



GAIL (India) Limited

### Petrochemical Marketing Group

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Nov. 2006

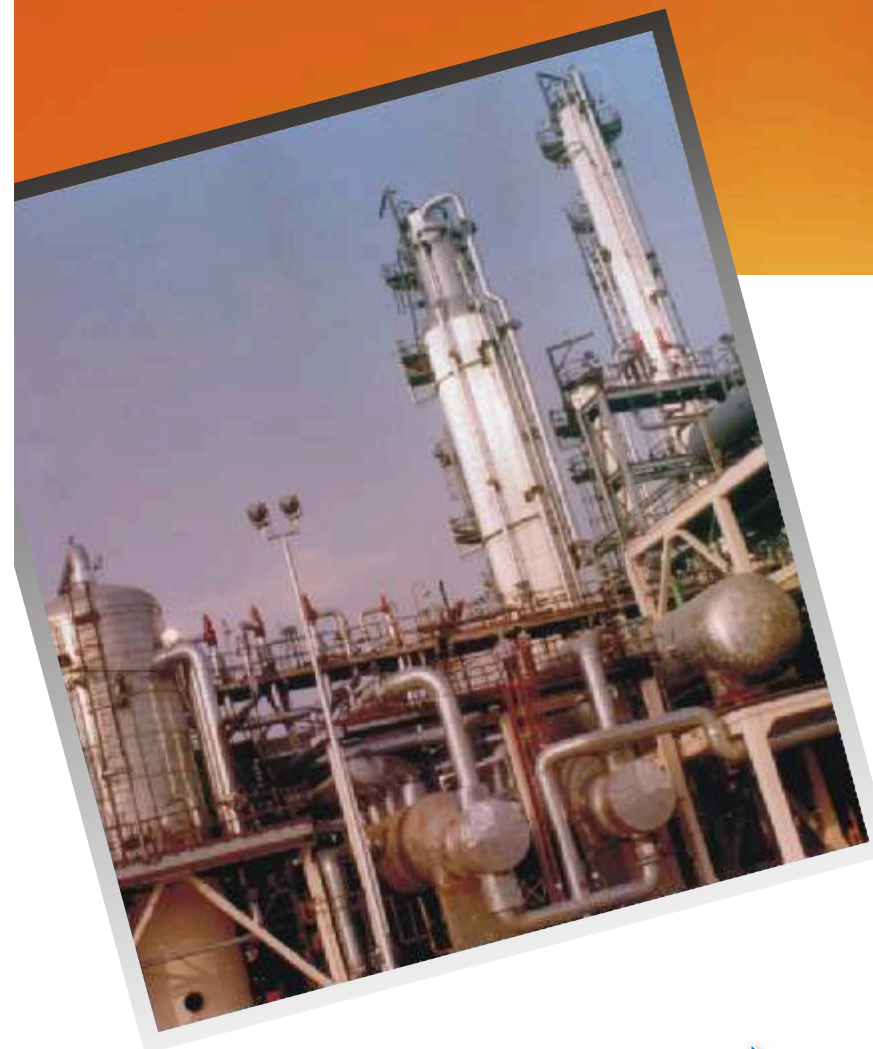


## Offering The Widest Range of HDPE & LLDPE



GAIL (India) Limited  
www.gailonline.com





# About GAIL

## About GAIL

GAIL (India) Ltd. (Erstwhile Gas Authority of India Ltd), India's principal gas transmission and marketing company, was set up by the Government of India in August 1984 to create gas sector infrastructure for sustained development of gas market in the country. Today GAIL has expanded into Gas Processing, Petrochemicals, Liquefied Petroleum Gas Transmission and Telecommunications. The company has also extended its presence in Power, Liquefied Natural Gas re-gasification, City Gas Distribution and Exploration & Production through equity and joint ventures participations.



