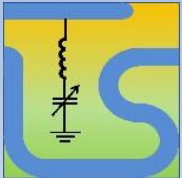


# WORKSHOP

Zelf een End Fed Half Wave  
(EFHW) antenne maken



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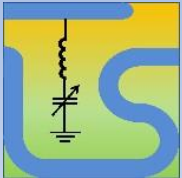
# Doelstellingen

EFHW????

Bouw van een prototype

Test van een prototype

Groepsaankoop onderdelen?

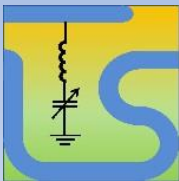


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**EFHW** = End Fed Half Wave =  $\lambda/2$  op de laagste frequentie

- Waarom EFHW?
  - Bruikbaar op meerdere HF-banden (80 tot 10m) met beperkte SWR.
  - Eenvoudige installatie. Slechts 1 hoog ophangpunt nodig.
  - Vele configuraties mogelijk.
  - Geen hangende voedingslijn. Voedingspunt op de grond mogelijk.
  - Coax kan dienen als “retour voor HF”.
  - Verkorte versies voor beperkte ruimtes.
  - Lage kostprijs (50 €)

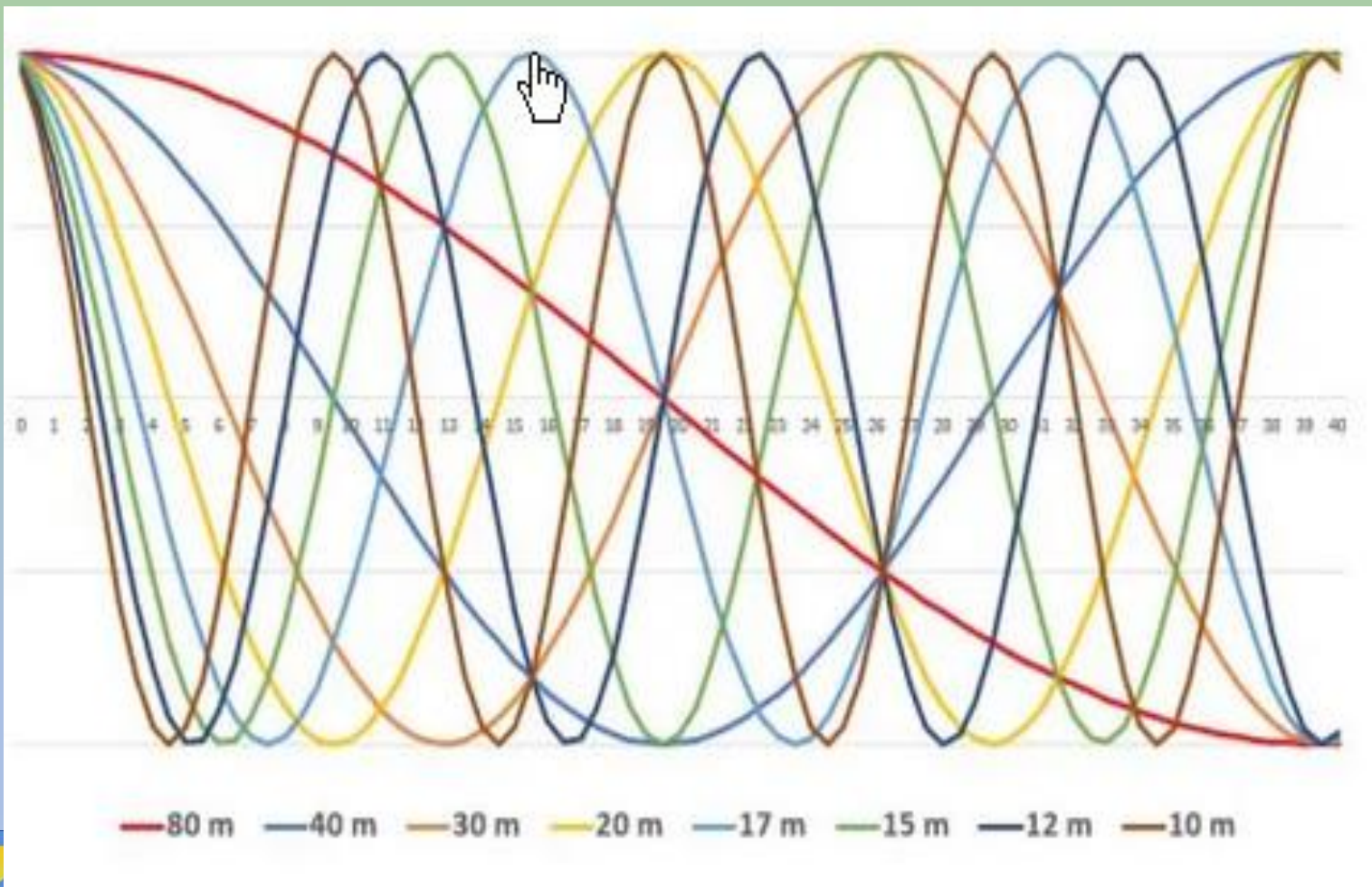


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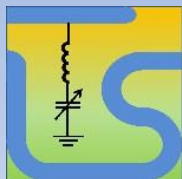
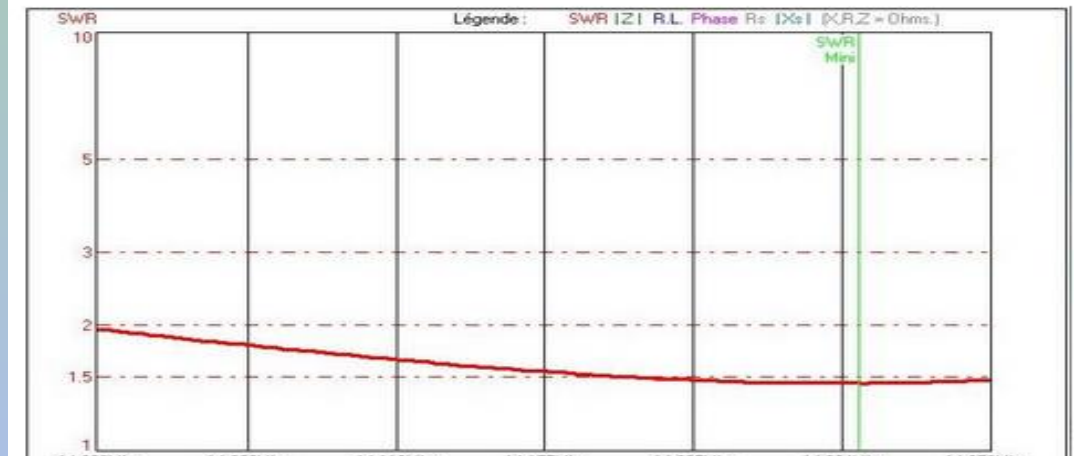
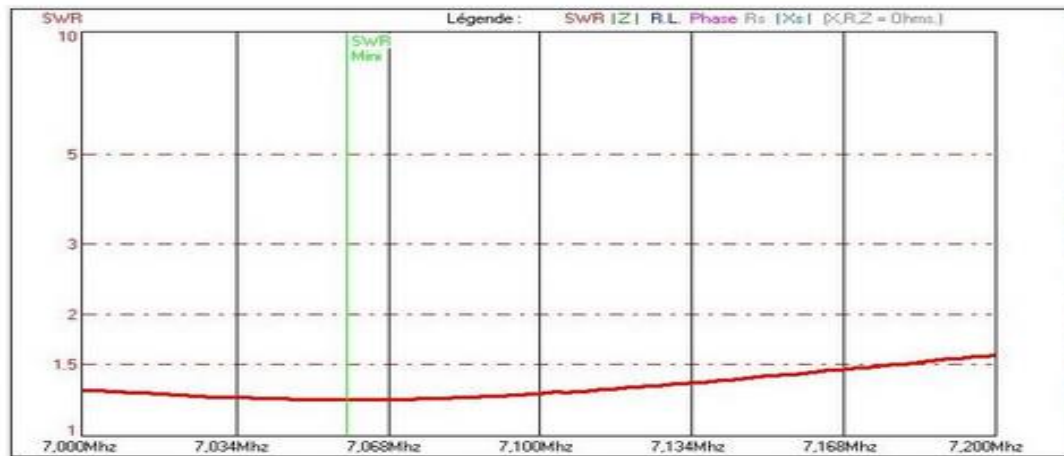
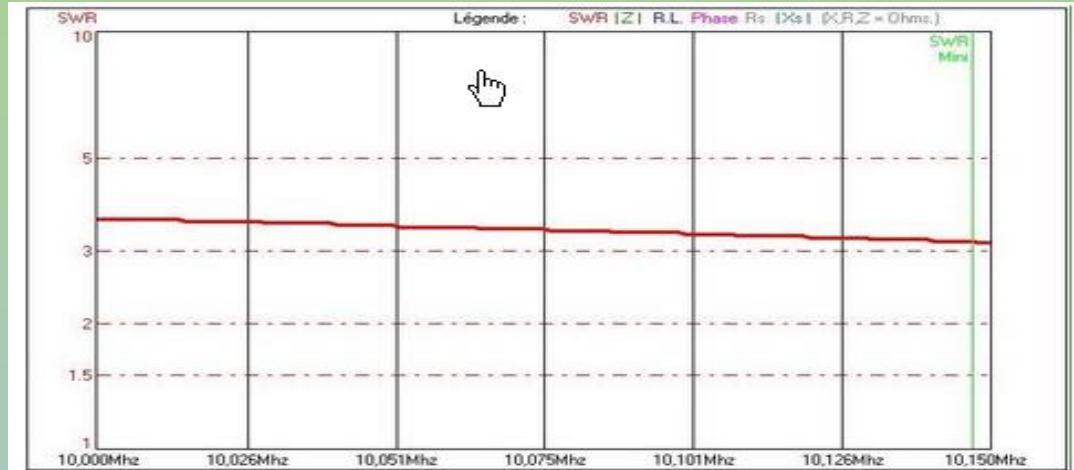
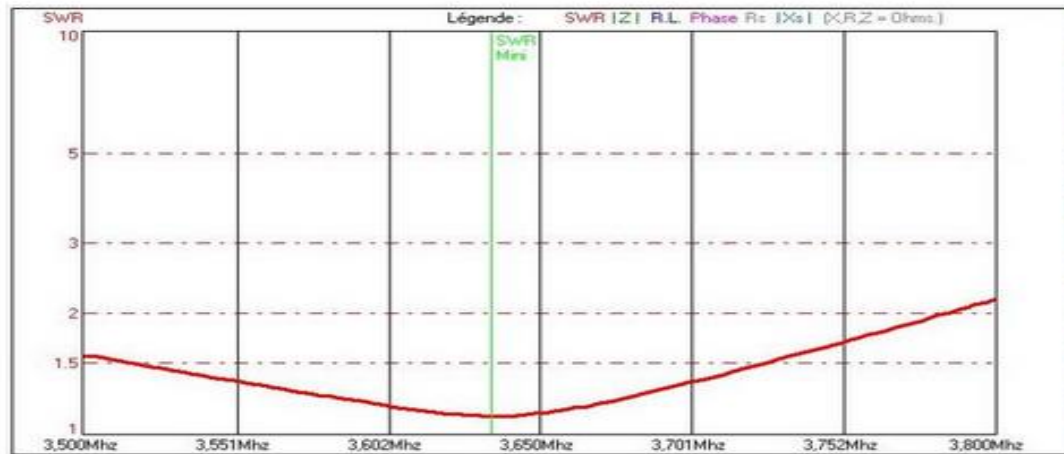
# Bruikbaar van 80 tot 10 m

