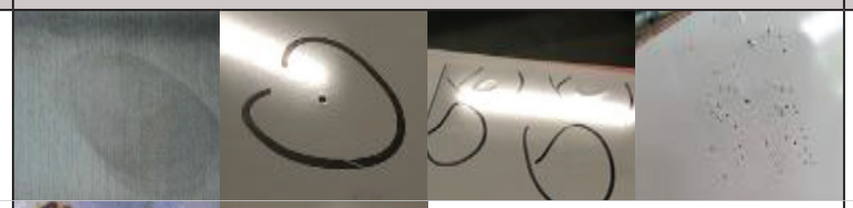
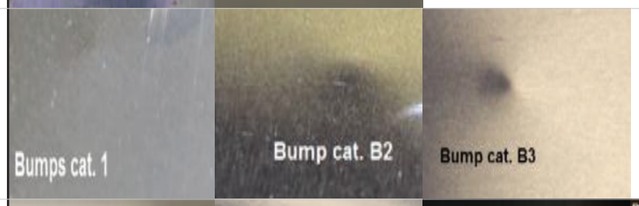
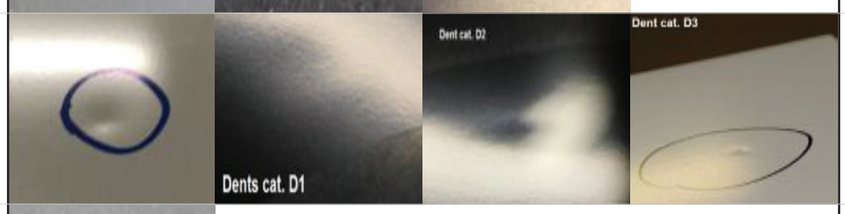
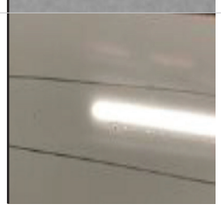
Polyvision Inspection Alignment Surface Defect Guide ENG

DEFECT	SOURCE	PICTURE	DESCRIPTION	SPECIFICATION
Grease Spots	STEEL		Grease is a local oily grease contamination of the bare steel surface which can be seen in the processed enameled material.	**Not OK:** Is considered as a major defect
Rust Spots	STEEL		Rust spots are local spots of corrosion of the bare steel surface which are visible in the finished surface.	**Not OK:** Is considered as a major defect
Repetitive Bumps	STEEL		Repetitive bumps are local deformation of the bare steel pointing outward. Often these bumps are repetitive.	B1: OK B2: Max 1/3’ B3: Not OK
Repetive Dents	STEEL		Dents are local deformation of the bare steel pointing inward. Often these dents are repetitive.	D1: OK D2: Max 1/3’ D3: Not OK
Steel Deformations	STEEL		Any other local plastic deformation of the bare steel. Plastic deformation is irreversible (as opposed to elastic deformation, such as simple bending).	**Not OK:** Is considered as a major defect
Line shape Steel Defect	STEEL		Small black open spots orientated in a line	**Not OK:** Is considered as a major defect

