INOXGFL GROUP
BEYOND INFINITY

Advancing EV & ESS Battery Materials Solutions Globally

GFL®
GUJARAT FLUOROCHEMICALS
VALUE THROUGH GREEN CHEMISTRY

GFCL EV Products Limited

GROUP'S JOURNEY

1987

1. GFL incorporated as a Refrigerant manufacturer in India

1988

2. Launch of a public issue
2. Established CFC Refrigerant gas, Hydrofluoric Acid units in Panchmahal, Gujarat

2006

3. Implementation of Clean Development Mechanism Project at Ranjitnagar, Gujarat
3. Carbon Credits issued by the UNFCCC

2007

4. Chemical complex at Dahej, Gujarat – with Caustic Soda & Chlorine, a Chloromethane & PTFE units and CPP

2009

5. Wholly owned subsidiary in the US
5. Diversification into wind energy - India's leading wind energy solutions provider

2011

6. GFL's captive Fluorspar Mine in Morocco

2013

7. Wholly owned subsidiary in Europe (Germany)
7. Became globally leading supplier of PFOA Free Fluoropolymers

2014-16

- Capacity expansion for Monomers & Polymers
- GFL introduced the Fluonox® brand of FKM (Fluoroelastomers)
- New Fluoropolymers under the brand name INOFLON®

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2018

- Launch of additives brand, INOLUB® - PTFE Micropowders & Polymer Processing Aids (PPA)

2019

- Launched PVDF under the brand name INOFLAR®

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2020-21

- Added new site at Jolva, Gujarat
- Diversification into New Age Products: materials for ACC* batteries, Solar & Hydrogen

  (*Advanced Cell Chemistries)
- Rated GOLD by Ecovadis in 2021

2023

- Commercialisation of $LiPF_6$ and PVDF
- Electrolyte Plant

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2024

- Capacity expansion - $LiPF_6$/ PVDF
- Application and Performance Testing Lab
- Portfolio expansion: CAMs and Additives

2025

- Commercialisation of LFP CAM
- Portfolio Expansion: VC & FEC
- Start of commercial supplies for all products

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2026

- Ramp-up of capacity across the entire product portfolio

ABOUT THE INOXGFL GROUP

The INOXGFL Group proudly stands as one of India's most esteemed business conglomerates, with a rich history spanning over a century. The Group has resiliently grown into a multibillion-dollar enterprise with diverse verticals, including Refrigerants, Fluoropolymers, Speciality Chemicals, Battery Chemicals, Wind Energy and Renewables.

INOXGFL: A US$11 Bn Conglomerate

- Legacy of over a century - One of the largest business Groups in India.
- Diversified business segments comprising fluoropolymer, fluorochemicals, battery chemicals, wind turbines and renewables.
- Projected capex of US$3 bn over the next 4-5 years- to become deepest integrated Green conglomerates in India.
- The Group, currently with 4 listed entities has a market capitalisation of ~ US$11 bn.

INOXGFL GROUP
BEYOND INFINITY

Chemical Business

GFL GUJARAT FLUOROCHEMICALS VALUE THROUGH GREEN CHEMISTRY

- Gujarat Fluorochemicals Ltd. is a leading Indian Chemicals Company
- Business verticals: Fluoropolymers, Fluorochemicals
- The only PTFE/fluoropolymer manufacturer in India
- Developing products/grades catering to new age businesses

GFCL EV

- Battery materials company, a subsidiary of GFL
- Catering to the EV/ESS ecosystem through Battery Salts, Additives, Electrolytes, CAM & Cathode Binders

SOLAR & GREEN HYDROGEN

- Subsidiary of GFL providing fluoropolymer solutions for the entire solar and green hydrogen value chain, including proton exchange membranes for electrolysers and fuel cells

Renewable Energy Business

INOX WIND

Fully integrated player in the wind energy market providing end-to-end turnkey solutions.

INOX GREEN ENERGY SERVICES LIMITED

Subsidiary of IWL; India's leading renewable O&M services player with > 5 GW of assets under management. Inox Green is India's only listed pure-play renewable O&M service company.

