ICL Advanced Additives

HALOX® Corrosion Inhibitors

ICL\ Advanced Additives

As the global leader providing HALOX® corrosion inhibitors to the paint and coatings market, ICL\ Advanced Additives is more than a pigment supplier, we are an innovative solution provider for your ever-evolving needs. Our HALOX® product line is formulated to offer safer, more durable and longer-lasting solutions to address a multitude of coatings markets such as:

- **Aerospace**
- **Agricultural & Construction Equipment**
- **Architectural**
- **Automotive Refinish**
- **Coil Coatings**
- **Industrial Maintenance**

The ICL Group is one of the world's leading fertilizer and specialty chemicals producer committed to fulfilling humanity's ever-evolving needs. Its major production activities are located in Israel, Europe, the US, South America and China, and are supported by major global marketing and logistics networks.

Our Commitment

Successful relationships begin at the product development planning stage and extend through plant trials and product launch. Customers come to us with challenges, and we are dedicated to provide them with solutions.

For manufacturers who rely on quality coatings with long-term resistance to corrosion or tannin stain, ICL\ Advanced Additives offers proven performance, corrosion and tannin stain protection, and acceptability and protection of the world around us.

Quality / REACH Statement / Responsible Care

As a responsible international supplier of specialty chemicals, ICL\ Advanced Additives is committed to advancing the principles of sustainability in the industries in which we operate. We incorporate quality, health, safety and environment management systems into all phases of the chemical life cycle, and pledge continuous improvement to provide the highest quality of products while protecting the safety of our people, our business partners, and the environment.

ICL\ Advanced Additives is ISO 9001, ISO 14001:2004 and RC 14001:2014 certified. We are committed to our Responsible Care® initiatives and consistent with the Responsible Care® code of Product Stewardship. We remain fully engaged in the implementation of the European Union's Registration, Evaluation, Authorization and Restriction of Chemicals legislation (REACH). The impact it will have on the future availability of chemicals is of vital importance for ICL\ Advanced Additives, our customers and the entire global chemical industry.

Technical Service

Our technical support capabilities allow us to help customers to achieve better products. We are committed to building our product portfolio and continually exploring and expanding the frontiers of today's coatings technologies. This includes delivering timely assistance on coating formulation questions, aiding formulators in achieving total system compatibility and identifying an optimum inhibitor package to address individual cost and performance targets.

We take the problem, analyze the parameters, work jointly with company product experts and create solutions that exceed customer expectations.

HALOX® ICL Performance Products REACH

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Product Recommendation Guide

Highly Recommended ● Recommended

By Resin (Solvent Based Coatings)	Epoxies	Epoxy Esters	Polyurethanes	Moisture Cure Polyurethanes	Short & Medium Oil Alkyds	Long Oil Alkyds	Polyesters	Silicones
HALOX® BW-191					●	●		
HALOX® CW-2230	●	●	HALOX	HALOX	HALOX	HALOX		
HALOX® CW-22/221					●	●		
HALOX® CW-291		●	●		HALOX	HALOX		
HALOX® 430	●	●	HALOX	HALOX	●	●	●	●
HALOX® 430 JM	●	HALOX	HALOX	HALOX	●	●	HALOX	●
HALOX® CW-491	●	●			●	●		
HALOX® SW-111	HALOX	●	●					
HALOX® Z-PLEX 111	●	●			●	●	●	
HALOX® Z-PLEX 250	●	●			●	●	●	
HALOX® Z-PLEX 750	HALOX	HALOX			●	●	●	
HALOX® CZ-170		●			●	●		
HALOX® SZP-391	●	HALOX	HALOX		HALOX	HALOX	HALOX	HALOX
HALOX® SZP-391 JM	●	HALOX	HALOX		HALOX	HALOX	HALOX	●
HALOX® 550 WF	●	●	●		●	●	HALOX	●
HALOX® 630	●	●	HALOX	●	HALOX	●	●	●
HALOX® 650	●	●	●	●	●	●	HALOX	●

Make the Right Choice.

Find the best HALOX® Corrosion Inhibitor to fit your formulation needs. For additional recommendations, contact THE INHIBITOR at halox.com.

