FIRE RETARDANT ADDITIVES

MOLDX® Alumina Trihydrate

for Polyester, Vinyl Ester and Acrylic Based Formulations

Superior Performance
in Low Viscosity Applications

Huber MoldX® Products

Eliminate Halogens and Reduce Resin Consumption with Huber's MoldX® Optimized Alumina Trihydrate (ATH) Products.

When things heat up and you need an advanced flame retardant for molding compounds, turn to the exclusive MoldX® optimtized ATH product line-up from Huber. All MoldX® products allow for higher loadings thanks to their low viscosity technology — thus providing increased flame retardant efficiency while lowering formulation costs.

MoldX® A400
MoldX® A300
MoldX® A110
MoldX® S45
MoldX® P18
MoldX® P12

Improve Performance - **Reduce Cost**

What Makes Huber's MoldX® Optimized Alumina Trihydrate Valuable For Your Formulation

- Increased Loading Levels
- Lower Viscosity
- Halogen-Free
- Better Glass Wet-Out and Faster Line Speeds
- Flame Retardance and Smoke Suppression in Molded Parts
- Reduced Flame Spread

MoldX® Product Portfolio

Product	Name	Value Proposition	Applications	Benefits
MoldX®	A400	Allows compounders to reduce their overall filler loading by 50 - 100 phr vs. conventional low viscosity ATH grades while maintaining fire retardance and smoke suppression performance	· Sheet Molding Compounds (SMC) · Bulk Molding Compounds (BMC) · Hand Lay-Up · Epoxy · Polyurethanes	· Halogen Replacement · Smoke Suppression · ASTM E84 (Flame Spread Index equal to or less than 25, giving a Class A Rating) · UL 723
MoldX®	A300	Highest ATH loadings at processable viscosity (optimal for >300 phr) with outstanding mold flow for increased flame retardant properties	· Sheet Molding Compounds (SMC) · Bulk Molding Compounds (BMC) · Hand Lay-Up · Epoxy · Polyurethanes · Spray-Up · Wet-Mat	· Halogen Replacement · Smoke Suppression · ASTM E84 (Flame Spread Index equal to or less than 15, giving a Class A Rating) · UL 723 · Color control
MoldX®	A110	High ATH loadings at a processable viscosity between 250 phr to greater than 300 phr with outstanding mold flow for increased flame retardant properties	· SMC · BMC · Hand Lay-Up · Polyurethanes	· Halogen Replacement · Smoke Suppression · ASTM E84 (Flame Spread Index equal to or less than 25, giving a Class A Rating) · UL 723
MoldX®	S45	High loadings at processable viscosities but at levels below MoldX® A110	· SMC · BMC · Hand Lay-Up · Polyurethanes	· Halogen Replacement · Smoke Suppression · ASTM E84 (Flame Spread Index equal to or less than 25, giving a Class A Rating) · UL 94 5VA and UL 94 VO
MoldX®	P18	Designed for use in applications with high reinforcement content, features high ATH loadings with low viscosity, excellent settling resistance and low pull force at fiberglass content in the range of 50 to 65%	· Pultrusion where fiberglass content is up to 65% by weight · Resin Infusion Molding · Cured-In-Place-Pipe (CIPP) · Vacuum Bag Molding · Filament Winding	· Halogen Replacement · Smoke Suppression · ASTM E84 (Flame Spread Index equal to or less than 25, giving a Class A Rating)
MoldX®	P12	Huber's recommended MoldX® product for pultrusion with >65% fiberglass content, featuring low pull force, fast line speeds and excellent resistance to settling	· Pultrusion where fiberglass content is greater than 65% by weight · Resin Infusion Molding · Vacuum Bag Molding · Filament Winding	· Halogen Replacement · Smoke Suppression · ASTM E84 (Flame Spread Index equal to or less than 15, giving a Class A Rating)

Customized MoldX®
Solutions for Your Application

MoldX® A400
For SMC, BMC, Hand Lay-Up, Epoxy and Polyurethane Applications

MoldX® A400 is Huber's highest performing optimized ATH grade. It is engineered to impart outstanding fire retardance and smoke suppression in fiberglass reinforced SMC without halogen additives. Formulations have better mechanical properties because less MoldX® A400 is needed to pass the same flame retardant certifications that would be required of competitive ATH grades.