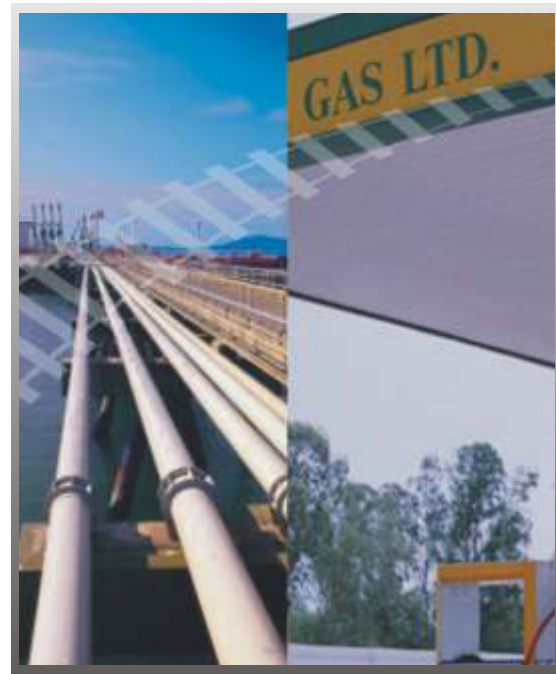
GAIL is the owner and operator of :

- India's largest Gas Transmission Networks (over 5340 kms of natural gas high pressure trunk pipelines)
- World's longest exclusive LPG pipeline (1269 km)
- Seven Gas Processing Facilities with an aggregate capacity of 1.3 MMTPA of LPG, Propane, Pentane and SBP
- India's largest gas-based Petrochemicals Complex with an installed capacity of 3,10,000 TPA of Polyethylene (HDPE & LLDPE)
- Optic Fibre Cable Network of nearly 13, 000 Kms to offer bandwidth as a Carrier's Carrier in the Telecom sector



GAIL is :

- An Equity Participant in 16 E&P blocks, including 13 blocks in India, 2 blocks in Myanmar and 1 in Oman.
- A JV Partner in 8 CNG/ City Gas Distribution Projects in Delhi, Mumbai, Hyderabad, Tripura, Kanpur, Lucknow, Agra and Pune
- An Equity Participant in CNG/ City Gas Distribution Projects in Egypt and China.
- A JV partner in a gas-based 156 MW Gujarat State Energy Generation (GSEG) Ltd's Power Plant
- A JV partner in Petronet LNG Ltd. to import LNG and deliver Regasified LNG in the Indian Market
- A JV partner for setting up a Petrochemical Complex in Assam



# Vision

Vision

Be the Leading Company in Natural Gas and Beyond, with Global Focus, Committed to Customer Care, Value Creations for all Stakeholders and Environmental Responsibilities



# Mission

Mission

Accelerating & Optimizing the Effective and Economic use of Natural Gas and its fractions to the Benefit of National Economy





## GAIL's Petrochemical Business

GAIL owns and operates a gas based Petrochemicals Complex at Pata (around 400 km from Delhi), which has ethylene capacity of 4,00,000 MT/Annum and polyethylene capacity of 3,10,000 MT/Annum. GAIL has adopted the world class "Sclairtech" solution polymerization process, licensed from M/s Nova Chemicals, Canada to produce LLDPE and HDPE, with an installed capacity of 2,10,000 MT/Annum and has adopted the world class slurry-based polymerization process licensed from M/s Mitsui Chemicals, Japan to produce HDPE, with an installed capacity of 1,00,000 MT/Annum. A new plant, licensed from M/s Mitsui Chemicals, to produce HDPE, with an installed capacity of 1,00,000 MT/Annum is likely to be commissioned in 2007.

