PPG Global Supplier Webinars – Contamination Prevention

Opening Remarks & Expectations

Scope

PPG Requirements for Contamination Prevention are relevant for **ALL industrial Segment: Automotive OEM, Autoparts, Packaging and Industrial Coatings and Specialty Coatings & Materials.**

Awareness

- Contamination causes & impact
- Preventive actions
- Risk Analysis

Deployment

- Disseminate this training within your organization
- Implement the best practices & preventive activities

Q&A

- Ask questions by using the Q&A.
- Questions for you will be sent using POLLS application.

WELCOME

CONTAMINATION PREVENTION

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If any question or doubt please share with us

Ver 2023

CONTAMINATION PREVENTION

IT'S TIME TO LEARN ABOUT CRATERS / CONTAMINATION AND WHY WE SHOULD ELIMINATE THEM

INTRODUCTION, KNOW THE THREAT

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P.01 Introduction, Know the threat

- ✓ Contamination that causes craters continues to be one of the biggest issues in Automotive Coatings (including plastic parts)
- ✓ Crater investigations have identified contamination sources in raw material, packages, transport, maintenance, production processes and all over the supply chain
- ✓ Awareness training is part of PPG effort in the overall contamination prevention strategy
- ✓ Craters are terrible threat, but with your help we can stop them !!!

What are craters and how are they formed ?
What is the impact of craters on our businesses ?

What is a crater ?

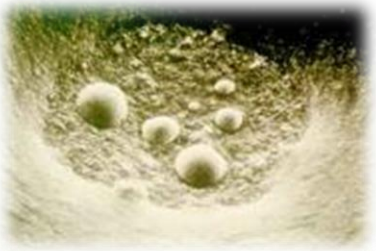
Craters are dish shape deformations in a paint surface caused by the presence of a low surface tension contaminant. It is also called a ‘fish-eye’.
The difference in the surface tension of the contaminant and the surface tension of the coating causes the paint to ‘crawl’ away from the contaminant.

Besides the unacceptable appearance, the film thickness at the crater site is below specification.

What do craters look like?

