a heating output. When making power connection or terminating the end of the heating cable care should be taken to assure the heating part of the cable contacts the process area to be heated. Heating zone spacing can be identified by a slight depression on the heating cables edge.

EXAMPLE



CAUTION

This product must only be installed by a qualified electrician, who fully understands electrical equipment placement, and must never under any circumstance be placed in service without the use of an adequate ground fault circuit interrupter to protect personnel from shock or injury.

After this equipment has been placed in service it must be tested to ensure all wiring and safety devices are working.

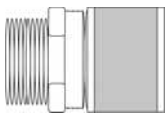
All National, State, and Local Electrical Codes must be followed.

If this product is not installed properly fire, death, or injury may result.

Installation Instructions for 206C, 207C or 207SS

for use with Arctic Trace® TL series submersible heat trace

Part # 206C



Part # 207C or 207SS

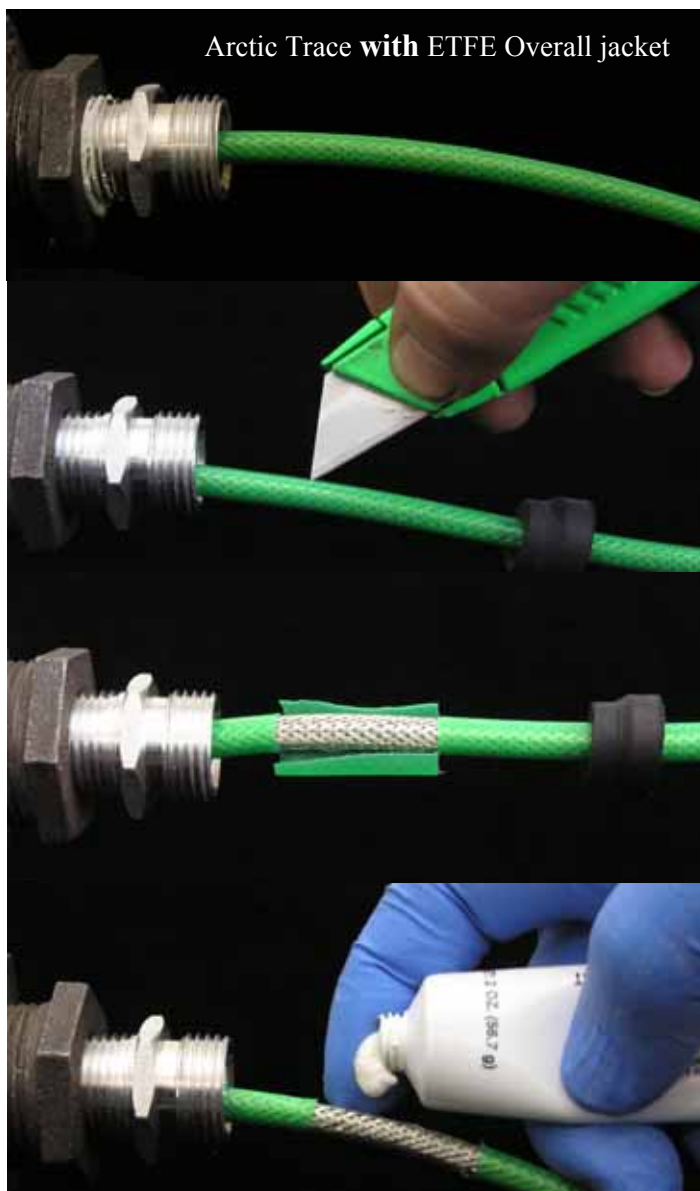


1/2" MNPT waterproof pressure connector / strain relief

Package Includes: 1 each 206C, 207C or 207SS 1/2" MNPT water proof strain relief pressure fitting
1 each Teflon paste tube

Caution should be taken when installing TL series heat trace **with overall jacket** inside pipes, tank, drains or vents. To insure a water tight seal follow installation instruction carefully. Failure to do so may cause liquid to leak from the pressure fitting and may enter the power connection.

- Install heat trace in pipeline or vessel with 305C waterproof end cap attached. Leave ample room to make electrical connections. Disassemble the pressure fitting. Apply Teflon paste to the 1/2" MNPT connection and screw it into your 1/2" FNPT pipe, tank or vessel.
- Slide the rubber grommet on the heat trace. Using a clean sharp blade cut a 2" slit along the heat trace outer jacket in the area where you are going to install the rubber grommet. **Use extreme caution not to damage or cut the metal braid.**
- Carefully remove the overall jacket from the assembly area. **Use extreme caution not to damage or cut the metal braid.**
- Open the Teflon paste supplied and apply the paste to the exposed metal braid.



- Massage the Teflon paste into the exposed metal braid. Make sure the paste covers the metal braid completely and fills all the holes in the metal braid as seen in Fig 1.
- Slide the rubber grommet over the metal braid placing it in the center of the prepared area.
- Reassemble the union assembly making sure the rubber grommet stays in place centered in the prepared area during this assembly.
- Completely tighten the union assembly compressing the rubber grommet making a water tight seal.
- Test the assembly for leaks before making any electrical connection. If leaks occurs repeat the field repair process until no leaks are found.



CAUTION

This product must only be installed by a qualified electrician, who fully understands electrical equipment placement, and must never under any circumstance be placed in service without the use of an adequate ground fault circuit interrupter to protect personnel from shock or injury.

After this equipment has been placed in service, it must be tested to ensure all wiring and safety devices are working.

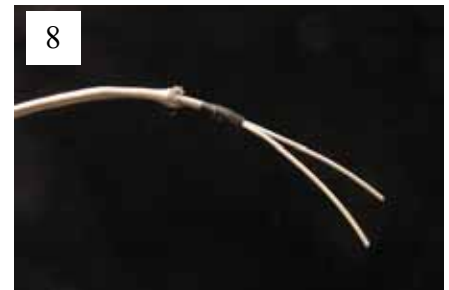
All National, State, and Local Electrical Codes must be followed.

If this product is not installed properly fire, death, or injury may result.

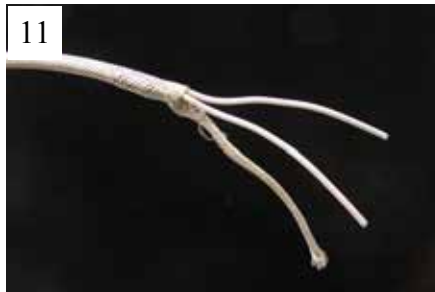
Instruction Sheet P/N C14880 GFCI Cord Assembly

Packing to include: - GFCI with extension cord, solderless connectors, and heat shrink

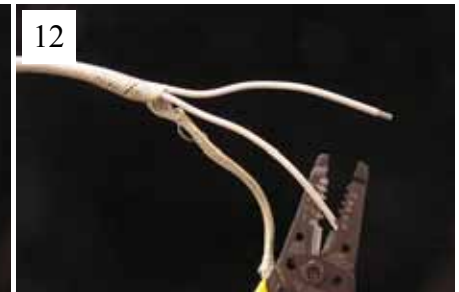
1. Place the Arctic Trace end to be attached to the pigtail on a suitable wood working surface.
2. Pull back metallic braid approximately 6" to 8".
3. Insert sharp razor knife in the center of the Arctic Trace between the two 12 gauge carrier bus wires.
4. With the blade firmly imbedded in the wood below carefully pull the Arctic Trace through the blade separating the two 12 gauge bus wires
- 5 & 6. Strip back the two over jackets and remove them.
7. Strip off any remaining heater element assuring it will not contact the metal braid.
8. Carefully tape the junction between the stripped wire and power wires to be connected with suitable electrical tape. Again assuring the metal heating element will not make contact with the braid.
9. Slip the metallic braid back over the bus wires and use a pencil or blunt instrument to open the braid.
10. Pull the bus wires through the braid as shown in picture.