INOX Renewable Solutions

Subsidiary of IWL (formerly Resco Global) offering a host of EPC services – resource assessment, site acquisition, project & evacuation infra development, erection and commissioning of WTGs and modules

INOX Clean Energy

INOX Neo Energies

Inox Neo is a C&I power generation platform targeting >3 GW of hybrid RE capacity within the next 2-3 years

INOX SOLAR

Inox Solar aims to be a fully integrated solar energy player offering end-to-end turnkey solutions from manufacturing of solar cells & modules to EPC & O&M

MANUFACTURING LOCATIONS

DAHEJ, GUJARAT, INDIA

Fluoropolymers, Fluoroelastomers & Chemicals

RANJITNAGAR, GUJARAT, INDIA

Fluorospecialities & Refrigerants

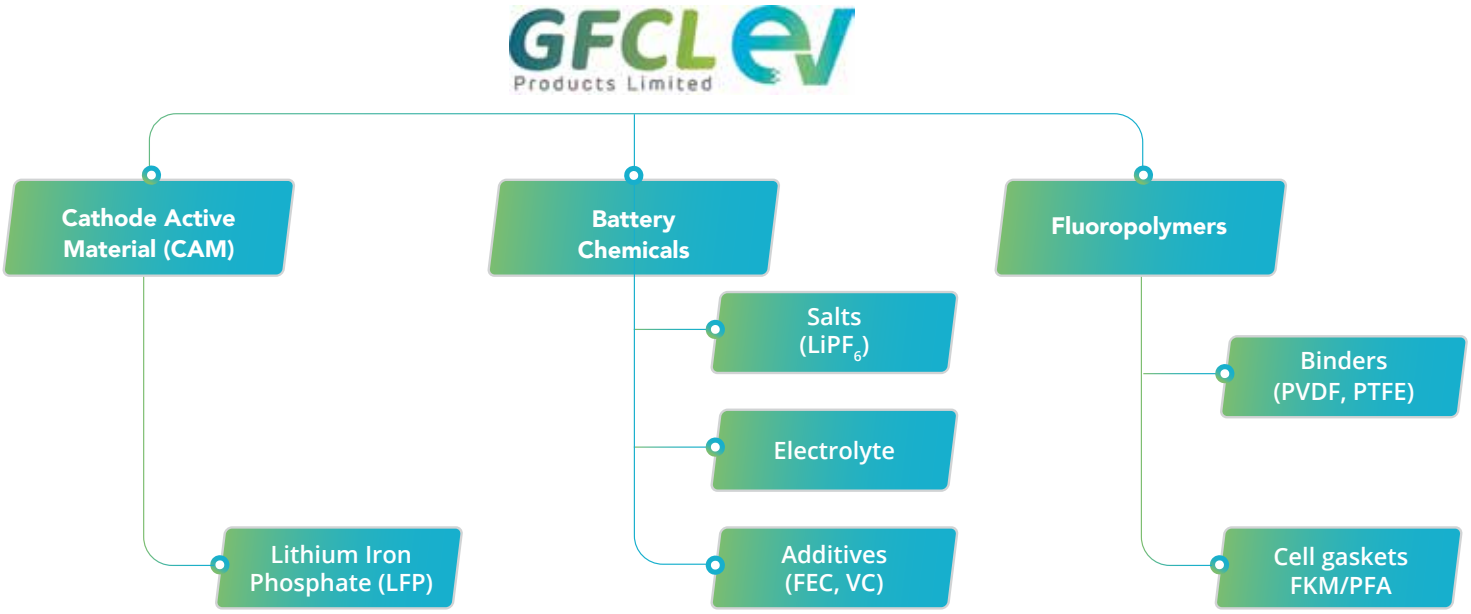
JOLVA, GUJARAT, INDIA

Battery Chemicals Manufacturing Plants

JT HILLS, MOROCCO

Fluorspar Mining & Beneficiation

GFCL EV: PRODUCT PORTFOLIO



Strong Value Proposition

- Catering to 100+ GWh of Global Battery Demand by 2032

  Our comprehensive battery materials portfolio and planned capacity expansion are positioned to support 100+ GWh of global battery demand by 2032.