Crater with particle

Crater with particle of aluminum

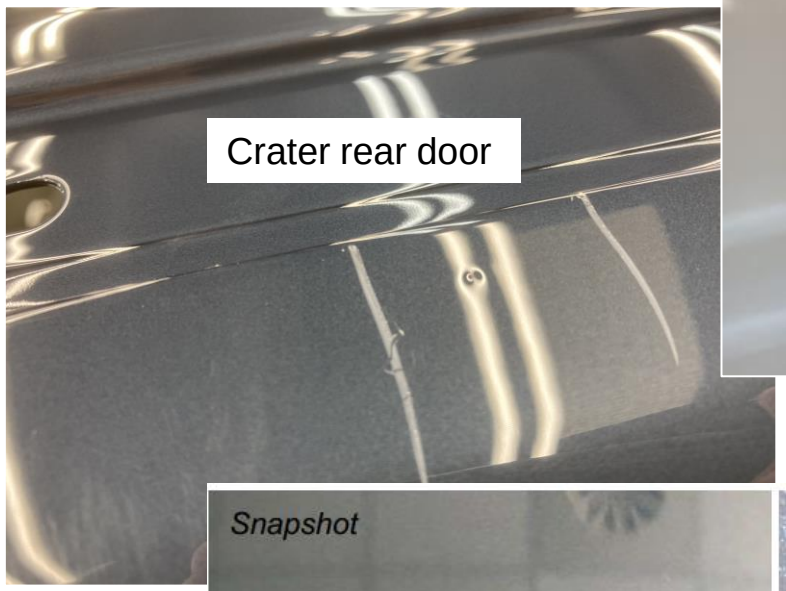


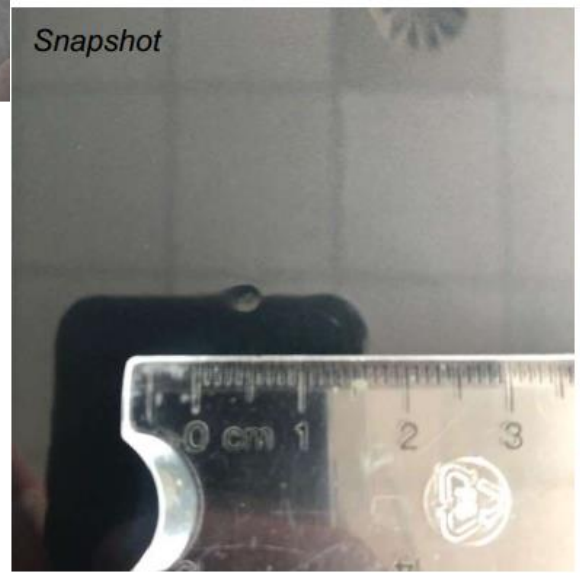
Crater contaminated with oil

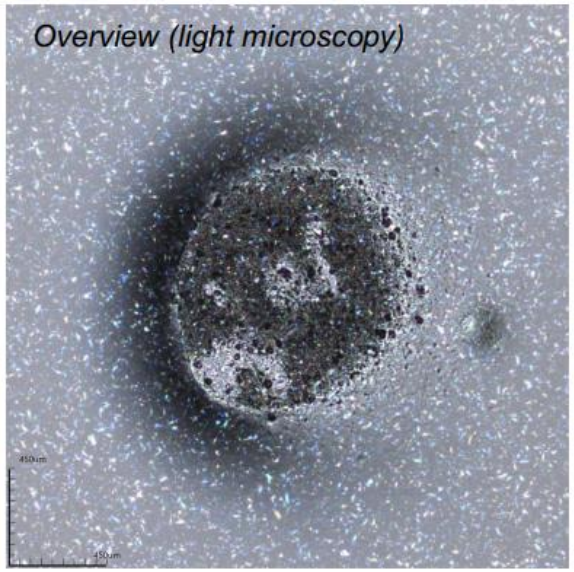
Crater from volatile contaminant

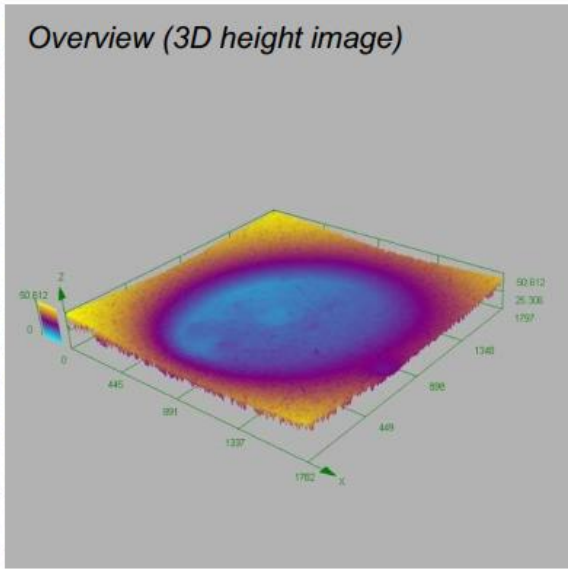
What is a crater ?

