

Guide

-Weld seams without temperature discolorations – *every time!*



© Walter Schnorrer 2012

Table of contents

1.0 Company profile

2.0 Preconditions

- 2.1 Job Environment
- 2.2 Requirements for purge equipment
- 2.3 Requirements for other tools and equipment

3.0 Purge gas fitting

- 3.1 Requirements for the gas fittings
- 3.2 Suitable types of gas

4.0 Purge gas welding

5.0 Source of error

1.0 Company profile

Walter Schnorrer ApS Welding Equipment of Aalborg, Denmark is a company specialising in the design and manufacture of advanced gas purging equipment.

The development of the company has been distinguished by innovative concepts and design, and has resulted in the granting of a number of patents. Schnorrer equipment is now used extensively for the production of the highest quality welds in the nuclear, petrochemical, offshore and semiconductor industries.

With major markets now established in Germany, Holland, Scandinavian, Belgium, France, Norway, Sweden, Chile, USA, Australia and Japan.

- SC Profi (12-215 mm pipe)
- WS & WS Plus Purge cylinder (145-1000 mm pipe)
- WS Purge profiles (Vessels)
- WS Glove Bag Unit
- WS Gas Drag
- WS clamp

2.0 Preconditions

2.1 Job Environment:

- Do not work with other composite metals in the same room.
- Grinding dust from other composite metals can reduce corrosion resistance.
- Particles on your working clothes and the gloves can also be a source of contamination.

2.2 Requirements for purge equipment:

- Easy to use, short purge time, see the data sheet for the recommended purge time and purge flow
- Air tight in all positions
- Efficient gas diffuser with high diffusion
- Efficient airing which prevents back pressure
- Available in many sizes to fit any job
- Can be used with any pipe parts and pipe fitting
- Withstands high temperature.
- Minimum of loose pieces
- Quick and flexible to assemble and dismantle
- Ability to pull or shoot (with compressed air) the tool through longer pipe distance

2.3 Requirements for other tools and equipment:

- Grinding appliance must be suitable for corrosion-resistant steel
- Cutting disc and grinding disc must not be ferritic tied
- Cutting tool must not deform the pipe, GF equipment is very suitable.
- Pipe alignment and clamping tool must be made of aluminium or stainless steel
- Tape must not leave glue residue
- The torch should be supplied with a gas lens, which produces a laminar gas flow
- Tungsten electrode must be ground correctly, approximately 30°
- The filler wire must not be placed in a ferritic holder and it must be cleaned and degreased.

3.0 Purge gas fitting

3.1 Requirements for the gas fittings:

- The pipe fitting should be made of stainless steel, and should be totally air tight without loose threads and packing boxes.
- 2-3 connection pieces to oxygen test measurement
- The gas supply should be stable without oscillation of the pressure
- Gas tubes should be as short as possible to minimize the diffusion
- The gas supply must be regulated between 2-60 litre pr. min.
- Please note, many manometers and flow meters have 2 different scales – make sure you are reading the correct scale
- The accuracy of measurement of the equipment must be known

3.2 Suitable types of gas

-Flammable gasses -Formiergasser

Formiergas 90/10 N₂+H₂ Hydrogen

Formiergas 85/15 N₂+H₂ Hydrogen

Formiergas 95/5 Ar+H₂ Hydrogen

Formiergas 93/7 Ar+H₂ Hydrogen

SAFETY!

With vessels and larger pipes, with a closed end, there can be a danger of explosion

Take care of to provide free ventilation

- Inflammable gasses

Ar 4.0

Ar 4.6

Ar 4.8

Ar 5.0

N₂ pure nitrogen

Ar + He Argon-Helium 10-30%

4.0 Purge gas welding

- Degreasing/cleaning the pipe (cutting coolant)
- Check the gas quality
- Check the flow at the gas connection to the purge tool.
- Clamping and placement purge gas tool
- Place tape at the weld seam 100%
- Purge for the recommended time, with the correct purge flow
- Remove the tape about 5 cm at a time, and make the tack welds
- Remove the clamping tool, and put the tape on again

After finishing the welding, the material should cool down with full purge gas protection (316L about 250°C)