- Secured & Compliant Non-PFE Supply Chain

  Our Non-PFE supply chain and manufacturing footprint provide Battery Cell OEMs with a secure, transparent and compliant sourcing alternative for markets with Non-PFE related requirements.

- Comprehensive Battery Materials Portfolio

  LFP CAM, Lithium Salt ($LiFP_6$), Specialized Electrolyte Additives & Binders, and Electrolyte Formulations — bringing together critical battery materials under one roof and covering ~50% of LFP battery material costs.

- Integrated Value Chain for Supply Security

  From Fluorine Mining to High-Grade Battery Materials, our integrated value chain combines critical raw-material access, in-house technology, fluorine-chemistry expertise and scalable manufacturing capabilities to strengthen supply security and support consistent growth.

CATHODE ACTIVE MATERIAL (CAM)

Lithium Iron Phosphate (LFP) Product Specifications

Lithium Ferro Phosphate with conductive carbon coating offers a long-life cycle, capacity and superior thermal stability, which makes it one of the safest and most abuse-tolerant cathode material options available to manufacturers.

- LFP chemistry gives below advantages to cell manufacturers:
  - Less degradation and a longer life
  - High safety and efficiency withstand extreme weather conditions and temperatures
  - Good storage and suitable for various applications
  - Low cell manufacturing cost
  - Low self-discharge rate

LFP grades are customised as per customer requirements

Typical Range of Physical & Chemical Properties

Properties	Property Details	UOM	Test Method	"GFCL EV Standard Technical Specification"
Appearance	Physical Appearance of Output Material		Visual	Grey/Black Powder, Colour is uniform without any hard Agglomeration
Surface Area	Specific Surface Area	m2/g	BET Surface Area Analyser	9-13
Particle Size	D10	µm	Particle Sizer with Dispersant	≥0.3
	D50	µm		0.7-1.5
	D90	µm		≤5.0
	D99	µm		≤10.0
Density	Density-Tap	g/cm3	Automated Tapper-3000 count	0.85±0.15
	Density-Compact	g/cm3	PRCD (3T)	2.4±0.05
Elemental Composition	Carbon (C)	%	C&S Analyser	1-1.5
	Iron (Fe)	%	Volumetric Titration	33.4-35.4
	Phosphorus (P)	%	Gravimetric	18.3-20.3
	Lithium (Li)	%	ICP-OES	4.0-4.80
Others	pH	-	pH Meter	8.5-10.0
Moisture		ppm	KF-Coulometer (at 230°C)	≤800
Impurities	Calcium (Ca)	ppm	ICP-OES	≤200
	Aluminium (Al)	ppm		
	Silica (Si)	ppm		
	Sodium (Na)	ppm	ICP-OES	≤100
	Potassium (K)	ppm		
	Copper (Cu)	ppm	ICP-OES	≤150
	Nickel (Ni)	ppm		
	Zinc (Zn)	ppm		
	Chromium (Cr)	ppm		
	Manganese (Mn)	ppm	ICP-OES	≤200
	Magnesium (Mg)	ppm	ICP-OES	≤50
	Titanium (Ti)	ppm	ICP-OES	≤2000
	Magnetic Substance	ppm	ICP-OES	≤2
Resistivity		Ω.cm	PRCD (3T)	≤20
Performance Characteristics (at 25°C)				
Charge/Discharge Characteristics	Initial Specific Charge @ 0.1 C	mAh/g		≥ 160
	Initial Coulombic Efficiency	%		≥ 96%

BATTERY CHEMICALS

Lithium Hexafluorophosphate ($LiPF_6$)

- Lithium Hexafluorophosphate ($LiPF_6$) is the conventional salt used to produce electrolytes for Lithium-ion Batteries (LiBs).
- $LiPF_6$-based electrolyte is suitable for all LiB chemistries such as LCO, LMO, NMC, NCA, LFP & LMFP that are used in applications like 3C digital devices and power tools, Electric Vehicles & Energy Storage Systems.
- GFCL EV offers $LiPF_6$ salt with good solubility, high purity and a higher degree of ion dissociation.

