



On import dependence of carbon fiber-related goods for Russian production of Iskander ballistic missiles

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Issue overview

The Iskander-M is a solid-fuel, single-stage ballistic missile with a range of 500 km and a speed of up to 800 m/s. In 2024 alone, Russia launched 200 ballistic missiles at Ukraine, half of which were of Russian manufacture.¹ According to the Ukrainian Air Forces, only approximately 45 Iskander missiles were shot down during the same year.² Thus, the combination of high speed, evasive maneuvers, and unpredictable trajectory makes the Iskander-M one of the hardest missiles to intercept, which causes significant damage to Ukrainian infrastructure.³

Broader research based on expert interviews, Russian trade records, tax filings, and other open-source information has identified carbon fiber as one of the key components essential for the production of the Iskander-M missile. Carbon fibre is important for the manufacture of the body and nozzle of this rocket's solid-fuel engine, which will allow it to reach supersonic speeds.

Although Russia is largely able to meet its needs for carbon fibre and PAN precursors, the main material for carbon fibre production, from domestic production, including from major producers such as Alabuga-Volokno and Umatex, the country continued to import key products in this sector in 2024, including auxiliary raw materials (epoxy resins), equipment and related components (vacuum forming and winding machines, dies) and carbon fiber itself. In the first 9 months of 2024, Russian companies imported the above goods for a total of USD 11.8 million.

In 2024, the key supplier of carbon fiber was the PRC with a share of more than 58%. The key suppliers of carbon fiber equipment were Turkey with a share of about 48%, the PRC with a share of about 30% and Austria with a share of about 11%. There were also significant supplies of auxiliary raw materials (epoxy resins) from such EU countries as Italy (21%) and Germany (18%).

Russian companies importing carbon fiber-related components supply products to numerous military enterprises, including the Iskander-M manufacturers.

Despite this, epoxy resins and machines for winding fibers, including carbon filament, are not prohibited in the EU for export, re-export to Russia and transit through Russia. Most of the companies involved in the supply chains of the aforementioned goods are not subject to blocking sanctions imposed by the European Union.

¹ <https://tsn.ua/ato/ekspert-defense-express-poyasniv-skilki-balistichniy-raket-rosiya-vipustila-po-ukrayini-protvyagom-roku-2710290.html>

² <https://sites.google.com/view/ukrainianairforce>

³ <https://mil.in.ua/uk/articles/otrk-yskander-zbroya-raketnogo-terroru/>



In order to effectively complicate and disrupt Russia's production of Iskander-M ballistic missiles, which are harming Ukraine's infrastructure and population, we call on the Member States of the European Union to take the following measures based on the information provided in this paper:

Strengthen export customs controls:

- a. extend part B of Annex VII and Annex XXIII to Council Regulation (EU) No 833/2014 in accordance with the list of HS codes in Annex 1 in order to avoid any future exports of these goods to Russia from the EU and to complicate deliveries from third jurisdictions, increase customs enforcement measures across key EU transit hubs;
- b. strengthen customs measures at key EU transit hubs to ensure stricter oversight of any movements of the goods under HS codes specified in Annex 1;
- c. investigate all cases of any goods under HS codes specified in Annex 1 being supplied to Russia from the EU countries as described in this paper.

Enhance international cooperation:

- d. use all available diplomatic channels and economic tools to decrease exports of any goods under HS codes specified in Annex 1 from third countries to the Russian Federation, including exports of carbon fiber and equipment for its production from the PRC and Turkey.

Strengthen sanctions against those involved in circumventing trade schemes with Russia:

- e. impose blocking sanctions against all legal entities involved in the supply of the goods specified in this paper and in Annex 1 to the Russian military industry, including Russian monopoly producers of the relevant goods, as well as Russian importers and foreign suppliers directly or indirectly tied to the manufacturers of the Iskander-M ballistic missile specified in Annexes 2, 3 and 4.



1. General information about carbon fiber-related goods and its use in Iskander-M

Carbon fiber, also known as graphite fiber, is a polymer prized for its lightness and strength. Carbon fiber composites outperform metals by increasing stiffness by 80%, strength by 30%, and reducing the weight of rocket bodies by 30%.⁴ Its high heat resistance—withstanding temperatures up to 450°C in air and up to 3000°C in inert environments or a vacuum—far surpasses steel's melting point of 1500°C.⁵ In addition, carbon fiber has a unique ability to absorb radar waves, which improves missile stealth and penetration.

Carbon fiber is widely used in thermal protection for spacecraft, aircraft, and missiles, particularly in components such as nose parts, engine casings, heat-conducting devices, and power plants. Carbon fiber may be used in ballistic missiles to produce composite cases of solid rocket motors, jet vanes, interior lining for rocket motor cases, radar absorbing devices, etc.⁶

Experts believe that the most crucial role of carbon fibre in Iskander-M missile is the solid propellant engine, which includes the case and nozzles that are made from carbon fibre. The nozzle must be able to withstand critical temperatures since solid fuel exhaust processes generate temperatures of 3-4 thousand degrees Kelvin.

The key material to produce carbon fiber is the polyacrylonitrile (PAN) precursor, which accounts for 70% of the quality and 40% of the cost of carbon fiber.⁷ About 90% of carbon fibers are produced from PAN precursors.⁸

The production of carbon fiber begins with white *PAN precursor fibers* being heated at very high temperatures in furnaces or autoclaves. The received carbon fibers are wound onto spools using a *winding machine* to create precise shapes. In order to bind the fibers together, making the final product stiff and durable, *epoxy resin*, a strong glue-like liquid, is applied to the carbon fibers. The fiber-resin combination is then once again shaped using *interchangeable dies* or pressing machines, forming it into the desired structure. After that, *vacuum molding and thermoforming machines* apply heat and pressure to eliminate air bubbles and ensure an even, flawless finish. Thus, the production of carbon fibre is a sophisticated process with different raw materials, auxiliary components and equipment to be used.

