FAILURE OF PLASTIC PLUMBING PRODUCTS

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OBJECTIVES

• Able To Identify Different Types of Plastic Plumbing Products
• Able To Establish Why The Failure Occurred
• Able To Protect Claims Against Manufacturer Defenses
EXAMPLES OF PLASTIC PRODUCT FAILURES

- Toilet and Faucet Connectors
- PVC and CPVC Pipes (Including Fire Sprinkler Piping and Freezing)

EXAMPLES OF PLASTIC PRODUCT FAILURES

- Polyethylene and PEX Tubing (Including Refrigerator Supply Lines)
- Adhesive and Threaded Fittings

EXAMPLES OF PLASTIC PRODUCT FAILURES

- Refrigerator Water Filters
- Shut-Off Valves
- Dishwasher/Washer Inlet Valves
EXAMPLES OF PLASTIC PRODUCT FAILURES

• Less Obvious: Metal/Plastics

TYPICAL ISSUES WITH PLASTIC PLUMBING PRODUCTS

• Special Aspects of Plastic Product Design
  – Temperature
  – Time and Creep of Plastics
  – Degradation
  – Variability and Failure Rates

TYPICAL ISSUES WITH PLASTIC PLUMBING PRODUCTS

• Special Aspects of Plastic Product Design
  – Temperatures

  Temperature Increase
  Stiffness, Strength
  Degradation

Thread Distorted Due To Heat
TYPICAL ISSUES WITH PLASTIC PLUMBING PRODUCTS

- Special Aspects of Plastic Product Design
  - Temperatures

Failure?

TYPICAL ISSUES WITH PLASTIC PLUMBING PRODUCTS

- Special Aspects of Plastic Product Design
  - Time And Creep Of Plastics: Load Applied Over Time

Time = 0
Time = 1 Year

Continuous Load

TYPICAL ISSUES WITH PLASTIC PLUMBING PRODUCTS

- Special Aspects of Plastic Product Design
  - Variability and Failure Rates

*A defective product does not always result in failure of all parts. Not all parts are manufactured the same and are not subject to the same environment.
TYPICAL ISSUES WITH PLASTIC PLUMBING PRODUCTS

• Special Aspects of Plastic Product Design
  – Chemical Exposure

Primary Causes of Plastic Failure
  – Design
  – Material
  – Manufacturing
  – Use/Abuse

• Primary Causes of Plastic Failure
  – Design: Sharp Corners, Thread Design, Geometry
TYPICAL ISSUES WITH PLASTIC PLUMBING PRODUCTS

• Primary Causes of Plastic Failure
  – Material: Same Material, Different Material
    • Batch To Batch Differences: Polymerization, Mixing, Additives, Fillers
    • Material Substitutions: “Similar” Grade, Additive Substitution

TYPICAL ISSUES WITH PLASTIC PLUMBING PRODUCTS

• Primary Causes of Plastic Failure
  – Manufacturing: Change Plastic From Good To Bad
    • Material Degradation: Thermal and Moisture (Drying)
    • Machine Settings: Weld Lines, Voids, Ripples, Mixing

TYPICAL ISSUES WITH PLASTIC PLUMBING PRODUCTS

• Primary Causes of Plastic Failure
  – Use/Abuse: Installation, Impact
TYPICAL ISSUES WITH PLASTIC PLUMBING PRODUCTS

- Expected Life
- Most life expectancy guidelines of plumbing products are not standardized. Exception: C/PVC Piping.
- Did manufacturer consider or test life-expectancy during design?
- Life expectancy should be one of the main inputs when designing a product (thickness, material).
- Expectations from end user vary widely.

TYPICAL ISSUES WITH PLASTIC PLUMBING PRODUCTS

- Expected Life
  - Labels (Problematic)
  - Troubleshooting:
    - If fill valve won’t turn off:
      - There may be dirt or sediments
      - The seal inside the valve may be damaged
      - Replace with new valve

TYPICAL ISSUES WITH PLASTIC PLUMBING PRODUCTS

- Expected Life
  - Labels (Effective)

TYPICAL ISSUES WITH PLASTIC PLUMBING PRODUCTS

- Expected Life
TYPICAL ISSUES WITH PLASTIC PLUMBING PRODUCTS

• Arguments From Manufacturers
  – “The part was in a good working condition when it left our facility.”
  – “The failure must be from user abuse!”
  – “Our part meets and exceeds all the applicable standards.”

INVESTIGATION OF PRODUCT BY THE EXPERT

• Common Techniques To Analyze Plastic Failures
  – Non-Destructive:
    • Visual Examination: Evidence, Labels, Manuals, Standards
    • Optical Microscopy: Fractography
    • CT Imaging and X-rays: Examination of Interior
    • Experimental: Replication of Failures and Exemplars
INVESTIGATION OF PRODUCT BY THE EXPERT

• Common Techniques To Analyze Plastic Failures
  – Destructive
    • Scanning Electron Microscopy (SEM): High-magnification and High-resolution Fractography
    • Energy Dispersive X-ray Spectroscopy (EDS): Elemental Analysis
    • Fourier Transformation Infrared Spectroscopy (FTIR): Molecular Analysis, Polymer Identification

LEGAL AND SUBROGATION ASPECTS

• Collection of Evidence
  – Initial Scene Inspection
  – Evidence Preservation
• Identification of the Manufacturer
• Causation
• Subrogation Demand
• Foreign Manufacturers

INITIAL INSPECTION OF THE LOSS SCENE

• Scene Documentation: Pictures, Pictures, And More Pictures
• Evidence Retention: Surrounding Evidence; Protect Failure Region
• Considerations In Evidence Transfer To Expert And Potential Defendant
IDENTIFICATION OF MANUFACTURER

• Labels
• Exemplars
• IAPMO Certificate

CAUSATION

• Expert Opinion On Causation
• Cause In Fact of Damages

SUBROGATION DEMAND

• Identification of Manufacturer
• Expert Opinion on Causation
• Legal Standard For Jurisdiction
• Damage Support Documentation
FOREIGN MANUFACTURERS

- Legal Considerations With Suit
- Difficulty With Collecting Default Judgments

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Any Questions?