CHEMICAL SAFETY REPORT

PROVIDED AS COMMENT TO THE PUBLIC CONSULTATION ON THE REACH RESTRICTION PROPOSAL ON PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS)

Public

Submitted by: Maschinenfabrik Kaspar Walter GmbH & Co. KG

Date: 15 September 2023

Substance: [redacted]

and

[redacted]

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Abbreviations

AoA	Analysis of Alternatives
CSR	Chemical Safety Report
DU	Downstream user
EU	European Union
[redacted]	[redacted]
LEV	Local exhaust ventilation
PFAS	Per- and polyfluoroalkyl substances
PFBA	Perfluorobutanoic acid
PFBS	Perfluorobutanesulfonic acid
PFHxA	Perfluorohexanoic acid
PFHxS	Perfluorohexanesulfonic acid
PFOA	Perfluorooctanoic acid
PFOS	Perfluorooctanesulfonic acid
PFPeA	Perfluoropentanoic acid
PFNA	Perfluorononanoate, perfluorononanoic acid
PFPeA	Perfluoropentanoate, perfluoropentanoic acid
PFPeS	Perfluoropentane sulfonate, perfluoropentane sulfonic acid
PFHpA	Perfluoroheptanoate, perfluoroheptanoic acid
PFDeA	Perfluorodecanoic acid
PFHpS	Perfluoroheptane sulfonate, perfluoroheptane sulfonic acid
PFOSA	Perfluorooctane sulfonamide
REACH	Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH)
SEA	Socio-Economic Analysis
WWTP	Wastewater Treatment Plant

1 SCOPE OF THIS REPORT

Maschinenfabrik Kaspar Walter GmbH & Co. KG ("**K.Walter**") is a manufacturer of plating equipment for gravure and embossing cylinders manufacturing and supplies customer-specific complete plating equipment (plating lines) for different segments: printing for packaging, printing for decorative, printing for publication and embossing. The core part of such plating systems is the device for the application of a chromium trioxide-based functional chrome coating on the printing cylinders further called 'electroplating unit'.

K. Walter manufactures and sells the galvanic machines/systems where the chrome plating of cylinders takes place, but the company itself does not perform functional chrome plating of cylinders as a commercial activity. Additionally, they supply their downstream users (DUs) with adequate wetting agents required to minimize any potential worker's exposure to Cr(VI) and environmental releases during the electroplating process. The most effective wetting agents used, contain PFAS (i.e., [redacted]). K.Walter aims to phase out the use of PFAS containing wetting agents among their DUs in association with the substitution of Cr(VI). As PFAS-free alternatives currently available in the market are not considered adequate, an earlier substitution (i.e., before substitution of Cr(VI)) is not technically or economically feasible.

This Chemical Safety Report ("**CSR**") is part of K.Walter's derogation submission from the PFAS[1] Annex XV REACH[2] Report ("**PFAS REACH Restriction Proposal**"). The derogation submission also consists of an Analysis of Alternatives ("**AoA**")/Socio-economic analysis ("**SEA**") provided separately.

This document will provide information on:

i. The identity of the substance within the wetting agent & its degradation products
ii. A description of the application as part of the hard chrome plating process
iii. Details on the conditions of use and disposal
iv. Details on the emissions during the use and end of life stages

With this information submitted as comment to the public consultation on the PFAS restriction proposal, K.Walter aims for the reconsideration of derogation ***v. [hard chrome plating until 6.5 years after EiF].*** According to the substitution plan described in the AfA, the phase out of CrO3 and [redacted] at K. Walter's DUs is expected to be completed end of 2032. For K. Walter's [redacted] use, this translates to a required derogation timeline of 7.5 years (calculated from the expected EiF in mid-2025). However, since ECHA's restriction proposal only foresees 5(+1.5) year and 12(+1.5) year derogation options, K. Walter needs to request the 12-year derogation to cover the required time for substitution.

[1] Per- and polyfluoroalkyl substances
[2] Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals

2 PRODUCT CHARACTERISTICS

The wetting agent sold by K.Walter is supplied by a contracted formulator and contains [redacted]

The identity of both PFAS substances is described in Table 1. Additionally, physicochemical properties of the mixture are shown in Table 2.