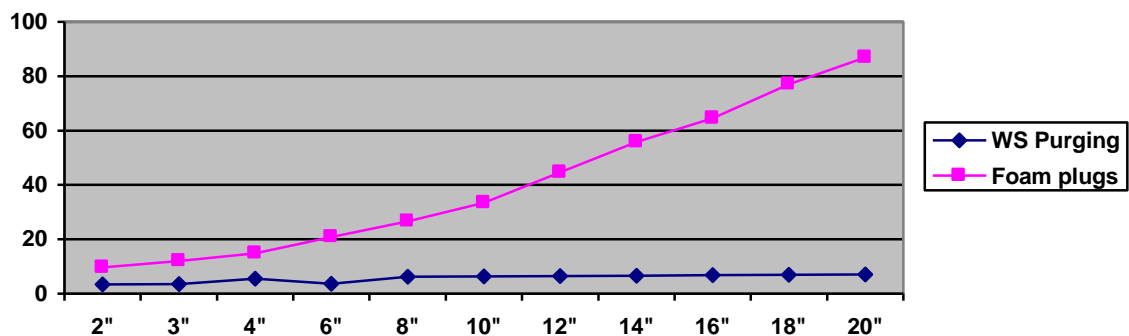
5.0 Source of error

- Tack welds without purge gas
- Too little purge gas (especial by welding duplex)
- Overpressure in the torch goes in through the weld seam (injection). Use about 10-15 sec. prepurge time to avoid blue spots by every beginning
- Too large a gas flow at the torch (result in injection)
- By grinding with a right-angle grinder the cool air can penetrate into the purge gas chamber. Purge process must therefore take place again
- Missing/poor cleaning
- Tape leaves glue residue
- Condensation. The material has to be at least 20°C
- Manometer and/or flowmeter read incorrectly
- Leaky hoses and hose clamps
- Too long hoses
- Too low quality of the hose (diffusion)
- Air - Argon, different density

WS Purging systems

- A. Purge time, This test is based on a 3 meter pipe w/ 1 elbow
- B. Gas flow rate: 10% of the pipe diameter.
- C. Purge procedure: must be repeated approx. 2,5 times per welding (grinding etc.)
- D. Salary per hour net: 53 Euro= 0,89 Euro/min
- E. Gas price 5 Euro /m³ = 0,005 Euro/Liter

| Dim. | A | B | C | D | E | D+E |
|------|---------|----------|-----------|------------|-----------|-----------|
| 2" | 1,5 min | 6 l/min | 22 l/min | 3,34 Euro. | 0,11 Euro | 3,45 Euro |
| 3" | 1,5 min | 8 l/min | 30 l/min | 3,34 Euro. | 0,15 Euro | 3,49 Euro |
| 4" | 1,5 min | 10 l/min | 37 l/min | 3,34 Euro. | 0,19 Euro | 3,53 Euro |
| 6" | 1,5 min | 15 l/min | 56 l/min | 3,34 Euro. | 0,28 Euro | 3,62 Euro |
| 8" | 2,5 min | 20 l/min | 125 l/min | 5,56 Euro. | 0,63 Euro | 6,19 Euro |
| 10" | 2,5 min | 25 l/min | 156 l/min | 5,56 Euro. | 0,78 Euro | 6,34 Euro |
| 12" | 2,5 min | 30 l/min | 187 l/min | 5,56 Euro. | 0,94 Euro | 6,50 Euro |
| 14" | 2,5 min | 35 l/min | 218 l/min | 5,56 Euro. | 1,09 Euro | 6,65 Euro |
| 16" | 2,5 min | 40 l/min | 250 l/min | 5,56 Euro. | 1,25 Euro | 6,81 Euro |
| 18" | 2,5 min | 45 l/min | 281 l/min | 5,56 Euro. | 1,41 Euro | 6,97 Euro |
| 20" | 2,5 min | 50 l/min | 313 l/min | 5,56 Euro. | 1,56 Euro | 7,12 Euro |



Foam Plugs

| Dim. | A | B | C | D | E | D+E |
|------|--------|-----------|------------|------------|------------|------------|
| 2" | 4 min | 15 l/min | 150 l/min | 8,90 Euro | 0,75 Euro | 9,65 Euro |
| 3" | 5 min | 15 l/min | 187 l/min | 11,13 Euro | 0,94 Euro | 12,07 Euro |
| 4" | 6 min | 20 l/min | 300 l/min | 13,35 Euro | 1,50 Euro | 14,85 Euro |
| 6" | 8 min | 30 l/min | 600 l/min | 17,80 Euro | 3,00 Euro | 20,80 Euro |
| 8" | 10 min | 35 l/min | 875 l/min | 22,25 Euro | 4,38 Euro | 26,63 Euro |
| 10" | 12 min | 45 l/min | 1350 l/min | 26,70 Euro | 6,75 Euro | 33,45 Euro |
| 12" | 15 min | 60 l/min | 2250 l/min | 33,38 Euro | 11,25 Euro | 44,63 Euro |
| 14" | 18 min | 70 l/min | 3150 l/min | 40,05 Euro | 15,75 Euro | 55,80 Euro |
| 16" | 20 min | 80 l/min | 4000 l/min | 44,50 Euro | 20,00 Euro | 64,50 Euro |
| 18" | 23 min | 90 l/min | 5175 l/min | 51,18 Euro | 25,88 Euro | 77,06 Euro |
| 20" | 25 min | 100 l/min | 6250 l/min | 55,63 Euro | 31,25 Euro | 86,88 Euro |