



TITECH PRO™

TRAILING SHIELD®

Made in Norway

A bright idea

a bright weld

A bright idea – a bright weld

TITECH PRO™ TRAILING SHIELD® MAKES WELDERS SATISFIED

According to welders' response the new generation TiTech PRO™ Trailing Shield® are distributing gas flow without turbulence, producing a uniform gas protection of the weld. Welders' statements are distributed later in this paper.

Trailing Shield® may be defined as a device providing the zone behind the welding torch with shielding gas to protect the hot surface from oxidising, and prevent embrittlement or poor corrosion resistance.

“ The TiTech PRO™ Trailing Shield® is a tool every welder should have in his toolbox! It is highly efficient, light weight, very easy to use and allows you to achieve perfect results when quality is all that matters, not only on titanium but on stainless too. I love it and I highly recommend it! ”

Johannes Ciobanica @tig_happens - ITALY

TRAILING SHIELD®:

- 
Trailing Shield® 2.0™ - FL
- 
Trailing Shield® 2.0™ - MINI
- 
Trailing Shield® 2.0™ - OD
- 
Trailing Shield® 2.0™ - ID
- 
Trailing Shield® 2.0™ -

Author: Tor Marlow Barka IWE, TiTech Production AS

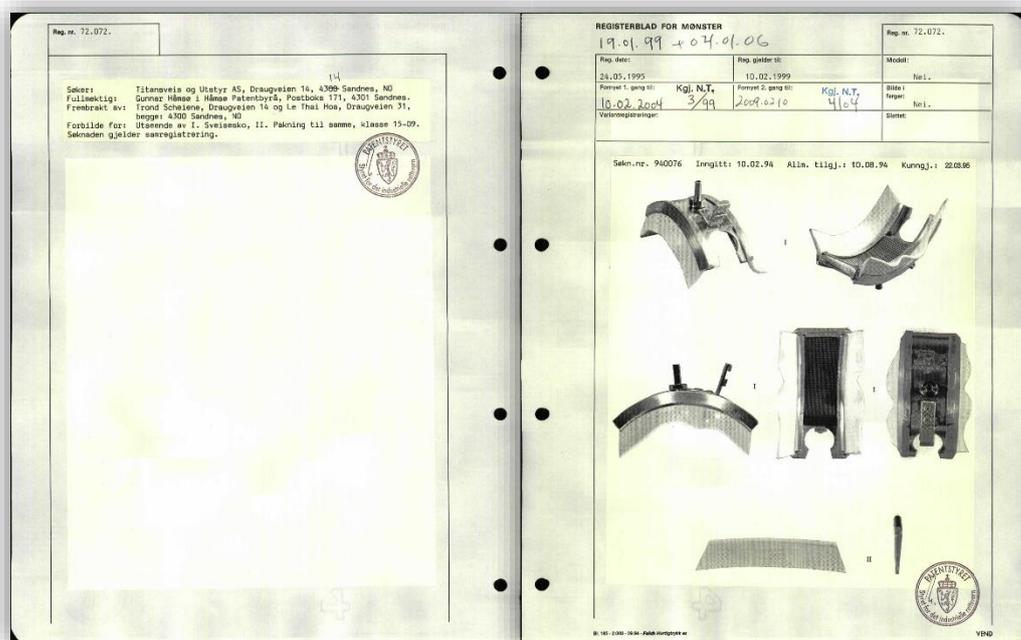


WHY TRAILING SHIELD®?

For decades titanium welding has been performed in a vacuum chamber or by using Trailing Shield® or other auxiliary shield to obtain best results.

The welding torch provide a gas flow shielding the arc and metal transfer. The gas is getting ionised and produces an arc-plasma for energy transfer which in turn are melting the metal. Argon is the most common shielding gas for TIG-welding, but in case of lack of fusion, adding 30% Helium will increase energy transfer.

Torch shielding gas protects the weld pool and adjacent hot metal surface from air. But by very reactive metals like titanium the torch gas may not give sufficient protection. By welding, the torch is continuously moving away from the hot weldment, allowing the hot titanium surface to combine with oxygen and nitrogen from the air. While at room temperature up to 200°C air combine with titanium forming a silver bright coloured protective oxide, high temperature oxides may adversely affect properties.



TiTech's original Trailing Shield® patent.