2. Russia's domestic production and dependence on carbon fibre-related goods imports

⁴ "Application of carbon fibre composite material in rockets and missiles," Impact Materials, April 28, 2022, <https://ru.impact-fibers.com/news/application-of-carbon-fiber-composite-material-56464415.html>

⁵ "Carbon Fibres," Composite Materials Plant, accessed January 20, 2025, <https://www.mvmpplant.com/materials/uglevolokno.html>

⁶ Enrico Carisch and Loraine Rickard-Martin, "Annex V. List of Items, Materials, Equipment, Goods and Technology Related to Ballistic Missile Programs," in United Nations Sanctions of Iran and North Korea: An Implementation Manual (New York: International Peace Institute, 2014), https://ipinst.org/images/pdfs/Annex5-Ballistic_Missile.pdf

⁷ Hamid Khayyam et al., "PAN Precursor Fabrication, Applications and Thermal Stabilization Process in Carbon Fiber Production: Experimental and Mathematical Modelling," *Progress in Materials Science* 107 (January 2020): 100575, <https://doi.org/10.1016/j.pmatsci.2019.100575>; Lyudmila Fradkina, "The basis of the domestic composites market. Productions of strategic importance are now not dependent on imports," MK.RU, November 24, 2021, <https://www.mk.ru/social/2021/11/24/osnova-otechestvennogo-rynka-kompozitov.html>

⁸ Todd Johnson, "How Is Carbon Fiber Made?," ThoughtCo, January 13, 2020, <https://www.thoughtco.com/how-is-carbon-fiber-made-820391>



According to data available in open sources, Russian demand for the carbon fibre can be met with internal production capacities.⁹ Russia's military-industrial complex reportedly requires about 300 tonnes of carbon fiber per year.¹⁰

Russia's largest producer of carbon fiber, the Alabuga-Volokno plant in Tatarstan, owned by Rosatom, was established with an annual capacity of 1,4 thousand tonnes.¹¹ In 2022, 407 tonnes were produced, making it the clear leader in carbon fiber production in the Russian Federation.¹² According to some sources, in 2023, Rosatom's enterprises doubled the volume of carbon fiber supplies for the Russian aviation industry, reaching production levels of more than 1 thousand tonnes worth RUB 35 billion.¹³

In parallel with the expansion of carbon fibre production, Rosatom is localising the production of a key raw material, namely PAN precursor. Until 2021, 80% of Russia's PAN precursor supplies came from the PRC.¹⁴ In November 2021, Umatex JSC, Rosatom's subsidiary owning Alabuga-Volokno plant, opened an additional plant in same area for producing PAN precursor, with an annual capacity of 5 thousand tonnes of polyacrylonitrile fiber.¹⁵ Based on available information, Russia now appears self-sufficient in PAN precursor production, eliminating its reliance on imports.¹⁶

In addition to the Alabuga-Volokno plant, Umatex JSC also owns two other carbon fibre producers, namely Argon LLC in the Samara region and the Carbon and Composite Materials Plant (ZUMK) LLC in the Chelyabinsk region.¹⁷

3. Russian imports of carbon fiber-related goods in first nine months of 2024

Although Russia can mostly cover its carbon fiber and PAN precursor needs through domestic production, in 2024, the country maintained its imports of key products in this sector, namely carbon fibre itself, auxiliary raw materials (epoxy resins), as well as equipment and respective components (vacuum forming and winding machines, dies).

In 2024, Russian companies imported the above goods for a total of USD 11.8 million. The largest category by volume was auxiliary raw materials used in the production of carbon fiber, primarily

⁹ Pavel Kober, "Russia doesn't know where to put new materials," Composite World, February 11, 2021,

<https://compositeworld.ru/articles/market/id602577875eeffd2664454c65>

¹⁰ "Carbon fibre production for Russia is a very underdeveloped business today," Kommersant, February 16, 2016,

<https://www.kommersant.ru/doc/2917921>

¹¹ Valeria Knyaginina, "Either PAN or gone. Russia aims to become a leader in carbon fibre production," RUPEC, December 6, 2021, <http://rupec.ru/news/48175/>. Alabuga-Volokno Plant (Full name in Russian: ООО "Алабуга-Волокно", TIN: 1646031132, under US sanctions).

¹² Interregional Industrial Cluster 'Composites without Borders,' "Analysis of the Russian carbon fibre-based PCM market" (Moscow: Interregional Industrial Cluster 'Composites without Borders,' 2023),

<https://compositescluster.ru/upload/iblock/0e5/520hpxkvxiqb8laj9o12plyb1uti7594.pdf?ysclid=m4gs7e4057241819381>

¹³ "Composite materials," Atom Media, March 21, 2024, <https://atommedia.online/reference/kompozitnye-materialy/>.

Olga Gladunova, "Rosatom doubles the volume of carbon fibre supplies for MS-21 production," Composite World, January 23, 2024, <https://compositeworld.ru/articles/materials/id65afa98b95fb9a0019430c30>

¹⁴ Victoria Voloshina, "A New Composite Plant of Rosatom Opened in Tatarstan," November 22, 2021, <https://strana-rosatom.ru/2021/11/22/eksperty-o-znachenii-novogo-kompozit/>

¹⁵ Umatex JSC (Full name in Russian: АО "Юматекс", TIN: 7706688991, under US sanctions).

¹⁶ Valeria Knyaginina, "Either PAN or gone. Russia aims to become a leader in carbon fibre production."

