ES FOR COMMUNICATION

Substance Name: C. I. Pigment Yellow 34

EC Number: 215-693-7

CAS Number: 1344-37-2

Registration Number: 01-2119502446-46-0003

Date of Generation/Revision: 14/09/2016

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Use 1: Distribution and mixing pigment powder in an industrial environment into solvent-based paints for non-consumer use

Authorisation Number: REACH/16/3/0

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Reader guide

Pigment Yellow 34 (PY.34) and Pigment Red 104 (PR.104) are restricted to industrial and professional uses within the paints/coatings and plastics sector as listed in the exposure scenarios (ES) for communication. The pigments must not be used for decorative coatings, children's articles (including toys, paints, jewelry and equipment), consumer products, printing inks for consumer products, food and food packaging, drugs and medical devices, ceramics and glassware, cosmetics and tattoos.

This document provides an overview of activities or contributing scenarios (CS) and exposure scenarios (ES) related to:

Use 1: Formulation of paints

- ES 1: Formulation; Distribution and mixing pigment powder in an industrial environment into solvent-based paints for non-consumer use.

Similar documents are also available for the following activities:

Use 2: Industrial use of paints (including service life)

- ES 2: Use at industrial site; Industrial application of paints on metal surfaces (machines, vehicles, structures, signs, road furniture, coil coating).
- ES 4: Service life (worker at industrial site); Service life of coated articles.

Use 3: Professional use of paints (including service life) including road marking

- ES 3: Use by professional worker; Professional, non-consumer application of paints on metal surfaces (machines, vehicles, structures, signs, road furniture) or as road marking.
- ES 5: Service life (professional worker); Service life of coated articles.

Use 4: Formulation of plastics

- ES 6: Formulation; Distribution and mixing pigment powder in an industrial environment into liquid or solid premix to colour plastic/plasticised articles.

Use 5: Industrial use of plastics (including service life and the use of plastic covered materials and articles)

- ES 7: Use at industrial site; Use of colour premixes and pre-compounds to colour plastic or plasticised articles for non-consumer use.
- ES 9: Service life (worker at industrial site); Service life of coloured plastic or plasticised articles.

Use 6: Professional use of plastics (including service life) including hotmelt road marking

- ES 8: Use by professional worker; Use of colour premixes and pre-compounds in the application of hotmelt road marking.
- ES 10: Service life (professional worker); Service life of coloured plastic or plasticised articles.

DCC in collaboration with its customers, identified the various exposure scenarios for each of these uses throughout the supply chain. This document serves to highlight the recommended operational conditions and risk management measures for the above uses to ensure these pigments are handled in a safe and responsible manner.

The risk management measures and operational conditions may vary from site to site; however, the objective is to achieve the DMELs assigned to these pigments (see section 4 of eSDS & section 8 of SDS). Each site handling PY.34 and PR.104 must ensure workplace exposures are adequately controlled and proper risk assessments are carried out regularly.

Prior to using DCC PY.34 and PR.104, it is important to verify that the intended use of these pigments falls within the scope of the permitted uses as described within this document and that the listed measures are in place to protect the worker and the environment.

This Appendix to the Safety Data Sheet (SDS) lists the operational conditions and risk management measures that are required for the use of DCC PY.34 under Use 1: Formulation of paints. The details are summarised in Section 1.

The Workplace Instruction Cards (WICs) contained within Section 2 of this document are guidelines for specific worker functions. These WICs are intended to be posted or readily accessible at the various worker stations.

The detailed explanations of the conditions of use, exposure scenarios (ES) and relevant contributing scenarios (CS) are contained within Section 3 and Section 4. These sections provide important information on the risk management measures, how to implement them and how to ensure their effectiveness.

Finally, the Appendix is the risk management measures and operational conditions verification form, to be completed for each worker handling or using DCC PY.34 or PR.104. The form needs to be completed with data on biomonitoring (blood lead) and air monitoring for each worker which is in line with the requirements of the final authorisation decision (Commission Implementing Decision C(2016) 5644 of 07.09.2016).

It is recommended to provide DCC with a copy of the completed Verification of DCC PY.34 & PR.104 RMM and OC forms on an annual basis, every March summarising the results of previous year. This form can also be the basis for the submission requirement to ECHA.

1. Summary of related worker functions

This section summarizes the worker functions that were identified within the use applied for. The table further indicates the specific activities that a worker is expected to perform within the defined function and the technical, organisational and risk management measures that are applicable for that worker. This section can be used to quickly identify the requirements as set for your workers to work safely. Also it enables you to directly refer to the applicable Workplace Instruction Card (WIC) in Section 2, using the "WICxx" code.

Table 1 provides an overview of activities (contributing scenarios) that are covered for Use 1. The activities are grouped per function. The table contains the following information:

- Tasks: a short description of the contributing scenario. Please refer to Section 4 of this Annex to the SDS for a further explanation on the contributing scenarios.
- Process category (PROC): a description of the activity in terms of the ECHA use descriptor system.
- Technical risk management measures (RMM) to be implemented per function for safe use. Please refer to Section 3 of this Annex to the SDS for a further explanation on the measures.
- Organisational risk management measures (RMM) to be implemented per function for safe use. The maximum duration per week is represented for each scenario and function.
- Personal protective equipment (PPE): the minimum respiratory protective equipment to be used per function for safe use. Generic information on the use of gloves is included in Section 3 of this Annex to the SDS.

Please note the prescribed risk managment measures shown in Table 1 are for guidance where the overall objective is to achieve the required DMELs.

Table 1. Overview of tasks per function for Use 1 (ES1)

Function	Workplace instruction card (WIC)	Contributing scenario (CS)	Tasks (description of Contributing Scenario)	Process category (PROC)	Technical RMM			Organisational RMM	RPE
					Containment of source	Personal enclosure (PE) / segregation (SEG)	Local exhaust ventilation (LEV)	Maximum hours per week	Minimum Respiratory protective equipment (APF[1])
Operator / Formulator	**WIC01**	**CS4** **or** **CS5**	Manual dosing of pigment powder **or** Automated dosing of pigment powder	PROC-8a **or** PROC-8b	 Y	- Y (SEG)	Y Y	6 10	40 -
		CS7	Mixing of pigment paste	PROC-5	Y			18	-
		CS10	Cleaning of vessel with solvent	PROC-10	Y			6	20
		CS12 **or** **CS13**	Pigment paste charging/discharging by gravity or manual handling or Pigment paste charging/discharging using a dedicated installation	PROC-8a **or** PROC-8b				9 9	- -
		CS20	Dried pigment paint cleaning	PROC-21				1	10
			Total					**40[2]**	
Lab worker / Quality control	**WIC02**	**CS3**	Pigment powder quality control / lab work	PROC-15			Y	10	-
		CS11	Pigment paste testing by smearing	PROC-10				9	-
		CS21	Spray testing of pigment paint in industrial booth	PROC-7			Y (spray room)	3	400
		CS22	Pigment paint testing by brushing/rolling	PROC-10			Y	6	-
		CS23	Pigment paste or paint laboratory operations	PROC-15			Y	12	-
			Total					**40**	
General worker	**WIC03**	**CS2**	Delivery, storage and handling of closed bags with pigment powder	PROC-3				10	-
		CS8	Storage of pigment paste / Transfer of pigment paste through closed piping	PROC-2	Y			15	-
		CS9	Manual cleaning / scraping of mixing vessels, equipment	PROC-21				3	10

[1]Level of respiratory protection that can realistically be expected to be achieved in the workplace by 95% of adequately trained and supervised wearers using a properly functioning and correctly fitted respiratory protective device.

[2]The limit value for the two pigments is based on an exposure duration of 40 hours per working week. Therefore the maximum duration for any function is 40 even though for this function the summed duration per task can be over 40 hours.

Function	Workplace instruction card (WIC)	Contributing scenario (CS)	Tasks (description of Contributing Scenario)	Process category (PROC)	Technical RMM			Organisational RMM	RPE
					Containment of source	Personal enclosure (PE) / segregation (SEG)	Local exhaust ventilation (LEV)	Maximum hours per week	Minimum Respirator y protective equipment (APF[1])
			and lids						
		CS10	Cleaning of vessel with solvent	PROC-10	Y			6	20
		CS19	Equipment cleaning: scraping and brushing	PROC-10	Y			5	10
		CS20	Dried pigment paint cleaning	PROC-21				1	10
			Total					**40**	
Repackager	**WIC04**	**CS6**	Re-packaging of pigment powder	PROC-9	Y	Y (SEG)		8	-
		CS14	Pigment paste filling into drums/cans at a filling line	PROC-9				32	-
			Total					**40**	
Mixing and blending operator	**WIC05**	**CS15** **or** **CS16**	Mixing colour paste in closed drum mixing machine with automated dosing of paste **or** Mixing colour paste into paint in closed mixing vessel	PROC-2 **or** PROC-3	Y Y			40 40	- -
Paint filling operator	**WIC06**	**CS17** **or** **CS18**	Pigment paint filling into drums/cans at a filling line **or** Pigment paint charging/discharging using a dedicated installation	PROC-9 **or** PROC 8b		Y (SEG) Y (SEG)	Y Y	40 40	- -

2. Workplace Instruction Cards

This section contains the applicable Workplace Instruction Cards (WIC) for this use. These cards describe the risk management measures from a worker point of view. It lists all the risk management measures that need to be in place to allow the worker to perform his tasks with the pigments safely. It is recommended to provide these documents to your workers and implement the use in their daily routine to ensure responsible handling of DCC PY.34 and PR.104.

The WICs contain information on the following:

- Organisational measures: maximum duration of use per week.
- Risk management measures: technical and personal, including the minimum Assigned Protection Factor (APF) for respiratory protective equipment (RPE).
- Good practice advice.
- Hazard properties of the substance: signal words, hazard symbols and hazard statements.

In the WIC, the APF's were consolidated wherever possible to reduce the different respirators required at hand. The exact values needed can be found in Table 1 and Section 4 of this document. In case of consolidation of RPE for a worker with multiple activities, we selected the highest APF. The pictures of respirators are exemplary.

Note: prior to working with PY.34 and PR.104, ensure workers have completed:

- Proper training on the risk of the substances.
- Proper training on the use and maintenance of personal protective equipment.
- Fit testing of RPE.
- Medical fitness test.

WORKPLACE INSTRUCTION CARD 1 (WIC01)
Version 1.0

OPERATOR / FORMULATOR
Preparation of pigment paste containing DCC PY.34 / PR.104 in an industrial setting

<table>
<tr><td colspan="3">Operational conditions and risk management measures needed to ensure worker protection</td></tr>
<tr><td>Maximum duration</td><td colspan="2">Total 40 hours per week</td></tr>
<tr><td colspan="3">Risk management measures (RMM)</td></tr>
<tr><td rowspan="4">Technical RMM</td><td colspan="2">Closed vessel: Mixing and dispersing</td></tr>
<tr><td colspan="2">Local Exhaust Ventilation (LEV), fixed capturing hood: dosing pigment powder (both automated and manual)</td></tr>
<tr><td colspan="2">Segregated area: Automated dosing equipment</td></tr>
<tr><td colspan="2">Good general ventilation: 3 air changes per hour</td></tr>
<tr><td rowspan="5">Conditions and measures related to personal protection equipment (PPE), hygiene and health evaluation</td><td>Full face mask fitted with P3 filter, minimum assigned protection factor 40
• Manual dosing of pigment powder</td><td>  </td></tr>
<tr><td>Half face mask P3, minimum assigned protection factor 20:
• Cleaning of vessel with solvent</td><td rowspan="2">  </td></tr>
<tr><td>Half face mask P2, minimum assigned protection factor 10:
• Dried pigment paint cleaning</td></tr>
<tr><td colspan="2">A powered respirator is needed, if a respirator is used for more than 60 minutes at a time</td></tr>
<tr><td colspan="2">Use chemically impervious gloves; take into account other substances used (e.g. solvents)</td></tr>
<tr><td colspan="3">Good practice advice (please refer to SDS section 1-16 for additional information)</td></tr>
<tr><td></td><td>Do not eat, drink or smoke at workplace
Wash hands after use</td><td>  </td></tr>
<tr><td>Environmental Measures/Spillage instructions</td><td colspan="2">For powder: Vacuum with industrial vacuum cleaner fitted with HEPA filter, dispose of dust bag as hazardous waste
For paints or pastes: Use gloves. Scoop up and store in suitable container. Absorb residual material. Flush spill area with water spray. Do not flush to sewer. Prevent run-off from entering drains, sewers or waterways. Dispose of collected material as hazardous waste. Dispose of contents/container in accordance with local, national and international regulation</td></tr>
<tr><td colspan="3">Properties of the substance, hazard and precautionary statements</td></tr>
<tr><td>Signal word
& hazard symbols</td><td>Danger</td><td>  </td></tr>
<tr><td>Hazard statements</td><td colspan="2">H317: May cause an allergic skin reaction
H334: May cause allergy or asthma symptoms or breathing difficulties if inhaled
H350: May cause cancer
H360Df: May damage the unborn child. Suspected of damaging fertility
H373: May cause damage to organs through prolonged inhalation
H410: Very toxic to aquatic life with long lasting effects</td></tr>
</table>

WORKPLACE INSTRUCTION CARD (WIC02)
Version 1.0

LAB AND QUALITY CONTROL WORKER
Laboratory and quality control activities with paste or paint containing DCC PY.34 / PR.104 in an industrial setting

