# Shielded Tents

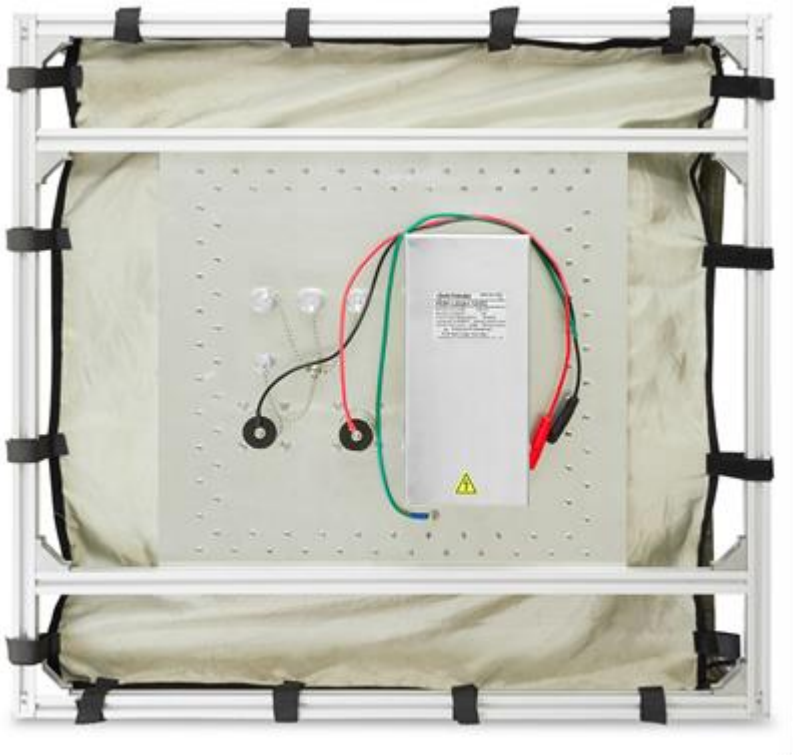
The TBST-B line of shielded tents is designed to suppress interference from ambient noise when carrying out EMC pre-compliance measurements. With sizes of 124 cm x 64 cm x 60 cm or 86 cm x 48 cm x 48 cm. The 124 cm tent can accommodate any Tekbox pre-compliance test equipment such as LISNs or TEM-cells. The 86 cm tent can accommodate the TBTC0/1/2 and any of our LISN models.

The shielded tents are made of two layers of conductive fabrics. It is supported by rigid aluminium profiles. The filter panel at the side provides a 240V/10A mains AC filter (optional for the smaller tent), two general purpose 240V/25A AC/DC filters and four coaxial feed through adapters with screw caps. The access opening is sealed with conductive Velcro tape.

Picture 1: shielded tent with closed opening

Picture 2: shielded tent with access opening

# Shielded Tents



Picture 3: side view with filter panel

## 1 Warning

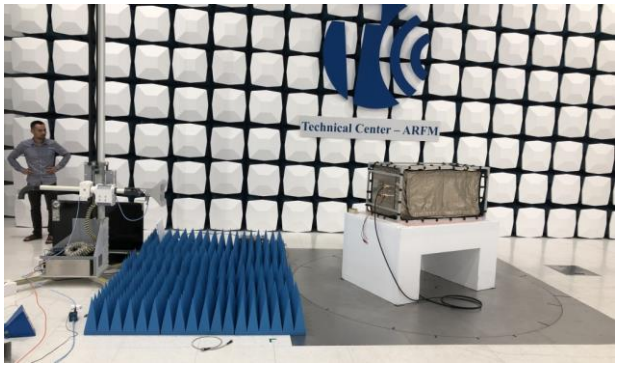
Make sure that your set up prevents main phase getting into contact with the metal parts/fabrics of the tent. Always connect protective earth to avoid any hazard of electrical shock.