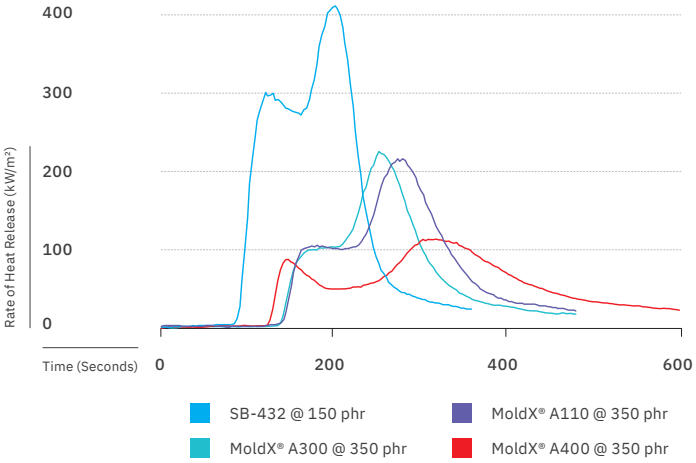
MoldX® A300
For SMC, BMC, Hand Lay-Up, Epoxy and Polyurethane Applications

MoldX® A300 provides dramatically improved processing viscosities to sheet molding compounds (SMC) at loadings ranging from 250 phr to greater than 350 phr. The unique characteristics of MoldX® A300 makes it our highest quality "low viscosity" grade in terms of fire retardancy and color excellence. The high loading levels allow for the elimination of halogenated resins and additives typically used to pass conventional flame-retardant certification tests such as UL 94V-O, UL94 5VA, Dockett 90, or ASTM E84 Class A ratings. The elimination of halogens from SMC formulations result in greatly reduced smoke generation, allowing compounds to pass UL 723.

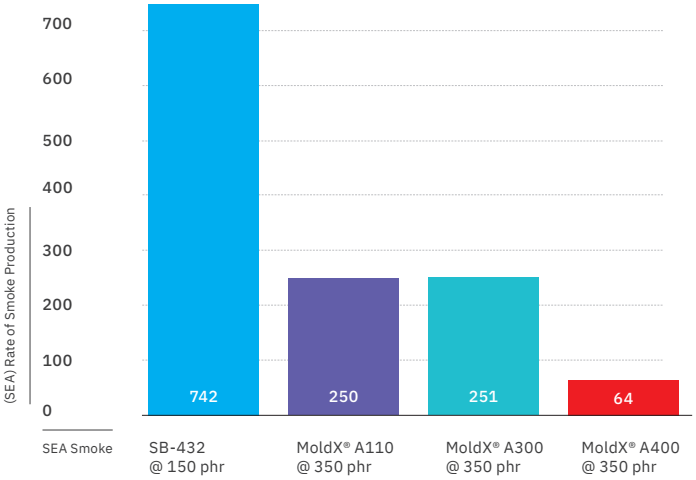
MoldX® A110
For SMC, BMC, Hand Lay-Up and Polyurethane Applications

MoldX® A110 is an optimized ATH fire retardant capable of very high loading levels, from 250 phr to greater than 350 phr. It is the choice for halogen-free product formulations requiring significant smoke suppression. The low-viscosity performance means MoldX® A110 can be processed on SMC machines and BMC mixers at loading levels not thought possible. The outstanding flow characteristics of A110 make it especially well-suited for molding large or intricate parts.