<table>
<tr><td colspan="3">Operation conditions and risk management measures needed to ensure worker protection</td></tr>
<tr><td>Maximum duration</td><td colspan="2">Total 40 hours per week</td></tr>
<tr><td colspan="3">Risk management measures (RMM)</td></tr>
<tr><td rowspan="3">Technical RMM</td><td colspan="2">Fume cupboard for laboratory work</td></tr>
<tr><td colspan="2">Spray booth for spraying of paint</td></tr>
<tr><td colspan="2">Good general ventilation: 3 air changes per hour</td></tr>
<tr><td rowspan="2">Organisational RMM and working practices</td><td colspan="2">Careful handling of powdered pigment</td></tr>
<tr><td colspan="2">Only spray downward or horizontally</td></tr>
<tr><td rowspan="2">Conditions and measures related to personal protection equipment (PPE), hygiene and health evaluation</td><td>Demand valve breathing apparatus with positive pressure self-contained demand – full face mask, minimum assigned protection factor of 400:
• Spray paint testing</td><td>  </td></tr>
<tr><td colspan="2">Use chemically impervious gloves; take into account other substances used (e.g. solvents)</td></tr>
<tr><td colspan="3">Good practice advice (please refer to SDS section 1-16 for additional information)</td></tr>
<tr><td></td><td>Do not eat, drink or smoke at workplace
Wash hands after use</td><td>  </td></tr>
<tr><td>Environmental Measures/Spillage instructions</td><td colspan="2">For powder: vacuum with industrial vacuum cleaner fitted with HEPA filter, dispose of dust bag as hazardous waste
For paints or pastes: Use gloves. Scoop up and store in suitable container. Absorb residual material. Flush spill area with water spray. Do not flush to sewer. Prevent run-off from entering drains, sewers or waterways. Dispose of collected material as hazardous waste. Dispose of contents/container in accordance with local, national and international regulation</td></tr>
<tr><td colspan="3">Properties of the substance, hazard and precautionary statements</td></tr>
<tr><td>Signal word
& hazard symbols</td><td>Danger</td><td>  </td></tr>
<tr><td>Hazard statements</td><td colspan="2">H317: May cause an allergic skin reaction
H334: May cause allergy or asthma symptoms or breathing difficulties if inhaled
H350: May cause cancer
H360Df: May damage the unborn child. Suspected of damaging fertility
H373: May cause damage to organs through prolonged inhalation
H410: Very toxic to aquatic life with long lasting effects</td></tr>
</table>

WORKPLACE INSTRUCTION CARD (WIC03)
Version 1.0

GENERAL WORKER
Handling of bagged DCC PY.34 / PR.104 pigment powder, work with closed systems containing working with pigment coloured pastes in closed systems and cleaning of equipment in an industrial setting

<table>
<tr><td colspan="3">Operation conditions and risk management measures needed to ensure worker protection</td></tr>
<tr><td>Maximum duration</td><td colspan="2">Total 40 hours per week</td></tr>
<tr><td colspan="3">Risk management measures (RMM)</td></tr>
<tr><td rowspan="3">Technical RMM</td><td colspan="2">Handling of closed bags</td></tr>
<tr><td colspan="2">Closed piping: Transferring of pastes</td></tr>
<tr><td colspan="2">Good general ventilation: 3 air changes per hour</td></tr>
<tr><td rowspan="4">Conditions and measures related to personal protection equipment (PPE), hygiene and health evaluation</td><td>Half face mask P3,
minimum assigned protection factor 20:
• Cleaning of vessel with solvent</td><td rowspan="2">  </td></tr>
<tr><td>Half face mask P2,
minimum assigned protection factor 10:
• Manual cleaning / scraping of mixing vessels, equipment and lids
• Dried pigment paint cleaning</td></tr>
<tr><td colspan="2">A powered respirator is needed, if a respirator is used for more than 60 minutes at a time</td></tr>
<tr><td colspan="2">Use chemically impervious gloves; take into account other substances used (e.g. solvents)</td></tr>
<tr><td colspan="3">Good practice advice (please refer to SDS section 1-16 for additional information)</td></tr>
<tr><td rowspan="2"></td><td>Do not eat, drink or smoke at workplace</td><td rowspan="2">  </td></tr>
<tr><td>Wash hands after use</td></tr>
<tr><td>Environmental Measures/Spillage instructions</td><td colspan="2">Use gloves. Scoop up and store in suitable container. Absorb residual material. Flush spill area with water spray. Do not flush to sewer. Prevent run-off from entering drains, sewers or waterways. Dispose of collected material as hazardous waste. Dispose of contents/container in accordance with local, national and international regulation</td></tr>
<tr><td colspan="3">Properties of the substance, hazard and precautionary statements</td></tr>
<tr><td>Signal word
& hazard symbols</td><td>Danger</td><td>  </td></tr>
<tr><td>Hazard statements</td><td colspan="2">H317: May cause an allergic skin reaction
H334: May cause allergy or asthma symptoms or breathing difficulties if inhaled
H350: May cause cancer
H360Df: May damage the unborn child. Suspected of damaging fertility
H373: May cause damage to organs through prolonged inhalation
H410: Very toxic to aquatic life with long lasting effects</td></tr>
</table>

WORKPLACE INSTRUCTION CARD (WIC04)
Version 1.0

REPACKAGER
Automated (re)packaging of DCC PY.34 / PR.104 powder or paste to small and medium size containers or bags (<20 l) in an industrial setting

Operation conditions and risk management measures needed to ensure worker protection		
Maximum duration	Total 40 hours per week	
Risk management measures (RMM)		
Technical RMM	Closed system: Filling of powder (transfer of 1-10 kg/min)	
	Semi-closed system: Filling of paste	
	Complete segregation (no ventilation): Powder filling equipment	
	Good general ventilation: 3 air changes per hour	
Conditions and measures related to personal protection equipment (PPE), hygiene and health evaluation	Use chemically impervious gloves; take into account other substances used (e.g. solvents)	
Good practice advice (please refer to SDS section 1-16 for additional information)		
	Do not eat, drink or smoke at workplace Wash hands after use	
Environmental Measures/Spillage instructions	For powder: Vacuum with industrial vacuum cleaner fitted with HEPA filter, dispose of dust bag as hazardous waste. For paste: Use gloves. Scoop up and store in suitable container. Absorb residual material. Flush spill area with water spray. Do not flush to sewer. Prevent run-off from entering drains, sewers or waterways. Dispose of collected material as hazardous waste. Dispose of contents/container in accordance with local, national and international regulation	
Properties of the substance, hazard and precautionary statements		
Signal word & hazard symbols	Danger	
Hazard statements	H317: May cause an allergic skin reaction H334: May cause allergy or asthma symptoms or breathing difficulties if inhaled H350: May cause cancer H360Df: May damage the unborn child. Suspected of damaging fertility H373: May cause damage to organs through prolonged inhalation H410: Very toxic to aquatic life with long lasting effects	

WORKPLACE INSTRUCTION CARD (WIC05)
Version 1.0

MIXING AND BLENDING OPERATOR

Mixing of pigment paste containing DCC PY.34 / PR.104 into paint in an industrial setting

Operation conditions and risk management measures needed to ensure worker protection		
Maximum duration	Total 40 hours per week	
Risk management measures (RMM)		
Technical RMM	Closed vessel (automated): Mixing and blending	
	Good general ventilation: 3 air changes per hour	
Conditions and measures related to personal protection equipment (PPE), hygiene and health evaluation	Use chemically impervious gloves; take into account other substances used (e.g. solvents)	
Good practice advice (please refer to SDS section 1-16 for additional information)		
	Do not eat, drink or smoke at workplace	
	Wash hands after use	
Environmental Measures/Spillage instructions	Use gloves. Scoop up and store in suitable container. Absorb residual material. Flush spill area with water spray. Do not flush to sewer. Prevent run-off from entering drains, sewers or waterways. Dispose of collected material as hazardous waste. Dispose of contents/container in accordance with local, national and international regulation	
Properties of the substance, hazard and precautionary statements		
Signal word & hazard symbols	Danger	
Hazard statements	H317: May cause an allergic skin reaction H334: May cause allergy or asthma symptoms or breathing difficulties if inhaled H350: May cause cancer H360Df: May damage the unborn child. Suspected of damaging fertility H373: May cause damage to organs through prolonged inhalation H410: Very toxic to aquatic life with long lasting effects	

WORKPLACE INSTRUCTION CARD (WIC06)
Version 1.0

PAINT FILLING OPERATOR

Filling of paint containing DCC PY.34 / PR.104 to small and medium size containers (<20 l) in an industrial setting

Operation conditions and risk management measures needed to ensure worker protection		
Maximum duration	Total 40 hours per week	
Risk management measures		
Technical risk management measures	Partial segregation with ventilation: Paint filling	
	Fixed capturing hood: Paint filling	
	Good general ventilation: 3 air changes per hour	
Conditions and measures related to personal protection equipment (PPE), hygiene and health evaluation	Use chemically impervious gloves; take into account other substances used (e.g. solvents)	
Good practice advice (please refer to SDS section 1-16 for additional information)		
	Do not eat, drink or smoke at workplace Wash hands after use	
Environmental Measures/Spillage instructions	Use gloves. Scoop up and store in suitable container. Absorb residual material. Flush spill area with water spray. Do not flush to sewer. Prevent run-off from entering drains, sewers or waterways. Dispose of collected material as hazardous waste. Dispose of contents/container in accordance with local, national and international regulation	
Properties of the substance, hazard and precautionary statements		
Signal word & hazard symbols	Danger	
Hazard statements	H317: May cause an allergic skin reaction H334: May cause allergy or asthma symptoms or breathing difficulties if inhaled H350: May cause cancer H360Df: May damage the unborn child. Suspected of damaging fertility H373: May cause damage to organs through prolonged inhalation H410: Very toxic to aquatic life with long lasting effects	

3. Explanation on workplace instruction cards

This section explains how to interpret, implement and monitor the use of the risk management measures as prescribed in the Workplace Instruction Cards (section 2). This section is aimed at line management and HSE personnel.

In selecting risk management measures (RMM) the hierarchy of control needs to be applied. This means that risk management measures must be selected based on the order of priority listed below:

1. Elimination
2. Substitution
3. Engineering controls
4. Administrative controls
5. Personal protective clothes and equipment

Risk management must provide effective worker protection while taking into consideration the economic feasibility. As such, measures of a lower order are only allowed if the higher order RMM do not result in adequate protection or if these RMM are not possible or not feasible from an economic point of view.

Over the years, the use of PY.34 and PR.104 has declined. However, the permitted use of PY.34 and PR.104 remains where technical performance and economic feasibility cannot be met by elimination and/or substitution.

3.1 Engineering controls - Technical risk management measures

Table 2 provides an overview of the technical risk management measures that have been applied in the exposure models. The user must check the description to confirm that the RMM complies with the listed values. For technical RMM which are dependent on maintenance, proper installment and correct use, the user must ensure that following conditions are met:

- Equipment is designed for a specific workplace and the equipment is used within the boundaries set by the manufacturer;
- Maintenance is performed according to the manufacturers instructions and documentation on the maintenance is kept;
- Workers are instructed in the proper use of the technical risk management measures. Training needs to be documented;
- Management supervision on the proper use of technical risk management measures is in place.

Table 2. Overview of technical risk measurement measures used in modelling and their effectiveness

Type of RMM	Description	Effectiveness[3]
Containment of source (Advanced REACH Tool)		
Low level containment	Physical containment or enclosure of the source of emission. The air within the enclosure is not actively ventilated or extracted. The enclosure is not opened during the activity. The process is performed in a vessel with a loose lid or cover, which is not air tight.  This class also includes bags or liners fitted around transfer points from source to receiving vessel. These include Muller seals, Stott head and single bag, and associated clamps and closures.	90%

[3] The listed effectiveness is the effectiveness used in the models. This effectiveness may be assumed to be present if the actual risk management measure at the workplace fulfils the description. For the technical RMM they should be designed and installed by qualified companies and staff, maintenance and periodic checks need to be performed according to the manufacturers' instruction. It is advised that these are documented.

