

Ophthalmic Optics

Cleaning systems for:

- Cleaning of moulds
- Cleaning ready for inspection
- Cleaning ready for coating
- Dip coating



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Cleaning at the manufacture of moulds

Blanks of moulds made of mineral glass

After grinding-, polishing and centering processes:
The moulds are contaminated, f.e. by residues of polishing agents.



Cleaning ready for inspection

After grinding-, polishing and centering processes an ultrasonic cleaning of the moulds is necessary to inspect them and to recognize any damages optically before hardening.



Hardening process, marking

After cleaning and inspection the moulds are marked and hardened for their further use in the production of plastic lenses.

Cleaning in the production of plastic lenses with moulds

Rotation of moulds

Joining of the moulds (front and rear side) by sealing ring or tape system for the filling process



Filling of the moulds with different plastic monomers;
polymerisation-, tempering- and cooling processes;
Mould release and separation of the plastic lenses.



Cleaning of moulds

For the production of plastic lenses the moulds are used in a repeated procedure.

To remove residues of polymer, monomer, finger prints and dust from the moulds, a cleaning process is chosen which is adapted to the mineral glass (water based with a preceding solvent step, only water based, or with concentrated sulfuric acid) and which does not unnecessarily shorten the life time of the moulds.



Ophthalmic lenses made from organic or mineral glass



After grinding-, polishing and centering processes, finishing of the edge:
Lenses are contaminated e.g. by residues of polishing agents, protection lacquer, protective plastic foils, finger prints and stamp colours.

Cleaning ready for inspection

After the mechanic treatment of the lenses, an ultrasonic cleaning is necessary to examine any optically defects or damages before further treatment.

There are different requirements for the cleaning process – according to the production technology Elma realises treatments with integrated

- deblocking,
- removal of protection or protective plastic foils.

In case of plastic semi-finished products with existing hard coating the Elma cleaning process (chemicals and ultrasonic) is chosen in a way which does not damage the coating.



Cleaning ready for coating

Before coating of the lenses a final cleaning is necessary to guarantee

- cleanness and absence of particles as well as
- conditioning of the surfaces for the different coatings (hard coating, anti reflection coating)

The cleaning process is therefore adapted to

- the different plastic and mineral glass materials and
- in case of plastic lenses also to already existing hard coatings.



Vacuum coating for anti reflection layers with integrated non-stick coating (if required)

The anti reflection multi layers are applied which are necessary for plastic and mineral glass lenses.

Decoating of ring holder and ring metal sheet of stainless steel
Metal oxide/SiO² coatings have to be removed from holders and sheets of the coating oven, if required.



Dip coating for hard coatings on plastic lenses

The hard coating necessary for plastic lenses is applied by different processes, mostly by wet process (dip coating, spin coating).

The requirements for primer and dip coating as well as the following are mostly customer specific. In this range Elma offers individual cleaning and dip coating equipments related to the special project.



Decoating of defect hard coating layers
From time to time defective hard coatings have to be removed before new coating.



Products for cleaning ready for inspection

Solvent device X-tra LSM 250 / 550



Ultrasonic equipments for cleaning with solvent (flash point >55°C) to remove protective lacquers.
The X-tra LSM devices are available with a bath volume of 25 resp. 55 liters. They can be combined with Flex 1, 2 and x-tra Line products.
Ultrasonic equipment is available in the multi frequency version 25/45 kHz.
Accessories: Agitation, pump filter unit for bath care.



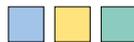
Flex 1 and 2 X-tra 250 / 550 / 800 / 1200 / 1600



Ultrasonic and rinsing equipments for cleaning ready for inspection of optics with water based cleaners including following rinsing.
Ultrasonic available in two multifrequency versions 25/45 kHz, 35/135 kHz.
Accessories: Agitation, pump filter unit for bath care.



X-tra Line 250 / 550 / 800 / 1200 / 1600



Modular system with standard devices. Can be individually combined according to the process requirements for the cleaning **ready for inspection with integrated deblocking and decomposition of alcacryl foils.**
From manual devices to fully automatic versions with transport robot.

