

Aspetti analitici legati alla Direttiva ROHS:
test e tecniche utilizzate, categorie di
elementi e molecole da ricercare, casi pratici



Simona Nobili



ATP Isothermal Laboratories



CSI SpA (IMQ Group)



Maranello Branch



CRIA Laboratories (Food Packaging Research Center)



CSI Srl (Montedison Group)



Shelf Life and Food Laboratories



PROTOTIPO TECH. fusion

1980

1984

1989

1995

2003

2010

2014

1970

1982

1986

1993

1997

2009

2012

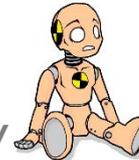
2015

Montedison Petrochemicals (CSI Labs)

Fire Laboratories



Full Scale Crash Laboratory



Wine Laboratory Pastrengo



Mechanical Laboratories



CSICERT Certification Body



Senago Proving Ground



ICILA acquisition



CSI - CERTIFICATION OF SAFETY INSTITUTE



IMQ
group



IMQ CSI



IMQ
Certification
Shanghai



IMQ
Gulf



IMQ
Ibérica



IMQ
Polska



IMQ
Turkey



CSI - TESTING & CERTIFICATIONS FOOD - PACKAGING - MATERIALS

ABOUT US

FOOD

PACKAGING

CONSUMER GOODS
& RETAIL

MATERIALS

NEWS

LOCATION
AND CONTACTS

SEARCH



FPM LABORATORY

Quality, reliability and competitiveness in problems regarding food, packaging, materials and consumer goods sectors....

Discover more... +



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ACCELERATED AGEING

CHARACTERIZATION

PERFORMANCE TESTS

BIODEGRADABILITY

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FOODSTUFFS CHEMICAL CONTAMINANTS FOOD PRODUCT SHELF LIFE NUTRITIONAL TEST AND QUALITY CONTROL MARKERS

FOOD LABELLING ASSISTANCE FOOD SAFETY FOOD MICROBIOLOGY AND DNA FOOD ORGANOLEPTIC TESTS

WINE LABORATORY

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FOOD CONTACT COMPLIANCE

PACKAGING PHYSICAL - MECHANICAL CHARACTERIZATION AND PERFORMANCE

REACH

SUSTAINABILITY

LEGISLATIVE SUPPORT SERVICE



ITM LABORATORI

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LOCATION
AND CONTACTS

HOUSEHOLD PRODUCTS

FOOD MACHINE

TOYS

CHILDCARE

COSMETICS AND CLEANING PRODUCTS

BAZAAR

ROHS

REACH

IMPORT SERVICES



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Categorie di AEE (Allegato I)

- Grandi elettrodomestici
- Piccoli elettrodomestici
- Apparecchiature informatiche e per telecomunicazioni
- Apparecchiature di consumo
- Apparecchiature di illuminazione
- Strumenti elettrici ed elettronici
- Giocattoli e apparecchiature per il tempo libero e per lo sport
- Dispositivi medici
- Strumenti di monitoraggio e controllo
- Distributori automatici
- Altre AEE

PRODOTTI ESENTI DALLA DIRETTIVA

- Batterie
- Impianti e attrezzature industriali fissi
- Piombo (componenti ceramici, alcune specifiche leghe e vetro in alcuni utilizzi particolari)
- Mercurio (determinati tipi di lampade)
- Applicazioni del settore Automotive

Sostanze con restrizione d'uso (Allegato II)

- Piombo (0,1 %)
- Mercurio (0,1 %)
- Cadmio (0,01 %)
- Cromo esavalente (0,1 %)
- Bifenili polibromurati (PBB) (0,1 %)
- Eteri di difenile polibromurati (PBDE) (0,1 %)

Sostanze con restrizione d'uso (Direttiva 2015/863)

- Ftalato di bis(2-etilesile) (DEHP) (0,1 %)
- Benzilbutilftalato (BBP) (0,1 %)
- Dibutilftalato (DBP) (0,1 %)
- Diisobutilftalato (DIBP) (0,1 %)

- Dal 07/2021 ai dispositivi medici; non si applica ai giocattoli (REACH)

Sostanze con restrizione d'uso (PIOMBO)

Pigmenti, specialmente giallo e rosso;
 Stabilizzanti, specialmente per PVC
 Sistemi di attivazione e polimerizzazione gomme
 Leghe per fusione di alluminio, rame, leghe, leghe di acciaio, specialmente quelle ad alto contenuto di piombo, leghe di saldatura
 Lampadine
 Bagno di zinco per zincatura a caldo
 Molle