Product Recommendation Guide

Highly Recommended ● Recommended

By Resin (Water Based Coatings)	Epoxies	Polyurethanes	Polyurethane Dispersions	Water Reducible Alkyds	Alkyd Dispersions	Chlorinated Polymers	Acrylics
HALOX® BW-191			●	●			●
HALOX® CW-2230	●	●	●	●	●		●
HALOX® CW-22/221	●	●	●	●	●		
HALOX® CW-291	●			●	●		
HALOX® 430	HALOX	HALOX	HALOX	●	●		●
HALOX® 430 JM							
HALOX® CW-491	●			●			●
HALOX® SW-111	HALOX	HALOX	●				●
HALOX® Z-PLEX 111	●			●	●		●
HALOX® Z-PLEX 250	●			●	●		●
HALOX® Z-PLEX 750	HALOX			HALOX	HALOX		HALOX
HALOX® CZ-170				●	●		●
HALOX® SZP-391	●	●	●	HALOX	HALOX	HALOX	HALOX
HALOX® SZP-391 JM	●	●	●	HALOX	HALOX	HALOX	HALOX
HALOX® 550	●	●	●	●	●		HALOX
HALOX® 550 WF	●	●	HALOX	●	●		HALOX
HALOX® 350	●	●	HALOX	●	●		●
HALOX® 515	●				●		●
HALOX® 570	●	●	HALOX	●	HALOX		●

By Specialty Application	Clear Coats	Thin Films	Acid Catalyzed	Powder Coating	Wash & Etch Primers	Aerospace	Coil Coating	High Temperature
HALOX® 430 JM	●	●		●	●	HALOX	HALOX	●
HALOX® CZ-170		●		●	●			●
HALOX® SZP-391 JM	●	●	HALOX	●	HALOX	●	●	HALOX
HALOX® 550 WF	HALOX	HALOX	HALOX	●	HALOX	●		
HALOX® 350	●	●					●	
HALOX® 570		●						
HALOX® 630	●	●				●		
HALOX® 650	●	●	●	HALOX	●	HALOX	HALOX	

Selecting Corrosion Inhibitors for an application is dependent on the resin system. Please visit halox.com to contact The Inhibitor for more information.

Eliminate hazardous toxins without sacrificing performance.

For over 40 years, HALOX® corrosion inhibitive pigments have provided a high standard of protection without the use of lead or hexavalent chromium compounds. ICL\ Advanced Additives proudly offers a variety of Inorganic Corrosion Inhibitors based on the proven performance of zinc. Our Z-PLEX® products are designed to allow you to choose the right inhibitor for your performance and manufacturing needs.

For more information visit **halox.com/inorganic**

HALOX® SZP-391

TRIED & TRUSTED

HALOX® SZP-391 is the standard for excellent corrosion protection in a myriad of coatings systems. The proprietary blend of strontium and zinc phosphosilicates offers protection in nearly all water and solvent based applications. The versatility of HALOX® SZP-391 makes it the pigment of choice for formulators seeking long-term corrosion protection.

HALOX® SZP-391 JM

JET MILLED

HALOX® SZP-391 JM contains the same proprietary blend of strontium and zinc phosphosilicates as HALOX® SZP-391 at a reduced particle size. HALOX® SZP-391 JM's jet-milled feature not only extends the range of applications to thin-film (<25 microns) and clear coats (<10 microns) with its reduced particle size range, but offers the opportunity for increased ease of incorporation. Emerging commercial coatings technologies, such as alkyd dispersions, benefit greatly from this feature.

HALOX® CZ-170

CORROSION & TANNIN BLOCKING

HALOX® CZ-170 is a zinc ortho-phosphate pigment with attributes beneficial to both corrosion inhibition and tannin-stain blocking. It is ideally suited for applications over multiple substrates where both types of protection are desired. The benefits of HALOX® CZ-170 can also be realized in thin-film and high gloss applications due to the low particle size range.