Type of RMM	Description	Effectiveness[3]
Medium level containment	Physical containment or enclosure of the source of emission. The air within the enclosure is not actively ventilated or extracted. The enclosure is not opened during the activity. The material transfer is enclosed with the receiving vessel being docked or sealed to the source vessel. Examples include sealing heads, transfer containers and multiple o-rings. Inflatable packing head with continuous liner ensures a seal is maintained during the powder transfer and the continuous plastic liner prevents direct contact with the product. The correct type of tie off must be used.	99%
High level containment	Physical containment or enclosure of the source of emission. The air within the enclosure is not actively ventilated or extracted. The enclosure is not opened during the activity. The substance is contained within a sealed and enclosed system. This class includes metal smelting furnaces or atomisation units. The material transfer is entirely enclosed with high containment valves (e.g. split butterfly valves and direct couplings, which consist of two sections which connect together to allow the opening of the valve). At the end of the material transfer the two halves are separated, forming a seal on both the process equipment and the material container. The system is designed to minimise the surface area which can contact the material or pairs of valves with wash space between them.	99.90%
Segregation or personal enclosure (Advanced REACH Tool)		
Partial segregation without ventilation	Sources are partially segregated from the work environment by isolating the source in a separate room (e.g. with open doors and/or windows to the adjacent area). This segregated area is generally not entered by the worker during a given activity or working shift. The air within the separate room is not actively ventilated.	30%
Partial segregation with ventilation and filtration of recirculated air	Sources are partially segregated from the work environment by isolating the source in a separate room (with open doors and/or windows). This segregated area is generally not entered by the worker during a given activity or working shift. The air within the separate area is actively ventilated and the recirculated air is filtered or there is no air recirculation.	70%
Complete segregation without ventilation	Sources are partially segregated from the work environment by isolating the source in a separate room (e.g. with open doors and/or windows to the adjacent area). This segregated area is generally not entered by the worker during a given activity or working shift. The air within the separate room is not actively ventilated.	70%
Complete personal enclosure without ventilation	Worker resides inside an enclosed cabin or room (door & windows closed) for the entire duration of the activity. The air within the separate room is not actively ventilated.	70%
Complete personal enclosure with ventilation	Worker resides inside an enclosed cabin or room (door & windows closed) for the entire duration of the activity. The air within the separate room is not actively ventilated.	90%
Complete segregation with ventilation and filtration of recirculated air	Sources are completely segregated from the work environment by isolating the source in a fully enclosed and separate room (incl. closed doors & windows). The air within the separate area is actively ventilated and the recirculated air is filtered or there is no air recirculation. The segregated area is generally not entered by the worker during a given activity or working shift.	90%

Local exhaust ventilation (Advanced REACH Tool)		
Fume cupboard	Any form of permanent encapsulation or encasing of the source of which maximally one side is open with a well designed local exhaust ventilation system (e.g. laminar air flow). The design of both the enclosure and the ventilation system is such that the influence of worker behaviour is minimal (e.g. an alarm system prevents the worker from using the fume cupboard in case the system is not working properly).	99%
Fixed capturing hood	Fixed capturing hoods located in close proximity of and directed at the source of emission. The design is such that the work is performed in the capture zone of the ventilation system and the capture is indicated at the workplace.	90%
Cross-flow spray room	The spray room must meet the following conditions: • The spray room is a fully enclosed, unidirectional spray room of volume between 30 and 1000 m³ with at least 10 air changes per hour • The spray room has been designed by a competent ventilation engineer, the airflow performance is regularly checked and the ventilation system is maintained. • The spray room needs to run under negative pressure (i.e. so any air leakage is inward). • The workers in the spray room must be properly trained in correctly using the room (e.g. operation of the ventilation system, good positioning of the worker relative to the source and the ventilation, knowing the ventilation clearance time of the room).	30%
Other measures (MEASE model)		
Partial segregation without ventilation	Sources are partially segregated from the work environment by isolating the source in a separate room (e.g. with open doors and/or windows to the adjacent area). This segregated area is generally not entered by the worker during a given activity or working shift. The air within the separate room is not actively ventilated.	70%
Other LEV systems	Local exhaust ventilation not fulfilling the definition of exterior LEV and Integrated LEV	50%
Exterior LEV	Fixed capturing hoods located in close proximity of and directed at the source of emission. The design is such that the work is performed in the capture zone of the ventilation system and the capture is indicated at the workplace.	75%
Integrated LEV	Local exhaust ventilation which is integrated into the equipment used to perform the task.	84%/80%

3.2 Administrative controls - Organisational risk management measures

The organisational risk management measures are not listed in the WICs. The main organisational risk management measures are:

- Prevention of exposure to workers not performing tasks with the pigments
- Prevention of exposure for specific groups (pregnant and breastfeeding women, young workers)
- Time constraints per type of activity

Based on the current Directives on the protection of the health and safety of workers, the use of the PY.34 and PR.104 by pregnant workers or breastfeeding women is not allowed. It is recommended that they are relocated to other tasks. Based on the same directives, working with these pigments is forbidden for workers which are not 18 years old.

The time constraints per type of activity can be found in Table 1. It is important to assess and document the maximum average duration of each listed activity with PY.34 and PR.104. Documentation regarding exposure is to be kept until 50 years after the last use of the pigments. This information needs to added to the individual files of the worker and be provided to their company physician.

Emptied bags with residual pigment powder should be collected in airtight containers or plastic bags to prevent dust exposure.

3.3 Personal protective clothes and equipment - PPE

Use of dermal protection
When working with DCC PY.34 or PR.104 products, workers should wear tight fitting long sleeved work clothes. Work clothes need to be washed by the employer and not by workers at home. Work clothes need to be stored in separate lockers.

Based on the risk assessment use of gloves is mandatory when manually handling powder pigments or paint. In the Workplace Instruction Cards gloves are prescribed as a risk management measure. These gloves must be 0.5 mm thick and made from chemically impervious materials such as:

- Nitrile rubber/Nitrile latex – NBR;
- Polychloroprene – CR;
- Polyvinyl chloride – PVC.

When DCC PY.34 or PR.104 are included into a paint, the solvents and other substances used within the paint may lead to a different selection of glove material. If chemically impervious gloves are used dermal exposure is minimised. However some dermal exposure may still arise if not adequately protected.

The use of chemically impervious gloves with 95% efficiency is required for workers where skin contact cannot be excluded. The following provisions for training are required to ensure the prescribed efficiency can be reached:

- Information on the hazard that requires the use of the gloves and the respective hazards of the substance. The training should address the correct way to put on, wear and take off protective gloves in order to ensure maximum protection.
- Testing for leakage (i.e. visual inspection or trapping air in the glove and tightly rolling the cuff towards the fingers).
- Instruction on when to use glove (which specific activities).
- Proper washing of reusable gloves.
- How and when to discard the used gloves (preferably after each use, but at a minimum at end of shift).
- Limitations of gloves as a control measure.
- Conduct training annually and maintain PPE training records.

Use of respiratory protective equipment (RPE)
In order to assess effectiveness of respiratory protection, the two values typically seen in literature, technical data and RPE user manuals are the nominal protection factor (NPF) and the Assigned Protection Factor (APF).

The NPF provides information on the maximum inward leakage of RPE when it is being worn in an optimised static setting. This value determines if a respirator fulfils the requirement of the European harmonised standard it adheres to and allows the manufacturer to place a CE mark on the RPE. The NPF **is not to be used in selecting RPE** when it is introduced in order to protect the workers' health. The proper value to use in selecting RPE used for the protection of the worker is the Assigned Protection Factor (APF), as it provides information on the level of protection one can confidently aspire to achieve. Furthermore, proper training, supervision, maintenance and fit testing are essential contributing factors.

The downstream users are advised to select RPE using the manual published by the British Health and Safety Authority (HSE) in December 2013[4] to determine if training, supervision, and fit testing programs are sufficient. They are also urged to take notice of other advice provided in this document. The British HSE Authority also hosts a website that helps downstream users in selecting the most appropriate RMM option (http://www.healthyworkinglives.com/rpe-selector). The use of this website is strongly recommended. The user can also use EN 529 to ensure the effectiveness of their respiratory protection program. The following needs to be included in the respiratory protection policies:

- Training of the worker prior to first use of the respirator;
- Testing of the fit of the respirator face of the user prior to first use;
- Testing of the fit of the respirator after donning the respirator;
- Training on proper maintenance of the respirator;

4 Health and Safety Guidance 53, Respiratory protective equipment at work, A practical guide, Fourth editions, December 2013.

- Testing of the medical fitness of the worker prior to first use;
- Management supervision and maintenance procedures;
- Training and testing should be repeated annually and documented.

Currently, there is no harmonised approach within the EU on the appropriate application of Assigned Protection Factors (APF) for respiratory protective equipment. Each user of DCC PY.34 or PR.104 needs to verify which RPE will provide the suitable APF for their jurisdiction. If no APF is established within a given jurisdiction, the UK standards should be considered as the minimum requirement. In the WICs the use of respirators is consolidated in order to prevent several different respirators during the performance of his tasks. If the risk assessment demonstrated that an APF of 4 would be sufficient, we have set the minimal APF at 10 because of the classification of the substance.

Table 3. Overview of APF and associated RPE in various jurisdictions

Assigned protection factor used in CSA	**Description of RPE based on EN 529 (Appendix C)**			
	Country	**Standard***	**Description of RPE**	**Class**
10	Fin, D, I, S, UK	EN 149	Filtering half mask	FF P2
	Fin, D, I, S, UK	EN 140	Half mask and quarter mask with filter	P2
20	Fin, S, UK	EN 149	Filtering half mask	FF P3
	UK	EN 136	Full Face mask, all classes	GasX P3
	Fin, D, I, S, UK	EN 12941	Powered filtering device incorporating a hood or a helmet	TH2
30	D, I	EN 149	Filtering half mask	FF P3
	D, I	EN 140	Half mask and quarter mask with filter	P2
	D	EN 140	Half mask and quarter mask with filter	GasX P3
	Fin, D, I, S	EN 12942	Powered assisted filtering device incorporating full face mask, half mask or quarter mask	TM2
	UK	EN 12942	Powered assisted filtering device incorporating full face mask, half mask or quarter mask	TM3
	Fin, D, I, S, UK	EN 136	Full face mask (all classes)	P3
40	Fin, D, I, S, UK	EN 136	Full face mask (all classes)	P3
	Fin, D, I, S, UK	EN 12941	Powered filtering device incorporating a hood or a helmet	TH3
	Fin, D, I, S, UK	EN 12942	Powered assisted filtering device incorporating full face mask, half mask or quarter mask	TM3
	Fin, D, I, S, UK	EN 138	Fresh air hose breathing apparatus	Full face mask
100	Fin, D, I, S	EN 136	Full face mask (all classes)	P3
	Fin, D, I, S	EN 12941	Powered filtering device incorporating a hood or a helmet	TH3
	Fin, D, I, S	EN 138	Fresh air hose breathing apparatus	Full face mask
	UK	EN 137	Self-contained open circuit compressed air breathing apparatus	Positive pressure demand
200	Fin, D, I, S	EN 136	Full face mask (all classes)	P3
	Fin, I, S	EN 12941	Powered filtering device incorporating a hood or a helmet	TH3
	Fin, D, I, S	EN 138	Fresh air hose breathing apparatus	Full face mask
	UK	EN 137	Self-contained open circuit compressed air breathing apparatus	Positive pressure demand

400	Fin, D, I, S	EN 136	Full face mask (all classes)	P3
	Fin, D, I, S	EN 12942	Powered assisted filtering device incorporating full face mask, half mask or quarter mask	TM3
	Fin, D, I, S	EN 14593-1	Compressed air line breathing apparatus with demand valve - Part 1: Apparatus with a full face mask	-
	Fin, D, I, S	EN 138	Fresh air hose breathing apparatus	Full face mask
	UK	EN 137	Self-contained open circuit compressed air breathing apparatus	Positive pressure demand
1000	Fin, S	EN 12942	Powered assisted filtering device incorporating full face mask, half mask or quarter mask	TM3
	Fin, D, I, S	EN 14593-1	Compressed air line breathing apparatus with demand valve - Part 1: Apparatus with a full face mask	-
	D	EN 138	Fresh air hose breathing apparatus	Full face mask
	D, I, UK	EN 137	Self-contained open circuit compressed air breathing apparatus	Positive pressure demand

*Explanatory table with reference and title of abovementioned standards:

Standard number	**Standard title**
EN 136:1998	Respiratory protective devices. Full face masks. Requirements, testing, marking
EN 137:2006	Respiratory protective devices. Self-contained open-circuit compressed air breathing apparatus with full face mask. Requirements, testing, marking
EN 138:1995	Respiratory protective devices - fresh air hose breathing apparatus for use with full face mask, half mask or mouthpiece assembly. Requirements, testing, marking
EN 140:1998	Respiratory protective devices. Half masks and quarter masks. Requirements, testing, marking
EN 149:2001 + A1:2009	Respiratory protective devices. Filtering half masks to protect against particles. Requirements, testing, marking
EN 529:2005	Respiratory protective devices. Recommendations for selection, use, care and maintenance. Guidance document
EN 12941:1998	Respiratory protective devices. Powered filtering devices incorporating a helmet or a hood. Requirements, testing, marking
EN 12942:1998	Respiratory protective devices. Power assisted filtering devices incorporating full face masks, half masks or quarter masks. Requirements, testing, marking
EN 14593-1:2005	Respiratory protective devices. Compressed air line breathing apparatus with demand valve. Apparatus with a full mask. Requirements, testing, marking

Table 4. Overview of RPE and assigned protection factors (APF) as set by the British HSE Authority

Adequacy/suitability	Respirators				
RPE type					
	Disposable half mask – particle filter*	Reusable half mask – particle filter	Full face mask – particle filter	Powered mask	Powered hoods/helmets
Effective for particles	Yes	Yes	Yes	Yes **	4 **
Continuous wear time	Less than 1 hr	Less than 1 hr	Less than 1 hr	More than 1 hr	More than 1 hr
APF4	Yes	Yes	Yes	No	8
APF10	Yes	Yes	Yes	Yes	4
APF20	Yes	Yes	No	Yes	4
APF40	No	No	Yes	Yes	4
Table reference	3	4	5	6	7

*Sometimes referred to as a filtering facepiece or nasal respirator.