Sostanze con restrizione d'uso (CADMIO)

Pigmenti, specialmente giallo e rosso
 Componenti elettrici ed elettronici (relays, switches, ...)
 Impurezza nello zinco

Sostanze con restrizione d'uso (MERCURIO)



Sistemi di polimerizzazione gomme
Resine

Sostanze con restrizione d'uso (CROMO ESAVALENTE)

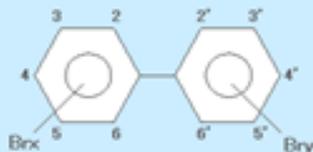
Pigmenti cromati



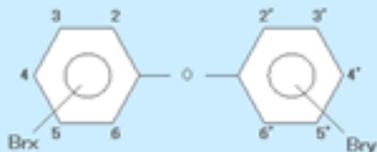
Sostanze con restrizione d'uso (PBB e PBDE)

Additivi ritardanti di fiamma
per le materie plastiche

Structure of PBB and PBDE



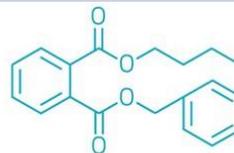
Polybrominated biphenyl
(PBB) ($x + y = 1-10$)



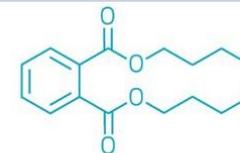
Polybrominated diphenyl ether
(PBDE) ($x + y = 1-10$)

Sostanze con restrizione d'uso (FTALATI)

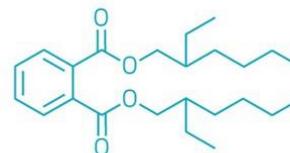
Plastificanti, specialmente nel
PVC



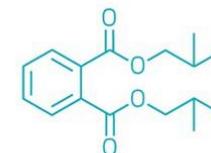
Butyl benzyl phthalate (BBP)



Di-n-butyl phthalate (DBP)



Di(2-ethylhexyl) phthalate (DEHP)



Diisobutyl phthalate (DIBP)

NORME TECNICHE

IEC 62321-1:2013

Determination of certain substances in electrotechnical products - Part 1: Introduction and overview

IEC 62321-2:2013

Determination of certain substances in electrotechnical products - Part 2: Disassembly, disjunction and mechanical sample preparation

IEC 62321-3-1:2013

Determination of certain substances in electrotechnical products - Part 3-1: Screening - Lead, mercury, cadmium, total chromium and total bromine using X-ray fluorescence spectrometry

IEC 62321-3-2:2013

Determination of certain substances in electrotechnical products - 3-2: Screening - Total bromine in polymers and electronics by Combustion - Ion Chromatography

NORME TECNICHE

IEC 62321-4:2013/AMD1:2017

Determination of certain substances in electrotechnical products - Part 4: Mercury in polymers, metals and electronics by CV-AAS, CV-AFS, ICP-OES and ICP-MS

IEC 62321-5:2013

Determination of certain substances in electrotechnical products - Part 5: Cadmium, lead and chromium in polymers and electronics and cadmium and lead in metals by AAS, AFS, ICP-OES and ICP-MS

IEC 62321-6:2015

Determination of certain substances in electrotechnical products - Part 6: Polybrominated biphenyls and polybrominated diphenyl ethers in polymers by gas chromatography-mass spectrometry (GC-MS)

NORME TECNICHE

IEC 62321-7-1:2015

Determination of certain substances in electrotechnical products - Part 7-1: Hexavalent chromium - Presence of hexavalent chromium (Cr(VI)) in colourless and coloured corrosion-protected coatings on metals by the colorimetric method

IEC 62321-7-2:20137

Determination of certain substances in electrotechnical products - Part 7-2: Hexavalent chromium - Determination of hexavalent chromium (Cr(VI)) in polymers and electronics by the colorimetric method

IEC 62321-8:2017

Determination of certain substances in electrotechnical products - Part 8: Phthalates in polymers by gas chromatography-mass spectrometry (GC-MS), gas chromatography-mass spectrometry using a pyrolyzer/thermal desorption accessory (Py-TD-GC-MS)