Table 1: Substance identity

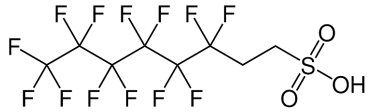
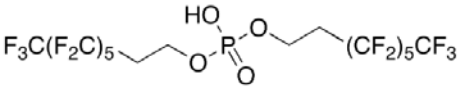
Chemical name	[redacted]	[redacted]
EC number	[redacted]	[redacted]
CAS number	[redacted]	[redacted]
Other names	[redacted]	[redacted]
	[redacted]	[redacted]
Molecular formula	[redacted]	[redacted]
Structural formula[3]		

Table 2: Physicochemical properties of the mixture

Property	Description of key information	Source
Physical state	Liquid	Safety data sheet (cf. section 4)
Color	Light yellow	
pH	Acidic	
Boiling point	100 °C	
Density	1.002 g/cm^3	
Flammability	Non-combustible	
Melting point	0°C	
Water solubility	Fully miscible	

Moreover, it is important to point out that the concentration of the [redacted] in the wetting agent is at least 50 times smaller as compared to the [redacted]. For this reason, in the following sections, information will only be provided for the [redacted].

[3] Source: Toronto Research Chemicals <https://www.trc-canada.com/product-detail/?B516300>; <https://www.trc-canada.com/product-detail/?T007805>

3 LIFECYCLE STAGES

The life cycle stages where potential emissions of [redacted] may be generated are the use stage and the end-of-life stage. Both stages along with the potential emissions will be briefly described in section 3.1 and summarized in section 3.2.

K.Walter has 60% of the market share for rotogravure in the EEA. The sections below will describe the potential PFAS emissions of the downstream users (DU) covered under K.Walter and will be extrapolated to cover the whole market (100 %).

3.1 Use of wetting agent in chromium plating

K.Walter provides electroplating units (see Figure 1) for the functional chrome plating of cylinders applied for rotogravure printing or embossing.

Rotogravure printing is a printing technique based on the transfer of fluid ink from engravings on a printing cylinder to the surface of a substrate, or the material to be printed. Rotogravure is used primarily for long printing runs in applications such as foils, packaging, catalogues, inserts, flyers, gift-wrap, and labels, among many others, achieving fine and clear images. Embossing is a process by which a relief is created on a substrate, usually paper, by means of a gravure cylinder. This technique is used for giving a 3D texture to the embossed surface for both decorative and functional purposes. Examples for this are chocolate packaging where printed sections are raised to match prints or drawings on the package or specific surface pattern that provides anti slip properties to the surface.

Even though these processes and their end products are different, the process of Cr(VI) plating of the cylinders is the same:

The production of gravure and embossing cylinders starts with the degreasing of steel or Copper cylinders, followed by copper plating and finishing. The printing pattern is then embedded into the copper coating through either engraving or laser imaging. Regardless of the method applied, the cylinders are then degreased and finally plated with chromium in a 20-minute step carried out in the closed electroplating unit. Following a finishing step, the cylinders are ready for printing. For embossing cylinders chromium could also applied directly on steel.

HelioChrome® Wetting Agent FF (FF = foam-free) is added to the chrome electrolyte within the electroplating unit to lower the surface tension of the bath, reducing the formation of aerosol during electrolysis. If the product is applied in the correct concentrations, a reduction of the surface tension form over 70 mN/m to less than 30 mN/m can be achieved. Low surface tension ensures small gas bubbles, less aerosol and a minimum of airborne hexavalent Chromium.

Figure 1: K.Walter electroplating unit SlimLine

3.1.1 Tonnage overview and substance concentration

K.Walter offers three products containing different concentrations of [redacted]: *HelioChrome® Wetting Agent FF, HelioChrome® Rapid EC* and *HelioChrome® Rapid ER*.

The main product, *HelioChrome® Wetting Agent FF, contains* [redacted] at a concentration of <3% (w/w)[4]. This product is added as an additive to the other two products, which are ready-to-use formulations of chromic acid for the automatic dosing of the plating units. In Table 3 the average annual tonnage (2020-2022) of [redacted] within products sold in the EEA is shown. As this value corresponds to K.Walter's 60% market share, an estimation of the tonnage for the full market is provided.

Table 3: Tonnage of products containing [redacted] sold in the EEA

Concentration of [redacted] in products (%)	*HelioChrome®Wetting Agent FF*	<3% w/w
	HelioChrome® Rapid EC	<0.1% w/w
	HelioChrome® Rapid ER	<0.1% w/w
Total tonnage of pure [redacted] in products sold (kg/a)	in the EEA by K.Walter (60%)	78 kg/year
	in the EEA for the full market (100%)	130 kg/year

The recommended concentration of [redacted] within the plating bath electrolyte solution is [redacted] is the commonly used constituent for PFAS based wetting agents offered for the application in chromium trioxide based functional metal plating.

[4] The concentration of [redacted] in the wetting agent is at least 50 times smaller than the concentration of [redacted].