¹⁷ Argon LLC (Full name in Russian: ООО "Аргон", TIN: 6454074501, under US sanctions); ZUMK LLC (Full name in Russian: ООО "Завод углеродных и композиционных материалов", TIN: 7450045935, under US sanctions).



epoxy resins.¹⁸ The Russian Federation imported over 403 tonnes of epoxy resins worth over USD 1.2 million.

The PRC accounted for the largest share of such imports, namely more than 270 tonnes worth USD 526 thousand or about 42% of all supplies. The second largest producer and supplier of epoxy resins was Italy (in particular, the Italian company SIR Industriale S.p.A.), which exported 84 tonnes of products to Russia worth USD 264 thousand (21% of total exports).¹⁹ During 2024, Russia also received worth more than USD 225 thousand worth of epoxy resins produced by the German company Dokters International GmbH, which accounted for 18% of all imports of this product.²⁰

Despite extensive domestic production, in 2024 Russia imported 184 tonnes of carbon fibre itself, worth USD 3.2 million, accounting for 27% of the tonnage of all imported carbon fibre-related products.²¹ Chinese companies accounted for 58% of the value and 72% of the tonnage of all carbon fiber supplies.

The largest category by value was carbon fibre production equipment and components (76% of total value).²² Turkey became the largest producer and supplier, accounting for 48% or USD 3.5 million of all shipments. Chinese entities took the second place with 30% of all supplies. Among European manufacturers, Austria became the largest exporter of carbon fibre production equipment, accounting for 11% of all Russian imports or USD 795 thousand. Germany and the Czech Republic exported equipment and components to Russia worth USD 122 thousand and USD 126 thousand, respectively.

It is worth noting that some carbon fibre-related goods mentioned above, including those exported to Russia from the EU in 2024, fall under Annex XXI and XXIII to Regulation 833/2014, which prohibits the purchase, import, or transfer of goods to Russia or for use in Russia. This includes HS 8207 (replaceable dies), HS 8477 (vacuum forming machines). At the same time exports of epoxy resins under HS 390730, machines for winding fibers, including carbon filament, under HS 844540 and HS 6815 (carbon fiber, carbon filament and other carbon fiber products) are not explicitly prohibited by the EU regulations.

At least 9 Russian entities that imported carbon fibre-related goods in 2024 have direct or indirect ties to the Russian military-industrial complex and the manufacturers of the Iskander-M missile. The top priority cases include the following:

¹⁸ Epoxy resins (HS 390730).

¹⁹ <https://sirindustriale.com/en/>

²⁰ <https://www.northdata.de/Dokters+International+GmbH,+Hünxe/Amtsgericht+Duisburg+HRB+18392>

²¹ Carbon fibre (HS code 68151100).

²² A significant limitation of the Umatex plant producing carbon fiber and PAN precursor is its reliance on a single production line. This lack of flexibility means the plant cannot simultaneously fulfill orders for multiple customers. Producing different types of carbon fiber on the same equipment results in inefficient changeovers, material waste, and reduced production stability. Furthermore, the equipment is technically complex and prone to breakdowns. Ensuring continuous operation for critical industries like TVEL, aviation, and strategic sectors requires significant resources for maintenance, spare parts, and preventive measures; The equipment and relevant components analyzed in this paper include Machines for winding fibres, including carbon fiber (HS code 84454000), Interchangeable dies for drawing or pressing metal/composite (HS code 820720), Vacuum-moulding machines and other thermoforming machines (HS code 84774000).



NORTEX LLC – one of the largest importers of epoxy resins, which imported USD 268 thousand worth of Chinese products to Russia (about 35% of total epoxy resins imports in 2024). In Q3 2024, NORTEX LLC supplied RUB 275 million to Russian defence companies and their contractors, including NII Polymerov JSC, a manufacturer of polymers for the military-industrial complex, which supplied KBM (Kolomna Engineering Bureau) and Gosnimash JSC. In addition, NORTEX LLC supplied products to 42 contractors of the Votkinsk Plant.²³

Nanotechnological Centre of Composites LLC – the entity imported 53 tonnes of carbon fiber of Chinese origin worth USD 1.9 million (29% of all carbon fiber imports). Subsequently, in Q3 2024, Nanotechnological Centre of Composites LLC made deliveries directly to the alleged manufacturer of the Iskander, Perm Plant Mashinostroitel JSC, a manufacturer of solid fuel engines, in the amount of RUB 39,118,186.8. Nanotechnological Centre of Composites LLC also supplied products to other military enterprises, such as Dynamika Centre for Scientific and Technical Services JSC, a manufacturer of unmanned aerial vehicles and simulators for UAV operators, for a total of RUB 82,302,000.²⁴

Intellectual Robotics Systems LLC – imported 47 tonnes of carbon fiber in 2024 worth USD 81.4 thousand, accounting for 26% of the total import volume. The importer directly supplied the Iskander missile manufacturer, Votkinsk Plant, with products worth RUB 64,826,866. In total, in Q3 2024, Intellectual Robotics Systems LLC supplied products to 18 contractors of PJSC KBM, Votkinsk Plant, and Gosniimash.²⁵

NPO Stekloplastik JSC – the largest and, in some aspects, the only scientific and production center in Russia dedicated to creating glass fiber materials and their composites. This company focuses on producing glass fiber but also produces a wide range of other composites. Although the company is not a carbon fiber producer, it has imported winding machines, which are a one-stop solution for all composite materials.²⁶ In 2024, NPO Stekloplastik JSC received winding machines worth USD 78,048 from the PRC's Changchun Yingsa International Trade Co.²⁷ It is also known that the same Russian company imported winding machines in 2023 for a total of more than USD 1 million (24 machines). During Q3 2024, NPO Stekloplastik JSC supplied products worth RUB 917 million to Russian defence companies, including direct deliveries to Perm Plant Mashinostroitel JSC and Votkinsk Plant, as well as supplies to PJSC KBM and Gosniimash and to 38 and 13 of their contractors, respectively.