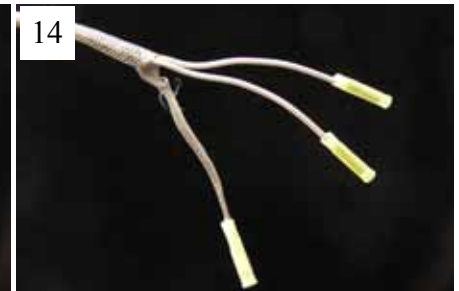
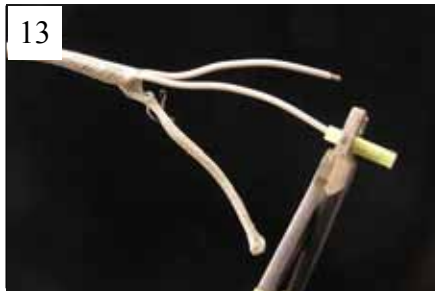
11. Cut to length needed



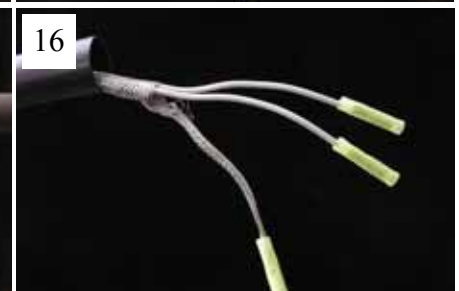
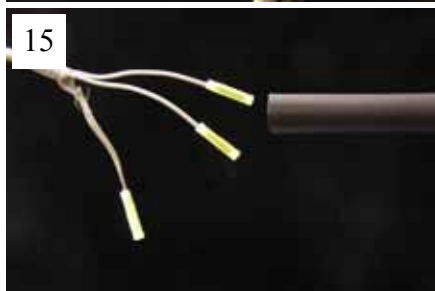
12. Carefully strip 1/4" of insulation from the bus wires.



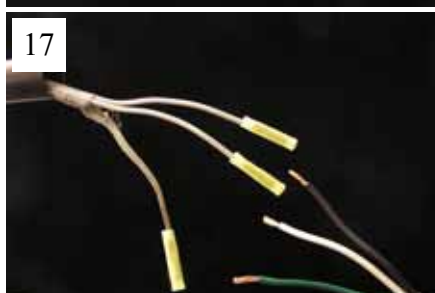
13 & 14. Crimp the solderless connectors to the bus wires and metallic braid using a suitable crimping tool.



15 & 16. Slip the heat shrink over the Arctic Trace assembly.



17. Prep the power connection wires on the Ground Fault Circuit Interrupter to accommodate the solderless connector.

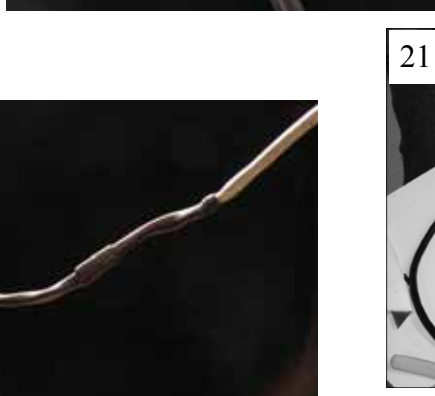


18. Connect the **green to braid**, the white to one of the bus wires, and the black to the other bus wire, polarity is not important.



19. Slip the heat shrink back over the splice assuring all exposed wiring is covered.

20. Shrink the heat shrink with a suitable hot air gun.



21. Plug the assembly into a power source and check operation of the Ground Fault Circuit Interrupter.



HEAT TRACE INSTALLATION RECORD

1. Circuit No, _____		
2. Receiving Documentation	Date _____	
Item	DESIGN	ACTUAL
A. Cable Type	_____	_____
B. Cable Length	_____	_____
3. Receiving Testing	Date _____	
A. Check for physical damage	O.K. _____ Damage _____	
B. Continuity Check Check for continuity between power leads.	O.K. _____ Open _____	
C. 500VDC min., 2500VDC recommended, megger check between leads and sheath, 20 megohms min.	Megohms _____	
D. Lot No.	No. _____	
4. Post Installation Testing	Date _____	
A. Continuity Check Check for continuity between cold leads	O.K. _____ Open _____	
B. 500VDC min., 2500VDC recommended, megger check between leads and sheath, 20 megohms min.	Megohms _____	
C. Visually Check Cable Installation Prior to Release for Thermal Insulation.	Visual Check O.K. _____	
5. Final Testing and Commissioning	Date _____	
A. Circuit approved for testing by client.	Approved _____	
B. 500VDC min., 2500 VDC recommended, megger check between leads and sheath, 20 megohms min.	Megohms _____	
C. Energized Testing (all test data to be within 10% of design data)	DESIGN	ACTUAL
1. Circuit Voltage	_____	_____
2. Initial Current	_____	_____
3. Current after 15 minutes of operation	_____	_____
4. Current after 30 minutes of operation	_____	_____
5. Pipe temperature	_____	_____
6. Circuit Acceptance		
<i>This circuit has been tested and documented in accordance with the above itemized data. This circuit accepted by:</i>		
Contractor _____	Date _____	
Client _____	Date _____	

du Alaska Incorporated, 6706 Greenwood Street, Anchorage, Alaska 99518, - 907-522-3004 - DUALASKA@ALASKA.NET

The Heat Trace Installation Record can be used to monitor the initial installation and circuit testing. This form can be used to verify heat trace installation at Periodic Inspection.

Accessories and Optional Equipment

Part

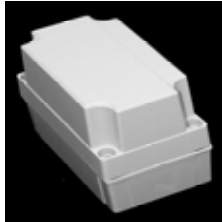
206C 1/2" MNPT Water Proof
Strain Relief / Pressure
Connector



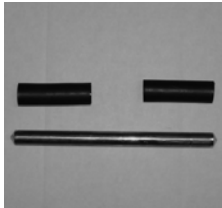
207SS 1/2"X1/2" MNPT Water
Proof Strain Relief /
Pressure Connector



208C NEMA 4X Power
Connection Junction Box
with DIN Terminals
Single Gang



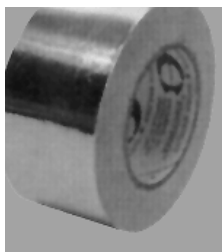
209C NEMA 4X Power
Connection Junction Box
with DIN Terminals
Double Gang



210 Brass Well Ballast
Allows for deep well heat
cable hold down ballast



305C Water Proof End Seal



330C 150'x2" Metal Heat Transfer
Tape

38036 500VDC Insulation Tester /
DC Megohmmeter



907 120VAC, 1100F Heat Gun
w/end cap adapter



Part

C148880
15 Amp GFCI Protected
Plug and Cord Set



C33120SP
20 Amp 120 volt, Universal
Power connection kit with
switch, pilot light and GFCI



SST-2 120/208/240/277VAC
30 AM Freeze Protection
Digital Thermostat , Status
Indicators, temperature
Sensor, 30 mA GFEP
NEMA 4X Enclosure



TRF115
120/240 VAC General
Purpose Adjustable
Thermostat, 5' Capillary,
NEMA4X



Automatic Ice and Snow Melting Controls

Snow , Ice, Roof , Gutter, Pavement, Concrete
Sensors and Controls



One Year Limited Warranty

du Alaska hereby warrants to the original purchasing consumer that its Arctic Trace heating cable is free from defects in material and workmanship for a period of one (1) year from the date of original purchase. du Alaska's obligation under the terms of this limited warranty shall be limited to repairing or replacing, at du Alaska's option, free of charge, F.O.B. from its factory, any part or parts of the Arctic Trace heating cable which in its sole judgment is found to be defective; and providing further that the claim be made within one (1) year from the date of original purchase and said part or parts be returned as directed by du Alaska at the time the claim is made.

This warranty applies to installations in the open ambient air. The warranty shall also apply to installation in clean water under a pressure of no more than 200 PSIG if the heat seal cap has been sealed to the wire by hot air gun welding in such a manner that no leak exists between the heat seal cap and the Cable Tefzel cover. No warranty whatsoever exists in any other installation or manner of installation.

All information concerning the product supplied by du Alaska is furnished upon the express condition that the customer shall make its own assessment to determine the product's suitability for a particular purpose.