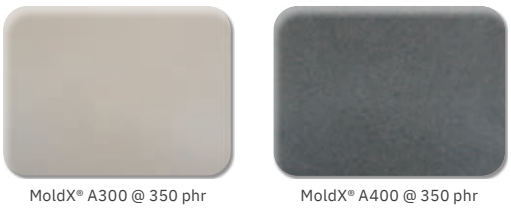
ASTM E1354 Cone Calorimeter
Rate of Heat Release @ 50 kW/m²



ASTM E1354 Cone Calorimeter
(SEA) Rate of Smoke Production



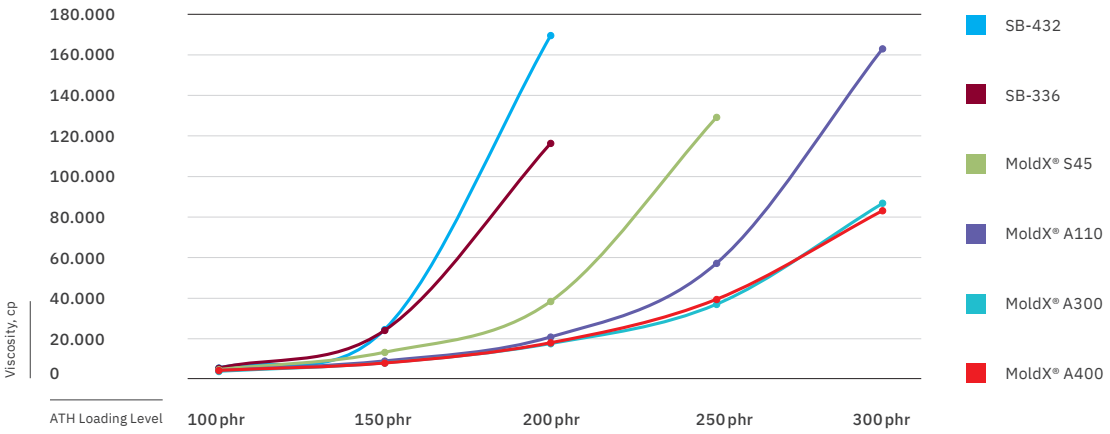
MoldX® Color Comparison



MoldX® A300 has superior color characteristics vs. MoldX® A400. The panel thickness in both images above is 100 mils. Resin type is unsaturated polyester.

MoldX® A300 Huber's Lowest Viscosity Optimized ATH Grade

Brookfield Viscosity @ 10 RPM @ 35°C



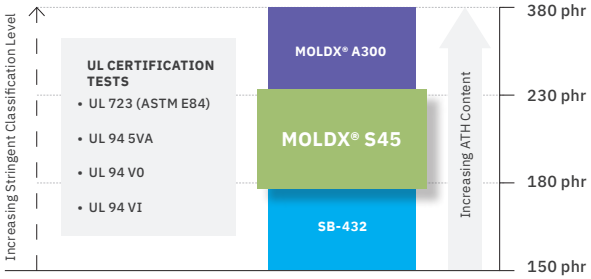
MoldX® S45

For SMC, BMC, Hand Lay-Up and Polyurethane Applications

MoldX® S45 optimized ATH is a halogen-free fire retardant product designed for fiberglass reinforced polyester applications such as SMC, BMC and laminating. MoldX® S45 is engineered to allow higher loadings (180 to 230 phr) versus competitive ATH products and offers excellent processing.

MoldX® S45 Optimal Loading Level:

Between 180 and 230 phr



MoldX® P18

For Pultrusion, Resin Infusion Molding, Cured-In-Place-Pipe (CIPP), Vacuum Bag Molding and Filament Winding Applications

MoldX® P18 has an optimized particle size distribution with a D100 (top size) of approximately 18 microns giving excellent processing performance at fiberglass contents from 50% to 65% by weight. The lack of coarse particles allows for the fine particles to flow readily throughout the fiberglass in the composite. As a result, the pultruder can obtain a very low pull force and outstanding settling resistance with increased line speeds when compared to other ATH products. Readily achievable loading levels give fire retardant performance that permit the elimination of more expensive fire retardant additives.

