Association of Rotational Molders
Regional Meeting
June 4, 2013
Chicago, IL

Tom Wyszynski
ICO Polymers NA
A Division of A Schulman Inc

What I Hope to Accomplish Today

Sharing knowledge of venting-both theoretical and practical.

Taking a close look at the details associated with venting and making it a more precise issue.

Defining and recognizing good and bad venting – discuss how to eliminate bad venting

My Agenda Today

Why we vent

How we vent

Types of vents / vent selection / vent location

Venting Issues

Why We Vent

All aspect of vents - vent placement, types of vents, length of vents, diameters of vents, number of vents, vent material etc. have to do with one thing –

keeping pressure equalized

Why We Vent

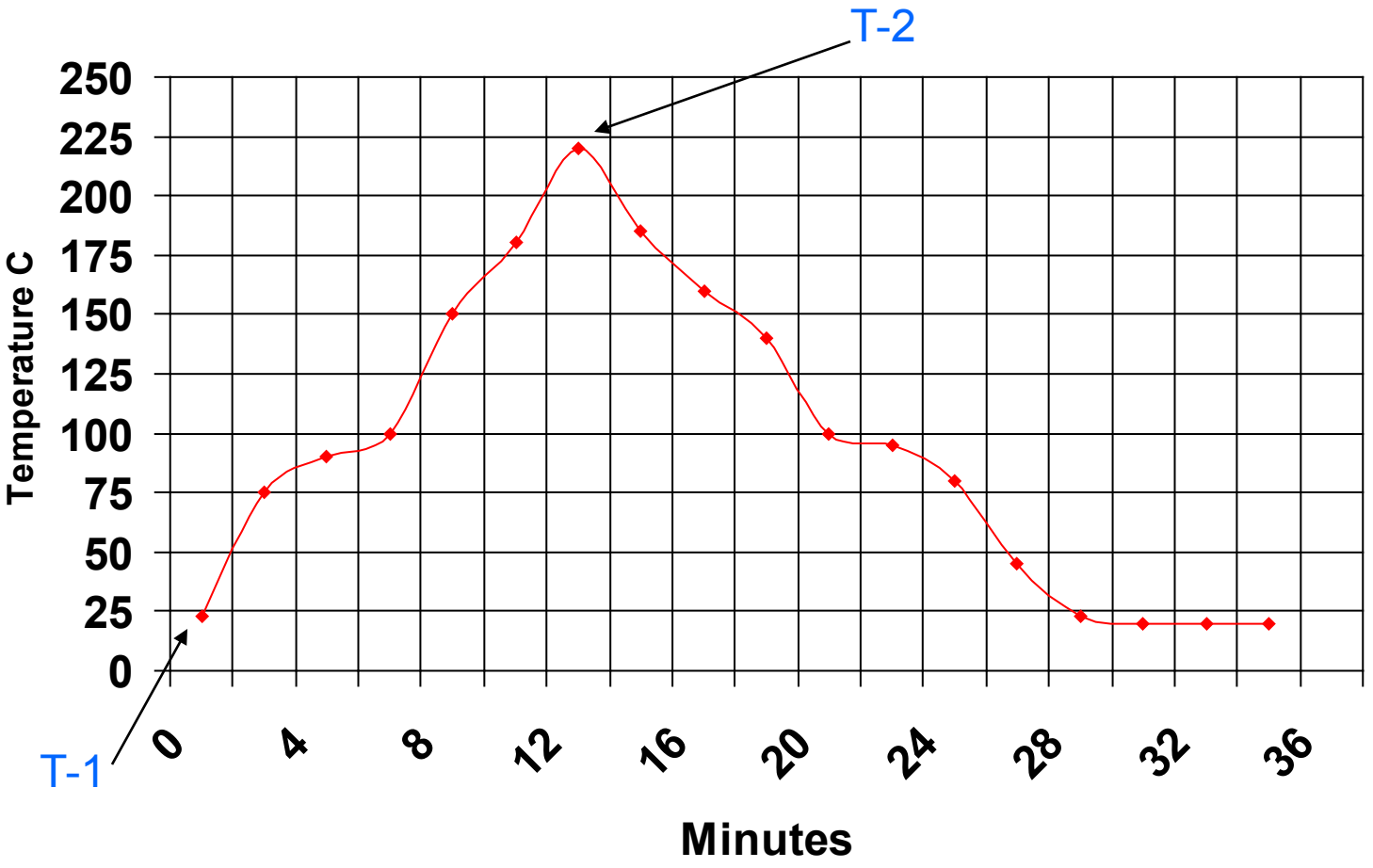
- Gases expand and contract according to temperature
- We vent to compensate for the pressure difference between mold cavity and surrounding atmosphere
- Pressure increases during the heating stage – excessive pressure could damage a mold
- Pressure is reduced during cooling as air flows back into the mold cavity- a vacuum could be had if the vent blinds off and doesn't allow pressure to compensate
- Blowing agents may add additional pressure to a molded part during the decomposition phase
- Any part heated and cooled experiences air expansion and contraction

Joseph Louis Gay-Lussac

Units of Measure

- Temperature
  - Celsius - Fahrenheit – Kelvin
- Pressure
  - PSI, Atmospheres, kPa
- Volume
  - Cubic Feet, Cubic Milliliters, Cubic Centimeters, Buttload

Typical Internal Air Trace



Gay-Lussac's Law

It states that the pressure exerted on a container's sides by an ideal gas is proportional to the absolute temperature.

$$\frac{P_1}{T_1} = \frac{P_2}{T_2}$$

$$\frac{14.7 \quad \text{psi}}{288.15 \text{ K}} \qquad \frac{X}{488.15\text{K}}$$

$$288.15X = 14.7 \text{ X } 488.15$$

$$288.15 \text{ X} = 7175.805$$

X = 24.9

Minus 1 atmosphere = 10.2 psi

P= pressure

T = Temperature (Kelvin)

