



STUDY AND TEST MATERIAL FOR THE CTFH2 ASSESSMENT

(Confidence Testing Fire Hydrants)

January 1, 2011

Revised 03-05-12

This document contains materials required for the CTFH2 assessment.

You will need this material for the test. Make sure it is bound in a binder or stapled. You will not be allowed to take this material into the test center if it is not bound.

(IMPORTANT: Material provided is not intended to endorse, represent quality, recommend a particular product, or single out any product. Material may be used to provide standardized content for test questions to ensure that participants know how to use data sheets and manufacturer materials to establish listing and installation limitations of these types of products. There is no implied or other relationship between CSA and the manufacturers or suppliers of information used. CSA is not liable for accuracy or content of material contained within these documents. Material in this booklet is for testing purposes only and is not to be used for installation of these systems / components. Check with suppliers for current and specific information to be used in actual design and installation conditions.)

About the Assessment:

Assessment Abbreviation: CTFH2

Number of Questions: 35

Amount of Time for Test: 60 minutes

Exam format: Open book (bring your own books); calculators will be available, writing tablet or paper will be provided for calculations. Any books or exam documents brought into exam must be bound as no loose papers are allowed.

Passing Score: 80%

Cell Phones: Cell phones, pagers, etc. must be left in vehicle. Do not bring them into test center.

Codes / Materials Used for Exam and Editions:

- 2010 NFPA 24, Standard for the Installation of Private Fire Service Mains and Their Appurtenances
- 2008 NFPA 25 Handbook (including Annex materials related to hydrants, valves, mains, flow testing) (the handbook includes excerpts from NFPA 291 that are needed)
- Mueller Co. Operating Instructions for Super Centurion Hydrant (within this booklet)
- Terminal City Iron Works Slide Gate Hydrant Maint. Manual (within this booklet)
- Confidence Testing Fire Hydrants - Colorado Springs FD 1998 (**Separate document**)
- Kennedy Valve K81 Guardian Hydrant Operation and Maint. Guide (**Separate document**)
- Other useful documents include:
 - Manual M-17 “Installation, Field Testing, and Maintenance of Fire Hydrants” by the American Water Works Association (not required for exam)
 - NFPA 291: Recommended Practice for Fire Flow Testing and Marking of Hydrants (not edition specific) (If NFPA 25 handbook is not used, than NFPA 291 is needed)

General Assessment Information:

About the Questions: Questions are randomly selected from respective topics within a larger database. Answer choices are randomly mixed, meaning that choice “B” will not always be in position “B”.

Exam Format: Questions are computer based and will be delivered one at a time. You will have the opportunity to go back and review all questions. You can also “check” a box within each question which will flag it for later review. During the review, checked questions will be marked for easier identification. See the document on “Screen Shots” under the “Test Info” link on our web site.

Time Clock: Most assessments will have a count-down timer displayed on the screen. It may appear as if this timer is fluctuating between questions (gaining time on one question and losing time on the next question). This is normal. The software has a specific function which ensures your time is protected if there is a loss of the Internet connection. It is very difficult to explain the logic behind the clock. However, we can assure you that you are getting all of your time. Do not steadily watch the clock, but rather use it as a general guide. Long pauses between questions will result in the biggest time jump as the computers verify that you are still testing and did not lose the Internet connection.

Study Concepts Include, but are not limited to:

- Understand how elevation impacts pressures. Example would be hydrants at different elevations. Assuming there is no flow, but different pressures, how does elevation impact pressures. Given pressure at one hydrant, be able to calculate pressures at other hydrants.
- Understand and apply the conservation of flow through a pipe.
- Be able to identify which hydrants to use for conducting fire flow test. Including which hydrant is the flow hydrant and which is the test hydrant. If several hydrants are detailed, identify which to use for test results.
- Test questions that refer to NFPA 291 can be found within the NFPA 25 Handbook, 2008 edition. Or you can use NFPA 291.
- Be able to calculate flow based on outlet size and coefficients, including multiple outlets.
- Be able to identify the different parts of hydrants and the different types of hydrants discussed in this document and NFPA 25.
- Be able to identify inspection, testing, and maintenance procedures for hydrants identified in this document and NFPA 25.
- Procedures for testing of fire mains out of NFPA 24. Includes allowed leakage, pressure testing new section of pipe, establishing velocity and flows for flushing.
- Limitations, and requirements around piping out of NFPA 24. Protection of piping and bolts such as when repairs are made.
- Minimum depth of bury of piping in accordance with NFPA 24. Including depth below frost line, under driveways, railroad tracks, etc. Distance of pipe from a retaining wall to provide freeze protection. (Distance from wall would be at least the same as depth of bury).
- Additional material found in documents mentioned above.

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Operating Instructions for

MUELLER® SUPER CENTURION® FIRE HYDRANT



MAIN OFFICE and PLANT

500 West Eldorado Street

Decatur, Illinois 62522

www.muellercompany.com

! WARNING

Before removing any bolts(s) holding the hydrant together, shut off gate valve to isolate hydrant from main water source. Loosen (do not remove) one nozzle cap two turns and check for water under pressure inside hydrant - bleed off any pressure, then remove nozzle cap completely. Open hydrant main valve completely. A continuous flow of water, no matter how slight, indicates hydrant is not properly isolated from the main water supply, and that problem must be corrected before any hydrant disassembly can proceed. Disassembly of hydrant with pressurized water acting against the main valve could result in unexpected ejection of hydrant parts, debris or high-pressure water stream, which could cause serious bodily injury.

MUELLER® SUPER CENTURION® FIRE HYDRANT

Inspection and Maintenance

Beginning with the 1997 date codes, there are two styles of Super Centurion Fire Hydrants:

- 1) the Super Centurion 250™ Hydrant and
- 2) the Super Centurion 200™ Hydrant.

This manual applies to all Mueller Super Centurion Fire Hydrants with date codes 1997 or later. However, the 250 psig rated 3-way Hydrant, which has O-ring Seals at the Bonnet and Ground Line Flanges, is shown in all illustrations and O-rings are referred to in the instructions. When working on a 2-way or 1-way Hydrant, which is rated at 200 psig, the foregoing references to O-rings should be understood to mean the flat gaskets that are standard with 2-way and 1-way Hydrants.

NOTE: HYDRANTS MADE PRIOR TO 1997 WILL CONTINUE TO USE FLAT GASKETS WHEN REPLACING THESE GASKETS AT THE BONNET AND SAFETY FLANGES.

All Hydrants produced in 1997 and after have a stainless steel Safety Coupling, Reversible Main Valve (patent pending) and two Shoe Bolts used to retain the Drain Ring Housing.

The 1997 style stainless steel Safety Coupling is compatible with the Hydrants made prior to 1997.

Non-reversible Main Valves for pre-1997 Hydrants are available. To retrofit such a Hydrant with the 1997 style Reversible Main Valve, both the Main Valve and the Lower Valve Plate must be changed to the 1997 style part.

For Hydrants made prior to 1997, see the operating instructions for the Centurion® Fire Hydrant (Form 10492).

Inspection

To ensure their readiness for instantaneous use, it is recommended that Fire Hydrants be inspected and tested at six-month intervals.

Inspect visually for damaged or missing parts.

Loosen one Nozzle Cap slightly and tighten the others. Open Hydrant fully. Tighten loose Nozzle Cap when water starts to flow. Remove Oil Filler Plug to check oil level. If oil level is low, fill as shown on page 3. Check all flange connections for leaks. Turn Operating Nut to fully CLOSED position.

If water or oil overflowed from Oil Filler Hole, remove Bonnet and replace O-rings in both the Bonnet and the Hold Down Nut. Inspect and clean Stem, and replace it if corroded or pitted. Check oil level. Replace Bonnet and test for leaks.

Use A-367 Brass Sleeve when removing or replacing Bonnet or Hydrant Barrel to protect stem O-rings.

Remove one Nozzle Cap, stand on the side of Hydrant opposite the cap removed, open Hydrant fully, and flush Barrel and Hydrant Lateral. Turn Operating Nut to fully CLOSED position.

Remove all Nozzle Caps. Clean and lubricate threads.

Examine inside of Barrel to make certain Drain Valves have completely drained water from Barrel. If water fails to drain from Barrel, it may be caused by one or more of the following conditions:

1. Water Table in ground is higher than drains.
2. When Hydrant was installed, coarse gravel was not placed around Drains, in locations where ground has a make up such that it will not absorb water.
3. Drains are stopped by some foreign material.
4. Failure to leave Cap off of Hydrant to allow air to enter so Barrel will drain.

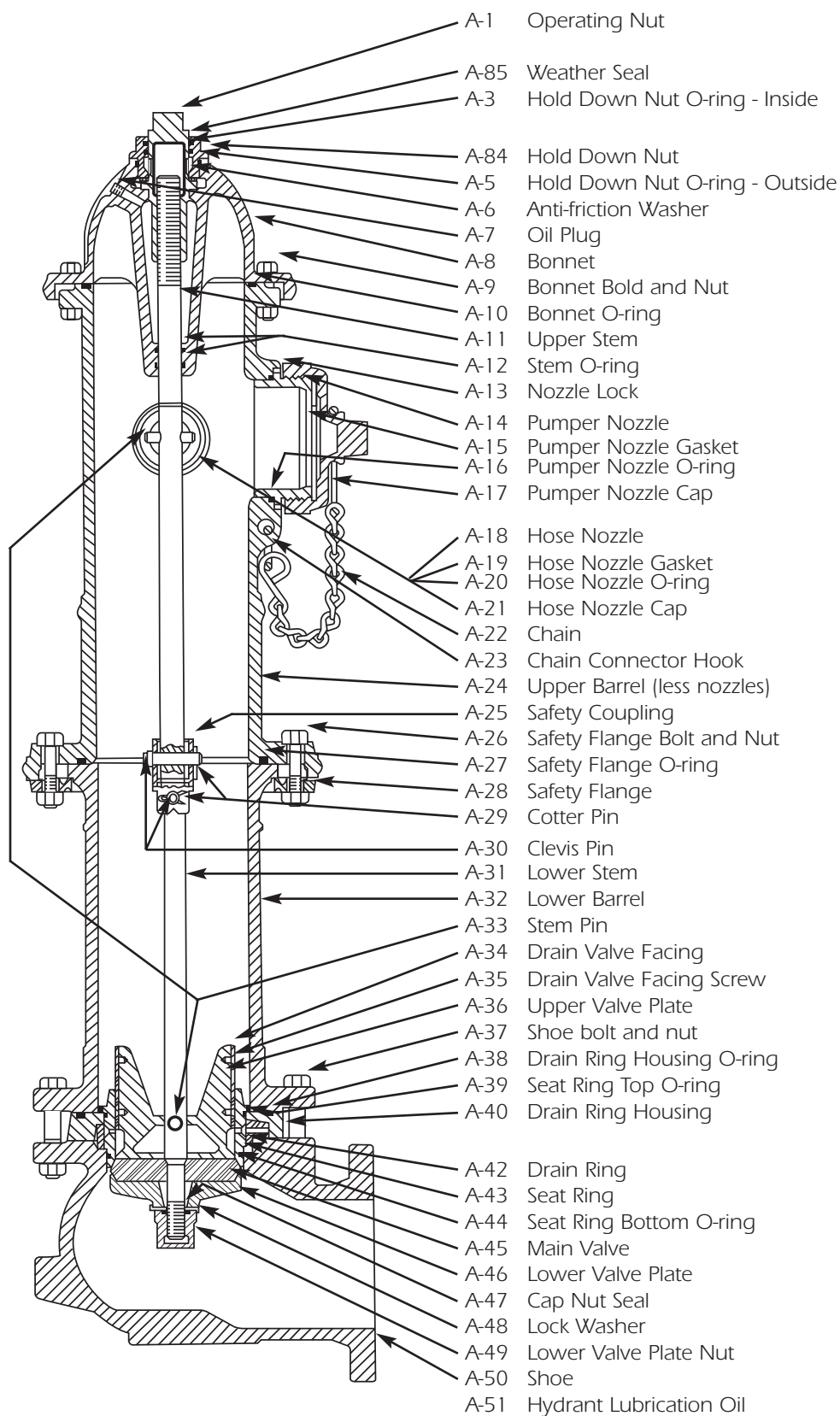
The foregoing procedure introduces full line pressure to Drain Valves. It provides the best method for cleaning Drain Valves using water pressure.