Crater front door







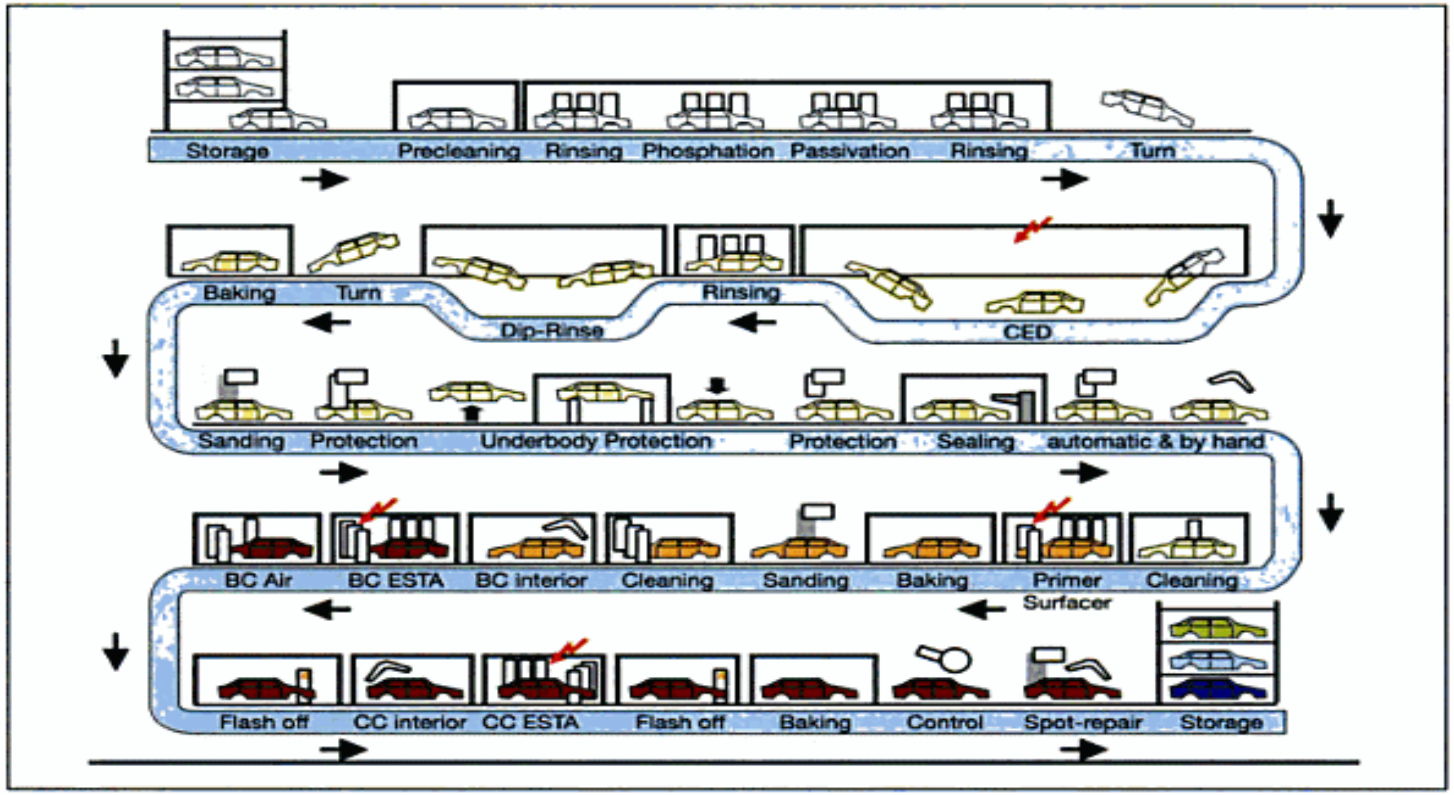


Crater contamination at an automotive site

The presence of low surface tension contaminants causes craters

Contamination could be in the paint, in the atmosphere or on the surface of the vehicles (or parts) being painted

Even very small quantities of the contaminant in the paint can cause craters - less than 0.001%



Typical stages in an OEM paint process

CONTAMINATION PREVENTION

LEARNING TO IDENTIFY CONTAMINANTS IS ESSENTIAL TO ELIMINATE CRATERS.

IDENTIFY THE CONTAMINANTS

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P.02 Identify the contaminants

Contaminant can be all over the entire supply chain

Risk Analysis and Preventive Actions is needed to stop them

Crater contaminants are a destructive threat that can be hidden in a wide range of chemicals

you must check, test and verify any chemical product before using it because, in many cases, you cannot tell if a material will cause craters by only looking at the ingredient label.

What kind of materials cause craters ?
Where would we encounter these materials ?

CHEMICAL FAMILIES THAT CAN CAUSE CRATERS & SEVERE CONTAMINATION

These are three of the key chemical families that can cause craters:

LEVEL OF THREAT:

HIGH

1. Petroleum based oils and greases

Some materials in this category cause craters, depending on the structure of the oil and the additive used to enhance the properties.

2. Detergents, defoamers and surfactants

These materials can cause craters, depending on their composition.

3. Chemical additives

Chemical additives used to enhance properties in a range of materials can contaminate products and cause craters.