Verdeling van de spanning op een draad van ongeveer 40 m lang



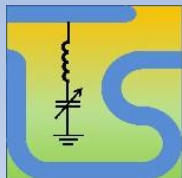
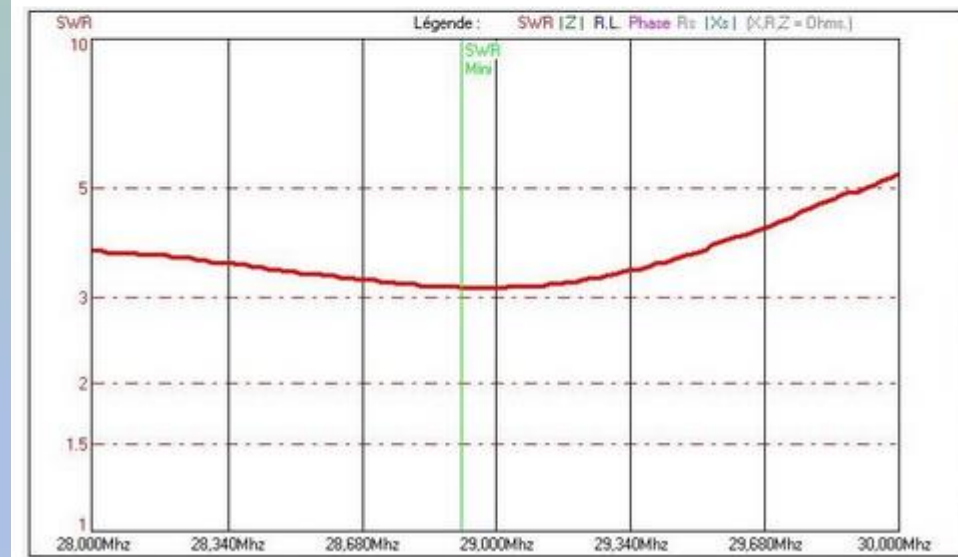
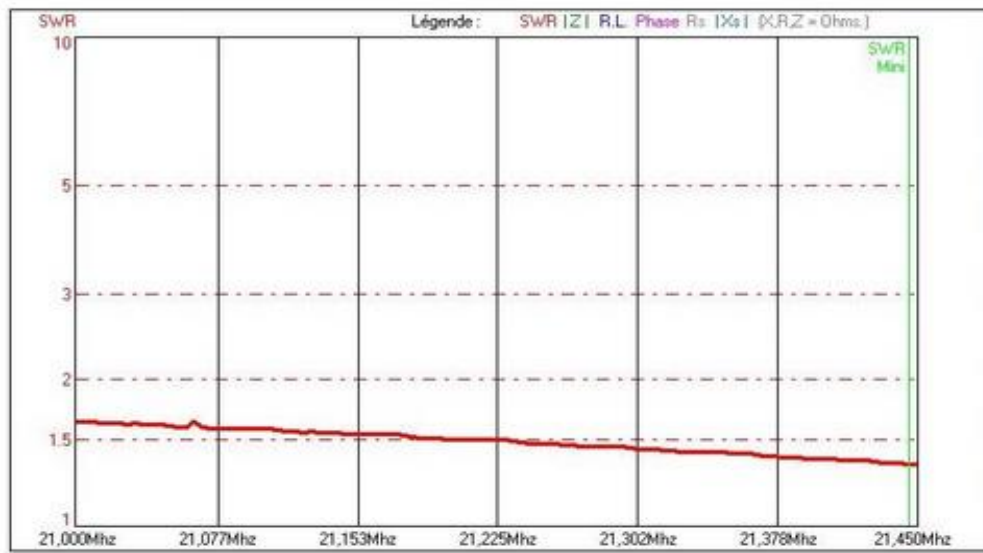
|                                     |     |
|-------------------------------------|-----|
| $3.57 \times 1 = 3.57 \text{ MHz}$  | 80M |
| $3.57 \times 2 = 7.14 \text{ MHz}$  | 40M |
| $3.57 \times 3 = 10.71 \text{ MHz}$ | 30M |
| $3.57 \times 4 = 14.28 \text{ MHz}$ | 20M |
| $3.57 \times 5 = 17.85 \text{ MHz}$ | 17M |
| $3.57 \times 6 = 21.42 \text{ MHz}$ | 15M |
| $3.57 \times 7 = 24.99 \text{ MHz}$ | 12M |
| $3.57 \times 8 = 28.56 \text{ MHz}$ | 10M |

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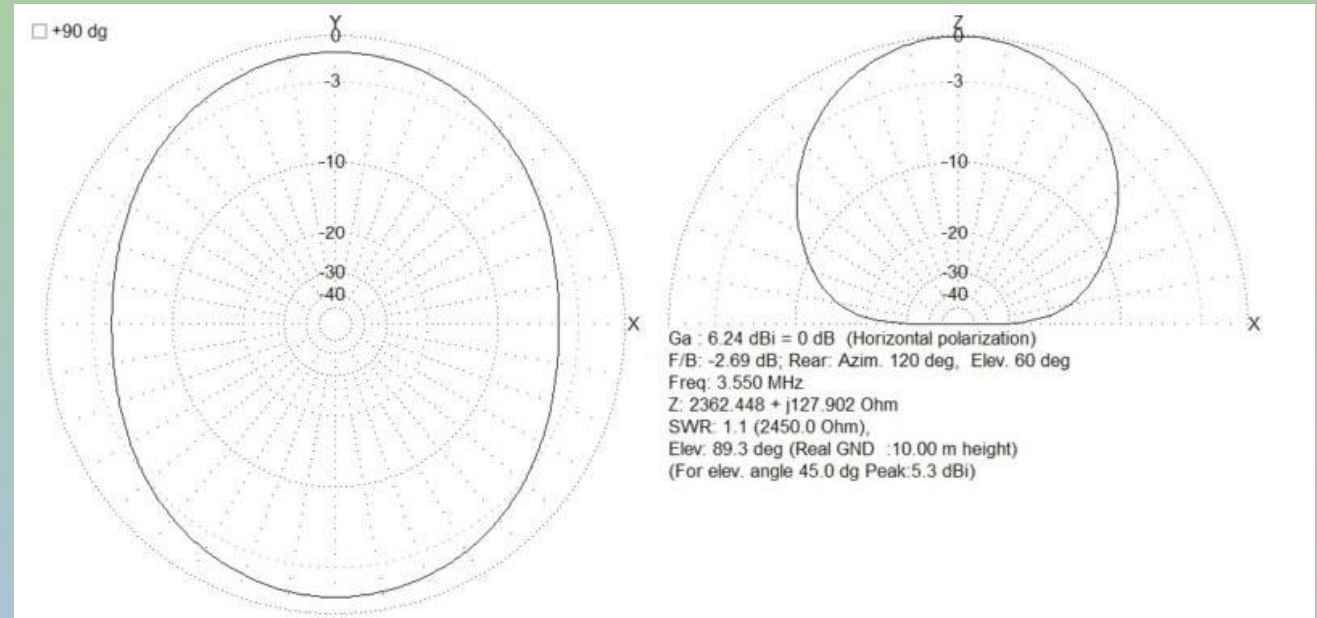
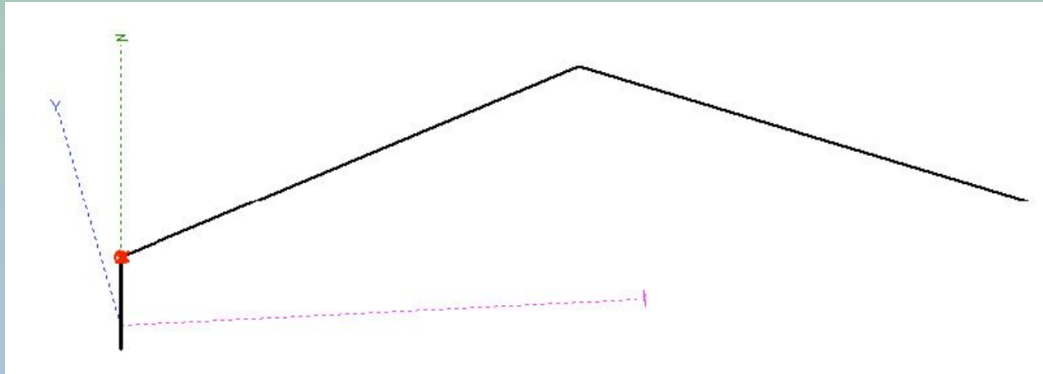