3.1.2 Workplace exposure

The chrome plating process in a K.Walter electroplating unit is designed for automatic and unstaffed chrome plating of rotogravure cylinders. The design of the units is such that no contact with CrO_3 solution is possible during loading/unloading takes place. The CrO_3 solution is situated in an enclosed basin below the main tank and is only pumped up to the main tank when the plating process is started, and the unit is closed. After the plating process is finished, the solution flows back into the basin and the cylinder is rinsed with water before the unit is opened again for unloading. The rinsing water is collected in the lower basin of the electroplating unit together with the CrO_3 solution. The evaporation of liquid during the electroplating process (temperatures between 60-70°C) is compensated by the additional volume from the rinsing step. Thereby, the solution in the basin does not overflow and the level remains relatively constant. Therefore, any potential for exposure towards CrO_3 or [redacted] contained in the electrolyte solution is low.

Additionally, the loading and unloading of the electroplating unit is performed via an automated or manual crane, which minimizes the exposure potential. The crane is controlled either fully automatically according to a pre-defined program or manually via a remote control. In Figure 2, the plating process is depicted exemplarily.

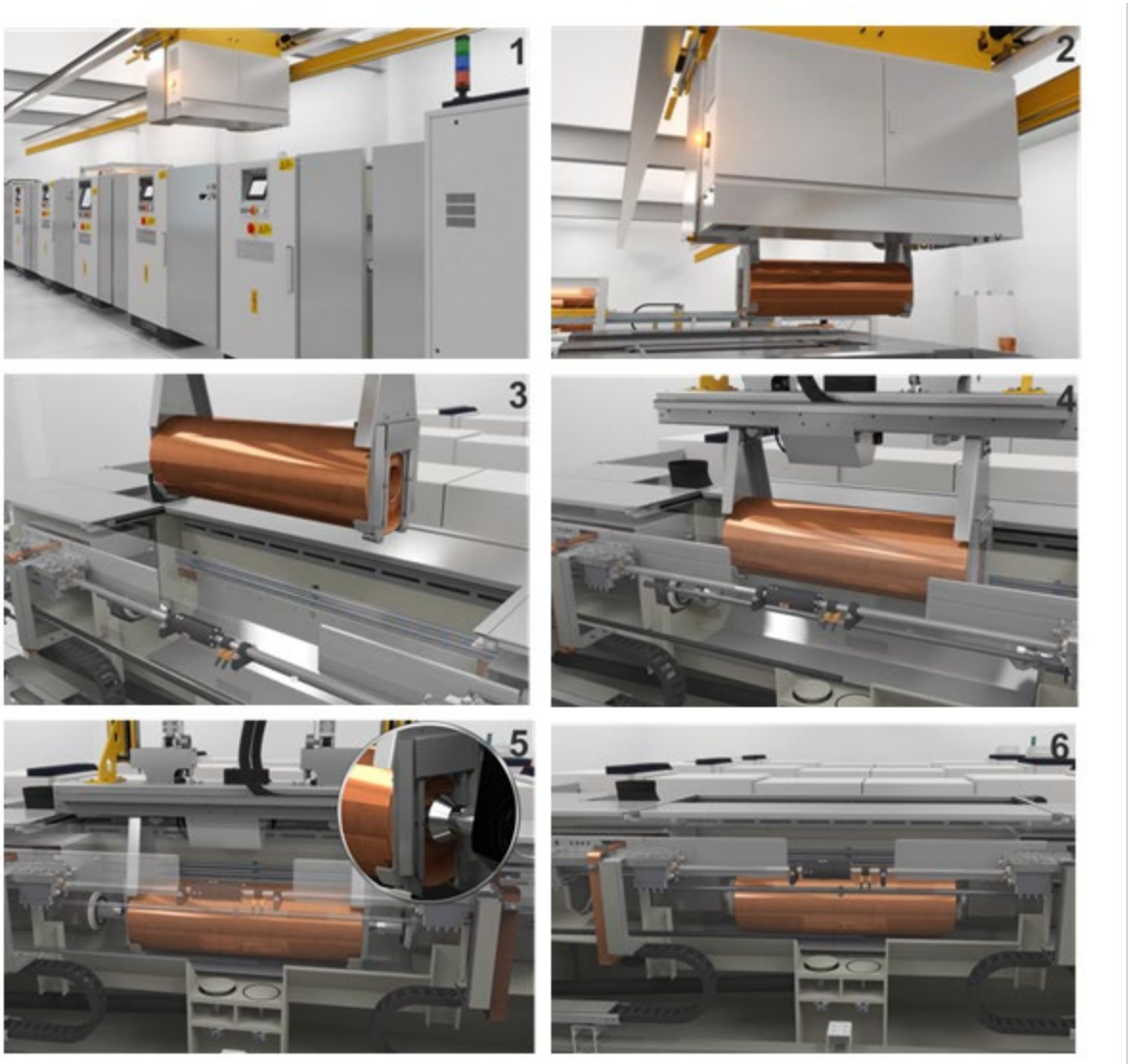


Figure 2: Computer rendered example of the automatic loading and plating process, following six consecutive steps

(1) the cylinder is picked up (2) and transported to the electroplating unit (3). The cylinder crane lowers the cylinder (4) and the electroplating unit opens. The cylinder is automatically clamped (5). Before the plating process begins, the opening of the electroplating unit is closed (6).