HALOX® Z-PLEX 111

ZINC PHOSPHATE REPLACEMENT

HALOX® Z-PLEX 111 is specially engineered to contain 80% less zinc compounds while providing improved corrosion efficiency. This engineered zinc phosphate complex is designed to compete head-to-head with standard zinc phosphate pigments. For light industrial coatings, the reduced cost of HALOX® Z-PLEX® 111 compared to that of zinc phosphate brings realized savings to your formulation without sacrificing performance.

HALOX® Z-PLEX 750

2-IN-1 ORGANIC/INORGANIC

HALOX® Z-PLEX 750 is a hybrid corrosion inhibitor combining organic and inorganic inhibitor synergies. A cost-effective alternative to modified zinc phosphate, HALOX® Z-PLEX 750 improves humidity resistance and wet adhesion in both water and solvent based coatings.

HALOX® Z-PLEX 250

ZINC PHOSPHATE

HALOX® Z-PLEX 250 is the universally accepted alternative to lead and chrome inorganic corrosion inhibitor for all applications. Its high degree of versatility is due to its narrow particle size distribution. It is a Type I, zinc phosphate di-hydrate crystal form, which allows for use in both water and solvent based coatings.

HALOX® SW-111

TRIED & TRUSTED

HALOX® SW-111 is a strontium phosphosilicate pigment designed for high performance applications, such as water and solvent based epoxy formulations. HALOX® SW-111 maintains a higher level of in-can stability than other zinc-based corrosion inhibitors and performs well in the most demanding resins where the reactivity of zinc-containing anti-corrosive pigments can be problematic.

HALOX® 430

ION EXCHANGE

HALOX® 430 is a patent protected pigment designed to provide both conventional passivation and ion-exchange technology in one product. The unique design enables formulation into nearly all water and solvent based formulations. The ability to ion-exchange corrosion inducing species showcases the latest technology in heavy-metal replacements to ensure long-lasting performance.

HALOX® 430 JM

JET MILLED

HALOX® 430 JM is a patent protected pigment designed to provide both conventional passivation and ion-exchange technology in one product. HALOX® 430 JM offers the same overall utility as HALOX® 430 with acceptance into thin-film and clear coat formulations. The ability to ion-exchange corrosion inducing species showcases the latest technology in heavy-metal replacements to ensure long-lasting performance.

HALOX® BW-111 & BW-191

SYNERGISTIC

HALOX® BW-111 and BW-191 are barium phosphosilicate pigments ideally suited to provide a balanced corrosion inhibitive package when used with lower solubility corrosion inhibitors such as HALOX® SZP-391 or HALOX® Z-PLEX 250. The increased solubility of these products compared to traditional zinc phosphate offers increased protection during the beginning of a coatings service life. These products can be used as sole corrosion inhibitors or as an enhancement for overall protection when used with HALOX® SZP-391.

HALOX® CW-2230

LOW MOISTURE

HALOX® CW-2230 is a calcium borosilicate pigment with unique manufacturing process results in a low moisture product, well-suited for polyurethane coatings, though not limited. HALOX® CW-2230 is an ideal choice for coatings applied over substrates such as galvanized steel and other treated substrates where saponification with surface zinc is undesirable.

HALOX® CW-22/221 & CW-291

HUMIDITY RESISTANCE

HALOX® CW-22/221 is a calcium borosilicate pigment recommended for protective coatings formulated with alkyd technology. HALOX® CW-22/221 is an ideal choice for coatings applied over substrates such as galvanized steel and other treated substrates where saponification with surface zinc is undesirable. HALOX® CW-291 can be used as a stand-alone corrosion inhibitor or to enhance overall protection when used with traditional corrosion inhibitors over untreated substrates.

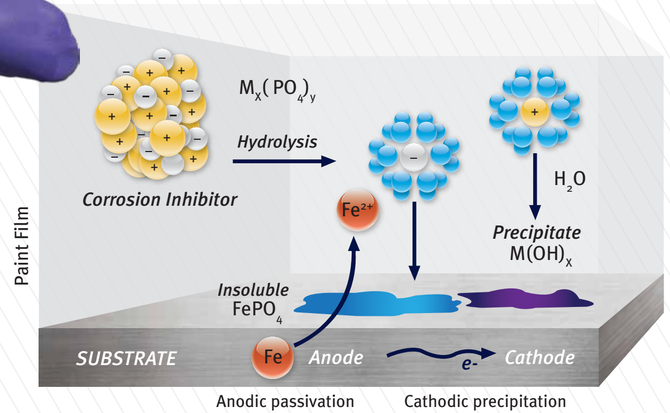
HALOX® CW-491

VERSATILE

HALOX® CW-491 is a calcium phosphosilicate pigment recommended for zinc-free protective coatings. HALOX® CW-491 offers a broad range of corrosion protection in both water and solvent based systems.

