

Cariflex™ Polyisoprene Rubber

Cariflex polyisoprene rubber products (often abbreviated as Cariflex IR) are produced via anionic polymerization by Kraton Polymers in Belpre, Ohio. The anionic polymerization process results in linear polyisoprene chains with a narrow molecular weight distribution and an extremely low gel content. The Cariflex polyisoprene grades are of the highest purity and are suitable for health care applications.

Cariflex IR products are supplied in 25-kg bales (55 pounds) wrapped in polyethylene film, and packed in a wooden crate of approximately 1 ton each.

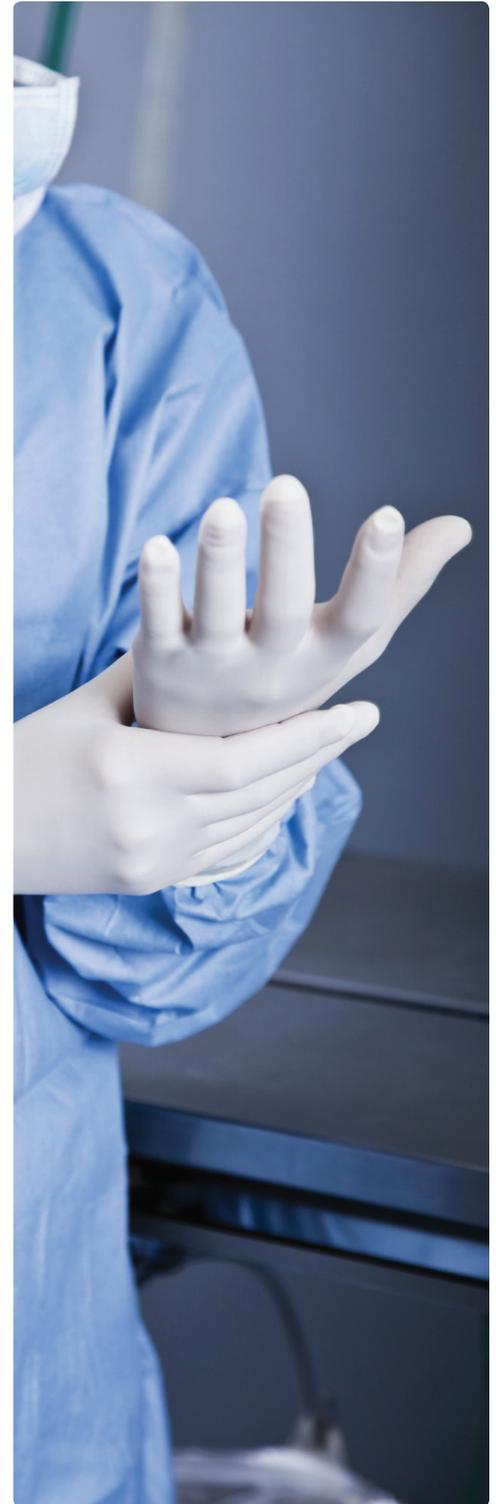
Table 1: Cariflex IR Grades - sales specification¹

	IR0307	IR0310
Characteristics/applications	Clear grade	Easy processing version of IR0307
Cis-1,4 content (%)	≥ 90	≥ 90
Volatile matter (% max)	≤ 0.5	≤ 0.5
Total ash (% max)	≤ 0.1	≤ 0.1
Stabiliser ² (% mass)	0.06 - 0.12	0.1 - 0.3
Limiting viscosity number (dl/g)	6.7 - 9.2	6.5 - 9.5
Mooney viscosity ³ , MU	N/A ⁴	40 - 50

1. Test methods – see relevant grade data sheets
2. Non-staining stabilizer
3. MML 1 + 4 (100 °C)
4. This grade is specified by limiting viscosity number only

Table 2: Comparison between Cariflex IR, polyisoprene produced in 'Ziegler-type' Process, and Natural Rubber (NR)

	Cariflex IR	Ziegler IR	NR
1,4-cis content (%w)	91	> 96	> 98
1,4-trans content (%w)	1.5	0.5	1.0
3,4-vinyl content (%w)	6.5	3.5	< 2
Macrostructure	linear	branched	branched
Mw distribution	narrow	broad	very broad
Green strength	low/medium	medium	high
Gel content	zero	medium	high
Ash	low	medium	high
Trace metals (ppm)	<70	400 - 3,000 (inc. Al)	~1,000
LVN (dl/g)	6 -10	2.5 - 4.5	6 - 7
Mw (kg/mol)	2,000	1,000	2,000
Mooney visc. (MU)	40 - 80	60 - 90	< 120
Flow (of compound)	excellent	good	medium/good
Color	white/clear	yellow/amber	dark
Smell	very low/low	low/medium	variable