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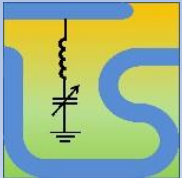


# Het stralingspatroon

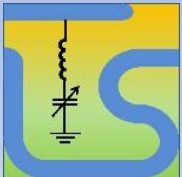
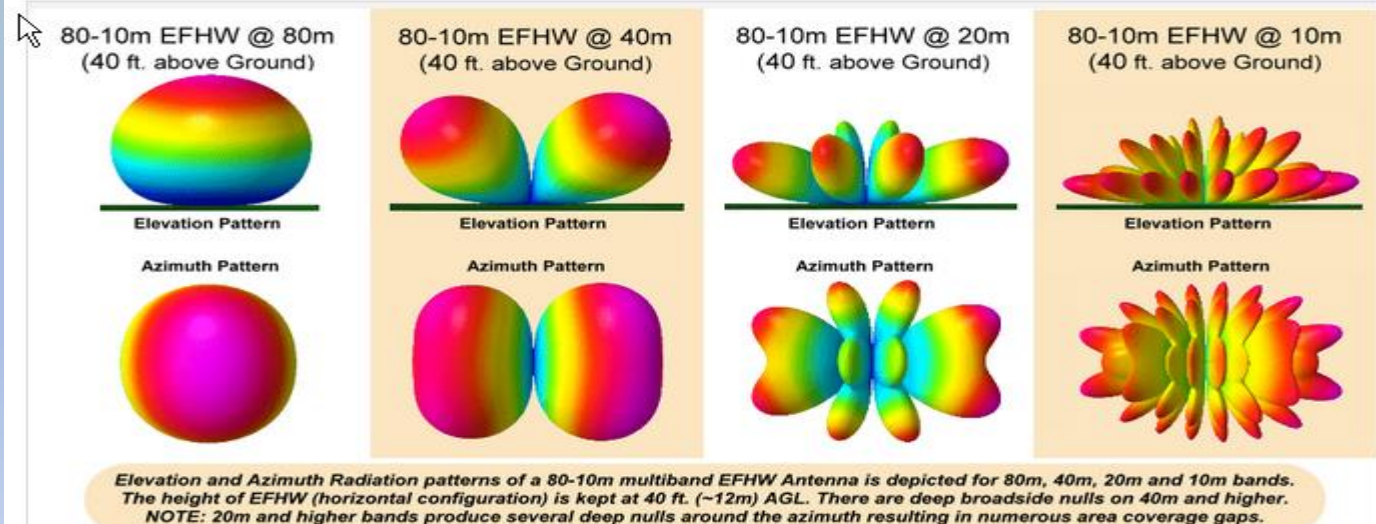
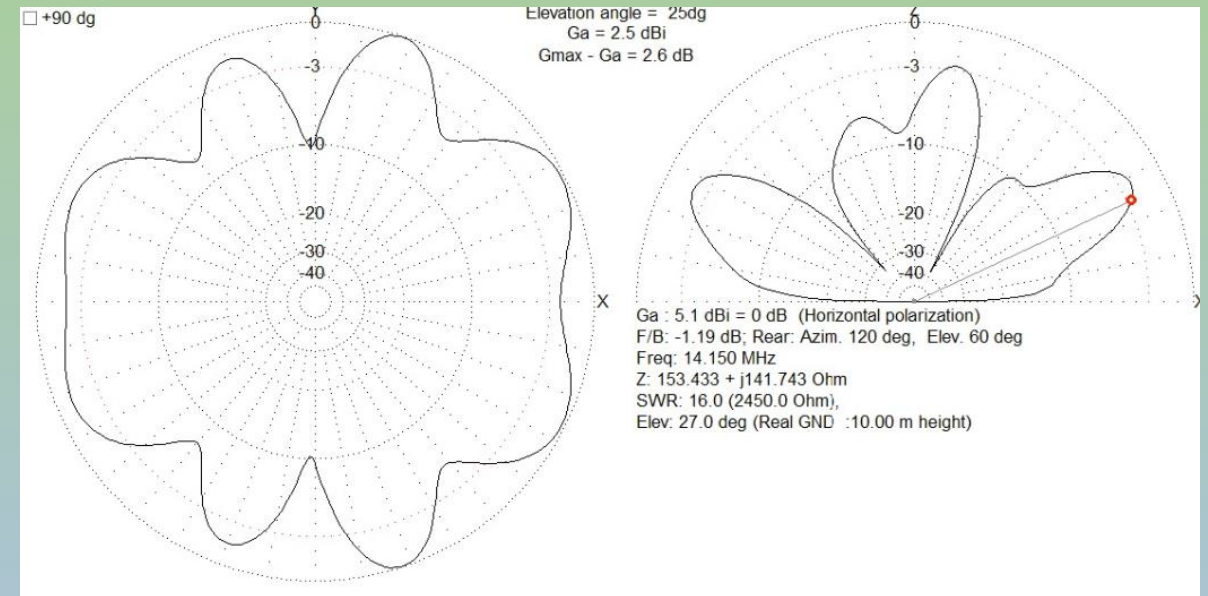
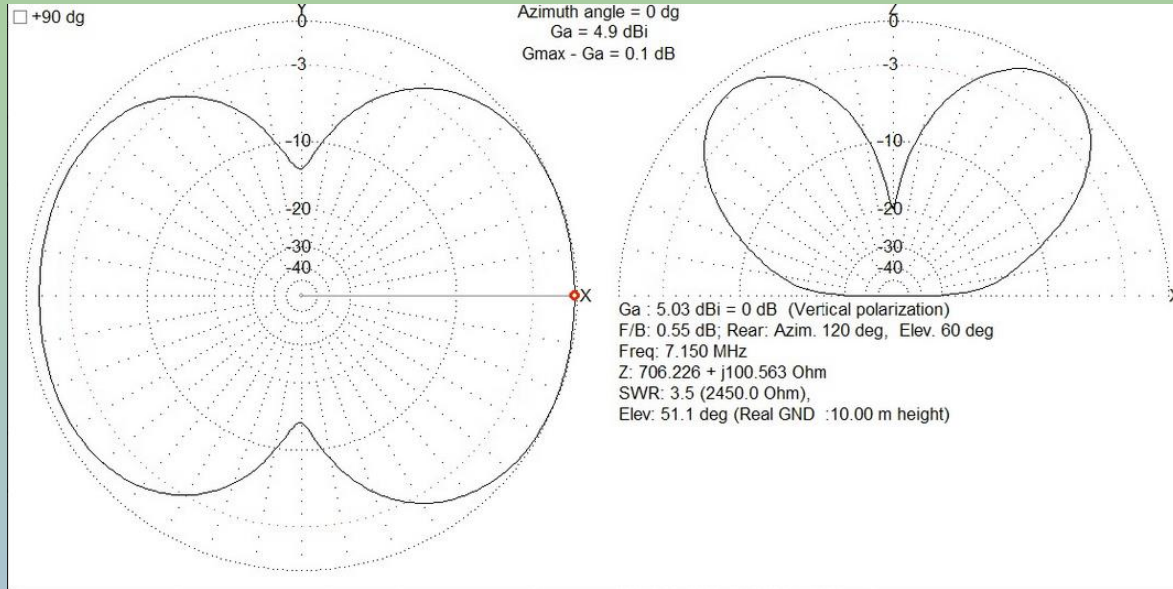