**Only protects against particle or gas/vapour when the appropriate filter is fitted.

Table 4 cont. Overview of RPE and assigned protection factors (APF) as set by the British HSE Authority

Adequacy/suitability	**Breathing apparatus**		
RPE type			
	Fresh air hose	Constant flow airline	Demand valve
Effective for particles	Yes	Yes	Yes
Continuous wear time	Unassisted less than 1 hr Assisted/powered more than 1 hr	More than 1 hr	More than 1 hr
APF4 types	No	No	No
APF10 types	Yes	Yes	No
APF20 types	No	Yes	No
APF40 types	Yes	Yes	No
APF200 types	No	Yes	No
APF2000 types	No	No	Yes
Table reference	8	9	14

4. ES 1: Formulation; Distribution and mixing pigment powder in an industrial environment into solvent-based paints for non-consumer use. Pigment choice depends on product specifications on visibility, shade and colour, durability, other requirements and Regulations.; Coatings; PC 9a

This section is aimed at HSE specialists and details the exposure scenario and its contributing scenarios as is required within the REACH Regulation (1907/2006/EC). Detailed information is presented on the worker and environmental exposure estimation and risk characterisation which are in line with the Chemical Safety Report that was submitted in the registration dossiers of DCC PY.34 and PR.104.

Section 4.1 provides an overview of the activities (contributing scenarios, CS) relevant for Use 1 with the related use descriptors. The contributing scenarios describe all activities that have a potential exposure to human and the environment. Multiple activities can be performed by one worker per day.
The table includes the following information:

- Subsection number: the same as the contributing scenario number listed in Table 1 of this document.
- Use descriptors: defined by the European Chemicals Agency (ECHA) (please refer to ECHA Guidance R.12 for a further explanation).
- Environmental Release Categories (ERCs): describe the emission from an environmental point of view.
- Process Categories (PROCs): describe exposure from a worker point of view.

Section 4.2 describes all conditions under which the activities of DCC PY.34 or PR.104 are in line with the permitted uses. Here you will find detailed information on the activities, the operational conditions and risk management measures for the environment and the workers.

For the environmental assessment the following information is outlined:

- Maximum amount of pigment to be used per site (both daily and per year).
- Maximum number of emission days per year (operating / use days).
- Minimum flow of a river to which the waste water is shed.
- Information regarding the treatment of sewage.

For the worker exposure the following information for each activity is described:

- The form of the mixture in which the pigments are used (i.e. powder, paste, slurry).
- Dustiness of the pigment and the respirable fraction.
- Concentration (%) of the pigments in any mixtures used.
- Average duration of use per week and maximum duration of use per shift (recalculated to maximum hours/week).
- Amounts of the pigment / paste / paint / pellets handled by users.
- Technical and organizational risk management measures (i.e. ventilation rate, local exhaust ventilation, good housekeeping).
- Required personal protective equipment (including gloves and respirator).
- Type of activity that is being performed (in line with the input of the exposure models used).

Corresponding information that is to be used by the worker itself is summarized in the Workplace Instruction Cards (see Section 2 of this document).

Section 4.3 provides information on the exposure and risk including the methods (e.g. models) used to estimate the exposure, the estimated exposure value and the ratio of this value with regard to the defined exposure limits (Exposure / DMEL ratio) for each contributing scenario.

Section 4.4 provides guidance to the downstream user regarding the boundaries of the exposure scenario, its contributing scenarios and the defined functions. It provides information on the effectiveness of risk management measures.

Please note that any other activity than the ones described in this Annex are not permitted. In case any doubt exists regarding the allowed uses, please contact HMG Paints Limited or DCC without undue delay.

4.1. Title section

Coatings and Paints, Thinners, paint removers (PC 9a)	
Environment	
CS 1: Distribution and mixing pigment powder in an industrial environment into solvent-based paints for non-consumer use	ERC 2
Worker	
CS 2: Delivery, storage and handling of closed bags with pigment powder	PROC 3
CS 3: Pigment powder quality control / lab work	PROC 15
CS 4: Manual dosing of pigment powder	PROC 8a
CS 5: Automated dosing of pigment powder	PROC 8b
CS 6: Re-packaging of pigment powder	PROC 9
CS 7: Mixing of pigment paste	PROC 5
CS 8: Storage of pigment paste / Transfer of pigment paste through closed piping	PROC 2
CS 9: Manual cleaning / scraping of mixing vessels, equipment and lids	PROC 21
CS 10: Cleaning of vessel with solvent	PROC 10
CS 11: Pigment paste testing by smearing	PROC 10
CS 12: Pigment paste charging/discharging by gravity or manual handling	PROC 8a
CS 13: Pigment paste charging/discharging using a dedicated installation	PROC 8b
CS 14: Pigment paste filling into drums/cans at a filling line	PROC 9
CS 15: Mixing colour paste in closed drum mixing machine with automated dosing of paste	PROC 2
CS 16: Mixing colour paste into paint in closed mixing vessel	PROC 3
CS 17: Pigment paint filling into drums/cans at a filling line	PROC 9
CS 18: Pigment paint charging/discharging using a dedicated installation	PROC 8b
CS 19: Equipment cleaning: scraping and brushing	PROC 10
CS 20: Dried pigment paint cleaning	PROC 21
CS 21: Spray testing of pigment paint in industrial booth	PROC 7
CS 22: Pigment paint testing by brushing/rolling	PROC 10
CS 23: Pigment paste or paint laboratory operations	PROC 15

4.2. Conditions of use affecting exposure

4.2.1. Control of environmental exposure (CS 1): Distribution and mixing pigment powder in an industrial environment into solvent-based paints for non-consumer use (ERC 2)

Product (article) characteristics
Correction for Pb content of pigment (60%): Correction applicable (The pigment contains 60% lead) [Effectiveness Water: 40%; Air: 40%]
Correction for water solubility of Pb in pigment (10%): Correction applicable (Transformation/dissolution tests were carried out with the pigment. Based on the results of these tests, 10% dissolution is applied as a worst-case.) [Effectiveness Water: 90%]
Amount used, frequency and duration of use (or from service life)
Daily amount per site <= 5.0 tonnes/day
Annual amount per site <= 120.0 tonnes/year

Percentage of EU tonnage used at regional scale: = 100 %
Emission days per year: = 24 days/year
Technical and organisational conditions and measures
Waste water treatment: If any process waste water is generated, this should be treated as hazardous waste
Conditions and measures related to treatment of waste (including article waste)
Dispose of waste or used sacks/containers according to local regulations.
Other conditions affecting environmental exposure
Receiving surface water flow >= 18000 m3/d

4.2.2. Control of worker exposure (CS 2): Delivery, storage and handling of closed bags with pigment powder (PROC 3)

Product (article) characteristics
Substance product type: Powders • *Covers percentage substance in the product up to 100 %.* • Dustiness: 1006 mg/kg for inhalable fraction *(Measured according to EN 15051)* • Moisture content of the product: Dry product (<5 % moisture content)
Amount used (or contained in articles), frequency and duration of use/exposure
Duration of use (hours/week): 10 hours/week
Technical and organisational conditions and measures
Ventilation rate of the general ventilation system in the work area: 3 ACH (ACH = air changes per hour.)
Use in closed batch process (synthesis or formulation)
Advanced (industrial) exposure controls assumed.
Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with specific activity training; For further specification, refer to section 8 of the SDS.
Other conditions affecting workers exposure
Careful handling of apparently clean objects
Room size of the work area: Any size workroom

4.2.3. Control of worker exposure (CS 3): Pigment powder quality control / lab work (PROC 15)

Product (article) characteristics
Substance product type: Powders (*Applicable to transfer activity)* • *Covers percentage substance in the product up to 100 %.* • Dustiness: 1006 mg/kg for inhalable fraction *(Measured according to EN 15051)* • Moisture content of the product: Dry product (<5 % moisture content)
Amount used (or contained in articles), frequency and duration of use/exposure
Duration of use (hours/week): 10 hours/week
Technical and organisational conditions and measures
Use in closed batch process (synthesis or formulation)
Advanced (industrial) exposure controls assumed.
Ventilation rate of the general ventilation system in the work area: 3 ACH (ACH = air changes per hour.)
Fume cupboard
Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with specific activity training; For further specification, refer to section 8 of the SDS.

Other conditions affecting workers exposure
Transfer of powders, granules or pelletised material: Falling of powders • Transferring 10 – 100 gram/minute • Drop height < 0.5 m • Handling that reduces contact between product and adjacent air • Careful transfer
Room size of the work area: Any size workroom

4.2.4. Control of worker exposure (CS 4): Manual dosing of pigment powder (PROC 8a)

Product (article) characteristics
Substance product type: Powders • *Covers percentage substance in the product up to 100 %.* • Dustiness: 1006 mg/kg for inhalable fraction (*Measured according to EN 15051)* • Moisture content of the product: Dry product (<5 % moisture content)
Amount used (or contained in articles), frequency and duration of use/exposure
Duration of use (hours/week): 6 hours/week
Technical and organisational conditions and measures
Advanced (industrial) exposure controls assumed.
Ventilation rate of the general ventilation system in the work area: 3 ACH (ACH = air changes per hour.)
Fixed capturing hood,
Conditions and measures related to personal protection, hygiene and health evaluation
Wear a respirator providing a minimum efficiency of 95 % (APF 20)
Wear chemically resistant gloves (tested to EN374) in combination with specific activity training; For further specification, refer to section 8 of the SDS.
Other conditions affecting workers exposure
Falling of powders • Transferring 10 – 100 kg/minute • Drop height < 0.5 m • Handling that reduces contact between product and adjacent air • Careful transfer
Room size of the work area: Any size workroom

4.2.5. Control of worker exposure (CS 5):Automated dosing of pigment powder (PROC 8b)

Product (article) characteristics
Substance product type: Powders • *Covers percentage substance in the product up to 100 %.* • Dustiness: 1006 mg/kg for inhalable fraction (*Measured according to EN 15051)* • Moisture content of the product: Dry product (<5 % moisture content)
Amount used (or contained in articles), frequency and duration of use/exposure
Duration of use (hours/week): 10 hours/week
Technical and organisational conditions and measures
Advanced (industrial) exposure controls assumed.
Ventilation rate of the general ventilation system in the work area: 3 ACH (ACH = air changes per hour.)
Fixed capturing hood
Medium level containment
Complete segregation of installation from worker
Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with specific activity training; For further

specification, refer to section 8 of the SDS.
Other conditions affecting workers exposure
Falling of powders • Transferring 10 – 100 kg/minute • Drop height < 0.5 m • Careful transfer • Open process
Room size of the work area: Any size workroom

4.2.6. Control of worker exposure (CS 6): Re-packaging of pigment powder (PROC 9)

Product (article) characteristics
Substance product type: Powders • *Covers percentage substance in the product up to 100 %.* • Dustiness: 1006 mg/kg for inhalable fraction *(Measured according to EN 15051)* • Moisture content of the product: Dry product (<5 % moisture content)
Amount used (or contained in articles), frequency and duration of use/exposure
Duration of use (hours/week): 8 hours/week
Technical and organisational conditions and measures
Advanced (industrial) exposure controls assumed.
Ventilation rate of the general ventilation system in the work area: 3 ACH (ACH = air changes per hour.)
Medium level containment
Complete segregation without ventilation
Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with specific activity training; For further specification, refer to section 8 of the SDS.
Other conditions affecting workers exposure
Falling of powders • Transferring 1 – 10 kg/minute • Drop height < 0.5 m • Open process • Careful transfer
Room size of the work area: Any size workroom

4.2.7. Control of worker exposure (CS 7): Mixing of pigment paste (PROC 5)

Product (article) characteristics
Substance product type: Paste • Concentration of substance in mixture: >25% • Covers solid products only (relevant for dermal assessment only).
Amount used (or contained in articles), frequency and duration of use/exposure
Duration of use (hours/week): 18 hours/week
Technical and organisational conditions and measures
Advanced (industrial) exposure controls assumed.
Ventilation rate of the general ventilation system in the work area: 3 ACH (ACH = air changes per hour.)
Low level containment
Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with specific activity training; For further specification, refer to section 8 of the SDS.
Other conditions affecting workers exposure
Handling of pastes

• Handling of apparently clean pastes • Normal handling, involves regular work procedures
Room size of the work area: Any size workroom

4.2.8. Control of worker exposure (CS 8): Storage of pigment paste / Transfer of pigment paste through closed piping (PROC 2)

Product (article) characteristics
Substance product type: Paste • Concentration of substance in mixture: >25% • Covers solid products only (relevant for dermal assessment only).
Amount used (or contained in articles), frequency and duration of use/exposure
Duration of use (hours/week): 15 hours/week
Technical and organisational conditions and measures
Advanced (industrial) exposure controls assumed.
Use in closed, continuous process with occasional controlled exposure
Ventilation rate of the general ventilation system in the work area: 3 ACH (ACH = air changes per hour.)
Low level containment
Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with specific activity training; For further specification, refer to section 8 of the SDS.
Other conditions affecting workers exposure
Handling of pastes • Handling of apparently clean pastes • Normal handling, involves regular work procedures
Room size of the work area: Any size workroom

4.2.9. Control of worker exposure (CS 9): Manual cleaning / scraping of mixing vessels, equipment and lids (PROC 21)

Product (article) characteristics
Substance product type: Powders • Concentration of substance in mixture: >25% • Dustiness: Granules, flakes or pellets (Inhalable fraction: 101 - 500 mg/kg) • Moisture Content of the product: 5 - 10 % moisture content • Covers solid products only (relevant for dermal assessment only).
Amount used (or contained in articles), frequency and duration of use/exposure
Duration of use (hours/week): 3 hours/week
Technical and organisational conditions and measures
Advanced (industrial) exposure controls assumed.
Ventilation rate of the general ventilation system in the work area: 3 ACH (ACH = air changes per hour.)
Conditions and measures related to personal protection, hygiene and health evaluation
Wear a respirator providing a minimum efficiency of 90.0 % (APF 10)
Wear chemically resistant gloves (tested to EN374) in combination with specific activity training; For further specification, refer to section 8 of the SDS.
Other conditions affecting workers exposure
Compressing of powders, granules or pelletised material • Compressing 10 – 100 gram/minute • Open process
Room size of the work area: Any size workroom