$K = ([F^{O}]+459.7) \times 5/9$

Three Very Important Laws

- Gay-Lussacs Law

- Charles's Law

- Dru Laws

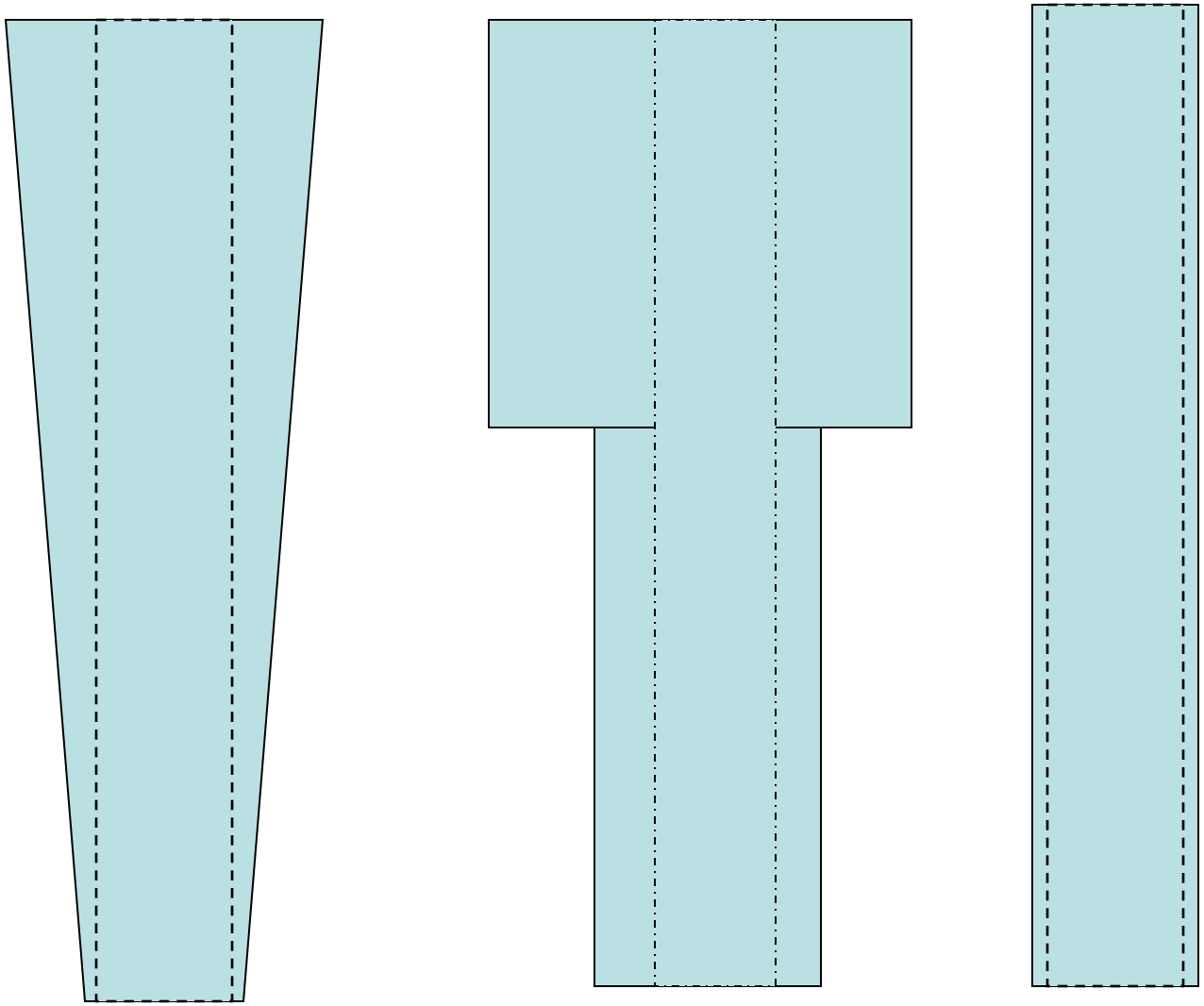
Research

Cans must be opened in order to measure pressure

How Do We Vent

Vent Tube

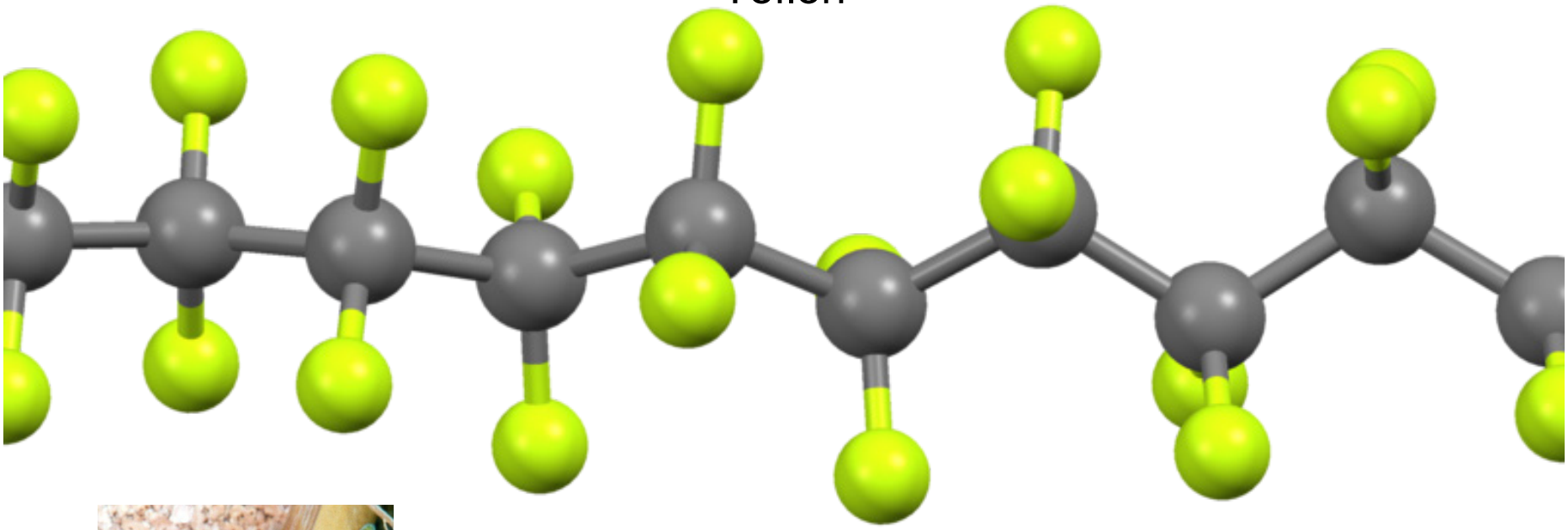
PTFE Vent Shapes

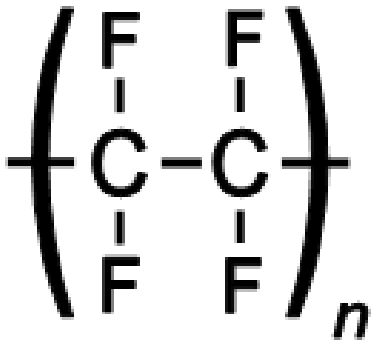


Polytetrafluoroethylene

PTFE

Teflon

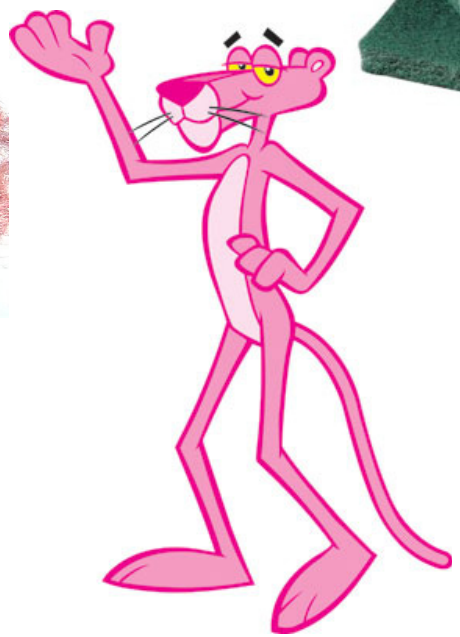




Melt Point 327C – 621F

Fixed Vent
Mild Steel

Vent Packing

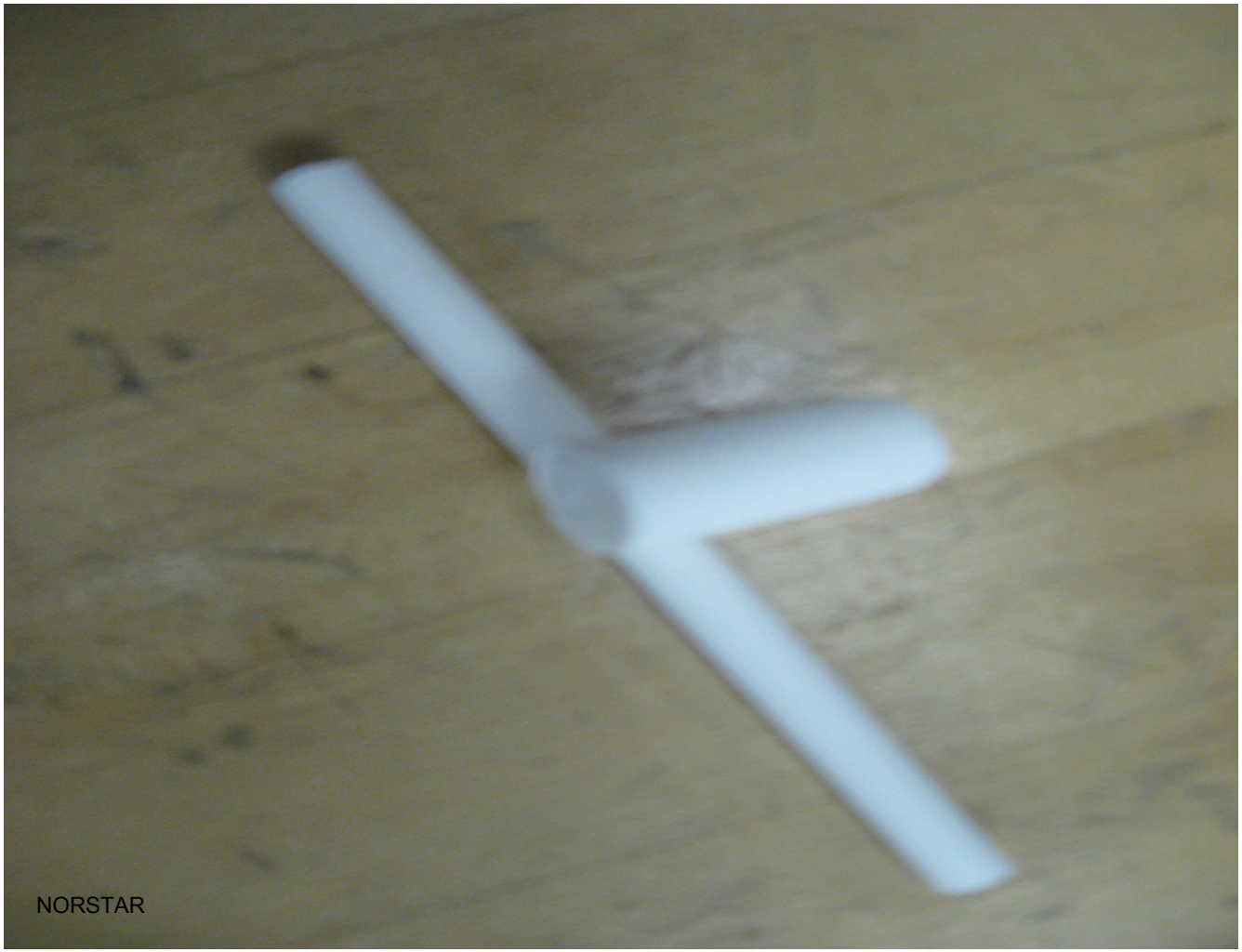


CELLOPHANE TAPE

Where does steel wool come from?