The wetting agent is normally dosed indirectly via the ready-to-use products *HelioChrome® Rapid EC* or *HelioChrome® ER* in the ideal concentration ([redacted]), which means that the wetting agent is consumed comparable to chromium trioxide and other additives. This mixture is dosed by small pumps controlled automatically by the plating unit.

Additional wetting agent (i.e., provided as *HelioChrome® Wetting Agent FF*) is only added to the plating unit after analyzing the surface tension of the baths and is dosed manually by the operator if it exceeds 40 mN/m. This can be necessary as [redacted] degrades over time and the ideal concentration must be renewed to achieve optimal performance.

With the use of a measuring cup, the operator adds the wetting agent into the reservoir of the plating unit, containing the chromium electrolyte. The frequency of the dosing varies from monthly to yearly.

Figure 3: Reservoir of the plating unit where the chromium electrolyte and the wetting agent are contained

3.1.3 Exhaust air emissions

The electroplating units are equipped with fixed capturing hoods. Exhaust air is passed through wet scrubbers according to best available techniques. The installation of a wet scrubber is assumed as standard industry practice to reduce emissions. The water from the wet scrubber is redirected into the process cycle during standard operation.

No air emission measurements for PFAS were available, however an estimation of the emissions is provided below.

To reflect an estimation of the emissions of PFAS to the air, the release rate of 0.083%, calculated for CrVI for the purpose of authorization was used[5]. For the purpose of this assessment, it is assumed that the behavior of PFAS is similar to CrVI and that the scrubber's efficiency is the same.

[5] https://echa.europa.eu/applications-for-authorisation-previous-consultations/-/substance-rev/62905/del/200/col/synonymDynamicField_1512/type/asc/pre/2/view (last accessed on 14.09.2023)

Based on the yearly tonnage of 78 kg of [redacted] in products sold, a value of **0.065 kg** of [redacted] is released per year via air emissions. This value represents K.Walter's market share of 60%.

Moreover, considering that K.Walter is not the only supplier of PFAS-containing wetting agents, the value estimated should be extrapolated to cover the full market (~130 kg of [redacted]). The potential amount of [redacted] considering the estimated tonnage for the full market is 0.108 kg/year (See the overview in Table 4). Considering that ~ 205 plating units are currently operated, the average emission of one plating unit is up to 0.52 g/a.

Table 4. Potential emission of [redacted] to air for K.Walter's current market share and for the full market.

	[redacted] emissions (kg/year)
K.Walter (60%)	0.065 kg/year
Full market (100%)	0.108 kg/year

Please note again that the estimation of [redacted] air emissions is based on the scrubber efficiency derived for CrO_3/Cr(VI) reduction. Even though this value may not reflect the exact conditions, the proportion of Cr(VI) and PFAS observed in the wash water of the scrubber are in a comparable order of magnitude (3 % of Cr(VI) versus 17 % of PFAS; cf. Table 5). It cannot be determined whether the difference is caused by the different physico-chemical properties or a difference in scrubber efficiency. In our opinion, additional measurements are required to determine the extent of potential PFAS emissions. K.Walter is supportive of such regulatory measures, if proposed, as the necessity for a more targeted regulation is emphasized. Based on measured data, additional abatement technologies to minimize potential emissions may be installed.

Table 5: Proportion of CrO_3, Cr(VI) and [redacted] measured in the electrolyte and in the scrubber wash water

	Concentration in electrolyte (Max)	**Concentration in wash water**	**Proportion ending up in wash water**
CrO_3	[redacted]	[redacted]	3%
CrVI [1)]			3%
PFAS [2)] ([redacted])	[redacted]	[redacted]	17%

[1)] Values obtained by multiplying the CrO_3 concentration by 0.52.
[2)] Degradation products are not included.

3.1.4 Wastewater emissions

During the chrome plating of cylinders, no wastewater is produced. Any liquids remain within the system as closed loop. When the chromium solution needs to be replaced (e.g., due to the accumulation of impurities), it is pumped into an IBC and disposed of as hazardous waste via external service providers.

3.1.5 Degradation studies

In May 2023, studies were carried out by K.Walter to investigate potential degradation products of [redacted] within the electrolyte. These studies were also performed to understand the need to re-apply the wetting agent to the baths.

Based on the measurements, we assume that the degradation of PFAS to short-chain molecules and finally to the individual substances is the main reason for the loss of [redacted] in our plating units.

