



September 9-10, 2023

Good and Bad Plastics in an RF Environment for Home-Brew Antenna Projects

John Portune / W6NBC



 **TEMCo**

TEMCo ID

RW0414**26 GA****100 FT**

Nichrome 80

Round Resistance Wire

temcoindustrial.com (510) 490-2187

MADE IN USA





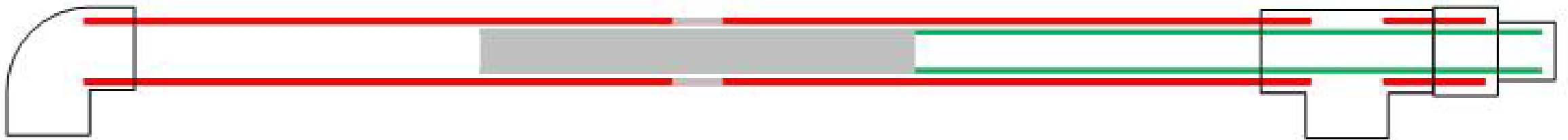
**Optimized
PVC &
foil tape
loop 10-20m**

**One of my
Projects
A 1½ in. PVC
4-foot
Mag Loop with
a low-cost
tuning capacitor**




Dual Linear Capacitors

BAND Tuning Capacitor



FINE Tuning Capacitor





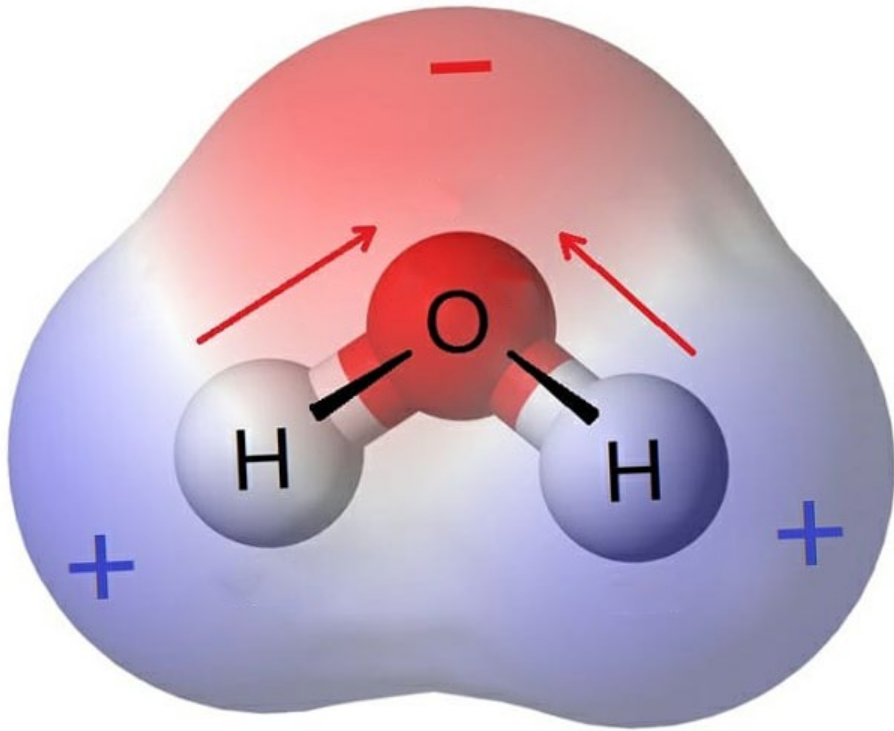
*This loop and two buddies
taught me a major lesson about
GOOD and **BAD** plastics
in antenna building*

Rob Jahnke K0XL Loop Design
K5DCC Denny Johnson Loop Builder/User



- Polar and Non-Polar
Plastics
- Dissipation Factor **DF**
Loss Tangent **δ**
(delta)