MoldX® P12

For Pultrusion, Resin Infusion Molding, Vacuum Bag Molding and Filament Winding Applications

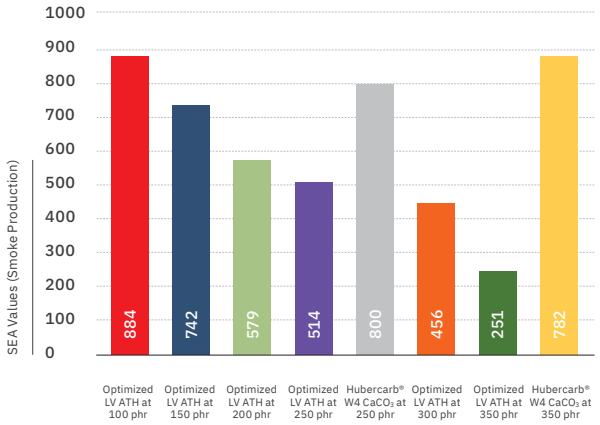
MoldX® P12 is an optimized ATH product designed to be used in the most demanding fire retardant pultrusion applications (for example, when high ATH loadings and fiberglass content of 65% or more is required). When the fiberglass content is greater than 65%, MoldX® P12 is recommended. MoldX® P12 has a finer top size than MoldX® P18, so MoldX® P12-based formulations allow for faster line speeds and lower pull force at the highest fiberglass contents.

MoldX® P18 Pull Force vs. Competitors

Pull force (Pounds) and Viscosity (cp)

Formulation Ingredients	**I**	**II**	**II**
Isophthalic Polyester Resin	100	100	100
Competitive ATH – 2 Microns	100	-	-
Competitive ATH – 6.5 Microns	-	100	-
MoldX® P18 Optimized ATH – 5.5 Microns	-	-	100
Fiberglass (Weight %)	62%	62%	62%
Performance Comparison			
Viscosity (cp) @ 25 °C	2,890	2,490	1,630
Pull Force (Pounds)	1,130	6,634	930

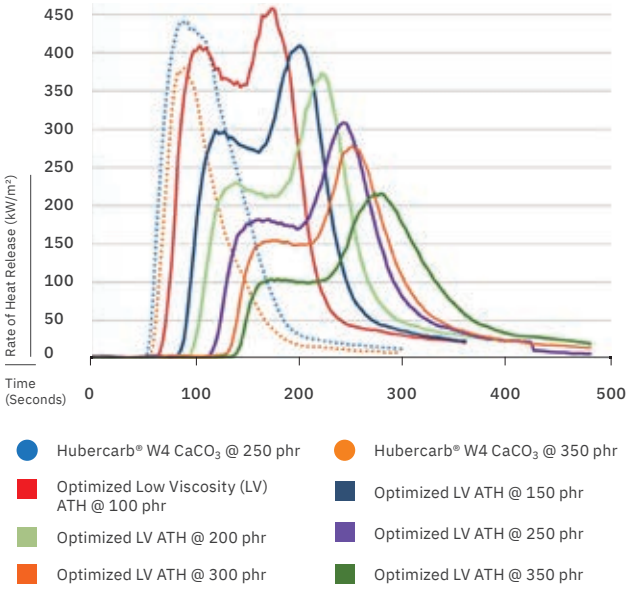
ASTM E1354 Cone Calorimeter
(SEA) Average Smoke Generation Values



Specific Extinction Area (SEA) is the ratio of smoke production to specimen mass loss (m^2/kg) averaged over the test duration.

The graphs above show how increased ATH loadings result in a decreased heat release rate and decreased smoke generation. Huber's MoldX® optimized ATH products allow for higher loadings at the process viscosity required by the formulator's process. This attribute makes the MoldX® grades very effective for imparting increased flame retardancy and smoke suppression to resin systems.