IMPORTANT - Initial installation of Hydrant MUST BE MADE PROPERLY so Safety Flange will function properly. Hydrant should be blocked at ground line and around Shoe using concrete or similar substance to prevent ground from giving way when Hydrant is struck.

For additional information on Hydrant anchorage, blocking, and drainage, see AWWA Standard C600 and Manual M17.

MUELLER® SUPER CENTURION® FIRE HYDRANT

Parts



MUELLER® SUPER CENTURION® FIRE HYDRANT

Filling Oil Reservoir

CAUTION: Always fill the oil reservoir with the bonnet installed, the hydrant in its normal upright position, and the main valve fully closed. If the hydrant is filled with lubricant under any other circumstances, excess lubricate can overflow the Bonnet and create a pressure lock. This could result in damage to the seals or Bonnet or prevent proper hydrant operation.



1. Remove Oil Filler Plug and check oil level. Oil should be level with Oil Filler Plug Hole.



2. If oil is low, use a small funnel to add MUELLER Hydrant Lubricant



3. When oil is level with Oil Filler Plug Hole, replace Oil Filler Plug.

MUELLER® SUPER CENTURION® FIRE HYDRANT

Facing of Hose Nozzles



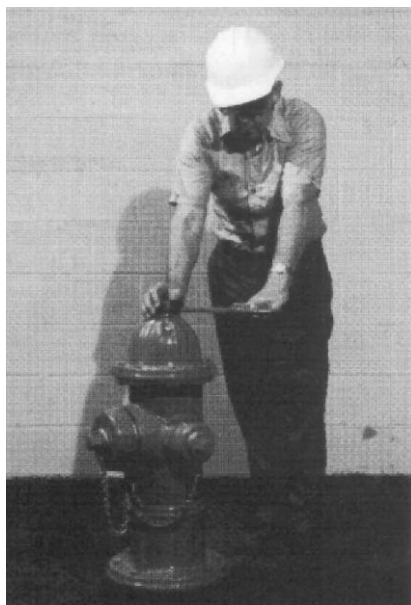
1. Loosen Nuts on Safety Flange Bolts.



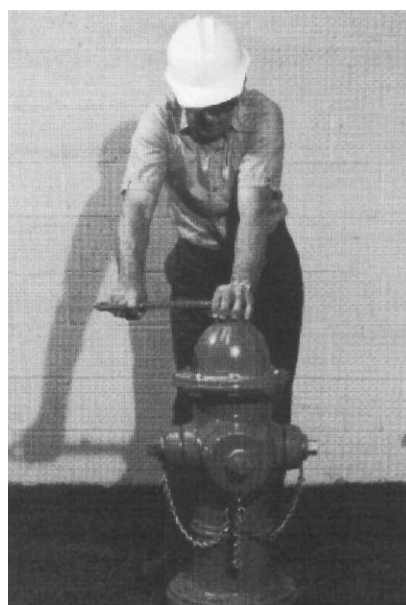
3. Rotate Upper Barrel section as desired.



5. Tighten Safety Flange Bolts.



2. Turn Operating Nut slightly in the opening direction to relieve compression between Barrel sections.

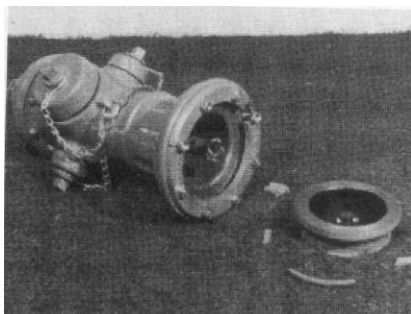


4. Tighten Operating Nut, turning in closing direction.

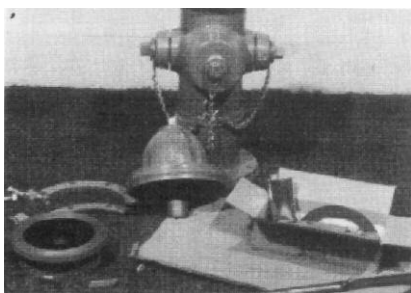
6. Turn Operating Nut in closing direction to make sure Main Valve is closed tightly, then turn in opening direction approximately 1/4 turn to relieve tension on operating mechanism.

MUELLER® SUPER CENTURION® FIRE HYDRANT

Replacing Safety Stem Flange and Safety Stem Coupling



1. Mueller Hydrant with Upper Barrel knocked over by truck. Note broken pieces of Safety Flange lying on ground.



2. Remove stainless steel Cotter Pin from stainless steel Clevis Pin. Remove Clevis Pin and Safety Coupling from Upper Stem. Unbolt and remove broken Safety Flange from Upper Barrel. Remove Hold Down Nut, Anti-Friction Washer, and Operating Nut from Bonnet. Lubricate Brass Sleeve and slide over threaded Stem end to prevent O-ring damage. Unbolt Bonnet from Upper Barrel. Slide Upper Stem out of Bonnet and remove Brass Sleeve.



3. Remove stainless steel Cotter Pin from stainless steel Clevis Pin in Lower Stem (throw away the old Clevis Pin and Cotter Pin).

CAUTION: ALWAYS FILL THE OIL RESERVOIR WITH THE BONNET INSTALLED, THE HYDRANT IN ITS NORMAL UPRIGHT POSITION, AND THE MAIN VALVE FULLY CLOSED. IF THE HYDRANT IS FILLED WITH LUBRICANT UNDER ANY OTHER CIRCUMSTANCES, EXCESS LUBRICANT CAN OVERFILL THE BONNET AND CREATE A PRESSURE LOCK. THIS COULD RESULT IN DAMAGE TO THE SEALS OR BONNET, OR PREVENT PROPER HYDRANT OPERATION.



4. Assemble new Safety Stem Coupling to Upper Stem with new stainless steel Clevis Pin and new stainless steel Cotter Pin. Safety Stem Coupling should be installed with notches towards the Lower Stem.

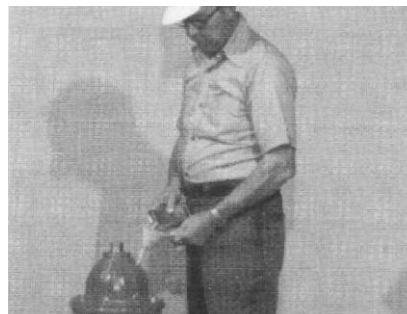
NOTE: "THIS END UP" STAMPED ON COUPLING.



5. Assemble Upper Stem and new Safety Stem Coupling onto Lower Stem and retain it with the new stainless steel Clevis Pin and new stainless steel Cotter Pin furnished with Safety Stem Coupling.



6. Install O-ring** in groove in Ground Line Flange of Upper Barrel and place Upper Barrel carefully in position on Lower Barrel. Be sure that Upper Barrel is concentric with Lower Barrel. Bolt the two halves of Safety Flange into place (with bevel on outer edge downward) and with Safety Flange snugly fitting around Lower Barrel.



7. Check Bonnet O-ring** for proper position and condition. Attach Brass Sleeve to Upper Stem and lubricate outside to protect O-ring Seals from thread damage. Place Bonnet onto Upper Barrel and assemble Bonnet Bolts only hand-tight. Remove Brass Sleeve. Reassemble Operating Nut, Anti-Friction Washer, and Hold Down Nut*. Be sure O-ring Seals are in good condition at thread shoulder on outside of Hold Down Nut and on in side where contact is made with Operating Nut. Remove Oil Filler Plug in side of Bonnet. Pour MUELLER Hydrant Lubricant into Oil Reservoir until it is level with the Oil Filler Hole. Replace Oil Filler Plug.



8. Tighten Bonnet Bolts. Unscrew one Hose Nozzle Cap slightly to bleed air. Open Hydrant fully. Tighten the Hose Nozzle Cap when water starts flowing and check all flange connections for leaks. Turn Operating Nut to fully closed position and remove Hose Nozzle Cap to allow Barrel to drain. Replace Hose Nozzle Cap.

9. Turn Operating Nut in closing direction to make sure Main Valve is closed tightly, then turn in opening direction approximately 1/4 turn to relieve tension on operating mechanism.

***TIGHTEN HOLD DOWN NUT TO 200-300 FT-LBS OF TORQUE. IF TORQUE WRENCH IS NOT AVAILABLE, USE A 3 LB HAMMER TO STRIKE THE END OF THE A-311 WRENCH FIRMLY TWO TIMES TO ASSURE THE NUT IS PROPERLY TIGHTENED.**

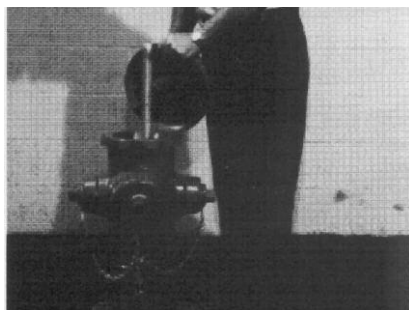
****TO DETERMINE CORRECT O-RINGS FOR BONNET AND GROUND LINE FLANGES, WHICH ARE SIMILAR IN APPEARANCE: SMALLER DIAMETER O-RING IS USED AT BONNET FLANGE; LARGER AT GROUND LINE FLANGE.**

MUELLER® SUPER CENTURION® FIRE HYDRANT

Removing Main Valve From Bonnet Flange

! WARNING

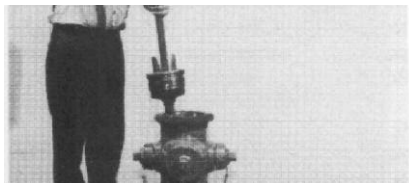
Before removing any bolt(s) holding the hydrant together, shut off gate valve to isolate hydrant from main water source. Loosen (do not remove) one nozzle cap two turns and check for water under pressure inside hydrant – bleed off any pressure, then remove nozzle cap completely. Open hydrant main valve completely. A continuous flow of water, no matter how slight, indicates hydrant is not properly isolated from the main water supply, and that problem must be corrected before any hydrant disassembly can proceed. Disassembly of hydrant with pressurized water acting against the main valve could result in unexpected ejection of hydrant parts, debris or high-pressure water stream, which could cause serious bodily injury.



1. Remove Hold Down Nut, Operating Nut, and Anti-Friction Washer from Bonnet. Lubricate Brass Sleeve and slide over threaded stem to prevent O-ring damage. Unbolt and remove Bonnet. Remove Brass Sleeve.



2. Slide slotted end of Wrench over top of Stem and engage the slot with Pin in Upper Stem. Thread Operating Nut onto stem and tighten against wrench to hold it securely. Lower support arm onto top flange of the Upper Barrel and tighten Thumb Screw to hold the Main Valve in the closed position. Shut off water at the Gate Valve. Remove Main Valve Assembly by turning Seat Wrench counter-clockwise.



3. Lift out Wrench, Lower Stem, Main Valve Assembly and Seat Ring from Hydrant Barrel as a unit.

CAUTION: ALWAYS FILL THE OIL RESERVOIR WITH THE BONNET INSTALLED, THE HYDRANT IN ITS NORMAL UPRIGHT POSITION, AND THE MAIN VALVE FULLY CLOSED. IF THE HYDRANT IS FILLED WITH LUBRICANT UNDER ANY OTHER CIRCUMSTANCES, EXCESS LUBRICANT CAN OVERFILL THE BONNET AND CREATE A PRESSURE LOCK. THIS COULD RESULT IN DAMAGE TO THE SEALS OR BONNET, OR PREVENT PROPER HYDRANT OPERATION.



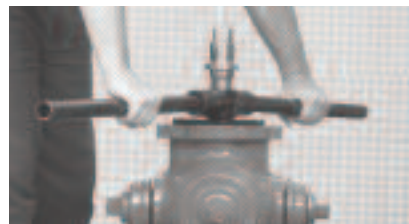
4. Straighten stainless steel Lock Washer, unscrew Cap Nut and remove Washer, Stem Seal, Lower Valve Plate, Main Valve and Seat Ring. Clean, inspect and replace any damaged parts. (Main Valve can be reversed to provide new seal.) Replace Drain Ring Facings. Inspect and lubricate Top and Bottom Seat Ring O-rings (replace if necessary). Lubricate all threaded surfaces and reassemble.