Steel Sheep

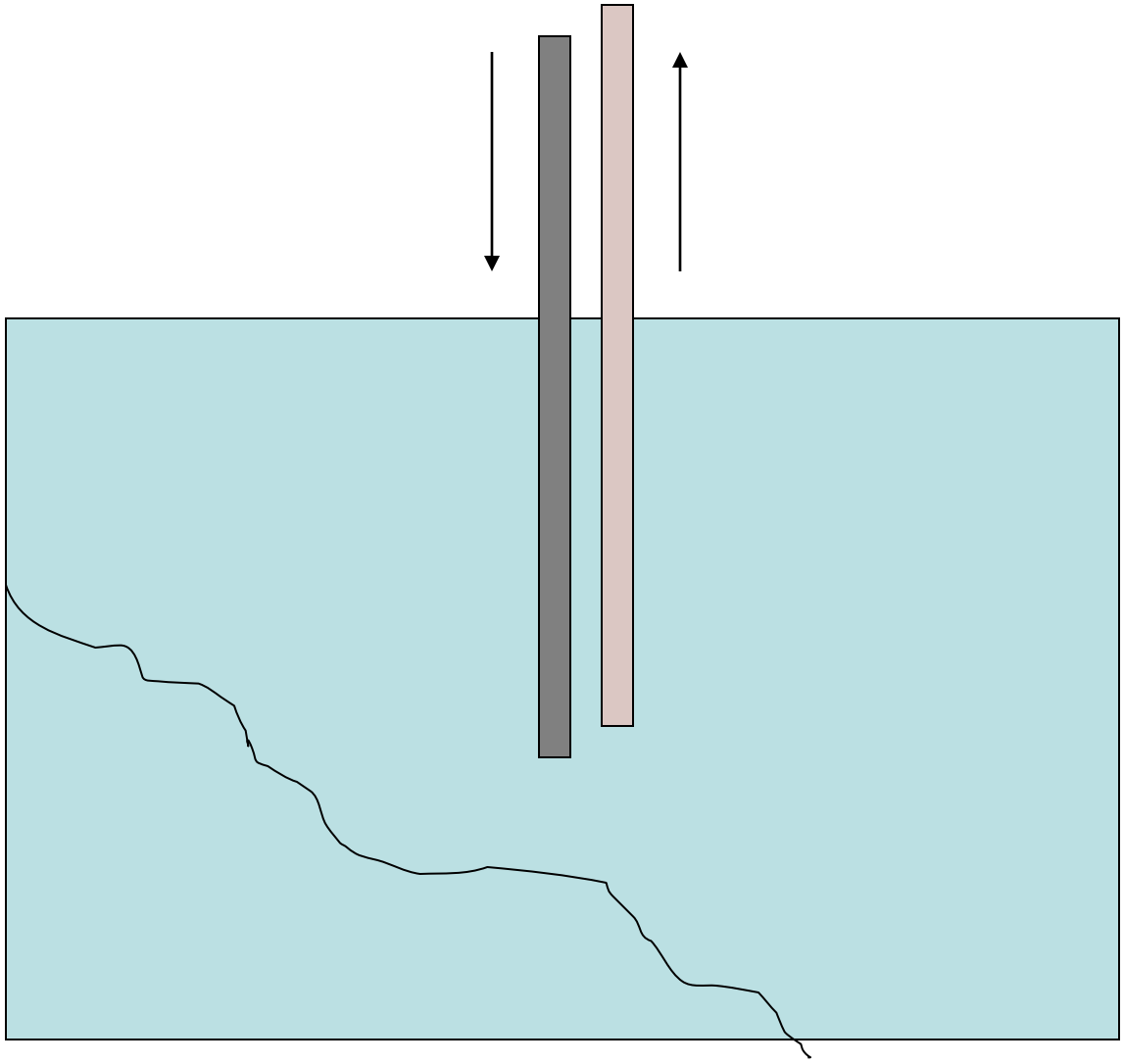
Filter Vents



SupaVents & Smart Vents

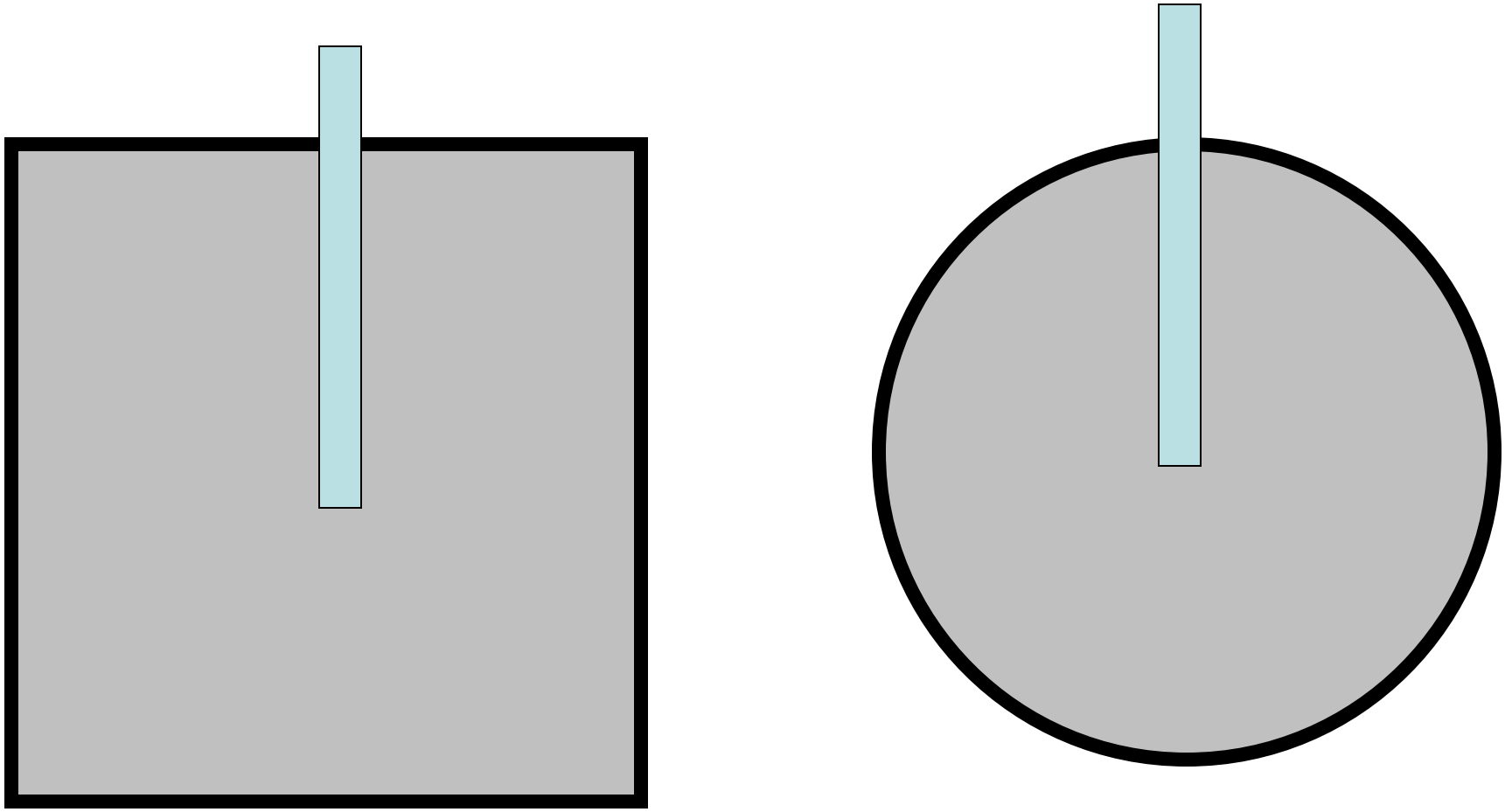
Norstar Company

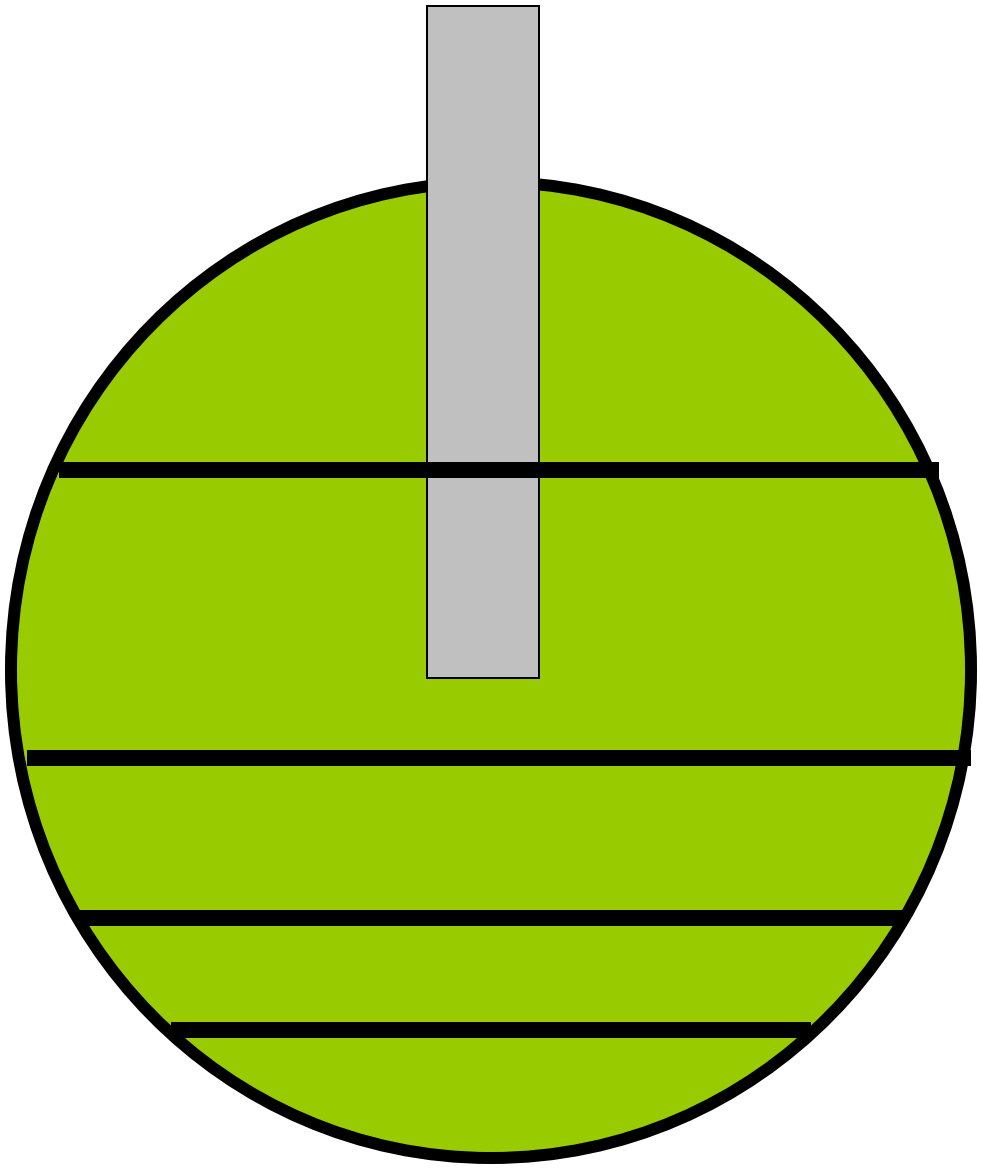