WARRANTY EXCLUSIONS. *Except as expressly stated herein and to the fullest extent permitted by law, du Alaska shall not be liable for direct, indirect, incidental, consequential or other types of damages arising out of resulting from the purchase or use of the product. This Limited Warranty is in lieu of all other warranties, express or implied, specifically including, but not limited to, implied warranties of merchantability or fitness for a particular purpose.* The remedies under this warranty are only as set forth herein (except as to the extent they are required by any applicable laws) and du Alaska neither assumes nor authorizes anyone to assume for it any other obligations. Some states do not allow the exclusion or limitations of incidental or consequential damages, so the foregoing limitations or exclusions may not apply to you. In such states, liability shall be limited to the extent allowed by state law. We do not warrant this product against normal wear and tear, unauthorized modifications or alterations, improper use, improper maintenance, accident, misuse, negligence, theft, loss or damage from outside causes.



6706 Greenwood Street, Anchorage, AK 99518
Phone: (907) 522-3004 Fax: (907) 349-1023
dualaska@alaska.net www.arctictrace.com

Appendix D Policy

CORPORATE POLICY AND PROCEDURE



POLICY	Frozen Water Pipe Policy
CATEGORY	IDE – Environmental Services, Water Services
APPROVED BY	Guelph City Council (pending)
EFFECTIVE DATE	November 2015
REVISION DATE	November 2018

POLICY PURPOSE AND GOALS

The overall purpose of this Frozen Water Pipe Policy is to prevent and manage interruptions to the City's supply of water, caused by the temporary freezing of City and/or Customer Water Pipes, so that Customers maintain reliable, continuous access to water.

Core goals of this Policy include:

- 1) To implement proactive first priority measures to prevent the freezing of Water Pipes.
- 2) To provide Customers who have frozen Water Pipes with timely access to continuous, reliable, safe, Potable water.
- 3) To recognize the special needs of Vulnerable Customers and implement processes to expedite resources required to restore their access to continuous, reliable, safe, and Potable water in frozen Water Pipe events.
- 4) To implement the elements of this Policy in an effective and efficient manner with available resources.
- 5) To improve the impact and value of this Policy through the engagement, beyond Water Services, of other City departments, public agencies, and third parties as part of response efforts.
- 6) To maintain compliance with utility regulations and health guidelines, while best managing the City's water resources during responses to frozen Water Pipe events.

POLICY DESCRIPTION

This Frozen Water Pipe Policy is comprised of programs that are implemented to achieve the above purpose and goals. Often the programs overlap and work in tandem.

The specific programs comprising this Policy include the following:

- 1) *Freeze Prevention Program*: a program that requires Customers to take specific actions to prevent the freezing of Water Pipes.
- 2) *Frozen Water Pipe Thawing Program*: a program whereby Water Services may, based on available technology, and where resources allow, attempt to thaw frozen Water Pipes which are readily accessible.
- 3) *Temporary Water Service Program*: a program that includes the installation of Temporary Water Service Lines providing temporary water supplies to Customers who are without water due to frozen Water Pipes.
- 4) *Temporary Water Access Program*: a program to provide eligible Customers with access, for domestic use, to temporary water supplies, other than by means of Temporary Water Service.
- 5) *Special Assistance Program*: a program that may be available in special circumstances to Vulnerable Customers and Critical Customers.

These programs are more fully described below.

DEFINITIONS

Critical Customer: any Customer requiring water for direct product inputs or core operational processes which may be affected if changes in quantity are experienced. Critical Customers include the following service areas:

- Food handling and processing facilities
- Arenas, stadiums and other large venues
- Colleges and universities
- Correctional facilities
- High volume industrial Customers
- Hotels
- Ice production facilities.

Customer: any person who has an active water and/or wastewater customer account, in good standing, with the City through Guelph Hydro Electric Systems Inc.

Non-potable: usable for non-consumptive uses (for example, water which can be used for toilet flushing, but not for drinking or cooking).

Potable: usable for all consumptive uses (for example, water which can be used for drinking or cooking).

Temporary Water Service: a temporary supply of water to a Customer who is without water due to frozen Water Pipes.

Temporary Water Service Donor: a Customer with an active water supply who provides a Temporary Water Service to a neighbour through a Temporary Water Service Line connected to the donating Customer's own Water Pipes.

Temporary Water Service Line: a Water Pipe used to provide a Temporary Water Service.

Vulnerable Customer: any Customer with a water-dependent medical condition or similar vulnerability; Vulnerable Customers include:

- Elderly residents
- Health care facilities such as hospitals, clinics, dialysis centres and other medical facilities
- Nursing homes
- Pregnant customers or those with infants
- Schools and day care centres
- Veterinary clinics.

Water Pipe: any pipe, main, plumbing, hose or appurtenance through which water from the City is provided to Customers.

Water Services: the City's Water Services Department, including all applicable directors, officers, employees and contractors.

RESPONSIBILITIES

Water Services will:

- Respond to Customer frozen Water Pipe issues in accordance with this Policy and provide timely service and communication to Customers.

Each applicable Customer will:

- Comply with this Policy.
- Ensure that the Customer's own Water Pipes meet the Building Code standards in place to prevent freezing.
- Take proactive actions to maintain the Customer's own Water Pipes to prevent freezing.

-
- Maintain adequate heat to the Customer's own Water Pipes to reduce the threat of internal freezing.
 - Pay all home-based energy costs incurred when the Customer applies heat to exposed Water Pipes on the Customer's property to cure or prevent Water Pipe freezing, whether instructed to do so by Water Services or voluntarily doing so.
 - Permit safe access to the Customer's property by Water Services if the Customer has requested assistance in addressing frozen Water Pipes.
 - Follow the provisions of this Policy and any instructions provided by Water Services.
 - Operate and maintain the Water Pipes on the Customer's property.
 - Contribute to the costs of these programs as set out in this Policy.

Each applicable Temporary Water Service Donor will:

- Allow Water Services safe entry to the Donor's property to install Temporary Water Services.

CUSTOMER SERVICE

In frozen Water Pipe events, Water Services will provide the following special customer service functions:

1. Customer Service Desk

- Water Services will maintain an open customer service desk accessible by telephone, email and walk-in on Monday to Friday between 8:00 am and 4:00 pm.
- In emergency situations, Water Services may offer extended customer service centre hours with hours of operation posted on the City's Frozen Water Pipe Policy webpage.

2. After Hours On-call Operator Support

- Customers impacted by frozen Water Pipes from 4:00 pm to 8:00 am may contact the Water Pipe On-call Operator at 1-888-630-9242.

3. Service Request Response Priorities

- Water Services will address Customer service requests on a "first come, first served" basis. Upon receipt of a service request regarding a frozen Water Pipe, Water Services will aim, wherever feasible, to initiate a response within twenty-four hours.
- Water Services may accelerate its response efforts to a service request from a Vulnerable Customer. Upon receipt of a service request from a Vulnerable

Customer regarding a frozen Water Pipe, Water Services will aim to initiate a response within twelve hours.

- Water Services will place recurring Customer service requests regarding frozen Water Pipes into the “first come, first served” queue for response.

4. Communications

- Water Services will provide specific updates and timely communications to Customers with frozen Water Pipes for the duration of the frozen Water Pipe event (for example, via e-mail or delivered hard copy letter).
- Water Services will provide general updates through appropriate media (for example, social media, City’s website, radio, and newspaper) as appropriate for the scale of the event and where capacity exists.

SPECIFIC PROGRAMS

1. Freeze Prevention Program

The Freeze Prevention Program requires Customers to take specific actions to prevent the freezing of Water Pipes.

In the late fall of each year, Water Services will provide advance communication to Customers regarding this program, including Customer obligations.

FREEZE PREVENTION PROGRAM TRIGGERS

Water Services will activate the Freeze Prevention Program under either of the following conditions:

- If the cumulative mean daily temperature reaches -400°C following the first confirmed fall frost event, or
- If the treated water temperature reaches 4°C, as measured at City water towers and distribution system temperature monitoring locations.

Once a Freeze Prevention Program trigger has been reached, Water Services will communicate with Customers, particularly those Customers whose properties have historically experienced interruptions in water supply as a result of frozen Water Pipes, requesting them to take the actions set out in this program.

Once a Freeze Prevention Program trigger has been reached, each applicable Customer will:

- i. Ensure that the Customer has plumbing and drains that will accommodate continuous, unattended running of water.

