Factsheet “PFAS in Electric Welding Equipment”

Products

- Welding and cutting products - especially welding and cutting torches and power sources.
- Joining and cutting of all types of metallic materials.
- Typical customer sectors:
  - General mechanical and plant engineering.
  - Infrastructure, civil engineering, bridge construction.
  - Automotive engineering, shipbuilding, rail vehicle construction, aerospace technology.
  - Agricultural machinery, construction machinery, defense technology.
  - Power engineering, wind turbines, pipeline construction.

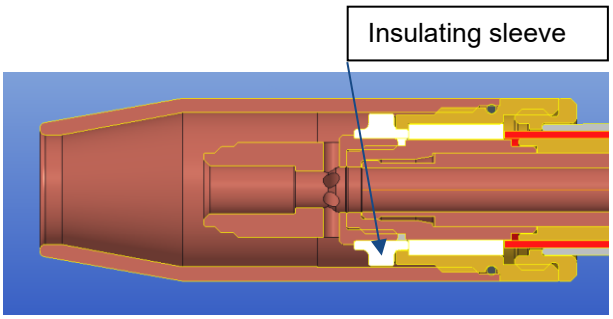
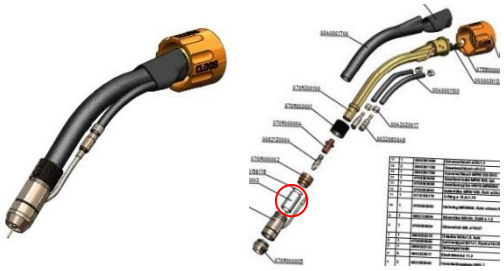
Market Information

- Market environment, information from EWA (European Welding Association):
  - Market of arc welding equipment in Europe: 1 billion Euro.
  - Employees of welding industry in Europe 25,000.
- Torches: approx. 30 %, power sources significantly more → Affected approx. 55 % of sales.
- Globally networked supply chains.
- Welding and cutting technology as core competence in almost all industrial applications.

Requirements Profile

- Service life: 1 to 5 years (torches) and 10 to 20 years (power sources).
- Development time: 3 years.
- Required availability period of spare parts: 10 years according to Ecodesign Regulation.
- Temperature resistance: Temperatures partly greater than 300 °C.
- Dielectric strength: 1,000 to 2,100 V (ignition voltages > 10,000 V).
- UV resistance to arc radiation.
- Flame protection.

Identified PFAS Applications in the Finished Products

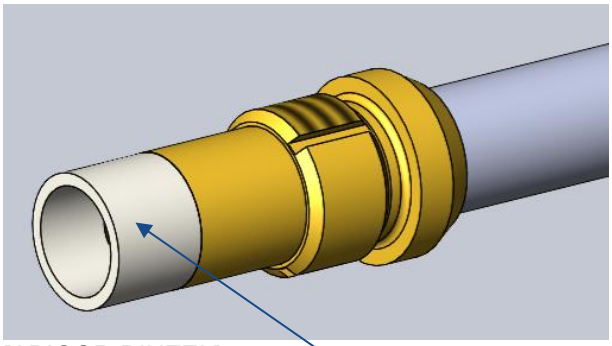
1. Insulation	
Substance class/name: • PTFE	**PFAS-containing material/component:** • Insulating sleeves, head labels
Reason for PFAS use/requirement profile: • High temperature resistance up to 300 °C • Dielectric strength > 1000 V • Good machinability • Minimal splash adhesion • Low modulus of elasticity • Good formability • UV stability • → Long service life of wear parts/torch body → Best possible welding results (little to no scrap) → Conservation of resources	
1.1. Insulations in MIG welding torches	 ABIROB W 300 MSG robot welding torch [ABICOR BINZEL].  Insulating sleeves MIG / MAG torch body [Fronius]  Insulating sleeve made of PTFE [Cloos]

Substance class/name:

- PTFE

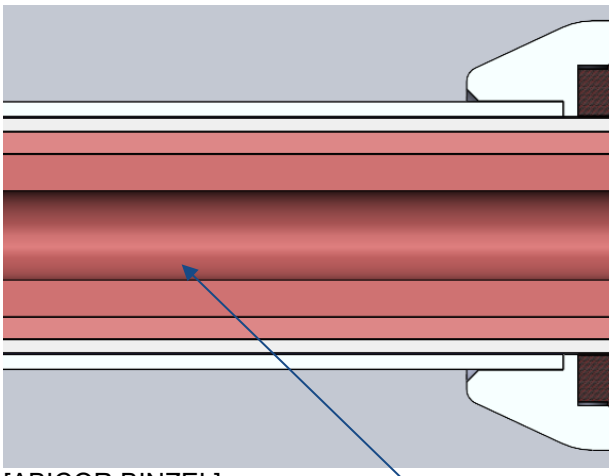
PFAS-containing material/component:

- Insulating tube in AC robot torches



[ABICOR BINZEL]

PTFE insulating ring



[ABICOR BINZEL]

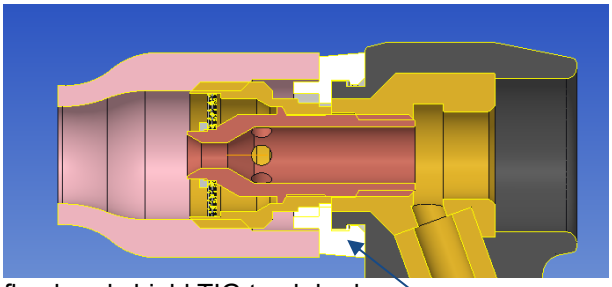
PTFE- Tube

Reason for PFAS use/requirement profile:

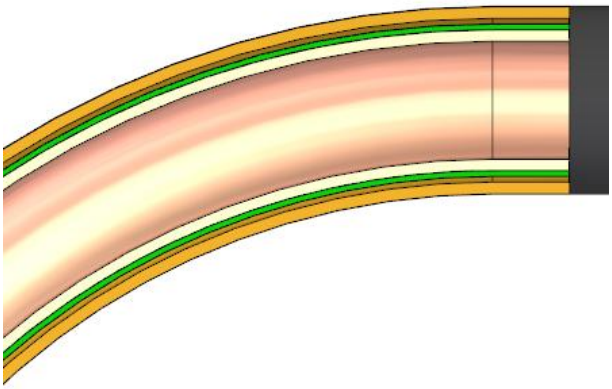
- The electrical insulation for minimum dielectric strength 1,000 V according to IEC 60974-7
- High temperature resistance for welding environments
- Impact resistance
- UV resistance to arc radiation

1.2 Insulations in TIG welding torches

ABITIG 20 manual TIG welding torch [ABICOR BINZEL]



Teflon head shield TIG torch body [Fronius]



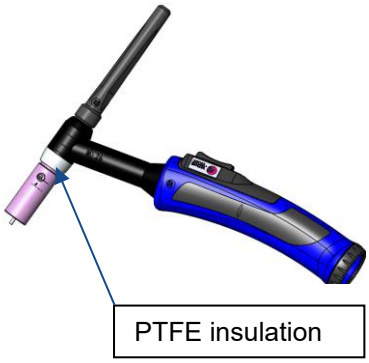
Insulating hose [EWM]

Substance class/name:

- PTFE

PFAS-containing material/component:

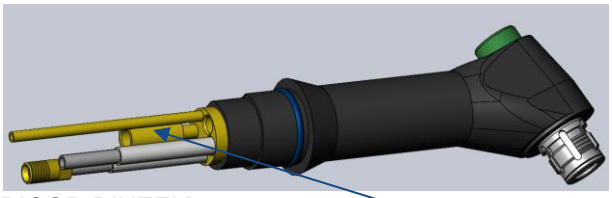
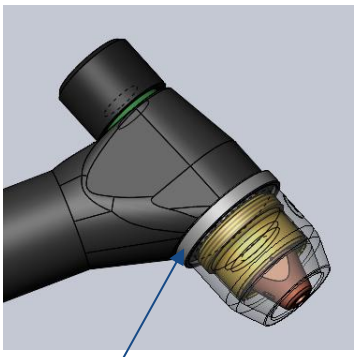
- Insulator to gas nozzle made of PTFE