IEC 62554:2011+AMD1:2017

Sample preparation for measurement of mercury level in fluorescent lamps

LIVELLI DI VALUTAZIONE

External Components



Internal Components

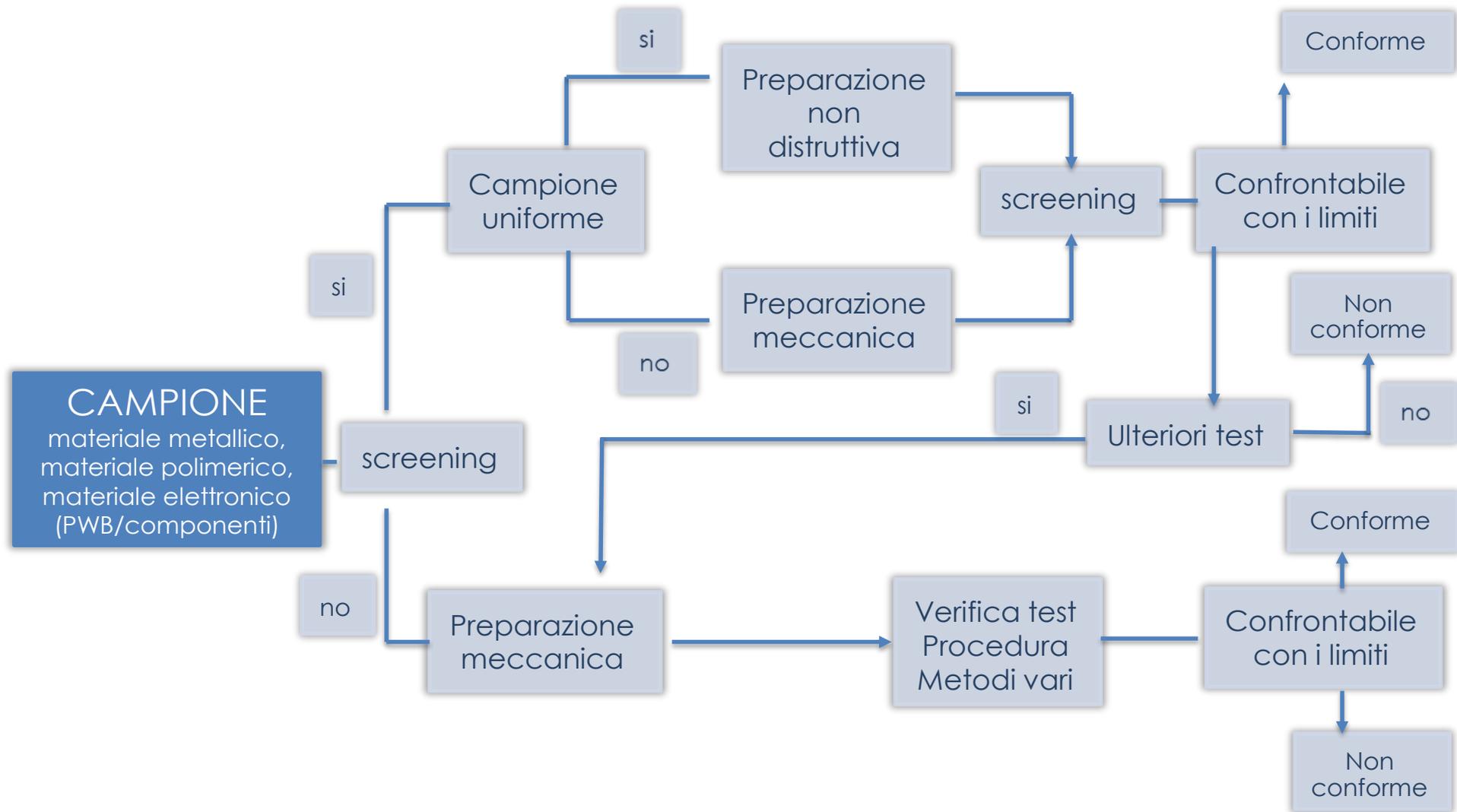


Poliestere

Tantalio

Ceramico

Elettrolitico



PREPARAZIONE CAMPIONE (Pb, Hg, Cd)



PREPARAZIONE CAMPIONE (Cr VI)

Pesata campione

Materiale non metallico

Materiale metallico

Dissoluzione
con ultrasuoni

Digestione a
150 – 160°C

Estrazione con H₂O
bollente

Digestione a
60°C

Separazione
fase acquosa

Correzione pH

Aggiunta di 1,5-difenilcarbazide per colorazione

UV-Vis

Risultato

PREPARAZIONE CAMPIONE (PBBs/PBDEs - FTALATI)