5. With Cap Nut tightened to 100 ft-lbs on 5 1/4" Hydrant or 75 ft-lbs on 4 1/2" Hydrant, bend edges of stainless steel Lock Washer over one flat on the Lower Valve Plate and one flat on the Cap Nut.



6. Lower Main Valve, turn Seat Wrench clockwise, and carefully thread Main Valve and Seat Ring into the base of the Hydrant hand-tight. Raise the Main Valve leaving about 1/2" of play between the Main Valve and Seat. Lower Support Arm and tighten Thumb Screw.



7. Turn Seat Wrench clockwise to tighten Main Valve to 200 ft-lbs. Turn on water at the Gate Valve and remove Seat Wrench by removing operating nut.



8. Check Bonnet O-ring for proper position and condition. Attach Brass Sleeve to Upper Stem and lubricate outside to protect O-ring Seals from thread damage. Place Bonnet onto Upper Barrel and assemble Bonnet Bolts only hand-tight. Remove Brass Sleeve. Reassemble Operating Nut, Anti-Friction Washer, and Hold Down Nut*. Be sure O-ring Seals are in good condition at thread shoulder on outside of Hold Down Nut and on inside where contact is made with Operating Nut. Remove Oil Filler Plug in side of Bonnet. Pour MUELLER Hydrant Lubricant into Oil Reservoir until it is level with the Oil Filler Hole. Replace Oil Filler Plug.



9. Tighten Bonnet Bolts. Unscrew one Hose Nozzle Cap slightly to bleed air. Open hydrant fully. Tighten the Hose Nozzle Cap when water starts flowing and check all flange connections for leaks. Turn Operating Nut to fully closed position and remove Hose Nozzle Cap to allow Barrel to drain. Replace Nozzle Cap.

10. Turn Operating Nut in closing direction to make sure Main Valve is closed tightly, then turn in opening direction approximately 1/4 turn to relieve tension on operating mechanism.

***TIGHTEN HOLD DOWN NUT TO 200-300 FT-LBS OF TORQUE. IF TORQUE WRENCH IS NOT AVAILABLE, USE A 3 LB HAMMER TO STRIKE THE END OF THE A-311 WRENCH FIRMLY TWO TIMES TO ASSURE THE NUT IS PROPERLY TIGHTENED.**

MUELLER® SUPER CENTURION® FIRE HYDRANT

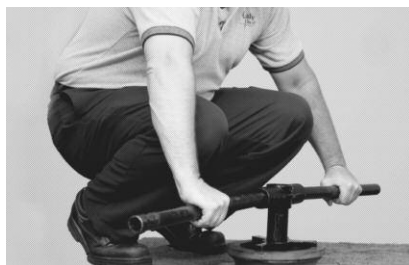
Remove Main Valve from Lower Barrel Flange

! WARNING

Before removing any bolt(s) holding the hydrant together, shut off gate valve to isolate hydrant from main water source. Loosen (do not remove) one nozzle cap two turns and check for water under pressure inside hydrant – bleed off any pressure, then remove nozzle cap completely. Open hydrant main valve completely. A continuous flow of water, no matter how slight, indicates hydrant is not properly isolated from the main water supply, and that problem must be corrected before any hydrant disassembly can proceed. Disassembly of hydrant with pressurized water acting against the main valve could result in unexpected ejection of hydrant parts, debris or high-pressure water stream, which could cause serious bodily injury.



1. Remove Hold Down Nut, Anti-Friction Washer, and Operating Nut from Bonnet. Lubricate Brass Sleeve and slide over threaded stem end to prevent O-ring damage. Unbolt and remove Bonnet. Remove Safety Flange Bolts and Safety Flange. Remove Upper Barrel. Remove Upper Stem and Stem Coupling from Lower Stem. Slide slotted end of Wrench over Lower Stem. Align holes in Wrench and Stem and attach Wrench to Stem with Clevis Pin. Lower Support Arm onto the Flange of Lower Barrel and tighten Thumb Screw (to hold Main Valve in closed position). Shut off water at Gate Valve.



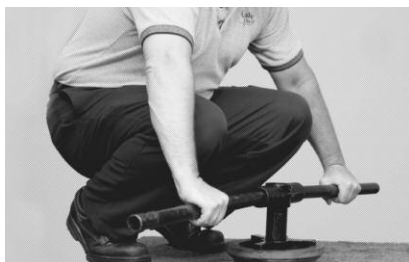
2. Remove Main Valve Assembly by turning Wrench counter-clockwise and lift out Wrench, Lower Stem, Main Valve Assembly and Seat Ring from Hydrant Barrel as a unit.



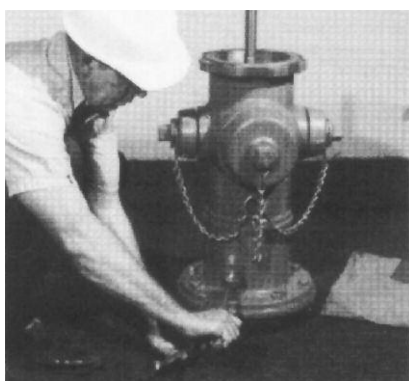
3. Straighten stainless steel Lock Washer, unscrew Cap Nut and remove Washer, Stem Seal, Lower Valve Plate, Main Valve and Seat Ring. Clean, inspect and replace any damaged parts. (Main Valve can be reversed to provide new seal.) Replace Drain Valve Facings. Inspect and lubricate Top and Bottom Seat Ring O-rings (replace if necessary). Lubricate all threaded surfaces and reassemble. With Cap Nut tightened to 100 ft-lbs on 5 1/4" Hydrant, or 75 ft-lbs on 4 1/2" Hydrant, bend edges on stainless steel Lock Washer over one flat on the Lower Valve Plate and one flat on the Cap Nut.



4. Lower Main Valve Assembly and carefully thread Seat Ring into the base of the Hydrant hand-tight. Raise the Main Valve leaving about 1/2" of play between the Main Valve and Seat. Lower Support Arm onto Flange of Lower Barrel and tighten Thumb Screw.



5. Tighten Main Valve to 200 ft-lbs. Turn on water at the Gate Valve and remove Wrench from Stem by removing Clevis Pin.

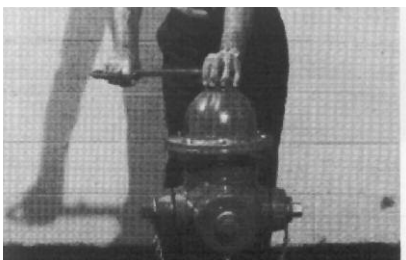


6. Reassemble Upper Stem to Lower Stem. Place Upper Barrel in place and reassemble Safety Flange.**

CAUTION: Always fill the oil reservoir with the bonnet installed, the hydrant in its normal upright position, and the main valve fully closed. If the hydrant is filled with lubricant under any other circumstances, excess lubricant can overfill the bonnet and create a pressure lock. This could result in damage to the seals or bonnet, or prevent proper hydrant operation.



7. Check Bonnet O-ring** for proper position and condition. Attach the Brass Sleeve to Upper Stem and lubricate outside to protect O-ring Seals from thread damage. Place Bonnet onto Upper Barrel and assemble Bonnet Bolts only hand-tight. Remove Brass Sleeve. Reassemble Operating Nut, Anti-Friction Washer, and Hold Down Nut*. Be sure O-ring Seals are in good condition at thread shoulder on outside of Hold Down Nut and on inside where contact is made with Operating Nut. Remove Oil Filler Plug in side of Bonnet. Pour MUELLER Hydrant Lubricant into Oil Reservoir until it is level with Oil Filler Plug Hole. Replace Oil Filler Plug.



8. Tighten Bonnet Bolts. Unscrew one Hose Nozzle Cap slightly to bleed air. Open Hydrant fully. Tighten the Hose Nozzle Cap when water starts flowing and check all flange connections for leaks. Turn Operating Nut to fully closed position and remove Hose Nozzle Cap to allow Barrel to drain. Replace Nozzle Cap.

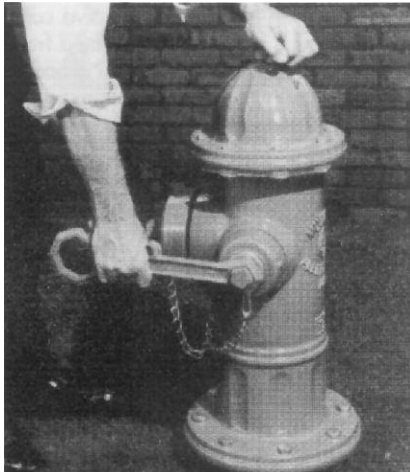
9. Turn Operating Nut in closing direction to make sure Main Valve is closed tightly, then turn in opening direction approximately 1/4 turn to relieve tension on operating mechanism.

*TIGHTEN HOLD DOWN NUT TO 200-300 FT-LBS OF TORQUE. IF TORQUE WRENCH IS NOT AVAILABLE, USE A 3 LB HAMMER TO STRIKE THE END OF THE A-311 WRENCH FIRMLY TWO TIMES TO ASSURE THE NUT IS PROPERLY TIGHTENED.

**TO DETERMINE CORRECT O-RINGS FOR BONNET AND GROUND LINE FLANGES, WHICH ARE SIMILAR IN APPEARANCE: SMALLER DIAMETER O-RING IS USED AT BONNET FLANGE; LARGER AT GROUND LINE FLANGE.

MUELLER® SUPER CENTURION® FIRE HYDRANT

To Replace Nozzles



1. Remove Nozzle Cap.



2. Remove stainless steel Nozzle Lock by driving it out with a pointed tool and hammer.



3. Place Nozzle Wrench, A-316, on Nozzle with Wrench Forks facing toward Hydrant Barrel and locked onto Nozzle Drive Lugs. Replace Nozzle Cap and tighten until Cap rests loosely against backside of Wrench.



4. Remove Nozzle. The Nozzle Wrench may be struck with a heavy brass hammer or additional leverage may be obtained by placing a length of 2" schedule 40 steel pipe over the handle of the Nozzle Wrench.



5. Thread new Nozzle into Upper Barrel, attach A-316 Nozzle Wrench as described in Step 3, and tighten Nozzle to approximately 600 ft-lbs torque (100 lbs. pull on a 6' lever).



6. Remove Nozzle Cap and A-316 Nozzle Wrench. Place the Nozzle Lock (Part 143137), lengthwise in the slot formed by either of the Nozzle Drive Lugs and the Barrel Bore. Drive the Nozzle Lock in place by striking the Nozzle Lock Installation Tool (Part 143132) several times with a heavy brass hammer.

NOTE: Wear safety glasses when using a striking tool. The Nozzle Lock does not have to be completely seated into the slot, but it should be well engaged along the entire length of the Nozzle Drive Lug and Barrel Bore.



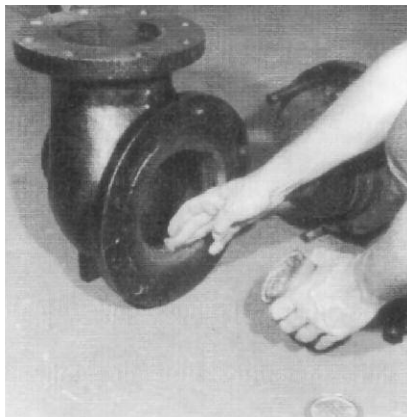
7. Replace and tighten Nozzle Cap.

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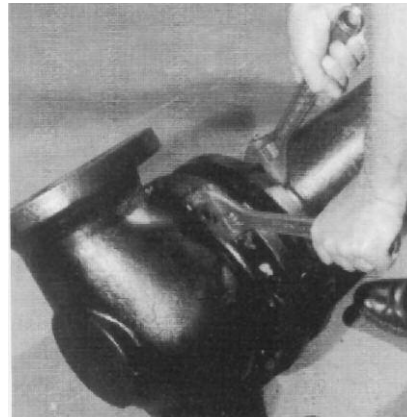
Changing Shoe



1. Tighten Operating Nut to be sure Main Valve is in the fully closed position.



4. Lubricate new Shoe and Bottom Seat Ring O-ring.



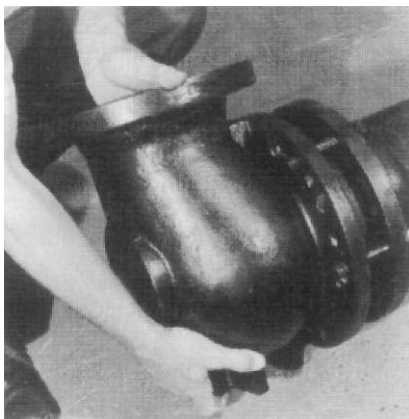
7. Replace Shoe Bolt Nuts. Tighten to approximately 1800 in-lbs.