The colour of the affected surface depends on oxide layer thickness (just like the refraction of light in oil contamination on water). From 300-400°C the colour of the un-shielded surface becomes straw yellow which is normally acceptable. Some standards (**ISO 15614-5** and **Norsok M-601**) may also allow a narrow band of intensive colours close to the limits of the gas shield. Temperatures from 400°C and above results in a thicker oxide layer starting with dark blue, then purple, brown or even light-blue and grey-blue colours, which indicates exposure to air at elevated temperatures for too long time. This is not acceptable because the properties of the titanium surface are adversely affected as oxygen and nitrogen at elevated temperatures may dissolve directly into base material, potentially causing embrittlement. **This is stated in a TWI report which conclude: "It is conventional for trailing gas shields to extend coverage down to a metal temperature of 250°C, to prevent the formation of coloured oxide films".**



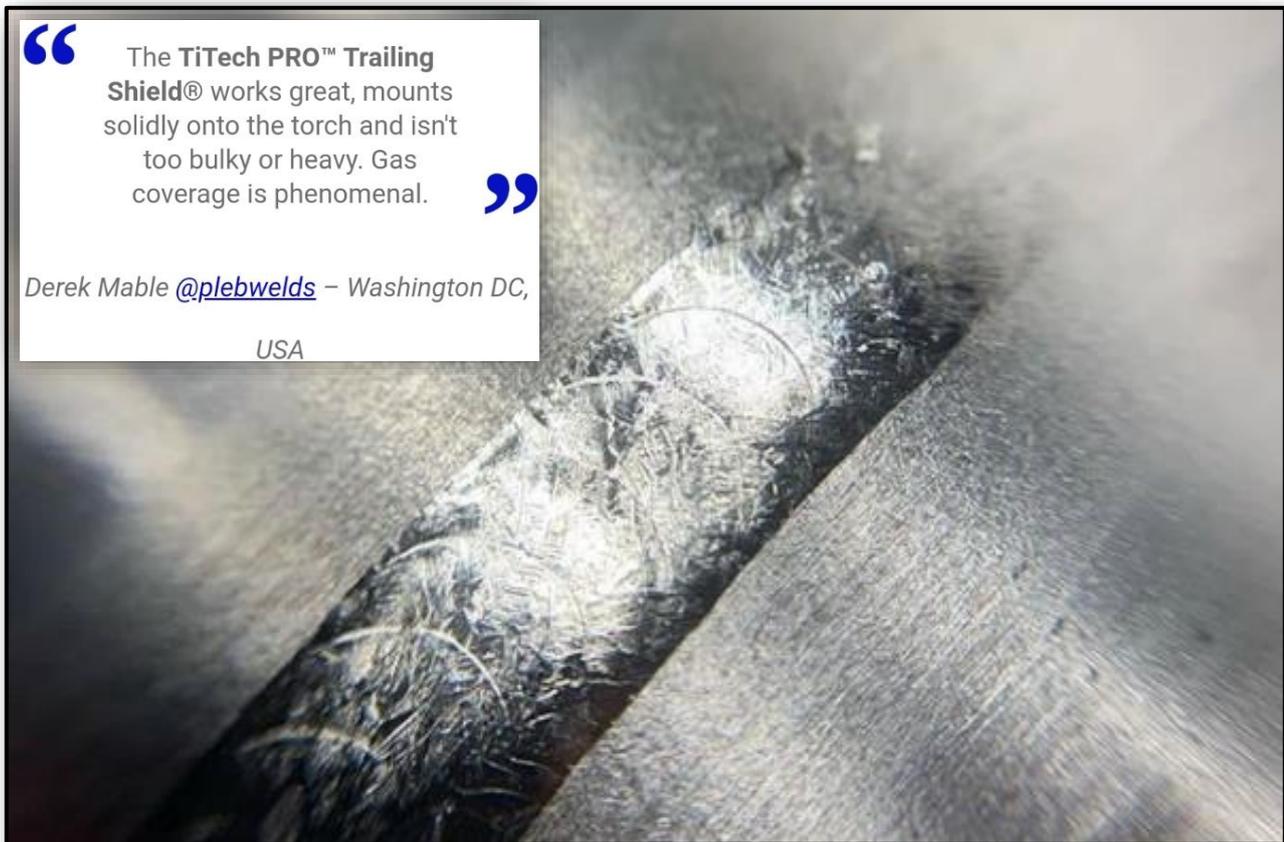
HIGH TEMPERATURE OXIDIZATION IS NO LONGER A PROBLEM

According to **Norsok M-601**, coloured oxide shall not be removed before visual inspection because the colours are telling the welding history, and will be decisional for acceptance or not. The oxide may be removed after finished welding by brushing with a clean stainless steel brush, but also between weld layers. Clean brush will not leave either iron contamination nor oil/grease (i.e. carbon and hydrogen) affecting the properties. Angle grinder is not recommended as it might add iron contamination and leave grinding marks on the surface.

Before starting welding drying, oxide brushing and degreasing will remove moisture and hydrogen which may cause porosity and embrittlement of weld deposit. Even a fingerprint is said to lead to porosity in weld deposit.

