Siphonic Roof Drainage



Introduction Siphonic Action Gravity *vs.* Siphonic Drainage Siphonic Drains Tailpipes Pipework LEED[™] - Green Building Design Applications Why Siphonic? Siphonix® Software







- Invented and patented 1968 by Olavi Ebeling
- A fully engineered and highly efficient system based on hydraulic principles
- Used throughout Europe since 1970s
- System design simplified by current generation of software





• First use documented in ancient Egypt







• Created by a pipe **completely** filled with fluid with one end lower than the other





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- Gravity will cause the fluid to drain through the lower end

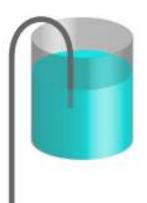




- Created by a pipe **completely** filled with fluid with one end lower than the other
- Gravity will cause the fluid to drain through the lower end
- Cohesive forces between water molecules ensures the pipe remains full

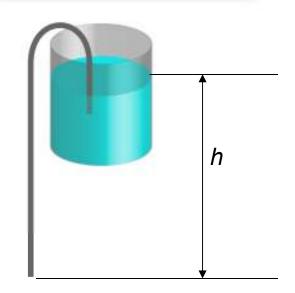


• The point of ingress must be higher than the exit point



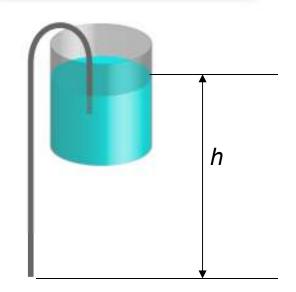
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- The greater the height difference, the greater the capacity





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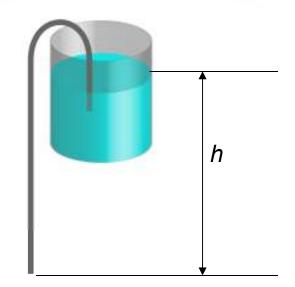


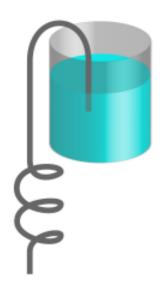


• The pipe must be completely full

- The point of ingress must be higher than the exit point
- The greater the height difference, the greater the capacity
- The pipe must be completely full
- Friction has a big impact











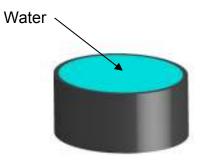


• Gravity Water Air

In gravity systems, water adheres to the wall of the pipe

Typically only 30% of the pipework is filled with water – 70% is air

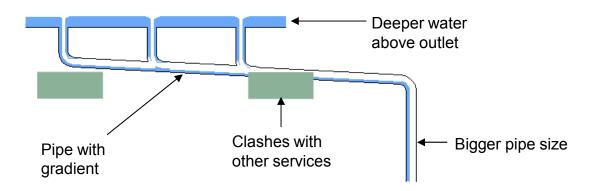
- Siphonic
- In a primed & working siphonic system, 100% of the pipe is filled with water