-
- ii. Begin running water at the Customer's property when instructed by Water Services in order to prevent Water Pipe freezing, as well as take meter readings and/or provide other information as requested to support administration of the Freeze Prevention Program.
 - iii. Notify Water Services at the earliest opportunity when an interruption in water supply occurs at the Customer's property.

2. Frozen Water Pipe Thawing Program

Under the Frozen Water Pipe Thawing Program, Water Services may, based on available technology, and where resources allow, attempt to thaw frozen Water Pipes which are readily accessible.

Water Services:

- i. Will receive each Customer request for thawing and assess whether thawing is feasible in the particular circumstances, and if so, provide the thawing service.
- ii. If conditions do not continue to support the safe use of existing thawing technology or if thawing stops being technically feasible, cease the thawing activities.
- iii. If notified by a Customer that the Customer has had a third party undertake thawing before Water Services was able to do so, may close the Customer's pending service request and/or determine what (if any) further field actions should be undertaken to address frozen Water Pipe issues at the Customer's property.

Each applicable Customer with frozen Water Pipes:

- i. Will ensure that the Customer's property is safe and accessible for Water Services to carry-out the thawing activity.
- ii. May, in accordance with the Program Costs set out in this Policy, initiate third party thawing of Water Pipes.
- iii. Will notify Water Services of any third party thawing of Water Pipes.

3. Temporary Water Service Program

The Temporary Water Service Program includes the installation of Temporary Water Service Lines providing temporary water supplies to Customers who are without water due to frozen Water Pipes.

Water Services will consider field conditions and technical constraints and may decide not to install a Temporary Water Service if field conditions or technical feasibility are unsatisfactory.

Out of concern for public health, Water Services does not condone or endorse the private installation of temporary water supplies. Any Customer who installs or operates a private temporary water supply does so at that Customer's own sole risk and expense.

Water Services will:

- i. If field conditions are appropriate and the installation is technically feasible, install a Temporary Water Service Line for a Customer with frozen Water Pipes, and provide the following at no cost to the Customer or the Temporary Water Service Donor:
 - o Materials, labour, Temporary Water Service Line installation, chlorine residual measurement, water quality sampling and meter readings;
 - o A Temporary Water Service Program information package; and
 - o If the Customer with the frozen Water Pipes receives a Temporary Water Service Line supplying Non-potable water, information regarding the Temporary Water Access Program.
- ii. Provide and install a hose bib backflow prevention device in any instance where a backflow prevention device was removed by the City to accommodate a Temporary Water Service Line installation.
- iii. At the end of the frozen Water Pipe event, remove the Temporary Water Service Line and take water meter readings.

Customers receiving the Temporary Water Service will:

- i. Provide written authorization to Water Services to install a Temporary Water Service Line.
- ii. Identify and obtain approval from the Temporary Water Service Donor and the owners and/or occupants of all other properties (if any) impacted by the installation or routing of the Temporary Water Service Line and provide this information to Water Services in a timely fashion.
- iii. Prepare for Water Services' installation of a Temporary Water Service Line by:

-
- Providing clear walkways and clear access to exterior unfrozen and undamaged hose bibs for the installation;
 - Turning off the internal water supply; and
 - Coordinating necessary plumbing modifications to support water servicing through a Temporary Water Service Line, including, but not limited to, removal of backflow prevention devices at outdoor hose bibs.
- iv. Run water continuously to prevent freezing of the Temporary Water Service Line as instructed by Water Services.
 - v. Retain or de-install the Temporary Water Service Line as instructed by Water Services.

Temporary Water Service Donors providing water to a Customer will:

- i. Provide written authorization to Water Services to install a Temporary Water Service Line.
- ii. Prepare for Water Services' installation of a Temporary Water Service Line by:
 - Providing clear walkways and clear access to exterior unfrozen and undamaged hose bibs for the installation;
 - Turning on the internal water supply to external hose bibs upon instruction by Water Services; and
 - Coordinating necessary plumbing modifications to support water servicing through a Temporary Water Service Line, where appropriate.
- iii. Continue to maintain active supply of water to the Temporary Water Service Line as instructed by Water Services to prevent freezing.

4. Temporary Water Access Program

The Temporary Water Access Program provides eligible Customers with access, for domestic use, to temporary water supplies other than by means of Temporary Water Service.

To be eligible for this program, the Customer must have:

- A water servicing issue that cannot be verified by Water Services as limited to the Customer's own Water Pipes,
- A frozen Water Pipe, and
- No Temporary Water Service supplying Potable water.

Water Services will:

- i. After initial notification by a Customer of a frozen Water Pipe, and if the Customer is eligible under this program, register the Customer under this program.
- ii. Provide each eligible Customer with an overview package that outlines resources available under this program and includes the first water voucher and instructions on how to access resources (for example, future water vouchers, shower facilities, filling stations and laundry). Water Services will provide the overview package by e-mail for each Customer with e-mail access, and make it available for pick-up at Water Services by each Customer without e-mail access.

Each eligible Customer will:

- i. Notify Water Services at the earliest opportunity when an interruption in water supply occurs at the Customer's property.
- ii. Provide notice to Water Services within 48 hours after normal water supply has been restored to the Customer's property. Upon such notice, Water Services will terminate that Customer's access to the resources under this program.

Various resources are available to Customers eligible for this program. Instructions on how, when and where to access these resources are included in the overview package. The resources include:

Fill stations (for Non-potable water only) –available at designated facilities during designated time periods.

Grocery Store Vouchers for Potable water purchase – provided by e-mail or in-person.

- Water Services will provide only the initial water voucher with the overview package, and will provide subsequent vouchers only upon Customer request.
- The conditions of voucher distribution are as follows:
 - They can only be used for the purchase of Potable water,
 - They can be provided on a weekly basis, upon Customer request,
 - They cannot be issued retroactively,
 - They will not surpass a weekly maximum value of \$50 per household, and
 - They will expire on the next April 30th.

Laundry Facilities for household washing

-
- Upon Customer request, Water Services will provide access to laundry facilities for household washing.
 - Laundry services will be limited to six (6) laundry loads per week per household.

Shower Facilities – will be available at Customer request at the City’s community centres.

- Water Services will sponsor showering facilities only to a maximum of one (1) shower per person per day.

Water Services will:

- i. Make the resources available to eligible Customers only as set out above and in the overview package.

Each applicable Customer will:

- i. Obtain and transport suitable, personal use water containers for filling at City Fill Stations.
- ii. Obtain the Customer’s own transportation to and from all locations where the resources under this program are available.

5. Special Assistance Program

The Plant Manager of Water Services may, in special circumstances, approve the use of additional resources, beyond those available in the foregoing programs, for Vulnerable Customers and Critical Customers. Any such special assistance will be consistent with provisions of the City’s Procurement By-law and in consultation with the City’s Community Emergency Management Coordinator, the Wellington Dufferin Guelph Public Health Unit, and Wellington County Social Services.

PROGRAM COSTS

Customers who participate in the frozen Water Pipe programs will share in the costs as set out below.

If a Customer is not eligible under any program under this Policy, yet submits service requests for assistance with frozen Water Pipes on the Customer’s property or for access to the resources of any program under this Policy, then Water Services will seek full cost recovery from such Customer.

If a Customer has chosen not to participate in the programs under this Policy or to follow the direction of Water Services, Water Services will bill to that Customer any

recurring service request calls, at call-out rates set out in the City's Water and Wastewater Rate By-law.

The costs of Water Services are based on actual labour costs, payroll burden costs, overhead and administration costs, vehicle, equipment, materials and all property restoration costs.

1. Freeze Prevention Program

A Customer instructed by Water Services to run water is responsible for the payment of water and wastewater basic charges and the payment of volumetric charges, as defined in the City's Water and Wastewater Rate By-law, but based on the Customer's average historical account consumption for similar annual periods.

A Customer who runs water to prevent freezing, without the direct instruction of Water Services, will be responsible for the full payment of water and wastewater basic charges and volumetric charges, as defined in the City's Water and Wastewater Rate By-law.

2. Frozen Water Pipe Thawing Program

If Water Services thaws a frozen Customer Water Pipe that had been supplied with water by a City Water Pipe that froze, then Water Services will pay the costs of the thawing. If Water Services thaws a frozen Customer Water Pipe that had been supplied with water by a City Water Pipe that did not freeze, then the Customer will pay the costs of the thawing.

