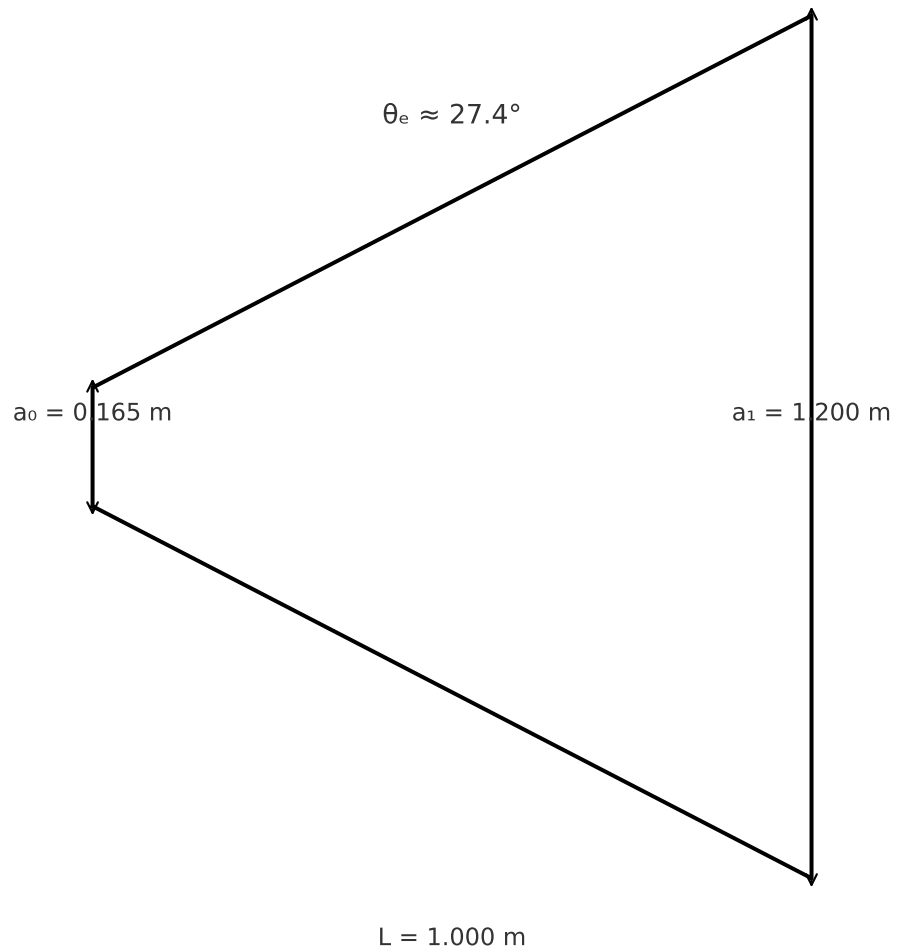


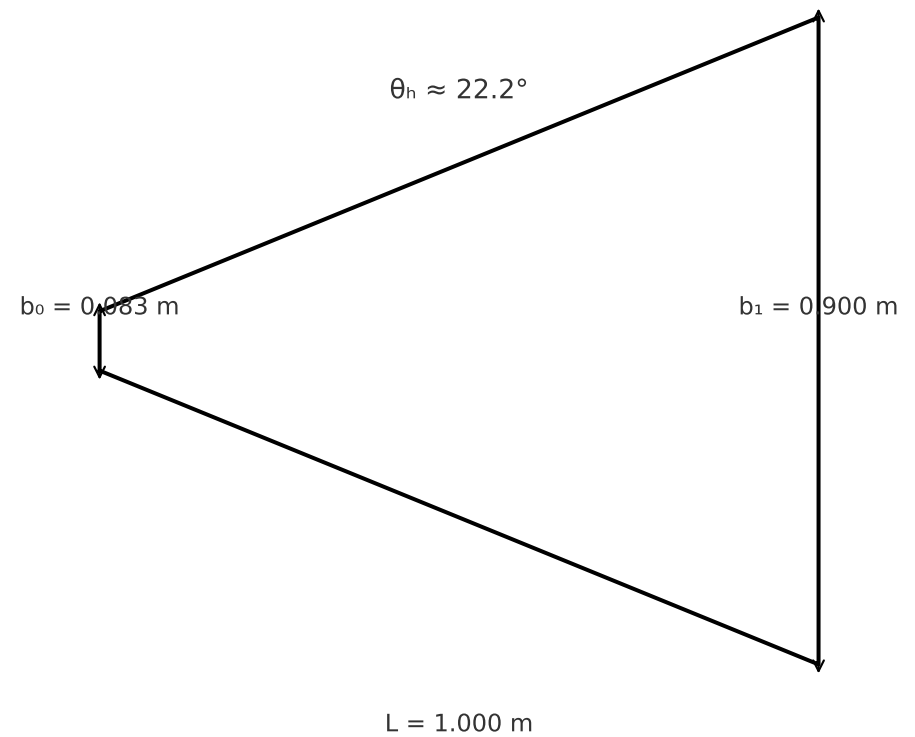
# 1420 MHz (H-line) Pyramidal Horn — Build Plans

- Design frequency: 1420.405 MHz (Hydrogen line). Wavelength  $\lambda \approx 0.211$  m.
- Mouth (aperture):  $a_1 = 1.200$  m (E-plane),  $b_1 = 0.900$  m (H-plane).
- Throat (WR-650 internal):  $a_0 = 0.165$  m,  $b_0 = 0.083$  m.
- Axial length:  $L = 1.000$  m.
- Half-flare angles:  $\theta_e \approx 27.4^\circ$ ,  $\theta_h \approx 22.2^\circ$ .
- Centerline slant lengths: E-panels  $\approx 1.126$  m, H-panels  $\approx 1.080$  m.
- Recommended material: 0.8–1.0 mm aluminum. Add 10–15 mm seam allowance for riveting/screws.
- Place LNA ( $NF \leq 0.7$  dB) at/inside the throat with a 1420 MHz band-pass filter after gain stage.

E-plane (side) profile



H-plane (side) profile



Panel Templates (flat patterns, add 10–15 mm seam allowance)

short base  $\approx 0.165\text{ m}$

short base  $\approx 0.083\text{ m}$

**Top/Bottom panel (×2)**  
**E-panel**

**Side panel (×2)**  
**H-panel**

side edges  $\approx 2.166\text{ m}$

side edges  $\approx 1.080\text{ m}$

Notes:

- These flat patterns are first-order (good for 1.4 GHz). Real intersection lines between panels are slightly curved; trimming during assembly is expected. Add 10–15 mm seam allowance on all edges for overlapping joints.
- Maintain squareness at the throat. Consider a short (100–150 mm) gradual throat taper from the WR-650 flange before the main flare to reduce reflections.
- Optional: add a 20–30 mm outward roll or frame at the mouth to reduce edge diffraction and stiffen the aperture.

long base  $\approx 1.200\text{ m}$

long base  $\approx 0.900\text{ m}$

height  $\approx 1.080\text{ m}$

height  $\approx 1.126\text{ m}$

## Cut List (all dimensions in meters; add 10–15 mm seams)

|                                  |   |       |       |             |       |
|----------------------------------|---|-------|-------|-------------|-------|
| Top panel (E)                    | 1 | 0.165 | 1.200 | 1.126       | 1.080 |
| Bottom panel (E)                 | 1 | 0.165 | 1.200 | 1.126       | 1.080 |
| Left side (H)                    | 1 | 0.083 | 0.900 | 1.080       | 1.126 |
| Right side (H)                   | 1 | 0.083 | 0.900 | 1.080       | 1.126 |
| Throat adaptor (rect. to WRL650) | 1 |       |       | 0.120       |       |
| Mouth frame/lip (optional)       | 4 |       |       | 0.020–0.030 |       |