Pipework can therefore be significantly smaller



• Gravity

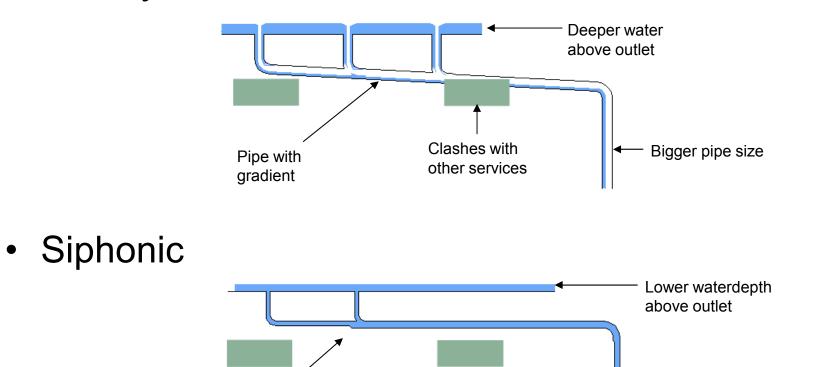


Pipe runs level



Smaller pipe size

• Gravity

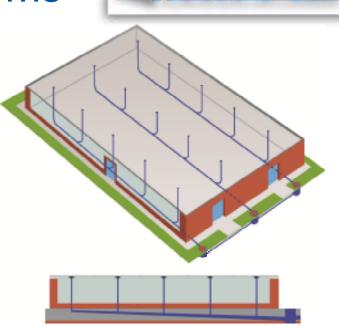


Easy coordination

with other services



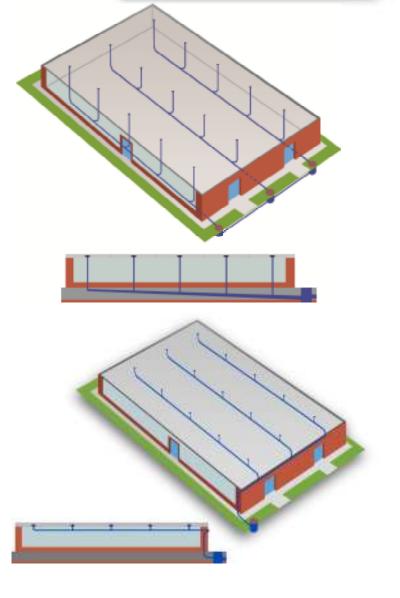
- Gravity
 - Number of downpipes
 - Significant underground work
 - Intrusive piping







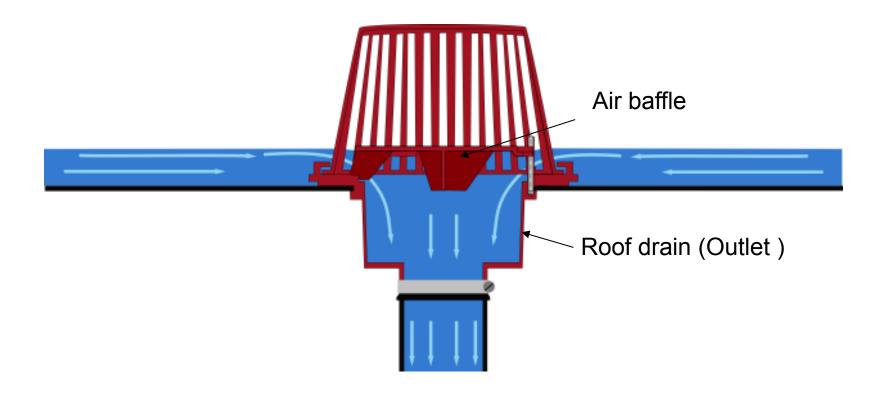
- Number of downpipes
- Significant underground work
- Intrusive piping
- Siphonic
 - Fewer downpipes
 - Minimised underground work
 - High level pipes
 - Horizontal pipes







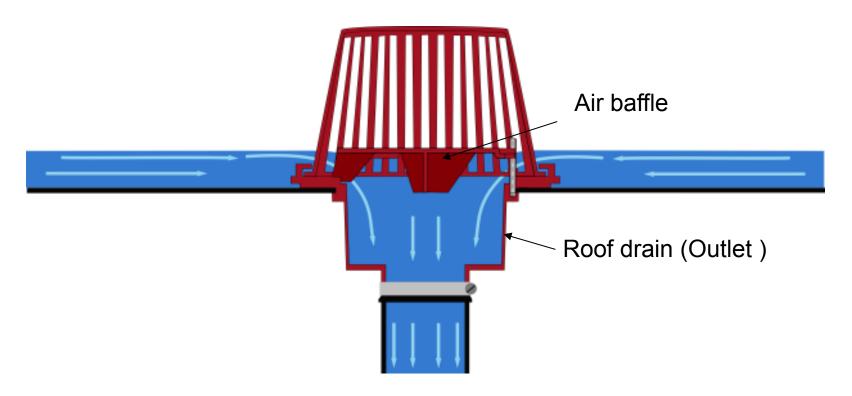
• Outlet: it's just a controlled hole in the roof!



