ASSOGALVANICA http://www.assogalvanica.it

ITALIAN ASSOCIATION OF PLATING INDUSTRIES MEMBER OF European Committee for Surface Treatments



ITALIAN CONSORTIUM FOR SUSTAINABLE DEVELOPEMENT OF PLATING INDUSTRY , Estabilished since 1994 By Assogalvanica, Associations Members ASSICC and AIFM.

ECOMETAL
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NiCKEL Electro-Plating

- Ni plating –bright

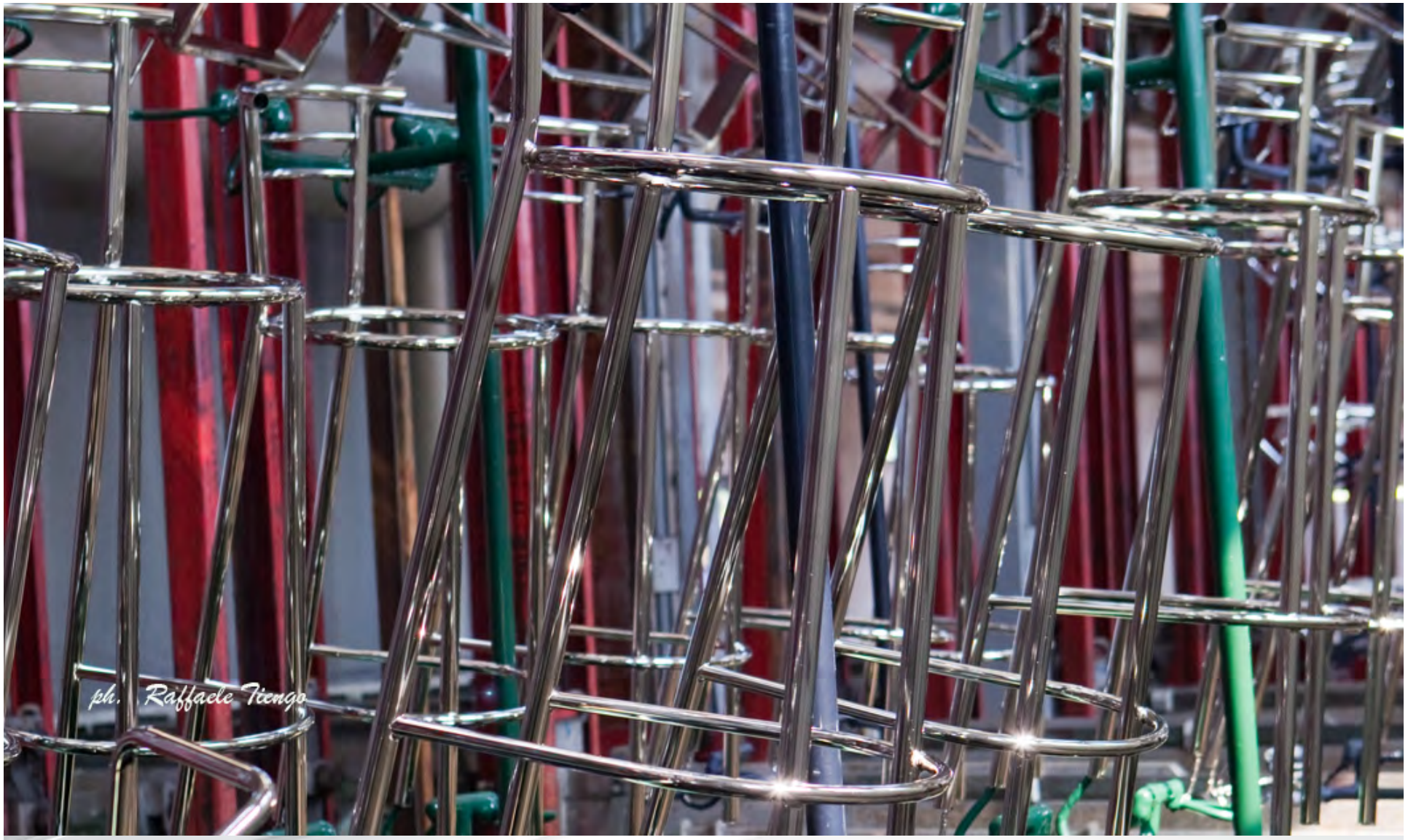
  _ satin

(we' ll see after for alt. Int)

- Ni plating as substrate of other finishing

(Chemical Nickel) Not considered here

- Protected or not protected by transparent coatings
- Nickel +Chromium
- Nickel+ Brass
- Nickel+ Precious Metals
- Nickel + PVD
- Nickel+CVD
- .....