4.2.10. Control of worker exposure (CS 10): Cleaning of vessel with solvent (PROC 10)

Product (article) characteristics
Substance product type: Powders incorporated in a liquid matrix • Liquid Weight Fraction: Substantial (10 - 50%) • Viscosity: Liquids with medium viscosity (like oil) • Covers solid products only (relevant for dermal assessment only).
Amount used (or contained in articles), frequency and duration of use/exposure
Duration of use (hours/week): 6 hours/week
Technical and organisational conditions and measures
Advanced (industrial) exposure controls assumed.
Ventilation rate of the general ventilation system in the work area: 3 ACH (ACH = air changes per hour.)
Low level containment
Conditions and measures related to personal protection, hygiene and health evaluation
Wear a respirator providing a minimum efficiency of 95.0 % (APF 20)
Wear chemically resistant gloves (tested to EN374) in combination with specific activity training; For further specification, refer to section 8 of the SDS.
Other conditions affecting workers exposure
Spreading of liquid products • Spreading of liquids at surfaces or work pieces 1 - 3 m² / hour
Room size of the work area: Any size workroom

4.2.11. Control of worker exposure (CS 11): Pigment paste testing by smearing (PROC 10)

Product (article) characteristics
Substance product type: Paste • Concentration of substance in mixture: >25% • Covers solid products only (relevant for dermal assessment only).
Amount used (or contained in articles), frequency and duration of use/exposure
Duration of use (hours/week): 9 hours/week
Technical and organisational conditions and measures
Advanced (industrial) exposure controls assumed.
Ventilation rate of the general ventilation system in the work area: 3 ACH (ACH = air changes per hour.)
Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with specific activity training; For further specification, refer to section 8 of the SDS.
Other conditions affecting workers exposure
Handling of contaminated pastes • Handling of apparently clean pastes • Normal handling, involves regular work procedures
Room size of the work area: Any size workroom

4.2.12. Control of worker exposure (CS 12): Pigment paste charging/discharging by gravity or manual handling (PROC 8a)

Product (article) characteristics
Substance product type: Paste • Concentration of substance in mixture: >25% • Covers solid products only (relevant for dermal assessment only).

Amount used (or contained in articles), frequency and duration of use/exposure
Duration of use (hours/week): 9 hours/week
Technical and organisational conditions and measures
Advanced (industrial) exposure controls assumed.
Ventilation rate of the general ventilation system in the work area: 3 ACH (ACH = air changes per hour.)
Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with specific activity training; For further specification, refer to section 8 of the SDS.
Other conditions affecting workers exposure
Handling of pastes • Handling of apparently clean pastes • Normal handling, involves regular work procedures
Room size of the work area: Any size workroom

4.2.13. Control of worker exposure (CS 13): Pigment paste charging/discharging using a dedicated installation (PROC 8b)

Product (article) characteristics
Substance product type: Paste • Concentration of substance in mixture: >25% • Covers solid products only (relevant for dermal assessment only).
Amount used (or contained in articles), frequency and duration of use/exposure
Duration of use (hours/week): 9 hours/week
Technical and organisational conditions and measures
Advanced (industrial) exposure controls assumed.
Use in semi-closed process with opportunity for exposure
Ventilation rate of the general ventilation system in the work area: 3 ACH (ACH = air changes per hour.)
Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with specific activity training; For further specification, refer to section 8 of the SDS.
Other conditions affecting workers exposure
Handling of pastes • Handling of apparently clean pastes • Normal handling, involves regular work procedures
Room size of the work area: Any size workroom

4.2.14. Control of worker exposure (CS 14): Pigment paste filling into drums/cans at a filling line (PROC 9)

Product (article) characteristics
Substance product type: Paste • Concentration of substance in mixture: >25% • Covers solid products only (relevant for dermal assessment only).
Amount used (or contained in articles), frequency and duration of use/exposure
Duration of use (hours/week): 32 hours/week
Technical and organisational conditions and measures
Use in semi-closed process with opportunity for exposure
Advanced (industrial) exposure controls assumed.
Ventilation rate of the general ventilation system in the work area: 3 ACH (ACH = air changes per hour.)

Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with specific activity training; For further specification, refer to section 8 of the SDS.
Other conditions affecting workers exposure
Handling of pastes • Handling of apparently clean pastes • Normal handling, involves regular work procedures
Room size of the work area: Any size workroom

4.2.15. Control of worker exposure (CS 15): Mixing colour paste in closed drum mixing machine with automated dosing of paste (PROC 2)

Product (article) characteristics
Substance product type: Paste • Limit the substance content in the product to 25 % • Covers solid products only (relevant for dermal assessment only).
Amount used (or contained in articles), frequency and duration of use/exposure
Duration of use (hours/week): 40 hours/week
Technical and organisational conditions and measures
Advanced (industrial) exposure controls assumed.
Use in closed, continuous process with occasional controlled exposure.
Ventilation rate of the general ventilation system in the work area: 3 ACH (ACH = air changes per hour.)
Low level containment
Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with specific activity training; For further specification, refer to section 8 of the SDS.
Other conditions affecting workers exposure
Handling of pastes • Handling of apparently clean pastes • Normal handling, involves regular work procedures
Room size of the work area: Any size workroom

4.2.16. Control of worker exposure (CS 16): Mixing colour paste into paint in closed mixing vessel (PROC 3)

Product (article) characteristics
Substance product type: Powders incorporated in a liquid matrix • Limit the substance content in the product to 25 %. • Viscosity: Liquids with medium viscosity (like oil) • Covers solid products only (relevant for dermal assessment only).
Amount used (or contained in articles), frequency and duration of use/exposure
Duration of use (hours/week): 40 hours/week
Technical and organisational conditions and measures
Advanced (industrial) exposure controls assumed.
Use in closed batch process (synthesis or formulation)
Ventilation rate of the general ventilation system in the work area: 3 ACH (ACH = air changes per hour.)
Medium level containment
Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with specific activity training; For further specification, refer to section 8 of the SDS.

Other conditions affecting workers exposure
Activities with open liquid surfaces or open reservoirs • Activities with agitated surfaces • Surface 1 - 3 m²
Room size of the work area: Any size workroom

4.2.17. Control of worker exposure (CS 17): Pigment paint filling into drums/cans at a filling line (PROC 9)

Product (article) characteristics
Substance product type: Powders incorporated in a liquid matrix • Limit the substance content in the product to 25 %. • Viscosity: Liquids with medium viscosity (like oil) • Covers solid products only (relevant for dermal assessment only).
Amount used (or contained in articles), frequency and duration of use/exposure
Duration of use (hours/week): 40 hours/week
Technical and organisational conditions and measures
Use in semi-closed process with opportunity for exposure
Advanced (industrial) exposure controls assumed.
Ventilation rate of the general ventilation system in the work area: 3 ACH (ACH = air changes per hour.)
Fixed capturing hood
Partial segregation with ventilation and filtration of recirculated air
Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with specific activity training; For further specification, refer to section 8 of the SDS.
Other conditions affecting workers exposure
Transfer of liquid products: Falling liquids • Transferring 10 - 100 l/min • Open process • Splash loading
Room size of the work area: Any size workroom

4.2.18. Control of worker exposure (CS 18): Pigment paint charging/discharging using a dedicated installation (PROC 8b)

Product (article) characteristics
Substance product type: Powders incorporated in a liquid matrix • Limit the substance content in the product to 25 %. • Viscosity: Liquids with medium viscosity (like oil) • Covers solid products only (relevant for dermal assessment only).
Amount used (or contained in articles), frequency and duration of use/exposure
Duration of use (hours/week): 40 hours/week
Technical and organisational conditions and measures
Advanced (industrial) exposure controls assumed.
Use in semi-closed process with opportunity for exposure
Ventilation rate of the general ventilation system in the work area: 3 ACH (ACH = air changes per hour.)
Fixed capturing hood
Partial segregation with ventilation and filtration of recirculated air
Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with specific activity training; For further specification, refer to section 8 of the SDS.

Other conditions affecting workers exposure
Transfer of liquid products: Falling liquids • Transferring 100 - 1000 l/minute • Handling that reduces contact between product and adjacent air • Splash loading
Room size of the work area: Any size workroom

4.2.19. Control of worker exposure (CS 19): Equipment cleaning: scraping and brushing (PROC 10)

Product (article) characteristics
Substance product type: Powders incorporated in a liquid matrix • Liquid Weight Fraction: Minor (5 - 10%) • Viscosity: Liquids with medium viscosity (like oil) • Limit the substance content in the product to 25 % (relevant for dermal assessment only). • Covers solid products only (relevant for dermal assessment only).
Amount used (or contained in articles), frequency and duration of use/exposure
Duration of use (hours/week): 5 hours/week
Technical and organisational conditions and measures
Advanced (industrial) exposure controls assumed.
Ventilation rate of the general ventilation system in the work area: 3 ACH (ACH = air changes per hour.)
Low level containment
Conditions and measures related to personal protection, hygiene and health evaluation
Wear a respirator providing a minimum efficiency of 90.0 % (APF 10)
Wear chemically resistant gloves (tested to EN374) in combination with specific activity training; For further specification, refer to section 8 of the SDS.
Other conditions affecting workers exposure
Spreading of liquid products: • Spreading 1 - 3 m² / hour
Room size of the work area: Any size workroom

4.2.20. Control of worker exposure (CS 20): Dried pigment paint cleaning (PROC 21)

Product (article) characteristics
Substance product type: Powders • Limit the substance content in the product to 25 %. • Dustiness: Granules, flakes or pellets • Moisture Content of the product: Dry product • Covers solid products only (relevant for dermal assessment only).
Amount used (or contained in articles), frequency and duration of use/exposure
Duration of use (hours/week): 1 hour/week
Technical and organisational conditions and measures
Advanced (industrial) exposure controls assumed.
Ventilation rate of the general ventilation system in the work area: 3 ACH (ACH = air changes per hour.)
Conditions and measures related to personal protection, hygiene and health evaluation
Wear a respirator providing a minimum efficiency of 90.0 % (APF 10)
Wear chemically resistant gloves (tested to EN374) in combination with specific activity training; For further specification, refer to section 8 of the SDS.
Other conditions affecting workers exposure
Compressing of powders, granules or pelletised material • Compressing 10 – 100 gram/minute

• Open process
Room size of the work area: Any size workroom

4.2.21. Control of worker exposure (CS 21): Spray testing of pigment paint in industrial booth (PROC 7)

Product (article) characteristics
Substance product type: Powders incorporated in a liquid matrix • Limit the substance content in the product to 25 %. • Viscosity: Liquids with medium viscosity (like oil) • Covers solid products only (relevant for dermal assessment only).
Amount used (or contained in articles), frequency and duration of use/exposure
Duration of use (hours/week): 3 hours/week
Technical and organisational conditions and measures
Advanced (industrial) exposure controls assumed.
Cross-flow spray room
Conditions and measures related to personal protection, hygiene and health evaluation
Wear a respirator providing a minimum efficiency of 99.75 % (APF 400)
Wear chemically resistant gloves (tested to EN374) in combination with specific activity training; For further specification, refer to section 8 of the SDS.
Other conditions affecting workers exposure
Spray application of liquids - Surface spraying of liquids • Moderate application rate (0.3 - 3 l/minute) • Only horizontal or downward spraying • Spraying with no or low compressed air use

4.2.22. Control of worker exposure (CS 22): Pigment paint testing by brushing/rolling (PROC 10)

Product (article) characteristics
Substance product type: Powders incorporated in a liquid matrix • Limit the substance content in the product to 25 %. • Viscosity: Liquids with medium viscosity (like oil) • Covers solid products only (relevant for dermal assessment only).
Amount used (or contained in articles), frequency and duration of use/exposure
Duration of use (hours/week): 6 hours/week
Technical and organisational conditions and measures
Advanced (industrial) exposure controls assumed.
Ventilation rate of the general ventilation system in the work area: 3 ACH (ACH = air changes per hour.)
Fume cupboard
Conditions and measures related to personal protection, hygiene and health evaluation
Wear chemically resistant gloves (tested to EN374) in combination with specific activity training; For further specification, refer to section 8 of the SDS.
Other conditions affecting workers exposure
Spreading of liquid products • Spreading of liquids at surfaces or work pieces 0.3 - 1 m^2 / hour
Room size of the work area: Any size workroom

4.2.23. Control of worker exposure (CS 23): Pigment paste or paint laboratory operations (PROC 15)

Product (article) characteristics		
Substance product type: Powders incorporated in a liquid matrix • Limit the substance content in the product to 25 %. • Viscosity: Liquids with medium viscosity (like oil) • Covers solid products only (relevant for dermal assessment only).		
Amount used (or contained in articles), frequency and duration of use/exposure		
Duration of use (hours/week): 12 hours/week		
Technical and organisational conditions and measures		
Advanced (industrial) exposure controls assumed.		
Ventilation rate of the general ventilation system in the work area: 3 ACH (ACH = air changes per hour.)		
Fume cupboard		
Conditions and measures related to personal protection, hygiene and health evaluation		
Wear chemically resistant gloves (tested to EN374) in combination with specific activity training; For further specification, refer to section 8 of the SDS.		
Other conditions affecting workers exposure		
Transfer of liquid products - Falling liquids • Transferring < 0.1 l/minute • Open process • Splash loading *Duration: 25% of allowed hours/week for this activity*	Activities with open liquid surfaces or open reservoirs - Activities with agitated surfaces • Open Surface: Surface < 0.1 m² *Duration: 50% of allowed hours/week for this activity*	Spreading of liquid products • Spreading 0.1 - 0.3 m² / hour *Duration: 25% of allowed hours/week for this activity*
Room size of the work area: Any size workroom		