80m (3.55MHz) Far Field Plot of  
End-Fed Half Wave Antenna

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# Het stralingspatroon

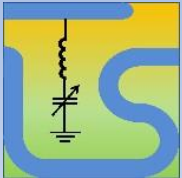




# De UNUN impedantietransformator

UNUN = Unbalanced to Unbalanced

- De XL van de primaire wikkeling moet voldoende hoog zijn op de laagste frequentie (80 m)  $\rightarrow XL=90 \text{ à } 200 \Omega \rightarrow 4 \text{ à } 9 \mu\text{H}$  op 3,5 MHz ( $L=X_L/2\pi f$ ). Hoeveel windingen?  $\rightarrow$  DL5SWB ring core calculator.
- Ferriet FT240-43. Geen “powered iron” (Txxx).
- Impedantieverhouding: 49:1 (wikkerverhouding = 7)
- Wikkeldraad AWG #14 (1,6 mm diameter) geëmailleerde koperdraad  $\rightarrow$  ringkern beschermen met “Glass Cloth Electrical Tape” (3M 27)



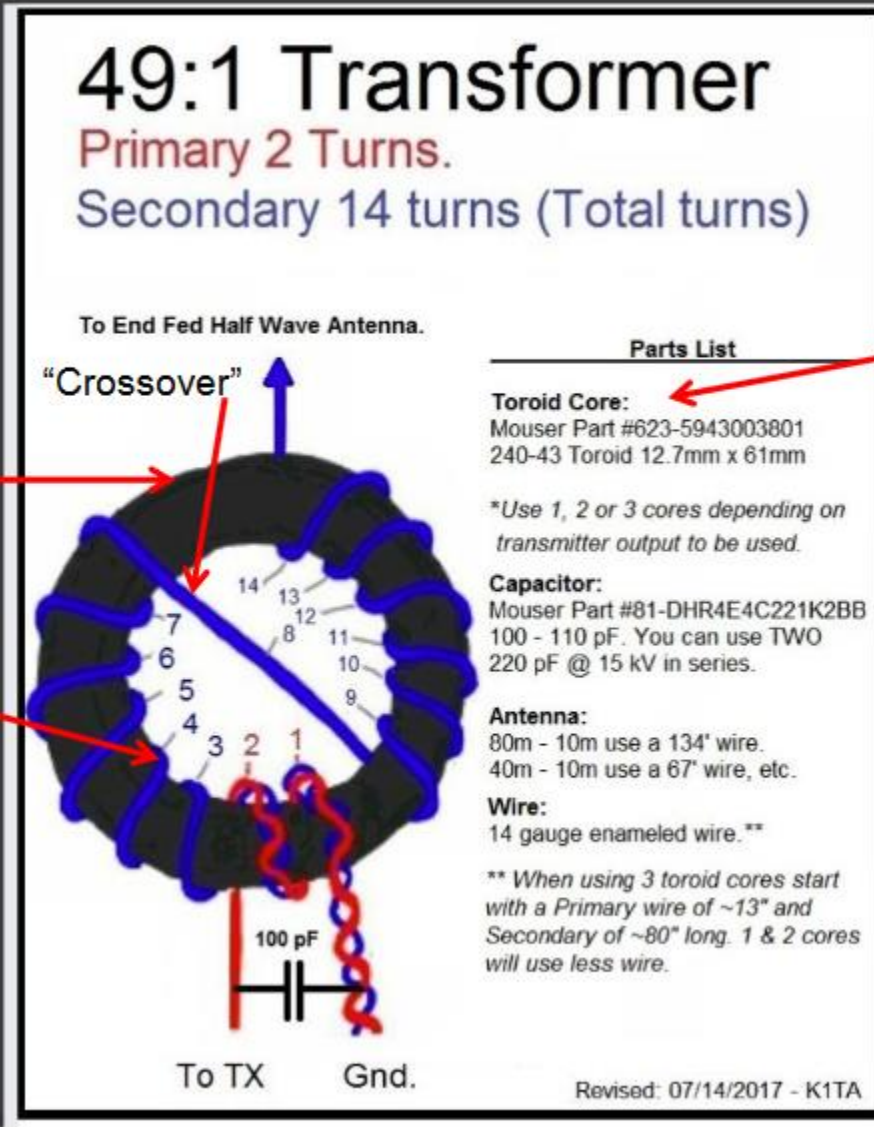
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# De UNUN impedantietransformator (K1RF)

I recommend  
at least 2 toroids  
for better efficiency,  
higher primary  
inductance, and  
splitting power  
between toroids —

Number of turns  
= number inside  
the toroid stack.  
Crossover counts  
as one turn

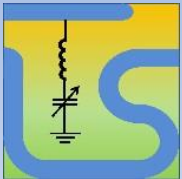


I recommend 2 type 43 material for less than ~250 watts for lower cost, Fair Rite P/N 5943003801

3 type 52 material for  
~500-1000W  
higher efficiency and  
higher temperature  
capable. Fair Rite  
P/N **5952003801**