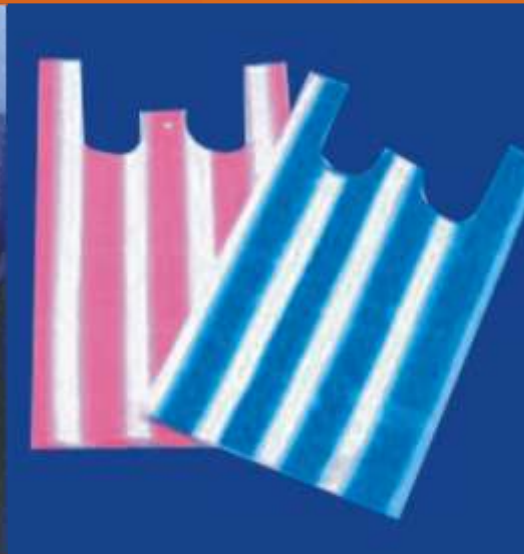
With ISO 9000 and ISO 14000 accreditations, GAIL is committed towards creating, maintaining and ensuring a safe and clean environment. GAIL's polymer products are environment-friendly and fully recyclable. GAIL provides a wide choice of grades with consistent quality products to its customers. Its manufacturing process and quality systems ensure that the products conform to the technical specifications, backed by competent services to provide complete confidence to the customers. The company supply chain management and network is designed to ensure regular supply of material through multiple delivery modes, both from our Production Site as well as Stock Points. Our marketing network consists of Petrochemical Marketing Group (PMG) at Corporate Office, Marketing Services Group (MSG) at GAIL Pata, 12 Marketing offices and strategically located stockist centers to ensure that customer needs are met on time.

Technical services to all our customers are ensured by GAIL Polymer Technology Centre (GPTC), located at Noida. It is the technical service wing of the GAIL Petrochemical Marketing group. It acts as the interface between the customers and the plant. It is the core of our product development and customer services. GPTC endeavors to bring customer delight by providing total technical solutions to fulfill their needs. The centre is equipped with state-of-the-art plastic testing facilities for raw materials, additives and end products.

In order to forge a long lasting profitable partnership with customers, GPTC is committed to providing the following services:

- Customer complaint redressal
- Guidance for proper selection of GAIL grades
- New application development and promotion
- Continual development of GAIL grades to meet market needs
- Representation in BIS committees related to plastics
- Latest Information on new products/applications for customer benefit
- Entrepreneurial guidance.





## About G-Lex



G-Lex is the brand name of HDPE, manufactured & marketed by GAIL (India) Ltd. These grades are manufactured using slurry process technology of M/s Mitsui Chemicals, Japan. It provides a variety of grades to the customers. G-Lex grades, with moderate and high molecular weight are suitable for various applications of HDPE, including Pressure Pipes, OFC Ducts, Blow Molded Containers, Thin Films, Monofilament, Raffia etc. All the grades conform to BIS specification for food contact applications.

### Features :

G-Lex product features include excellent mechanical strength, impact strength, weatherability, easy processability, good low temperature impact resistance and superior ESCR.

### Blow Molding

- B52A003 is recommended for small size containers for Lube oil, Shampoo, Cosmetic, Pesticide etc.
- B63A003 is recommended for medium size containers due to excellent stiffness and stackability. Major application areas include Vanaspati and Edible oil containers.
- B55HM0003 is recommended for large size containers (50-100 litres). It has excellent thermal resistance for long life application, along with outstanding creep strength, impact strength, processability and ESCR. Its high molecular weight attributes to excellent mechanical strength.

### Film :

- F55HM0003 is a bi-modal HM film grade with excellent processability and an optimum balance of toughness and impact strength. It has excellent drawdown ability for making thin gauge film. Major uses are Carry Bags, Industrial Liners, Grocery Bags, Shopping Bags and Multilayer Packaging Film for Edible Oil, Vanaspati Packaging etc.

### Monofilament:

- W52ASR009 has an excellent processability and good balance between linear strength and knot strength. Major use is in Ropes and Twines.

### Pipe :

- P54A001 has excellent processability, chemical resistance and mechanical properties. It conforms to the hydrostatic pressure requirement of IS 4984, as per PE 80 classification for piping material. Major uses are in the Potable Water System (As per IS 4984), Sprinkler Irrigation System (As per IS 14151) and Sewerage (As per IS 14333).
- E52A003 conforms to the hydrostatic pressure requirement of IS 4984, as per PE 63 classification for piping material. Major usage is in Sprinkler Irrigation System (As per IS 14151).
- E52U003 is UV stabilized. It conforms to DoT specifications for Optical Fiber Cable duct applications.

### Raffia :

- W52A009 has an excellent processability and good balance of tape strength and elongation. It is used for low strength stretched tape applications in woven sacks like, Flour Packaging, Industrial Packaging etc.