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No Man envolved in the immersion of the pieces

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Nickel Plating Plants: Rack Line



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Large Series





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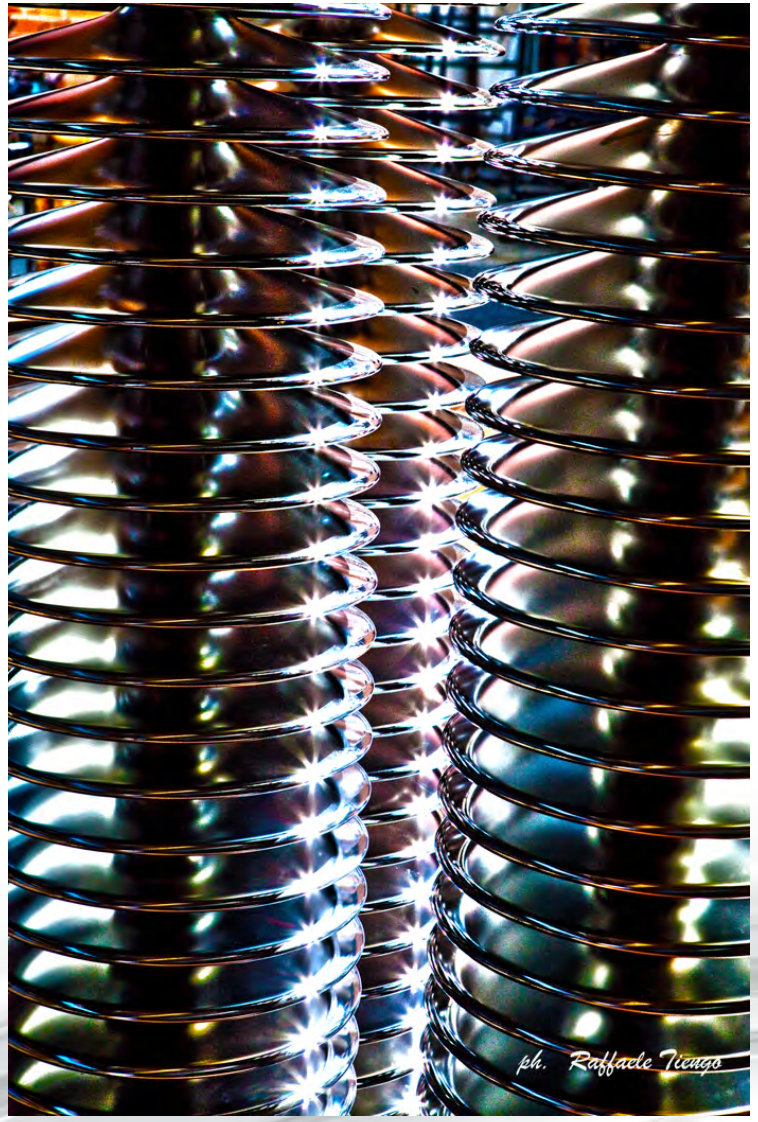