# De “Counterpoise of het Tegengewicht”

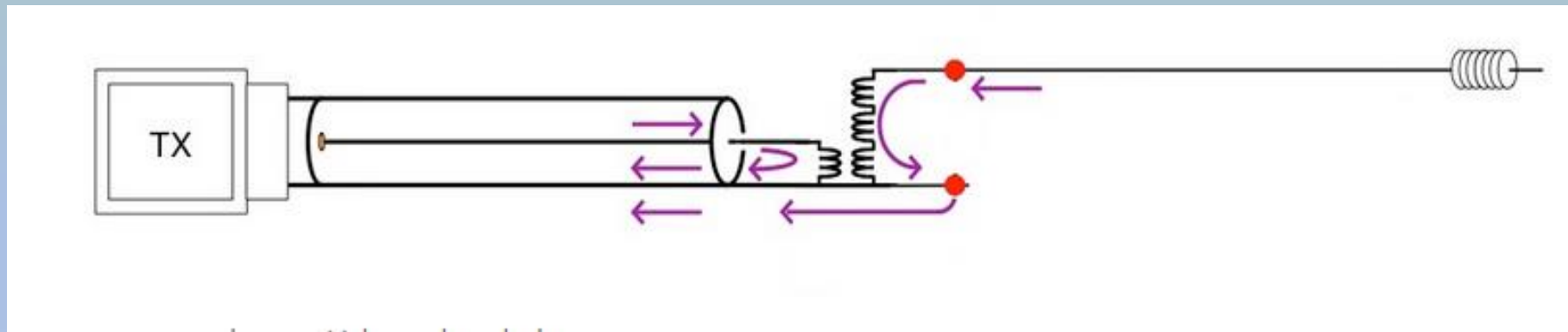
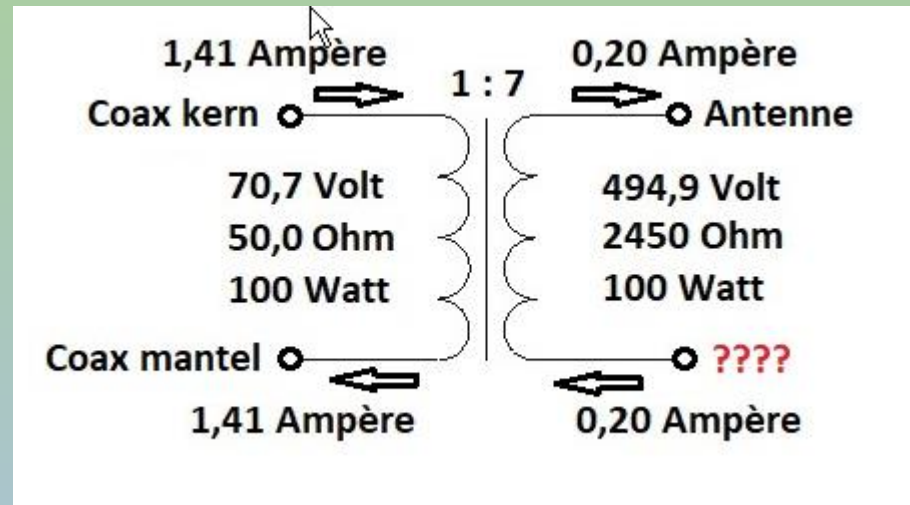
- Noodzakelijk voor het terug vloeien van de antennestroom.
- Eventueel buitenmantel van de coax.



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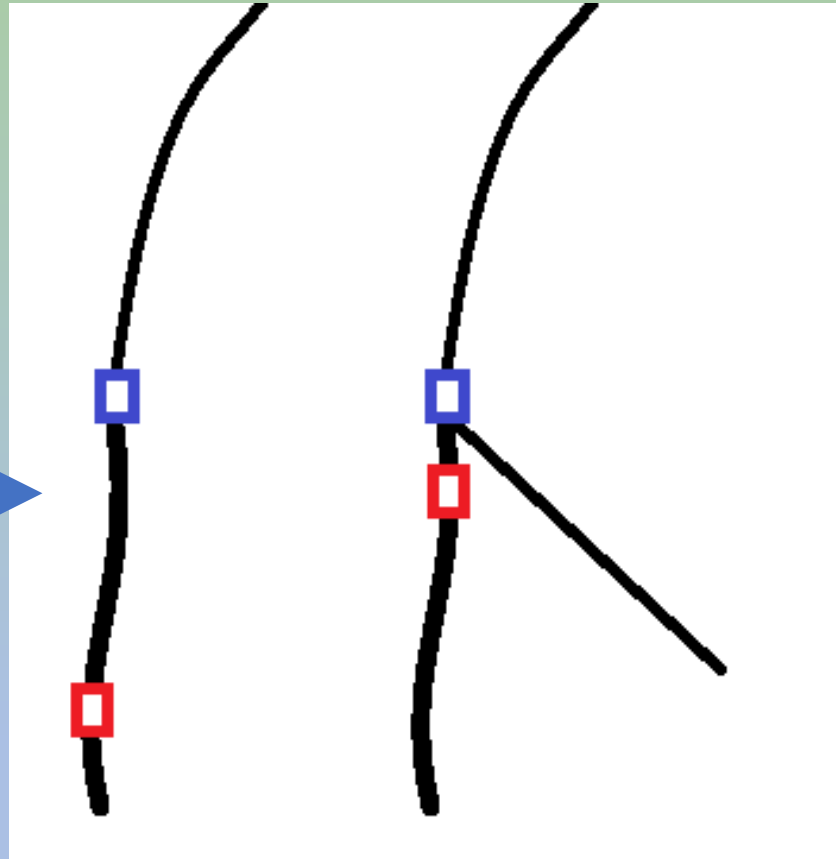
# Buitenmantel coax als counterpoise



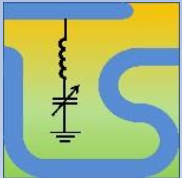
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# Plaatsing van de RF-choke waar?

$0,03 - 0,05 \lambda$   
 $2,4 - 4 \text{ m (80 m)}$   
([www.hfkits.com](http://www.hfkits.com))



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# De RF-choke waarde?

$X_L = 2 \times \pi \times f \times L = 4 \times 50 = 200 \Omega$  op de laagste frequentie

Voor 80 m:  $L = 200 / (2 \times 3,14 \times 3,5 \times 10^6) = 9,1 \mu\text{H}$

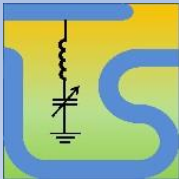
Bijvoorbeeld: 15 windingen RG213 op buis met  $D = 10 \text{ cm}$



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## De capaciteit

- 100 à 150pF/1 kV (voor 100 W) of meer.
- Over de primaire wikkeling.
- Beter SWR op hogere frequenties.