Pesata campione

Estrazione del campione con solvente

Concentrazione/diluizione della soluzione estratta

Filtrazione

GC - MS

Risultato

CAMPIONE	SOSTANZA	POLIMERO	METALLO	PWBs/COMPONENTI
Preparazione meccanica		Misurazione diretta Macinazione	Misurazione diretta Macinazione	Macinazione
Preparazione chimica		Digestione al microonde Digestione acida Incenerimento a secco Estrazione con solvente	Digestione al microonde Digestione acida	Digestione al microonde Digestione acida Incenerimento a secco Estrazione con solvente
Tecnica analitica	PBB/PBDE FTALATI	GC - MS	NA	GC-MS
	Cr VI	Digestione alcalina Metodo colorimetrico	Spot-test/estrazione in acqua bollente	Digestione alcalina Metodo colorimetrico
	Hg	CV-AAS, AFS, ICP-OES, ICP-MS		
	Pb/Cd	ICP-OES, ICP-MS, AAS	ICP-OES, ICP-MS, AAS	ICP-OES, ICP-MS, AAS

Valutazione del campione

Separazione componenti

Saldature

Cavi/Interruttori

Motore

PBC e componenti

Plastiche

Metalli

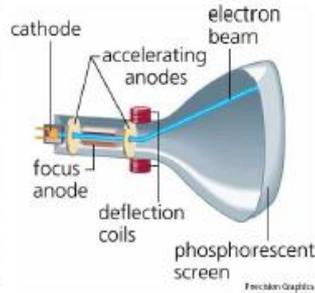


Preparazione per analisi

Screening

Valutazione risultati

Ulteriori controlli



Valutazione del campione

Separazione componenti
per natura materiale

Vetro

Metallo

Plastica

Preparazione per analisi

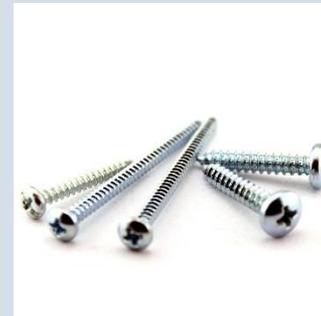
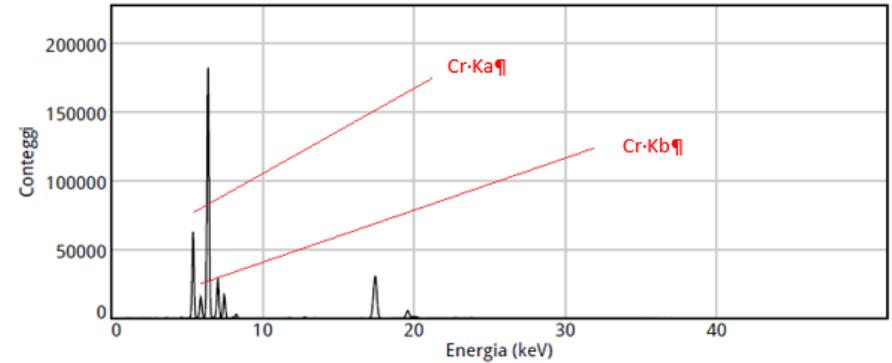
Screening

Valutazione risultati

Ulteriori controlli

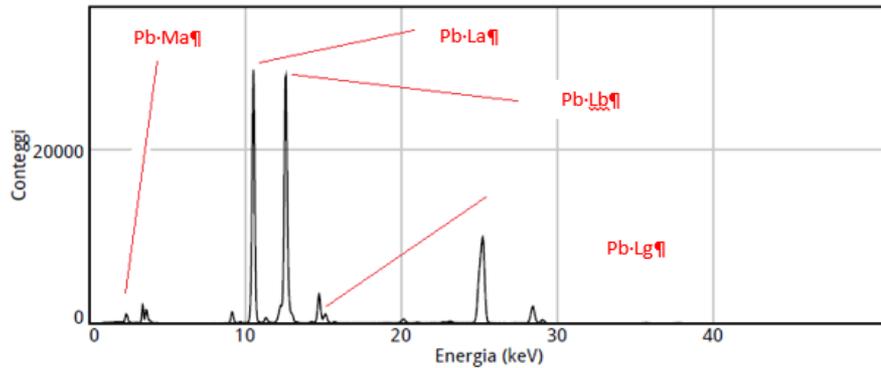


Elemento	Fe %	Cr %	Ni %	Mo %	Mn %	W %	Cu %	Co %	V %	Nb %
±	66,58	18,29	8,99	2,61	2,05	0,92	0,26	0,19	0,09	0,01
	0,061	0,030	0,027	0,005	0,011	0,101	0,005	0,004	0,006	0,001
Elemento	Br %									
±	0,01									
	0,001									
Gradi: SS316 (1,41), SS316 Ti (1,71)										
Riferimento:										