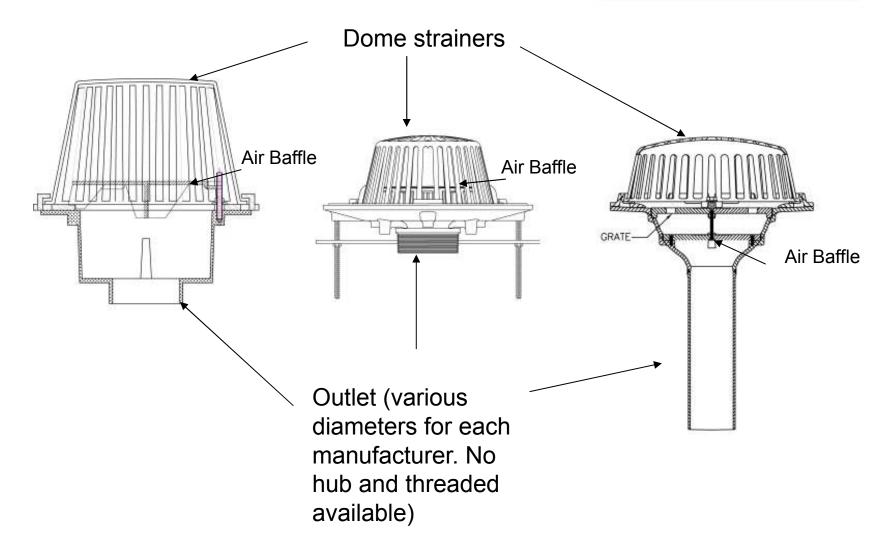




- Outlet: it's just a controlled hole in the roof!
- Siphonic action only occurs when the air baffle is completely submerged









 Design & testing performed with CRM Drainage Consultants





- Design & testing performed with CRM Drainage Consultants
- Full siphonic test rig



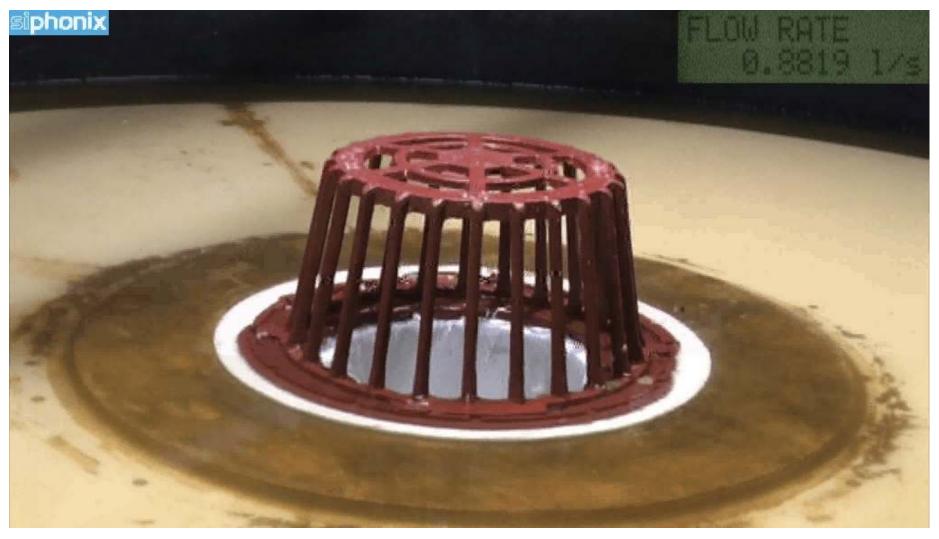


- Design & testing performed with CRM Drainage Consultants
- Full siphonic test rig
- Conforms to ASME Standard A112.6.9-2005