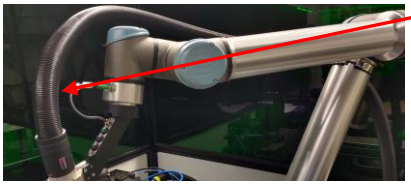
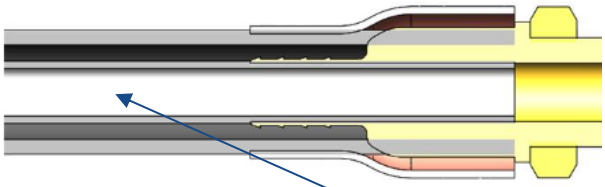


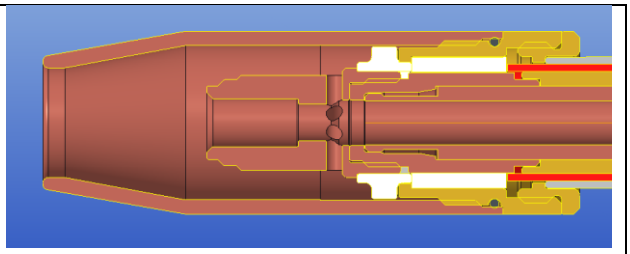
[ABICOR BINZEL]

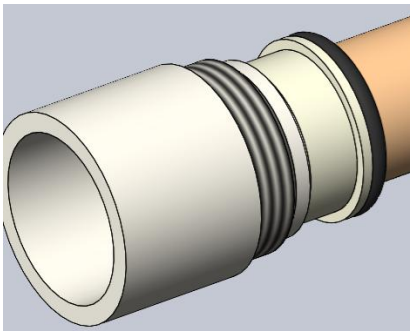
Reason for PFAS use/requirement profile:

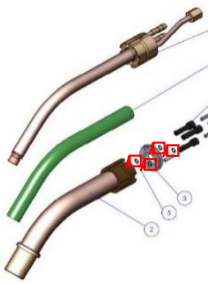
- The electrical insulation for minimum dielectric strength 1,000 V according to IEC 60974-7
- High temperature resistance for welding environments
- UV resistance to arc radiation

1.3 Insulations in plasma cutting torches	 ABICUT 75 plasma hand cutting torch [ABICOR BINZEL]
Substance class/name: • PTFE	**PFAS-containing material/component:** • Insulator to the gas nozzle  [ABICOR BINZEL] PTFE- Tube  [ABICOR BINZEL] PTFE insulation
Reason for PFAS use/requirement profile: • The electrical insulation for minimum dielectric strength 2,100 V according to IEC 60974-7 • Torch-internal electrical insulation between pilot circuit and cutting circuit • High temperature resistance for cutting environmental conditions • UV resistance to arc radiation	

1.4 Insulations in the hose assembly	 Hose package Robot hose package [ABICOR BINZEL]
Substance class/name: • PTFE	**PFAS-containing material/component:** • Inner tube in coaxial cable  [ABICOR BINZEL] PTFE- Tube
Reason for PFAS use/requirement profile: • The electrical insulation for minimum dielectric strength 1,000 V according to IEC 60974-7 • Flexibility under highly dynamic alternating loads • Sliding properties during assembly • UV resistance to arc radiation	

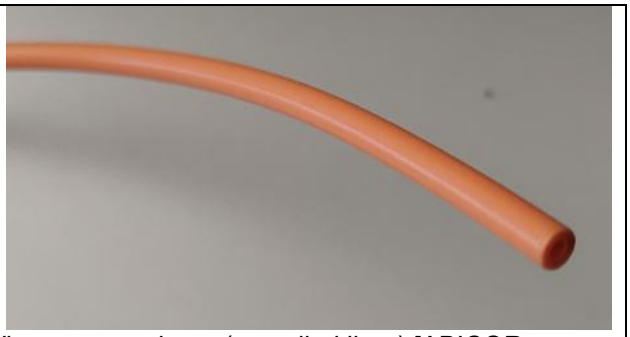
2. O-rings	 [Fronius] • Sealing for our coolant • Gas nozzle holder FKM O-ring
Substance class/name: • FKM • FFKM • Viton	**PFAS-containing material/component:** • O-rings
Reason for PFAS use/requirement profile: • Ozone resistance • high temperature resistance → wear parts last longer → resource conservation • long service life → resource conservation • high media resistance (glycol-based coolant) → resource conservation	
2 Seals (O-rings)	 MSG robot alternating neck welding torch ABIROB WH W600 [ABICOR BINZEL]