End Use Requirements

If the finished article is intended for use in food contact applications, toys, or human contact areas, manufacturers of the final product should observe all relevant regulations. Detailed information is available from Kraton Polymers. For food packaging, manufacturers of the final product should ensure that all ingredients used comply with applicable regulations. Some of these regulations require tests to be carried out on the final product, e.g. migration. These are the responsibility of the final product manufacturer.

Restriction on Medical/Health care Applications and Trademark Usage

No customer of Kraton Performance Polymers, Inc and/ or any of its direct or indirect subsidiaries ("Kraton Polymers"), or any other party, shall, without the express written consent of Kraton Polymers for each specific, individual application, be permitted to manufacture, use, sell, process, or otherwise supply, directly or indirectly, any Kraton Polymers product, or any compound containing or made from any Kraton Polymers Product, in any of the following applications:

Cosmetics (exclusive of packaging or delivery applications);

Drugs and other Pharmaceuticals (exclusive of packaging or delivery applications);

and Medical devices; provided, that any medical device that satisfies any one of the following definitions shall not be deemed to fall within the foregoing medical device restriction: (a) any medical device falling within the definition of either a Class I or Class II medical device, as defined in any federal law or regulation of the United States or Canada, or (b) any medical device falling within the definition of a Class I or Class II(a) medical device, as defined by any applicable regulation of the European Union or any member state thereof.

Kraton Polymers has no specific expertise in the medical/health care market or medical/health care

applications and does not intend to perform testing, clinical studies or other investigations of the suitability of its products for these specific applications intend to perform testing, clinical studies or other investigations of the suitability of its products for these specific applications. Kraton Polymers makes no warranty of merchantability or fitness for a particular purpose (including medical/health care applications for its products.

Each customer or user of Kraton Polymers' products is solely responsible for determining the suitability of the materials it selects for the intended purpose. For medical/health care applications, each customer or user must conduct its own studies, registrations, and other related activities to establish the safety and efficacy of its products.

Do not use Kraton Polymers' trade names, trademarks, logos or other similar identifying characteristics for the manufacture, sale or promotion of products intended for Medical/Health care Applications.

Safety and Handling Precautions

Read the Material Safety Data Sheet for Kraton Polymers' products carefully and thoroughly before beginning any work with such products. Additional information relating to the health, safety, storage, handling and processing of Kraton Polymers' products can be found in the Kraton Polymer HSE Fact Sheet (K0155), available from your local Kraton Polymers Sales Representative. Kraton Polymers also recommends that customers or users consult other sources of safety information, for example, the current edition of the "Code of Practice on the Toxicity and Safe Handling of Rubber Chemicals," British Rubber Manufacturers Association Limited (www.brppa.co.uk/). Kraton Polymers' products and compounds can accumulate electrostatic charges when rubbed, chafed or abraded. Processing and storage equipment for use with Kraton Polymers' products should provide a means of

dissipating any charges that may develop.

When processing Kraton Polymers' products, maintain a fire watch if the material reaches 225 °C (437 °F) for Cariflex™ IR and Kraton D (polymers and compounds), and 280 °C (536 °F) for Kraton G (polymers and compounds). The temperatures listed above are indicated only for safety reasons (risk of fire and product degradation) and are not necessarily recommended for processing. Degradation of the polymer (polymer breakdown) will start at lower temperatures depending on the specific processing conditions. Therefore, operating below these temperatures does not guarantee the absence of product degradation. Kraton Polymers' products (the neat resin or the base product) are high molecular weight polymers which by all accounts are non-toxic and biologically inactive.

Warranty

The information contained in this publication is, to the best of Kraton Polymers' knowledge, true and accurate, but any recommendations or suggestions that may be made are without guarantee, since the conditions are beyond Kraton Polymers' control. The customer understands that it shall make its own assessment to determine the suitability of a Kraton Polymers' product for a particular purpose. Further, nothing contained herein shall be construed as a recommendation to use any Kraton Polymers product in conflict with existing patents. All products purchased from or supplied by Kraton Polymers are subject to terms and conditions set out in the applicable contract, order acknowledgement and/or bill of lading. Kraton Polymers warrants only that its products will meet those specifications designated therein.

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