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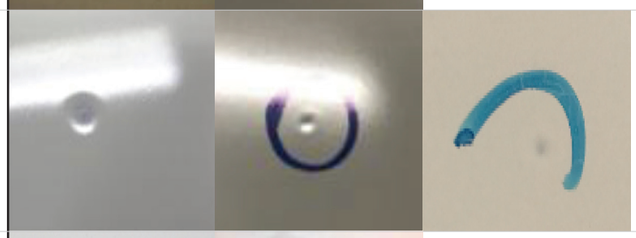
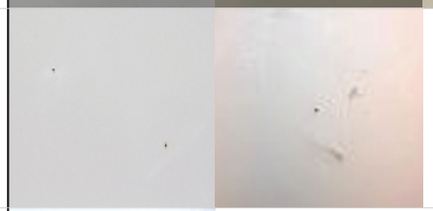
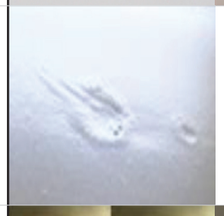
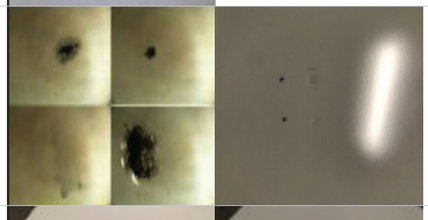
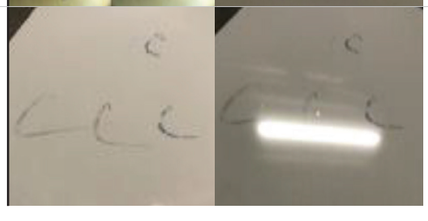
Drop	PES / PROCESS		Also known as “enamel trash”, this defect can occur in both ground and cover coat. It is a local bump caused by an agglomeration of sagged out enamel particles which are causing a visual distortion after firing.	Minor defects: visible in diffuse light = NG, not visible in diffuse light = OK Objective criterium > 5/64” : not OK < 5/64”: OK. Max 4 pc /10 ft² and Min distance between = 12”
Dimple / Fish eye	PES / PROCESS		Also referred to as “fish eye”, “crater” or “surface tension” defects. It is usually a round shaped distortion of either the ground or cover coat. Depending on the severity of the surface tension change, the cover coat dimple may show a bluish center due to ground coat showing through the reduced cover coat thickness.	Minor defects: visible in diffuse light = NG, not visible in diffuse light = OK Objective criterium > 5/64” : not OK < 5/64” and >3/64” with a black center: not OK < 5/64”: OK. Max 4 pc /10 ft² and Min distance between = 12”
Black Specks	PROCESS		Black Specks on the surface. Because of their contrasting color against the (white) cover coat they are fairly easy to detect visually.	Minor defects: visible in diffuse light = NG, not visible in diffuse light = OK Objective criterium > 3/64” : not OK < 3/64”: OK. Max 10 pc /10 ft² and Min distance between = 8”
Spots in cover coat	PROCESS		It is usually a round shaped distortion of either the ground or cover coat	Minor defects: visible in diffuse light = NG, not visible in diffuse light = OK Objective criterium > 1/8” : not OK < 1/8”: OK. Max 4 pc /10 ft² and Min distance between = 12”
Dirt & Fibers	PROCESS		Black Specks in the surface. Because of their contrasting color against the (white) cover coat they are fairly easy to detect visually	Minor defects: visible in diffuse light = NG, not visible in diffuse light = OK Objective criterium > 1/8” : not OK < 1/8”: OK. Max 4 pc /10 ft² and Min distance between = 12”
Pinholes / Needle pricks	STEEL		Very small surface defects, usually even smaller than 0,5mm, which present themselves as if the PES surface has been pricked by a needle point. This type of defect does not show a color difference against the (white) cover coat.	Considered as an imperfection = OK Objective criterium After coloring with a dry erase marker and erasing, no visible ink may be left behind

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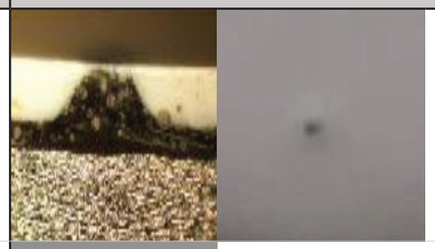
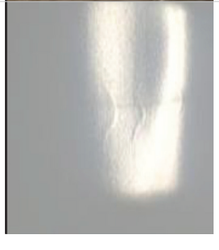
BUC (Breakthrough with Unquit Counteroxide layer)	STEEL		BUCs present themselves visually much like a dimple, i.e. a small circular distortion of the surface. The larger BUCs often show a sharp black speck in the center.	Minor defects: visible in diffuse light = NG, not visible in diffuse light = OK Objective criterium > 1/8” : not OK < 1/8” and > 5/64”: OK. Max 8 pc /10 ft² and Min distance between = 12” < 5/64”: OK. Max 16 pc / 10 ft² and Min distance between = 15 cm > 3/64”: Not acceptabel if center is black (see “black specks”)
Comet	PROCESS		A usually larger defect which presents itself as a comet shaped distortion of the surface showing a center and a tail behind it. Can be repetative.	Minor defects: visible in diffuse light = NG, not visible in diffuse light = OK Objective criterium > 1/8” : not OK < 1/8”: OK. Max 4 pc /10 ft² and min distance between = 12”
Hairlines	PES / PROCESS		This defect consists of microscopic cracks in the affected layer(s). When hairlines occur in the ground coat, They will be visible as lines of bubbles or black specks. When the hairlines are induced after cover coat firing they are invisible to the naked eye, and can only be made visible by a dedicated test using electrostatically charged powder. Another method is by incolorating the hairlines using a dry marker. After erasing the coloration, hairlines become visible as small lines.	**Not OK:** Is considered as a major defect
Dry Cracks	PES / PROCESS		Usually larger surface distortions. In the case of a fracture of cover coat biscuit, ground coat may show through. Usually this type of defect occurs at the edges of the strip.	**Not OK:** Is considered as a major defect
Run downs	PES		Looks like paint flowing downwards	**Not OK:** Is considered as a major defect