Chemical Name	Lithium Hexafluorophosphate
CAS Number	21324-40-3
Chemical Formula	$LiPF_6$
Structural Formula	
Molecular Weight	151.9
Appearance	Powder
Colour	White
Density (g/cm^3)	1.5
Solubility	Soluble
Flash Point (°C)	25
Melting Point (°C)	200

Electrolyte Formulations

- Electrolyte formulations for LiBs.
- A liquid electrolyte acts as a conductive pathway for the movement of cations passing from the negative to the positive electrodes during discharge.
- GFCL EV offers various electrolyte formulations for Lithium batteries which allow ionic conduction over large temperature range, stabilise cathode and anode surfaces, extend battery lifespan and improve cell performances and safety.
- Focussed on helping battery manufacturers commercialise ambitious new energy storage technologies.

Additives: Vinylene Carbonate (VC)

- Vinylene Carbonate (VC) is the most popular electrolyte additive used in Li-ion batteries, which helps to achieve excellent characteristics such as high energy density, long cycle life, high-rate performance, high safety and is an essential part of Lithium battery electrolyte.
- Vinylene Carbonate (VC) is used in electrolytes of all types of battery chemistries.

Chemical Name	Vinylene Carbonate
Other Name	1,3-dioxol-2-one
CAS Number	872-36-6
Chemical Formula	$C_3H_2O_3$
Structural Formula	
Molecular Weight	86.05
Appearance	Liquid
Colour	Colourless or Light Yellow
Density (g/cm^3)	1.355
Boiling Point (°C)	178
Flash Point (°C)	73
Melting Point (°C)	22

Additives: Fluoroethylene Carbonate (FEC)

- Fluoroethylene Carbonate (FEC) is also a commonly used SEI formation additive, which is particularly used in the electrolytes of NMC batteries.
- FEC as an electrolyte additive can significantly alter the solvation structure, electrolyte reduction leading to enhanced electrochemical performance.
- FEC offers a simple and economical strategy to develop high-performance Lithium metal batteries in electrolytes.

Chemical Name	Fluoroethylene Carbonate
Other Name	4-Fluoro-1,3-dioxolan-2-one
CAS Number	114435-02-8
Chemical Formula	$C_3H_3FO_3$
Structural Formula	
Molecular Weight	106.05
Appearance	Liquid
Colour	Colourless
Density (g/cm^3)	1.45
Boiling Point (°C)	212
Flash Point (°C)	102
Melting Point (°C)	18-23

FLUOROPOLYMERS

Binders

INOFLAR® PVDF

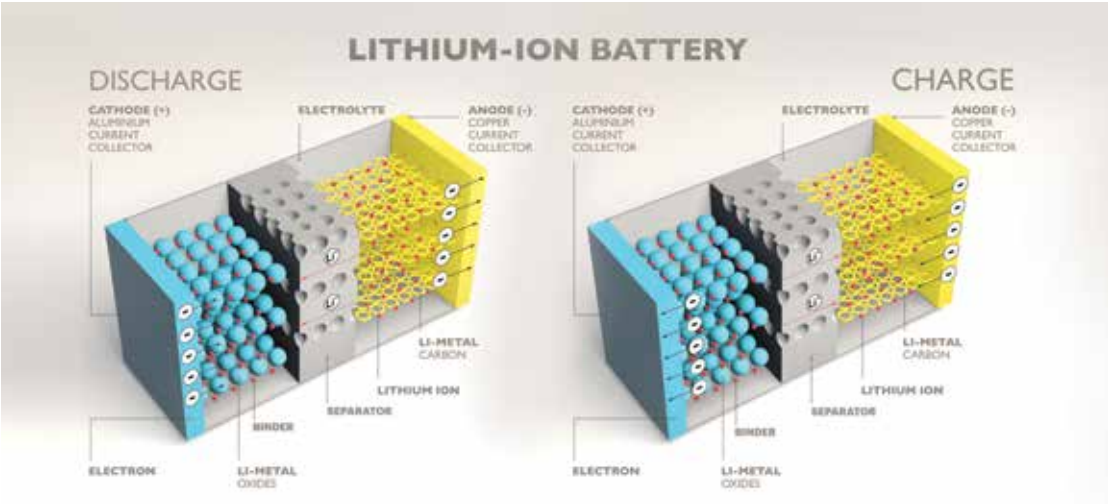
- Variety of grades suited for wet and dry electrode process
- Portfolio includes Homopolymers and Copolymers
- Uses emulsion technology using non-PFAS surfactant technology