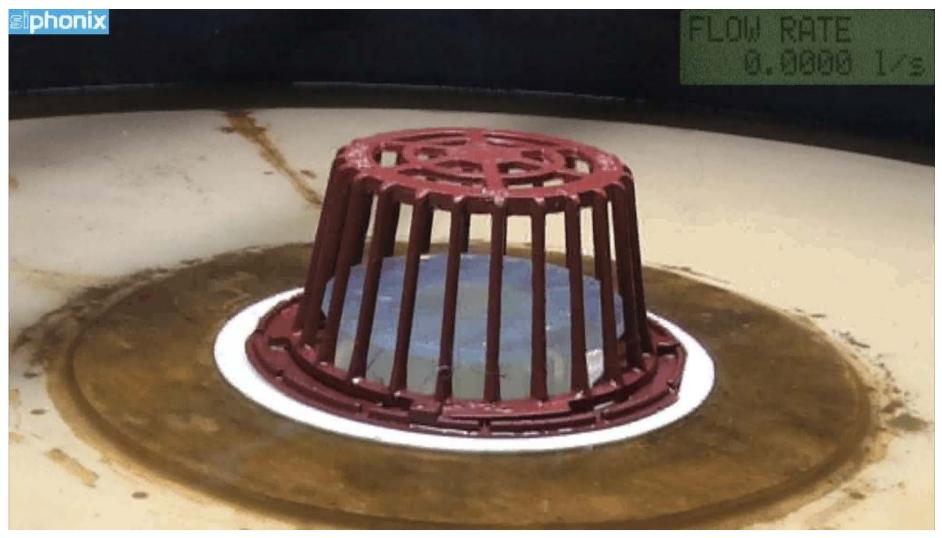


Conventional Roof Drain





Siphonic Roof Drain







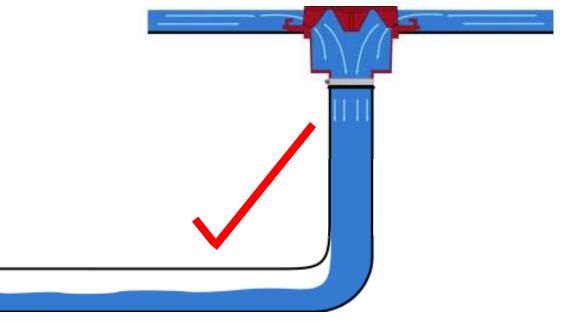
 Connects the roof drain to the horizontal collector







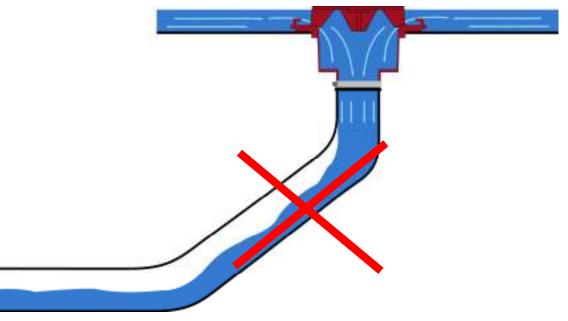
- Connects the roof drain to the horizontal collector
- Pipes must be vertical and horizontal not inclined







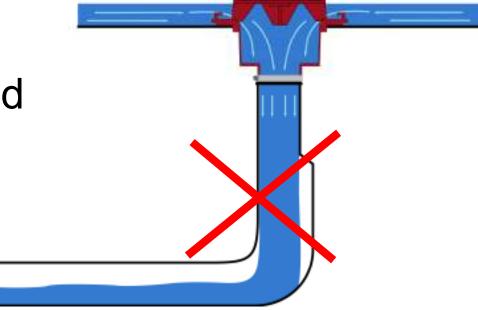
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- Connects the roof drain to the horizontal collector
- Pipes must be vertical and horizontal not inclined
- Expansion in the vertical plane should be avoided