LEVEL OF THREAT:
EXTREME

These two chemical families can cause SEVERE craters. Therefore, they are our greatest enemies:

1. Silicones (polysiloxanes)

Polysiloxanes are popular ingredients in a large range of maintenance materials, release agents, personal care products (lotions, anti-perspirants, hair gels, etc.).

These silicones can be hidden in ourselves!
Also Poly-di-methyl-siloxane (PDMS) based additives have caused craters.

2. Perfluoropolyethers (PFPE)

Polytetrafluoroethylene (PTFE) is a synthetic fluoropolymer of tetrafluoroethylene that has numerous applications. The best known brand name of PTFE-based formulas is Teflon™

They are typically used in high temperature greases.

WHERE DO WE ENCOUNTER THESE CONTAMINANTS?

MAINTENANCE MATERIALS

Maintenance and engineering areas depend on the use of a wide range of oils, greases, waxes and chemical compounds that have a low surface tension to keep the machines running

LUBRICANTS

Agitator gear boxes, liquid valves.

SEALANTS

Valve connections or gauge/regulator fittings.

CUTTING OILS

Cutting steel in the fabrication and repair of equipment.

ADHESIVES

Used to cement equipment pieces together.

But not all maintenance materials cause craters, we must test them before using them near to raw materials or the paint to secure the processes free of contamination

CONSUMABLES MATERIALS

GASKETS

Used in fittings to connect hoses, valves, etc.

RUBBER BANDS (LARGE SIZE)

Used to secure plastic covers on portable tanks or to secure empty drums on a skid.

NITRILE GLOVES

Used in both production and laboratories.

DRUM FAUCETS

Used to draw liquids from containers.

But we can trust in the products made by blow molding, where cold air is used to chill and help release the part from the mold, therefore no release agents are used. *Example: plastic drums and IBC (plastic totes).*

All molded or extruded products can be a **source of contamination** since their production involves the use of **silicones (one of our greatest enemies!)** as release agents in the extruder to allow a smooth release of the tubes.

Consumables materials used in manufacturing, re-packaging and at our Supplier / customer sites, **they are a potential threat due to the "risky" materials for contamination used in their production.**

FILTERS

Filament and cartridge type filter media used to strain liquids.

Silicone infuse thread use to sew sides of filter bag.

Recycled material used to fabricate the filter media.

PACKING

Braided pump packing.

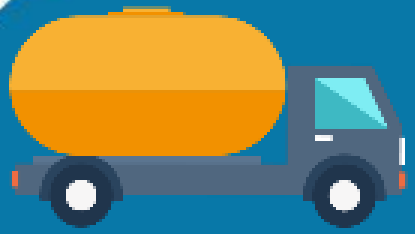
Some brands are coated with s
PTFE.

Threat: Dangerous materials used in the production process of the filters and packing.

ROAD TANKERS OR TANK WAGONS USED FOR BULK TRANSPORT

If the wagons are not dedicated then the prior contents (solvents, resins, ….) can become crater contaminants.

Hoses, fittings, gaskets, valves associated with the wagons can potentially be contaminated – if new or not cleaned properly.



Tank Wagons/Road Tankers Delivering Non-Solvents

- **Dedicated wagons are recommended where possible**
- **If the wagon is NOT dedicated, then wagon selection based on prior content is critical**
- **Use of an EFTCO or approved by PPG cleaning station is also mandatory**
- **PPG's Prohibited Prior Contents list must be adhered to when selecting the wagon**

  - Oils & Greases - Materials with Low Surface Tension Additives - ……..

  (See Supplier Quality Requirements SQR07)

EFTCO = European Federation of Tank Cleaning Organizations

STEEL TOTES

Craters have come from contaminated residue that was not rinsed adequately during the cleaning process.

STEEL DRUMS AND PAILS

Additives used in the lining of a pail or drum have leached into PPG products and caused craters.

THREAT:

- New container lining not tested before approval.
- Grease , oils …..non approved in the drums & pails production lines
- Deep clean of the tank, steel totes ,…… is not executed.

PERSONNEL RELATED SOURCES

Contaminants can be anywhere, even in ourselves!