Advantages:

Proved industrial series devices in different sizes and versions.
From the single device to the automated equipment.
Elma X-tra line can be extended step by step according to your needs and available budget.
Modular system for different cleaning requirements.
Extensive range of options and peripheral devices.
Short delivery time.
Plug & Clean.
Choice of different cleaning programs in connection with transport system.
Interchangeable devices and options for later modification and upgrade of cleaning requirements possible.
Upgrade of the modules and devices is possible at any time.

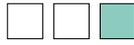


Customized equipments for the cleaning of moulds and lenses for the cleaning ready for inspection or ready for coating



According to the product range, throughput and integration requirements in the production process Elma is manufacturing individual equipments for water based or semi-aqueous processes with different drying technologies.

NA 265/162/150/4



Type: Robot device for the final cleaning before coating.
Cleaning product: Recipe lenses, material: CR 39, 1.6, 1.67.
Pollution: Dust, finger prints.
Process: Water based.
Cleaning chemistry: elma clean 310.
Periphery: Laminar flow unit.
Throughput: 4 - 6 batches/h.
Machine speciality:
Compact equipment for recipe workshops with little throughput requirements.



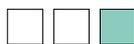
HS 600/680/250/4



Type: Lift-push device for pre-cleaning of moulds.
Cleaning product: Moulds.
Material: Mineral moulds.
Pollution: Plastic residues of different refraction indices.
Process: Sulfuric acid.
Cleaning chemistry: Sulfuric acid.
Periphery: Waste air washer.
Throughput: 16 – 18 batches/h.
Machine speciality:
Supply and cooling tank for the fully automatic change of sulfuric acid.



HSO 350/400/400/7-WLT



Type: Lift-push device for the cleaning ready for further treatment of recipe and storage lenses.
Cleaning product: Recipe lenses.
Material: Plastic lenses CR 39, MR 6, MR 7, MR 8.
Pollution: Finger prints, dust.
Process: Water based with hot air drying.
Cleaning chemistry: elma clean 330.
Periphery: Clean water circulation equipment.
Throughput: approx. 1200 lenses/h.
Machine speciality: Single lift device per process tank for lift and oscillation functions.
Referring to the product different process and transport procedures are possible.
- flow-through dryer with hot air and clean room filter.
- basket buffering in the distribution area under clean room conditions.



HS 600/600/250/3-IR



Type: Lift-push device for the final cleaning of moulds.
Cleaning product: Moulds.
Material: Mineral moulds.
Pollution: Little plastic residues with different refraction indices, finger prints, dust.
Process: Water based with IR drying.
Cleaning chemistry: elma clean 300.
Periphery:
Throughput: approx. 1400 moulds/h.



Fully automatic standard ultrasonic cleaning equipments of modular construction units for the cleaning ready for inspection or ready for coating

STC/MTC 50-200

For the cleaning ready for inspection or ready for coating.



Advantages of the standard equipments:

- Modular system depending on the individual process requirements.
- Ultrasonic equipment with multi frequency technology for the different sensitive products.
- Flexible integration into the production process (in line solution).
- Process related flexibility of cleaning line and application.
- Well proven components.
- Graphically designed control system.
- Process controll production for constant quality.
- Lower investment costs through standardization.
- Adjustment of investment costs to the shortened product lifecycles.



STC 350/500/300/11-WLT-LRS1



Type: Robot device for the cleaning ready for coating for plastic and mineral recipe and storage lenses.

Cleaning product: Recipe lenses.

Material: Plastic lenses CR 39-MR 7, mineral to 1.9.

Pollution: Finger prints, dust.

Process: Water-based with hot air drying.

Cleaning chemistry: elma clean products.

Periphery: Clean water circulation equipment.

Throughput: approx. 300 – 400 lenses/h.

Machine speciality: Integrated inspection room with clean room conditions behind the hot air dryer.

Ultrasonic multi frequency 35/130 kHz depending on the lense material and on already existing hard coatings in the case of semi-finished products.



STC 270/720/270/11-WLT3-2LRS1



Type: Robot device for the cleaning of plastic and mineral recipe and storage lenses.

Cleaning product: Recipe lenses.

Material: Plastic lenses CR 39, MR 6, MR 7 MR 8.

Pollution: Finger prints, dust.

Process: Water-based with hot air drying.

Cleaning chemistry: elma clean products.

Periphery: Pure water circulation equipment.

Throughput: approx. 320 lenses/h.