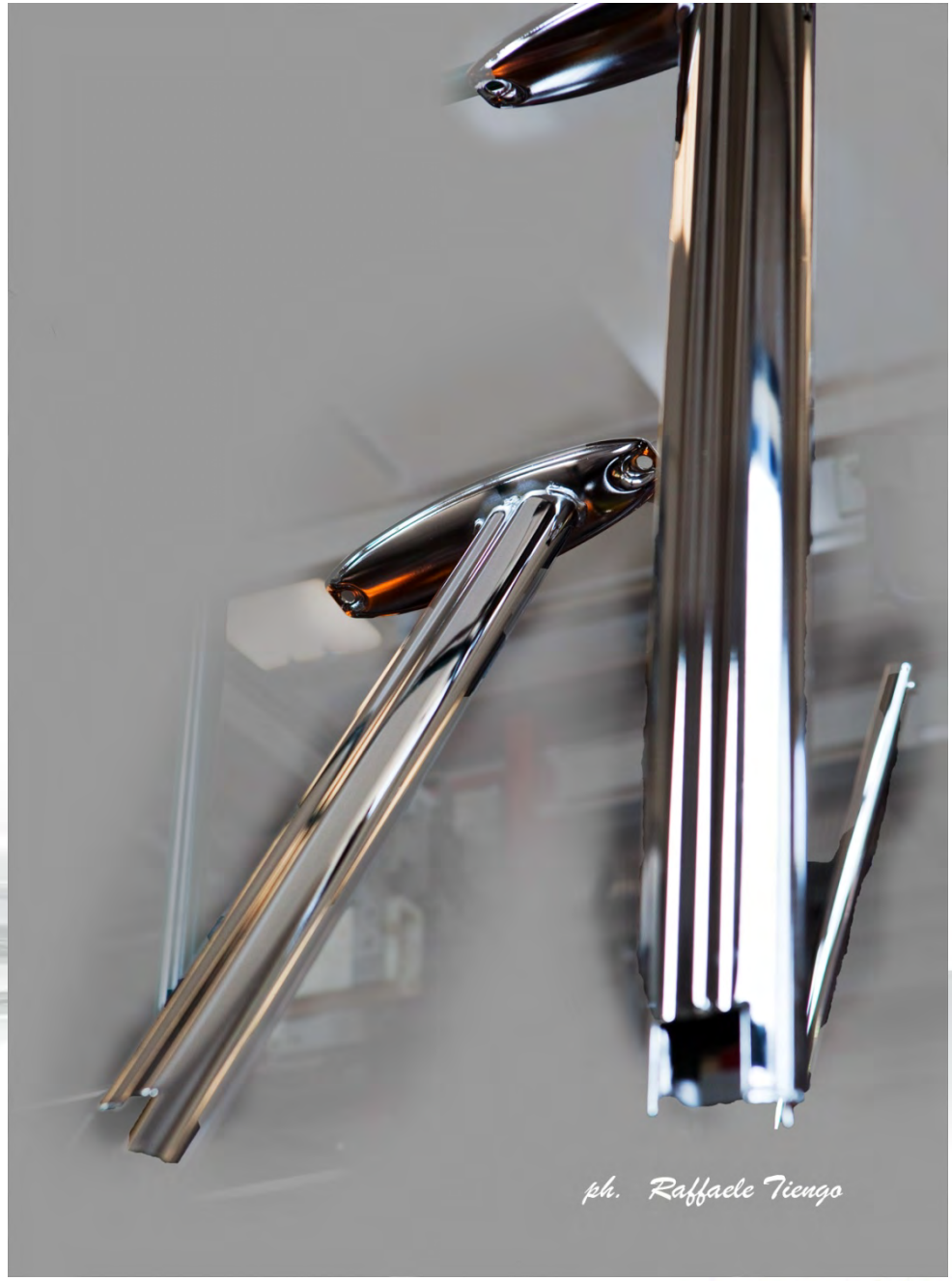

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Plating Plants: Barrel Line



Another barrel plating line

Controls & production



Automatic load down



Ni-Cr plating line



Ni-Cr PLATING LINE



Load /unload stations rack
Ni-multipurpose plating line





Rack Ni-multifinishing line

New controls for multipurpose plating line



The plating line is in another building



Nickel effluents’ Depuration line



ANALYSIS of ALTERNATIVES

- ALTERNATIVE : alternative treatments, alternative materials, alternative concept of product
- CRITERIA

Identify, Evaluate of the alternatives

- Definition of Alternative see Echa's Guide

Painting : IS AN ALTERNATIVE ?

Or only metal finishings have to be considered ?

- ANSWER TO ANNEX XV
- EXAMPLES
- ……..
- ……..

3.2. What is an alternative? (Echa's Guidance)

- An alternative is a **possible replacement** for the Annex XIV substance.
- **It should be able to replace the function** that the Annex XIV substance performs.
- ***The alternative could be another substance or it could be a technique*** (e.g. a process, procedure, device, or modification in end product) ***or a combination*** of technical and substance alternatives. For example, a technical alternative could be a physical means of achieving the same function of the Annex XIV substance or perhaps changes in production, process or product that removes the need for the Annex XIV substance function altogether.
- Article 60(5) provides ***that when assessing the availability of suitable alternative*** substances or techniques, ***all relevant aspects must be taken into account***, including:

a) whether ***the transfer to the alternative would result in reduced overall risks*** to human health and the environment (as compared to the Annex XIV substance) taking into account risk management measures,

b) the technical and economic feasibility of alternatives for the applicant for replacement of the Annex XIV substance.

The alternative must also be available for the applicant (i.e. can be accessed in sufficient quantityand quality) for transferral.