How our Inorganic Corrosion Inhibitors work:

Our Inorganic Corrosion Inhibitors work hard to give your coatings the best corrosion protection by delaying the onset of corrosion and providing long-term corrosion protection.



Maximize corrosion resistance while promoting adhesion.

HALOX® Specialty Inhibitors provide formulators with additional tools to increase hydrophobicity and adhesion in challenging environments. The performance attributes of HALOX® 550 and HALOX® 550 WF lead to overall improvements to barrier properties through both the formation of domains within the pores of a coating in addition to an affinity for bonding at the metal surface.

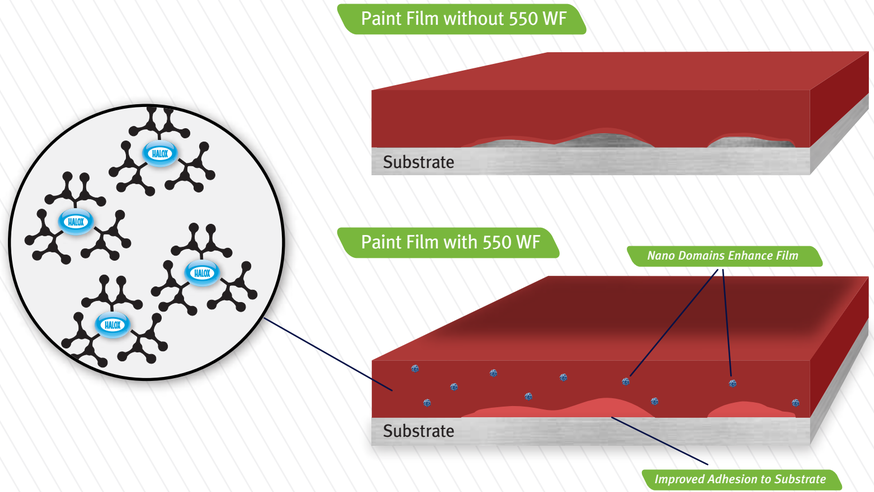
For more information visit **halox.com/specialty**

HALOX® 550/ HALOX® 550 WF

WATER BASED

WATER & SOLVENT BASED

HALOX® 550/550 WF works directly with corrosion inhibitive pigments and organic additives. When used at a low loading level, they can boost the adhesion of the systems through the development of a sol-gel network and the formation of hydrophobic nano-domains within the coating. It's more than just an adhesion promoter – its fundamental chemistry is the ultimate synergist for improved coating performance. HALOX® 550 is designed for water based systems. The versatility of HALOX® 550 WF enables it to be used in both water and solvent based formulations.



Improve adhesion and provide a high gloss, corrosion-resistant finish.

HALOX® Organic Corrosion Inhibitors are effective against flash rusting and in-can corrosion prevention, though the benefits of using these products does not end there. Our HALOX® Organic Corrosion Inhibitors are ideally suited for high gloss, thin film, and clear coat applications. They also provide superior synergy when used in combination with inorganic corrosion inhibitors in traditional coatings. To achieve desired performance of your resin system proper selection of HALOX® Inhibitors in essential.

For more information visit **halox.com/organic**

HALOX® 515/515 LFG

LIQUID DUAL PROTECTION

HALOX® 515 is a liquid corrosion inhibitor designed for water based formulations which is free from heavy-metals and nitrites. This low viscosity, liquid organic corrosion inhibitor meets all the needs of a traditional flash-rust inhibitor in addition to providing galvanic corrosion resistance and superior humidity resistance, all of which lead to better overall corrosion inhibition. A lower freeze point variant, HALOX® 515 LFG, is available for improved stability during cold weather transport and application.

