ASTM STANDARDS OFFER A SOLUTION TO THE PIPE COLOR CODE ISSUE

Water Reuse in Texas 2012

July 12, 2012
Presentation Outline

- Problem Recognition
- Current Utility Pipe Color Codes
- Plumbing Code Pipe Colors/Revision Process
- Plumbing Code Pipe Conflicts
- Potential Solutions

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Problem Recognition

• Purple pipe - accepted international pipe color for reclaimed water
• Identified in the EPA Guidelines for Water Reuse
• Adopted/required by most US states
• Plumbing code changes now require purple pipe for alternate waters

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Plumbing Code - Alternate Waters

- All alternate waters are non-potable
  - Graywater
  - Rainwater
  - Stormwater
  - AC condensate, etc.
  - Onsite reclaimed water
- Cross-connection risk
  - Potable water cross-connection potential with 5 non-potable sources
  - Municipal reclaimed water system contamination
  - Cross connection between two non-potable sources
Historical Utility Pipe Color Codes

- Two national standards familiar to utilities
  - American Public Works Association—Uniform Color Standard
  - Common Ground Alliance—Best Practices, Feb 2009
Reclaimed Water Guidance/Standards

- 1980 AWWA California-Nevada Section adopted purple standard
- 1980 APWA-ULCC blue/green code
- 2003 APWA –reclaimed purple
- EPA Guidelines for Water Reuse many states-Pantone 512 or 522
- Draft AWWA Standard for Reclaimed Water
- Included in numerous professional Manuals of Practice
Onsite Plumbing Code Changes

International Association of Plumbing and Mechanical Officials (IAPMO) Uniform Plumbing Code (UPC) 3-year update cycle

• 2006 required yellow pipe/ black text
• 2009 requires purple pipe/ black text
• 2012 amended-new and old colors

2009/12 International Code Council (ICC) International Plumbing Code (IPC) also requires purple pipe

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Plumbing Code Revision Process

- Water reuse organizations contacted IAPMO - TIA
- AWWA/WEF/WRA White Paper - green pipe with black text proposed August 2009 - rejected
- 2012 UPC Code revision done, 2015 in process
- 2010/2011 - several requests submitted to change alternate water pipe color – one amended
- Council accepted one amendment during Public Comment from Alliance For Water Efficiency

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Amended Color Coding in 2012 UPC

• Final amendment accepted to Section 601.2

• **601.2.1 Potable Water.** Green background with white lettering

• **601.2.2 Color and information.** Except as required in Section 601.2.2.1, nonpotable water systems shall have a yellow background with black uppercase lettering

• **601.2.2.1 Alternate Water Sources.** Purple background
  – Reclaimed (municipal) - black uppercase lettering
  – Gray water - yellow letters (Pantone 108)
  – On-Site Treated Water Systems - yellow letters (Pantone 108)
  – Rainwater Catchment Systems - yellow letters (Pantone 108)
Conflicts Remain in UPC

- Section 601.2.2 requires yellow pipe with black marking for non-potable water
- Remember - 2006 required yellow pipe/ black text

- UPC considers green pipe to carry potable water onsite – a potential cross connection?
- ASTM B88, Type K copper with green stripe

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Alternate Water Standards

• Monitoring alternate waters
  – State agency review/approve/monitor alternate water treatment or quality
  – Alternate water match quality of other state regulated waters

• National Sanitation Foundation (NSF) Treatment Standard 350 and 350-1, July 2011
  – Treatment Capacity > 379 lpd (100 gpd) and < 5,678 lpd (1500 gpd)

• IAPMO Standard
  – Treatment Capacity < 379 lpd (100 gpd)
Acceptable Existing Pipe?