That’s why we must be extra careful of the products we use:

- Personal Hygiene products: *Lotions, deodorants, hair sprays, etc.*
- Lens cleaners
- Gloves and work wear fabrics.

CONTAMINATION PREVENTION

NOW THAT YOU KNOW
TO IDENTIFY
CONTAMINANTS. IT'S
TIME TO ELIMINATE THEM

ELIMINATE THE CONTAMINANTS

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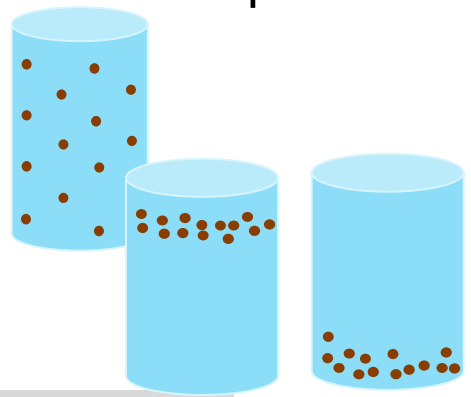
P.03 Eliminate the contaminants

Everything would be easier if we could test the paint for craters !!!, we can but …. There are some problems

We need a homogeneous sample, is the contaminant evenly distributed ? We do our best to take representative samples when we check for contamination, but we don't know if we have complete homogeneity

We try to emulate our customer's line by spraying the sample of paint with similar application parameters. But all crater checking is DESTRUCTIVE TESTING – the paint is consumed in the test.

With the homogeneity question and the reality of destructive testing, we must focus very heavily on CONTAMINATION PREVENTION!

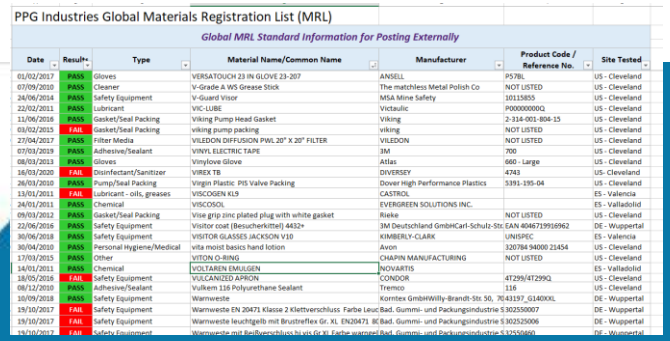


How do we prevent crater causing contamination ?
What controls will reduce the risk ?

MAINTENANCE CONTROLS

SUPPLIER SITES

Our suppliers shall have the same quality standards that PPG applies indoors; they must be informed of any actualization in the Materials Registration List (MRL) of approved products and chemicals.


PPG Industries Global Materials Registration List (MRL)