INOFLON® PTFE

- Offers good fibrillation desirable for dry coating
- Homopolymer and chemically stabilised grades
- Producing PTFE commercially without the use of PFAS surfactant

PVDF Binder Portfolio

INOFLAR® PVDF Grade	Salient features
5105	Homopolymer; Dry Coating
6150	Copolymer; Dry Coating
1170	Homopolymer; Wet Coating

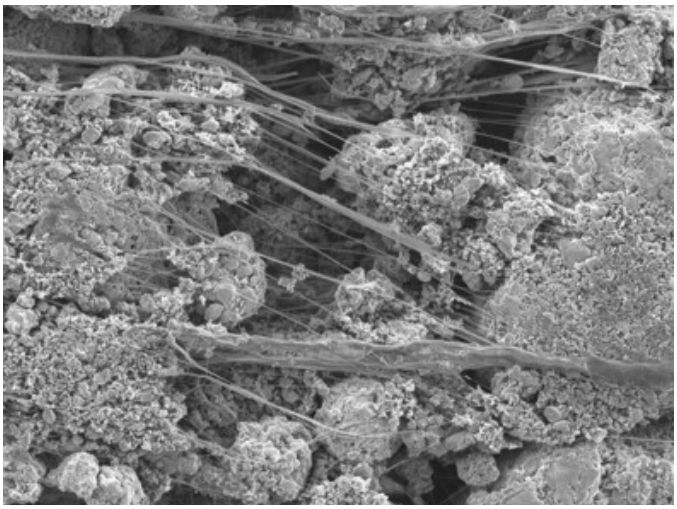


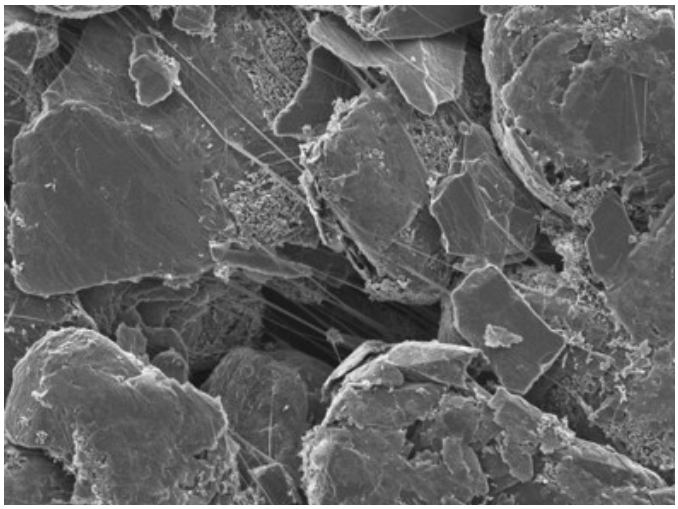
PTFE Binder Portfolio

INOFLON® PTFE Grade	Salient Features
PB7300	Standard grade with good fibrillation
PB7040EX	Produced using non-fluorinated surfactant (NFS) technology

Highlights of INOFLON PTFE

- Facilitates excellent process control
- Good fibrillation achieved in anodes as well as cathodes
- Good adhesion/cohesion and low resistivity
- Low degradation in anodes





SEALING SOLUTIONS

- Gaskets are used to electrically insulate the positive and negative terminal and provide sealing to ensure air and moisture from passing through the battery container.
- The gasket is present in a location exposed to the cell's internal and external environment.
- These gaskets are terminal can insulators and come into direct contact with the electrolyte. Hence, the gaskets must be chemically stable with electrolytes and resist creeping pressure. These are made of PFA/FKM material.