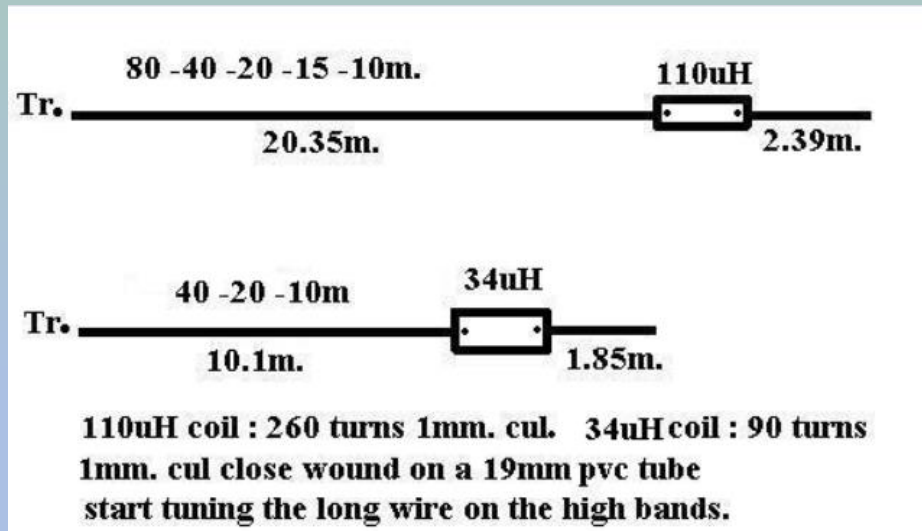
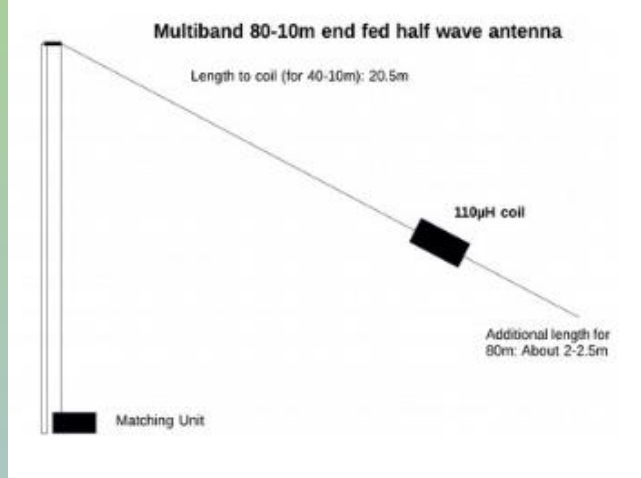
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# De verkorte EFHW

GOKYA

[http://infotechcomms.co.uk/downloads/Multi band EFHW.pdf](http://infotechcomms.co.uk/downloads/Multi_band_EFHW.pdf)