²³ NORTEX LLC (Full Russian name: ООО "НОРТЕКС", TIN: 7701618743); NII Polymerov JSC (Full Russian name: АО "Научно-исследовательский институт химии и технологии полимеров имени академика В.А. Каргина с опытным заводом", TIN: 5249164736); Gosnimash JSC (Full Russian name: АО "Государственный научно-исследовательский институт машиностроения имени В.В. Бахирева", TIN: 5249093130), <https://war-sanctions.gur.gov.ua/en/tools/company/323>; Kolomna Engineering Bureau (Full Russian name: АО "Научно-производственная корпорация "Конструкторское бюро машиностроения", TIN: 5022039177), <https://war-sanctions.gur.gov.ua/en/tools/company/235>; Votkinsk Plant (Full Russian name: АО "Воткинский завод", TIN: 1828020110), <https://war-sanctions.gur.gov.ua/en/tools/company/5109>.

²⁴ Full Russian name: ООО "Нанотехнологический центр композитов"; АО "Пермский завод "Машиностроитель" (TIN: 5906075029); АО "Центр научно-технических услуг "Динамика" (TIN: 5013026936).

²⁵ Intellectual Robotics Systems LLC (Full Russian name: ООО "Интеллектуальные робот системы", TIN: 7719747034).

²⁶ "Russian manufacturer and supplier of special glass fibre materials and composites - NPO Stekloplastik named after N.N. Trofimov," NPO Stekloplastik named after N.N. Trofimov, December 28, 2024, <https://npo-stekloplastic.ru/>.

²⁷ Full Russian name: АО "НПО Стеклопластик имени Н.Н. Трофимова" (TIN: 5044000039) <https://war-sanctions.gur.gov.ua/en/sanctions/companies/9953>; Changchun Yingsa International Trade Co., Ltd (address: Китай, Room 5-516, No.1928 Anda street, Chaoyang District, Changchun City, Jilin Province, China, 130000).



Mak LLC, AL5-Yug LLC, Ava-Trade LLC – three importers, which together accounted for 63% of imports of replaceable carbon fibre moulding dies.²⁸ In 2024, the companies imported dies of Turkish origin worth USD 860 thousand. All three companies are owned by a Russian citizen, Gusev Andrey Vitalievich.²⁹ In turn, during Q3 2024, Mak LLC supplied products to 4 contractors of Votkinsk Plant and Gosniimash, while AL5-Yug LLC supplied 2 contractors of the former.

None of the above-mentioned Russian companies involved in the supply chain of the Iskander-M ballistic missile manufacturers are subject to the European Union's blocking sanctions.

²⁸ Mak LLC (Full Russian Name: ООО "МАК", TIN: 5035022276); AL5-YUG LLC (Full Russian Name: ООО "АЛ5-ЮГ", TIN: 6142026478); Ava-Trade LLC (Full Russian Name: ООО "Ава-Трейд", TIN: 3662135848).

²⁹ Gusev Andrey Vitalievich (ru: Гусев Андрей Витальевич, TIN: 710301865998).



Key Recommendations

Strengthen export customs controls:

- a. extend part B of Annex VII and Annex XXIII to Council Regulation (EU) No 833/2014 in accordance with the list of HS codes in Annex 1 in order to avoid any future exports of these goods to Russia from the EU and to complicate deliveries from third jurisdictions, increase customs enforcement measures across key EU transit hubs;
- b. strengthen customs measures at key EU transit hubs to ensure stricter oversight of any movements of the goods under HS codes specified in Annex 1;
- c. investigate all cases of any goods under HS codes specified in Annex 1 being supplied to Russia from the EU countries as described in this paper.

Enhance international cooperation:

- d. use all available diplomatic channels and economic tools to decrease exports of any goods under HS codes specified in Annex 1 from third countries to the Russian Federations, including exports of carbon fiber and equipment for its production from China and Turkey.

Strengthen sanctions against those involved in circumventing trade schemes with Russia:

- e. impose blocking sanctions against all legal entities involved in the supply of the goods specified in this papers and in Annex 1 to the Russian military industry, including Russian monopoly producers of the relevant goods, as well as Russian importers and foreign suppliers directly or indirectly tied to the manufacturers of the Iskander-M ballistic missile specified in Annexes 2, 3 and 4.



Annex 1. HS codes recommended for supplementing part B of Annex VII and Annex XXIII to Council Regulation (EU) № 833/2014

HS codes	Description	Total sum of Russian imports in 2024 (USD) ³⁰
HS codes recommended for supplementing part B of Annex VII		
820720	Replaceable dies for drawing or pressing metal/composite	1,367,398
847740	Vacuum forming machines and other thermoforming machines	3,009,669
844540	Machines for winding fibers, including carbon filament	2,849,830
681513	Carbon fiber and other carbon fiber products	171,944
681511	Carbon filament	3,182,818
390730	Epoxy resins	1,250,676
HS codes recommended for supplementing Annex XXIII		
844540	Machines for winding fibers, including carbon filament	2,849,830
390730	Epoxy resins	1,250,676
681513	Carbon fiber and other carbon fiber products	171,944
681511	Carbon filament	3,182,818

³⁰ The research analyses supplies for the first 9 months of 2024.