If a Customer wishes a more immediate thawing of only the Customer's Water Pipes, than Water Services can provide, then the Customer may retain a third party to thaw the Customer's Water Pipes at the Customer's own cost.

If a Customer wishes a more immediate thawing of both the Customer's Water Pipes and the City's Water Pipes supplying them, than Water Services can provide, then the Customer may retain a third party to thaw the Customer's Water Pipes and the City's Water Pipes, with the costs shared equally between Water Services and the Customer, as long as:

- The Customer provides, in advance, the particulars of the proposed thawing;
- Water Services approves the particulars of the proposed thawing;
- The Customer proceeds with the thawing as proposed; and
- The Customer reports the outcome of the thawing to Water Services.

3. Temporary Water Service Program

Each Temporary Water Service Donor is responsible for the payment of water and wastewater basic charges and the payment of volumetric charges, as defined in the City's Water and Wastewater Rate By-law, but based on the Donor's average historical account consumption for similar annual periods. In remuneration for extending water servicing to a neighbour, the Temporary Water Service Donor will receive a full volumetric credit for all water and wastewater used during the service period. This credit will be applied to the Donor's water and wastewater Customer accounts by May 30th of the year in which the frozen Water Pipe event ends.

4. Temporary Water Access Program

Use of the resources under the Temporary Water Access Program is, as long as such use is within the limitations set out in this Policy, free to qualifying Customers.

TO:	CHAIR AND MEMBERS CIVIC WORKS COMMITTEE MEETING ON JANUARY 5, 2016
FROM:	JOHN LUCAS, P.ENG. DIRECTOR – WATER & WASTEWATER
SUBJECT:	RESPONSE PLAN FOR FROZEN WATER SERVICES

RECOMMENDATION

That, on the recommendation of the Director, Water & Wastewater, the following report **BE RECEIVED** for information regarding London’s Response Plan for frozen water services.

PURPOSE

This report summarizes the Response Plan that has been implemented as a result of two consecutive severe winters that produced numerous frozen water services.

2015–19 STRATEGIC PLAN

This report supports the Strategic Plan with respect to Building a Sustainable City – Robust Infrastructure, through investments in infrastructure to reduce customer service disruptions.

BACKGROUND

Water services are the pipes that carry water from the municipal water mains into each building connected to the water system. Water services must be buried between 1.7 and 1.9 m deep, in order to prevent the water from freezing in the winter.

Winter temperatures cause moisture in the soil to freeze solid. This freezing starts at the surface and progresses downward. The frost depth that is reached each winter depends upon the severity of the cold temperatures experienced.

In typical winters, frost penetration does not affect water services. However, in very cold winters, the frost can reach depths that cause some water services to become frozen, leaving the building with no running water.

The winter of 1993/94 was extremely cold, and 258 water services froze in London. Smaller numbers of frozen water services were experienced in the cold winters of 1995/96 and 2006/07. All of these water services were subsequently excavated and rehabilitated, either by being lowered or insulated.

The winters of 2013/14 and 2014/15 were extremely cold in Ontario; in fact, February 2015 was the coldest month ever recorded in London. Once again, large numbers of frozen water services were experienced.

DISCUSSION

The winter of 2013/14 was very cold in London, causing 348 frozen water services. London had never before experienced this many frozen services in one season. Remarkably, the winter of 2014/15 was even colder, resulting in 531 frozen service calls, with an additional 32 calls for frozen customer plumbing. The response effort by London’s Water Operations Division was complicated by the fact that all of the frozen services occurred within a relatively short time frame. The winter was not unusually cold at first, but in mid-February, the temperature plummeted and remained extremely low for nearly two weeks. Frozen service calls came in slowly at first, then escalated to total over 200 in a single week.

Below is a table summarizing the public right-of-way frozen service calls that were received.

Date	Number of Frozen Service Calls	Cumulative Total
February 3, 2015	4	4
February 15, 2015	1	5
February 17, 2015	2	7
February 19, 2015	1	8
February 20, 2015	3	11
February 21, 2015	1	12
February 22, 2015	17	29
February 23, 2015	40	69
February 24, 2015	17	86
February 25, 2015	17	103
February 26, 2015	91	194
February 27, 2015	28	222
February 28, 2015	22	244
March 1, 2015	22	266
March 2, 2015	40	306
March 3, 2015	47	353
March 4, 2015	33	386
March 5, 2015	25	411
March 6, 2015	12	423
March 7, 2015	13	436
March 8, 2015	9	445
March 9, 2015	15	460
March 10, 2015	8	468
March 11, 2015	5	473
March 12, 2015	3	476
March 13–21, 2015	30	506
March 22–31, 2015	22	528
April 1 – 7, 2015	3	531

Over a 2-month period, emergency response measures were implemented, utilizing all available Water Operations personnel, equipment, and supplies to remedy customers’ loss of water. Remediation measures included the following:

- Using hoses to connect to a neighbour’s plumbing, where possible, using outside taps. These temporary connections reinstated water service, although with reduced flow and pressure. In these cases, an inside faucet would need to be left running to prevent the hose connection from freezing.

- Excavating and utilizing hot-water thawing equipment to restore water supply through the building’s service. Once a service was thawed, customers were instructed to leave a faucet running to prevent the service from re-freezing.
- Excavating and replacing sections of frozen service piping within the public road allowance.
- Where temporary connections were not possible, providing totes of water in the interim for those who were queued and awaiting assistance.
- Maintaining contact with affected customers, and making repeated return visits to some locations which re-froze.

As a result of these efforts, the Water Service Area expended approximately \$730,000 beyond the 2015 Water Operating Budget. Nearly \$300,000 was attributed to staff overtime costs, with an additional \$430,000 for external equipment rentals, material purchases, and surface restoration.

The following is a summary of frozen services on public right-of-way from the previous two winters.

Winter	Total Services Frozen	Services Receiving Water via Connection to Neighbour	Repeat Frozen Services
2013/14	348	63	N/A
2014/15	523*	85	160

*Some customers did not follow instructions to continuously run a faucet and their services subsequently re-froze as a result.

Considering that 160 of these services froze in both winters, a total of 711 separate water services were identified as prone to freezing within the public right-of-way. The reasons that these particular services froze were primarily shallow burial depth, improper construction practices in proximity to storm sewers, and inadequate heating of spaces within buildings for frozen internal plumbing.

Learning from the 2014/15 experience, and to help alleviate future frozen water service issues, a Response Plan was developed. It contains 4 key areas: Education, Notification, Prevention, and Remediation.

Education

- Information regarding frozen water services, causes, and prevention, including a “what-to-do” section for customers experiencing water loss, is being posted to the City’s website at:
<http://www.london.ca/residents/Water/Water-System/Pages/default.aspx>

Notification

- Every customer who experienced a frozen service in the last two years has been placed onto a contact list. Customers on this list will receive a letter by early-January outlining London’s remediation strategy and interim prevention measures.

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- London Hydro, the water billing service provider, has been informed of the protocol for customers with services prone to freezing, and for neighbours who provide temporary by-pass connections.

Prevention

- Standard design specifications for watermains and services have been revised, requiring a deeper depth of burial and enhanced insulation when in proximity to storm sewers and Private Drain Connections (PDCs).
- Staff will be monitoring temperatures, frost penetration depths, and watermain break activity to determine if the potential for frozen water services is developing.
- If a threat of freezing services develops, customers with a previously frozen service (not yet rehabilitated through the work plan), will be notified by staff to continuously run a pencil-sized stream of water, usually from a laundry tap. Customers will be notified to stop the flow once the threat subsides. Notification to start and stop the flow will come directly from the City’s Water Service Area by telephone.
- Where customers are instructed to leave a tap running, they will only be charged the minimum monthly water and sewer bill. They will not be responsible for consumptive charges during the period in which they have been instructed to run their water. Only those customers specifically notified by the City’s Water Service Area will be granted this exemption.

Remediation

- A prioritized work plan has been developed to excavate and rehabilitate every service that froze in 2014 and 2015.
- To date, 187 services have been rehabilitated based on this prioritization (51 in 2014; 136 in 2015). The first targets were those on septic systems, where continuous running of water would be detrimental.
- Rehabilitation efforts will mainly utilize in-house staffing. External contractors will be considered where frozen service locations overlap with capital replacement contracts, or in other advantageous situations.