## 2 Specification

| | |
|---|---|
| Outer dimensions: | 124 cm x 64 cm x 60 cm (86 cm x 48 cm x 48 cm) |
| Opening dimensions: | 85 cm x 35 cm (40 cm x 22 cm) |
| Frame: | 20 mm x 20mm extruded aluminium profiles |
| Shielding: | 2 layers of conductive fabrics |
| Seal: | conductive Velcro tape |
| Suspension: | Velcro straps |
| Filter panel: | 1 x 240V/10A AC filter; IEC socket (optional for the smaller tent)<br>2 x 240V/25A AC/DC filter; cables with female Banana couplers<br>3 x N- female feed through connector with screw caps<br>1 x BNC-female feed through connector with screw caps |
| Internal AC socket: | pigtail cable with detachable female Schuko |
| Attenuation: | Up to 50 dB dB in the range 10 MHz to 6 GHz, see chapter 3 |
| Weight: | 10.8 kg (6.7 kg / 8.7 kg) |

# 3 Ambient noise attenuation

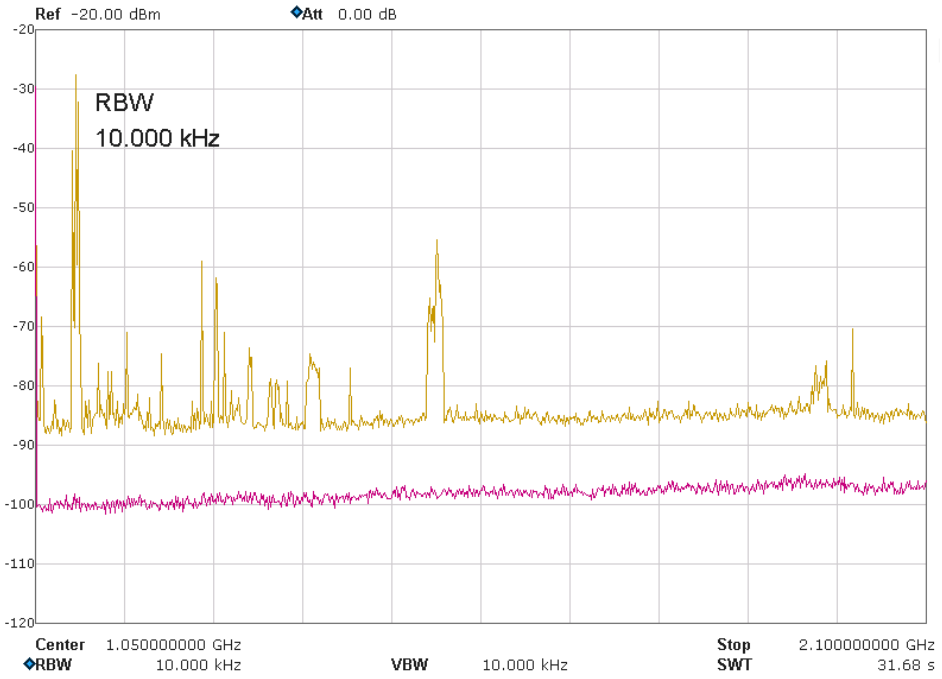
DC – 1 GHz: ≥ 55 dB
1 GHz – 3 Ghz: ≥ 70 dB
3 GHz – 4.5 GHz: ≥ 60 dB
4.5 GHz – 6 GHz: ≥ 50 dB




## 3.1 Example: Whip antenna

The ambient noise spectrum plot below was taken with a whip antenna outside of the shielded tent (yellow graph) and inside of the shielded tent (pink graph). The green graph was taken with lower resolution bandwidth in order to reduce the base noise level of the spectrum analyzer.

The spectrum plot clearly shows the attenuation of the shielded tent.