Annex 2. Biggest suppliers and manufacturers of carbon fiber-related goods and equipment for its production to Russian Federation

Sending company (Jurisdiction)	HS Codes	Supplies value in 2024	Importing company	Producing company
		Total (\$)		
Sinopec Chemical Commercial Holding Wuhan Company Ltd (China)	3907300009	268 661,00	NORTEX LLC (ru: ООО "НОРТЕКС")	Sinopec Assets Management Corporation
Anhui Kingpower Equipment And Mold Manufacture Co Ltd (China)	84774000	899 641,00	KHAIR LLC (ru: ООО "ХАИР")	Anhui Kingpower Equipment and Mould Manufacture Co., Ltd
Chemint Raw Materials Trading (China)	3907300009	109 068,50	PROKEM LLC (ru: ООО "ПРОКЕМ")	Chemint Raw Materials Trading
Hitex Composite Ningbo Co Ltd (China)	68151100	6 909,25	GK APGROUP-SMT LLC (ru: ООО "ГК "АПГРУПП-СМТ")	Hitex Composite (Ningbo) Co., Ltd
Texaspro China Company (China)	68151100	2 803,31	Intellectual Robotic Systems LLC (ru: ООО "Интеллектуальные робот системы")	Toray Carbon Fibers Europe, S.A.
Kuzey Global Machine Ltd Sti (Turkey)	84774000	1 009 617,00	Istok LLC (ru: ООО "Исток")	Kuzey Global Makina LTD.STI.
Unknown	68151100	1 040 889,07	Nanotechnological Composite Centre LLC (ru: ООО "Нанотехнологический центр композитов")	Zhongfu Shenying Carbon Fiber Xining Co.,Ltd
Jiangsu Sanmu Group Co Ltd (China)	3907300009	46 314,50	Prime Top LLC (ru: ООО "Прайм Топ")	Jiangsu Sanmu Group Co., Ltd.
ООО TKM Part (Germany)	3907300009	225 619,00	Albion LLC (ru: ООО "Альбион")	Dokters International GmbH
Kamex Magazyn by order Sir Industriale Spa (Italy)	3907300009	56 722,75	Prime Top LLC (ru: ООО "Прайм Топ")	Sir Industriale S.P.A.
Zhongfu Shenying Carbon Fiber Xining Co Ltd (China)	68151100	604 453,00	Nanotechnological Composite Centre LLC (ru: ООО "Нанотехнологический центр композитов")	Zhongfu Shenying Carbon Fiber Xining Co., Ltd
Lohia Corp Ltd (India)	84454000	133 126,31	Baltpolypro LLC (ru: ООО "Балтполипро")	Lohia Corp Limited
		58 859,99	Granit-M LLC (ru: ООО "Гранит-М")	
Shanghai Galileo Import and Export Ltd (China)	84774000	168 207,14	Nizhny Novgorod Foreign Trade	Shanghai Galileo Import and Export Ltd



			Company LLC (ru: ООО "Нижегородская внешнеторговая компания")	Wings Technology (Shenzhen) Co., Ltd.
Forex Ekstruzyon Kalip Ltd Sti (Turkey)	820720	153 455,66	MAK LLC (ru: ООО "МАК")	Forex Ekstruzyon Kalip Ltd Sti
	820720	44 307,56	AL5-Yug LLC (ru: ООО "АЛ5-ЮГ")	
	820720	19 878,18	Ava-Trade LLC (ru: ООО "Ава-Трейд")	
Rui Jin Machinery Co Ltd (China)	68151100	224 150,50	Obltransterminal LLC (ru: ООО "Облтранстерминал")	Hyosung Advanced Materials Corporation
Beijing Aviation And Aerospace Xianghui Technology Co Ltd (China)	68151100	293 510,00	Nanotechnological Composite Centre LLC (ru: ООО "Нанотехнологический центр композитов")	Zhongfu Shenyang Carbon Fiber Xining Co. Ltd
Ats Kalip Sanayi Ticaret Limited Sirketi (Turkey)	820720	149 503,92	MAK LLC (ru: ООО "МАК")	Ats Kalip Sanayi Ticaret Limited Sirketi
		71 452,45	Ava-Trade LLC (ru: ООО "Ава-Трейд")	
		55 519,68	AL5-Yug LLC (ru: ООО "АЛ5-ЮГ")	
Qingdao Kaijet Energy Technology Co Ltd (China)	68161300	171 944,00	Taskom JSC (ru: АО "Таском")	Suzhou Haxcore Material Technology Co, Ltd
Ooo Gsp Bio (unknown)	3907300009	47 947,20	Albion LLC (ru: ООО "Альбион")	Dokters International GmbH
Queentrans Lojistik Oto Yedek Parca Sanayi Ve Dis Ticaret Limited Sirketi (Turkey)	84774000	422 794,00	Kamensk Polymer Plant LLC (ru: ООО "Каменский завод 'Полимер'")	Wenzhou Zecheng International Trade Co., Ltd
Isler Makina Imalat San Ve Tic Lim Sti (Turkey)	820720	72 355,22	MAK LLC (ru: ООО "МАК")	Isler Makina Imalat San. Ve Tic. Lim. Sti
		53 790,00	AL5-Yug LLC (ru: ООО "АЛ5-ЮГ")	
Eksenal Aluminum Eks Tek San Ve Tic As (Turkey)	820720	65 678,07	AL5-Yug LLC (ru: ООО "АЛ5-ЮГ")	Eksenal Alüminyum Eks. Tek. San. Ve Tic. A.S.
		37 518,23	Ava-Trade LLC (ru: ООО "Ава-Трейд")	
Changchun Yingsa International Trade Co Ltd (China)	84454000	78 048,20	JSC NPO Stekloplastik (ru: АО "НПО Стеклопластик")	Changchun Yingsa International Trade Co., Ltd
Zhuzhou Grewin Tungsten Carbide Tools Co Ltd (unknown)	68151100	78 615,10	Intellectual Robotic Systems LLC (ru: ООО "Интеллектуальные робот системы")	Hyosung Advanced Materials Corporation