Fourteen (14) different PFAS were considered in this study: PFOS, PFOA, PFNA, PFHxS, PFBA, PFBS, PFPeS, PFPeA, PFHxA, PFHpA, PFDeA, PFHpS, PFOSA, [redacted]. PFAS mentioned before were measure in different conditions:

- In a chrome plating unit without additional wetting agent (unused, ready-to-use electrolyte)
- In a chrome plating unit with 5ml/L of wetting agent[6] (unused, ready-to-use electrolyte + additional wetting agent)
- In 2 chrome plating units with wetting agent, running for many years at a DU site (in equilibrium).

The results showed that through operation of the plating units, [redacted] degrades into shorter-chain perfluorocarboxylic acids, mainly PFOS, PFOA, PFHxS, PFBS, PFPeS, PFHxA and PFHpA, with PFBS being the predominant degradation product. Results are shown in Table 6. As [redacted] is the main active substance for the modification of the required surface tension of the electrolyte its degradation must be compensated by regular re-dosing as described under section 3.1.2. Considering the substance diversity of PFAS, further decomposition products may be formed. The detectability of these substances in the electrolyte matrix with very high metal concentrations is only given for the few PFAS substances mentioned.

[6] 5 ml/L of wetting agent leads to the lowest surface tension

Table 6: Degradation Studies - Measurements of PFAS present in four different conditions

	Cr(VI) bath without additional wetting agent (µg/L)	Cr(VI) bath with 5 mL/L of wetting agent (µg/L)	Bath 1 (µg/L)	Bath 2 (µg/L)
PFOS	0	0	162	13.6
PFOA	0	0	0	14.1
PFNA	0	0	0	0
PFHxS	0	0	9.28	2.16
PFBA	0	0	0	0
PFBS	0	0	13,500	2,550
PFPeA	0	0	0	0
PFPeS	0	0	22.7	4.85
PFHxA	0	0	0.762	0.535
PFHpA	0	0	1.22	0.799
PFDeA	0	0	0	0
PFHpS	0	0	0	0
PFOSA	0	0	0	0
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

3.1.6 Carry over

In the subsequent process of chrome plating, a small amount of PFAS is dragged out into the polishing machine. The concentration of PFAS in polishing water is 1.4 ppb. This water then enters the evaporator system or wastewater treatment, which treats the rinsing water for the entire system. The concentrate containing PFAS is collected and then incinerated. The purified water then has a concentration of only 0.03 ppb PFAS. The closed loop design of the coating systems ensures very low emissions to subsequent process steps.

3.2 End of life

The waste generated in the end-of-life phase through the disposal of the PFAS containing electrolyte is expected to be produced after around 12 years of use. ~100% of the PFAS containing electrolyte is considered to be disposed as hazardous waste and assumed to be incinerated.

3.2.1 Incineration

As outlined above, the electrolyte solution containing [redacted] respectively its degradation products is considered to be disposed of as hazardous waste via incineration. K.Walter estimates that the electrolyte needs to be exchanged once every twelve years. The volume of one electroplating unit ranges between [redacted] L with a target concentration of [redacted] of [redacted]. This amounts to [redacted] kg of PFAS waste once the electrolyte needs to be exchanged.

A total of 205 plating units are operated by 102 DUs within EEA. In the last 3 years the electrolyte of 25 plating units was exchanged. This means that the electrolyte of around 8.3 plating units is exchanged per year, resulting in an annual PFAS waste tonnage of 1.16 kg and is assumed to be disposed of as hazardous waste, which is incinerated.

As stated in the restriction proposal[7] (Section 1.1.5.5), the efficiency of incineration depends on numerous conditions and a complete destruction (100%) of PFAS is not expected. However, please note that the values above represent a worst-case scenario. While it is acknowledged that a small proportion of PFAS may be emitted from incineration, it would not be adequate to assume that the total waste fraction is released to the environment.

3.2.2 Landfilling

No PFAS containing waste from the use-phase is expected to end up in landfills, as all waste is considered to be incinerated.

3.2.3 Recycling

No PFAS containing waste from the use-phase is expected to go into recycling processes. Although it would be technically possible to recover PFAS it is too much effort to separate it from the other substances contained in the electrolyte solution to be economically feasible.

3.3 Summary

An overview of the material flow of PFAS ([redacted]) in the different stages of the plating process is shown in Figure 4. As mentioned in the sections above, the PFAS-containing wetting agent used by the rotogravure market in the EEA contains around ~130 kg of [redacted]. During the use phase of the wetting agent and based on the full tonnage, a

[7] https://echa.europa.eu/documents/10162/f605d4b5-7c17-7414-8823-b49b9fd43aea (last accessed 14.09.2023)

potential amount of 0.108 kg/year of [redacted] are estimated to be released via air emissions from the plating process. This means that for each plating unit, a potential emission of 0.52 g/year of [redacted] may be expected. Regarding the end-of-life phase, the electrolyte containing the wetting agent has a useful life of around 12 years. This accounts for an estimated amount of 1.16 kg of [redacted] which are disposed of via incineration every year.