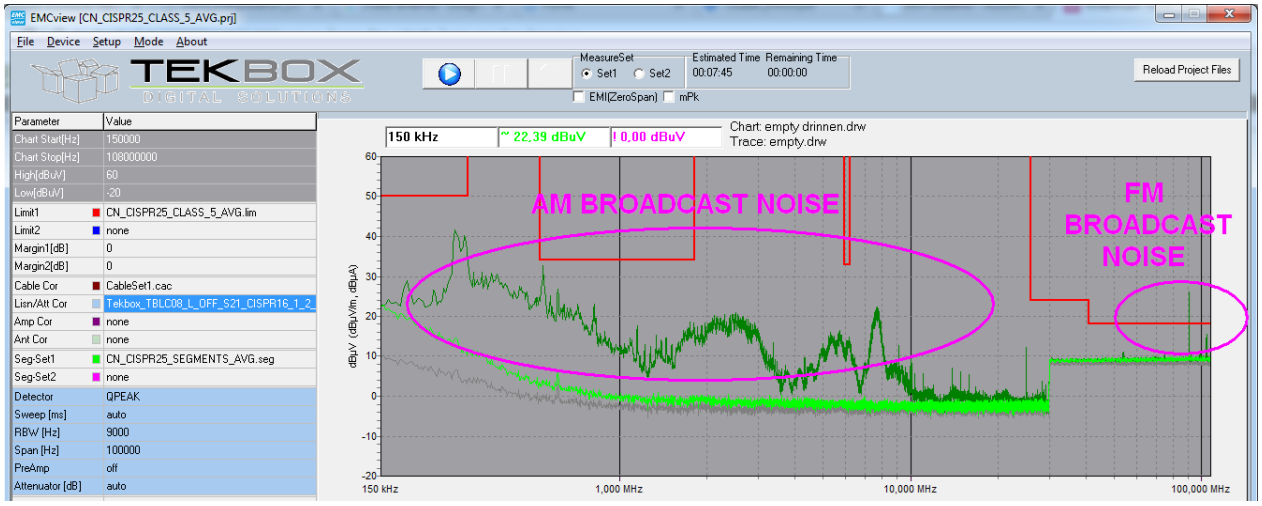



Picture 4: ambient noise outside (yellow) and inside the tent (pink)

## 3.2 Example: Conducted noise measurement

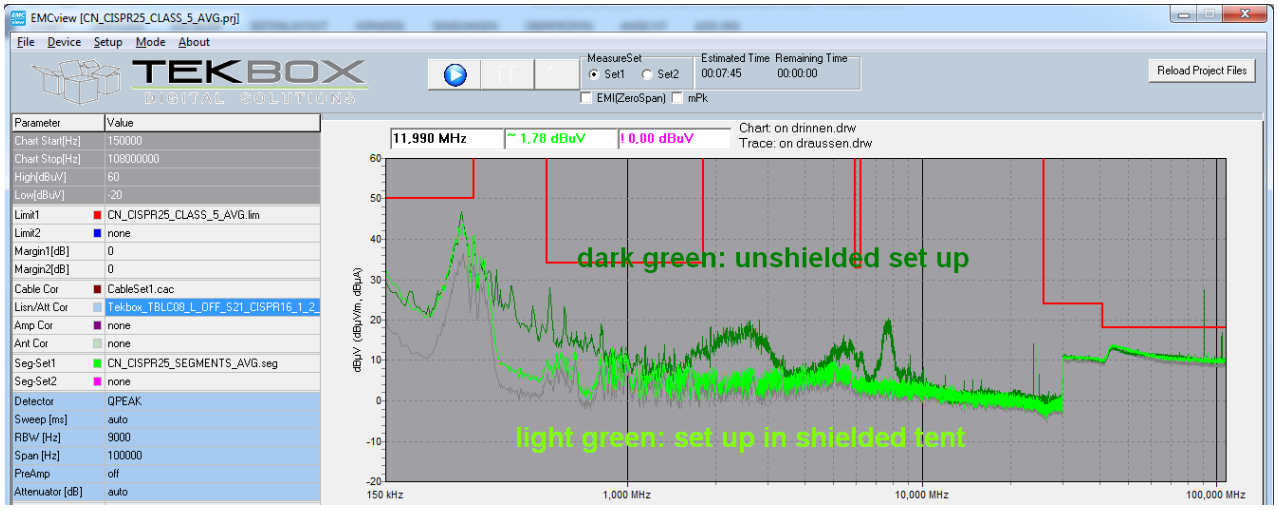
The dark green graph below shows the measured spectrum of a non-powered DUT in a CISPR 25 conducted noise measurement setup. The DUT connects to the TBOH01 5µH LISN with a very short supply cable (10cm). The cable between LISN and DUT and the DUT PCB itself already pick up significant ambient noise from AM and FM broadcast stations.