4.3. Exposure estimation and reference to its source

4.3.1. Environmental release and exposure (CS 1): Distribution and mixing pigment powder in an industrial environment into solvent-based paints for non-consumer use (ERC 2)

Release route	**Release rate**	**Release estimation method**
Water	0 kg/day	Release factor *(Site-specific information)*
Air	0.291 kg/day	Release factor *(SpERC CEPE 2.1c.v1 / Eurometaux 2.2b.v2.1)*
Soil	0 kg/day	Release factor *(SpERC CEPE 2.1c.v1 / Eurometaux 2.2b.v2.1)*

Protection target	**Exposure estimate (based on: EUSES 2.1.2)**	**Exposure / DMEL**
Freshwater	0 mg/L	< 0.01
Sediment (freshwater)	0 mg/kg dw	< 0.01
Marine water	0 mg/L	< 0.01
Sediment (marine water)	0 mg/kg dw	< 0.01
Sewage treatment plant	0 mg/L	< 0.01
Agricultural soil	3.915E-4 mg/kg dw	< 0.01

4.3.2. Worker exposure (CS 2): Delivery, storage and handling of closed bags with pigment powder (PROC 3)

Route of exposure and type of effects	Exposure estimate	Exposure / DMEL
Inhalation, systemic, long-term (carcinogenicity, lung)	**1.38E-5 mg/m³** (External Tool: *Extended ART v1.5*)	0.206
Oral, systemic, long-term (carcinogenicity, intestinal)	**8.73E-05 µg/kg bw/day** (calculated from exposure value for: Inhalation, systemic, long-term)	6.55E-05
Inhalation, systemic, long-term (neurodevelopmental damage)	**6.25E-04 mg/m³** (External Tool: *Extended ART v1.5*)	0.108
Dermal, systemic, long-term (neurodevelopmental damage)	**0.009 mg/kg bw/day** (External Tool (Extended TRA Workers v3))	0.002
Combined routes, systemic, long-term (neurodevelopmental damage)		0.110

4.3.3. Worker exposure (CS 3): Pigment powder quality control / lab work (PROC 15)

Route of exposure and type of effects	Exposure estimate	Exposure / DMEL
Inhalation, systemic, long-term (carcinogenicity, lung)	**4.18E-6 mg/m³** (External Tool: *Extended ART v1.5*)	0.063
Oral, systemic, long-term (carcinogenicity, intestinal)	**2.65E-05 µg/kg bw/day** (calculated from exposure value for: Inhalation, systemic, long-term)	1.99E-05
Inhalation, systemic, long-term (neurodevelopmental damage)	**1.90E-04 mg/m³** (External Tool: *Extended ART v1.5*)	0.033
Dermal, systemic, long-term (neurodevelopmental damage)	**0.004 mg/kg bw/day** (External Tool (Extended TRA Workers v3))	8.5E-4
Combined routes, systemic, long-term (neurodevelopmental damage)		0.034

4.3.4. Worker exposure (CS 4): Manual dosing of pigment powder (PROC 8a)

Route of exposure and type of effects	Exposure estimate	Exposure / DMEL
Inhalation, systemic, long-term (carcinogenicity, lung)	**3.8E-5 mg/m³** (External Tool: *Extended ART v1.5*)	0.569
Oral, systemic, long-term (carcinogenicity, intestinal)	**2.41E-04 µg/kg bw/day** (calculated from exposure value for: Inhalation, systemic, long-term)	1.81E-04
Inhalation, systemic, long-term (neurodevelopmental damage)	**1.73E-03 mg/m³** (External Tool: *Extended ART v1.5*)	0.297
Dermal, systemic, long-term (carcinogenicity, intestinal)	**0.103 mg/kg bw/day** (External Tool: *Extended TRA Workers v3*)	0.021
Combined routes, systemic, long-term (neurodevelopmental damage)		0.318

4.3.5. Worker exposure (CS 5): Automated dosing of pigment powder (PROC 8b)

Route of exposure and type of effects	Exposure estimate	Exposure / DMEL
Inhalation, systemic, long-term (carcinogenicity, lung)	**1.82E-6 mg/m³** (External Tool: *Extended ART v1.5*)	0.027
Oral, systemic, long-term (carcinogenicity, intestinal)	**1.15E-05 µg/kg bw/day** (calculated from exposure value for: Inhalation, systemic, long-term)	8.64E-06
Inhalation, systemic, long-term	**8.25E-05 mg/m³** (External Tool: *Extended ART v1.5*)	0.014

Route of exposure and type of effects	Exposure estimate	Exposure / DMEL
(neurodevelopmental damage)		
Dermal, systemic, long-term (neurodevelopmental damage)	**0.171 mg/kg bw/day** (External Tool: *Extended TRA Workers v3*)	0.034
Combined routes, systemic, long-term (neurodevelopmental damage)		0.048

4.3.6. Worker exposure (CS 6): Re-packaging of pigment powder (PROC 9)

Route of exposure and type of effects	Exposure estimate	Exposure / DMEL
Inhalation, systemic, long-term (carcinogenicity, lung)	**1.45E-5 mg/m³** (External Tool: *Extended ART v1.5*)	0.218
Oral, systemic, long-term (carcinogenicity, intestinal)	**9.22E-05 µg/kg bw/day** (calculated from exposure value for: Inhalation, systemic, long-term)	6.92E-05
Inhalation, systemic, long-term (neurodevelopmental damage)	**6.60E-04 mg/m³** (External Tool: *Extended ART v1.5*)	0.114
Dermal, systemic, long-term (neurodevelopmental damage)	**0.069 mg/kg bw/day** (External Tool: *Extended TRA Workers v3*)	0.014
Combined routes, systemic, long-term (neurodevelopmental damage)		0.128

4.3.7. Worker exposure (CS 7): Mixing of pigment paste (PROC 5)

Route of exposure and type of effects	Exposure estimate	Exposure / DMEL
Inhalation, systemic, long-term (carcinogenicity, lung)	**0 mg/m³** (External Tool: *Extended ART v1.5*)	0
Oral, systemic, long-term (carcinogenicity, intestinal)	**0 µg/kg bw/day** (calculated from exposure value for: Inhalation, systemic, long-term)	0
Inhalation, systemic, long-term (neurodevelopmental damage)	**0 mg/m³** (External Tool: *Extended ART v1.5*)	0
Dermal, systemic, long-term (neurodevelopmental damage)	**0.309 mg/kg bw/day** (External Tool: *Extended TRA Workers v3*)	0.062
Combined routes, systemic, long-term (neurodevelopmental damage)		0.062

4.3.8. Worker exposure (CS 8): Storage of pigment paste / Transfer of pigment paste through closed piping (PROC 2)

Route of exposure and type of effects	Exposure estimate	Exposure / DMEL
Inhalation, systemic, long-term (carcinogenicity, lung)	**0 mg/m³** (External Tool: *Extended ART v1.5*)	0
Oral, systemic, long-term (carcinogenicity, intestinal)	**0 µg/kg bw/day** (calculated from exposure value for: Inhalation, systemic, long-term)	0
Inhalation, systemic, long-term (neurodevelopmental damage)	**0 mg/m³** (External Tool: *Extended ART v1.5*)	0
Dermal, systemic, long-term (neurodevelopmental damage)	**0.026 mg/kg bw/day** (External Tool: *Extended TRA Workers v3*)	0.005
Combined routes, systemic, long-term (neurodevelopmental damage)		0.005

4.3.9. Worker exposure (CS 9): Manual cleaning / scraping of mixing vessels, equipment and lids (PROC 21)

Route of exposure and type of effects	Exposure estimate	Exposure / DMEL
Inhalation, systemic, long-term (carcinogenicity, lung)	**4.13E-6 mg/m³** (External Tool: *Extended ART v1.5*)	0.062
Oral, systemic, long-term (carcinogenicity, intestinal)	**2.62E-05 µg/kg bw/day** (calculated from exposure value for: Inhalation, systemic, long-term)	1.96E-05
Inhalation, systemic, long-term (neurodevelopmental damage)	**1.88E-04 mg/m³** (External Tool: *Extended ART v1.5*)	0.032
Dermal, systemic, long-term (neurodevelopmental damage)	**0.011 mg/kg bw/day** (External Tool: *Extended TRA Workers v3*)	0.002
Combined routes, systemic, long-term (neurodevelopmental damage)		0.034

4.3.10. Worker exposure (CS 10): Cleaning of vessel with solvent (PROC 10)

Route of exposure and type of effects	Exposure estimate	Exposure / DMEL
Inhalation, systemic, long-term (carcinogenicity, lung)	**5.94E-6 mg/m³** (External Tool: *Extended ART v1.5*)	0.089
Oral, systemic, long-term (carcinogenicity, intestinal)	**3.77E-05 µg/kg bw/day** (calculated from exposure value for: Inhalation, systemic, long-term)	2.83E-05
Inhalation, systemic, long-term (neurodevelopmental damage)	**2.70E-04 mg/m³** (External Tool: *Extended ART v1.5*)	0.047
Dermal, systemic, long-term (neurodevelopmental damage)	**0.206 mg/kg bw/day** (External Tool: *Extended TRA Workers v3*)	0.041
Combined routes, systemic, long-term (neurodevelopmental damage)		0.088

4.3.11. Worker exposure (CS 11): Pigment paste testing by smearing (PROC 10)

Route of exposure and type of effects	Exposure estimate	Exposure / DMEL
Inhalation, systemic, long-term (carcinogenicity, lung)	**0 mg/m³** (External Tool: *Extended ART v1.5*)	0
Oral, systemic, long-term (carcinogenicity, intestinal)	**0 µg/kg bw/day** (calculated from exposure value for: Inhalation, systemic, long-term)	0
Inhalation, systemic, long-term (neurodevelopmental damage)	**0 mg/m³** (External Tool (Extended ART v1.5))	0
Dermal, systemic, long-term (neurodevelopmental damage)	**0.309 mg/kg bw/day** (External Tool: *Extended TRA Workers v3*)	0.062
Combined routes, systemic, long-term (neurodevelopmental damage)		0.062

4.3.12. Worker exposure (CS 12): Pigment paste charging/discharging by gravity or manual handling (PROC 8a)

Route of exposure and type of effects	Exposure estimate	Exposure / DMEL
Inhalation, systemic, long-term (neurodevelopmental damage)	**0 mg/m³** (External Tool: *Extended ART v1.5*)	0
Oral, systemic, long-term (carcinogenicity, intestinal)	**0 µg/kg bw/day** (calculated from exposure value for: Inhalation, systemic, long-term)	0

Route of exposure and type of effects	Exposure estimate	Exposure / DMEL
Inhalation, systemic, long-term (neurodevelopmental damage)	**0 mg/m³** (External Tool: *Extended ART v1.5*)	0
Dermal, systemic, long-term (neurodevelopmental damage)	**0.154 mg/kg bw/day** (External Tool: *Extended TRA Workers v3*)	0.031
Combined routes, systemic, long-term (neurodevelopmental damage)		0.031

4.3.13. Worker exposure (CS 13): Pigment paste charging/discharging using a dedicated installation (PROC 8b)

Route of exposure and type of effects	Exposure estimate	Exposure / DMEL
Inhalation, systemic, long-term (carcinogenicity, lung)	**0 mg/m³** (External Tool: *Extended ART v1.5*)	0
Oral, systemic, long-term (carcinogenicity, intestinal)	**0 µg/kg bw/day** (calculated from exposure value for: Inhalation, systemic, long-term)	0
Inhalation, systemic, long-term (neurodevelopmental damage)	**0 mg/m³** (External Tool: *Extended ART v1.5*)	0
Dermal, systemic, long-term (neurodevelopmental damage)	**0.154 mg/kg bw**/day (External Tool: *Extended TRA Workers v3*)	0.031
Combined routes, systemic, long-term (neurodevelopmental damage)		0.031

4.3.14. Worker exposure (CS 14): Pigment paste filling into drums/cans at a filling line (PROC 9)

Route of exposure and type of effects	Exposure estimate	Exposure / DMEL
Inhalation, systemic, long-term (carcinogenicity, lung)	**0 mg/m³** (External Tool: *Extended ART v1.5*)	0
Oral, systemic, long-term (carcinogenicity, intestinal)	**0 µg/kg bw/day** (calculated from exposure value for: Inhalation, systemic, long-term)	0
Inhalation, systemic, long-term (neurodevelopmental damage)	**0 mg/m³** (External Tool: *Extended ART v1.5*)	0
Dermal, systemic, long-term (neurodevelopmental damage)	**0.274 mg/kg bw/day** (External Tool: *Extended TRA Workers v3*)	0.055
Combined routes, systemic, long-term (neurodevelopmental damage)		0.055

4.3.15. Worker exposure (CS 15): Mixing colour paste in closed drum mixing machine with automated dosing of paste (PROC 2)