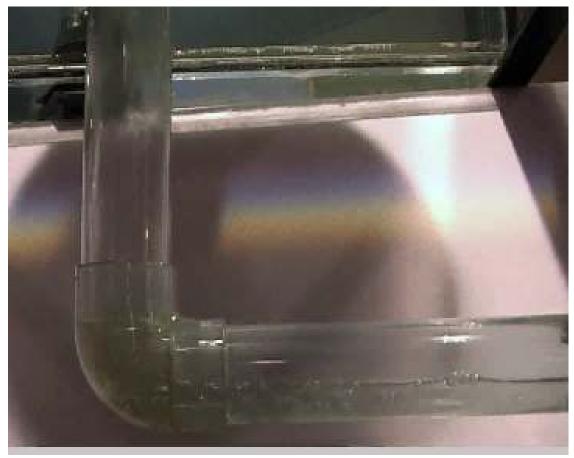
Pipework



- Most materials are suitable
 - Cast Iron
 - Ductile Iron
 - Stainless Steel
 - Galvanised steel
 - Copper
 - ABS
 - HDPE
 - PVC
- Check ASPE Guide for details
- Remember pressure is negative!



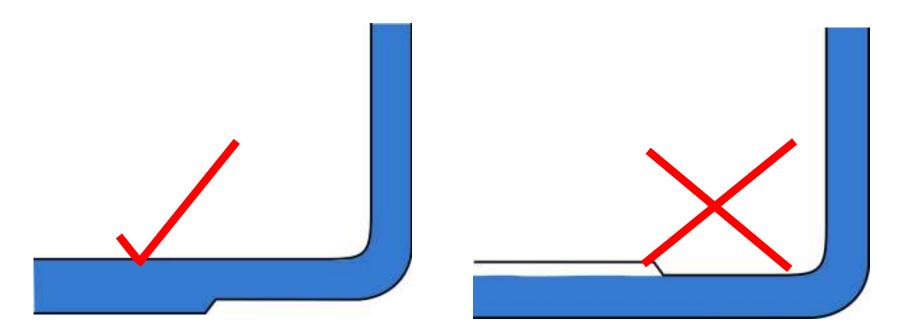
• Water drains normally before siphonic action







- Pipes are installed horizontal & vertical
- Eccentric fittings should be used where possible



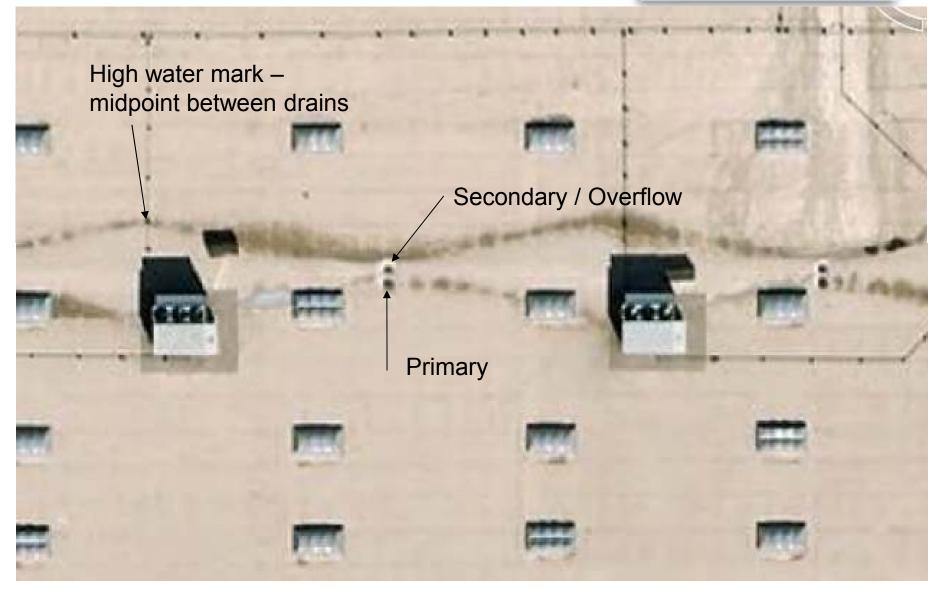
On the roof





On the roof





LEED[™] - Green Building Design



• Siphonic Roof Drainage can gain points

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✓ Reduced site disturbance (SS Credit 5.1)