Dual Passage Vent

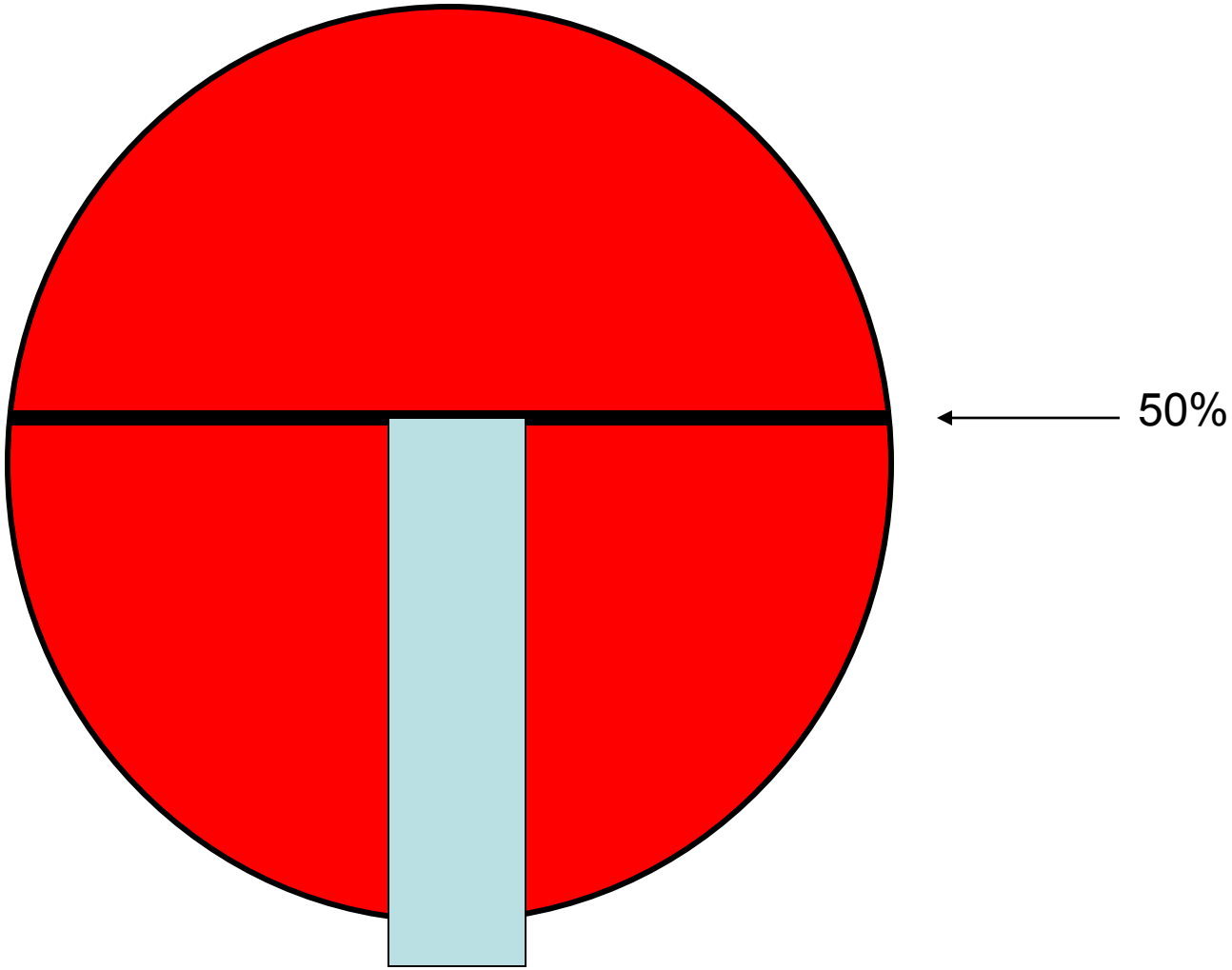


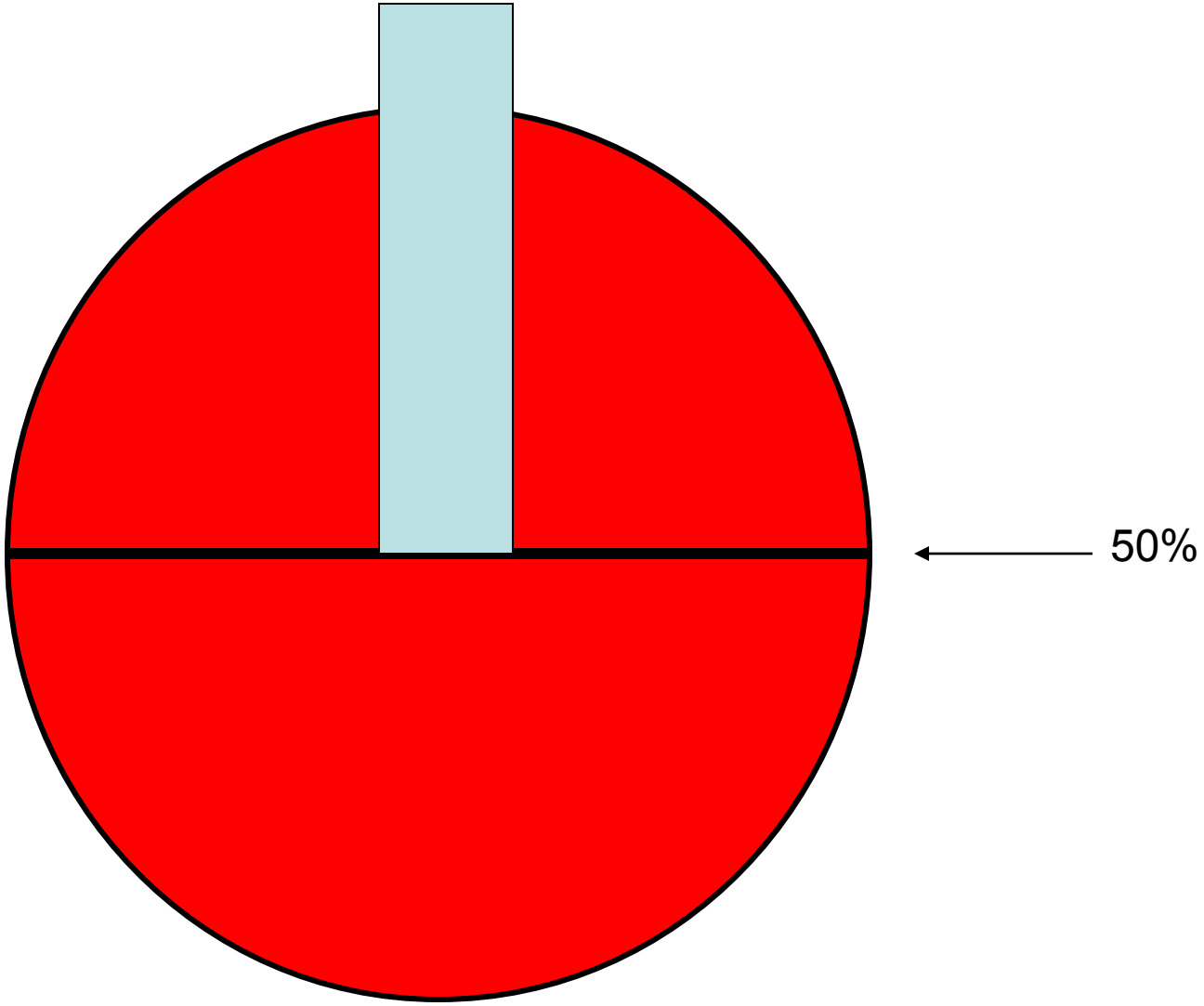
Vent Placement

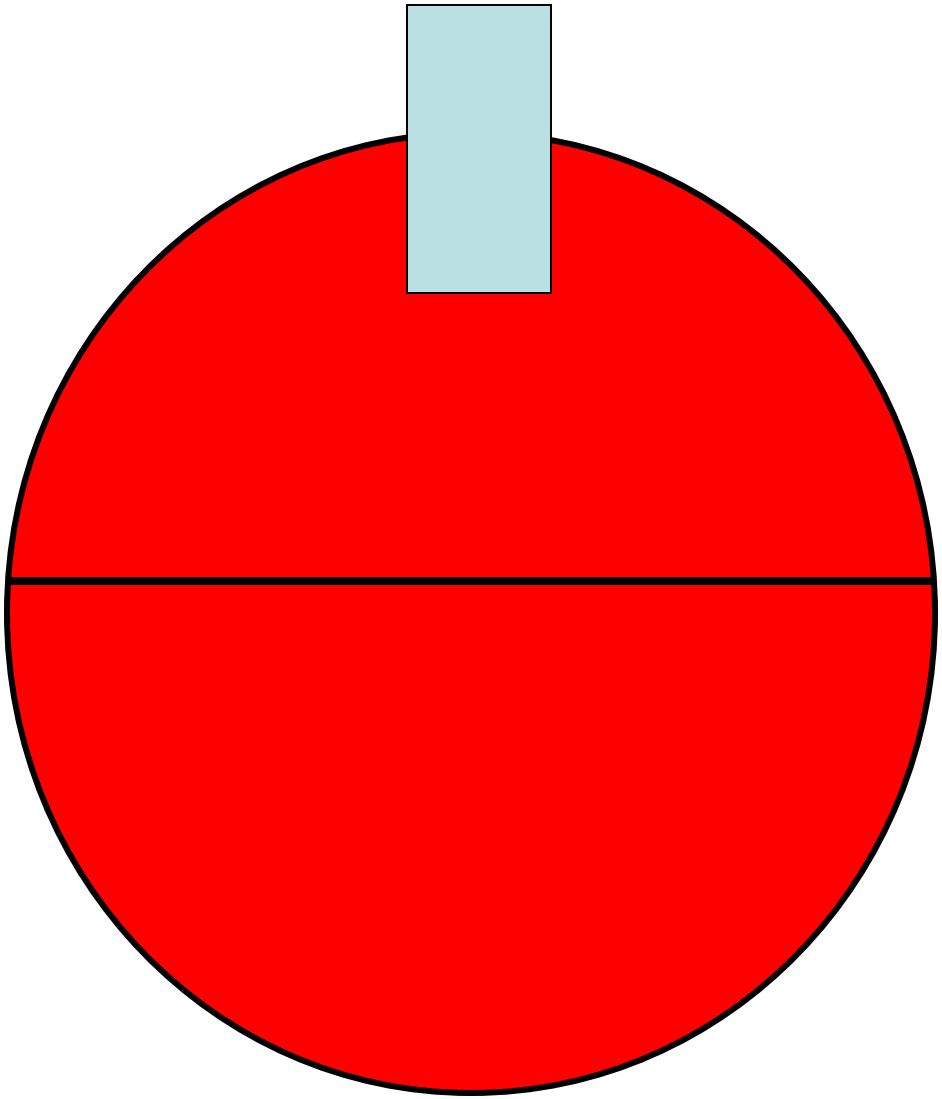
Vent Placement