Global MRL Standard Information for Posting Externally

Date	Result*	Type	Material Name/Common Name	Manufacturer	Product Code / Reference No.	Site Tested
01/02/2017	PASS	Gloves	VERSATOUCH 23 IN GLOVE 23-207	ANSELL	2578L	US - Cleveland
07/09/2010	PASS	Cleaner	V-Grade A WS Grease Stick	The matchless Metal Polish Co	NOT LISTED	US - Cleveland
26/06/2014	PASS	Safety Equipment	V-Guard Visor	MSA Mine Safety	10115855	US - Cleveland
22/02/2011	PASS	Lubricant	VIC-LUBE	Victaulic	P00000000Q	US - Cleveland
11/06/2016	PASS	Gasket/Seal Packing	Viking Pump Head Gasket	Viking	2-314-001-804-15	US - Cleveland
03/02/2015	FAIL	Gasket/Seal Packing	viking pump packing	viking	NOT LISTED	US - Cleveland
27/04/2017	PASS	Filter Media	VILEDON DIFFUSION PWL 20" X 20" FILTER	VILEDON	NOT LISTED	US - Cleveland
07/03/2019	PASS	Adhesive/Sealant	VINYL ELECTRIC TAPE	3M	700	US - Cleveland
08/03/2013	PASS	Gloves	Vinylove Glove	Atlas	660 - Large	US - Cleveland
16/03/2020	FAIL	Disinfectant/Sanitizer	VIREX TB	DIVERSEY	4743	US- Cleveland
26/03/2010	PASS	Pump/Seal Packing	Virgin Plastic PIS Valve Packing	Dover High Performance Plastics	5391-195-04	US - Cleveland
13/01/2011	FAIL	Lubricant - oils, greases	VISCOGEN KL9	CASTROL		ES - Valencia
24/01/2011	PASS	Chemical	VISCOSOL	EVERGREEN SOLUTIONS INC.		ES - Valladolid
09/03/2012	PASS	Gasket/Seal Packing	Vise grip zinc plated plug with white gasket	Rieke	NOT LISTED	US - Cleveland
22/06/2016	PASS	Safety Equipment	Visitor coat (Besucherkittel) 4432+	3M Deutschland GmbHCarl-Schulz-Ste	EAN 4046719916962	DE - Wuppertal
30/08/2018	PASS	Safety Equipment	VISITOR GLASSES JACKSON V10	KIMBERLY-CLARK	UNISPEC	ES - Valencia
30/04/2010	PASS	Personal Hygiene/Medical	vita moist basics hand lotion	Avon	320784 94000 21454	US - Cleveland
17/03/2015	PASS	Other	VITON O-RING	CHAPIN MANUFACTURING	NOT LISTED	US - Cleveland
14/01/2011	PASS	Chemical	VOLTAREN EMULGEN	NOVARTIS		ES - Valladolid
18/05/2016	FAIL	Safety Equipment	VULCANIZED APRON	CONDOR	4T299/4T299Q	US - Cleveland
08/12/2010	PASS	Adhesive/Sealant	Vulkem 116 Polyurethane Sealant	Tremco	116	US - Cleveland
10/09/2018	PASS	Safety Equipment	Warnweste	Korntex GmbHWilly-Brandt-Str. 50, 7	43197_G1400XXL	DE - Wuppertal
19/10/2017	FAIL	Safety Equipment	Warnweste EN 20471 Klasse 2 Klettverschluss Farbe Leuc	Bad. Gummi- und Packungsindustrie S	302530007	DE - Wuppertal
19/10/2017	FAIL	Safety Equipment	Warnweste leuchtgelb mit Brustreflex Gr. XL EN20471	BE Bad. Gummi- und Packungsindustrie S	302525006	DE - Wuppertal
19/10/2017	FAIL	Safety Equipment	Warnweste mit Reißverschluss hi vis Gr XL Farbe warngel	Bad. Gummi- und Packungsindustrie S	32559600	DE - Wuppertal

Green and Red stickers are used as visual aids in the Maintenance Stores

ASK TO FULFILL 3 SIMPLE STEPS:

1. Supplier compiles list of maintenance and production materials on site.
2. Supplier validates each material against PPG's MRL.
3. If…

NOT ON LIST:
Test or send sample to PPG for testing.

ON LIST- PASS:
Add to internal approved list and mark them with approved stickers.

ON LIST-FAIL:
Eliminate or use with restrictions (away from product processes).

Each supplier site must develop its own internal list of materials that can be used in PPG related processes and use visual aids, like approved stickers, to inform their employees.

MAINTENANCE CONTROLS FOR EQUIPMENT

All new or repaired equipment or parts in the production areas must be pre-cleaned and purged with solvent, afterwards the solvent rinse must be tested for craters.

FOLLOW 3 EASY STEPS:

1. New equipment purchased for use in the production area, like valves, is locked in a quarantine cabinet.
2. Work orders are used to ensure that each new equipment is cleaned in solvent followed by testing for craters.
3. Once approved, the equipment is bagged and tagged as ready for use.

Approved pump

Approved valve

REMEMBER: ALL new or repaired equipment must be cleaned, purged and tested BEFORE being used in the production processes.

CONTROLS FOR TOTES AND CONTAINERS

STEEL TOTES

FOLLOW 3 EASY STEPS:

Tote cleaning sites are audited every year.

All maintenance materials used must be tested and approved.

Before filled with paint, totes are sampled and tested for craters

REMEMBER: Samples can be tricky, we must be alert for any threat.