INOFLON® PFA

Excellent Chemical Resistance

High-Temperature Stability

Low Permeability

Superior Mechanical Strength

Electrical Insulation

Ease of Fabrication

Long Lifespan

PFA Grade	Melting Point (°C)	Melt Flow Rate (g/10 min)	Flex Life (Cycles)	Tensile Strength (MPa)	Elongation (%)
TEST METHOD	ASTM D 4591	ASTM D 1238	ASTM D 2176	ASTM D 3307	ASTM D 3307
PFA 8015HS	310	13	60000	25	300
PFA 8025HS	310	25	10000	25	275

Fluonox® FKM

Fluonox® high Fluorine FKM is engineered to deliver exceptional durability and outstanding chemical and electrochemical, electrolyte and insulation resistance under demanding high-temperature operating conditions. It is an ideal sealing material for Li-ion battery applications, including cell gaskets, static and dynamic seals. Fluonox® FKM offers excellent compression set resistance, ensures reliable long-term sealing performance, along with outstanding resistance to steam, acids and a wide range of aggressive chemicals. With enhanced component design flexibility, Fluonox® FKM helps battery manufacturers extend battery service life, improve safety during battery processing and achieve greater system reliability.

The other salient features of FKM include the following:

Excellent chemical and thermal resistance	Outstanding compression set resistance	Excellent permeation resistance	Outstanding weatherability

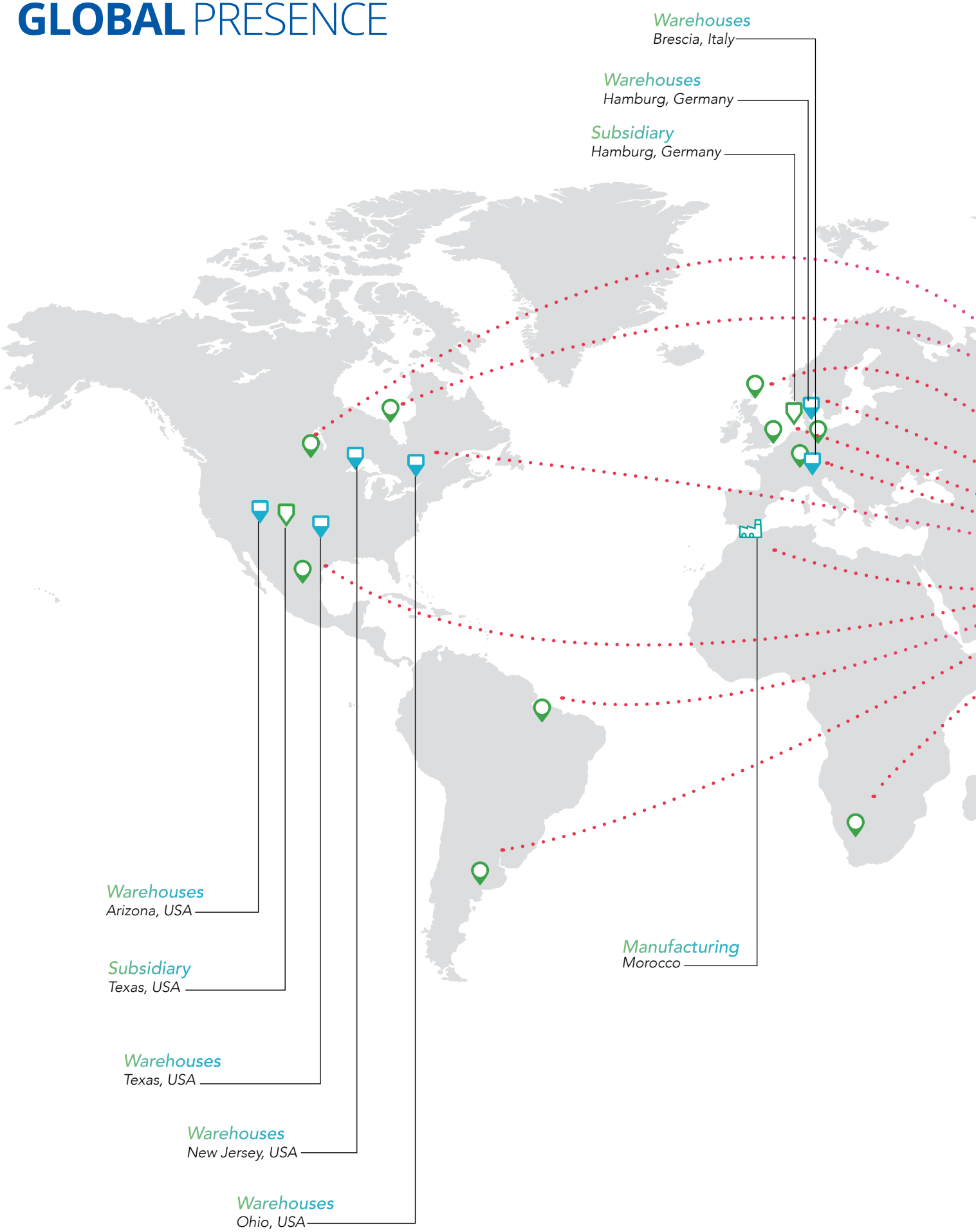
Press cure 10 min at 160°C (320°F); Post cure 4 hours at 230°C (446°F)