The light green line shows the results of the same arrangement, with the DUT and LISN placed inside the shielded tent.




Picture 5: CISPR 25 conducted noise measurement; DUT not powered

The graphs below show the conducted noise spectrum of the powered DUT. In the unshielded set up, all emissions, except the first harmonic of the DUT and conducted noise between 40MHz and 50MHz, are hidden under the ambient noise level. An accurate measurement would not be possible without a shielded set up.




Picture 6: CISPR 25 conducted noise measurement; DUT powered

# 4 Assembly

It is not essential to first insert the profile nuts into the profile grooves. The nuts can be inserted and positioned in line with the groves. When tightened, the nuts spin 90° and lock at a right angle to the direction of the grove.

The frame of the 124 cm x 64 cm x 60 cm tent is made up of ten 60cm aluminium profiles and four 120cm long aluminium profiles.

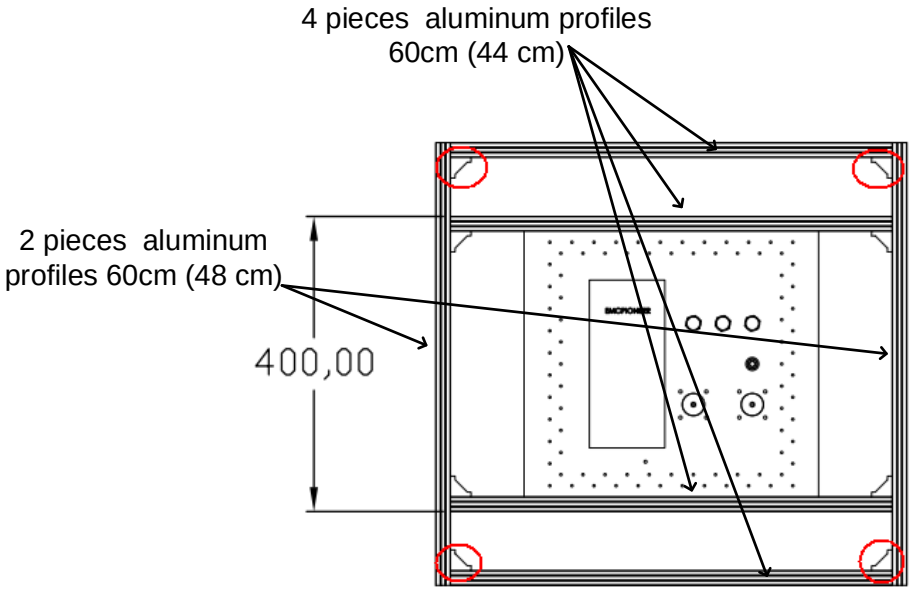
The 86 cm x 48 cm x 48 cm frame consists of 6 pieces aluminum profiles with 44 cm length, 4 pieces aluminum profiles with 48 cm length and 4 pieces aluminum profiles with 82 cm length.

There are two kinds of screws. The shorter version is used to secure the filter plate to the frame.

**Step 1:**

First, put together the left side frame that holds the filter plate. Attach six pieces 60 cm (4 pieces 44cm and 2 pieces 48 cm) aluminum profiles to each other as shown in the drawing below.

# Shielded Tents




Picture 7: left side frame

It should be noted that the filter plate is only shown for illustration purposes. The filter plate is pre-assembled with the tent fabrics and is connected after the frame is completed.