Machine speciality: Deblocking of the lenses with automatic transport of the block pieces out of the process chamber.

Loose and dissolve of the protective sheet (alkacryl foil).

Ultrasonic with multi frequency 35/130 kHz.

Handling of the baskets by two transport robots for the exact observation of the process periods in the case of single time critical process steps.



Besides the cleaning devices and equipments Elma offers a wide range of accessories.

Water treatment plant for the generation of softened city water, reosmosis water rsp. pure water for the circulation in different classes of performances of 100 – 2400 l/h.



Pump-filter units for the continous bath care of cleaning and rinsing tanks.



Treatment of solvent by separating of soluble contaminations as e.g. fillers, pitches, protection.



Laminar flow modules for the generation of clean room conditions within closed cleaning equipments.



Optics: Reference list

Böttcher GmbH (Cazal)	Passau	Germany	Omsag (Satis)	Milan	Italy
Carl Zeiss	Aalen	Germany	Optische Werke Rathenow	Rathenow	Germany
Carl Zeiss	Cape Town	South Africa	Optiswiss Thaler AG	Basel	Switzerland
Carl Zeiss	Chinchon	Korea	Optrex	Babenhausen	Germany
Carl Zeiss	Göttingen	Germany	Optyl Brillenmode	Berlin	Germany
Carl Zeiss	Jena	Germany	Pearle		Netherlands
Carl Zeiss	London	Great Britain	Pro Optik	Stockholm	Sweden
Carl Zeiss	Matescalka	Ungarn	Rodenstock	München	Germany
Carl Zeiss	Nattheim	Germany	Rodenstock	Bangkok	Thailand
Carl Zeiss	Oberkochen	Germany	Rodenstock	Regen	Germany
Carl Zeiss	Wetzlar	Germany	Rupp + Hubrach	Bamberg	Germany
Essilor	Braunschweig	Germany	Rupp + Hubrach	Blessington	Irland
Essilor	Freiburg	Germany	Satis	Groveport	USA
Eyal	Kibutz	Israel	Satis	Horgen	Switzerland
Gebr. Brasseler	Lemgo	Germany	Schmidt-Optik	Braunschweig	Germany
GKB-Ophthalmics	Goa	India	Shamir	Kibutz Shamir	Israel
Holland Optical Comp.	Amsterdam	Netherlands	Stratemeyer	Bochum	Germany
Hoya Lens	Mönchengladbach	Germany	UVEX	Fürth	Germany
Hoya Lens	Müllheim	Germany			
Hoya Lens	Paris	Frankreich			
Hoya Lens	Uithorn	Netherlands			
Hughes Leitz	Ontario	Canada			