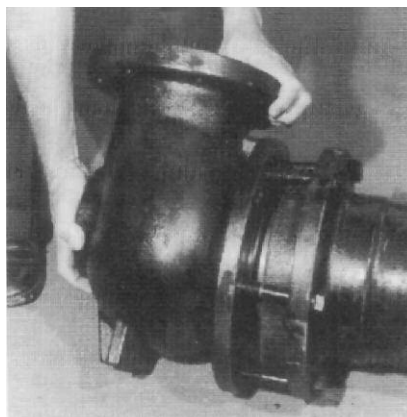
2. Remove all 6 Shoe Bolt Nuts.



5. Position Shoe to slip in place.



3. Slip off Hydrant Shoe.



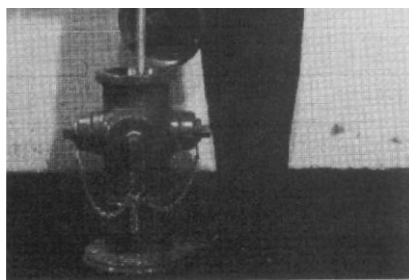
6. Slip new Shoe in place being careful not to damage Bottom Seat Ring O-ring.

MUELLER® SUPER CENTURION® FIRE HYDRANT

Inserting Extension Section

! WARNING

Before removing any bolt(s) holding the hydrant together, shut off gate valve to isolate hydrant from main water source. Loosen (do not remove) one nozzle cap two turns and check for water under pressure inside hydrant – bleed off any pressure, then remove nozzle cap completely. Open hydrant main valve completely. A continuous flow of water, no matter how slight, indicates hydrant is not properly isolated from the main water supply, and that problem must be corrected before any hydrant disassembly can proceed. Disassembly of hydrant with pressurized water acting against the main valve could result in unexpected ejection of hydrant parts, debris or high-pressure water stream, which could cause serious bodily injury.



1. Remove Hold Down Nut, Anti-Friction Washer and Operating Nut from Bonnet. Lubricate outside of Brass Sleeve and slide over threaded stem end to prevent O-ring damage. Unbolt Bonnet from Upper Barrel and remove. Remove Brass Sleeve.



2. Unbolt Safety Flange. Remove Upper Barrel. Remove Upper Stem and Safety Stem Coupling by removing the lower stainless steel Cotter Pin and stainless steel Clevis Pin.

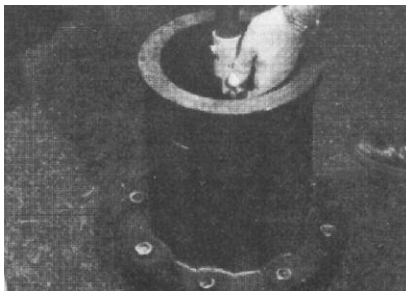


3. Place Extension Stem and Extension Coupling on Lower Stem and retain it with stainless steel Clevis Pin and stainless steel Cotter Pin.

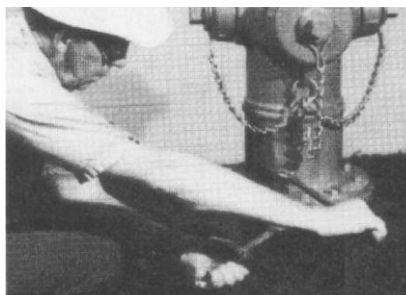
CAUTION: Always fill the oil reservoir with the bonnet installed, the hydrant in its normal upright position, and the main valve fully closed. If the hydrant is filled with lubricant under any other circumstances, excess lubricant can overflow the bonnet and create a pressure lock. This could result in damage to the seals or bonnet, or prevent proper hydrant operation.



4. Attach Extension Barrel to Lower Barrel with solid Flange halves (without groove) and Bolts, being sure Flange Gasket is in place.



5. Assemble Upper Stem and Safety Stem Coupling on to Extension Stem and retain it with stainless steel Clevis Pin and stainless steel Cotter Pin. **MAKE SURE SAFETY STEM COUPLING IS INSTALLED WITH NOTCHES TOWARDS THE LOWER STEM. WORDS "THIS END UP" TOWARDS THE UPPER STEM.**

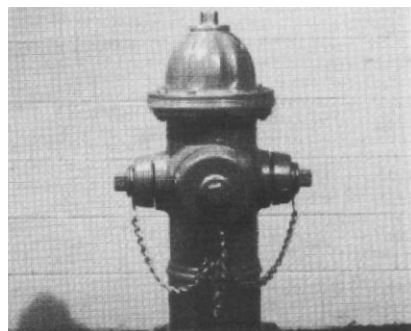


6. Attach Upper Barrel with Safety Flange Halves (with bevel on outer edge downward) and Bolts; being sure Safety Flange O-ring** is in groove in Upper Barrel.

*TIGHTEN HOLD DOWN NUT TO 200-300 FT-LBS OF TORQUE. IF TORQUE WRENCH IS NOT AVAILABLE, USE A 3 LB HAMMER TO STRIKE THE END OF THE A-311 WRENCH FIRMLY TWO TIMES TO ASSURE THE NUT IS PROPERLY TIGHTENED.



7. Check Bonnet O-ring** for proper position and condition. Attach Brass Sleeve to Upper Stem and lubricate outside to protect O-ring Seals from thread damage. Place Bonnet onto Upper Barrel and assemble Bonnet Bolts only hand-tight. Remove Brass Sleeve. Reassemble Operating Nut, Anti-Friction Washer, and Hold Down Nut*. Be sure O-ring Seals are in good condition at thread shoulder on outside of Hold Down Nut and on inside where contact is made with Operating Nut. Remove Oil Filler Plug in side of Bonnet. Pour MUELLER Hydrant Lubricant into Oil Reservoir until it is level with Oil Filler Plug Hole. Replace Oil Filler Plug.



8. Tighten Bonnet Bolts. Unscrew one Hose Nozzle Cap slightly to bleed air. Open Hydrant fully. Tighten Hose Nozzle Cap when water starts flowing and check all flange connections for leaks. Turn Operating Nut to fully closed position and remove Hose Nozzle Cap to allow Barrel to drain. Replace Hose Nozzle Cap.

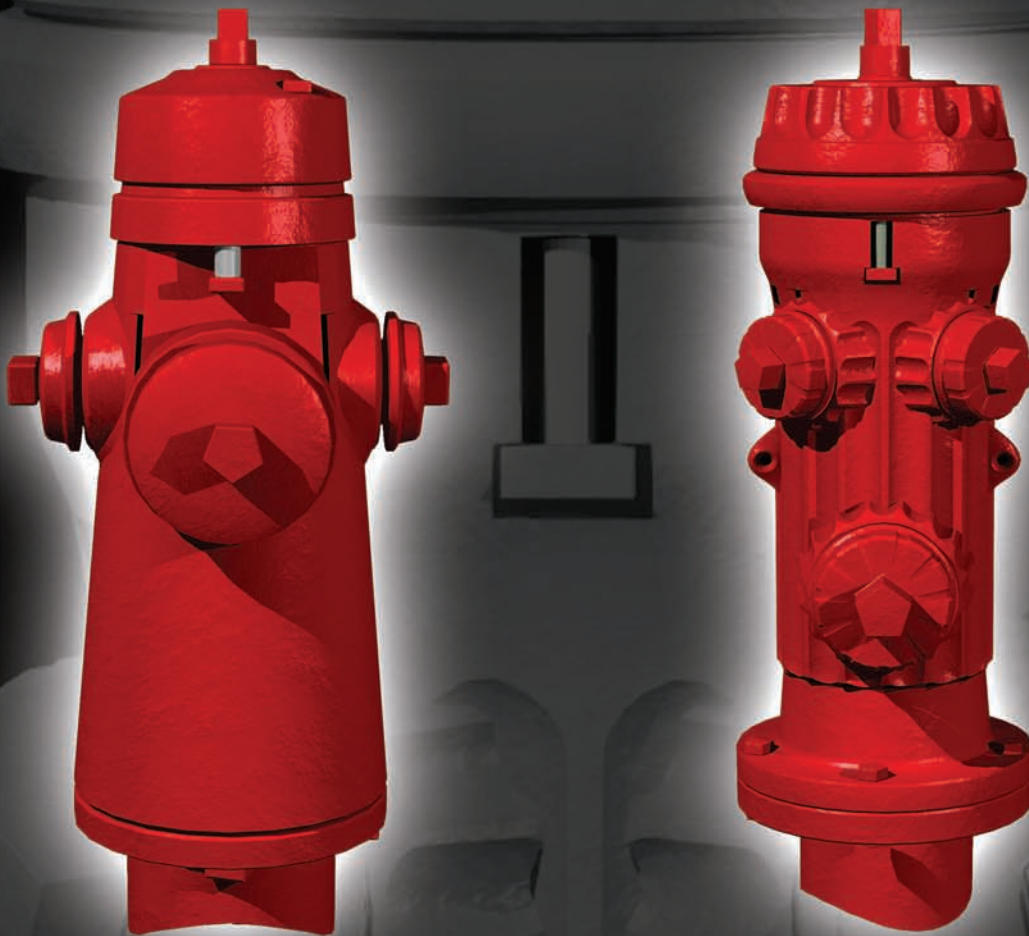
9. Turn Operating Nut in closing direction to make sure Main Valve is closed tightly, then turn in opening direction approximately 1/4 turn to relieve tension on operating mechanism.

**TO DETERMINE CORRECT O-RINGS FOR BONNET AND GROUND LINE FLANGES, WHICH ARE SIMILAR IN APPEARANCE: SMALLER DIAMETER O-RING IS USED AT BONNET FLANGE; LARGER AT GROUND LINE FLANGE.

Mueller Co.



SLIDE GATE HYDRANT MAINTENANCE MANUAL



TERMINAL CITY IRON WORKS LTD.

Unit#3 9494 – 198th Street, Langley, BC V1M 3C8

This Maintenance Manual is intended to give a guide to Hydrant Maintenance.

The Manual covers:

- Maintenance and Service procedures
- Parts list for T.C. Slide Gate Fire Hydrants
- Trouble shooting to find the problem.

The Manual does not deal with specific problems but rather assists you in explaining the problem to those in maintenance who are required to keep the hydrants fire-fighting fit. More specific detailed information is available upon request.

INSPECTION

It is recommended that fire hydrants be inspected twice a year. The generally accepted times are during Spring and Fall. It is also strongly recommended that hydrants be serviced immediately after they have been used by the fire department at a fire, or after extensive flow such as flushing mains, etc.

SERVICE CALL

The spring inspection is a “service” call, and will check out the hydrant after the results of winter frost, ground heave, snow, road salt and sand, etc. have left their mark.

The general procedure is to **fully** open the hydrant and the outlet caps left on in order to pressurize the hydrant.

The operating characteristics which will be covered in this simple operation are:

- insufficient number of turns to open – (should have 27 to 29 for Side Gate)
- hard-binding operation in opening and closing.
- leakage through stuffing box seals.
- leakage at outlets and outlet caps.
- leakage at ground-line flange gasket.
- leakage through CLOSED drain port.
- continuous turning of the operating spindle with no opening of the hydrant taking place.

After checking for the above on this inspection the hydrant should be fully closed and one of the 2¹/₂-inch outlet caps removed.

The operating characteristics which will be covered in this simple operation are:

- non-drainage of hydrant (feel for suction when hand placed over open port for correct drainage).
- leakage past valve seat (continuous running of water).
- plugged drain preventing drainage.

If any of the above characteristics are present then the spring “service” call will become a MAINTENANCE call.

None of the above listed characteristics should be present in the hydrant, and if they are, then they should be corrected.