HALOX® 350

ZERO VOC

HALOX® 350 is a highly effective corrosion inhibitor designed for water based formulations in order to provide flash-rust inhibition, in-can rust prevention, and improved adhesion performance. This product may be used as a powder (formulation pH dependant) or as an easily prepared liquid additive to a wide array of coatings systems. HALOX® 350 is a nitrite-free corrosion inhibitor.

HALOX® 570

FLASH RUST & SYNERGIST

HALOX® 570 is a highly effective long-term corrosion inhibitor designed for water based formulations in order to provide flash-rust inhibition, galvanic corrosion resistance, and improved adhesion performance. This product may be used as a powder (formulation pH dependant) or as an easily prepared liquid additive to a wide array of coatings systems including UV applications.

HALOX® 630

LIQUID

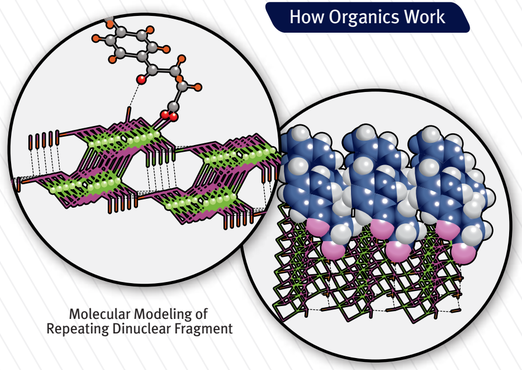
HALOX® 630 is a high performance liquid corrosion inhibiting additive for solvent based formulations. The ability of HALOX® 630 to improve adhesion to poorly prepared substrates is unsurpassed. HALOX® 630 may be used alongside traditional corrosion inhibiting pigments or as the stand-alone inhibitor for DTM applications including clear coats.

HALOX® 650

ZERO VOC

HALOX® 650 is a highly effective corrosion inhibitor designed for water and solvent based formulations in order to provide flash-rust inhibition, in-can rust prevention, and improved adhesion performance. It may be used in powder coatings or in liquid formulations as a powder (formulation pH dependant) or as an easily prepared liquid.

How Organics Work



Molecular Modeling of
Repeating Dinuclear Fragment

A Pre-Neutralized Solution

30% HALOX® 350 SOLUTION	WEIGHT	30% HALOX® 570 SOLUTION	WEIGHT
De-ionized Water	57.3	De-ionized Water	62.8
28% Ammonium Hydroxide*	15.0	28% Ammonium Hydroxide*	7.2
HALOX® 350	27.7	HALOX® 570	30.0
TOTAL	100.00	TOTAL	100.00

Stir Slowly, adjust pH to 8-9

**AMP-95 is suitable*

Put an end to the appearance of rust spotting and in-can corrosion.

Flash Rust Corrosion Inhibitors are added to water based coatings in order to stop corrosion formation that occurs during the drying process. Without the use of Flash Rust Inhibitors, water soluble corrosion products migrate to the surface of the coating appearing as rust stains or spots. In addition to the flash rust protection provided by the entire line of HALOX® Organic Corrosion Inhibitors, we are proud to offer FLASH-X® products specifically designed to prevent unsightly staining which can ruin an otherwise perfect finish.

For more information visit **halox.com/flash-rust**

HALOX® FLASH-X® 150

TRIED & TRUSTED

HALOX® FLASH-X® 150 combines dual mechanisms to combat flash rusting and in-can rusting. The low viscosity liquid is ideal for increasing production output and may be post-added to meet the challenges of customer specific modifications.

HALOX® FLASH-X® 330

NITRITE FREE

HALOX® FLASH-X® 330 is a nitrite-free, low odor liquid flash rust inhibitor designed to prevent both flash rust and in-can corrosion. HALOX® FLASH-X® 330 may also be added to water jet-blasting solutions to provide temporary protection prior to applying the protective coating.

Our HALOX® Corrosion Inhibitors are available for purchase through our global distribution network. To contact a distributor in your area for pricing and availability, visit **halox.com/distributors**.

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