Foshan Yongxin Mold Co Ltd (China)	820720	44 060,66	Ava-Trade LLC (ru: ООО "Ава-Трейд")	Foshan Yongxin Mold Co., Ltd
Comes Makina Kalip Sanayi Ve Ticaret Limited Sirketi (Turkey)	820720	31 149,43	AL5-Yug LLC (ru: ООО "АЛ5-Юг")	Comes Makina Kalip Sanayi Ve Ticaret Limite Sirketi
		13 550,21	MAK LLC (ru: ООО "МАК")	
		14 449,16	Ava-Trade LLC (ru: ООО "Ава-Трейд")	
Hefei Fanyuan Instrument Co Ltd (unknown)	84454000	14 812,20	Umatex JSC (ru: АО "Юматекс")	Hefei Fanyuan Instrument Co., Ltd
LBB Trade Makine San Ith Ihr Ltd Sti (Turkey)	820720	14 429,73	MAK LLC (ru: ООО "МАК")	Lbb Trade Makine San. Ith. Ihr. Ltd. Sti
				Suns Electric (Zhangzhou) Co., Ltd
Mikrotek Machines Ltd (India)	820720	113 261,31	"NPP 'Crystal LTD'" LLC (ru: ООО "НПП 'Кристал ЛТД'")	Mikrotek Machines Limited
Jiangsu Giant Ally Imp &Exp Co Ltd (China)	820720	5 098,02	AVA-TRADE LLC (ru: ООО "АВА-ТРЕЙД")	Jiangsu Giant Ally Imp.&Exp. Co., Ltd.
Exal Aluminum Kalip Sanayi Ve Tic Ltd Sti (Turkey)	820720	5 152,50	Ava-Trade LLC (ru: ООО "Ава-Трейд")	Exal Aluminyum Kalip Sanayi Ve Tic. Ltd. Sti.
Alkalsan Aluminum Kaliplari San Ve Tic Ltd Sti (Turkey)	820720	6 380,18	MAK LLC (ru: ООО "МАК")	Alkalsan Aluminyum Kaliplari San. Ve Tic. Ltd. Sti.
		5 700,31	Ava-Trade LLC (ru: ООО "Ава-Трейд")	
Sidas on behalf of Yu Tec Llc (France)	84774000	2 804,54	Sidas Plus LLC (ru: ООО "Сидас Плюс")	Sidas SAS
Ooo Yu Tec (Sweden)	84774000	9 172,19	Sidas Plus LLC (ru: ООО "Сидас Плюс")	Sidas SAS
Ekstek Alumlnyum Profil Kaliplari San Ve Tic Ltd Sti (Turkey)	820720	1 317,86	MAK LLC (ru: ООО "МАК")	Ekstek Alumlnyum Profil Kaliplari San. Ve Tic. Ltd. Sti.



Annex 3. Biggest importers of carbon fiber-related goods and equipment for its production to Russian Federation

Importing company (TIN)	Quantities of supplies in 2024	Supplies value in 2024	Sanctions status
	Tonnage (M.T.)	Total (\$)	
Epoxy resins (HS code 3907300009)			
Albion LLC (7727518729)	24	273 566,20	Not designated
Nortex LLC (7701618743)	143,52	268 661,00	Not designated
Prokem LLC (9728033826)	57,3	109 068,50	Not designated
LKM Group LLC / Prime Top LLC (4802024282)	44	103 037,25	Not designated
Other Importers	134,41706	496 342,90	
Carbon fibre (HS code 68151100)			
Nanotechnological Centre of Composites LLC (7727770372)	53,43	1 938 852,07	Not designated
Obltransterminal LLC (5053042571)	7,81704	224 150,50	US
Intellectual Robot Systems LLC (7719747034)	47,967	81 418,41	Not designated
GK Apgrupp SMT LLC (7816693056)	45,732	6 909,25	Not designated
Other Importers	29,32299	931 487,36	
Carbon-fibre reinforced plastics (HS code 68151300)			
Taskom JSC (4025422770)	4	171944	US
Winding/reeling machines (HS code 84454000)			
Baltpolipro LLC (3902011687)	264	133 126,31	Not designated
NPO Stekloplastik JSC (5044000039)	0	78 048,20	US, UA
Granit M LLC (6830003136)	2	58 859,99	Not designated
Yumatex JSC (7706688991)	1	14 812,20	US, UK, UA, NZ
Other Importers	281	2 564 983,47	
Dies for drawing or extruding metal (HS code 820720)			
MAK LLC (5035022276)	17,16	410 992,78	Not designated



ALS Yug LLC (6142026478)	10,83	250 444,74	Not designated
Ava Trade LLC (3662135848)	9,12	203 309,51	Not designated
TD Crystal LLC LLC (7725734717)	0,2975	113 261,31	Not designated
Other Importers	541,4245	389 389,49	
Vacuum-moulding machines (HS code 84774000)			
Istok LLC (5029223104)	2	1 009 617,00	Not designated
Hayer Industry Rus LLC (1650371043)	3	899 641,00	Not designated
Kamensky Plant Polymer LLC (6147037307)	1	422 794,00	Not designated
Nizhegorodskaya Foreign Trade Company LLC (5260153375)	11	168 207,14	Not designated
Sidas Plus LLC (9701094839)	9	11 976,73	Not designated
Other Importers	15	496 021,30	



Annex 4. Connections between Russian importers and Russia's military-industrial complex (MIC)