Route of exposure and type of effects	Exposure estimate	Exposure / DMEL
Inhalation, systemic, long-term (carcinogenicity, lung)	**0 mg/m³** (External Tool: *Advanced REACH Tool v1.5*)	0
Oral, systemic, long-term (carcinogenicity, intestinal)	**0 µg/kg bw/day** (calculated from exposure value for: Inhalation, systemic, long-term)	0
Inhalation, systemic, long-term (neurodevelopmental damage)	**0 mg/m³** (External Tool: *Advanced REACH Tool v1.5*)	0
Dermal, systemic, long-term	**0.041 mg/kg bw/day** (TRA Workers 3.0)	0.008

Route of exposure and type of effects	Exposure estimate	Exposure / DMEL
(neurodevelopmental damage)		
Combined routes, systemic, long-term (neurodevelopmental damage)		0.008

4.3.16. Worker exposure (CS 16): Mixing colour paste into paint in closed mixing vessel (PROC 3)

Route of exposure and type of effects	Exposure estimate	Exposure / DMEL
Inhalation, systemic, long-term (carcinogenicity, lung)	**2.2E-5 mg/m³** (External Tool: *Advanced REACH Tool v1.5*)	0.330
Oral, systemic, long-term (carcinogenicity, intestinal)	**1.40E-04 µg/kg bw/day** (calculated from exposure value for: Inhalation, systemic, long-term)	1.05E-04
Inhalation, systemic, long-term (neurodevelopmental damage)	**1.00E-03 mg/m³** (External Tool: *Advanced REACH Tool v1.5*)	0.172
Dermal, systemic, long-term (neurodevelopmental damage)	**0.021 mg/kg bw/day** (TRA Workers 3.0)	0.004
Combined routes, systemic, long-term (neurodevelopmental damage)		0.177

4.3.17. Worker exposure (CS 17): Pigment paint filling into drums/cans at a filling line (PROC 9)

Route of exposure and type of effects	Exposure estimate	Exposure / DMEL
Inhalation, systemic, long-term (carcinogenicity, lung)	**2.42E-5 mg/m³** (External Tool: *Advanced REACH Tool v1.5*)	0.363
Oral, systemic, long-term (carcinogenicity, intestinal)	**1.54E-04 µg/kg bw/day** (calculated from exposure value for: Inhalation, systemic, long-term)	1.15E-04
Inhalation, systemic, long-term (neurodevelopmental damage)	**1.10E-03 mg/m³** (External Tool: *Advanced REACH Tool v1.5*)	0.190
Dermal, systemic, long-term (neurodevelopmental damage)	**0.206 mg/kg bw/day** (TRA Workers 3.0)	0.041
Combined routes, systemic, long-term (neurodevelopmental damage)		0.231

4.3.18. Worker exposure (CS 18): Pigment paint charging/discharging using a dedicated installation (PROC 8b)

Route of exposure and type of effects	Exposure estimate	Exposure / DMEL
Inhalation, systemic, long-term (carcinogenicity, lung)	**2.2E-5 mg/m³** (External Tool: *Advanced REACH Tool v1.5*)	0.330
Oral, systemic, long-term (carcinogenicity, intestinal)	**1.40E-04 µg/kg bw/day** (calculated from exposure value for: Inhalation, systemic, long-term)	1.05E-04
Inhalation, systemic, long-term (neurodevelopmental damage)	**1.00E-03 mg/m³** (External Tool: *Advanced REACH Tool v1.5*)	0.172
Dermal, systemic, long-term	**0.411 mg/kg bw/day** (TRA Workers 3.0)	0.082
Combined routes, systemic, long-term (neurodevelopmental damage)		0.255

4.3.19. Worker exposure (CS 19) : Equipment cleaning: scraping and brushing (PROC 10)

Route of exposure and type of effects	Exposure estimate	Exposure / DMEL
Inhalation, systemic, long-term (carcinogenicity, lung)	**9.63E-7 mg/m³** (External Tool: *Extended ART v1.5*)	0.014
Oral, systemic, long-term (carcinogenicity, intestinal)	**6.11E-06 µg/kg bw/day** (calculated from exposure value for: Inhalation, systemic, long-term)	4.58E-06
Inhalation, systemic, long-term (neurodevelopmental damage)	**4.38E-05 mg/m³** (External Tool: *Extended ART v1.5*)	0.008
Dermal, systemic, long-term (neurodevelopmental damage)	0.103 mg/kg bw/day (External Tool: *Extended TRA Workers v3*)	0.021
Combined routes, systemic, long-term (neurodevelopmental damage)		0.028

4.3.20. Worker exposure (CS 20): Dried pigment paint cleaning (PROC 21)

Route of exposure and type of effects	Exposure estimate	Exposure / DMEL
Inhalation, systemic, long-term (carcinogenicity, lung)	**3.52E-6 mg/m³** (External Tool: *Extended ART v1.5*)	0.053
Oral, systemic, long-term (carcinogenicity, intestinal)	**2.24E-05 µg/kg bw/day** (calculated from exposure value for: Inhalation, systemic, long-term)	1.68E-05
Inhalation, systemic, long-term (neurodevelopmental damage)	**1.60E-04 mg/m³** (External Tool: *Extended ART v1.5*)	0.028
Dermal, systemic, long-term (neurodevelopmental damage)	**0.002 mg/kg bw/day** (External Tool: *Extended TRA Workers v3*)	4.26E-4
Combined routes, systemic, long-term (neurodevelopmental damage)		0.028

4.3.21. Worker exposure (CS 21): Spray testing of pigment paint in industrial booth (PROC 7)

Route of exposure and type of effects	Exposure estimate	Exposure / DMEL
Inhalation, systemic, long-term (carcinogenicity, lung)	3.83E-5 mg/m³ (External Tool: *Extended ART v1.5*)	0.574
Oral, systemic, long-term (carcinogenicity, intestinal)	**4.01E-05 µg/kg bw/day** (calculated from exposure value for: Inhalation, systemic, long-term)	3.01E-05
Inhalation, systemic, long-term (neurodevelopmental damage)	**3.19E-04 mg/m³** (External Tool: *Extended ART v1.5*)	0.055
Dermal, systemic, long-term (neurodevelopmental damage)	0.097 mg/kg bw/day (External Tool: *Extended TRA Workers v3*)	0.019
Combined routes, systemic, long-term (neurodevelopmental damage)		0.074

4.3.22. Worker exposure (CS 22): Pigment paint testing by brushing/rolling (PROC 10)

Route of exposure and type of effects	Exposure estimate	Exposure / DMEL
Inhalation, systemic, long-term (carcinogenicity, lung)	**9.57E-6 mg/m³** (External Tool: *Extended ART v1.5*)	0.144
Oral, systemic, long-term (carcinogenicity, intestinal)	**6.08E-05 µg/kg bw/day** (calculated from exposure value for: Inhalation, systemic, long-term)	4.56E-05

Route of exposure and type of effects	Exposure estimate	Exposure / DMEL
Inhalation, systemic, long-term (neurodevelopmental damage)	**4.35E-04 mg/m³** (External Tool: *Extended ART v1.5*)	0.075
Dermal, systemic, long-term (neurodevelopmental damage)	**0.123 mg/kg bw/day** (External Tool: *Extended TRA Workers v3*)	0.025
Combined routes, systemic, long-term (neurodevelopmental damage)		0.100

4.3.23. Worker exposure (CS 23): Pigment paste or paint laboratory operations (PROC 15)

Route of exposure and type of effects	Exposure estimate	Exposure / DMEL
Inhalation, systemic, long-term (carcinogenicity, lung)	**9.24E-7 mg/m³** (External Tool: *Extended ART v1.5*)	0.014
Oral, systemic, long-term (carcinogenicity, intestinal)	**5.87E-06 µg/kg bw/day** (calculated from exposure value for: Inhalation, systemic, long-term)	4.40E-06
Inhalation, systemic, long-term (neurodevelopmental damage)	**4.20E-05 mg/m³** (External Tool (Extended ART v1.5))	0.007
Dermal, systemic, long-term (neurodevelopmental damage)	**0.003 mg/kg bw/day** (External Tool: *Extended TRA Workers v3*)	6E-4
Combined routes, systemic, long-term (neurodevelopmental damage)		0.008

4.4. Guidance to downstream user (DU) to evaluate whether he works inside the boundaries set by the ES

Assessing compliance with the exposure scenario
The downstream user must assess the operational conditions and risk management measures for each worker activity with the contributing scenarios in section 4.2. The prescribed risk management measures are shown for guidance where the overall objective is to achieve the required DMELs. The following should be considered:

- The actual volumes used (kg/day) and transfer speed (kg/minute, L/minute or m^2/hour) must not exceed the values listed.
- The average duration (hours/week) for which a task is performed in practice must not exceed the values listed.
- Technical risk management measures are used within the boundaries set by the manufacturer (DCC) and are adequately maintained including:
    - General ventilation and LEV: a direct measurement of the airspeed in the ventilation channels and the concentration of the pigments is below 10% of the DMEL
    - Assigned protection factor (APF) of the RPE is adequate for the specific worker function (**Table 1**).
    - Fit testing prior to first use and repeated annually or as often as the workers face changes shape (weight loss or gain of more than 4 kg).
    - Supervision of proper use for RPE needs to be in place and documented.

Explanation on risk characterisation
Most of the worker contributing scenarios have been assessed at less than 40 hours/week. In this chapter, the tasks as described by the contributing scenarios are combined into worker functions. The combinations were based on information gathered in the extensive site visits, information from interviews and literature. The combined tasks aim to provide an adequate description of actual exposures. If a downstream user has a different combination of activities, it is important to assess each function.

The carcinogenicity (lung and intestinal cancer) and developmental effects of PY.34 or PR.104 are linked to long term average exposure. The cumulative risk is referred to as the Exposure/DMEL ratio (EDR). In order for the cancer risk to be regarded as "acceptably low", the Exposure / DMEL ratio (EDR) for the activity must not be higher than the EDR listed under Section 4.3.

This also means that the EDR for lung cancer combined with the EDR for intestinal cancer must be below 1 at all times in order for the yearly worker risk to be below 10^{-6} per year and the related life time worker risk to be below $4*10^{-5}$ (which is accepted by Competent Authorities in the EU). The combined EDR for neurodevelopmental effects (inhalation and dermal route) must be below 1 for all female workers of childbearing age, because at this level the effect is toxicologically insignificant.

Risk calculation for functions
The summary tables provided in Section 1 (**Table 1**) of this document show which tasks (or contributing scenarios) are combined into functions. For each task among others the use of respiratory protection (including Assigned Protection Factor; APF) and the frequency of use (hours/week) is provided.

The cumulative risks for chromium (exposure / DMEL ratio) for these different functions are provided in **Table 5**:

1. **The ratio of the 8-hour time weight average (TWA) respirable exposure value to pigment in µg/m^3 taking into account the assigned protection factor of respiratory protection and the inhalation DMEL for the pigment.**
   This value shows the level of control for this route. As the value is below 1 for all functions, the excess lung cancer risk is less than $4*10^{-5}$ for a 40 hour per week, 40 year exposure. This means that the additional cancer risk can be assessed as being "acceptably low".
2. **The ratio of the 8-hour oral dose in µg/kg bw into account the assigned protection factor of respiratory protection used and the oral DMEL for the pigment.**
   This value shows the level of control for this route. As the value is below 1 for all functions, the excess intestinal cancer risk is less than $4*10^{-5}$ for a 40 hour per week, 40 year exposure. This means that the additional cancer risk can be assessed as being "acceptably low".

3. **The combined ratios mentioned under 1 and 2.**
   This value shows the level of control for both the inhalation of the respirable fraction and the oral intake of the non-respirable inhalable fraction inhaled.
   As the value is below 1 for all functions, the excess cancer risk is less than $4*10^{-5}$ for a 40 hour per week, 40 year exposure. This means that the additional cancer risk can be assessed as being "acceptablylow".

The cumulative risks for chromium (exposure / DMEL ratio) for these different functions is provided in **Table 5**:

Table 5. Overview of function based exposure / DMEL ratios for Use 1 (ES1)

	Function	**Operator / formulator**	**Lab worker / Quality control**	**General worker**	**Repackager**	**Mixing and blending operator**	**Paint filling operator**
	Hours per week	**40**	**40**	**40**	**40**	**40**	**40**
1	Function inhalation respirable dust / DMEL ratio Chrome, *taking* RPE into account	7.11E-01	7.94E-01	4.13E-01	2.18E-01	3.36E-01	3.36E-01
2	Function oral exposure / DMEL ratio Chrome, taking RPE into account	2.26E-04	9.99E-05	1.31E-04	6.92E-05	1.15E-04	1.15E-04
3	Function combined inhalation and oral exposure / DMEL ratio Chrome, taking RPE into account	7.11E-01	7.94E-01	4.13E-01	2.18E-01	3.36E-01	3.36E-01

In case the conditions as specified in this Annex are not in line with the actual conditions in your facility, contact and inform your supplier.

For any inquiries please contact the DCC Maastricht BV OR via the following e-mail address: hschulpen@dominioncolour.nl.

USE 1: Verification of DCC PY.34 & PR.104 RMM and OC
Summary of Blood lead, Air Monitoring and RPE

DATE: 28.11.2016

Dear Customer and Down Stream User,

We are pleased to inform you that our pigment supplier, DCC has successfully applied for the continued use of Pigment Yellow 34 and Pigment Red 104. In order to ensure safe handling of these pigments, the European Commission has included the assessment of biomonitoring data, air monitoring data and RPE effectiveness by the Authorisation holder.