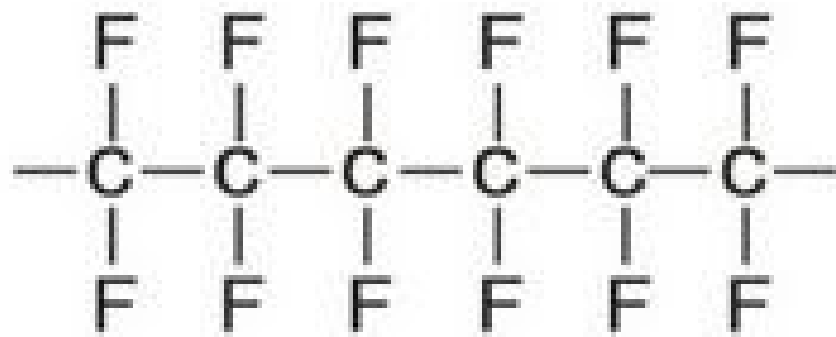
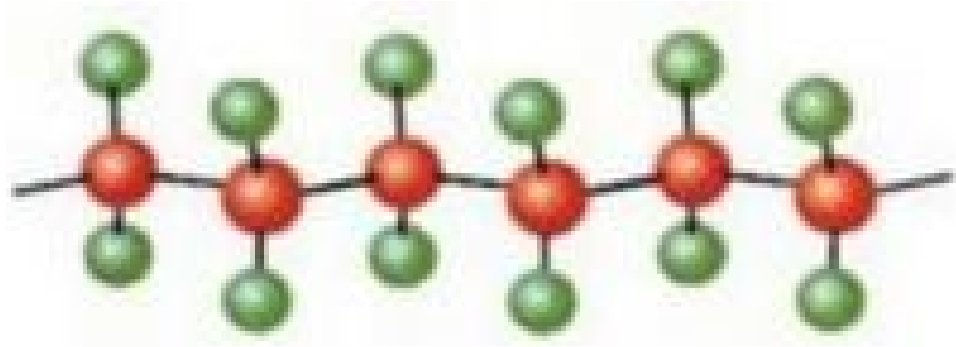
A Water Molecule

POLAR MOLECULE

(Non-Symmetric)

- **Electrons share orbits**
- **Spend more time around Oxygen Atom**



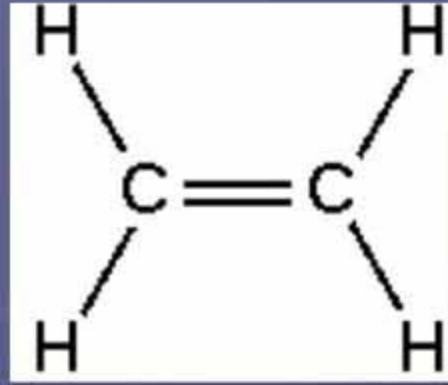


Polytetrafluoroethylene
(PTFE)