3.2. What is an alternative? (Echa's Guidance)

- **A possible replacement** , **It should be able to replace the function**
- ***The alternative could be another substance or it could be a technique or a combination***
- ***when assessing the availability of suitable alternative all relevant aspects must be taken into account***, including:

-whether ***the transfer to the alternative would result in reduced overall risks***,

- ***the technical and economic feasibility of alternatives for the applicant*** for replacement of the Annex XIV substance.
- **The alternative must also be available for the applicant**

BEFORE TO SEE THE REPLACEMENTS WE HAVE TO IDENTIFY THE FUNCTIONS, CONSIDERING ALL THE ASPECTS, AND THE AVAILABILITY FOR THE APPLICANT.

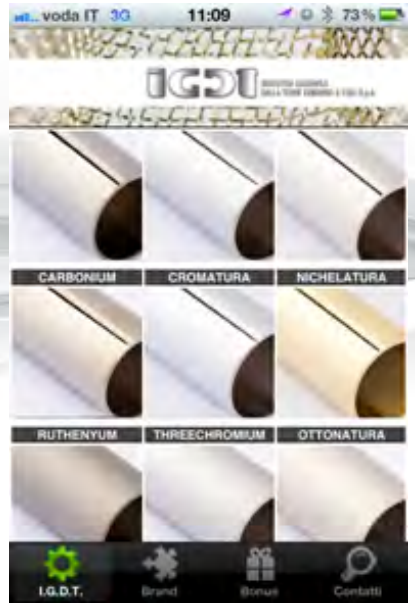
LET'S COMPARE THE 2 TECHNIQUES OF Ni- electroplating to define the replacements.

Endogenous AlternativeS ?

- Nickel electro Plating

Bright

- Nickel elctroplating satin



Criteria of evaluation

Properties	Bright	Satin	winner
Brightness	+++	++	Bright
Hygiene (antibacterial properties, don't use chemicals)	+++	++	Bright
Cleanability (easy to clean, don't use chemicals)	+++	++	Bright
Resistance to cleaning agents (if using chemicals or solvents)	++	+++	Satin
Easy Decontamination (in terms of identifying the fingerprints, the touched areas)	++	+++	Satin
Chemical Resistance (for other purposes , liquids flowings..)	+++	+++	Both
Hardness	+++	+++	Both
Micro-hardness	+++	+++	Both
Abrasion resistance	+++	++	Bright
Mirroring , Specularity	+++	-	Bright
Resistance to Corrosion (Durability)	++	+++	Satin

Criteria of evaluation

Variables	Bright	Satin	Winner
Cost	+++	++	Bright
Energy Saving	++	+	Bright
Natural Resources saving Preservation of Resources	+++ ++(+)	++ +++	Bright Satin
Water use	++	+	Bright
Air	+++	+++	Both
Recyclability (end of life of product)	+++	+++	Both

ANNEX XV : ALTERNATIVES TO CHROMIUM PLATING

Nickel Chromium Plating

- Vacuum coatings PVD/CVD
- Zinc Based alternatives

  Zn-Fe, Zn-Ni , Zn-Co
- Nickel based alternatives

Hard Chromium

- HVOF
- Vacuum coatings PVD/CVD
- Nickel Based Alternatives (Ni-Bo, Ni-Co-P, NiP)

Conclusions on alternatives in Annex XV for Cr

- Furthermore technology trends were evaluated in the report "The Future of Finishing". These are
- [Chalmer, 2008]:
- • **Change to "greener" process chemistries –**
- • **Change from "wet" processes to "dry" processes** – Change from conventional surface finishing immersion chemistry solutions to alternative metal deposition technologies (e.g. HVOF or PVD)
- • **Change substrate materials from finished metals to non-metals** – Change materials and manufacturing processes from metal finishing to non-metals, such as composites or plastics
- • **Develop new metal alloys that reduce surface finishing requirements** – Use new metal alloys that provide sufficient corrosion resistance and reduce or eliminate the need for metal finishing using toxic chemical processes (e.g. new stainless steel alloy that can replace steel coated with cadmium*)
- • **Develop processes based on nanotechnology** – Use nanocrystalline metal coating processes or using nanomaterial-enhanced metal or non-metal substrates.