Material class/name: • FKM • FPM • FKM • Teflon® • Viton®	**PFAS-containing material/component:** • O-rings  [ABICOR BINZEL] O-ring
Reason for PFAS use/requirement profile: • Temperature resistance • Sliding properties at interfaces • Resistance to aggressive cooling media • UV resistance to arc radiation	

O-ring: Sealing of gas flow and cooling water flow in manual welding torch	  [Cloos]
Substance class/name: • Fluoroelastomers	**PFAS-containing material/component:** • Viton™ O-Ring
Reason for PFAS use/requirement profile: • Mechanics: Sealing and dimensional stability up to approx. 200 °C	

3. Hoses	 Media hoses [ABICOR BINZEL]
Substance class/name: • PTFE	**PFAS-containing material/component:** • Wire Conveyor Hose • Gas hose • Water hose
Reason for PFAS use/requirement profile: • Diffusion resistance to water / hydrogen and oxygen • Flexibility under highly dynamic alternating loads • Thermal shock resistance • Resistance to aggressive media, especially cooling media • Sliding properties • High temperature resistance up to 300 °C • Strength • Insulating properties • UV resistance to arc radiation (with exposed media routing at interfaces) • Longevity • Low water absorption • → Conservation of resources (rework, pores in the weld seam, ...)	

4. Liner	
Substance class/name: • PTFE	**PFAS-containing material/component:** • Souls
Reason for PFAS use/requirement profile: • Sliding properties • High temperature resistance up to 300 °C • Strength • Dielectric strength • Insulating properties • UV stability • Longevity • Low water absorption • → Conservation of resources (rework, pores in the weld seam, ...)	

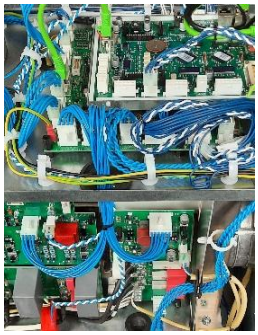
4. Wire guides liner	 Wire conveyor hose (so-called liner) [ABICOR BINZEL]

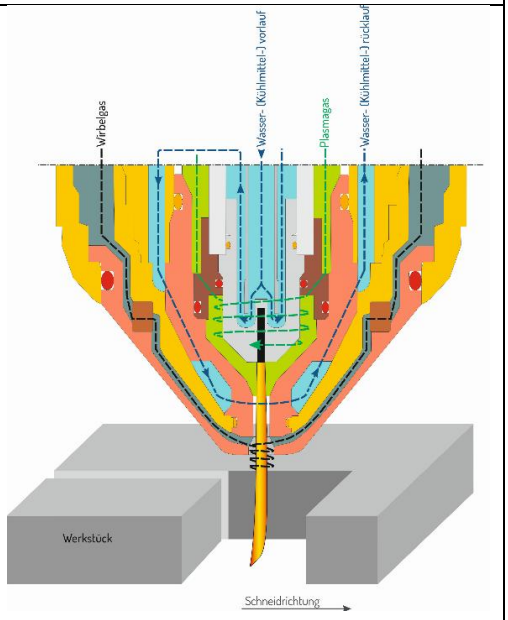
Substance class/name: • PTFE	**PFAS-containing material/component:** • Liner
Reason for PFAS use/requirement profile: • Good internal sliding properties from the wire filler material (PTFE liner / carbon PTFE liner) • Good external sliding properties during assembly • Flexibility under highly dynamic alternating loads • UV resistance to arc radiation (with external wire guides)	