The rehabilitation of frozen services is being funded from the “Lead and Copper Service Replacement” Account EW3482. This program has been utilized for all rehabilitation and/or replacements of water services, regardless of material type or mode of failure. The transitioning of the use of these funds is timely, since lead service replacements are now most commonly completed in conjunction with Capital Works projects, such as the watermain relining program, where efficiencies have been realized through coordinated activities.

In 2015, the volume of water that was used by customers continuously running taps to prevent freezing was tracked. These were either customers who were connected to a neighbour, or who had been thawed and instructed to run water to prevent re-freezing. A total of 101,000 cubic metres of water passed through the water meters of these customers. The cost to the City for this water was just under \$88,000, based on lost revenue and wholesale cost recovery. Using these values, it is estimated that it would cost \$84 per month to have a customer run a continuous flow of water to prevent their

service from freezing. Assuming a two and a half month run time, it will cost approximately \$210 per customer, if this strategy needs to be implemented.

In 2015, 136 water services were rehabilitated at a total cost of approximately \$720,000, translating to an average cost of \$5,300 per service. The projected cost to remediate the remaining 524 services is therefore approximately \$2,780,000, to be expended over the next four years.

SUMMARY

Due to record-breaking cold weather over the past two winters, municipalities across Ontario experienced an overwhelming number of customers with frozen water services. The Water Service Area has developed a 5-year work plan to rehabilitate all the services that were frozen in London, in order to reduce their susceptibility to freezing in the future.

In the interim, staff have created a customer service protocol that will instruct at-risk customers to run a faucet if frost penetration into the soil poses a risk to their water services. In these cases, a minimum water billing structure will be employed so that customers will not be asked to cover the cost of the additional water used.

For future construction, improved design specifications have been implemented to prevent freezing in water services that cross storm sewers and Private Drain Connections (PDCs).

Acknowledgements:

This report has been prepared with input from Scott Koshowski, P. Eng. - Environmental Services Engineer.

PREPARED BY:	RECOMMENDED BY:
JOHN SIMON, P.ENG. DIVISION MANAGER, WATER OPERATIONS	JOHN LUCAS, P.ENG. DIRECTOR – WATER & WASTEWATER
CONCURRED BY:	
JOHN BRAAM, P.ENG. MANAGING DIRECTOR – ENVIRONMENTAL & ENGINEERING SERVICES & CITY ENGINEER	

- c.c.
- Cathy Saunders - City Clerk
Scott Koshowski – Water Operations Engineer
Dan Huggins – Water Quality Manager – Water Operations
Steve Irwin – Water Meter Supervisor – Water Operations
Rick Grenier – Water Services Supervisor – Water Operations

LOCATION: DISTRIBUTION AND TREATMENT

CLASSIFICATION: 3

INTRODUCTION:

There is an existing SOP for dealing with recurring freezing services, on a 3-priority system, during a typical winter. However, during the winter of 2014/2015, the extremely cold weather created a situation in which the existing SOP was completely inadequate, and additional measures were required. The emergency became one which the Water Distribution department alone did not have the resources to handle. The following are the components of this emergency response plan, and the detailed information required to implement the plan is included in a binder entitled “Frozen Services Emergency Response Binder”, located in the same location as the Water Distribution SOP binder.

THE 2014/2015 EVENT BY THE NUMBERS:

The freezing event itself was primarily limited to late January to the end of March 2015.

- 317 total frozen services.
- Approximately 2200 homes running water.
- More than 50 watermain breaks November 2014 to March 2015 inclusive.
(Typically 20 to 40 yearly total)
- About 1.4 km of watermain replaced, including services.
- Total Cost: Approximately \$ 2.1 Million.

One of the figures in the “Frozen Services Emergency Response Binder” shows the locations where watermains were replaced, as well as the locations of the main breaks. Another figure shows the location of the frozen services, and another, the location of streets which were asked to run water.

INITIALIZING THE PLAN AND PREVENTATIVE MEASURES

Transition from SOP to ERP

The decision to move from the implementation of the normal SOP to the implementation of the ERP should be determined by the Director of Operations in consultation with the City Manager, Manager of Water and Wastewater, and the Water Distribution Supervisor. The following is meant to guide that decision:

- If all three priority levels of the SOP have been implemented, the temperature is still below freezing and the forecast remains cold, and additional freezing is anticipated or witnessed, including mains as well as services.
- Tracking of negative degree days: By adding the cumulative average temperature from the start of November, and by comparison to effects seen in

the winter of 2014/2015, the implementation of the SOP will likely be required to be implemented by about the time the cumulative negative degrees days reaches -200. The ERP will likely be required to be implemented by about the time the cumulative negative degrees days reaches -400. This observation is very general and the amount of snow cover would also be a large factor.

Resources:

The following resources were required in 2014/2015 in addition to the water distribution department. These resources need to be added at the appropriate time as the plan is implemented:

- Considerable extra time required by the Director of Operations and the Manager of Water and Wastewater, who, in addition to keeping senior staff and Council and the public informed, were required to make decisions to undertake action, usually on an immediate emergency basis.
- Two administrative assistants at Public Works to receive calls and transfer that information to the frozen service tracking spreadsheet, and also document work done by hose crews on the same sheet.
- The involvement of the staff of IT to provide up to date “run water” maps on the website, as well as the billing department, who coordinated handing out “run water” notices, as well as setting billing policy and answering billing questions.
- Additional supplementary City staff for hose crews, operating electrical thawing units, and delivering door to door notices, and other duties. (Note that for adequate speed of delivery and response, as many as 8 persons are needed for door-to-door notices. Smaller numbers could not always deliver the notices in time to make a difference.) Required supplementary staff was generally as follows: one or more from Wastewater Treatment, one or more from Water Treatment, one from Wastewater Collection, two staff from Parks, one staff from Engineering, and Public Works staff, whose numbers (and equipment) varied between the help needed but balanced against the need for Winter Control. At any given time, at least one, and often two “hose crews” of two people each were in operation.
- Considerable contractor assistance was required, under the emergency provisions of the purchasing bylaw, paid on a time and material basis. Three watermain contractors were required as well as a private Vactor and plumbers
- A consulting Engineer coordinated the replacement of broken watermain sections, and the installation of temporary watermains. This allowed Water staff to focus on “triage” efforts to isolate sections of main where the watermain was split, to fix localized main breaks, and to co-ordinate hose crew and other efforts.
- Suppliers of materials needed included Carson’s, Porter’s, and Evan’s. Additionally hose was purchased from a wide range of locations, even far outside Owen Sound (the City has stored thousands of feet of hose for future events)
- Flowmetrix provided leak detection services where needed.

- Thawing equipment needed included the “Magikist”, “Steam Johnny”, and “KT-190” electrical units. For watermains and valves, the Public Works steamer was used with dedicated hose for potable use.
- Other heavy equipment in the Water and Public Works divisions were dedicated greatly to the issue. As mentioned, Public Works assisted to the extent possible given the need to run Winter Control.

Notice to Run Water:

A drawing showing the affected streets where a run-water notice should be provided can be found in the “Frozen Services Emergency Response Binder”. The areas selected to run water are where there are shallow mains, and especially where dead ends occur, and near normally-closed valves between pressure zones. People are asked to run water via:

1. Door to door notices, which, when time is of the essence, must be handed out within a day.
2. Media releases.
3. The City website, which shows the run-water area map, and the website should be referenced in the media releases.

In addition to the affected areas, where residential users should run water, certain special facilities should be designated as “run water” locations, regardless of location. These are:

1. Schools
2. Nursing Homes
3. Other health care i/c hospital, dentist offices
4. Group homes
5. Funeral homes
6. Necessary institutional (Police, Fire, etc)
7. Churches
8. City facilities

Examples of both the door to door notices and media releases can be found in the “Frozen Services Emergency Response Binder”. They emphasize the need to run water at a minimum rate 24/7, and not to stop in spite of temporary warm weather, until advised to do so. Other Media Releases provide important tips to the public.