STEEL DRUMS AND PAILS

Recycled drums & pails are prohibited.

All new containers types and interior liner formulations must be tested and approved.

Drum and pail suppliers are audited on a regular basis.

BULK TRANSPORT CONTROLS

PRIOR CONTENTS

All road tanker or tank wagon carriers for PPG (inbound or outbound) must adhere to our prior loads contents rules.

Prohibited prior contents have been identified and published for our suppliers and carriers.

Cleaning station shall be **EFTCO** approved (or PPG approved)

CLEANING

Cleaning sites and procedures must **be audited on a regular basis.** EFTCO approved in EMEA

EFTCO = European Federation of Tank Cleaning Organizations

SAMPLING AND TESTING

Inbound solvent and resin wagons are **sampled and tested for contamination**

Any wagon with a fail result in **craters or cleanliness will be rejected**

HOUSEKEEPING

Housekeeping is crucial to reduce the risk of crater contamination in our sites

Control of dirt, oils, greases must be built into site procedures.

Housings, connectors, ducts, filters and pipes should be kept clean

But before applying any cleaning procedure we must:

Check that the cleaning procedures are validated as effective.

Check if the equipment is dedicated by compatible technology

Verify that the cleaning products are approved

FOR CRITICAL PRODUCTS EQUIPMENT, RINSES MUST BE TESTED FOR CRATERS

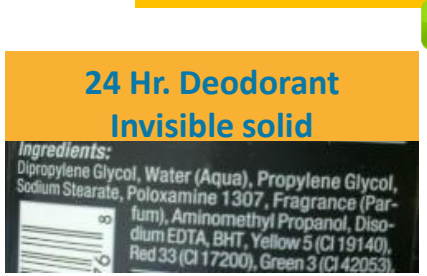
PERSONNEL RELATED CONTROLS

PERSONAL CARE PRODUCTS, WORKWEAR & FOOD

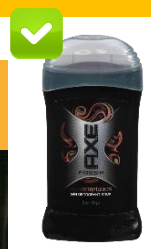
PERSONAL CARE

As we have said before, crater contaminants are a deceivious threat that can hide in our selves. That's why each process should be assessed for risks related to operators' personal care products.

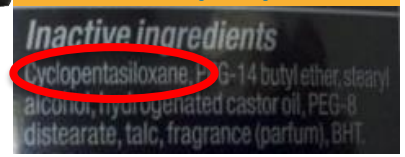
CHECK OUT THIS EXAMPLE:



24 Hr. Deodorant Invisible solid



24 Hr. Deodorant stick and anti-perspirant



CRATER

All employees involved in production areas must verify that their personal care products are approved. You can't just trust in the brand, each product must be verified.

WORKWEAR

Our workwear meets two objectives: protecting ourselves and protecting our products. That's why we must ensure:

- The workwear is clean and in good condition.
- All new uniforms are tested and approved.
- In some cases, new uniforms should be pre-washed to remove any traces of silicc from the threads used for sewing the garment.
- Lint free suits are worn in application areas.

FOOD

For your own safety and the safety of the products:

NEVER CONSUME FOOD IN PRODUCTION AREAS

Do not risk getting poisoned or causing a crater contamination:

- Hands should be washed PRIOR to eating for safety reasons.
- Hands should be washed AFTER eating to avoid crater contamination.

10 GOLDEN RULES

10 GOLDEN RULES

1

I follow the crater prevention process and procedures. Crater risk assessment check list used

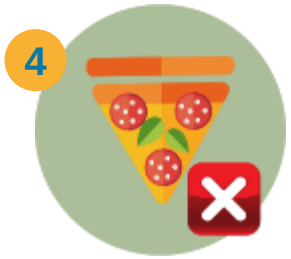
2

I do not enter any material in productive areas without prior authorization and "free of crater" approval.

3

I always use approved work-wear in areas of production, laboratories and applications.

4



I do not introduce food to the productive areas.

5

I only use personal hygiene products approved as crater-free.

6

I work with order and cleanliness.

7

I check the contamination risk assessment is done in my working area

8

I do not use makeup, cosmetics, …in productive areas.