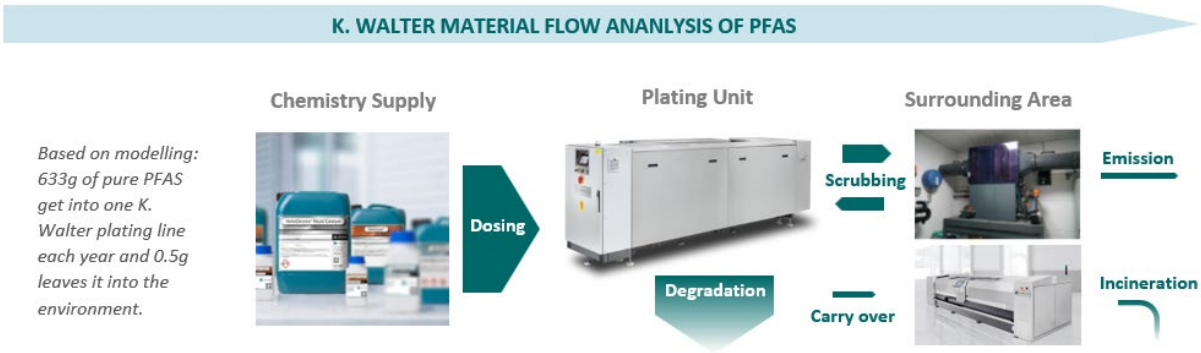


Figure 4: Material flow analysis of PFAS ([redacted]) in the hard Chrome plating process

4 SAFETY DATA SHEET

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier

Trade name	HelioChrome® Wetting Agent FF
Registration number (REACH)	not relevant (mixture)

1.2 Relevant identified uses of the substance or mixture and uses advised against

Relevant identified uses	Metal surface treatment product Industrial use

1.3 Details of the supplier of the safety data sheet

Maschinenfabrik Kaspar Walter GmbH & Co. KG
Konrad-Zuse-Bogen 18
82152 Krailling
Germany

Telephone: (+49) 089-78596-0
Telefax: (+49) 089-78596-111
e-mail: sales@kwalter.de
Website: www.kwalter.de

e-mail (competent person)	sales@kwalter.de

1.4 Emergency telephone number

Emergency information service [redacted](0)89-19240 (24h | 7d | de | en)

WF Gendorf . Telephone. +49 (0) 8679 7 - 2222. Telefax. [redacted]. This number is only for transport emergencies.

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008 (CLP)

This mixture does not meet the criteria for classification in accordance with Regulation No 1272/2008/EC.

2.2 Label elements

Labelling according to Regulation (EC) No 1272/2008 (CLP)

not required

2.3 Other hazards

of no significance

SECTION 3: Composition/information on ingredients

3.1 Substances

Not relevant (mixture)

3.2 Mixtures

Description of the mixture

This product does not meet the criteria for classification in any hazard class according to GHS.

SECTION 4: First aid measures

4.1 Description of first aid measures

General notes

Do not leave affected person unattended. Remove victim out of the danger area. Keep affected person warm, still and covered. Take off immediately all contaminated clothing. In all cases of doubt, or when symptoms persist, seek medical advice. In case of unconsciousness place person in the recovery position. Never give anything by mouth.

Following inhalation

If breathing is irregular or stopped, immediately seek medical assistance and start first aid actions. Provide fresh air.

Following skin contact

IF ON SKIN: Wash with plenty of water. Take off contaminated clothing. Preventive skin protection (barrier creams/ointments) is recommended. If skin irritation occurs: Get medical advice/attention.

Following eye contact

Remove contact lenses, if present and easy to do. Continue rinsing. Irrigate copiously with clean, fresh water for at least 10 minutes, holding the eyelids apart. If eye irritation persists: Get medical advice/attention.

Following ingestion

Rinse mouth with water (only if the person is conscious). Let water be drunken in little sips (dilution effect). Do NOT induce vomiting.

4.3 Indication of any immediate medical attention and special treatment needed

none

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media

Water spray, Alcohol resistant foam, BC-powder, Carbon dioxide (CO2)

Unsuitable extinguishing media

Water jet

5.2 Special hazards arising from the substance or mixture

Danger of bursting container.