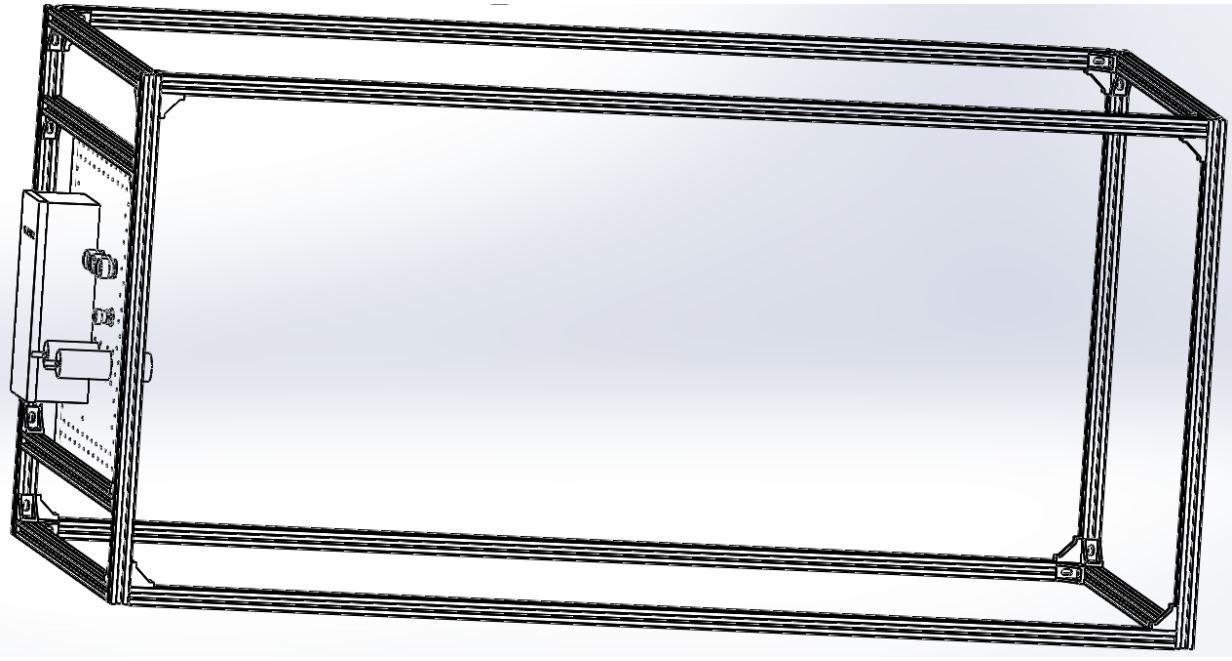
**80 cm tent:** Do not assemble the edge elements highlighted in picture 7. Assemble the top and bottom profiles in step 3. They will be fastened with edge elements in the horizontal plane only.