“ The TiTech PRO™ Trailing Shield® works great, mounts solidly onto the torch and isn't too bulky or heavy. Gas coverage is phenomenal. ”

Derek Mable @plebwelds – Washington DC,
USA



Weld by Derek Mable @plebwelds with TiTech PRO™ Trailing Shield®

By using TiTech PRO™ Trailing Shield® the high temperature oxidation problem is solved. You may even increase heat input to some extent within existing WPQR range of approval, or document by a new WPQR. Increased heat input implies

increased welding productivity and still have a silver bright weldment surface. The uniform gas distribution of the new generation TiTech PRO™ Trailing shield® cools and shields the high temperature metal surface even better than observed before.



TRAILING SHIELD® ONLY FOR TITANIUM?

Except from construction steel, TiTech PRO™ Trailing Shield® may have the same positive effect on welding other metal alloys. Stainless steel alloys are like titanium getting oxidised in air at ambient temperatures. 11-12% chromium steel alloys form a corrosion resistant chromium oxide layer at room temperature. The ability to protect the steel from more aggressive environment will improve by adding more chromium and molybdenum. But at elevated temperatures like obtained by welding, exposed in air the chromium oxide layer will grow thicker, extracting chromium from the steel surface making it less protective against corrosion. This is most detrimental for high chromium alloys like duplex, super duplex and 6Mo stainless steel and even for 316 and duplex stainless steel, so oxide and adjacent metal surface need to be removed.

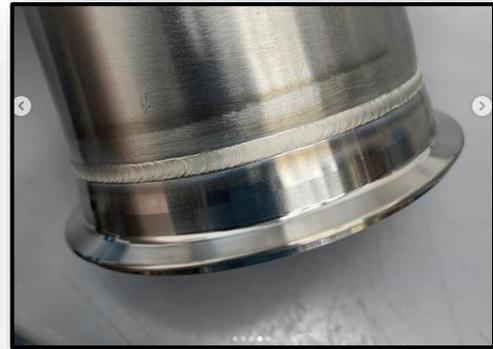
TiTech PRO™ Trailing Shield® leave a silver bright weld after finishing welding, with no need for brushing or pickling.

Like for titanium welding, welding of stainless steel will have similar oxide colour challenges (ref. Norsok M-601).

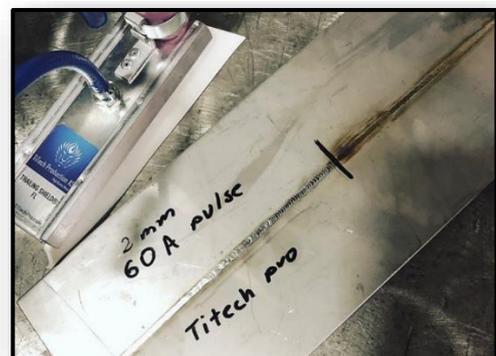
In many cases stainless steel brushing may be sufficient to remove the poor oxide layer. But in cases like robotised and mechanised welding, the efficiency will be affected by need of removing oxide also between welding layers. In general, brushing will make a stop in welding progress. TiTech PRO™ Trailing Shield® will produce a bright weldment both during welding and after finished welding. No post weld treatment is needed.

As with stainless steel, other metal alloys may have advantage in using trailing shields for welding.

First commandment in general is always to start with a clean weld joint and 99,996% pure gas. Humidity contains hydrogen, and grease consist of hydrogen and carbon, all having a detrimental effect especially on titanium. Even Trailing Shield® cannot compensate for a contaminated shielding gas or weld groove.



321 Stainless Steel



304 Stainless Steel



316 Stainless Steel



316 Stainless Steel



OTHER BENEFITS WITH TRAILING SHIELD®

Welding produces heat that for stainless steel and many other exclusive metal alloys are not only affecting surface properties but also heat affected zone (HAZ) in metal beside the weld deposit. In construction steel we normally wish slow cooling, but in non-hardenable stainless steels, hardenable aluminium alloys and other metal alloys we wish a rapid cooling not to disturb the metal structure and properties. **Trailing Shield® may have a good influence on cooling the weldment including HAZ, for better mechanical and corrosion properties.**



316 weld by Glenn Hovet at @titanwelds with TiTech PRO™ Trailing Shield®

TRAILING SHIELD® FOR OTHER REASONS THAN OXIDATION OR COOLING WELDMENTS?

Site/open air welding and in big halls sometimes with draft, the gas shielded welding may have challenges with proper gas protection of the welding arc. The shielding gas may be blown away or disturbed by turbulence causing different kinds of weld defects. **TiTech PRO™ Trailing Shield® will make a protected local environment around the welding process that keeps the shielding gas in place, including the zone behind the weld torch.**

Trailing Shield® might also have good influence on welders' work environment, like air pollution and ergonomic aspects.