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✓ Reduced site disturbance (SS Credit 5.1)✓ Controlled flow roof drainage (SS Credit 6.1)

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✓ Reduced site disturbance (SS Credit 5.1)
 ✓ Controlled flow roof drainage (SS Credit 6.1)
 ✓ Rainwater harvesting (WE Credit 3.1/3.2)

LEED[™] - Green Building Design



• Siphonic Roof Drainage can gain points

✓ Reduced site disturbance (SS Credit 5.1)
 ✓ Controlled flow roof drainage (SS Credit 6.1)
 ✓ Rainwater harvesting (WE Credit 3.1/3.2)
 ✓ Innovation in design (ID Credit 1.1)

Applications



- Large footprint buildings!
 - Warehouses
 - Distribution Units
 - Airports
 - Sports Stadiums
 - Shopping Malls
 - Factories







MEAE

Why Siphonic?

- Greater efficiency
 - Smaller pipes
 - Fewer outlets
 - Easier maintenance



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Lower groundwork costs

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Lower groundwork costs

- Less underground pipework
- Reduced installation time
 - Easier to install
- Greater architectural freedom
 - Fewer downpipes
 - Level installation of pipework
 - Smaller pipes



🜢 Siphunix Vers. 3 - [New Siphun Wizard]	
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Collector Collector Collector Length 380 tt No. Tails or Tailpipe Spacing 33 tt Add Additional Collector Main Collectors	
Tail Pipes Branch to bendt Length 6.6t Height 3.3t Cranked Use Orifice Plates Drain Size Overflow Height Move to Next Branch	
Loaded Project: Loaded Siphon:	

