



HOW TO WELD TPO WITH A ROBOTIC HEAT WELDER

» Purpose

To teach roofers how to safely and correctly weld TPO seams using a robotic heat welder. This makes strong, watertight seams that pass inspection and waterproof the roof.

The importance of the welding process

The seams are the most common point of failure on a TPO roof. If they are not welded right, water can get in and the system can fail. Using the robot welder correctly ensures every seam is flat, tight, and sealed.



Hand Weld Vs Machine Weld:

We only hand weld when we cant weld using a machine due to access or availability.

Machine welds are easier to get right and less likely hood of failure. Use welding robot whenever possible.

1 Set the Robot Welder

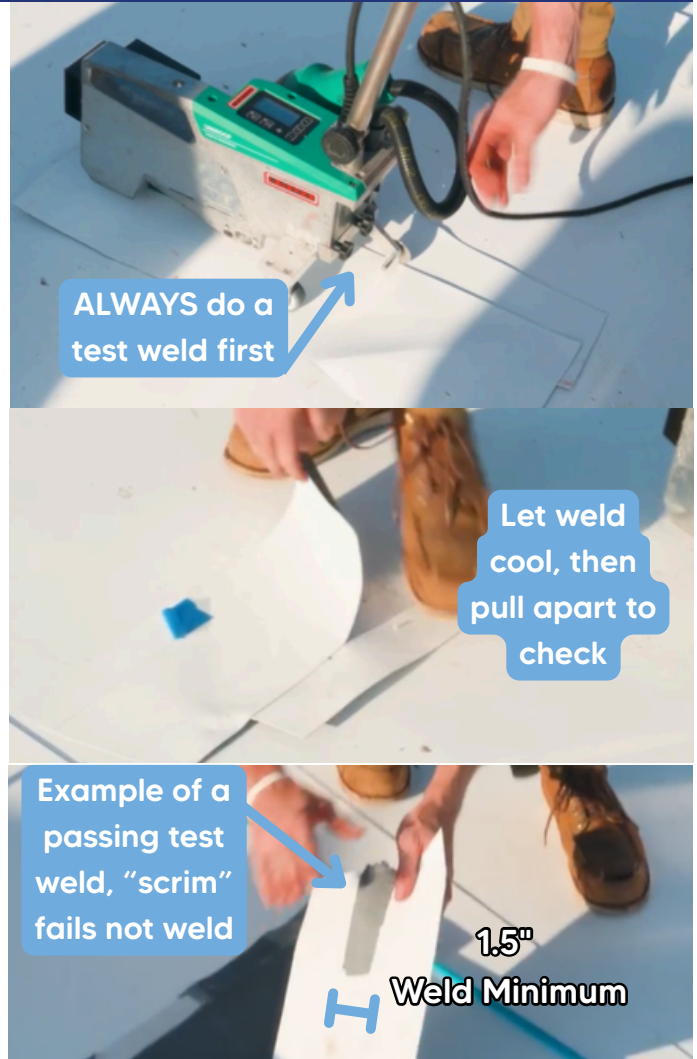
- Set the Robot Welder. Each model has its unique settings, we will go through leisters for this training.
- **Leister VARIMAT (large model):** Usual setting is around 950-1000° degrees, 12.5ft/min, 100% airflow. **Leister UNIROOF (smaller model):** Start at 850-900° degrees, around 9 ft/min, 100% airflow.
- **Settings will change depending on weather and other conditions.** Example: colder weather may need slightly slower speeds, very warm temps and you may need a cooler temp or faster speed.
- **Always perform a test weld** to make sure settings are right, as weather conditions may require changes to settings.
- Clean your welder tip with a wire brush always.