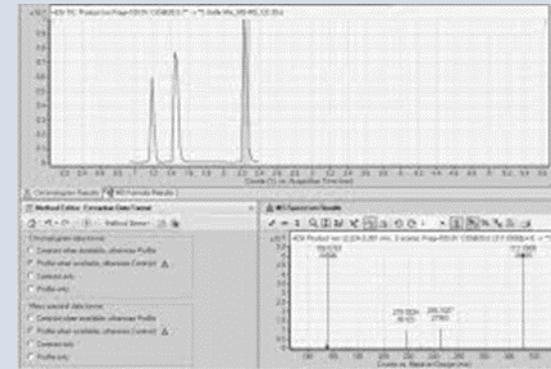
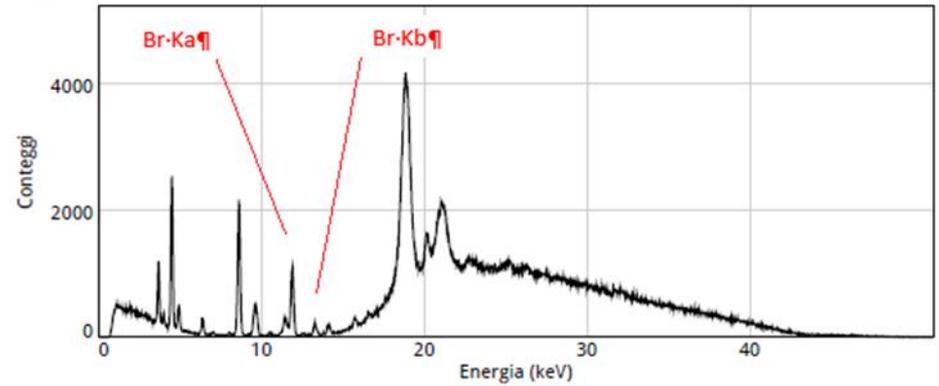
Elemento Sn % Pb % Ti % Se %
 ± 0,143 0,060 0,070 0,003
 Gradi: Sn55Pb45 (1,80), 60Sn-40Pb (2,25)
 Riferimento:

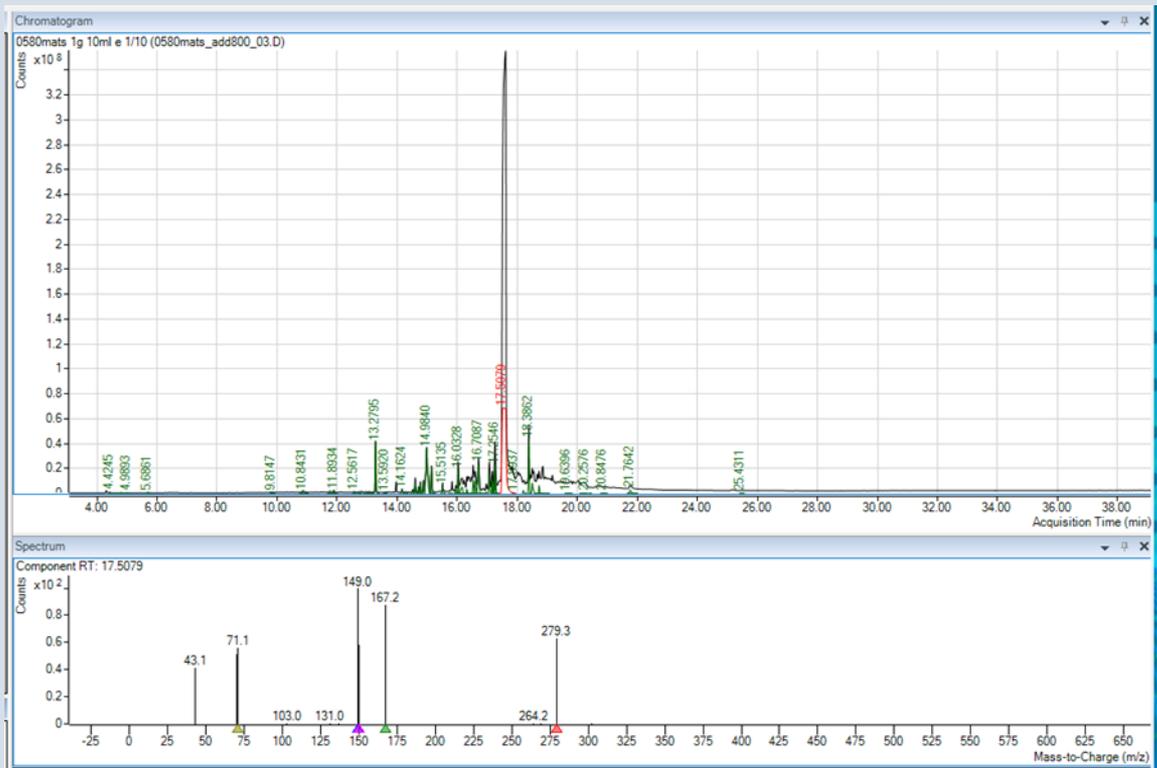


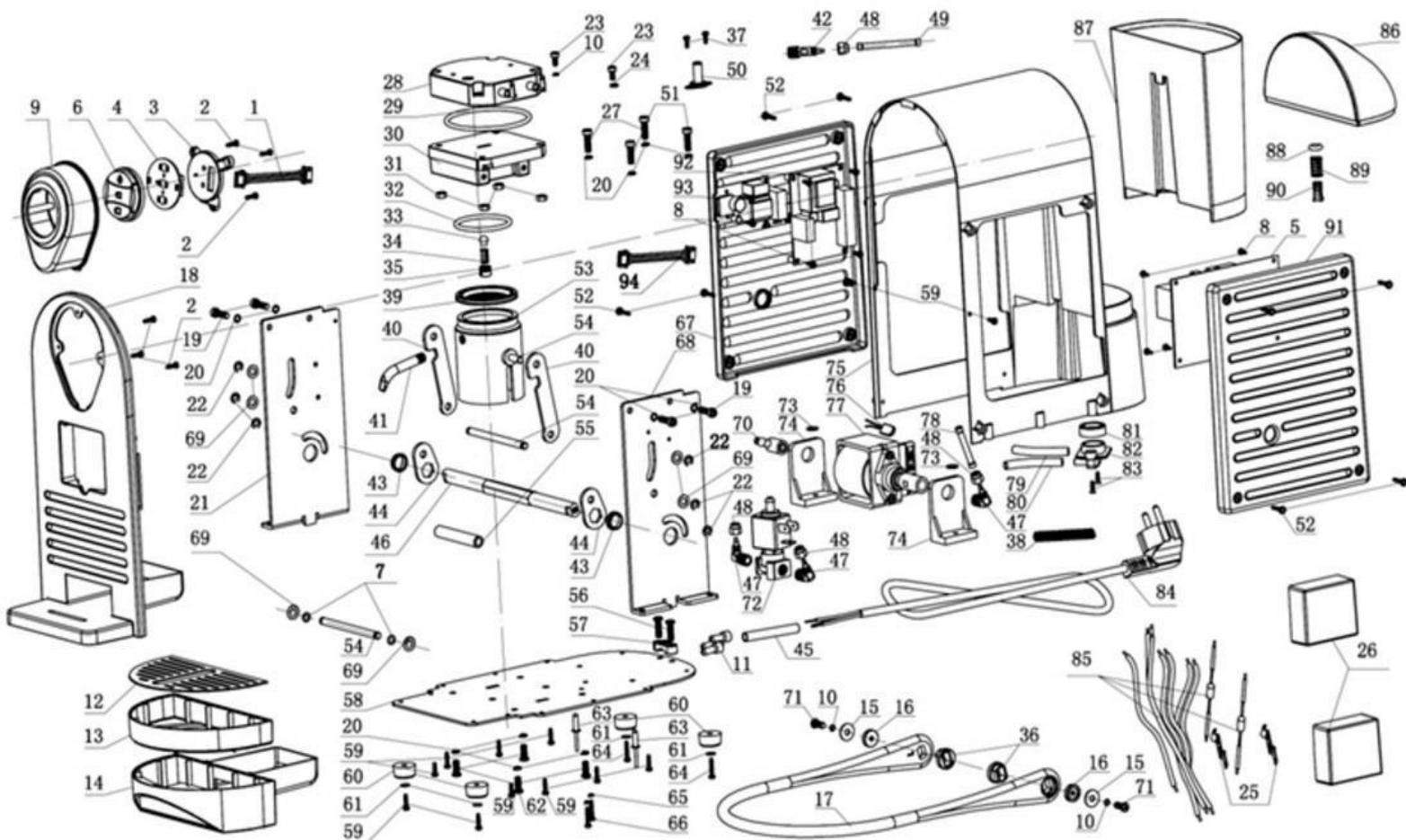


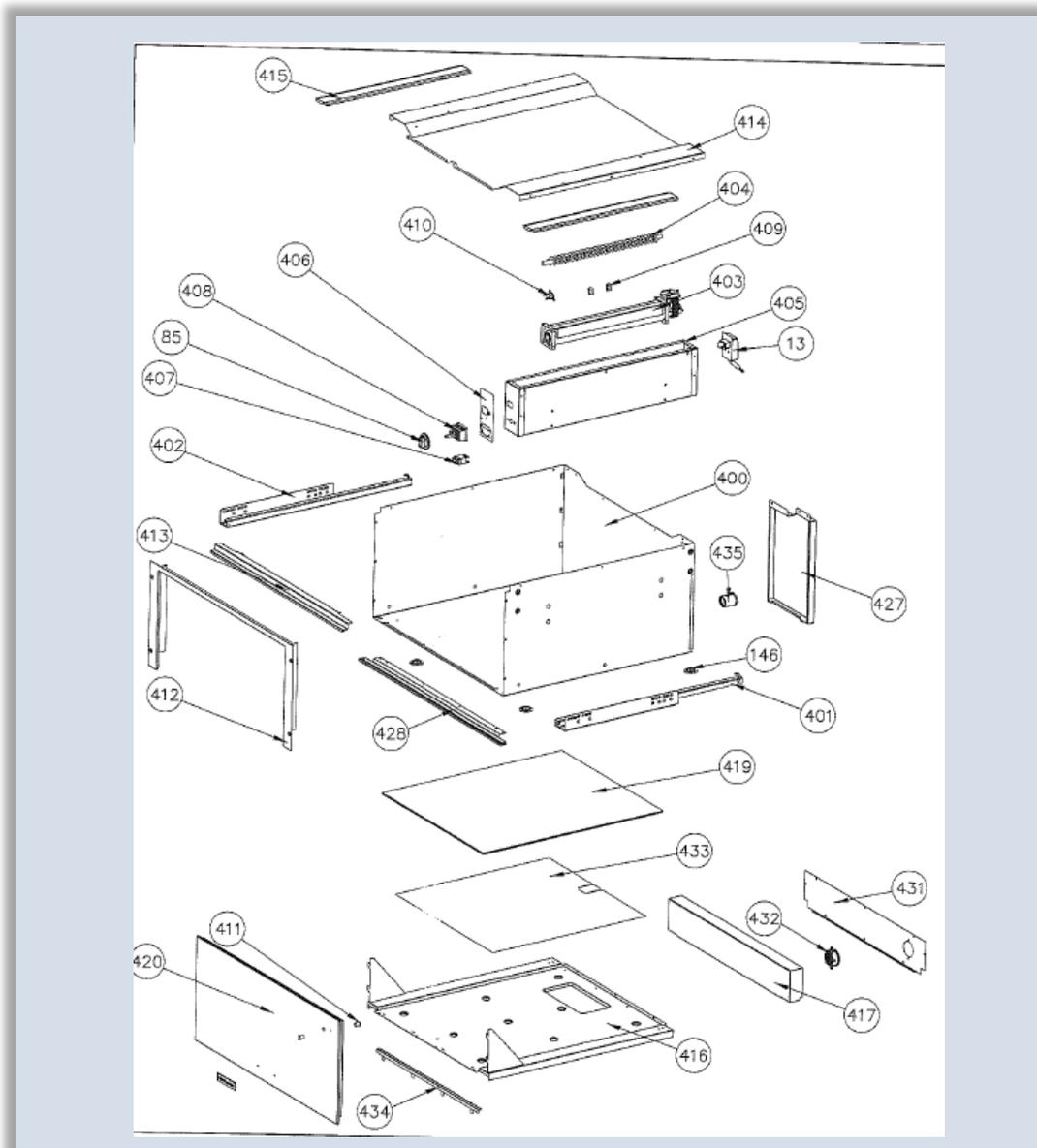
Elemento	Ti ppm	Ca ppm	Cl ppm	Zn ppm	Fe ppm	Ba ppm	Br ppm	Sb ppm
±	5378	4331	1501	334	148	114	71	42
	17	21	73	3	5	20	0	7
Elemento	V ppm	Sr ppm	Zr ppm	Cu ppm	Pb ppm			
±	14	8	7	6	3			
	2	0	0	1	0			