## About G-Lene



G-lene<sup>hd</sup> and G-lene<sup>ll</sup> are the brand names of HDPE and LLDPE manufactured and marketed by GAIL (India) Ltd. These grades are manufactured using "Sclairtech" solution process technology of M/s Nova Chemicals, Canada. This process provides a variety of grades ranging from LLDPE to HDPE.

All the grades conform to BIS specification for food contact applications.

### G-lene<sup>hd</sup> Features :-

G-lene HDPE features include excellent gloss and low degree of warpage, high impact strength and stiffness, offering an optimal mix of chemical resistance and mechanical performance for various applications. These grades offer greater ability to meet the diverse and innovative requirement of the market with exceptionally high quality performance in both extrusion and moulding applications. G-lene HDPE grade densities ranges from 0.941 gm/cc to 0.965 gm/cc and MFI in the range from 0.30 (I<sub>2</sub>) to 18.

### Raffia:

- W50A009 has an excellent processability with an optimum balance of tape strength and elongation. Its application includes woven sacks for Fertilizer Industry, Foodgrain packaging, Sugar, Chemicals and Industrial packaging. It is well accepted by the leading processors for high strength (tenacity) stretched tape application.

### Wire and cable:

- E45A003 conform to DOT specifications for JFC (jelly filled cables) in telecommunication for sheathing.
- C43D006 conform to DOT specifications for JFC (jelly filled cables) in telecommunication for insulation applications.

### Pipe coating:

- P41A004 (base resin for HDPE black compound) and PB48A004 (HDPE black compound) have been extensively used for coating on steel pipes used for gas transportation. The grade has excellent processability, ESCR, carbon black dispersion, abrasion resistance characteristics etc.

### Injection moulding:

- 160A080 has excellent processability with optimum balance of mechanical properties and low degree of warpage. It is used for General Purpose, Multi Purpose, Vegetable Creates etc.

- 160U080 is UV stabilized and has excellent processability with optimum balance or mechanical properties and low degree of warpage. It is widely used in Soft Drink Crates, Vegetable Crates, Milk Crates etc.
- 150A180 has excellent process ability with low degree of warpage and is suitable for household items like Buckets, Mug etc.

### Monofilament :

- S56A010 has excellent extrudability and good balance between liner strength and knot strength. It's major use is in low denier application like Fishing Nets, Mosquito Net etc.

### G-lene<sup>ll</sup> Features :-

G-lene LLDPE features include excellent processability with an optimal mix of optical and mechanical properties for various applications. These grades offer greater ability to meet the diverse and innovative requirement of the market with exceptionally high quality performance in primarily extrusion applications. G-lene LLDPE grade densities ranges from 0.918 gm/cc to 0.935 gm/cc and MFI(I<sub>2</sub>) in the range from 0.9 to 50 gms/10 minutes.

### Film :

- F20S009 has excellent processability with optimum balance of mechanical and optical properties. Its low gel count, resistance to leakage and pinholes, excellent sealing characteristics makes it attractive for consumers in Industrial packaging/liquid packaging. Its applications cover superior films for Industrial Bags, Shopping Bag, Liquid Packaging Lamination etc.
- E20AN009 is a non slip film grade used for Lamination, Cling Film etc.

### Rotomoulding :

- R35A042 has excellent processability and impact strength. It finds application in Chemical Tanks, Water Storage Tanks, Toys etc.

### Coating/Lamination :

- E36A060 has excellent process ability and is suitable for coating/lamination of Woven Bags, Tarpaulin etc.

### Injection Moulding :

- 124A530 has excellent gloss and high flow. It is used in Caps, Closures and also as a base resin for Masterbatches.