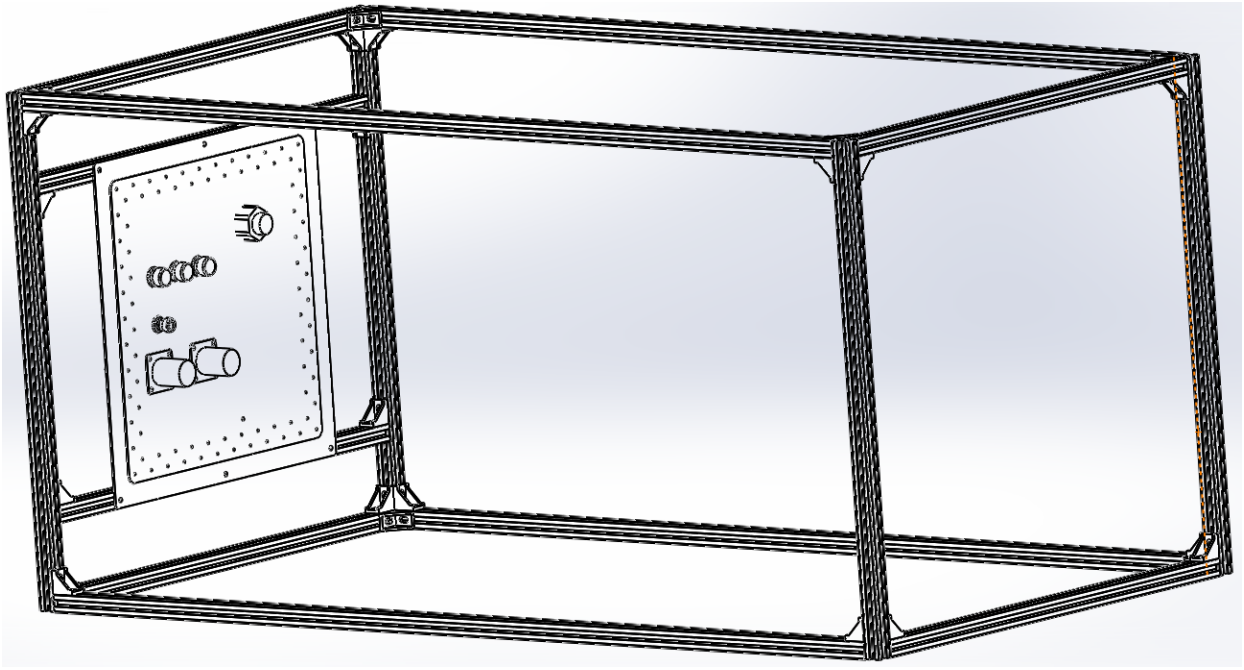
**Step 2:**

Assemble the right-side frame similar as in step 1, using 4 pieces 60 cm (2 pieces 44cm and 2 pieces 48 cm) aluminum profiles

**Step 3:**

Complete the frame by connecting the two side frames with 4 pieces 120 cm (82 cm) aluminum profiles.





Picture 8: completed frame

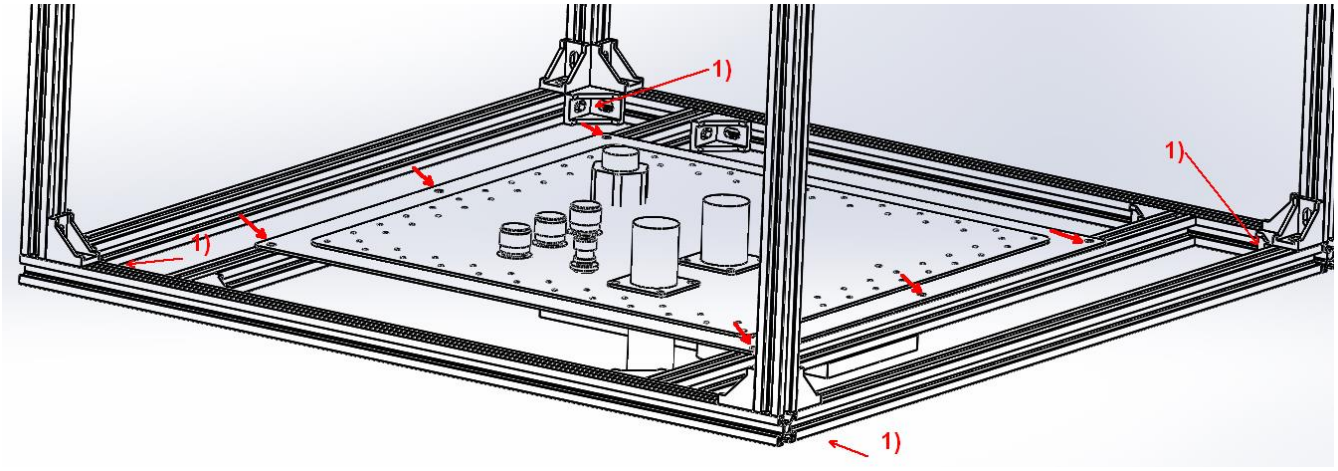
**Step 4:**

Unpack the fabrics and remove the outer foam protection of the filter plate. To avoid damaging the fabrics, do not open the plastic wrapping with a knife or scissors.

Place the frame with the left side at the bottom and support the four corners to get clearance for the filters.

Attach the filter plate with six screws to the frame.

1) These edge elements are not used in case of the 80cm tent




**Step 5:**

Unfold the fabrics and fasten it to the frame with the attached Velcro strips.

# 5 Hints

**Minimize residual ambient noise:**

When sealing the access opening, make sure there are no gaps between the conductive Velcro hook and loop tapes. Begin closing it at the upper left or right corner and work your way to the diagonally opposite corner. Then begin at the opposite upper corner and see if you can finish without a large wave or gap. If there is a gap, rip the tapes apart at the lowest corner and re-attach them until they fit.

Connect the spectrum analyzer to the tent's connector panel with an RG223 or better cable. RG58 cables should be avoided since they may pick up more ambient noise.