The Water Treatment Plant daily flows will increase. Flows should be monitored daily as areas are brought into the “run water” mode. It can be expected that flows will increase from on or about 8000 CMD (about 30% capacity) to about 13000 CMD (about 50% capacity). This should be closely monitored, and can create serious concerns once spring runoff occurs, discussed in a later section.

MITIGATIVE MEASURES TO MAINTAIN OR RESTORE SERVICE

Database:

A spreadsheet was developed to track the frozen service status. It can be found in the “Frozen Services Emergency Response Binder”. This was maintained by the administrative assistants at Public Works who received calls, in daily consultation with the Water Distribution supervisor as work progressed. The City’s IT department is working on a ticket system on a GIS base to do that more efficiently.

Provision of Water Stations for those with No Service:

As a stopgap measure until services could be thawed or hooked up to a neighbour’s hose, the “Frozen Services Emergency Response Binder” includes a media release to inform people that free water would be made available at the Recreational Centre, the Bayshore Community Centre, and the Water Depot (who volunteered to assist). Additionally showers were made available at the YMCA at the Recreational Centre.

Prioritization of Service:

Early on in the process, the need to prioritize the restoration of service was identified. The following was the prioritization system:

1. People who are vulnerable due to medical conditions and the elderly
2. Locations which required make up water for hot water heating systems
3. Businesses
4. Others

Note that special attention would also be paid to institutional users such as those listed in the earlier section. However they would specifically have been asked to run water early, and at a good rate, in order to try to prevent the freezing in the first place.

Thawing Water Services:

Water Distribution has the “Magikist”, “Steam Johnny”, and “KT-190” electrical units. Service can be restored with these units, but the following are considerations:

- The “Magikist is a very effective unit for thawing services, but it is time consuming to use. It can take a half day to a full day for a service to be thawed with it. The Steam Johnny is considered a backup alternative to the Magikist; the Magikist units are maintenance intensive and break down frequently.

- The KT-190 electrical units can be effective at thawing services, but can only thaw between two points of electrical connection (the curb stop and the internal plumbing) and can only be effective if a good electrical connection is maintained.

In general, thawing water services is time intensive. As a result, depending on how fast services are freezing and the extent of backlog, it can make more sense to dedicate staff to hose crews instead.

House to House hose connections:

Often the only feasible alternative to restore service to a household is to run hose from an adjacent house with water. In some cases the hose may even be run from a fire hydrant. The following are considerations:

- House to house hose connections can refreeze, especially if the person connected forgets to continue to run water. This was a major public education issue; persons on hose must keep running water to prevent the service from freezing.
- The water is not considered potable. During the 2014/2015 event, an attempt was made to make a case-by-case decision about potability, but this led to some public confusion, therefore in the future the policy should be for blanket non-potability. Please see the notice attached in the "Frozen Services Emergency Response Binder".

Temporary Watermains:

In circumstances where watermains in some areas are frozen and damaged thoroughly, temporary watermain may be laid in those areas. This was required in the 5th Ave, 800 block area, and the adjacent "Snake Alley" area (5th Ave "A" East) in 2014/2015. The following are considerations:

- The temporary watermain is installed in generally the same way as is done for normal construction purposes.
- People on temporary watermain must run water constantly to prevent freezing.
- Temporary watermain should be insulated where possible, such as by bales of straw.
- Temporary watermain should be considered non-potable, and appropriate door to door notice given. However precautionary samples could still be taken to document actual water bacteriological quality. One issue with temporary watermain is that constant refreezing creates the need to continually work on it, and associated shutdowns. This makes assuring quality more difficult.

Billing while running water or while on hose connections:

The Finance department provided a report to Council summarizing a policy regarding how to invoice affected households. It is included in the "Frozen Services Emergency Response Binder".

Frozen Hydrants:

As the water distribution department encounters frozen hydrants, an updated list of frozen hydrants should be maintained and provided regularly to the fire department. Please see the list attached in the "Frozen Services Emergency Response Binder". Hydrants being used as temporary water supplies, or being run regularly to prevent freezing, should also be flagged on the same list as "in use: out of service". The fire department should be made aware that many other hydrants may also be frozen, and they should have consideration for that in their planning.

ISOLATION AND RESTORATION

Isolation of Damaged Intersections: Cut and Cap

In the winter of 2014/2015, various intersections were "lost", meaning:

- Pipes and valves in the intersection were frozen, and some were split. Sometimes this was evidenced by watermain breaks in the intersection, or valves which were frozen which could not be thawed, or damaged valves.
- At intersections where that had occurred, Water Distribution could not be confident of maintaining control of flow at the intersection once it thawed, due to the unknown conditions of the pipes and valves at those intersections.

When the intersection was "lost" in this manner, the decision was made to:

- Thaw valves and leave them closed in an attempt to maintain control of the situation when the damaged pipes thaw, releasing water to the area.
- Failing the restoration of valves, if that was not possible, the watermain was cut and capped near the intersection, at a point known to be providing water (ie, near a service location that was running).

The "Frozen Services Emergency Response Binder" includes figures which were drawn up in the field to document those intersections that were cut and capped on a triage basis.

Once the pipes thawed, each intersection was restored as a minor construction project on a time and material basis. See the next section.

Emergency Repairs on a Time and Material Basis:

Various general watermain contractors were brought in on a time and material basis to execute emergency repairs, replaced frozen damaged watermain, and also replacing services in the affected areas:

- The abovementioned isolated intersections
- The sections of watermain that failed; in some cases a good portion, or all of, a city block.

One of the figures in the “Frozen Services Emergency Response Binder” shows the locations where watermains were replaced, as well as the locations of the main breaks. In general, shallow frozen damaged watermain (almost always cast iron) was replaced by PVC watermain with 1.8 metres cover. Where 1.8 metres of cover could not be achieved for whatever reason, the appropriate amount of insulation was installed. Services were replaced because, generally speaking, where the mains were shallow, so were the service pipes.

WRAPPING UP THE EMERGENCY

Notice to Stop Running Water

The Notice to stop running water was issued via media release on April 15, 2015. Generally speaking, the notice to stop running water is a judgment call issued based on observed frost conditions, and forecasted temperatures. However consideration should be given to the impact of Spring Runoff on the Water Treatment Plant, which may cause the Notice to be issued earlier; see below.

The Water Treatment Plant cannot effectively run at capacity, or even a reasonable fraction of capacity, when raw water quality is adversely affected by the spring runoff. When that happens, the plant must use treated water to backwash filters very frequently, which can result in the net production of the plant decreasing to less than 5000 CMD. This can cause the storage reservoir to be drawn down to levels less than 50% even when there is no run-water request in place. During the run-water scenario, plant demand was about 13,000 CMD, compared to average demand of 8,000 CMD. The duration of the event can vary, but often goes on for days. This could be a serious concern during future events.

Gathering Hose

The amount of hose needed to provide temporary service to hundreds of homes is substantial. Usually about 100 feet of hose is required to service a home. The City has stored more than 15,000 feet of hose from the 2014/2015 event. Gathering hose will take two crews about two weeks.

MISCELLANEOUS CONSIDERATIONS

Existing Watermains left out of Commission for Extended Periods

In certain areas, where some mains were isolated by “cut and cap” or other measures, some existing watermain was left out of service and unpressurized for a period of time, then put back into service. This raised the following water quality concerns:

1. Could the pipe have been adversely impacted by contaminated water, especially sewage, during that time?
2. Would the disinfection procedures as defined by AWWA for construction and commissioning of new watermain be adequate for existing mains which, among other things, can be heavily tuberculated?

The solution selected to address these concerns was two-fold:

1. Take a Sample First : A bacteriological sample was taken after flushing the main, then re-isolating the main, but prior to superchlorination. The purpose of that sample was simply to establish if there was any evidence of contamination.
2. Disinfection procedures in accordance with AWWA procedures for new pipe were undertaken, but at greater chlorine concentrations as an additional precaution.

Relationship with Road Maintenance Activities

In certain locations it has been speculated that the freezing of watermains may be related to two road maintenance activities:

1. Snow clearing on the edges of some streets, may reduce snow cover which was protecting a watermain from freezing.
2. Crack sealing activities may be helpful. In the winter salt water runoff can penetrate the ground in cracked areas. Salt water can be cooled to temperatures lower than freezing, and this may contribute to deeper penetration of frost and pipe freezing in such areas. This is a speculative theory but may have merit.