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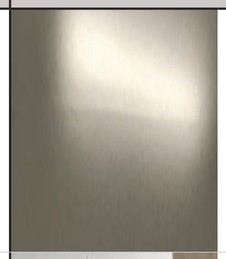
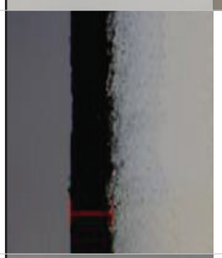
Longitudinal Line	PROCESS		Very fine lines along the strip direction are inherent to pollution in the application process of the enamel slurry. The sharpness of the line can differ and makes it more or less visible.	**Not OK** if the line can be detected in diffuse light (blueish): NG If the line has a sharp imprint and can be detected easily
Longitudinal process lines	PROCESS		Small lines in the surface inherent to the process.	If clearly visible : NG
Transversal lines	PROCESS		The defect presents itself as lines across the strip due to layer thickness variations of the coating(s) due to process technical reasons or tranversal deformations in the steel. These lines can be evenly distributed or incidental as well. In their severest fo3’ they are deep enough for the ground coat to show through as a bluish discoloration.	if the line can be detected in diffuse light (bluish): NG If the line has a sharp imprint and can be detected easily: NG
Black Edges	PROCESS		An edge where there is no cover coat at all, showing ground coat only.	> 5mm: not OK: Is considered as a major defect Some customers don’t allow a balck edge (no covering by trim)
Blue Edge	PES / PROCESS		This edge defect presents itself as a bluish discoloration of one or both edges caused by decreased layer thickness of the (white) cover coat.	Colour measurement ΔE<1,5 (spectrometer): OK Special criterium: ΔE<0.5 (spectrometer) difference between the middle of the belt and the edges

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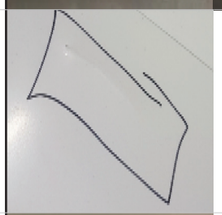
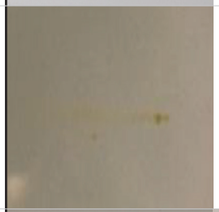
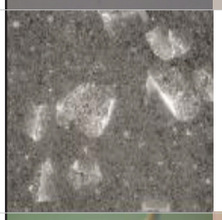
DEFECT	SOURCE	PICTURE	DESCRIPTION	SPECIFICATION
Enamel Trash Backside	PROCESS		Usually it occurs on the edge(s) due to pollution of equipment. When the amount of coating is causing a significant thickness increase at the backside , this can result in lamination problems in a later stage during board manufacturing or cracked enamel which could end up as a break out.	If clearly tactile : NG
Strings of Ground Coat / Cover Coat	PES / PROCESS		Strings are visible as a thickening on the surface after firing. They can have various sizes depending on the size. They mostly occur on the ground coat bottom side.	Minor defects: visible in diffuse light = NG, not visible in diffuse light = OK Objective criterium > 1/8” : not OK < 1/8”: OK. Max 4 pc /10 ft² and min distance between = 12”
Yellow line	PROCESS		Colored lines of dirt in the top coating caused by pollution.	If visible in diffuse light at 24” : NG
Jumpers	PROCESS		Cover coat enamel contaminated with ground coat enamel chips. This contamination occurs at the edges of the material.	Minor defects: visible in diffuse light = NG, not visible in diffuse light = OK Objective criterium > 3/64” : not OK < 3/64”: OK. Max 5 pc /3’ and Min distance between = 12”
Fish scaling	STEEL		Fish scales are half moon shaped cracks which occure immediately or even hours or days after the firing operation. They can occure individually with a type size of 1-5 mm diameter or in clusters.	**Not OK:** Is considered as a major defect
Scratches	HANDLING		A very thin line in the surface. Can appear in all directions. A physical damage of the enam-eled surface which can be felt when rubbing with a fingernail. Residue of ink is visible in the complete scratch after coloring this defect with a standard red dry erase marker and cleaning it with a standard Polyvision eraser.	**Not OK:** Is considered as a major defect

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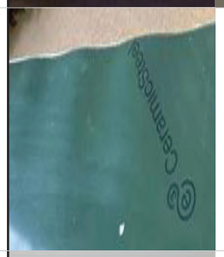
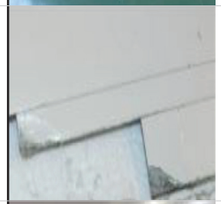
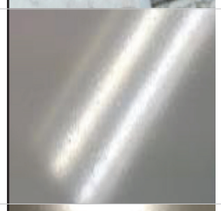
Eyebrow	HANDLING		A curved deformation of the enemaled steel which is visible with or without a reflecting lightsource.	**Not OK:** Is considered as a major defect
Wavy / Edge Wave	STEEL		A severe waving effect along the edges of the enameled sheet. There will always be tensions in the delivered enameled steel. When laying a sheet on a flat table (top up) one can see area's where the sheet doesn't touch the table. This edge waving can cause problems during and after lamination due to a bad or no adherence between sheet and the substrate in these waving areas.	Flatness specification: 4 foot - 5/64" gap between sheet and flatness table with 62 lbs of weight 5 foot - 5/64" gap between sheet and flatness table with 97 lbs of weight
Edge Damage	HANDLING		Sharp strikes, deformation or damages of the edges.	**Not OK:** Is considered as a major defect
Blisters	PES / STEEL		A gassy surface which is visible in reflective light.	**Not OK:** Is considered as a major defect
Local deformation	HANDLING		Gassy lines, starting from the central deformed point, which are visible after a 3rd firing step	**Not OK:** Is considered as a major defect
Enamel break out	HANDLING		Small break out of enamel (starlike shape)	**Not OK:** Is considered as a major defect

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