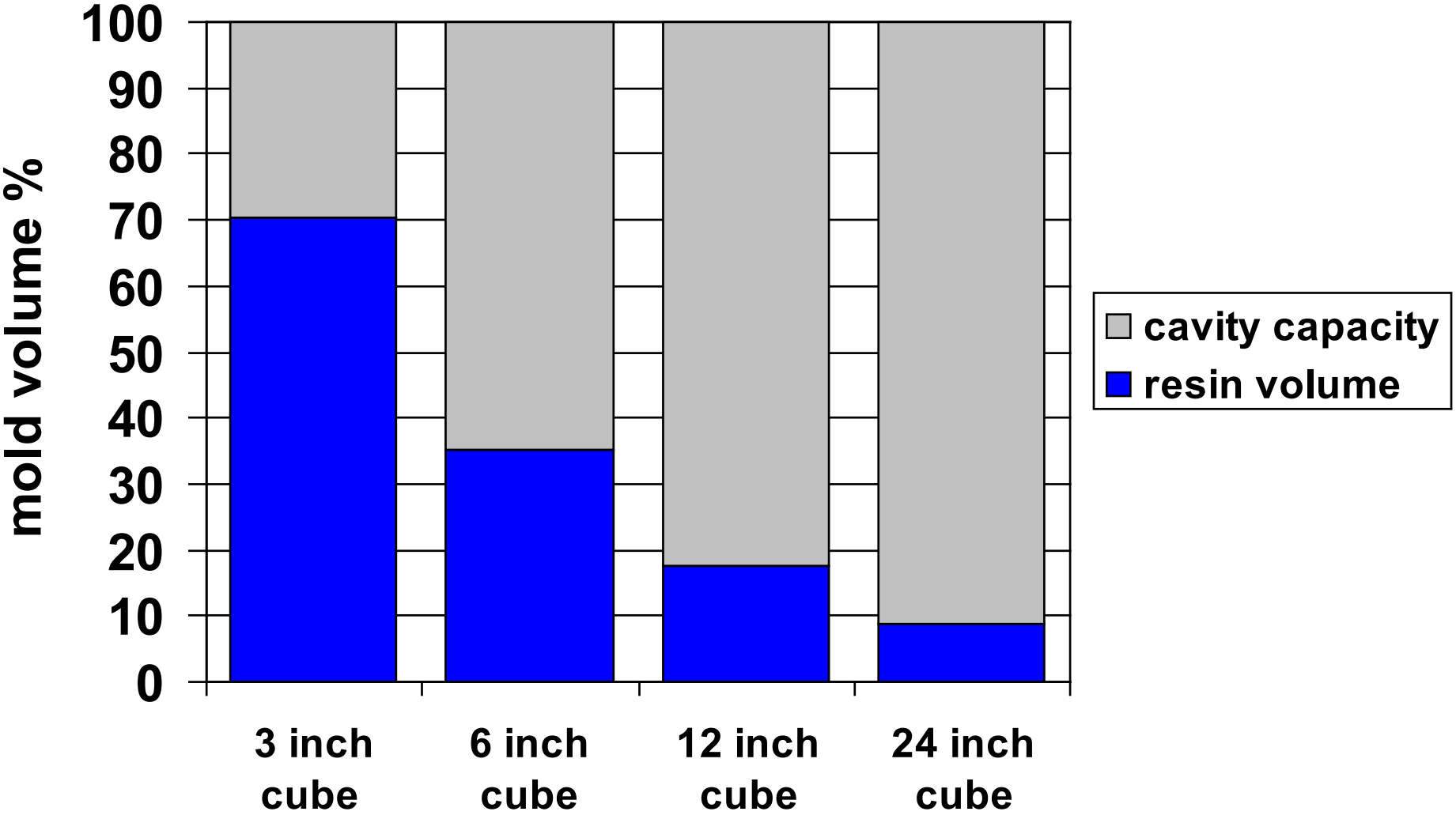



50%


50%

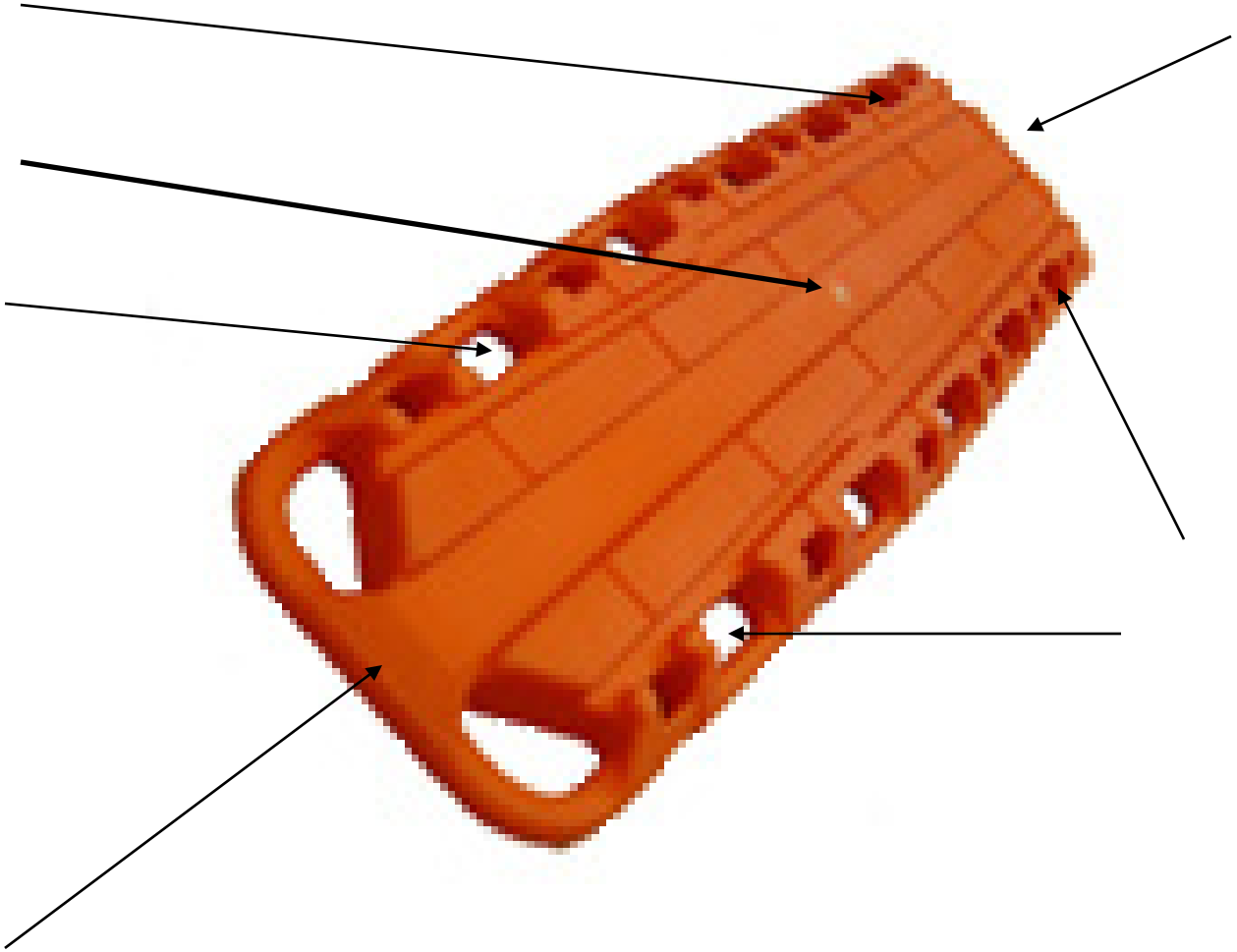


.125 Inch Wall Thickness

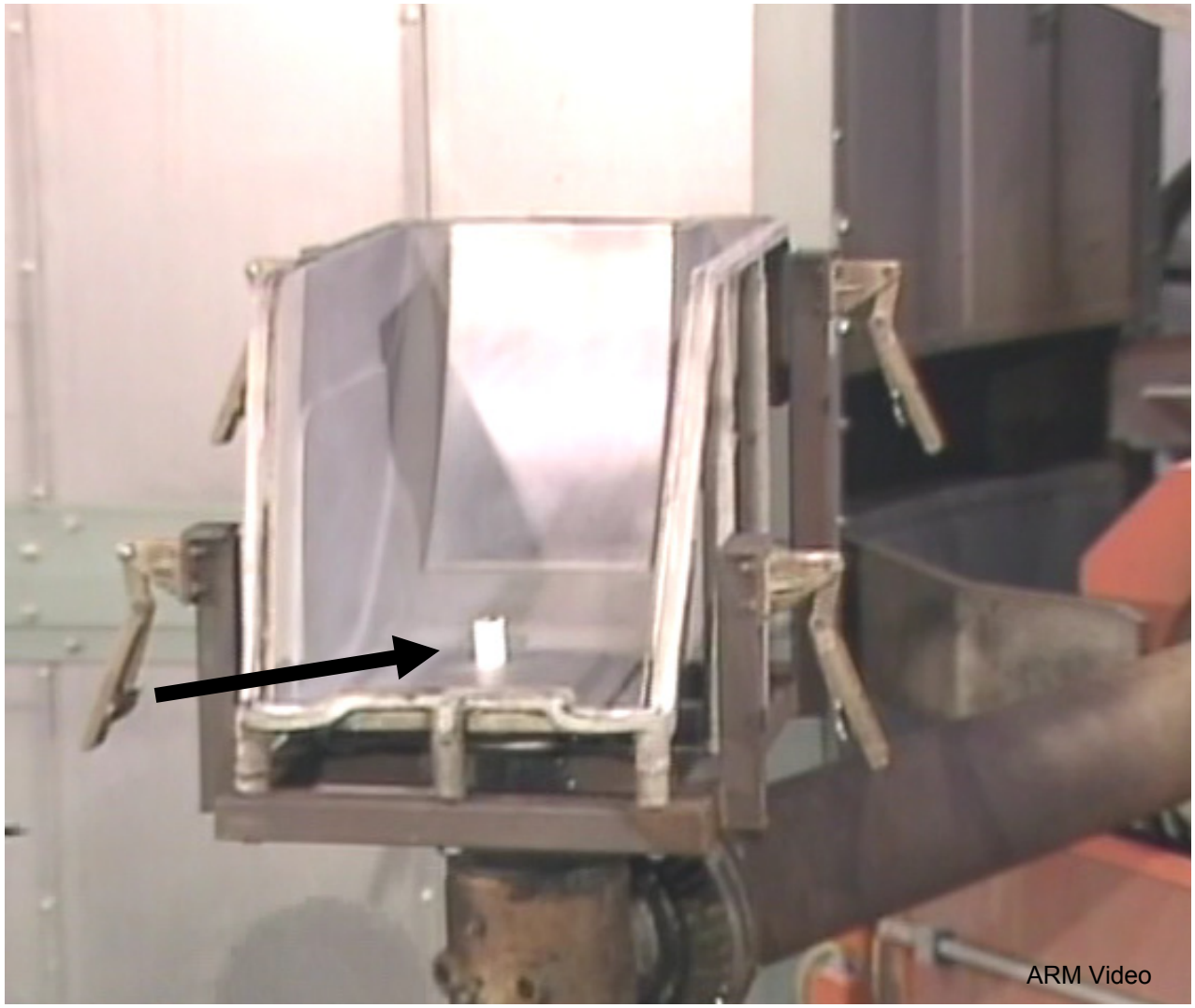


Tough to Vent