Less need for brushing, grinding or pickling after welding is profitable for welders health.

TiTech PRO™ Trailing Shield® may give the welder physical support by uncomfortable weldments, like outside corner welds and other cases with poor ergonomic support.



A bright idea

a bright weld

TRAILING SHIELD® FOR OTHER WELDING PROCESSES THAN TIG?

Automatised and mechanised welding processes normally are performed by **MIG/MAG** welding.

TiTech PRO™ Trailing Shield® are perfect tailor-made for MIG/MAG welding processes, and may rise productivity as there is less need for interrupting welding sequence because of oxide cleaning. MIG/MAG is an effective welding process that may produce higher heat input than TIG and thus meet a greater challenge to make acceptable weldments due to oxide colours. TiTech PRO™ Trailing Shield® tackle the challenge by providing prolonged gas protection and cooling of metal surface.



“ The TiTech PRO™ Trailing Shield® were easy to get used to and hook up, a simple clamp onto your regular torch and cup no messing around. Easy to manoeuvre into a suitable position for whatever position you need to weld in. ”

Dakota Sterling [@the_bearded_wonder69](#) – Alberta,

CANADA

Weld by [Travis Field](#) at [Legion Piping Fabricators](#) with TiTech PRO™ Trailing Shield®

TRAILING SHIELD® FOR OTHER SIZES, OTHER FORMS AND WELDERS' OTHER NEEDS?

TiTech PRO™ may help you designing the perfect Trailing shield for your purpose. Tell us about your need and we will try to provide you Trailing shields with special design or size, hopefully to your satisfaction.

TITECH PRO™

TRAILING SHIELD®

Made in Norway



A bright idea

a bright weld

ECONOMIC ASPECTS

TiTech PRO™ Trailing Shield® are low cost and long lasting. The rubber skirts withstand the hot welding arc and the aluminium components are designed for the purpose.



TiTech PRO™ Trailing Shield® 2.0™

Applying Trailing Shield® in other disciplines than titanium welding may meet resistance as they might be looked at as un-convenient. But if the welder finds advantages by using Trailing Shield®, it might be a successful history, like all the positive responses TiTech PRO™ has received from satisfied customers.

TITECH PRO™

TRAILING SHIELD®

Made in Norway



A bright idea

a bright weld

TRAILING SHIELD® USAGE FROM WELDERS WORLDWIDE



All photos are taken and published by welders themselves who use our Trailing Shield®. More photos and videos are available on [Instagram](#), [YouTube](#), [Pinterest](#), [LinkedIn](#), [Facebook](#) and [website](#).

TITECH PRO™

TRAILING SHIELD®

Made in Norway



A bright idea

a bright weld

TESTIMONIES FROM WELDERS AND BUSINESSES WORLDWIDE

#2

"The TiTech PRO™ Trailing Shield® are awesome. I have been using them since 2013 and because of the quality and aesthetics of my Titanium Welds, my name has become quite popular for the Welding of Titanium. I have many sample welding coupons on display behind a glass cabinet at work for clients to look at; thanks to the TiTech PRO™ Trailing Shield®"



- Travis Field @fieldres - Alberta,
CANADA

#8

"To meet the visual quality requirements and avoid TiO2 brittleness in the weld Trailing Shield® must be used"



- Erik Sundkvist, Sr. Welding Engineer
(IWE) - Metallurgist (MSc), Aker
Solutions AS - NORWAY

#7

"I had the pleasure to use the TiTech PRO™ Trailing Shield® it is really very good, light, rubbers do not impede movement and do not stop the hand when moving. Clear effects are visible on thin 2mm-3mm 304ss materials. I am very pleased with the result."



- Karol Kubala @karol_kubala -
POLAND

#10

"I weld almost all the pipes in the round table, after welding with TiTech PRO™ Trailing Shield®, I could speed up because of better gas coverage. So better quality and faster welding."



- Keld Kiel, KK Titan Svejs -
DENMARK

#13

"If you are welding stainless steel, titanium, or any other exotic metals, TiTech PRO™ Trailing Shield® are a must. Cleaner welds/weld area, less gas usage, long travel passes, and a lot of time saved are a few of the benefits of using Trailing Shield®."



- Eric, Strictly Modified
@strictly_modified_fab - Illinois, USA

#16

"In using my Trailing Shield® more and more I find it easier to use all the time. Great craftsmanship, and design. I'm sure it will make thousands of beautiful welds!!! Thank you TiTech PRO™ for such a great product!!!!"



- Eric Gabbert @ens_welding_service
- North Dakota, USA

More Trailing Shield™ testimonies [here](#)

TITECH PRO™

TRAILING SHIELD®

Made in Norway