Contaminations to be removed	Preceding and following processing steps	Moulds	Mineral glass	Organic glass	Product (cleaning concentrate)	Properties of the product	Cleaning solution: concentration, pH-value
Cleaning of moulds after mould manufacturing.							
Grinding residues, dust, fingerprints.	After grinding (and polishing). Before chemical hardening.	+			elma clean 330 (EC 330)	Aqueous cleaning concentrate, suitable for ultrasonic dipping bathes; KOH - (potassium hydroxide) based.	2 – 4 vol%; highly alkaline; pH: 13 – 13,5
Precleaning of moulds.							
Residues of polymers, incompletely reacted residues (e. g. monomers), dried external residues.	Following the mould release of allyl diglycol carbonate- (CR39 and analogous) as well as urethane-based (MR and analogous) glasses.	+			elma clean 305 (EC 305)	Aqueous cleaning concentrate, suitable for ultrasonic dipping bathes; NaOH - (sodium hydroxide) based, with solutizer.	10 – 50 vol%; highly alkaline; pH: 13 – 14
Final cleaning of moulds.							
Partially soluted residues of polymers, dust, fingerprints.	Following the mould release of allyl diglycol carbonate- (CR39 and analogous) as well as urethane-based (MR and analogous) glasses.	+			elma clean 300 (EC 300) (elma nonfoam 1)	Aqueous cleaning concentrate, suitable for ultrasonic dipping bathes, with foam-inhibitor elma nonfoam 1 also for splash-cleaning at > 55°C; KOH - (potassium hydroxide) based.	0.5 – 2 vol%; alkaline; pH: 11,5 – 12,5 (0.1 - 0.2 vol%)
Cleaning of ophthalmic glasses: ready for inspection.							
Storage dirt, dust, fingerprints.	After storage, handling. Before inspection.		+	++	elma clean 330 (EC 330)	Aqueous cleaning concentrate, suitable for ultrasonic dipping bathes; KOH - (potassium hydroxide) based.	2 – 4 vol%; highly alkaline; pH: 13 – 13,5
Residues of protective lacquer, grinding & polishing abrasives; dust, fingerprints.	After or combined with solvent-based precleaning for the removal of protecting lacquer. Before inspection.		++	+	elma clean 335 (EC 335)	Aqueous cleaning concentrate, suitable for ultrasonic dipping bathes; NaOH - (sodium hydroxide) based.	1 – 4 vol%; highly alkaline; pH: 12,5 – 13
Cleaning of ophthalmic glasses: ready for coating I.*)							
Step (1): Residues of protective lacquer, grinding & polishing abrasives; dust, fingerprints.	After or combined with solvent-based precleaning for the removal of protecting lacquer. Before step (2).		++	+	elma clean 335 (EC 335)	Wässriges Reinigungskonzentrat, geeignet für Ultraschall-Tauchbäder, NaOH-basiert.	1 – 4 vol%; highly alkaline; pH: 12,5 – 13
Step (2): Residues of polishing abrasives, dust, fingerprints.	After step (1).		+		elma clean 260 dip&splash (EC 260 d&s)	Aqueous cleaning concentrate, suitable for ultrasonic dipping bathes and for splash-cleaning above 55°C.	1 – 2 vol%; neutral; pH: 7 – 8
or							
Step (2): Dust, fingerprints.	After step (1). Before rinsing with deionized water, lift-out, drying and coating.		+	+	elma clean 300 (EC 300) (elma nonfoam 1)	Aqueous cleaning concentrate, suitable for ultrasonic dipping bathes, with foam-inhibitor elma nonfoam 1 also for splash-cleaning at > 55°C; KOH - (potassium hydroxide) based.	0.5 – 2 vol%; alkaline; pH: 11,5 – 12,5 (0.1 - 0.2 vol%)
Cleaning of ophthalmic glasses: ready for coating II.*)							
Step (1): Storage dirt, dust, fingerprints.	After storage, handling. Before step (2).		+	++	elma clean 330 (EC 330)	Aqueous cleaning concentrate, suitable for ultrasonic dipping bathes; KOH - (potassium hydroxide) based.	2 – 4 vol%; highly alkaline; pH: 13 – 13,5
Step (2): Dust, fingerprints.	After step (1). Before rinsing with deionized water, lift-out, drying and coating.		+	+	elma clean 300 (EC 300) (elma nonfoam 1)	Aqueous cleaning concentrate, suitable for ultrasonic dipping bathes, with foam-inhibitor elma nonfoam 1 also for splash-cleaning at > 55°C; KOH - (potassium hydroxide) based.	0.5 – 2 vol%; alkaline; pH: 11,5 – 12,5 (0.1 - 0.2 vol%)
*) The right conditioning of the surface for subsequent hard or antireflection coating itself may require an alkaline, a neutral or even an acidic cleaning step (2).							
Removal of imperfect hard- or hard- & antireflection coatings from organic glasses.							
Hard-coating layer.	After imperfect dip-coating.			+	elma clean 330 (EC 330) + KOH (potassium hydroxide)	Aqueous cleaning concentrate, suitable for ultrasonic dipping bathes; KOH - (potassium hydroxide) based. Alkalinity strengthened by KOH-addition.	EC 330: 2 – 4 vol% + KOH: 2 – 4 mass%; very highly alkaline; pH > 14
Removal of multilayer antireflection coatings from stainless steel holders or sheets.							
Combinations of different metal oxide and SiOx-coatings.	After imperfect multilayer antireflection coating.		Stainless steel surfaces		elma clean 112 (EC 112) + elma clean 212 (EC 212) + KOH (potassium hydroxide)	Aqu.'s surfactant-free cleaning concentrate, suitable for ultrasonic dipping bathes; KOH - (potassium hydroxide) based.	EC 112: 4 vol% + EC 212: 0.4 vol% + KOH: 2 – 4 mass%; very highly alkaline; pH > 14