**A Teflon Molecule
(PTFE)**

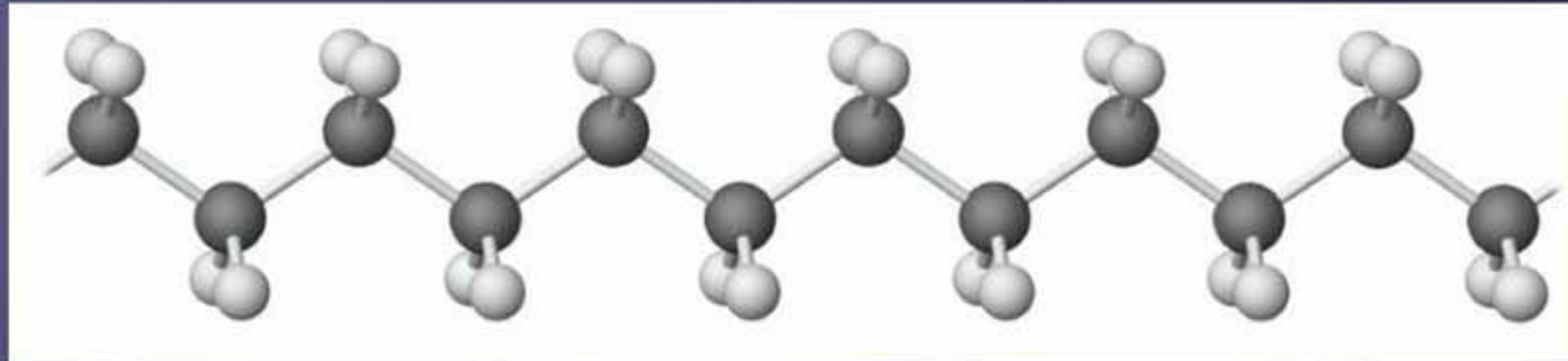
**NON-POLAR
MOLECULE
(Symmetric)**





POLYETHYLENE

Monomers to Polymers



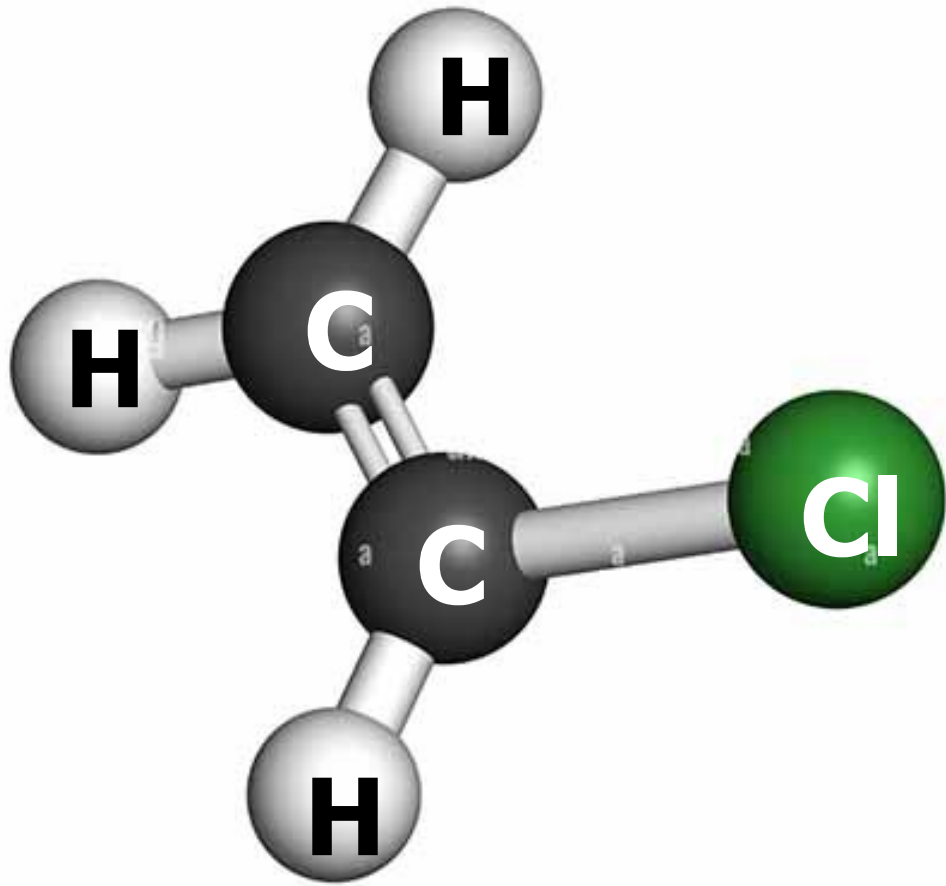
PEX A



PEX B



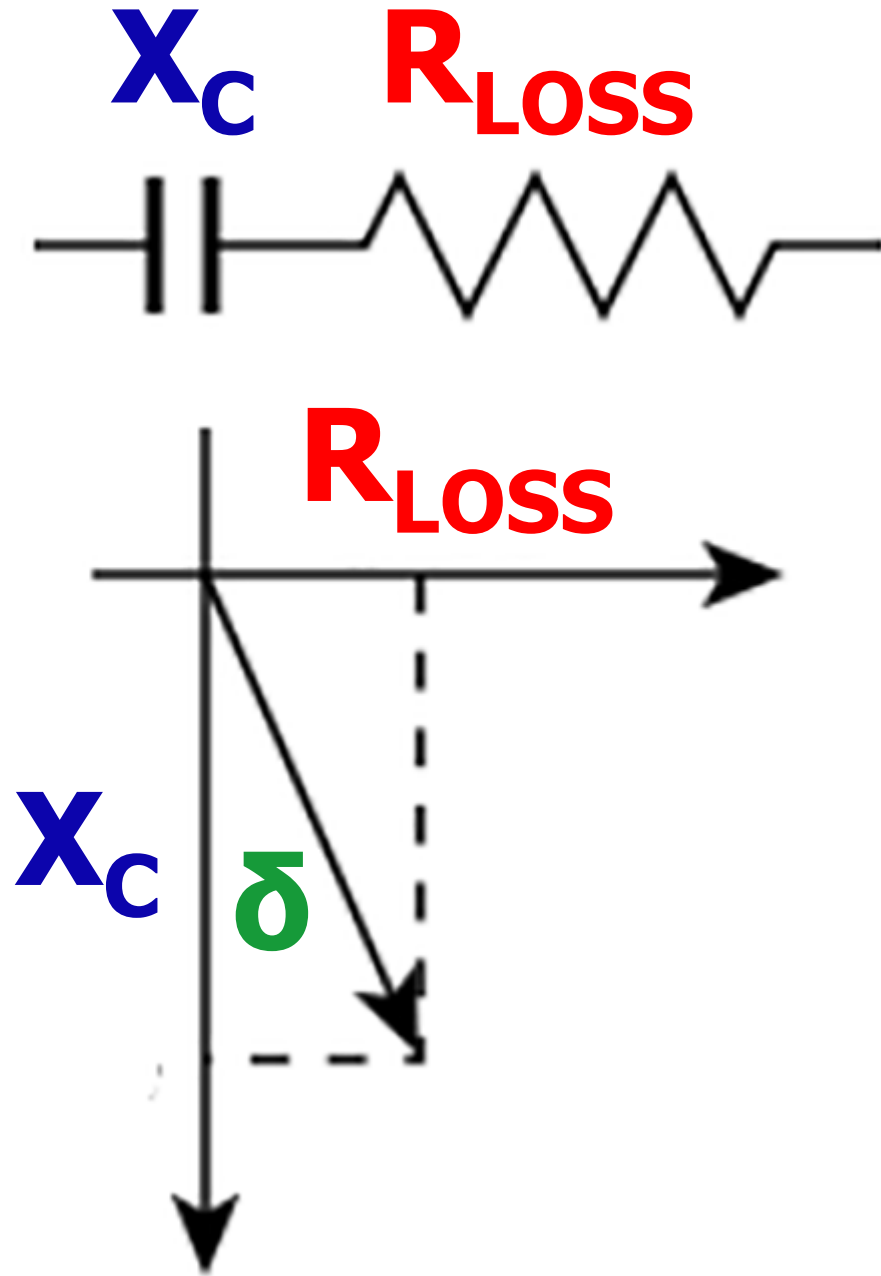
PEX-B



**POLAR
MOLECULE
(Non-Symmetric)**

PVC Monomer





Dissipation Factor Loss Tangent δ

Energy lost (to **heat**)
When it's a dielectric

- If δ is 0° , loss is zero
- If δ is 90° , loss is 100 %





Non-polar Plastics			
PTFE	Teflon	Dissipation Factor	0.0001
PDMS	Silicone Sealant (clear)		0.0002
PE	Low density polyethylene		0.0003
PP	Polypropylene		0.0003
PE	High density polyethylene (PEX)		0.0005
PS	Polystyrene		0.0005
POM	Delrin		0.0005
BPA	Nalgene		0.0007
Polar Plastics			
PC	Lexan, Polycarbonate		0.0100
EVA	Hot Glue		0.0150
PLA	Poly Lactic Acid		0/0150
PET	Mylar		0.0160
PET	PC board		0/0170
PVC	PVC, vinyl, electrical tape		0.0170
ABS	ABS		0.0200
	Epoxy		0.0200
PMMA	Acrylic, Plexiglas		0.0300
PA	Nylon		0.0360