MAINTENANCE & SERVICE CALL:

The fall inspection is a maintenance call and will require the removal of internal operation parts for visual inspection. The general procedure is to shut off the isolating gate valve on the line into the hydrant and after opening the hydrant to the full open position the operating mechanism, valve and internal parts are removed from the hydrant for inspection, lubrication and replacement of worn or damaged parts.

A careful inspection should be made of:

- the straightness of the operating spindle and “off-pitch” or twist of the thread on the main gate screw.
- the main Gate rubber, drip valve rubber,

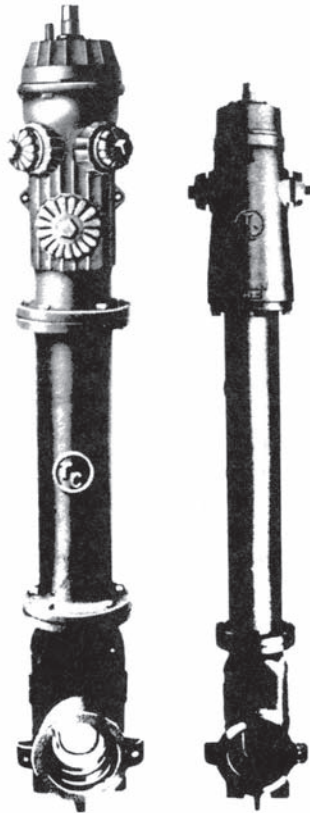
After replacement of damaged and worn parts and after complete lubrication of all moving parts the hydrant is re-assembled.

The hydrant **now MUST BE SERVICED** as was done in the spring call, that is, open the hydrant full and pressurize the hydrant with water and follow with a check of all the spring call characteristics.

The servicing AFTER maintenance assures that two very important points have been covered.

1. The **isolating gate valve has been turned back on** in order to pressurize or fill the hydrant with water.
2. A check is made of the correctness of the work done on maintenance. All gaskets are tight, the correct number of turns, ease of operation, correct drainage, etc. The hydrant has been left in working order.

FIRE HYDRANTS - Slide Gate



No. 1 No. 20 or No. 20P

When ordering Terminal City Slide Gate Fire Hydrants, please give information listed below:

Type of Hydrant:

No. 1: 2 - 2 1/2 - inch outlets and a pumper outlet.
No. 1 - 1: 2 - 2 1/2 - inch outlets and a pumper outlet.
No. 20: 2 - 2 1/2 - inch outlets.
No. 20P: 2 - 2 1/2 - inch outlets and a pumper outlet.

Depth of Bury:

The distance from the ground line to the centre line of the inlet connection in inches. Available in increments of 6-inch.

Direction of Operation:

The hydrants are normally supplied to open by rotating the spindle in a counter-clockwise direction.

Operating Spindle Nut:

Shape and size.

Pentagon - 1 1/2 - inch from point to flat.

Square - 1 1/4 - inch from point to flat.

Three sided - 1 7/16 - inch arc from point to flat.

Thread Specifications:

The 2 1/2 - inch outside diameter.

Outlets - Pitch of thread.

The pumper - Outside diameter in mm.

Outlet - Pitch of thread.

Inlet Connections:

Size - 6-inch

Style - Mechanical Joint, Push - On, Flanged

- Terminal City Slide Gate Fire Hydrants are readily serviceable with proper design to give unrestricted maximum flow.
- Terminal City Slide Gate Fire Hydrants have all working parts accessible for inspection and servicing.
- Terminal City Slide Gate Fire Hydrants are assembled with all parts manufactured to give interchangeability.
- Terminal City Slide Gate Fire Hydrants are provided with automatic self-draining thus leaving the hydrant completely dry for cold weather conditions. Where normal hydrant drainage is impossible special arrangements can be provided.
- Terminal City Slide Gate Fire Hydrants are designed to prevent contact of the seating surfaces during opening and closing thereby eliminating wear of the seating surfaces.
- Terminal City Slide Gate Fire Hydrants are provided with 2 1/2-inch outlets and operating pentagon manufactured to the British Columbia Fire Hose Thread Specifications (unless otherwise specified).
- Terminal City Slide Gate Fire Hydrants are made in the following styles:

No.1 Hydrant: Constructed with 2 - 2 1/2-inch outlets and a pumper outlet. The inside diameter of the barrel is 6 3/8 inch.

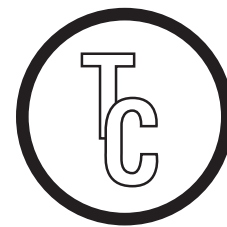
No. 20 Hydrant: Constructed with 2 - 2 1/2 -inch outlets. The inside diameter of the barrel is 5 3/4 -inch.

No. 20P Hydrant: Similar to the No. 20 with the addition of a pumper outlet.

Material Specifications: All cast iron parts are manufactured to ASTM A-126-B. All bronze parts are manufactured to ASTM B-62. Stainless steel for main spindle type 416.

Mild steel to SAE 1020.

When ordering parts for the No. 10 or No. 2 Hydrant, prefix the part numbers with No. 10 or No. 2. - e.g. if ordering a main gate casting specify part No. 2 - 40 or No. 10 - 6.

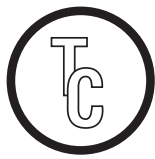


NO.	NAME	MATERIAL	NO.	NAME	MATERIAL
863-1	Barrel	Cast Iron	631	Operating Stem Gland "O" Ring	Syn. Rubber
IX	No. 1 Hydrant Extension	Cast Iron	50	Nut	Mild Steel
2	Bottom End	Cast Iron	53	Pumper Hose Outlet Cap Gasket	Rubber Red
6	Main Gate	Cast Iron	55	Square Stem to Collar Pin	Mild Steel
8	Stem Collar	Cast Iron	60	Ind. & Plain Hose Outlet Cap Gasket	Rubber Red
9	Ind. & Plain Hose Outlet Cap	Cast Iron	67	Nut, Extension Bolt	Mild Steel
863-10	Plain Hose Outlet	Bronze	68	Extn. to Barrel & Bottom End Gasket	Rubber CBS
11	Main Gate Screw	St's St'l	69	Sq. Stem to Main Gate Screw Pin	Mild Steel
11A	Square Stem to Screw Coupling	Ductile Iron	70	Bolt, Ind. Cut-off Gate Chain	Brass
12	Main Gate Wedge Nut	Bronze	71	Chain, Ind. Cut-off Gate	Galv. Steel
13	Main Gate Seat Ring	Bronze	617	Bonnet Bolt	Brass
14	Main Gate Seat Plate	Bronze	623	Operating Stem	Mang Bronze
15	Main Gate Seat Nut	Bronze	628	Head	Cast Iron
16	Screwed End Piece	Bronze	629	Bonnet	Cast Iron
17	Drip Cup	Bronze	630	Independent Cut-off Screw	Yellow Brass
18	Drip Valve Washer	Bronze	22	Square Stem	Mild Steel
19	Drip Valve Bolt	Bronze	66	Head Gasket	
20	Drip Valve Nut	Bronze	40	Main Gate (#20)	Cast Iron
21	Drain Action Spring	St's St'l	41	Main Gate Wedge Nut (#20)	Bronze
23	Gate Valve Rubber	Rubber	42	Bottom End (#20)	Cast Iron
24	Drip Valve Rubber	Rubber	43	Main Gate Seat Ring (#20)	Bronze
25	Pumper Hose Outlet	Bronze	44	Main Gate Seat Plate (#20)	Bronze
26	Pumper Hose Outlet Cap	Cast Iron	46	Head Gasket (#20)	Rubber
863-27	Independent Hose Outlet	Bronze	47	Extn. to Barrel & Bottom End Gasket (#20)	Rubber
28	Independent Cut-off Gate	Bronze	48	Barrel to Extn. Stud (#20)	St's St'l
31	Independent Cut-off Nut	Bronze	59	Plain Hose Outlet Cap (#20)	Cast Iron
863-33	Independent Cut-off Screw Gland	Bronze	IOIX	No. 20 Hyd't Extn. (#20)	Cast Iron
37	Barrel to Head Bolt	St'l ASTM A-31 -40	222	Square Stem (#20)	Mild Steel
38	Extension Bolt	Mild Steel	616	Operating Stem (#20)	Mang. Bronze
863-40	Ind. Cut-off Screw Gland "O" Ring	Syn. Rubber	617	Bolt Hex Head	Bronze
863-41	Ind. & Plain Hose Outlet "O" Ring	Syn. Rubber	618	Bonnet	Cast Iron
863-42	Ind. & Plain Hose Outlet Locking Ring	Bronze	620	Head	Cast Iron

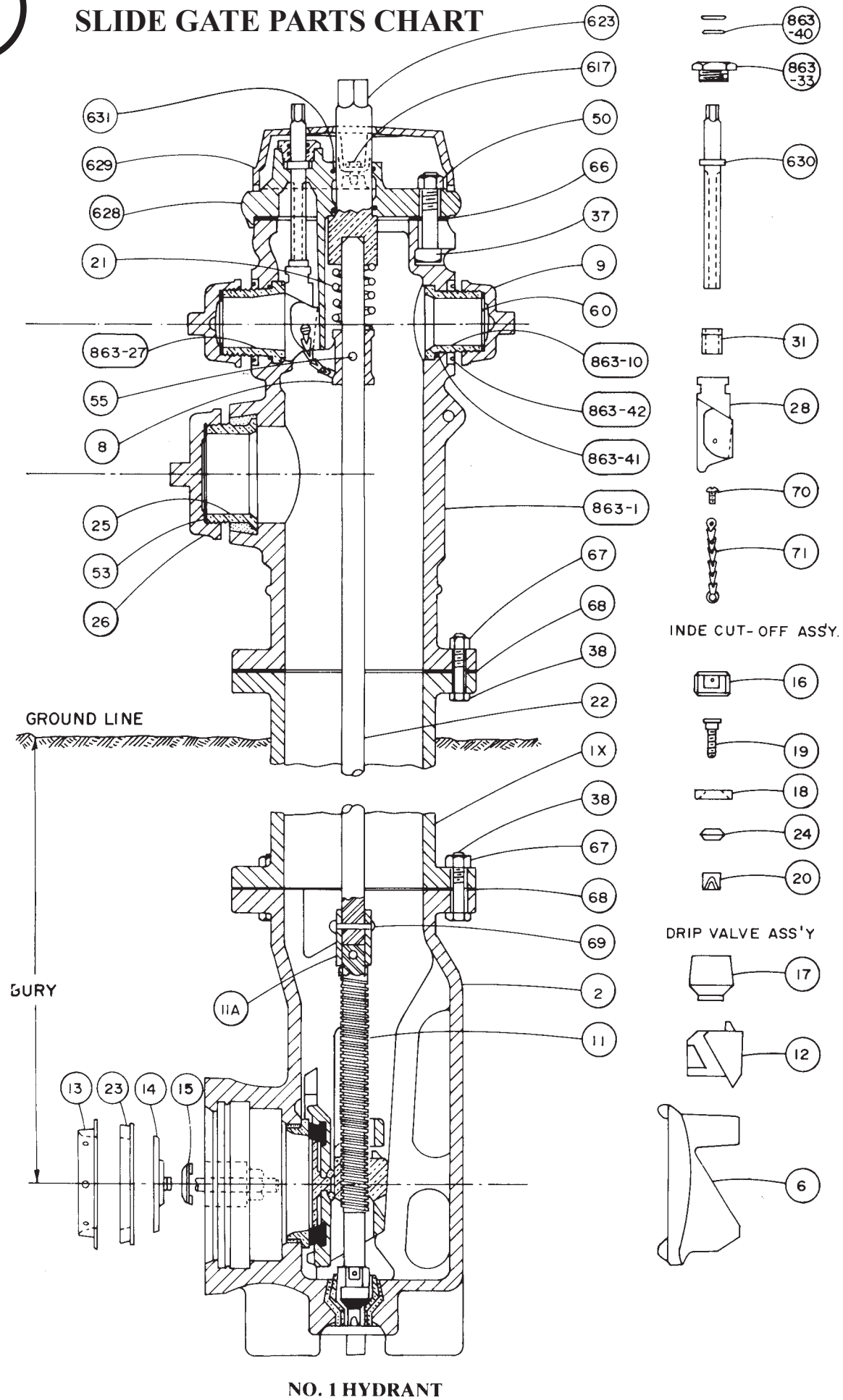
When ordering parts for No. 10 or No.2 Hydrants prefix part numbers with No. 10 or No.2