### TYPICAL PROPERTY CHART

Grade	MFI (I <sub>2</sub> ) (gm/10min) ASTM D-1238	Density (@23degc) (g/cc) ASTM D-1505	Tensile @Yield (Kg/cm <sup>2</sup> ) ASTM D-638	Elong@Yield (%) ASTM D-638	Flexural Modulus (Kg/cm <sup>2</sup> ) ASTM D-790	Izod Impact (Kg-cm/cm) ASTM D-256A	VSP (Deg C) ASTM D-1525
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#### Raffia

G-Lene W50A009	0.9	0.950	220	12	5100	-	123
G-Lex W52A009	0.9	0.952	210	13	6100	-	125

#### Monofilament

G-Lex W52ASR009	0.5	0.964	275	11	8550	-	126
G-Lene S56A010	1.0	0.956	220	13	5200	-	125

#### Wire & Cable

G-Lene C43D006	0.6	0.943	190	14	5000	-	116
G-Lene E45A003	0.6	0.945	190	14	5100	-	113

#### Pipe Coating

G-Lene PB48A004	0.3	0.948	190	15	-	-	118
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#### Extrusion Coating

G-Lene E36A060	6	0.922	-	-	-	-	118
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#### Pipe

G-Lex E52A003	0.28, I <sub>5</sub> =1.0	0.954	240	12	7100	23	122
G-Lex E52U003	0.28, I <sub>5</sub> =1.0	0.954	240	12	7100	23	122
G-Lex P54A001	0.09, I <sub>5</sub> =0.46	0.954	255	11	8500	DNB	123

Grade	MFI (I <sub>2</sub> ) (gm/10min) ASTM D-1238	Density (@23 degc) (g/cc) ASTM D-1505	Tensile @Yield MD/TD (Kg/cm <sup>2</sup> ) ASTM D-882	Elong@Break MD/TD (%) ASTM D-882	Tear Strength MD/TD (gm/mic) ASTM D-1922	Dart Impact (gm/mic) ASTM D-1709	C.O.F. Static/Dyn ASTM D-1894
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#### Film

G-Lene F20S009	0.9	0.918	430/320	760/860	4.0/10	3.4	0.16/0.13
G-Lene E20AN009	0.9	0.918	430/320	760/800	4.0/10	3.2	0.5/0.44

#### HM-Film

G-Lex F55HM0003	0.09, I <sub>21</sub> =11	0.954	500/420	500/600	3/9	7	0.22/0.21
Film Thickness = 15 micron, BUR = 4.0							



### TYPICAL PROPERTY CHART

Grade	MFI (I <sub>2</sub> ) (gm/10min) ASTM D-1238	Density (@23degc) (g/cc) ASTM D-1505	Tensile @Yield (Kg/cm <sup>2</sup> ) ASTM D 638	Elong@Yield (%) ASTM D-638	Flexural Modulus (Kg/cm <sup>2</sup> ) ASTM D-790	Izod Impact (Kg-cm/cm) ASTM D-256A	ESCR (F50) Hrs (10% Igepal) ASTM D1693	VSP (deg C) ASTM D-1525
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#### Injection Molding

G-Lene I60A080	8.0	0.960	255	11	8200	9	<48	126
G-Lene I60U080	8.0	0.960	255	11	8200	9	<48	126
G-Lene I50A180	20	0.950	206	12	6000	2.5	<10	120
G-Lene I24A530	50	0.924	145	20	3260	-	<10	80

#### Roto Molding

G-Lene R35A042	4.2	0.935	190	14	4590	-	300	114
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#### Blow Molding

G-Lex B52A003	0.3	0.952	240	11	7100	20	>400	122
G-Lex B63A003	0.3	0.963	285	10	10000	60	>40	130
G-Lex B55HM0003	0.05, I <sub>21</sub> =9.0	0.955	230	13	8780	DNB	>600	129

Typical values based on injection moulded specimen ; not to be taken as specification

#### Application Legends :

F= Film; I= Injection Moulding; W= Woven Sacks; M=Monofilament; P= Pipe; R=Roto Moulding; B=Blow Moulding; E=Extrusion; C=Cable Insulation grade;HM= High Molecular grade;

#### Additive legends :

S= Slip additive; A=Anti-oxidant; U=UV-stabiliser; AN=With Antioxidant /No anti-block;

All relevant grades meet the requirement of BIS Standard 10146-1982 on "Specification for PE for its safe use in contact with foodstuffs, Pharmaceutical and drinking water". It also conforms to the positive list of constituents as prescribed in BIS 10141-1982 and passes the "undue toxicity test"

#### Disclaimer:

The data, information, and suggestion contained herein are given purely as a guide