ASTM E1354 Cone Calorimeter
Rate of Heat Release at 50 kW/m²



40 Years
of Experience

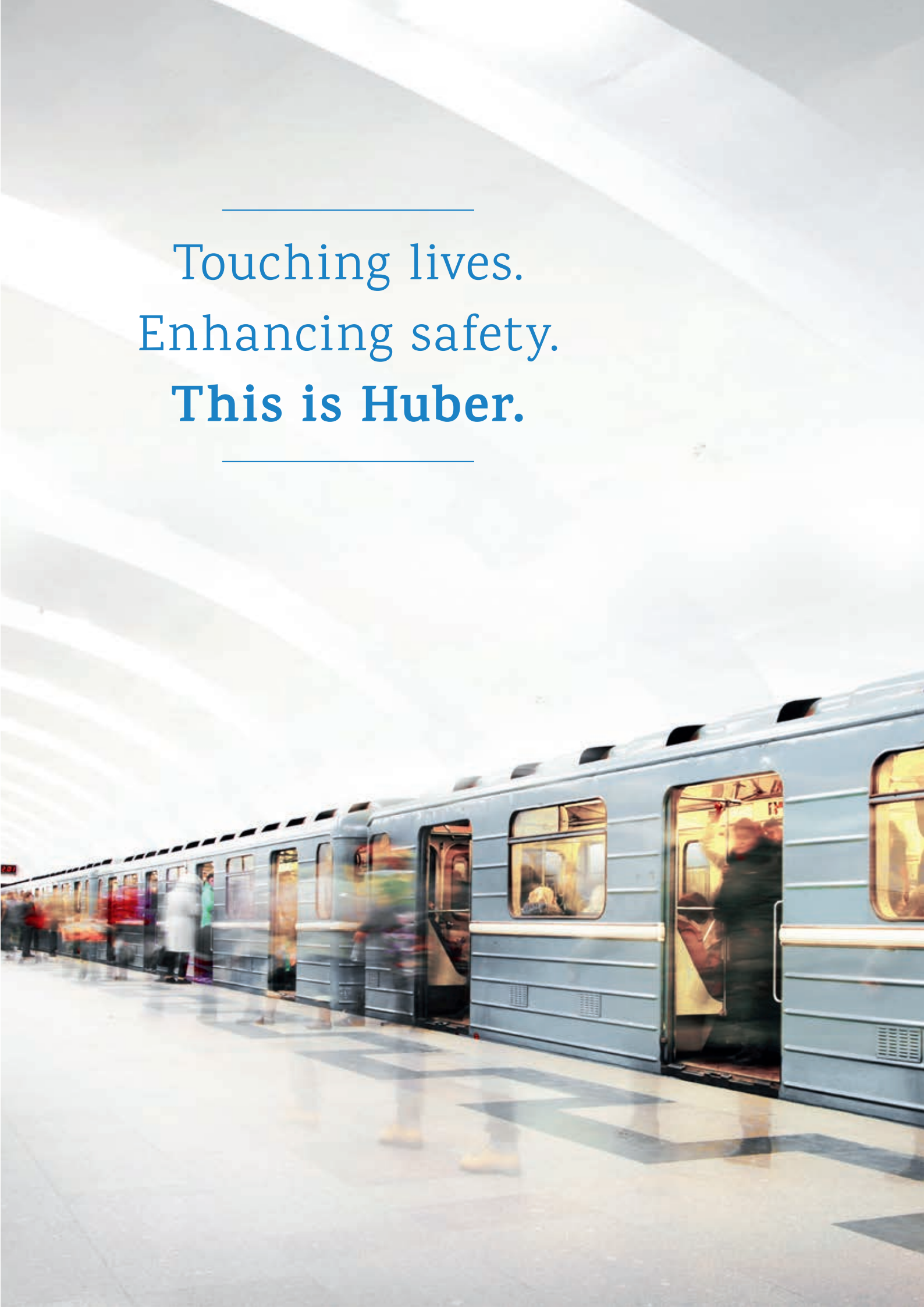
An Optimized Product Portfolio of Unparalleled Performance

The halogen-free MoldX® optimized ATH product portfolio from Huber offers unparalleled flexibility by allowing for higher loadings with low viscosity performance while imparting outstanding mold flow characteristics. Huber is your flame retardant and smoke suppression expert with over 40 years of experience offering product use guidance and a dedicated technical team for strong customer focus and support. Before things heat up, contact us today. Let us consult with you about the MoldX® solution best-suited and perfect for your next application.

HUBER
FIRE RETARDANT ADDITIVES

TRANSPACIFIC CERTIFICATIONS LTD
TCL

Touching lives.
Enhancing safety.
This is Huber.



Our global **footprint**

Huber's Fire Retardant Additives (FRA) SBU is a specialty chemicals business with a global, leading position in the development and production of halogen-free fire retardant solutions, smoke suppressants and specialty aluminas touching lives and enhancing safety for millions of people around the world.