Importer, TIN	Imported product	Connection to the Iskander producers	Client of the importer	Cost of deliveries from the importer to the client (RUB)	Iskander producer	Cost of deliveries from the client to the Iskander producing plants (RUB)
Nortex LLC (7701618743)	Carbon fibres	through clients	JSC "NII POLYMERS" (TIN: 5249164736)	42 500,00	GOSNIIMASH (TIN: 5249093130)	233 735 094,01
					JSC "NPK KBM" (TIN: 5022039177)	9 206 295,36
			JSC DKBA	376	JSC "Votkinsk Plant" (TIN: 1828020110)	209 949 121,50
			JSC 'YART'	10 026 245,00		89 112 328,39
			LLC "NIIEMI"	23 250,00		29 532 632,40
			LLC "PO "POBEDA"	846 450,00		24 831 235,95
			LLC "SUPERPLAST "	3 507 000,00		19 758 225,00
			LLC "EXPORT-IMPORT"	123 920,00		19 470 000,00
			PJSC "UHP"	4 727 668,78		19 136 684,04
			JSC "NIIRPI"	649 350,00		13 689 460,80
			LLC "NPK "STEP"	133 780,00		10 576 530,00
			LLC "RYBINSKAB LE"	15 043 553,00		9 637 612,41
			JSC "KZSK"	718 684,00		8 994 362,57
			JSC "GNIICHTEOS "	337 000,00		5 827 610,40
			LLC "NPP KVALITET"	3 744 000,00		5 460 000,00
			JSC "Institute of Polymers"	42 500,00		4 843 513,32
			LLC "KOMPONEN T-REAKTIV"	198 900,00		3 464 271,56
			LLC "CHIMTECH-R"	442 178,00		2 990 764,80
			PJSC "CHIMPROM"	87 890,00		2 823 911,92



			OJSC "SZRT", OJSC "SARANSK RUBBER TECH FACTORY"	13 840 097,03		2 248 695,11
			JSC "PLANT "SPECPLATE"	3 174 000,00		2 151 510,00
			LLC "SZS"	9 200 000,00		1 722 613,20
			JSC "URALELASTO TECHNIKA"	2 376 680,00		1 660 327,20
			LLC "NPC METALLURG"	6 364 016,00		1 576 164,00
			LLC "NPP "IKAR"	227 315,00		994 896,00
			LLC "PIGMENT- HOLDING"	803 212,00		887 200,00
			LLC "KAMSKY CABLE"	1 625 950,00		704 248,59
			LLC "PROFHOLOD "	5 942,00		676 012,17
			LLC "VATI- AVTO"	748 000,00		669 620,10
			LLC "TEOKHIM- PROM"	34 786 980,00		638 500,00
			JSC "ELECTROIZO LIT"	40 809 200,00		476 991,37
			CJSC "BLOCKFORM "	1 104 600,00		363 385,20
			JSC "REMTECHKO MPLEKT"	3 907 840,00		360 851,16
			JSC "KVART"	18 627 635,00		342 752,40
			OJSC "KRT", OJSC "KURSK RUBBER TECH"	55 325 889,37		245 477,28
			LLC "SNHZ FINANCE"	84 250,00		89 805,00
			CJSC "NPK YARLI"	8 170 028,80		88 200,00
			PJSC "URALATI"	340 000,00		64 059,24



			LLC "FNM "THE WHOLE WORLD"	1 979 250,00		45 000,00
			LLC CONCERN "AKSION"	312 000,00		42 978,00
			LLC "CHIMPRODU CT"	781 650,00		29 808,00
			LLC "SUREL"	29 653 626,00		18 414,00
			JSC "EKZ"	114 500,00		14 340,00
			LLC "LEGA"	10 800,00		13 668,00
TOTAL				275 068 705,98		739 165 170,45
Intellectual Robot Systems LLC (7719747034)	Carbon fibres	direct	—	—	JSC "Votkinsk Plant" (TIN: 1828020110)	64,826,866
		through clients	Votkinsky Plant (TIN: 1828020110)	64 826 866	JSC "NPK KBM" (TIN: 5022039177)	76 156 150 677,06
			PJSC "NPP "IMPULSE" (TIN: 7717022177)	782410,4		656 675 507,23
			FSUE "PSZ" (TIN: 7405000428)	3598980		436 654 685,74
			JSC "NPO "PRIBOR" (TIN: 7726700943)	19560		687 757,82
			JSC "COMPOSITE" (TIN: 5018078448)	74320888		223 453,98
			JSC "VOTKINSK FACTORY" (TIN: 1828020110)	64 826 866	GOSNIIMASH (TIN: 5249093130)	1 300 351 268,79
			PJSC "ENERGIYA"	227 000,00	JSC "Votkinsk Plant" (TIN: 1828020110)	602 493 341,70
			JSC "KOMPOZIT"	74 320 888,00		229 174 915,60
			JSC "OKB KP"	3 702,00		69 887 972,16
			JSC "INTEK ANALYTICS"	4 652,00		19 350 000,00
			RIC "KURCHATOV"	1 476 498,00		8 895 040,50