- *Note that is unchanged in the legal text Cadmium not Chromium
- (Pages 44/45)

ANNEX XV : ALTERNATIVES TO CHROMIUM PLATING

Nickel Chromium Plating

- Vacuum coatings PVD/CVD
- Zinc Based alternatives

  Zn-Fe, Zn-Ni , Zn-Co
- Nickel based alternatives
- Change substrates from metals to non metals (plastics)
- Use Stainless steel

Hard Chromium

- HVOF
- Vacuum coatings PVD/CVD
- Nickel Based Alternatives (Ni-Bo, Ni-Co-P, NiP)
- Change Alloys
- Use nanotechniques

Criteria of evaluation

Properties (Functions) for a pipe in wardrobe	Required	Useful	No matter
Brightness		X	
Hygiene (antibacterial properties, don't use chemicals) Cleanability (easy to clean, don't use chemicals) Resistance to cleaning agents (if using chemicals or solvents) Easy Decontamination (in terms of identifying the fingerprints, the touched areas)	X	 X X	 X
Chemical Resistance (for other purposes , liquids flowings..)			X
Hardness Micro-hardness Abrasion resistance	X XX	 X	
Mirroring , Specularity			X
Resistance to Corrosion (Durability)	XX		

Criteria of evaluation

VARIABLES FOR A PIPE IN A WARDROBE	important	useful	No matter
Cost	XXX		
Energy Saving			X
Natural Resources saving Preservation of Resources			X X
Water use			X
Air			X
Recyclability (end of life of product)		X	

Example 1,tube for wardrobe

Alternatives	Hardness	Abrasion Resist.	Hygiene	Corrosion Resistance	Cost Feas	Recycle	Tech Feasible
1/Nickel Chromium Bright Plating	OK+	OK+	OK+	OK	OK	OK+	obviously
2/Nickel Chromium Satin Plating	OK+	OK-	OK-	OK+	***No***	OK+	Yes !
3/Painting	***No***	***No***	OK--	OK-	OK+	--	Yes
4/Tube in stainless steel	OK+	OK+	OK	OK++	***NO***	OK+	Yes
5/Zn alternatives	Ok-	***NO***	***NO***	OK	OK	OK-	Yes
6/PVD-CVD	????	***No***	????	????	***NO***	?	***NO (>30cm)***

Criteria of evaluation

Properties (Functions) for a CHAIR METAL FRAME	Required	Useful	No matter
Brightness	X		
Hygiene (antibacterial properties, don't use chemicals) Cleanability (easy to clean, don't use chemicals) Resistance to cleaning agents (if using chemicals or solvents) Easy Decontamination (in terms of identifying the fingerprints, the touched areas)	X X X	 X	
Chemical Resistance (for other purposes , liquids flowings..)			X
Hardness Micro-hardness Abrasion resistance	X X	 X	
Mirroring , Specularity			X
Resistance to Corrosion (Durability)	X		

Criteria of evaluation

VARIABLES FOR CHAIR METAL FRAME	important	useful	No matter
Cost	X		
Energy Saving			X
Natural Resources saving Preservation of Resources			X X
Water use			X
Air			X
Recyclability (end of life of product)		X	
FIRE PROOF NO DANGEROUS GASES IN CASE OF FIRE	X X		

Example 2,metal frame for chair

Alternatives	BRIGHTNESS	HARDNESS Abrasion Resist.	Hygiene Fire proof	Corrosion Resistance (Durability)	Cost Feas	Recycle	Tech Feasible
1/Nickel Chromium Bright Plating	OK++	OK+	OK+	OK	OK++	OK+	obviously
2/Nickel Chromium Satin Plating	OK+	OK+	OK+	OK+	OK+	OK+	Yes !
3/Painting	***NO***	***--***	--	OK-	OK++(+)	---	Yes
4/Chair in stainless Steel or in Al Or in Plastic	OK- Ok- NO	OK+ Ok- No	OK Ok No	OK++ Al oxide No	***OK—--*** ***OK—*** ***OK+++***	OK+ OK+ OK ---	Yes Yes/no Yes/no
5/Zn alternatives	OK-	***OK-***	***NO***	Zn oxide problems	OK	OK-	Yes
6/PVD-CVD	????	***No***	????	????	***NO***	?	***NO (>30cm)***

Chairs

alternatives	Use
Metal chair Ni -plated	In Home (Luxury) Outside cheap
• Metal chair painted	In Home & Outside Cheap,
• Chair in Stainless steel /Al	Outside luxury (may be plated)
• Chair in plastic	Outside cheap , (dangerous inside for community use)Structural pr.
• Zn based alternatives	Outside (often primer for paint)
• Wood Chairs	Inside /outside … Luxury ..
• Other materials	……..To See use in community