Frozen Water Service Pipes

<http://ottawa.ca/en/residents/water-and-environment/drinking-water/frozen-water-service-pipes>

Severe and uninterrupted cold can result in frozen water service pipes which prevent water from reaching the homes of impacted residents. The City assigns crews to respond to this issue and works to restore water service to affected properties as soon as possible throughout the winter months.

REMINDER: If your service has been thawed, continue to leave a steady stream of water running equal to an adult thumb width until April 30 or until the frost thaws.

- [What is a water service pipe?](#)
- [Whose service pipes are vulnerable to freezing?](#)
- [What should property owners do if their service pipe is frozen?](#)
- [How can I help City crews thaw my service pipe?](#)
- [When can I expect my service to be thawed?](#)
- [Will you be calling me in advance so that I know when you are coming?](#)
- [Will I be charged a fee for thawing a frozen service?](#)
- [What are my options while I am waiting for my service to be thawed?](#)
- [Am I able to thaw the frozen service on my own?](#)
- [Am I responsible for the cost of running my water?](#)
- [How can I stop my service from freezing in the future?](#)
- [Why are there so many frozen services this year?](#)

Temporary Water Service Recipients (properties receiving water via an external hose from a neighbour)

- [Am I responsible for paying for the water that I need to run while on temporary water service?](#)
- [Is the water I am getting from the temporary hose at my neighbour's place safe to drink?](#)
- [How long will I have to remain on a temporary service?](#)
- [Why has the City decided not to thaw those on temporary services?](#)
- [How will I know when my water pipes have thawed?](#)
- [What do I do with the hose, etc., when my pipes have thawed?](#)
- [Do the temporary service hook-ups provide full water service to my home?](#)



Temporary Water Service Providers (Neighbours)

- [Will I have to pay for the water I am giving to my neighbour?](#)
- [Will the external hose running cause my pipes to freeze?](#)
- [How will I know when to stop my water from running?](#)

What is a water service pipe?

A water service pipe runs underground, connecting a building's plumbing to a City water main. Every property that receives water from one of the City of Ottawa's municipal drinking water systems has a water service pipe.

Which service pipes are vulnerable to freezing?

Most water service pipes in Ottawa are buried deep enough to protect them from frost penetration. However, depending on soil conditions and snow cover, frost may penetrate the ground deep enough to freeze some water pipes during extended periods of extremely cold weather.

If you have received a letter from the City about frozen service pipes, or if your service pipe has frozen in the past, your pipes are vulnerable to freezing this winter.

What should property owners do if their service pipe is frozen?

Report a frozen service pipe by calling the City at 3-1-1.

How can I help City crews thaw my service pipe?

- Find the shutoff valve outside your house and clear away the snow.
- Clear a path to the water shutoff valve inside your house and remove any furniture or breakables from the immediate area.

When can I expect my service to be thawed?

Wait times will vary based on the volume of requests we have at any given time. Please contact 3-1-1 for information on current wait times for temporary service installation or thawing.

Will you be calling me in advance so that I know when you are coming?

Yes. We will call you in advance. We will give you as much notice as we can. If we call and you are not there, we will leave a message and a direct contact number.

Will I be charged a fee for thawing a frozen service?

- If the frozen water service is on municipal property, there is no charge to the property owner for thawing.



- If the frozen water service is on private property, property owners will be charged a minimum rate of \$304 to thaw up to a 25 mm pipe. Over 25 mm is the cost plus 15%. This fee applies each time the municipality must thaw a water service on private property.

What are my options while I am waiting for my service to be thawed?

- The City is providing bottled water to affected residents. Contact the City to request bottled water through 3-1-1.
- Use the shower facilities at any City recreation facility (no admission fee will be charged).
- Melt snow in your bathtub for non drinking water uses, such as flushing toilets.
- All residents should have an emergency water kit/supply available year-round as part of normal emergency preparedness.

Am I able to thaw the frozen service on my own?

- If you are unable to locate the frozen section of indoor pipe or are unsure what to do, please contact a licensed plumber.
- If you are able to determine that the frozen section of water pipe is located inside your home, you can try the following methods:
 - Open a cold water tap nearest to the frozen section so you will know when the pipe is thawed.
 - Apply heat using an electric heating pad wrapped around the pipe, or from an electric hair dryer.
 - You may also use a portable heater with caution, especially around flammable materials.
 - Ensure rooms or crawl spaces where pipes are located are adequately heated.

IMPORTANT: Never use an open flame to thaw a frozen water pipe. Always use caution when applying any heat source near insulation or other flammable materials.

Am I responsible for the cost of running my water?

- If records show the service freezes on your property, you must cover the cost of running the water and should have received a notice informing you of this situation.
- If records show the service freezes on the City's property and you have received a written notification from the City to run the water this winter, the City will cover the cost of running the service by adjusting your water bill in future months.



How can I stop my service from freezing in the future?

- Ensure your indoor air temperature is kept above 8°C in areas that contain water pipes and especially near the meter.
- Investigate why your service is at risk of freezing. The service may not be installed deeply enough.
- Shut off and drain pipes leading to outside faucets.
- Wrap foam pipe insulation around pipes most likely to freeze (e.g. near outside walls, crawl spaces, attics).
- Seal air leaks in your home and garage, especially in areas where pipes are located.
- Run a continuous steady stream of cold water (at least the width of an adult thumb) until the frost is out of the ground (mid April).
- If you received a letter from the City about letting your water run, it means your property is at risk and you should follow those instructions.
- If you are away, have someone check your home regularly.

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Temporary Water Service Recipients (external hoses extending from a neighbour's yard)

Am I (the recipient) responsible for paying for the water that I need to run while on temporary water service?

No. While you are on temporary services, your neighbour will provide your water supply and will not be charged for water use up to the date that the temporary service is removed.

Is the water I am getting from the temporary hose at my neighbour's place safe to drink?

Yes.

How long will I have to remain on a temporary service?

We will keep you on a temporary service until your pipes thaw on their own. If there is a reason why you need to be removed from the temporary service earlier, please contact 3-1-1 to make that request.

Why has the City decided not to thaw those on temporary services?

It is less disruptive to you and less expensive to allow the services to thaw as the frost leaves the ground. During winters with deep frost, there is always a chance that services will re-freeze or thaw attempts will be unsuccessful.



How will I know when my water pipes have thawed?

As temperatures rise above zero for several days in a row and the ground starts thawing, you can leave a tap running in your home and turn off the tap where the hose is connected to your house. If your water continues to run, then your buried service is thawed. If the water doesn't continue running, open the tap where the hose is connected and try again at a later time. To avoid refreezing, wait until there has been a long run of above zero temperatures day and night before you attempt this.

What do I do with the hose, etc., when my pipes have thawed?

Once the majority of services have thawed (late April/early May), the City will contact you and collect the temporary service equipment. You can disconnect your hose once your pipes have thawed and you have running water. If you need assistance disconnecting your hose, please contact 3-1-1 to make a request.

Do the temporary service hook-ups provide full service to my home?

Temporary service is provided via a hose that connects the external hose bib of one property to the external hose bib of an adjacent property. As a result, some reduction in pressure may be experienced if both customers use the water supply at the same time, but not to levels that would prevent normal use.

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Temporary Water Service Providers (Neighbours)

Will I have to pay for the water I am giving to my neighbour?

You will not be charged for water being provided to your neighbour or your own water for the duration of the temporary service.

- If you have an **automatic meter** reader that reports meter readings automatically you don't need to do anything further. The City will record your address and make the adjustment to your water bill in late spring/early summer.
- If you are on a **meter** that the City must **read manually**, please call in your meter reading immediately to the City's automated number at 613-580-2727 and again at the end of the temporary service to ensure water consumption is deducted from your bill.

How will I know when to stop my water from running?

When your neighbour advises you or the City advises you that your neighbour has been thawed.

Will the external hose running cause my pipes to freeze?

Not as long as you leave your water running and ensure your indoor air temperature is kept above 8°C in areas that contain water pipes. When your neighbour's water service is thawed, turn off your external tap and drain your external water line like you did in the fall.

If your water pipes or temporary hose freeze, call 3-1-1 and we will dispatch a crew to assist with thawing it.