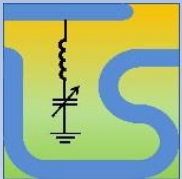
PD7MAA

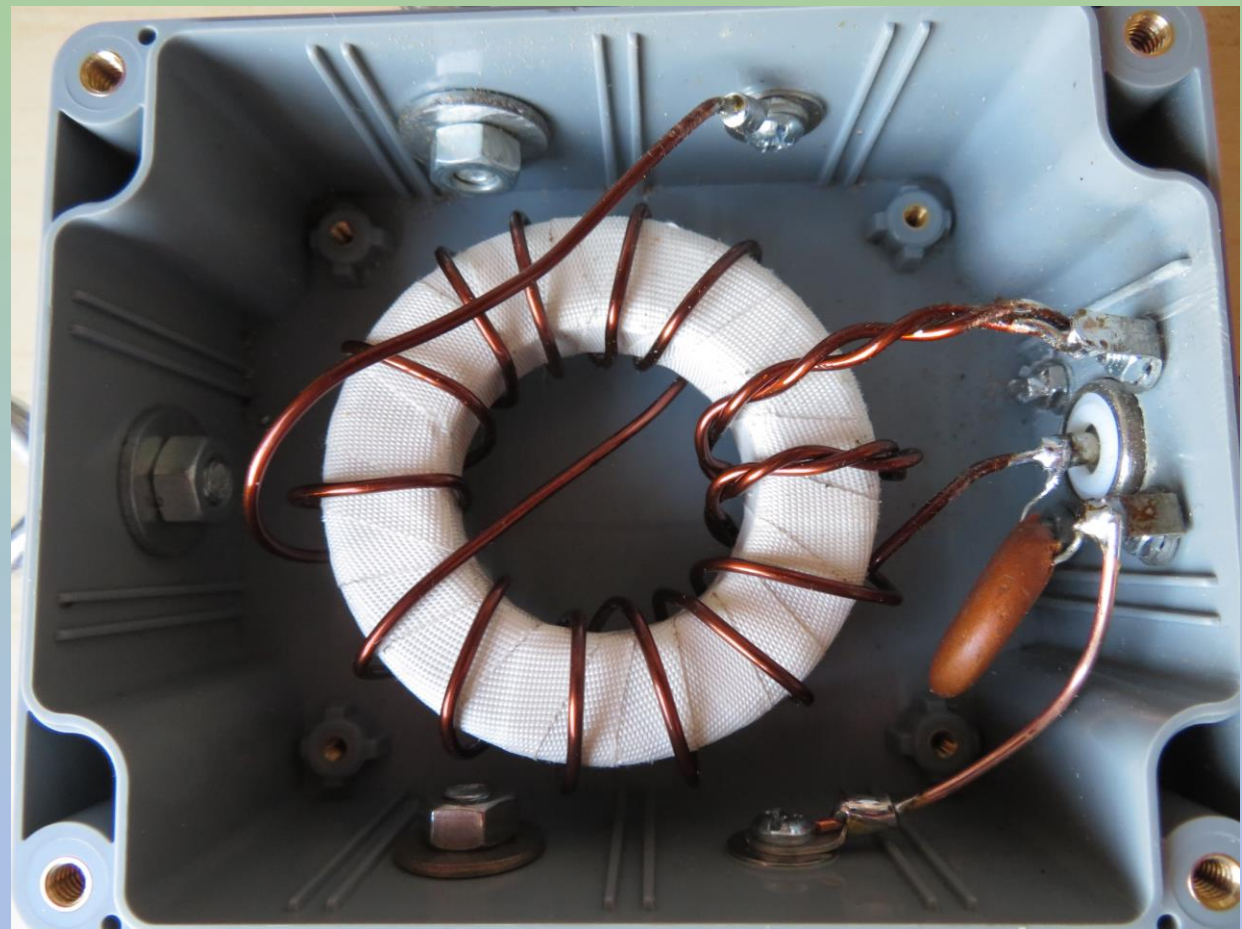
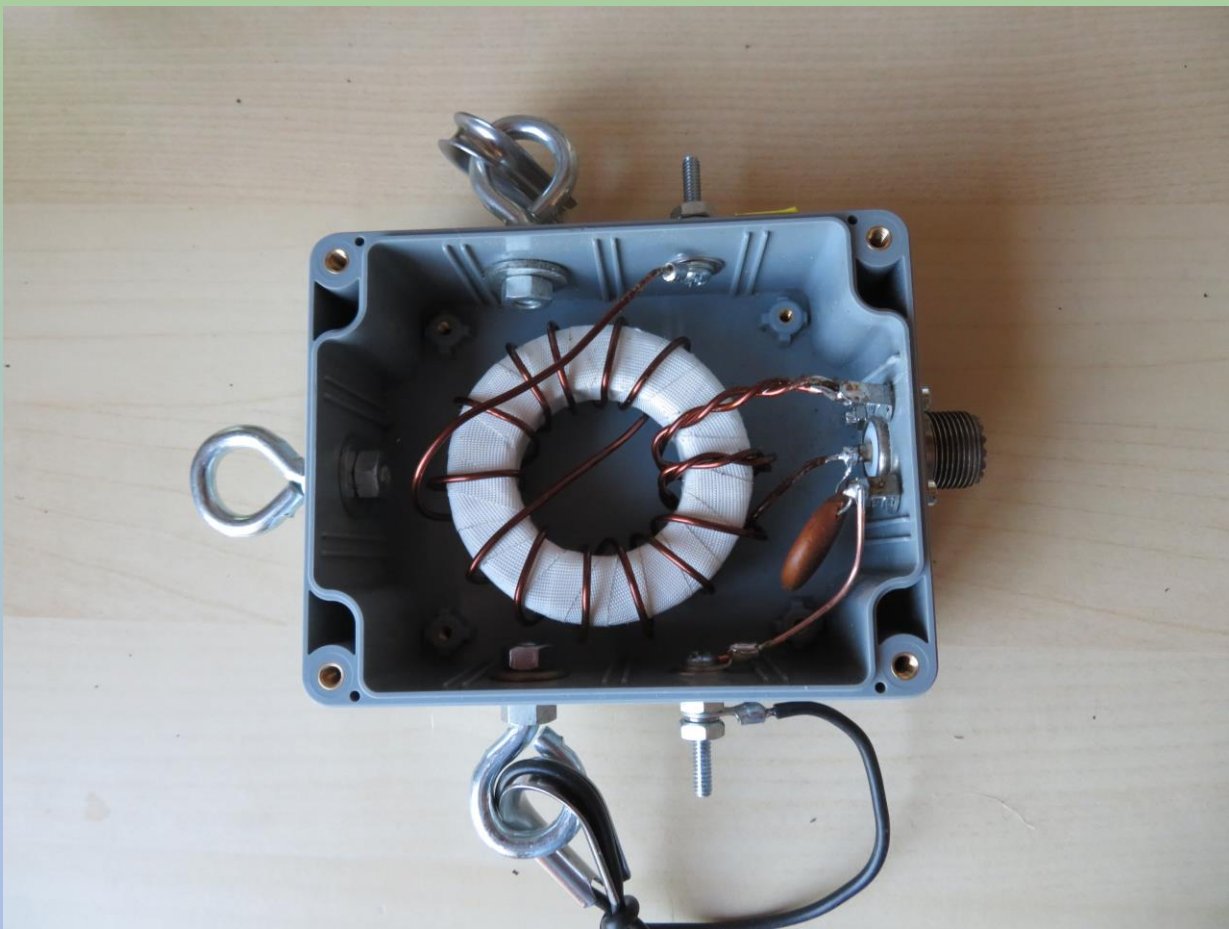
<https://pa-11019.blogspot.com/2012/04/149-transformer-for-endfed-antennas-35.html>

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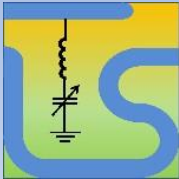
## Aandachtspunten

- Waterdichte behuizing.
- Afdichten en beschermen met pasta (Plast 2000)
- Trekontlastingen voor coax en antennedraden.
- Afwerking met krimpkins, vulcaniserende tape, isolatietape (3M +33).
- Goede isolator(en) aan het uiteinde.
- RF-choke!
- Zo ver mogelijk verwijderd van metalen constructies





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Antennedraad: VOBST 1,5 mm

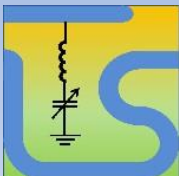


Glasvezel tape 3M 27  
Isolatietape Scotch 33+



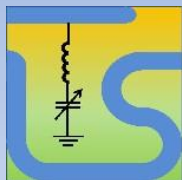
Afdichtingspasta Plast 2000

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RF choke: 19 w RG-58 op PVC diameter 5 cm

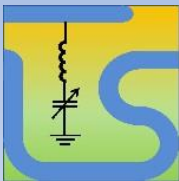


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# Metingen

- Bij meting van de impedantie in de shack moet men rekening houden met lengte van de coax om de impedantie te bepalen aan het voedingspunt van de antenne!
- Demo MiniVNA, TLW (Transmission Line for Windows – ARRL) en PASAN.

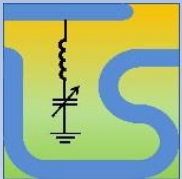


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## Links

- <https://f4fei.wordpress.com/realisations/antenne-efhw>
- <https://f4fei.wordpress.com/2022/01/efhwanennabyk1rf.pdf>
- <https://wiki.wx0mik.net/doku.php/antennas/efhw>
- <https://vu2nsb.com/antenna/wire-antennas/multiband-efhw-antenna/>
- <https://www.hfkits.com/end-fed-antennas-a-critical-view/>
- <http://science4all.nl/?Electronics>      [Pasan](#)
- <https://dl5swb.software.informer.com/>
- [http://www.ae6ty.com/Smith\\_Charts.html](http://www.ae6ty.com/Smith_Charts.html)



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