**DUT control:**

If your DUT requires connectivity to outside control devices or additional multiple voltages, use shielded control cables and feed it through any unused filter or coaxial connector at the filter panel of the shielded tent. You can also use the AC-filter to feed DC supply voltages into the tent. Similarly, the DC filters are capable of carrying AC. Should you need multiple control cables or a USB or HDMI interface, you can feed it sideways through the Velcro tape: use shielded cables and remove a section of the outer jacket to expose the shielding mesh of the respective cable where it would pass the Velcro tape. Then, tightly close the tape, ensuring that the cable shield has good electrical contact with the Velcro. Ensure that the setup is properly grounded, and avoid connecting the mains phase to the sheet metal of the filter panel or the tent's surface.

**Internal AC mains connector:**

The output of the AC filter is connected to a pigtail with detachable (non over molded) female Schuko connector. Use a travel adapter or similar, to match it with any other country specific connector. Alternatively detach the Schuko connector from the pigtail cable and mount a connector that fits your specific requirements.

**Protection:**

The tent is made of two layers of conductive fabrics that can be damaged by sharp instruments or equipment with sharp edges. Handle with caution.

Insert a cardboard, foam, or other suitable material at the bottom for more protection.

You may also attach MDF or plywood panels to the aluminium frame to cover the tent's bottom or stack stuff on top.

Patch any cuts with the included fabric remnants. You can stitch it with any thread as long as it makes a close contact with the overlaying fabric.

# 6 Ordering Information

| Part Number | Description |
|---|---|
| TBST120/60/60/2-B-EU | Shielded tent 124 cm x 64 cm x 60 cm, RF cable RG223/N-male to N-male/1m, repair patch fabrics, C19 Schuko Power cord |
| TBST120/60/60/2-B-US | Shielded tent 124 cm x 64 cm x 60 cm, RF cable RG223/N-male to N-male/1m, repair patch fabrics, C19 US Power cord, C13 schuko cable |
| TBST120/60/60/2-B-UK | Shielded tent 124 cm x 64 cm x 60 cm, RF cable RG223/N-male to N-male/1m, repair patch fabrics, C19 English Power cord, C13 schuko cable |
| TBST120/60/60/2-B-AU | Shielded tent 124 cm x 64 cm x 60 cm, RF cable RG223/N-male to N-male/1m, repair patch fabrics, C19 Australian Power cord, C13 schuko cable |
| TBST-86/49/45/1-B | Shielded tent 86 cm x 48 cm x 48 cm, RF cable RG223/N-male to N-male/1m, repair patch fabrics, without mains filter |
| TBST-86/49/45/2-B-EU | Shielded tent 86 cm x 48 cm x 48 cm, RF cable RG223/N-male to N-male/1m, repair patch fabrics, C13 Schuko Power cord |
| TBST-86/49/45/2-B-US | Shielded tent 86 cm x 48 cm x 48 cm, RF cable RG223/N-male to N-male/1m, repair patch fabrics, C13 US Power cord, C13 schuko cable |
| TBST-86/49/45/2-B-UK | Shielded tent 86 cm x 48 cm x 48 cm, RF cable RG223/N-male to N-male/1m, repair patch fabrics, C13 UK Power cord, C13 schuko cable |
| TBST-86/49/45/2-B-AU | Shielded tent 86 cm x 48 cm x 48 cm, RF cable RG223/N-male to N-male/1m, repair patch fabrics, C13 Australian Power cord, C13 schuko cable |

# 7 History

| Version | Date | Author | Changes |
|---|---|---|---|
| V 1.0 | 19.09.2019 | Mayerhofer | Creation of the document |
| V 1.1 | 06.02.2020 | Hoa | Update Section 2: Outer dimensions; Update section 4 assembly; Update ordering information |
| V 1.2 | 15.4.2020 | Mayerhofer | Updated page 1 |
| V1.3 | 30.03.2021 | Hoa Hoang | Update Chapter 6 ordering information |
| V1.4 | 6.5.2023 | Mayerhofer | Updated chapter 2 |
| V1.5 | 26.1.2025 | Mayerhofer | Updated AC/DC filter current rating |