SERVICE and MAINTENANCE

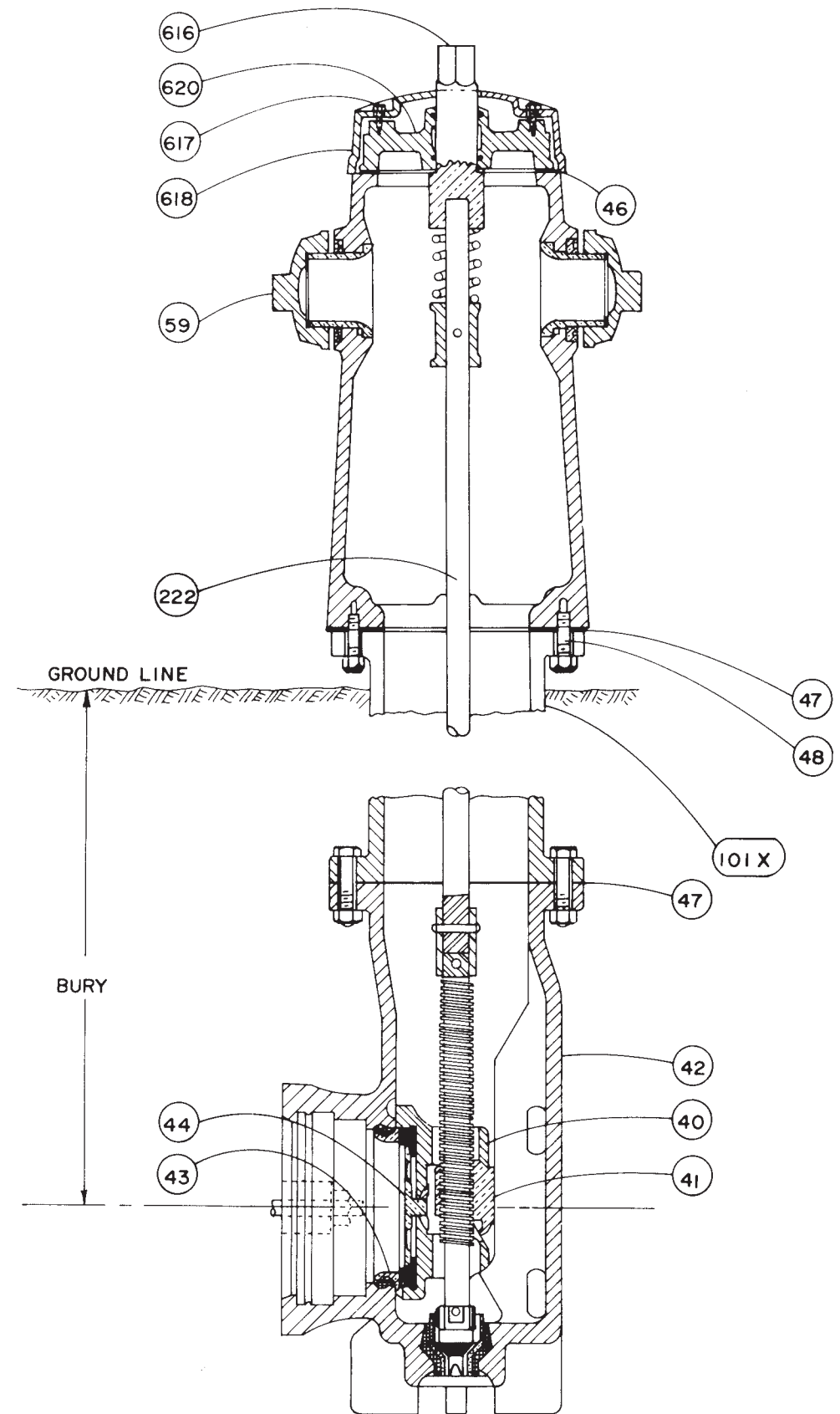
EVERY 6 MONTHS:- Flush out by removing plain nozzle cap (not shown) and opening main gate at least 12 turns. Upon closing hydrant after flushing place hand over nozzle opening to check that vacuum is being created. This shows that hydrant is draining properly. EVERY YEAR:- a. Lubricate - see table. b. Inspect Packing - replace if it has gone hard. c. Inspect Rubber Surfaces on Main Gate and Drip Valve for tears & pitting caused by Silt, Rocks Etc. - replace if damaged. d. Inspect all other internal components such as Drip Valve, Wedge Nuts. Main Gate Etc.	No.	Name of Part	LUBRICATION Recommended Grease	Remarks
	11	Main Gate Screw	Environmentally Friendly Food Grade Grease	Give ample coating
	12	Main Gate Wedge Nut		Give ample coating
	9, 10, 25, 26, 27	Threads of 2 1/2" & Pumper Outlet & Caps		
	7	Top Spindle		Give ample coating where spindle passes through stuffing box & where shoulder of spindle bears against head. Seal off top of packing with grease to prevent freezing.
		Top Spindle Packing		



FIRE HYDRANT SLIDE GATE PARTS CHART



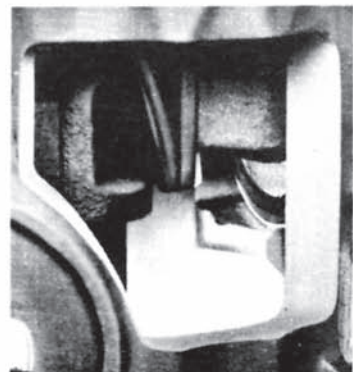
NO. 1 HYDRANT



NO. 20 HYDRANT
NO. 20P HYDRANT



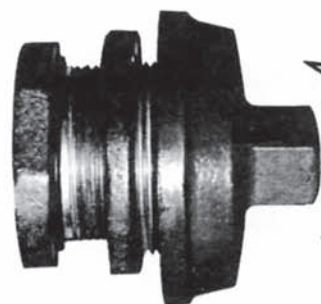
MAXIMUM FLOW – SELF DRAINING SLIDE GATE *Hydrants*



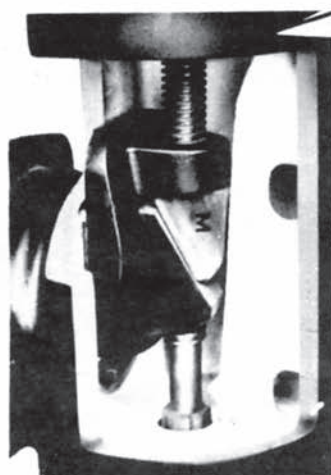
Independent Cut Off Valve



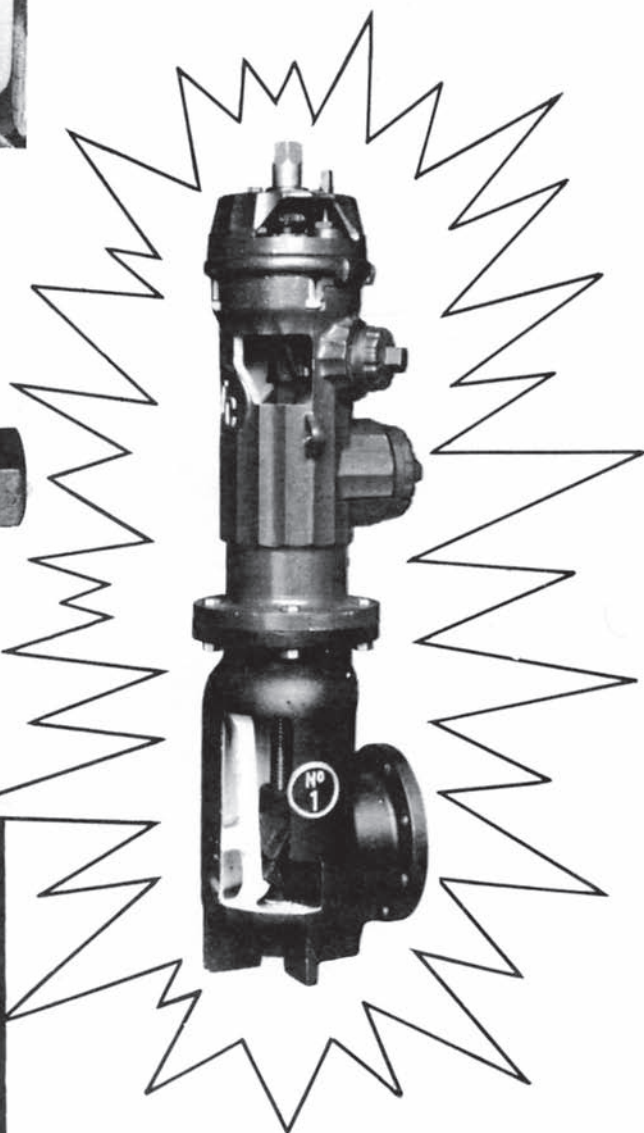
"O" Ring Packing Gland



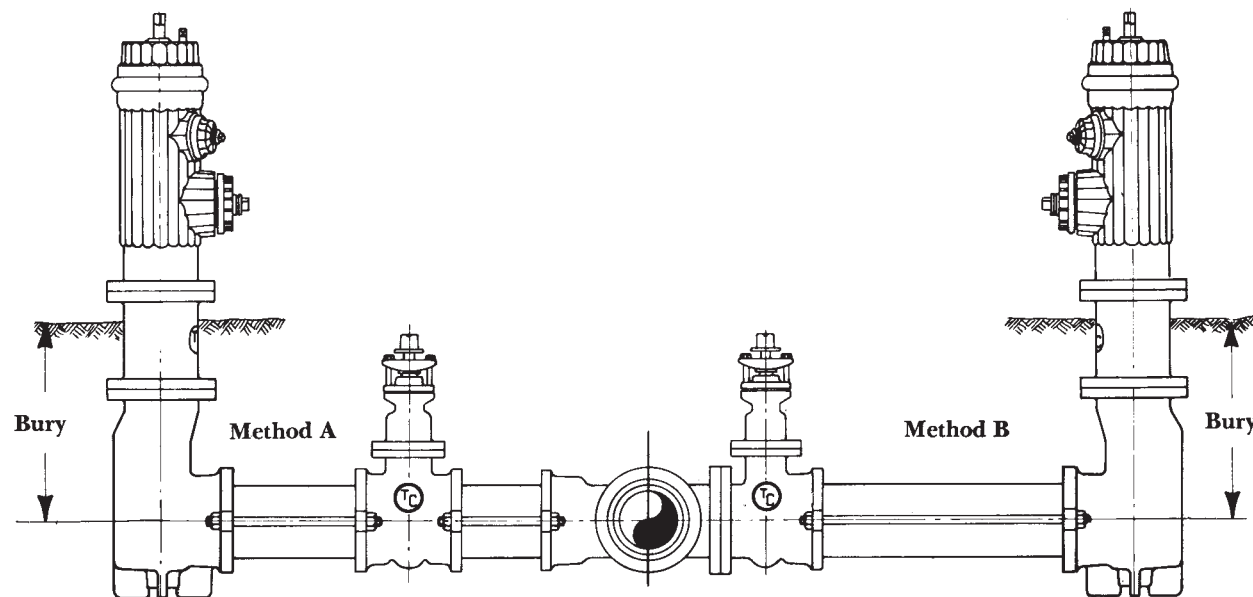
2 1/2" "O" Ring Outlet
Assembly Pat. #720007



Main Gate Assembly



TWO SUGGESTED METHODS OF INSTALLING HYDRANTS TO THE MAIN



The purpose of the following suggested methods of installation is to allow flexibility so that a minimum of direct vehicular impact to the hydrant would be transferred to the main.

Method A: This method requires a hub end tee from the main connected by a nipple of pipe to a hub end valve. The valve, in turn is connected by another nipple of pipe to the hub end inlet connection of the hydrant. The hub ends on the branch of the tee, valve and hydrant are provided with tie lugs to carry the tie rods as shown.