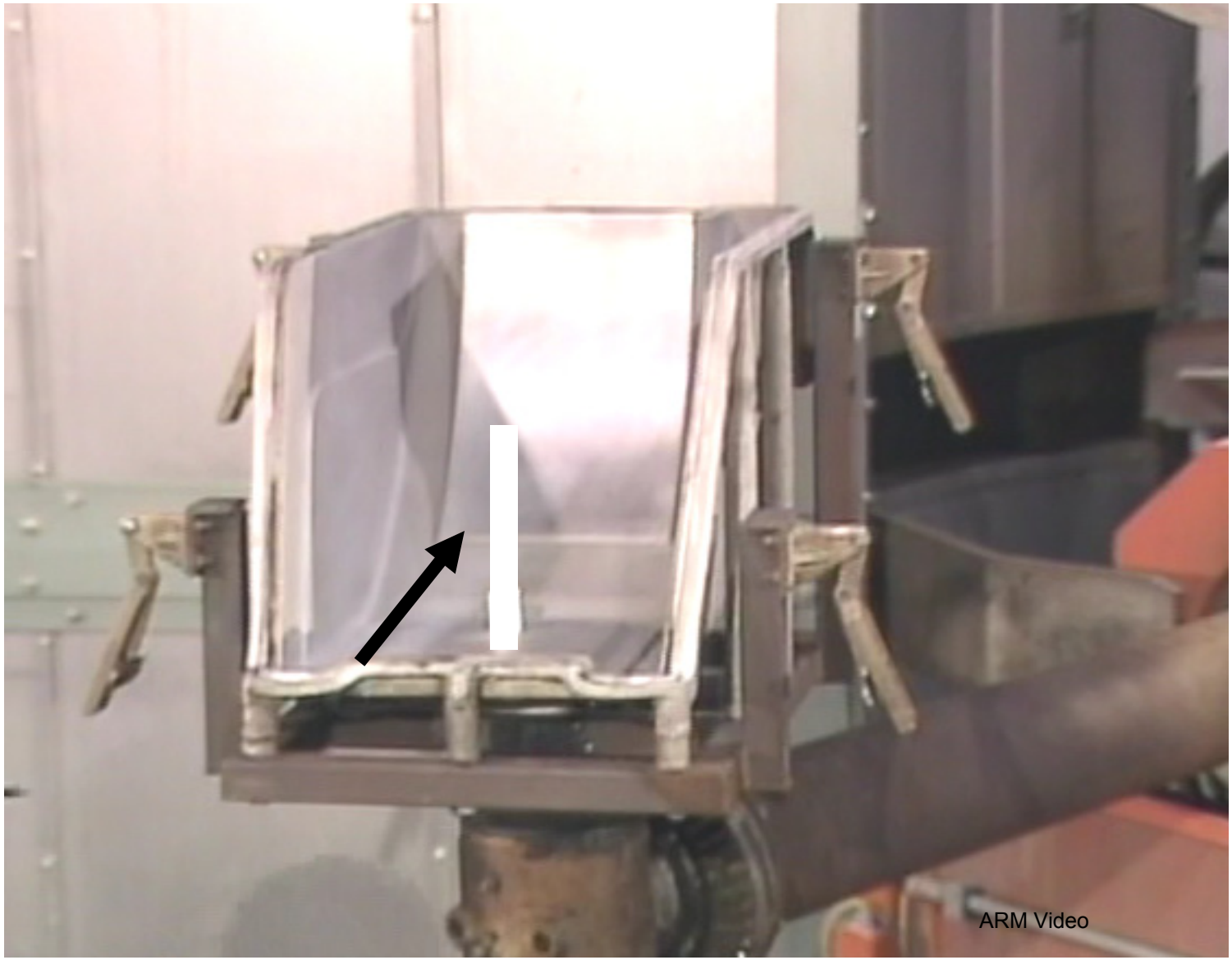
Tough to Vent



Short Vent



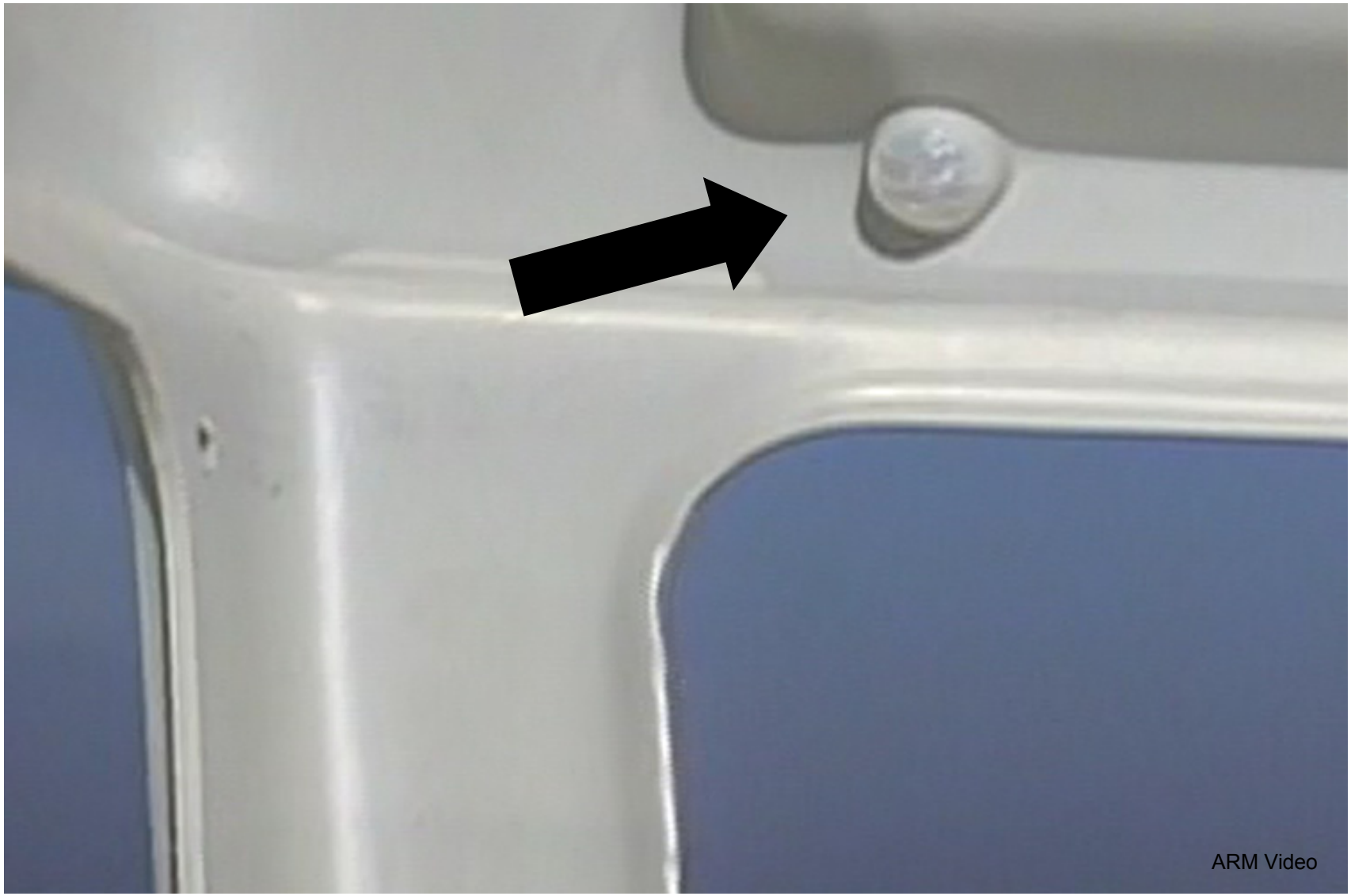
Better Vent



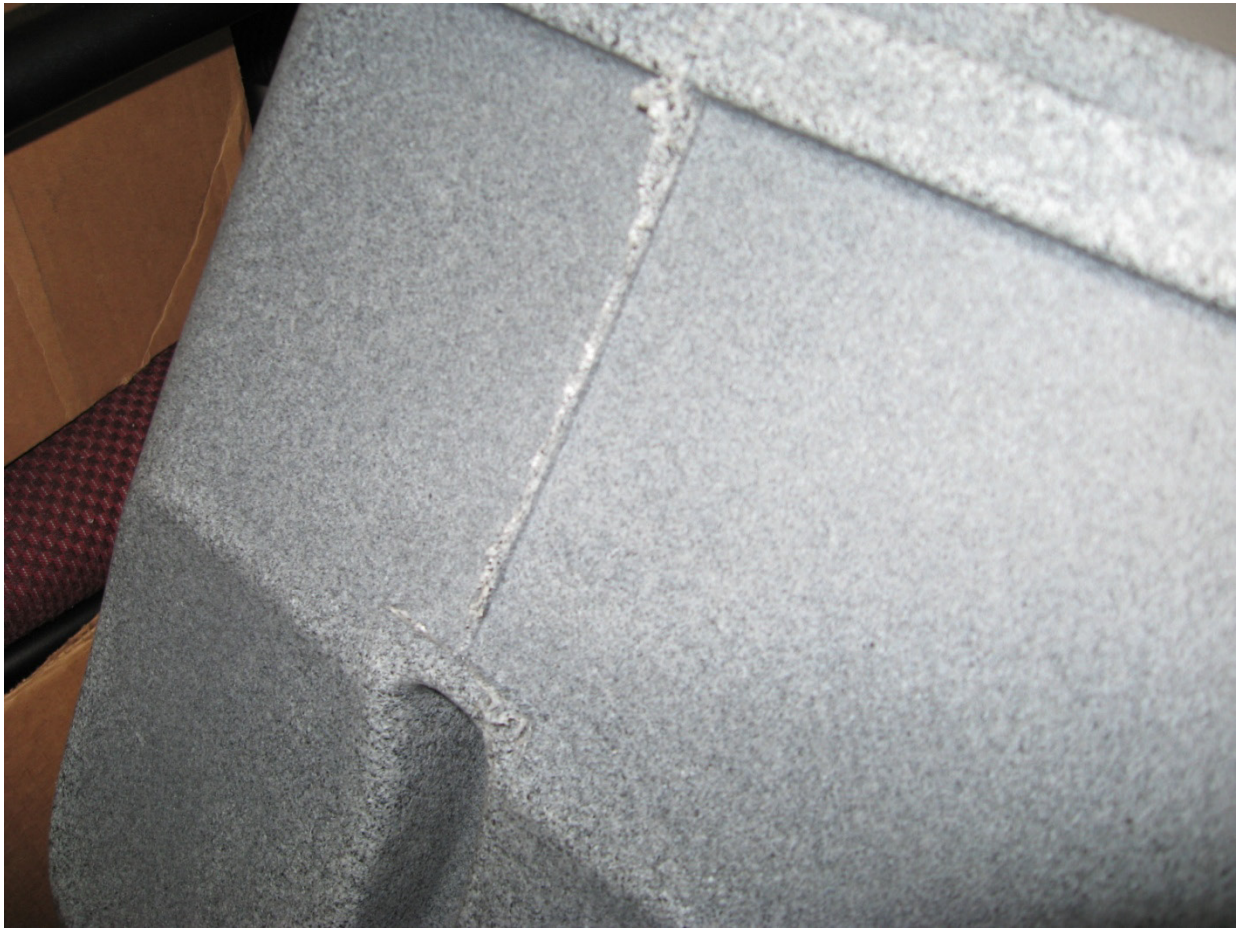
Common Vent Related Issues

- Blow/suck Holes
- Resin Leaking from Mold
- Part Distortion – placement / blinding off
- Water in mold
- Contamination - color or packing
- Flash / porosity at part line
- Leaks at inserts