5.3 Advice for firefighters

In case of fire and/or explosion do not breathe fumes. Co-ordinate firefighting measures to the fire surroundings. Do not allow firefighting water to enter drains or water courses. Collect contaminated firefighting water separately. Fight fire with normal precautions from a reasonable distance. Wear self-contained breathing apparatus.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

For non-emergency personnel

Remove persons to safety. Wearing of suitable protective equipment (including personal protective equipment referred to under Section 8 of the safety data sheet) to prevent any contamination of skin, eyes and personal clothing.

For emergency responders

Wear breathing apparatus if exposed to vapours/dust/spray/gases.

6.2 Environmental precautions

Keep away from drains, surface and ground water. Retain contaminated washing water and dispose of it.

6.3 Methods and material for containment and cleaning up

Advice on how to contain a spill

Covering of drains

Advice on how to clean up a spill

Wipe up with absorbent material (e.g. cloth, fleece). Collect spillage: sawdust, kieselgur (diatomite), sand, universal binder

Appropriate containment techniques

Use of adsorbent materials.

Other information relating to spills and releases

Place in appropriate containers for disposal. Ventilate affected area.

6.4 Reference to other sections

Personal protective equipment: see section 8. Incompatible materials: see section 10. Disposal considerations: see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Recommendations

- Measures to prevent fire as well as aerosol and dust generation

Use local and general ventilation. Use only in well-ventilated areas.

Advice on general occupational hygiene

Wash hands after use. Do not eat, drink and smoke in work areas. Remove contaminated clothing and protective equipment before entering eating areas. Never keep food or drink in the vicinity of chemicals. Never place chemicals in containers that are normally used for food or drink. Keep away from food, drink and animal feedingstuffs.

7.2 Conditions for safe storage, including any incompatibilities

Control of effects

Protect from sunlight. Protect from moisture. Store in a well-ventilated place. Keep container tightly closed.

- Specific designs for storage rooms or vessels

- Storage temperature

Recommended storage temperature: 5 – 30 °C

- Packaging compatibilities

Keep only in original container.

7.3 Specific end use(s)

See section 16 for a general overview.

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

This information is not available.

8.2 Exposure controls

Appropriate engineering controls

General ventilation.

Individual protection measures (personal protective equipment)

Eye/face protection

Wear eye/face protection. Use protective eyewear to guard against splash of liquids.

Skin protection

- Hand protection

Wear suitable gloves. Chemical protection gloves are suitable, which are tested according to EN 374. Check leak-tightness/impermeability prior to use. In the case of wanting to use the gloves again, clean them before taking off and air them well. For special purposes, it is recommended to check the resistance to chemicals of the protective gloves mentioned above together with the supplier of these gloves.

- Type of material

FKM: fluoro-elastomer

- Material thickness 0.5 mm

- Breakthrough times of the glove material

>60 minutes (permeation: level 3)

- Other protection measures

Take recovery periods for skin regeneration. Preventive skin protection (barrier creams/ointments) is recommended. Wash hands thoroughly after handling.

Environmental exposure controls

Use appropriate container to avoid environmental contamination. Keep away from drains, surface and ground water.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Physical state	liquid
Colour	light yellow
Odour	Onion
Melting point/freezing point	0 °C
Boiling point or initial boiling point and boiling range	100 °C
Flammability	non-combustible
Lower and upper explosion limit	not determined
Flash point	not determined
Auto-ignition temperature	not determined
Decomposition temperature	not relevant
pH (value)	<2.5 (acid)
Kinematic viscosity	not determined

Solubility(ies)

Water solubility	miscible in any proportion

Partition coefficient

Partition coefficient n-octanol/water (log value)	this information is not available

Vapour pressure	not determined

Density and/or relative density

Density	1.002 $^{g}/_{cm^3}$
Relative vapour density	information on this property is not available

Particle characteristics	not relevant (liquid)

9.2 Other information

Information with regard to physical hazard classes	hazard classes acc. to GHS (physical hazards): not relevant

Other safety characteristics

Miscibility	Completely miscible with water.

SECTION 10: Stability and reactivity

10.1 Reactivity

Concerning incompatibility: see below "Conditions to avoid" and "Incompatible materials".

10.2 Chemical stability

The material is stable under normal ambient and anticipated storage and handling conditions of temperature and pressure.

10.3 Possibility of hazardous reactions

No known hazardous reactions.

10.4 Conditions to avoid

There are no specific conditions known which have to be avoided.

10.5 Incompatible materials

There is no additional information.

10.6 Hazardous decomposition products

Reasonably anticipated hazardous decomposition products produced as a result of use, storage, spill and heating are not known. Hazardous combustion products: see section 5.

SECTION 11: Toxicological information

11.1 Information on hazard classes as defined in Regulation (EC) No 1272/2008

Test data are not available for the complete mixture.

Classification procedure

The method for classification of the mixture is based on ingredients of the mixture (additivity formula).