9

I strictly follow the procedures for the handling of silicone containing materials.

10

I report deviations from procedures or possible problems that may put the quality of the products at risk.

CONTAMINATION PREVENTION

NOW THAT YOU KNOW WHAT IS NECESSARY TO ELIMINATE CONTAMINATION / CRATERS. LET'S PUT IT INTO PRACTICE

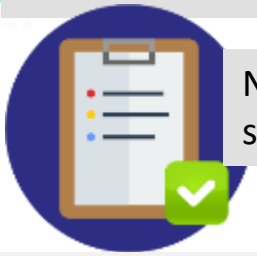
REVIEW AND CHECK YOUR ABILITIES

SUMMARY

PPG We protect and beautify the world™

Crater defects in paints cost millions of dollars and are caused by the presence of low surface tension contaminants.

Prevention is key - upstream at our suppliers and entire supply chain



Numerous controls are needed for a strong prevention strategy.

Detection of contaminated product is difficult.

Summary / Actions :

- Housekeeping is key to optimizing cleanliness levels
- Strong oversight is needed for bulk transport
- Packaging must be free of contamination
- If using silicones, measures must be in place to prevent cross-contamination
- Each site should have an internal list of approved maintenance materials and consumables (refer to PPG's MRL for test results)
- All new or repaired equipment and parts in direct contact with PPG related materials must be pre-cleaned before putting in service
- For non-dedicated processing vessels, mills, piping, pumps, etc., thorough cleaning is required between batches of different products to prevent cross-contamination
- Minimize contamination risk with personnel awareness and policies – work wear, personal care products, food in the workplace.
- Employees are well trained and understand the contamination prevention actions / procedures

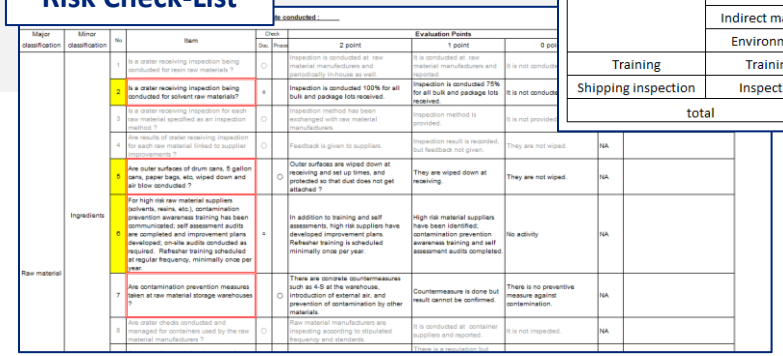
Risk Assessment - Contamination

Risk Assessment – Key topics:

- Risk analysis up-stream since developing / creating new materials or modifying existing one to be delivered to PPG
- Risk analysis by production process / area
- Integrate those assessments in existing ones (e.g. food contamination risk assessment, ISO risk, ……)
- Use D / P-FMEA where is possible

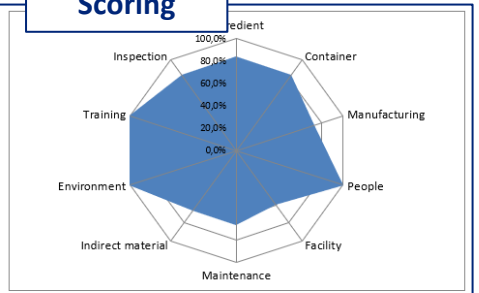
- Check-list with audits on shop floors to identify opportunities
- Tracking scoring
- Action plan to eliminate risk
- Effectiveness of the action plans

Risk Check-List



Scoring

Major classification	Minor classification	point	full point	point (%)
Raw material	Ingredient	5	6	83,3%
	Container	5	6	83,3%
Process	Manufacturing	16	22	72,7%
	People	4	4	100,0%
	Facility	6	10	60,0%
	Maintenance	4	6	66,7%
	Indirect material	4	6	66,7%
	Environment	4	4	100,0%
Training	Training	4	4	100,0%
Shipping inspection	Inspection	5	6	83,3%
total		57	74	77,0%



CONTAMINATION PREVENTION

END

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If any question or doubt please share with us

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