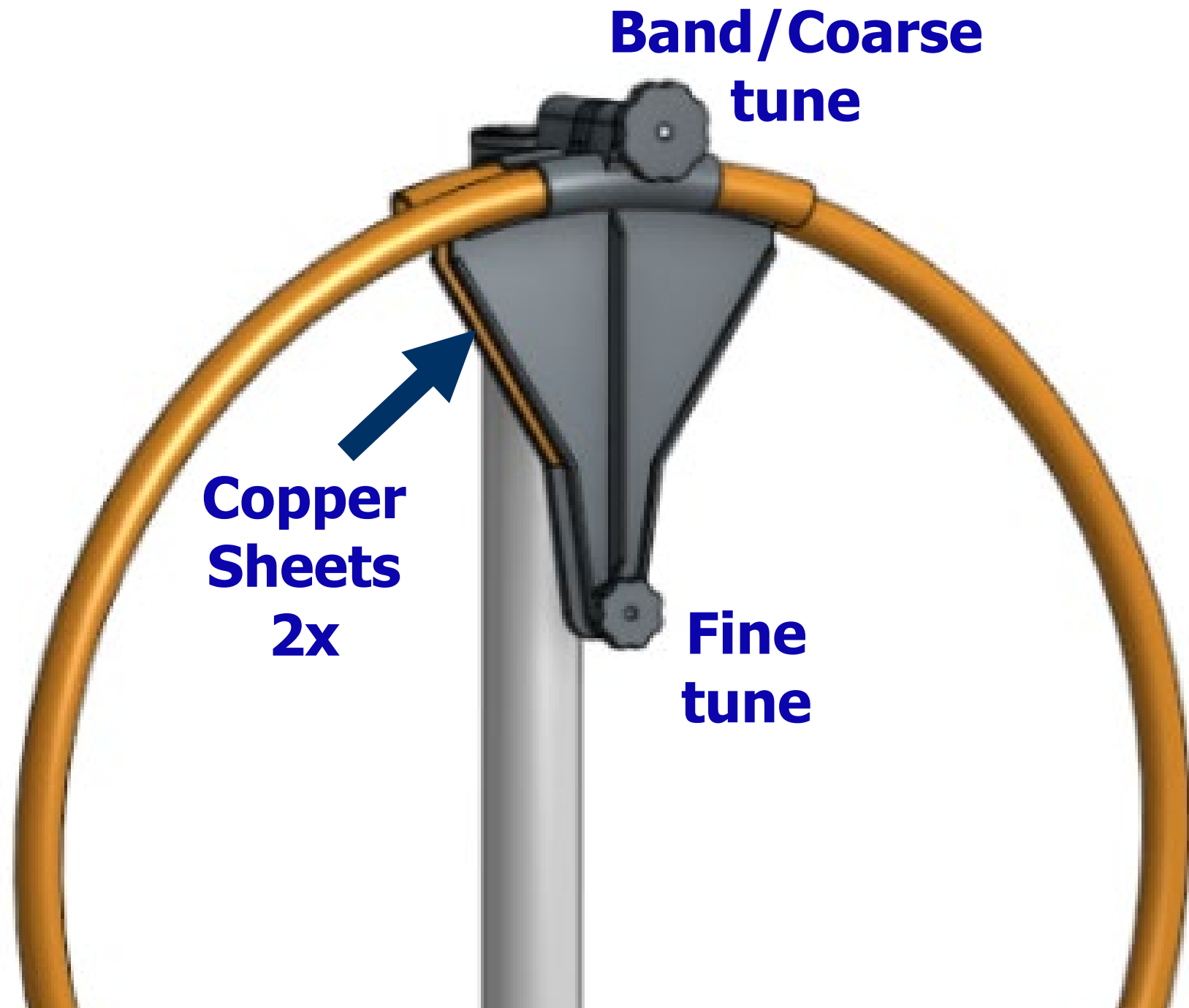
Eye-Opening Ham Example






K0XL

**2 ft. 5/8 in.
OD Soft
Copper
with Coarse
& Fine
Tuning for
6 & 10
meters**



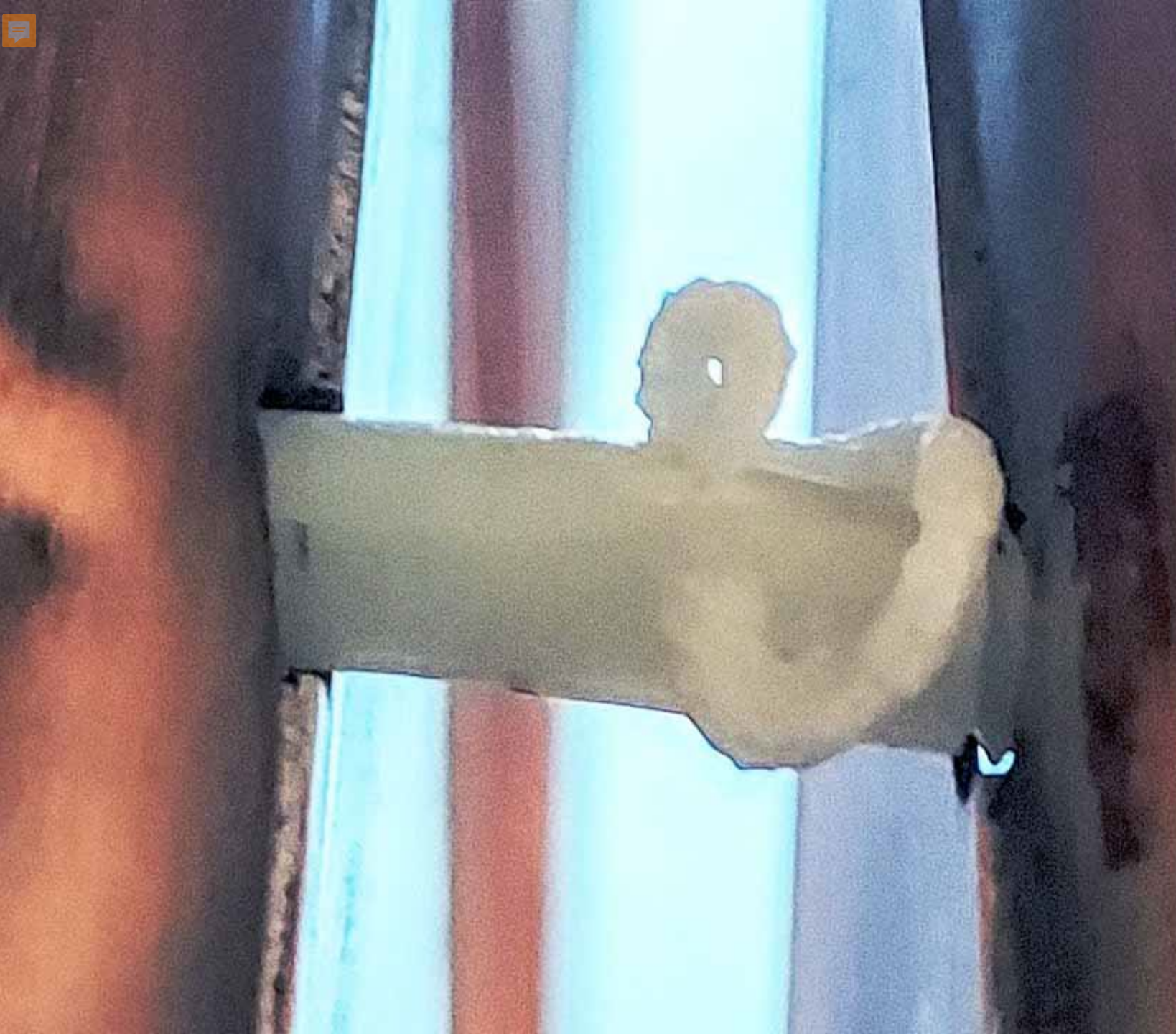


**Nylon
Screw**

The first version








**50
Watts**

**Nylon
Jet**





Hybrid 2 ft. Mag Loop

**1 in.
PEX**

**Inside
Capacitor**

**1 in.
PVC**



LDPE Bottles from Amazon



Roll over image to zoom in



IMPRESA 3 Pack 16oz Plastic Bottle with 6 Caps in 2 Styles - BPA Free Latex-Free, Food-Grade, Great for Shampoo, Body Wash, Sauce and More

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100+ bought in past week

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Pay \$14.99 \$0.00 for this order. Get a \$100 Amazon Gift Card upon approval for the Amazon Business Card. Terms apply.

Brand	IMPRESA
Material	Plastic
Color	Natural
Capacity	16 Ounces
Special Feature	Bpa Free

Outside Capacitor





OKAY

PVC



NO!

ABS

DWV





Take Away

Avoid just where the field is intense

Example, inside a mag loop's pipes covered with foil, there is no field.



Take Away

- **PLA, ABS, PET, Nylon**
- **PVC, Plexiglass (acrylic), PCB**
- **Polypropylene**
- **Hot glue, Epoxy**
- **Silicon Sealant .**





Take Away

If you wouldn't use
Nichrome wire for an
antenna, **don't think all
plastics and glues are the
same either!**





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