Americas

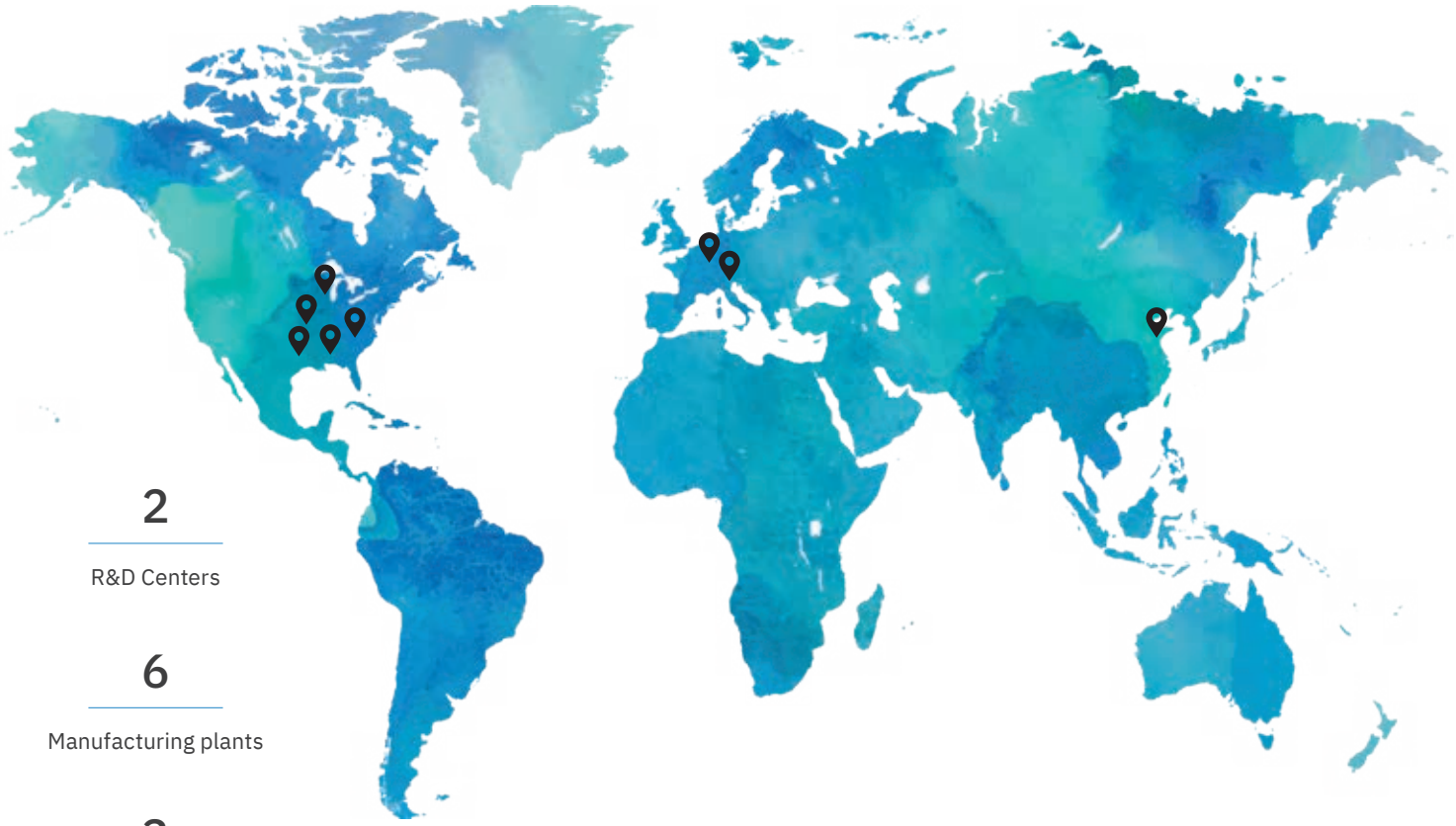
Fairmount, GA
Atlanta, GA
Kennesaw, GA
Marblehead, IL
Bauxite, AR

Europe

Bergheim, Germany
Breitenau, Austria

Asia Pacific

Qingdao, China



2

R&D Centers

6

Manufacturing plants

3

Customer Care Centers

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