- Pipe choices available – PVC coated copper, PVC, CPVC, HDPE
- Codes possibly driven by product protection
- Codes often influenced by those seeking patent protection
- Utilities confident in the ROW color code
- We must cross the property line

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Plumbing Code Color Requirements

- IAPMO 2009 UPC-“601.2.1 Potable Water. Green background with white lettering.”
- ICC 2012 IPC-“608.8.2 Color. The color of the pipe shall be discernable and consistent throughout the building.”
- UPC/IPC require labeled purple pipe, flow arrow, text listing material in pipe
  “CAUTION: NONPOTABLE RECLAIMED (RECYCLED) WATER, DO NOT DRINK.”
- UPC/IPC allow alternate material- ie PVC, CPVC, copper

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### Alternate Pipe Solutions - ASTM Code

<table>
<thead>
<tr>
<th>ASTM Standard</th>
<th>Type of Pipe</th>
<th>Drawn or Annealed</th>
<th>Color Code</th>
<th>Use</th>
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<tbody>
<tr>
<td>B-88</td>
<td>Seamless Copper Water Tube Type K</td>
<td>Drawn</td>
<td>Green</td>
<td>Water distribution</td>
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<tr>
<td></td>
<td>Seamless Copper Water Tube Type L</td>
<td>Drawn</td>
<td>Blue</td>
<td>Water distribution</td>
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<td></td>
<td>Seamless Copper Water Tube Type K</td>
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<td>Water distribution</td>
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<tr>
<td></td>
<td>Seamless Copper Water Tube Type L</td>
<td>Annealed</td>
<td>none</td>
<td>Water distribution</td>
</tr>
<tr>
<td>B-302</td>
<td>Threadless Copper Pipe (TP)</td>
<td>Drawn</td>
<td>Gray</td>
<td>General plumbing</td>
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<tr>
<td>B-306</td>
<td>Copper Drainage Tube (DWV)</td>
<td>Drawn</td>
<td>Yellow</td>
<td>Sanitary drain, waste, vent</td>
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<tr>
<td>B-819</td>
<td>Seamless Copper Tube for Medical Gas Systems Type K</td>
<td>Drawn</td>
<td>Green</td>
<td>Non-flammable medical gases with type marked</td>
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<tr>
<td>B-819</td>
<td>Seamless Copper Tube for Medical Gas Systems Type L</td>
<td>Drawn</td>
<td>Blue</td>
<td>Non-flammable medical gases with type marked</td>
</tr>
</tbody>
</table>
Plumbing Code Color Conflicts

• Green Stripe Copper
  – B-88 Type K Drawn - Potable Water
  – B-819 Type K Drawn - Medical Gas
• Blue Stripe Copper
  – B-88 Type L Drawn - Potable Water
  – B-819 Type L Drawn - Medical Gas
• Yellow Stripe Copper
  – B-306 DWV drain/vent, 2009
  UPC/IPC non-potable, flammable gas pipe code
• Gray Stripe Copper
  – B-302 TP general purpose plumbing
  – Consider for graywater?

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Potential Pipe Solutions

- Blue pipe or blue stripe pipe for onsite potable piping
- Green pipe or green stripe pipe for onsite wastewater
- Yellow pipe or yellow stripe pipe for flammable gas pipe
- Gray pipe or gray stripe pipe for graywater or drains
- Purple pipe or purple stripe pipe for highly treated reclaimed water

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Potential Plumbing Code Arguments

• Type L copper is lower pressure!
  Yes- 7,765 psi for 0.5 in copper to 2,650 psi for 8-in
  – Incised type K, L, or M to designate thickness
  – Thickest class K still available

<table>
<thead>
<tr>
<th>Nominal or Standard Size, inches</th>
<th>Actual Outside Diameter, in</th>
<th>K Drawn</th>
<th>Annealed</th>
<th>L² Drawn</th>
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<td>4535</td>
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<td>3915</td>
<td>2235</td>
<td>3365</td>
<td>1910</td>
</tr>
</tbody>
</table>

• May create conflict with medical gas pipe!
  – Change ASTM B-819 to allow green as medical gas color
  – Incised type K or L to designate thickness
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