2

Always Perform a Test Weld

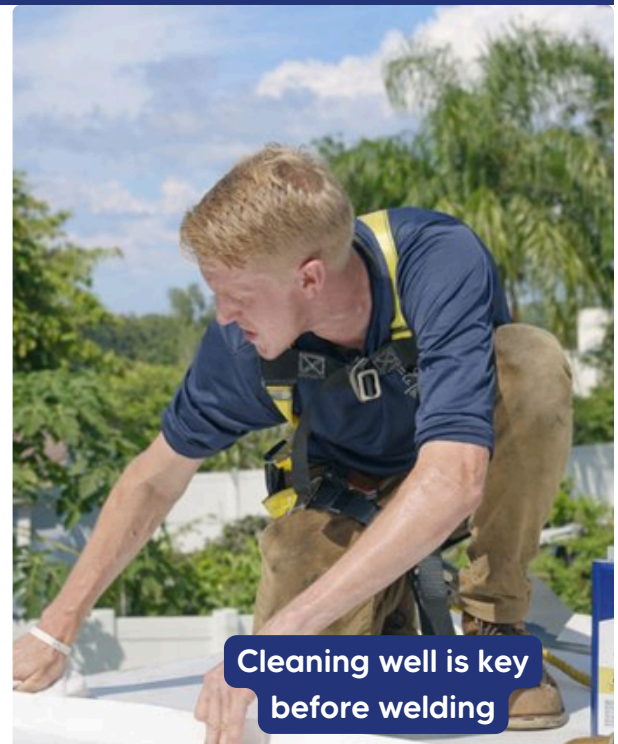
- Once your welder is set and clean, perform a short weld on some scrap material. Give it a few moments to cool.
- **Always perform a test weld. Skipping this step can cause an entire roof to be welded incorrectly. Take photos of succesful test weld with job photo paper.**
- Pull it apart: the sheet should tear, and the reinforcing scrim should remain welded.
- If it peels apart to easy, doesn't leave "scrim", adjust temperature or speed and test again. If it welds some, but not 1.5", clean welder tip, adjust settings and try again.
- If the test weld seams "melted" in anyway this is an overheated weld and will also cause roof failures.



3

Clean and Prepare the Seam

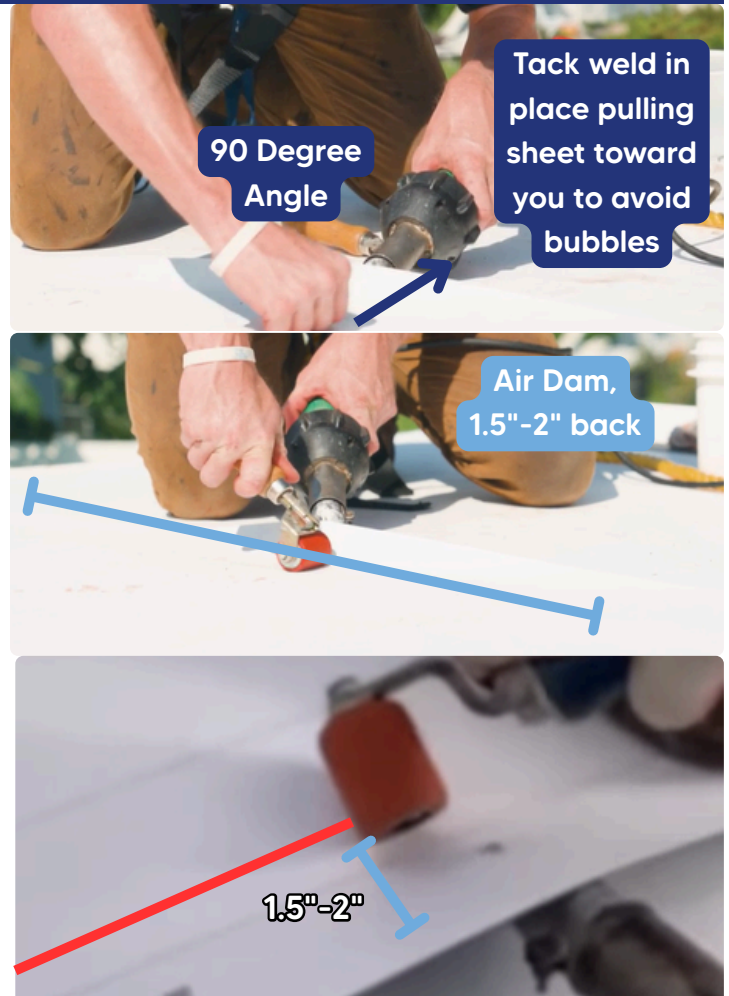
- Always ensure seam is clean before running robot. If it is clean and welded same day, it can be welded without cleaning
- **If the seam is dirty** start with simple green or other similar detergent. If the seam is not dirty move to next step
- Then use Xylene for TPO, or Acetone for PVC. A small amount of these gets the job done, **don't over apply these, this can effect the weld.**
- **Wait a few minutes after using the cleaner** to let it "flash off". "Flash off" means for it to dry and evaporate into the air. The seam must be clean and dry, before welding.