Classification according to GHS (1272/2008/EC, CLP)

This mixture does not meet the criteria for classification in accordance with Regulation No 1272/2008/EC.

Acute toxicity

Shall not be classified as acutely toxic.

- Acute toxicity estimate (ATE)

Oral	73,000 $^{mg}/_{kg}$
Dermal	220,000 $^{mg}/_{kg}$
Inhalation: vapour	2,200 $^{mg}/_{l}$/4h

Skin corrosion/irritation

Shall not be classified as corrosive/irritant to skin.

Serious eye damage/eye irritation

Shall not be classified as seriously damaging to the eye or eye irritant.

Respiratory or skin sensitisation

Shall not be classified as a respiratory or skin sensitiser.

Germ cell mutagenicity

Shall not be classified as germ cell mutagenic.

Carcinogenicity

Shall not be classified as carcinogenic.

Reproductive toxicity

Shall not be classified as a reproductive toxicant.

Specific target organ toxicity - single exposure

Shall not be classified as a specific target organ toxicant (single exposure).

Specific target organ toxicity - repeated exposure

Shall not be classified as a specific target organ toxicant (repeated exposure).

Aspiration hazard

Shall not be classified as presenting an aspiration hazard.

11.2 Information on other hazards

There is no additional information.

SECTION 12: Ecological information

12.1 Toxicity

Shall not be classified as hazardous to the aquatic environment.

Biodegradation

The relevant substances of the mixture are readily biodegradable.

12.2 Persistence and degradability

Data are not available.

12.3 Bioaccumulative potential

Data are not available.

12.4 Mobility in soil

Data are not available.

12.5 Results of PBT and vPvB assessment

Data are not available.

12.6 Endocrine disrupting properties

Information on this property is not available.

12.7 Other adverse effects

Data are not available.

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Sewage disposal-relevant information

Do not empty into drains. Avoid release to the environment. Refer to special instructions/safety data sheets.

Waste treatment of containers/packagings

Completely emptied packages can be recycled. Handle contaminated packages in the same way as the substance itself.

Remarks

Please consider the relevant national or regional provisions. Waste shall be separated into the categories that can be handled separately by the local or national waste management facilities.

SECTION 14: Transport information

14.1	UN number or ID number	not subject to transport regulations
14.2	UN proper shipping name	not relevant
14.3	Transport hazard class(es)	none
14.4	Packing group	not assigned
14.5	Environmental hazards	non-environmentally hazardous acc. to the dangerous goods regulations

14.6 Special precautions for user

There is no additional information.

14.7 Maritime transport in bulk according to IMO instruments

The cargo is not intended to be carried in bulk.

Information for each of the UN Model Regulations

International Maritime Dangerous Goods Code (IMDG) - Additional information

Not subject to IMDG.

International Civil Aviation Organization (ICAO-IATA/DGR) - Additional information

Not subject to ICAO-IATA.

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

Relevant provisions of the European Union (EU)

Industrial Emissions Directive (IED)

VOC content	0 %

15.2 Chemical Safety Assessment

Chemical safety assessments for substances in this mixture were not carried out.

SECTION 16: Other information

Abbreviations and acronyms

Abbr.	Descriptions of used abbreviations
ADR	Accord relatif au transport international des marchandises dangereuses par route (Agreement concerning the International Carriage of Dangerous Goods by Road)
CLP	Regulation (EC) No 1272/2008 on classification, labelling and packaging of substances and mixtures
DGR	Dangerous Goods Regulations (see IATA/DGR)
GHS	"Globally Harmonized System of Classification and Labelling of Chemicals" developed by the United Nations
IATA	International Air Transport Association
IATA/DGR	Dangerous Goods Regulations (DGR) for the air transport (IATA)
ICAO	International Civil Aviation Organization
IMDG	International Maritime Dangerous Goods Code
PBT	Persistent, Bioaccumulative and Toxic
REACH	Registration, Evaluation, Authorisation and Restriction of Chemicals
VOC	Volatile Organic Compounds
vPvB	Very Persistent and very Bioaccumulative

Key literature references and sources for data

Regulation (EC) No 1272/2008 on classification, labelling and packaging of substances and mixtures. Regulation (EC) No. 1907/2006 (REACH), amended by 2020/878/EU.

Agreement concerning the International Carriage of Dangerous Goods by Road (ADR). International Maritime Dangerous Goods Code (IMDG). Dangerous Goods Regulations (DGR) for the air transport (IATA).

Classification procedure

Physical and chemical properties: The classification is based on tested mixture.
Health hazards, Environmental hazards: The method for classification of the mixture is based on ingredients of the mixture (additivity formula).

Disclaimer

This information is based upon the present state of our knowledge. This SDS has been compiled and is solely intended for this product.