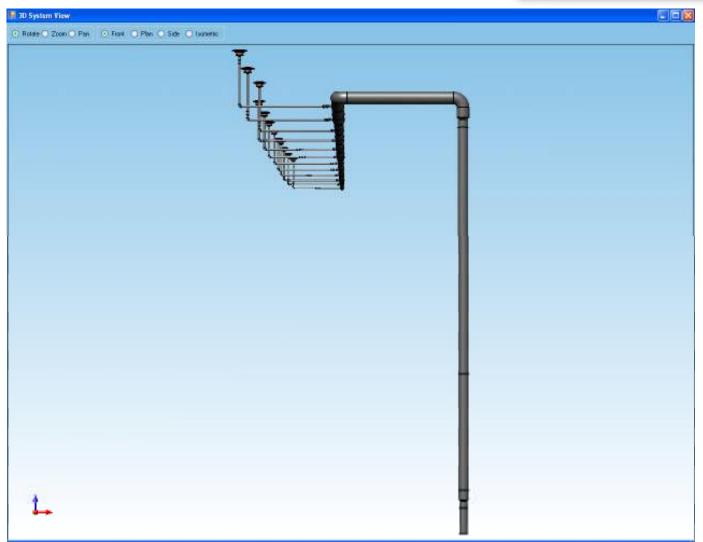


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Joint Speak-479/560F 97/37 2 \$4495.40 \$970.80 Joint Speak-479/522F 107/32* 4 \$937.03 \$2149.12 Joint Speak-479/522F 107/32* 4 \$937.03 \$2149.12 Joint Speak-479/52F 107/3* 1 \$977.43 \$977.43 Joint Speak-479/52F 107/3* 3 \$1738.87 \$2186.91 Joint Speak-429/338FE - 37/2.5* 12 \$35.83 \$327.96 Reduceri Speak-429/338FE - 37/2.5* 12 \$35.83 \$327.96 Reduceri Speak-429/338FE - 27/2.5* 12 \$35.83 \$327.96 Reduceri Speak-429/338FE - 27/2.5* 1 \$162.73 \$162.73 Cold of Reducerix \$494.69 \$107.32 \$162.73 \$164.93 Incleasivel Speak-429/338FE - 27/3* 1 \$17.30 \$97.30 Incleasivel Speak-429/638FE - 6*/10* 1 \$193.51 \$138.51 Incleasivel Speak-429/638FE - 6*/10* 1 \$192.73 \$162.73 Incleasivel		No.5 Y 10 160 PR 45 1000 105	1.	-2010-24	10000				
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Iown Speaki - 479-623F - 10"/7" 1 \$575,43 \$577,43 Iown Speaki - 479-623F - 12"/2" 3 \$1738,87 \$2136,91 Reducery Speaki - 429-335FE - 37/2.5" 12 \$358,83 \$321,96 Reducer Speaki - 429-335FE - 10"/8" 1 \$162,73 \$162,73 Reducer Speaki - 429-335FE - 10"/8" 1 \$162,73 \$162,73 Cold of Reducers \$4934,69 1 \$162,73 \$162,73 Increasient Speaki - 429-335FE - 20"/9" 4 \$35,88 \$107,32 Increasient Speaki - 429-438FE - 70"/6" 1 \$162,73 \$162,73 Increasient Speaki - 429-438FE - 20"/9" 4 \$35,88 \$107,32 Increasient Speaki - 429-438FE - 70"/6" 1 \$37,50 \$33,51 Increasient Speaki - 429-638FE - 10"/12" 1 \$162,73 \$162,73 Increasient Speaki - 429-638FE - 10"/12" 1 \$162,73 \$162,73 Increasient Speaki - 429-638FE - 10"/12" 1 \$162,73 <td< td=""><td>Loint .</td><td>Speaks - 475-622E - 107 V2 5"</td><td>14</td><td></td><td>\$2149.12</td><td></td><td></td><td></td><td></td></td<>	Loint .	Speaks - 475-622E - 107 V2 5"	14		\$2149.12				
Iow Spean-475-661F 12 V2* 3 \$728.87 \$2186.91 Reducent Reducer Spean-429-338FE - 3*/2.5* 12 \$35.83 \$327.96 Reducer Spean-429-338FE - 3*/2.5* 12 \$35.83 \$327.96 Reducer Spean-429-338FE - 27*/2.5* 12 \$35.83 \$327.96 Increase Spean-429-338FE - 27*/2.5* 1 \$162.73 \$162.73 Cost of Reducers \$498.69 \$107.32 \$162.73 \$169.73 Increasies Spean-429-338FE - 27*/7* 1 \$175.30 \$97.30 Increasies Spean-429-338FE - 5*/6* 1 \$175.10 \$38.51 Increasies Spean-429-538FE - 5*/6* 1 \$175.20 \$165.73 Increasies Spean-429-638FE - 6*/10* 1 \$185.73 \$185.73 Increasies Spean-429-6376FE - 10*/12* 1 \$1167.46 \$107.46 Increasies Spean-429-670FE - 10*/12* 1 \$1167.46 \$107.46 Indel Total \$85.09.50 Tender Total \$80.00 Tender Total									
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Increaser Speaks - 429-670FE - 10*/12* 1 \$167,46 \$167,46 Cost of Increaser: \$532.32 Initial Total \$8,509:50 Tender Total \$0.00									
Cost of Increases: \$532.32 Initial Total \$8.509.50 Tender Total \$0.00			351						
Cost of Increases: \$532.32 Initial Total \$8.509.50 Tender Total \$0.00	riceater	Speake - 429-670FE - 10*/12*	11	\$160.46	\$165.46				
				Cost of Increasers:					
Telescone 40 PD				Initial Total	\$8.609.50		Tender Total	\$0.00	
							Difference:	\$0.00	