Name/description of the application 4: Liner Welding wire feeding in manual welding torch, robot welding torch and wire feeding hose	  [Cloos]
Substance class/name: • Polyhaloolefin	**PFAS-containing material/component:** • Wire guide core made of PTFE
Reason for PFAS use/requirement profile: • Mechanical properties: low friction and high abrasion resistance, dimensional stability up to approx. 300 °C • Insulation: dielectric strength 1,000 Vac according to EN 60974-7	
4. Torch liner / wire core	 Wire Conveyor Hose for TIG welding torch [EWM]
Substance class/name: • PTFE	**PFAS-containing material/component:** • Liner
Reason for PFAS use/requirement profile: • Low mechanical resistance/slipperiness	

5. Cables and connectors	 Cable package [ABICOR BINZEL]
Material class/name: • PTFE • FEP	**PFAS-containing material/component:** • Connector housing • Plug inserts • Cable sheaths
Reason for PFAS use/requirement profile: • Flexibility • Temperature resistance • UV resistance to arc radiation (with exposed media routing at interfaces)	

6. Electronic components	Various electronic components
Substance class/name: • PTFE • Teflon	**PFAS-containing material/component:** • Switching power supply transformer • Printed circuit boards and flexible printed circuit boards • Inductive proximity switches
Reason for PFAS use/requirement profile: • Isolation • Temperature resistance • Resistance to aggressive media • Resistance to stress cracking • UV resistance	

6.1 Power Electronics Electronic components: Power electronics and electronic control in the welder	  [Cloos]
Substance class/name: • Thermoplastic fluoroplastic	**PFAS-containing material/component:** • PVDF

Reason for PFAS use/requirement profile: • Ecodesign directive: Energy efficiency requirements can only be met by power electronics • Good welding properties and quality only achievable with power electronics • Production: Ultrapure water required for the production of the semiconductors	
7. Gas guide	 [Kjellberg]
Substance class/name: • PTFE	**PFAS-containing material/component:** • Gas guide for plasma gas
Reason for PFAS use/requirement profile: • The gas guide (brown) has, in addition to the gas supply for the plasma jet, the function of insulation between the cathode (400 V) and the nozzle. • In addition, isolation of the ignition voltage (18 kV) for a short time • The heat load is very high due to the proximity to the arc • The gas guide is a rotating part with additional holes	

Identified PFAS Applications in the Process

1. Mounting aids	
Substance class/name: • PTFE	**PFAS-containing material/component:** • PTFE spray
Reason for PFAS use/requirement profile: • Silicone-free (automotive, paintability) • High temperature resistant release agent (potting , ...) • Less assembly effort → Gender Equality	

2. In the welding process	
Substance class/name: • PTFE	**PFAS-containing material/component:** • Insulating sleeves • O-rings
Reason for PFAS use/requirement profile: • Optimum sliding properties (scrap, sustainability, wire feed forces → process stability) • High temperature properties	

Substitution

- No substitution for temperature-loaded electrical insulations.
- Silicone for O-rings → not useful.

Safe Use: Avoidance and Reduction of Emissions and Exposure

- Disposal is regulated by electrical equipment (WEEE).
- Ecodesign directive: repairability over 10 years, reduction of waste.

Socio-economic Consequences

Consequences of the Proposed Restriction

- Conflicting goals with Ecodesign directive – mandatory spare part delivery over 10 years.
- Mandatory compliance with Ecodesign directive – energy efficiency.

Evidence and Analytical Aspects

- Ecodesign directive.
- IEC 60974.
- Product quality and performance – only attainable with PFAS.

Required Transition Period of Derogations

- Substitutes have to be delivered by suppliers, transition period cannot be influenced by users.
- Derogation of fluorpolymers in general or increase the limit value.
- Derogations are needed for products regulated by Ecodesign directive and IEC 60974.
- Limit the restriction scope to volatile substances and leave out bound substances.

We offer

- Substantial increase of lifetime of products due to Ecodesign directive – reduction of total amount of PFAS.
- Increase of recycling and upcycling depending on results of suppliers.

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