Method B: This method requires a hub x hub run x flange branch from the main with a flange x hub valve bolted to the flange outlet of the tee. A nipple of pipe is used to connect the hub of the valve to the hub inlet connection of the hydrant. The hubs of the valve and hydrant are provided with tie lugs to carry the tie rods as shown.

DIRECTIONS FOR REMOVING INTERNAL PARTS

From a study of the hydrant drawing shown on page 7 the following details may be easily followed.

- Shut off the water supply to the hydrant and open the hydrant no less than eight turns.
- Take off the bonnet by removing the two bonnet nuts.
- Take off the head assembly by removing the two head nuts.
- The entire gate assembly may now be lifted out by means of the operating rod.
- When the gate reaches the top of the hydrant, turn to bring it out through the widest diameter, being careful not to injure the face of the gate rubber.

DIRECTIONS FOR RE-ASSEMBLING INTERNAL PARTS

Care must be taken to insure the proper location of the gate and drain mechanism for re-assembly.

- Have gate assembly approximately half way up the main gate screw.
- Drop the gate assembly through the widest diameter of the top of the body, then turn so that the face of the gate faces the inlet of the hydrant. Lower carefully by the square stem until the drip valve is properly located in the drip cup.
- Re-assemble the head assembly and bonnet.
- Open and close the hydrant two or three times to assure correct alignment and proper functioning of all parts before turning on the water.

DIRECTIONS FOR EXTENDING HYDRANTS

Follow directions for removing internal parts.

- Remove the top body section.
- Place required length of extension. Extensions are available in multiples of 6-inch.
- Replace the top body section after being sure the flange faces and gaskets are clean.
- Add the square steel rod supplied with the extension assembly to the TOP of the existing square rod for 12-inch and longer extensions. For a 6-inch extension the square rod supplied with the extension assembly **MUST BE FITTED and PINNED** into the main gate spindle coupling 11A and tightened by set screw onto the existing square rod.

Extension assemblies are in 6-inch increments for extending hydrants. They are supplied complete with rod, coupling and one set of body bolts and gasket.

TROUBLE SHOOTING FROM OPERATING CHARACTERISTICS

1. Fire Hydrant fails to open upon rotation of the operating spindle:

Slide Gate Hydrant:

- stripped thread on main spindle or main gate nut (11; 12).
- broken spindle coupling (11 A).
- broken main spindle (11).
- top operating spindle not engaged with operating rod (623 & 616—22 & 222).

2. Fire Hydrant will not open or operating spindle will not turn:

Slide Gate Hydrant:

- hard, worn, overtightened packing in the hydrant head or packing gland binding on the top spindle (623 & 616).
- bent main gate spindle and/or “off-pitch” thread on the main spindle and main gate nut causing a seized unit (11,12).

3. Fire Hydrant will not shut off:

Slide Gate Hydrant:

- foreign material trapped on the seating surfaces (23;13).
- damaged and worn rubber seat (23)
- damaged seat ring (13)
- foreign material trapped in the bottom end not allowing the main gate to travel down to the internal stop position (2;6)

4. Non-Draining of the Hydrant after shutoff:

- the outlet caps replaced onto the outlets immediately after closing of the hydrant. Allow at least 15 minutes before replacing caps.
- foreign material plugging the drain hole or an elbow or boot completely encased in concrete.
- the hydrant could have been manufactured as a "non-drain style". The non-draining feature is available for areas of high ground water table and the hydrant must be pumped out after use.
- in the case of the SLIDE GATE HYDRANT also watch for the drain assembly broken off the end of the main spindle and laying in the drip cup in the boot (2, 11 & drip assembly).

5. Leakage around hydrant barrel at the surface of the ground:

- drain mechanism is not closed.
- offset line from the main is cracked at the socket entrance to the hydrant or a leaking joint in the hydrant socket.
- foreign material trapped in the drain..
- foreign material trapped on seating surface preventing final 2 to 3 turns of the main valve closure.
- worn drip valve rubber

6. External leakage from HEAD, Outlet Caps, Groundline Flange or Stuffing Box:

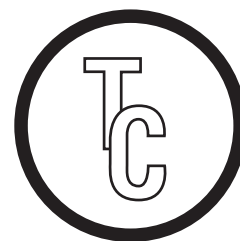
- damaged gaskets.
- worn or damaged “O” rings.
- hard dry’ worn flax packing.

7. Fire Hydrant is hard operating:

- lack of lubrication.
- bent main spindles.
- “off-pitch” threads.
- stuffing box flax packing too hard and worn.
- stuffing box “O” rings jammed with silt from external or internal source.
- stuffing box and/or gland pulled down on an angle thus binding the operating spindle.

8. Vibrating or Chattering Fire Hydrant:

- worn rubber seat.
- soft rubber seat.
- use of too many short extension assemblies.
- loose rubber seat.





SELF-DRAINING STANDPIPE



The Terminal City two-inch self-draining stand pipe is a factory assembled unit specifically designed and constructed to take the place of "in-field" component assembled units.

The self-draining stand pipe can be supplied with 2 1/2" B.C. Std hose outlet.

MATERIALS

The unit is manufactured with bronze operating and draining components. The valve seating surface, main body, operating thread and spindle are manufactured with A.S.T.M. B-62 bronze.

The stuffing box and draining mechanism have "O" ring rubber gaskets for sealing purposes.

Polyurethane anti-score seating material is used for the valve disc facing.

ACCESSIBILITY

All moving parts subject to wear are readily accessible from above ground by the removal of the top body casting.

DRAINING MECHANISM

When the stand pipe is not in use the drain ports remain open, thereby providing a dry barrel for frost conditions. During the first turn of the operating rod water is expelled through the drain ports as well as rising in the barrel of the stand pipe. This allows the drain ports to be flushed and removes any foreign material which may become lodged in the mechanism. During the remaining opening turns the drain mechanism is closed.

After closing it is recommended that the stand pipe be allowed to drain before replacing the port cap on the outlet.

PARTS LIST

Part No.	NAME	Material
1	Handwheel	Aluminum
2	Handwheel Bolt	Brass
3	Washer	Brass
4	Handwheel Stem	Cast Bronze
5	Top End "O" Ring	Houghton — 211
6	Handwheel Stem Pin	St'l's Steel
7	Top End	Cast Iron
8	Pipe	Steel
9	Operating Rod	Steel
10	Gate Pin	Stainless Steel
11	Drain Shield	Plastic
12	Screwed Gate "O" Ring	Houghton — 227
13	Bottom End	Cast Bronze
14	Screwed Gate	Cast Bronze
15	Cotter Pin	Brass
16	Valve Discwasher	Steel
17	Valve Disc	Urethane

MATERIAL SPECIFICATIONS

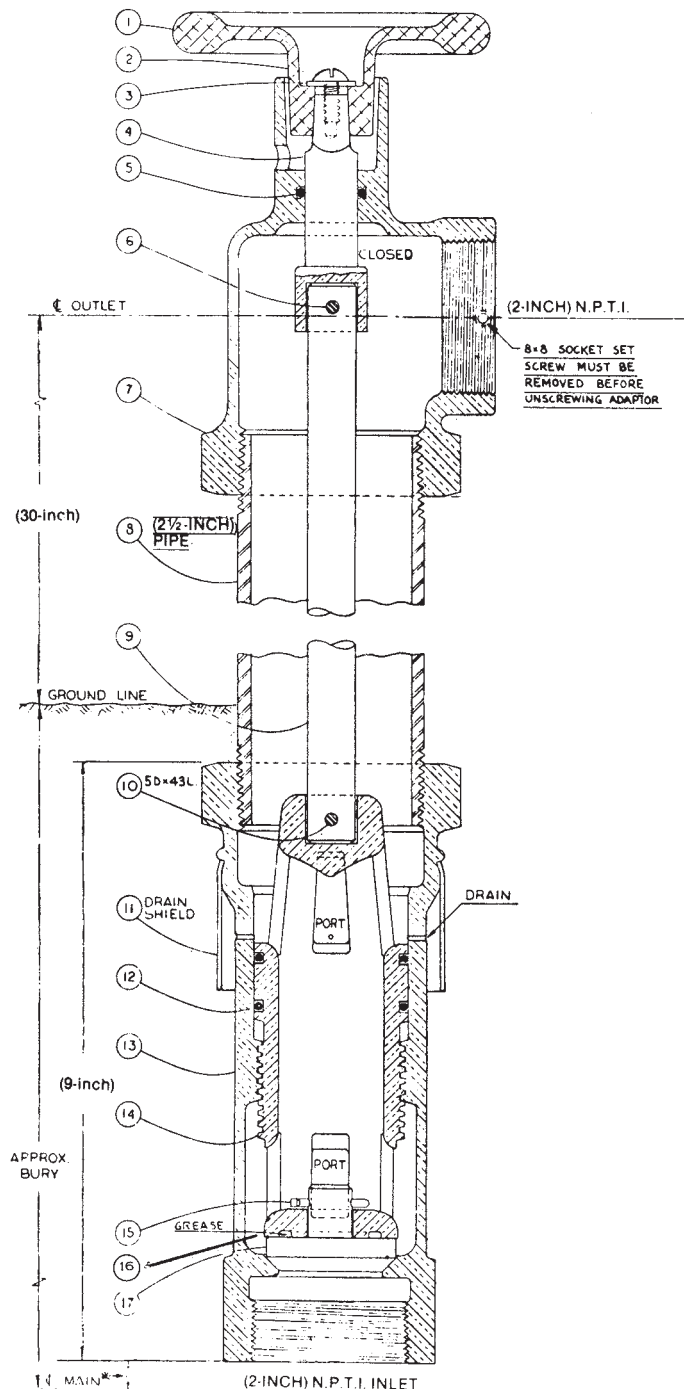
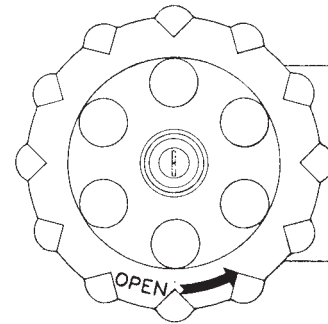
Cast Iron (C.I.) to ASTM A-126-B