3

Weld an "Air Dam" or "Back Weld"

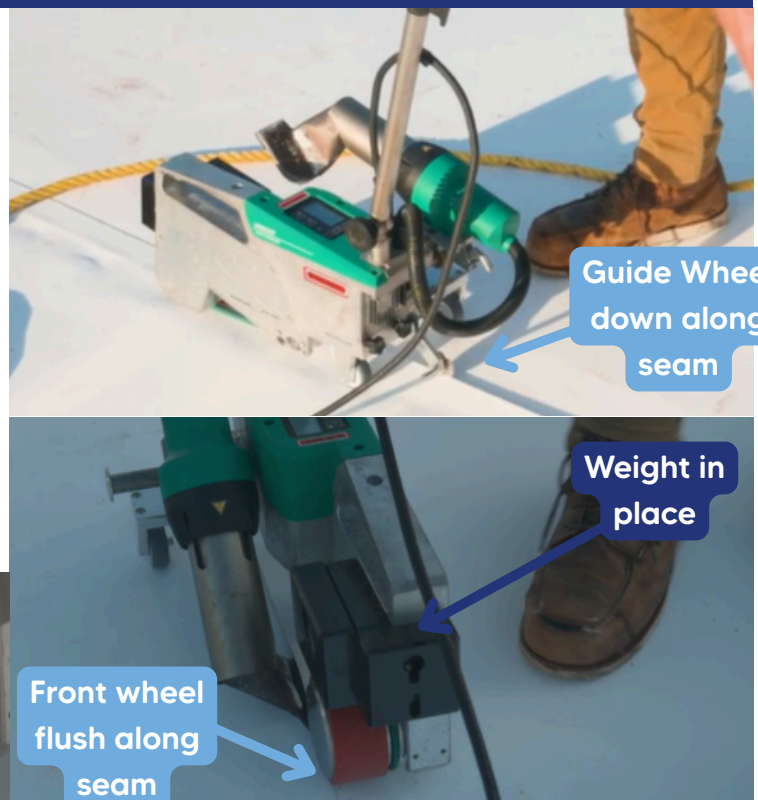
- Start with tacking the material down in one location to set the TPO in place
- Then perform a full weld a few inches back from the TPO edge called an "air dam" or "back weld".
- An air dam is an initial weld behind the final weld that works to stop bubbles and gives backup protection.
- Push firm pressure outward always so the sheet stays tight with no gaps or bubbles.
- When welding keep your gun "flat" and low otherwise it can act to pry the TPO up.
- Note: There are ways to use a robot welder without a back weld by using other methods to avoid bubbles, for starting off back welds are best practice.



4

Run the Robot

- Place the robot on the seam, ensure all settings are correctly configured, guide wheel down along seam, front roller flush with edge and weights in place, welder nozzle out from seam.
- Keep a steady pace and watch where you step as you walk it back.
- Don't pull, push, or rush the robot. Let it run even and smooth.



❌ Welding Don'ts

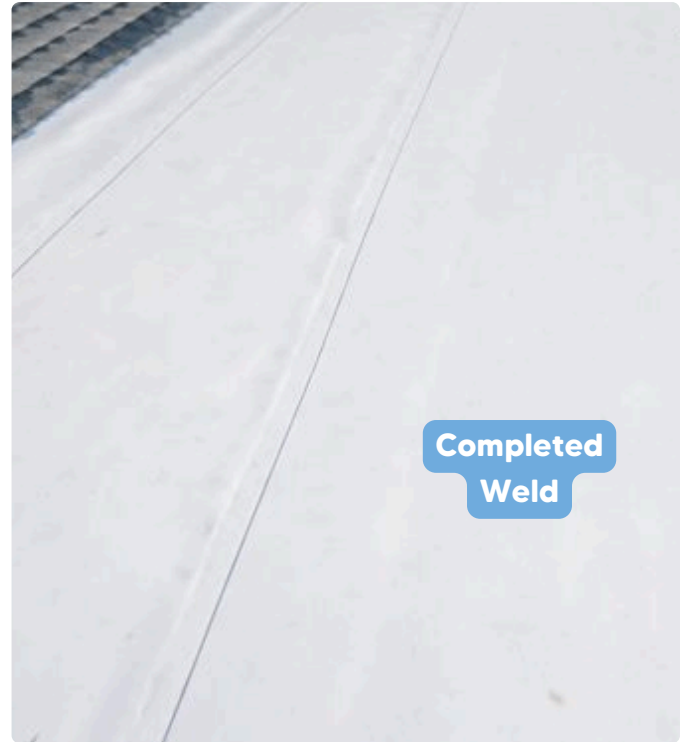
- Don't forget to check settings.
- **Don't weld without a test weld.**
- Don't run robot over dirty, wet, or dusty seams.
- Don't push or pull the robot- let it walk itself steady.

➔ Probe your work!

Always probe your work. Let it cool for at least 5 minutes and check it well with a probe. It doesn't matter how good you are at welding, if you don't probe check you will end up with a bad weld that can cause a leak.

✅ Final Checks :

- ✓ Correct machine settings used
- ✓ **Test weld passed (scrim stayed welded) document with photos.**
- ✓ Air dam installed
- ✓ Seam welded smooth and even
- ✓ Allowed to cool before probing
- ✓ Probe test passed with no voids



How to Weld TPO With a Robotic Heat Welder

Scan Code for
Training Video