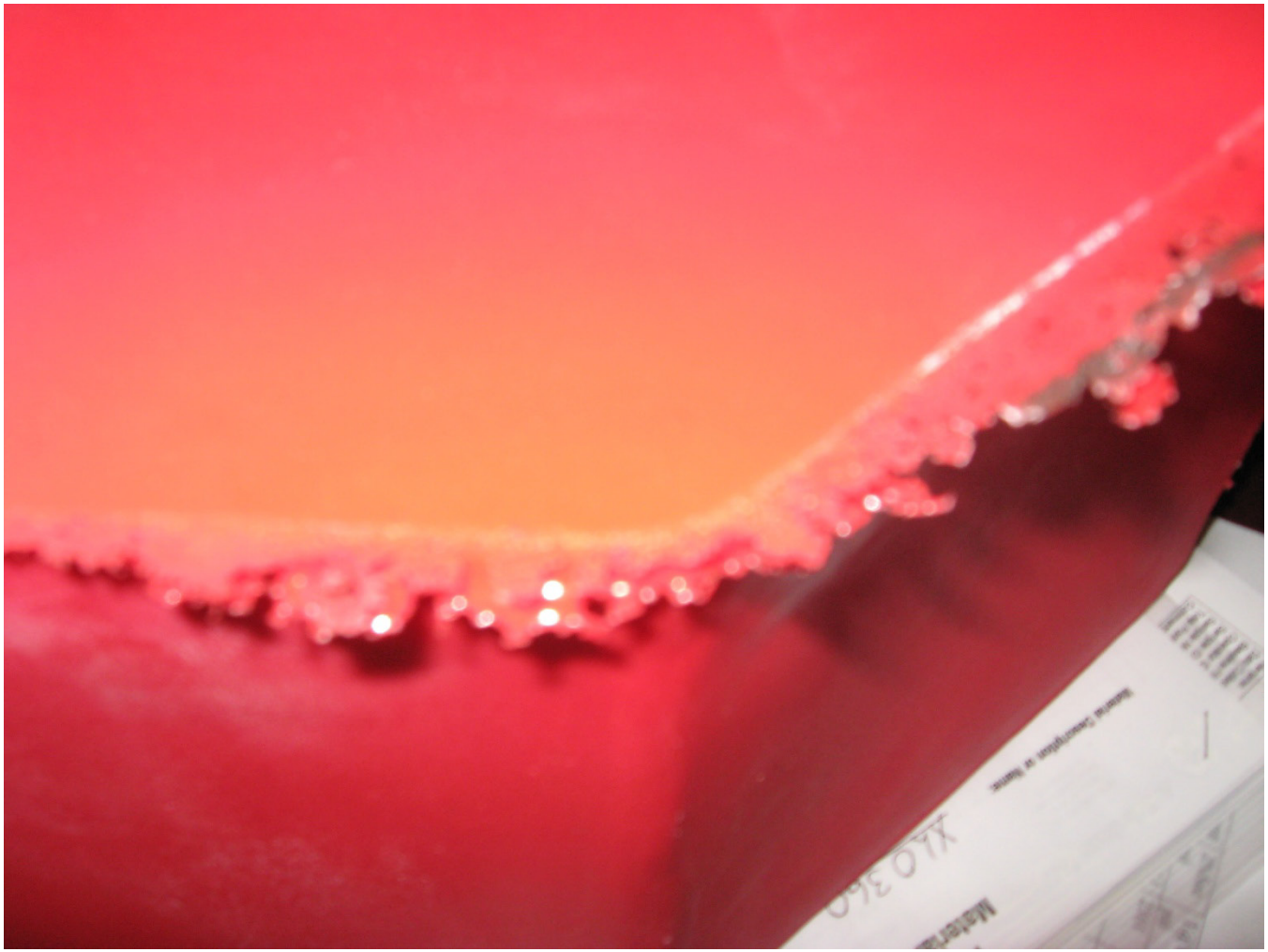
Suck Holes



Pain in the Flash



A Flashy Part?



Some materials may tend to flash or suffer suck holes more than others

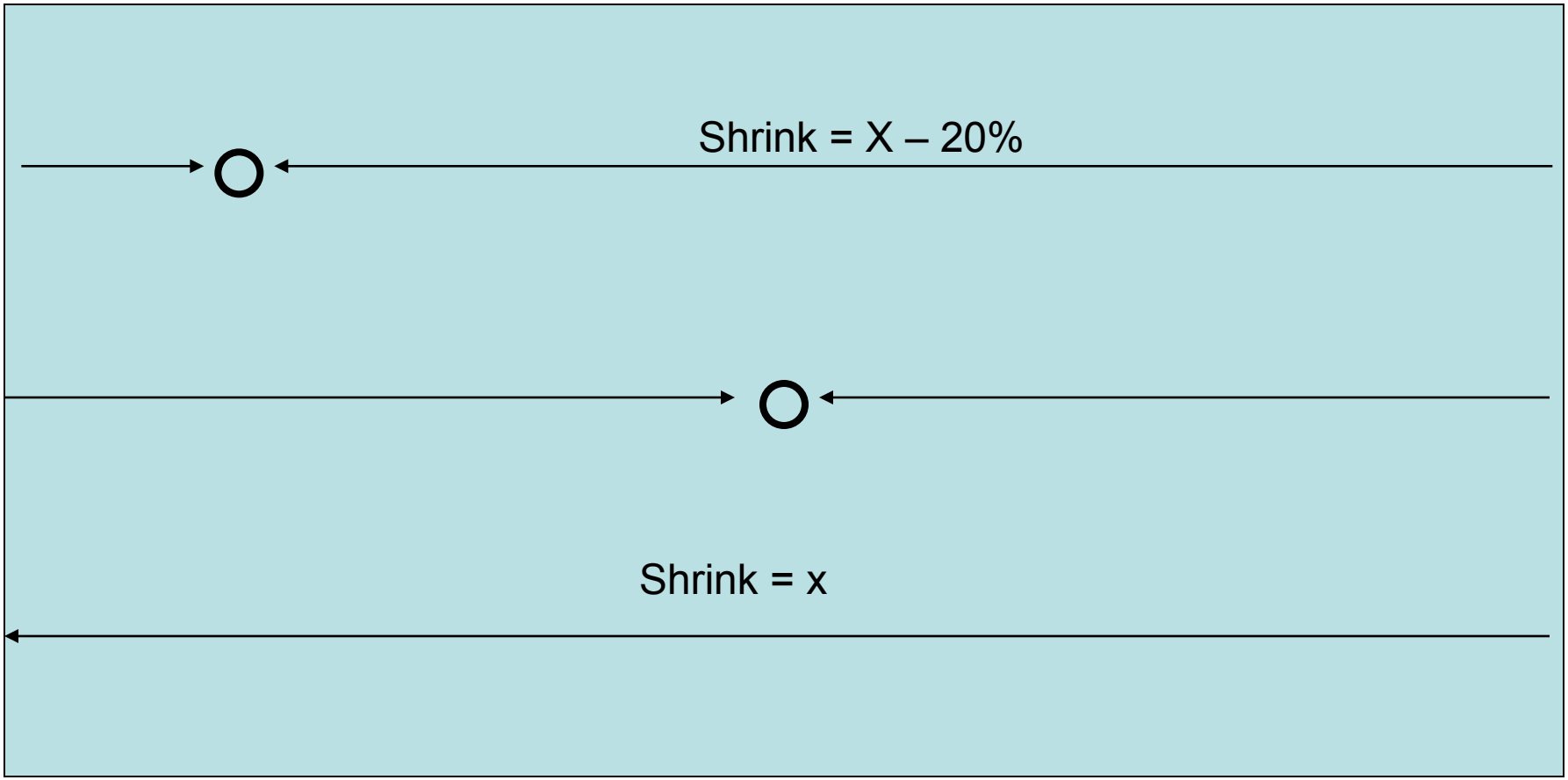
High Melt Strength

Low Melt Strength

Steel Wool in the Part

Mild Part Distortion

Recipe for Distortion restricted shrink



Oven Spills and PE Burns

Vent Plan

- **Effectiveness** - will the vent be in such a position and of such size as to offer unimpeded air movement to and from the mold cavity?
- **Manufacturing** – will the vent be placed in such an area as to limit access to it should it need removed every cycle. Can it be place with the draw to eliminate the need to pull it? (Fixed vent?) Can the vent be incorporated into an existing feature –cut out?
- **Quality/ Appearance** will in be located in such a position as not to influence shrink and create warp/distortion? Will its resulting hole be inconspicuous –easy to spin weld a plug if needed?

My Perfect Vent

- Allow pressure to equalize between the mold and atmosphere. This would be done by allowing air volume to freely move in and out of the mold.
- It would also prevent any powder from spilling from the mold.
- This vent would be as inconspicuous as possible - located in an area that is to be trimmed away if possible.
- The vent would need very little attention and may not need to be removed or serviced every cycle.
- The vent would in no way affect the shape (warp) of a part

Remember

All aspect of vents - vent placement, types of vents, length of vents, diameters of vents, number of vents, vent material etc. have to do with one thing – *keeping pressure equalized*

Questions?