Mild Steel (M. St.) to SAE 1020

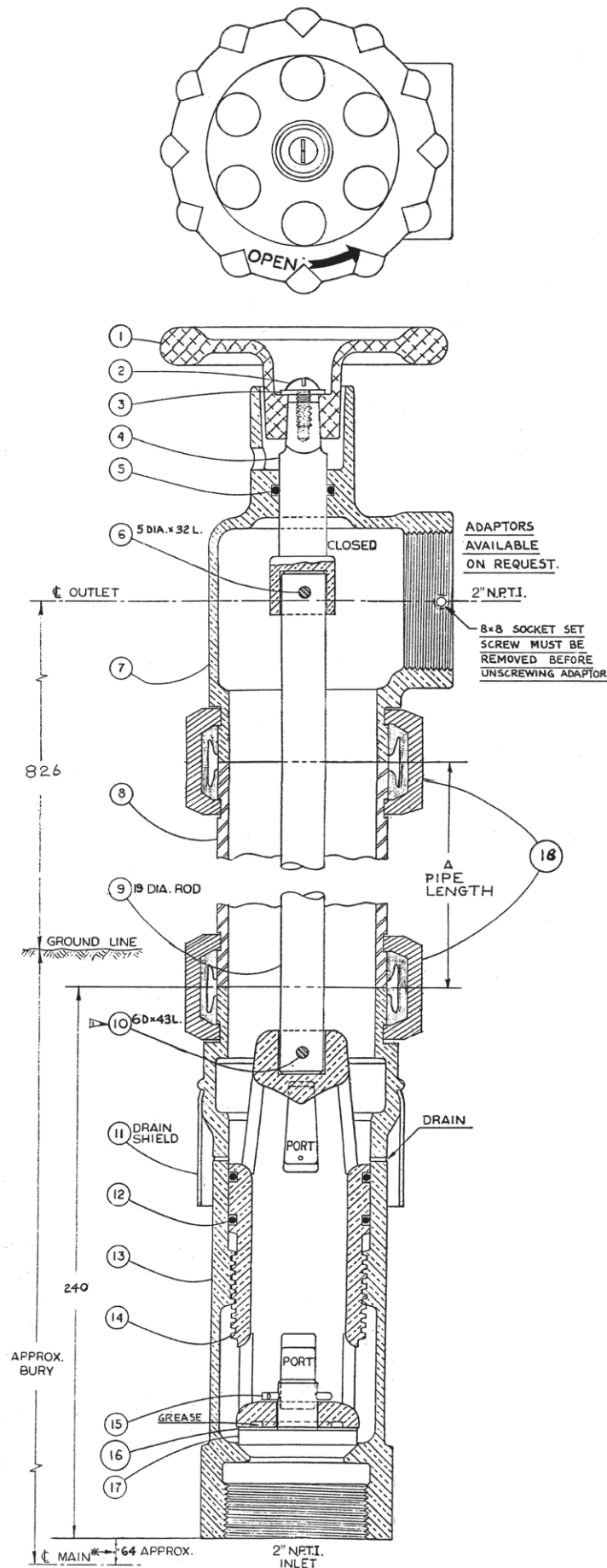
Bronze (Br'z) to ASTM B-62

Urethane, Durometer 60

TCIW SELF-DRAINING STANDPIPE



TCIW SELF-DRAINING STANDPIPE



	Bury	Pipe	Rod
.150m	0' - 6"	2' - 0"	2' - 4 3/4"
.300m	1' - 0"	2' - 6"	2' - 10 3/4"
.450m	1' - 6"	3' - 0"	3' - 4 3/4"
.600m	2' - 0"	3' - 6"	3' - 10 3/4"
.750m	2' - 6"	4' - 0"	4' - 4 3/4"
.900m	3' - 0"	4' - 6"	4' - 10 3/4"
1.05m	3' - 6"	5' - 0"	5' - 4 3/4"
1.20m	4' - 0"	5' - 6"	5' - 10 3/4"
1.35m	4' - 6"	6' - 0"	6' - 4 3/4"
1.50m	5' - 0"	6' - 6"	6' - 10 3/4"
1.65m	5' - 6"	7' - 0"	7' - 4 3/4"
1.80m	6' - 0"	7' - 6"	7' - 10 3/4"
1.95m	6' - 6"	8' - 0"	8' - 4 3/4"
2.10m	7' - 0"	8' - 6"	8' - 10 3/4"
2.25m	7' - 6"	9' - 0"	9' - 4 3/4"
2.40m	8' - 0"	9' - 6"	9' - 10 3/4"
2.55m	8' - 6"	10' - 0"	10' - 4 3/4"
2.70m	9' - 0"	10' - 6"	10' - 10 3/4"
2.85m	9' - 6"	11' - 0"	11' - 4 3/4"
3.00m	10' - 0"	11' - 6"	11' - 10 3/4"
3.15m	10' - 6"	12' - 0"	12' - 4 3/4"
3.30m	11' - 0"	12' - 6"	12' - 10 3/4"
3.45m	11' - 6"	13' - 0"	13' - 4 3/4"
3.60m	12' - 0"	13' - 6"	13' - 10 3/4"
3.75m	12' - 6"	14' - 0"	14' - 4 3/4"
3.90m	13' - 0"	14' - 6"	14' - 10 3/4"

PARTS LIST		
Part No.	NAME	Material
1	Handwheel	D.I.
2	Handwheel Bolt	Brass
3	Washer	Brass
4	Handwheel Stem	Cast Bronze
5	Top End "O" Ring	Houghton — 211
6	Handwheel Stem Pin	Stainless Steel
7	Top End	Cast D I
8	Pipe	Steel
9	Operating Rod	Steel
10	Gate Pin	Stainless Steel
11	Drain Shield	PVC
12	Screwed Gate "O" Ring	Houghton — 227
13	Bottom End	Cast Bronze
14	Screwed Gate	Cast Bronze
15	Cotter Pin	Brass
16	Disc Washer	Stainless Steel
17	Valve Disc	Urethane
18	Coupling	D.I.
	Top Coupling (Primer)	
	Bottom Coupling (Galv.)	S.S Nuts & Bolts

MATERIAL SPECIFICATIONS
Cast Iron (C.I.) to ASTM A-126-B
Mild Steel (M. St.) to SAE 1020
Ductile Iron (D.I.) to ASTM A536 (65-45-12)
Bronze (Br'z) to ASTM B-62
Urethane, Durometer D60

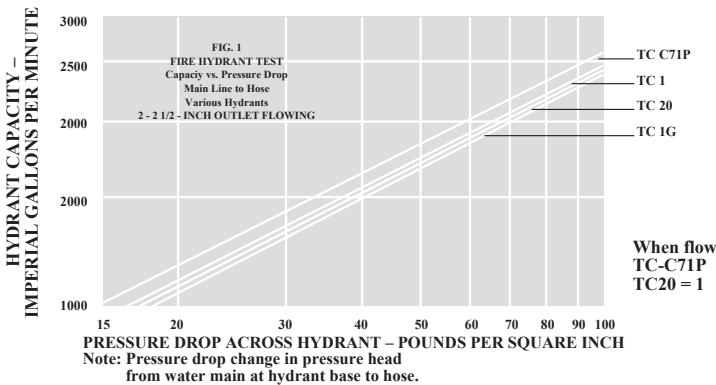
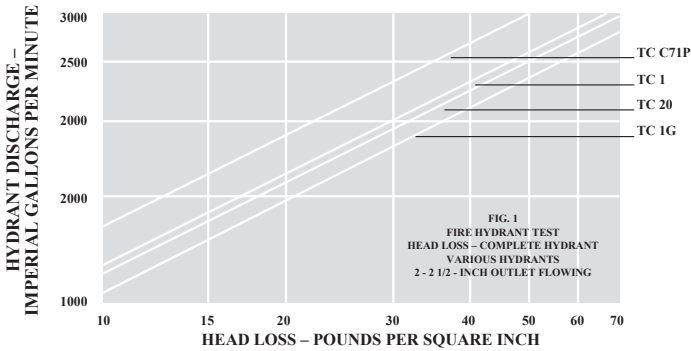
ENGINEERING DATA (IMPERIAL)

PRESSURE IN LBS. PER SQUARE INCH AND EQUIVALENT HEAD OF WATER IN FEET,
ALSO HEAD OF WATER IN FEET AND EQUIVALENT PRESSURE IN I.B. PER SQUARE INCH

LB or FT.	EQUIVALENT		LB or FT.	EQUIVALENT		LB or FT.	EQUIVALENT	
	HEAD FT.	PRESSURE PSI		HEAD FT.	PRESSURE PSI		HEAD FT.	PRESSURE PSI
1	2.31	.4325	105	242.77	45.41	205	473.98	88.66
5	11.56	2.16	110	254.33	47.57	210	485.54	90.82
10	23.12	4.32	115	265.89	49.73	215	495.10	92.98
15	34.68	6.48	120	277.45	51.90	220	508.66	95.15
20	46.24	8.65	125	289.01	54.06	225	520.22	97.31
25	57.80	10.81	130	300.57	56.22	230	531.78	99.47
30	69.36	12.97	135	312.13	58.38	235	543.34	101.63
35	80.92	15.13	140	323.69	60.55	240	554.90	103.80
40	92.48	17.31	145	335.25	62.71	245	566.46	105.96
45	104.04	19.46	150	346.81	64.87	250	578.02	108.12
50	115.60	21.62	155	358.37	67.03	255	589.58	110.28
55	127.16	23.78	160	369.93	69.20	260	601.14	112.45
60	138.72	25.95	165	381.49	71.36	265	612.70	114.61
65	150.28	28.11	170	393.05	73.52	270	624.26	116.77
70	161.84	30.27	175	404.61	75.68	275	635.82	118.93
75	173.40	32.43	180	416.17	77.85	280	647.38	121.10
80	184.96	34.60	185	427.73	80.01	285	658.94	123.26
85	196.52	36.76	190	439.29	82.17	290	670.50	125.42
90	208.08	38.92	195	450.85	84.33	295	682.06	127.58
95	219.64	41.08	200	462.42	86.50	300	693.63	129.75
100	231.25	43.25						

FIRE HYDRANT HEAD LOSSES

- TC-C71P = Compression Hydrant 2-2¹/₂ - inch and 1 - pumper outlet.
TC-1 = No. 1 Slide Gate Hydrant 2 - 2¹/₂ - inch and 1 - pumper outlet.
TC-20 = No. 20 Slide Gate Hydrant 2 - 2¹/₂ - inch outlet.
TC-1G = No. 1 Slide Gate Hydrant 2 - 2¹/₂ - inch and 1 - pumper outlet
(1 - 2¹/₂ c/w independent cut-off valve).



HEAD LOSS COEFFICIENTS FOR FIRE HYDRANTS

Both Hose Outlets
Operating

Based on Hose Connection
Velocity - V

$$hL = \frac{KV^2}{2g}$$

Hydrant Identification	K
TC 1	0.740
TC 20	.794
TC C71P	.595

PUMPER OUTLET OPERATING ONLY

Based on Pumper
Connection Velocity - V

TC C71P	0.843
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When flowing 1500 Imp. gal./min. - Head Loss through the hydrant
TC-C71P = 13 p.s.i. TC-1 = 17¹/₂
TC20 = 18¹/₂ p.s.i. TC-1G = 21 p.s.i.

ENGINEERING DATA (METRIC)

PRESSURE IN kPa AND EQUIVALENT HEAD OF WATER IN METRES,
ALSO HEAD OF WATER IN METRES AND EQUIVALENT PRESSURE IN kPa

kPa or METRES	EQUIVALENT		kPa or METRES	EQUIVALENT		kPa or METRES	EQUIVALENT	
	HEAD METRES	PRESSURE kPa		HEAD METRES	PRESSURE kPa		HEAD METRES	PRESSURE kPa
0.5	0.051	4.896	22	2.244	215.402	44	4.488	430.804
1	0.102	9.791	23	2.346	225.193	45	4.590	440.595
2	0.204	19.582	24	2.448	234.984	46	4.692	450.386
3	0.306	29.373	25	2.550	244.755	47	4.794	460.177
4	0.408	39.164	26	2.652	254.566	48	4.896	469.968
5	0.510	48.955	27	2.754	264.357	49	4.998	479.759
6	0.612	58.746	28	2.856	274.148	50	5.100	489.550
7	0.714	68.537	29	2.958	283.939	60	6.120	587.460
8	0.816	78.328	30	3.060	293.730	70	7.140	685.370
9	0.918	88.119	31	3.162	303.521	80	8.160	783.280
10	1.020	97.910	32	3.264	313.312	90	9.180	881.190
11	1.122	107.701	33	3.366	323.103	100	10.200	979.100
12	1.224	117.492	34	3.468	332.894	110	11.220	1077.010
13	1.326	127.283	35	3.570	342.685	120	12.240	1174.920
14	1.428	137.074	36	3.672	352.476	130	13.260	1272.830
15	1.530	146.865	37	3.774	362.267	140	14.280	1370.740
16	1.632	156.656	38	3.876	372.058	150	15.300	1468.650
17	1.734	166.447	39	3.978	381.849	160	16.320	1566.560
•18	1.836	176.238	40	4.080	391.640	170	17.340	1664.470
19	1.938	186.029	41	4.182	401.431	180	18.360	1762.380
20	2.040	195.820	42	4.284	411.222	190	19.380	1860.290
21	2.142	205.611	43	4.386	421.013	200	20.400	1958.200

HEAD LOSS COEFFICIENTS FOR FIRE HYDRANTS

Both Hose Outlets
Operating

Based on Hose Connection
Velocity - V

$$(hL = \frac{KV^2}{2g})$$

Hydrant Identification	K
TC 1	0.740
TC 20	.794
TC C71P	.595

PUMPER OUTLET OPERATING ONLY

Based on Pumper
Connection Velocity - V

TC C71P	0.843
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FIRE HYDRANT CAPACITIES FIG.1

TC-C71P = Compression Hydrant 2 - 65mm and 1 pumper outlet.
TC-1 = No. 1 Slide Gate Hydrant 2 - 65mm and 1 pumper outlet.
TC-20 = No. 20 Slide Gate Hydrant 2 - 65mm outlets.

FIRE HYDRANT HEAD LOSSES FIG.2

When flowing 6000 litres/min. – Head loss through the hydrant
TC-C71P = 74.5 kPa TC-20 = 96.2 kPa
TC-1 = 96.2 kPa