Grade	Mooney Viscosity Ml (1+10)' at 121°C	Fluorine Content (%)	100% Modulus MPa	Tensile Strength MPa	Elongation at Break %	Shore A Hardness
TEST METHOD	ASTM D 1646	Internal NMR method	ASTM D 412	ASTM D 412	ASTM D 412	ASTM D 2240
KR531P	20	71.4	6	20.5	195	74 points

Compression Set: 70 hours at 200°C (392°F)

Properties	Value Unit %	Method
Compression Set	18	ASTM D 395 Method B

GLOBAL PRESENCE



Warehouses

Gujarat, India
Texas, USA
New Jersey, USA
Arizona, USA
Ohio, USA
Hamburg, Germany
Brescia, Italy

Corporate HQ

Noida, India

Subsidiary

Hamburg, Germany
Texas, USA

Manufacturing

Dahej, Gujarat, India
Ranjitnagar, Gujarat, India
Morocco

Sales & Distribution

Americas: Michigan, Philadelphia, Atlanta, New Jersey, Mexico, Brazil and Argentina

EU: Italy and Germany

ROW: India, South Africa, Thailand, China, Korea, Taiwan and Japan

INOXGFL GROUP
BEYOND INFINITY

CORPORATE HQ

GUJARAT FLUOROCHEMICALS LIMITED | GFCL EV PRODUCTS LIMITED

INOXGFL TOWERS, PLOT NO. 17, SECTOR-16A, NOIDA-201301 UP, INDIA | +91-120-6149600 | HTTPS://GFCLEV.CO.IN/

Mr. Sekhar Rao Bontha: sekhar.bontha@gfclev.co.in

Krishna Rajagopal (PVDF Binders Business): krishna.rajagopal@gfclev.co.in

WORKS

PLOT NO. D-2/CH/173 & 222, VILLAGE – JOLVA, GIDC INDUSTRIAL ESTATE, DAHEJ II, DAHEJ, DISTT - BHARUCH, GUJARAT, INDIA

CONTACT@GFCLEV.CO.IN | WWW.GFCLEV.CO.IN

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