As per Article 3(e) of the final EC decision, C(2016) 5644 of 07.09.2016, all customers and downstream users are obligated to provide blood lead information and air monitoring results for chromium to ECHA. DCC Maastricht B.V. OR will receive data from ECHA as per Article 3(f) for the purpose of preparing a review reports.

In order to complete your notification to ECHA, please refer to Table 1 which can be found in each eSDS to identify the worker functions and the activities that are covered per use under DCC's Authorisation. Table 1 indicates the specific activities that a worker is permitted to perform under the specified technical and organisational conditions. The table below summarises the uses and the assigned Authorisation numbers for DCC PY.34 and PR.104.

DCC eSDS (Use)	Description of USE for Paint Sector	DCC PY.34 Authorisation Numbers:	DCC PR.104 Authorisation Numbers:
Use 1	Use: distribution and mixing of pigment powder in an industrial environment into solvent-based paints for non-consumer use	REACH/16/3/0	REACH/16/3/6
Use 2	Use: industrial application of paints on metal surfaces (such as machines vehicles, structures, signs, road furniture, coil coating, etc.)	REACH/16/3/1	REACH/16/3/7
Use 3	Use: professional, non-consumer application of paints on metal surfaces (such as machines, vehicles, structures, signs, road furniture, etc.) or as road marking	REACH/16/3/2	REACH/16/3/8

DCC eSDS (Use)	Description of USE for Plastic Sector	DCC PY.34 Authorisation Numbers:	DCC PR.104 Authorisation Numbers:
Use 4	Use: distribution and mixing pigment powder in an industrial environment into liquid or solid premix to colour plastic/plasticised articles for non-consumer use	REACH/16/3/3	REACH/16/3/9
Use 5	Use: industrial use of solid or liquid colour premixes and pre-compounds containing pigment to colour plastic or plasticised articles for non-consumer use	REACH/16/3/4	REACH/16/3/10
Use 6	Use: professional use of solid or liquid colour premixes and pre-compounds containing pigment in the application of hot melt road marking	REACH/16/3/5	REACH/16/3/11

HMG Paints Limited and DCC recommends using the attached form **for each employee** involved with DCC PY.34 and/or PR.104 to verify and monitor worker exposures. This form can be submitted to ECHA and to DCC (hschulpen@dominioncolour.nl) by March, 31st of each year, summarising the results of the previous year.

If you have any questions regarding the use of DCC PY.34 and/or PR.104, please feel free to contact your HMG representative.

Thank you for your continued support.

USE 1: Verification of DCC PY.34 & PR.104 RMM and OC
Summary of Blood lead, Air Monitoring and RPE

I. General Information:

Company Name:		Contact Name:	
Address:		Contact Phone #:	
Postal Code		Contact e-mail:	
City, Country:		Date:	
# Workers handling/exposed to PY.34 and/or PR.104			
Annual volume PY.34/ PR.104 used:			
Comments:			

II. Company specific: Use and Legal Requirements

REACH Authorisation Number: Tick the boxes that apply to your company	% PY.34/PR.104 in product (ranges are acceptable, but within ± 10% of the contents)	Member State Regulation related to Health Surveillance	Health Surveillance		Air Monitoring for Chromium
			Action Level[1]	Suspension Level[2]	Comments:
PY.34 USE 1: REACH/16/3/0 USE 4: REACH/16/3/3 USE 2: REACH/16/3/1 USE 5: REACH/16/3/4 USE 3: REACH/16/3/2 USE 6: REACH/16/3/5		Directive 98/24/EC Directive 2004/37/EC Other. If other apply, please specify:	40 µg lead/100 ml blood Other. If other apply, please specify:	70 µg lead/100 ml blood Other. If other apply, please specify:	Please provide Member State Regulation for Air Monitoring: Please provide Sampling Procedure for air monitoring: Please provide analytical method for air monitoring:
PR.104 USE 1: REACH/16/3/6 USE 4: REACH/16/3/9 USE 2: REACH/16/3/7 USE 5: REACH/16/3/10 USE 3: REACH/16/3/8 USE 6: REACH/16/3/11			Please provide Sampling test Method for Blood Lead:		

[1] Action level: triggers employer to carry out investigation, review control measures and take steps to reduce employee's blood lead concentration below the action level so far as reasonably practicable

[2] Suspension level: concentration at which employees are normally taken off work which exposes them to lead. Return to work/modification of work exposure is based on Doctor's recommendations

USE 1: Verification of DCC PY.34 & PR.104 RMM and OC
Summary of Blood lead, Air Monitoring and RPE

III. Worker / Employee specific

Table 1. Overview of tasks per function for Use 1 (ES 1)

Company: **Comments:**			**Employee (internal) Id[3]:** Smoker Non- smoker						**Approximate volume handled by employee over last 6-12 months:** **Approximate volume handled by employee/per day:**					
Description of Worker Functions and Tasks			**Summary of RMM for USE 1**						**Verification of RMM**			**Results of Monitoring Programs**		
Function	**Workplace instruction card (WIC)**	**Tasks (description of Contributing Scenario)**	**Technical RMM**			**Organisational RMM**	**RPE**		**Site RMM**	**Max. hours/week**	**Type RPE used**	**Blood lead Testing**		**Personal Air Monitoring**		
			A. Containment of source	**B. Personal enclosure (PE) / segregation (SEG)**	**C. Local exhaust ventilation (LEV)**	**Maximum hours per week**	**Minimum Respiratory protective equipment (APF[4])**		**A, B or C**	**hours**	**APF**	**µg lead/100 ml blood**	**Date of test**	**Pigment µg/m³**	**Cr µg/m³[5]**	**Date of Test**
Operator / Formulator	**WIC01**	Manual dosing of pigment powder **or** Automated dosing of pigment powder	 Y	- Y (SEG)	Y Y	6 10	40 -									
		Mixing of pigment paste	Y			18	-									
		Cleaning of vessel with solvent	Y			6	20									
		Pigment paste charging/discharging by gravity or manual handling **or** Pigment paste charging/discharging using a dedicated installation				9 9	- -									
		Dried pigment paint cleaning				1	10									
		Total				**40[6]**										

[3] Only list non-confidential details. Personal data to be maintained by the customer/downstream user.
[4] Level of respiratory protection that can realistically be expected to be achieved in the workplace by 95% of adequately trained and supervised wearers using a properly functioning and correctly fitted respiratory protective device.

[5] The exposure related to chromium can be calculated based on a general 15% Cr-content of PY.34/PR.104
[6] The limit value for the two pigments is based on an exposure duration of 40 hours per working week. Therefore the maximum duration for any function is 40 even though for this function the summed duration per task can be over 40 hours.

USE 1: Verification of DCC PY.34 & PR.104 RMM and OC
Summary of Blood lead, Air Monitoring and RPE

Table 2 continue: Overview of tasks per function for Use 1 (ES 1)

Company: **Comments:**			**Employee (internal) Id[7]:** Smoker Non- smoker							**Approximate volume handled by employee over last 6-12 months:** **Approximate volume handled by employee/per day:**					
Description of Worker Functions and Tasks			**Summary of RMM for USE 1**					**Verification of RMM**			**Results of Monitoring Programs**				
Function	**Workplace instruction card (WIC)**	**Tasks (description of Contributing Scenario)**	**Technical RMM**			**Organisational RMM**	**RPE**	**Site RMM**	**Max. hours/week**	**Type RPE used**	**Blood lead results**		**Personal Air Monitoring**		
			A. Containment of source	**B. Personal enclosure (PE) / segregation (SEG)**	**C. Local exhaust ventilation (LEV)**	**Maximum hours per week**	**Minimum Respiratory protective equipment (APF[8])**	**A, B or C**	**hours**	**APF**	**µg lead/100 ml blood**	**Date of test**	**pigment µg/m³**	**Cr µg/m³[9]**	**Date of Test**
Lab worker / Quality control	**WIC02**	Pigment powder quality control / lab work			Y	10	-								
		Pigment paste testing by smearing				9	-								
		Spray testing of pigment paint in industrial booth			Y (spray room)	3	400								
		Pigment paint testing by brushing/rolling			Y	6	-								
		Pigment paste or paint laboratory operations			Y	12	-								
		Total				**40**									

[7] Only list non-confidential details. Personal data to be maintained by the customer/downstream user.
[8] Level of respiratory protection that can realistically be expected to be achieved in the workplace by 95% of adequately trained and supervised wearers using a properly functioning and correctly fitted respiratory protective device.
[9] The exposure related to chromium can be calculated based on a general 15% Cr-content of PY.34/PR.104

USE 1: Verification of DCC PY.34 & PR.104 RMM and OC
Summary of Blood lead, Air Monitoring and RPE

Table 3 continue: Overview of tasks per function for Use 1 (ES 1)

Company: **Comments:**			**Employee (internal) Id[10]:** Smoker Non- smoker								**Approximate volume handled by employee over last 6-12 months:** **Approximate volume handled by employee/per day:**				
Description of Worker Functions and Tasks			**Summary of RMM for USE 1**					**Verification of RMM**			**Results of Monitoring Programs**				
Function	**Workplace instruction card (WIC)**	**Tasks (description of Contributing Scenario)**	**Technical RMM**			**Organisational RMM**	**RPE**	**Site RMM**	**Max. hours/week**	**Type RPE used**	**Blood lead results**		**Personal Air Monitoring**		
			A. Containment of source	**B. Personal enclosure (PE) / segregation (SEG)**	**C. Local exhaust ventilation (LEV)**	**Maximum hours per week**	**Minimum Respiratory protective equipment (APF[11])**	**A, B or C**	**hours**	**APF**	**µg lead/100 ml blood**	**Date of test**	**pigment µg/m³**	**Cr µg/m³[12]**	**Date of Test**
General worker	**WIC03**	Delivery, storage and handling of closed bags with pigment powder				10	-								
		Storage of pigment paste / Transfer of pigment paste through closed piping	Y			15	-								
		Manual cleaning / scraping of mixing vessels, equipment and lids				3	10								
		Cleaning of vessel with solvent	Y			6	20								
		Equipment cleaning: scraping and brushing	Y			5	10								
		Dried pigment paint cleaning				1	10								
		Total				**40**									

[10] Only list non-confidential details. Personal data to be maintained by the customer/downstream user.

[11] Level of respiratory protection that can realistically be expected to be achieved in the workplace by 95% of adequately trained and supervised wearers using a properly functioning and correctly fitted respiratory protective device.

[12] The exposure related to chromium can be calculated based on a general 15% Cr-content of PY.34/PR.104

USE 1: Verification of DCC PY.34 & PR.104 RMM and OC
Summary of Blood lead, Air Monitoring and RPE

Table 4 continue: Overview of tasks per function for Use 1 (ES 1)

Company: **Comments:**			**Employee (internal) Id[13]:** Smoker Non- smoker							**Approximate volume handled by employee over last 6-12 months:** **Approximate volume handled by employee/per day:**							
Description of Worker Functions and Tasks			**Summary of RMM for USE 1**							**Verification of RMM**			**Results of Monitoring Programs**				
Function	**Workplace instruction card (WIC)**	**Tasks (description of Contributing Scenario)**	**Technical RMM**			**Organisational RMM**	**RPE**			**Site RMM**	**Max. hours/week**	**Type RPE used**	**Blood lead results**		**Personal Air Monitoring**		
			A. Containment of source	**B. Personal enclosure (PE) / segregation (SEG)**	**C. Local exhaust ventilation (LEV)**	**Maximum hours per week**	**Minimum Respiratory protective equipment (APF[14])**			**A, B or C**	**hours**	**APF**	**µg lead/100 ml blood**	**Date of test**	**pigment µg/m³**	**Cr µg/m³[15]**	**Date of Test**
Repackager	**WIC04**	Re-packaging of pigment powder	Y	Y (SEG)		8	-										
		Pigment paste filling into drums/cans at a filling line				32	-										
		Total				**40**											
Mixing and blending operator	**WIC05**	Mixing colour paste in closed drum mixing machine with automated dosing of paste **or** Mixing colour paste into paint in closed mixing vessel	Y Y			40 40	- -										
Paint filling operator	**WIC06**	Pigment paint filling into drums/cans at a filling line **or** Pigment paint charging/discharging using a dedicated installation		Y (SEG) Y (SEG)	Y Y	40 40	- -										

[13] Only list non-confidential details. Personal data to be maintained by the customer/downstream user.
[14] Level of respiratory protection that can realistically be expected to be achieved in the workplace by 95% of adequately trained and supervised wearers using a properly functioning and correctly fitted respiratory protective device.
[15] The exposure related to chromium can be calculated based on a general 15% Cr-content of PY.34/PR.104

USE 1: Verification of DCC PY.34 & PR.104 RMM and OC
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IV. Company specific: Stationary Air Monitoring Data for Chromium

Company Name: **Approximate Volume of PY.34/PR.104 handled during sampling period:**		**Please state Member State Regulation for Air Monitoring:**	**DMEL inhalation:** ***0.067µg pigment/m3*** **Sampling method/frequency:**		
Location Description	**Length of Sampling Period (hours)**	**Date of Sampling**	**Results (µg pigment/m^3)**	**Results (µg Cr/m^3)**[16]	**Comments**

[16] The exposure related to chromium can be calculated based on a general 15% Cr-content of PY.34/PR.104