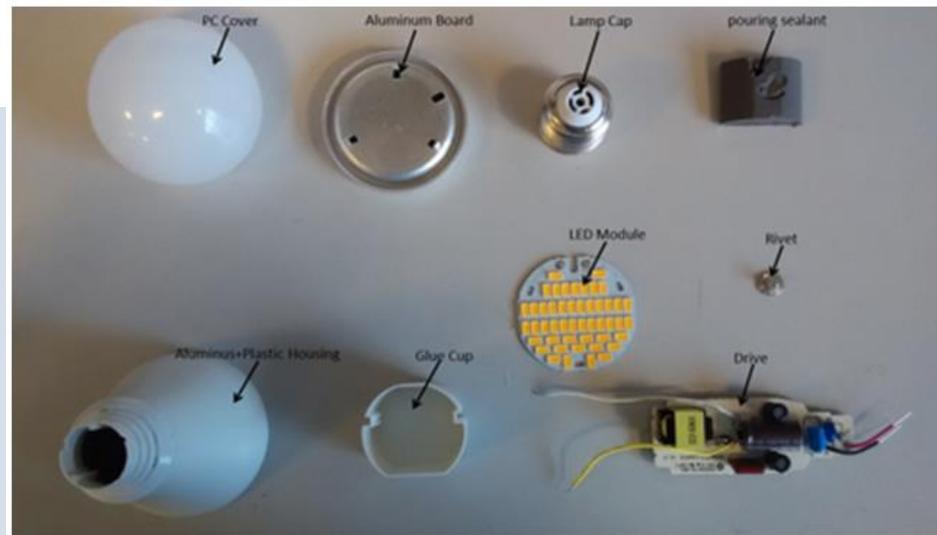
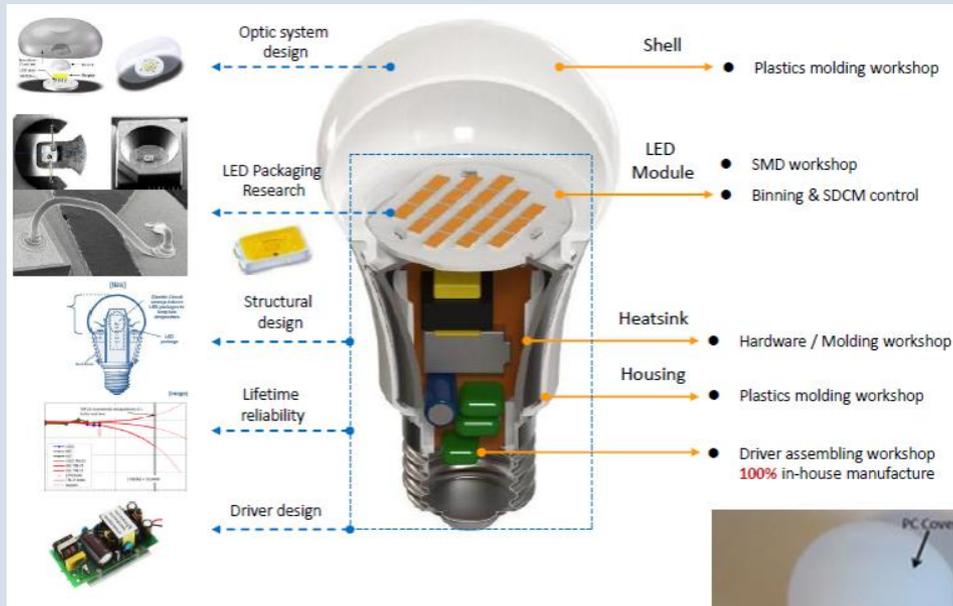
Gradi: Al-380 (0,02), Al-5182 (0,25)
Riferimento:













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