			INSTITUTE" - VIAM			
			JSC "NPC "MERA"	1 138 500,00		2 042 000,00
			LLC "IV"	22 481,00		564 750,00
			JSC "NIKIMT-ATOMSTROY"	95 311,20		550 020,00
			JSC "SOVPLIM"	3 441,00		354 888,00
			JSC "VOSKHOD"-KRLZ	13 000,00		131 568,20
			JSC "FERROPRIBOR"	43 133,00		127 494,65
			CJSC "NPK YARLI"	203 834,00		88 200,00
TOTAL				285 928 010,60		79 484 403 541,43
NPO Stekloplastik JSC (5044000039)	Carbon fibres	direct	—	—	JSC "Perm Machine-Building Plant" (TIN: 5906075029)	68 122 942,00
			—	—	JSC "Votkinsk Plant" (TIN: 1828020110)	61 220 223,60
			—	—	JSC "NPK KBM" (TIN: 5022039177)	948 896,00
		through clients	JSC "Votkinsk Plant"	61 220 223,60	JSC "NPK KBM" (TIN: 5022039177)	76 156 150 677,00
			JSC "NPK "KBM"	948 895,58		12 775 633 962,00
			JSC "TsNIRTI named after Academician A.I. Berg"	446 400,00		1 466 861 407,00
			JSC "ZID"	5 004,12		1 150 608 202,00
			JSC "NPO "POISK"	510 252,00		546 112 940,30
			JSC "KB "LUTCH"	193 452,00		493 636 561,70
			PJSC "ENERGIYA"	185 320,32		201 447 709,20
			JSC "TsKBA"	167 880,00		176 262 869,90
			JSC "KRASMASH"	67 047 400,66		99 878 735,01



		JSC "OKB KP"	2 580 586,08	26 678 218,33
		JSC "PromTech- Dubna"	834 615,36	24 615 524,10
		JSC "NPO "KURGANPRI BOR"	154 449,00	15 902 094,68
		JSC "GRPZ"	2 958 450,00	12 540 792,57
		LLC "ZhZKM"	565 185,06	10 784 400,00
		JSC "NII "FERRIT- DOMEN"	86 400,00	6 961 518,00
		LLC "SZS"	98 400,00	5 525 339,51
		JSC "OKB "NOVATOR"	28 211 122,80	4 939 650,74
		JSC "EZ OTSM"	220 404 012,00	2 978 038,73
		JSC "ROZ"	7 492 089,60	2 752 968,00
		JSC "NPO Stekloplastic"	6 338,82	1 583 478,00
		LLC "NIVOLA"	4 469 711,40	1 383 600,00
		LLC "RTTM"	199 446,72	980 967,36
		PJSC "ROSTVERTOL O"	11 157 216,96	804 576,00
		JSC "GKNPC named after M.V. Khrunichev"	4 496 080,80	794 054,40
		JSC "Institute of Plastics"	106 201,92	717 482,40
		LLC "NIIKAM"	1 308 000,00	705 578,40
		LLC "NPP "ELEMER"	107 700,00	703 327,20
		JSC "KZSK"	2 378 851,20	554 945,13
		LLC PTK "TEHNOPRO M"	607 560,00	320 348,37
		JSC "KOMPOZIT"	3 255 397,44	223 453,98
		JSC "ZASLON"	3 452 400,00	200 000,00
		PJSC "VYMPEL"	22 569 120,00	178 081,84
		Research Institute "Kurchatov"	59 115 418,95	155 006,46



			Institute" - VIAM			
			LLC "ARGON"	151 008,00		135 162,04
			PJSC "OAK"	551 103,24		72 074,88
			LLC "PTS"	39 024,00		63 365,40
			LLC NPF "TEHPOLIKO M"	6 782 400,00		25 872,00
			JSC "NPP "ETALON"	142 310,40		18 558,00
			JSC "PO "STRELA"	261 219 758,88	GOSNIIMASH (TIN: 5249093130)	2 382 147 402,00
			JSC "Votkinsk Plant"	7 447 660,80		1 300 351 269,00
			PJSC "OAK"	551 103,24		796 921 821,10
			JSC "NPO "POISK"	510 252,00		666 028 098,80
			JSC "NPO "KURGANPRI BOR"	154 449,00		581 249 397,70
			JSC "PZ "MASH", JSC "Perm Machine-Building Plant"	68 122 942,44		552 755 787,60
			JSC "VMP "AVITEK"	3 271 650,00		80 633 708,29
			JSC "SMAZ"	5 778 693,00		16 771 731,18
			JSC "Corporation "Tactical Missile Weapons"	3 492 960,00		1 456 867,89
			LLC "PROMELEKT RO"	180 960,00		759 470,84
			JSC "OKB "NOVATOR"	28 211 122,80		628 728,00
			PJSC "VYMPEL"	22 569 120,00		431 838,93
			JSC "Concern "Granite-Electron"	1 152 000,00		22 484,00
TOTAL				917 668 100,19		99 700 342 207,56



"Kamsky Cable" LLC (5904184047)	Carbon fibres	direct	–	–	JSC "Votkinsk Plant" (TIN: 1828020110)	704 248,59
"ITGF" JSC (3731001069)	Carbon fibres	direct	–	–	JSC "Votkinsk Plant" (TIN: 1828020110)	268 775,91
"Tverdosplav" JSC (7726063780)	Carbon fibres	direct	–	–	JSC "Votkinsk Plant" (TIN: 1828020110)	49 891,46
"EKZ" JSC (3306007697)	Carbon fibres	direct	–	–	JSC "Votkinsk Plant" (TIN: 1828020110)	14 340,00
MAK LLC (5035022276)	Carbon fibres	through clients	JSC "TRV-ENGINEERING" (TIN: 5018205784)	1 184 654 531,07	GOSNIIMASH (TIN: 5249093130)	935 875 921,70
			JSC "METALLURGICAL PLANT "ELEKTROSTAL"	0	JSC "Votkinsk Plant" (TIN: 1828020110)	678 803 203,90
			PJSC "MTS"	491 883,76		769 116,22
			PJSC "VYMPELCOM"	151 886,15		907,2
TOTAL				1 185 298 300,98		1 615 449 149,02
TD Crystal LLC (7725734717)	Carbon fibres	through clients	ZPP LLC (TIN 6367032625)	53343,24	JSC "NPK KBM" (TIN: 5022039177)	42 287 623,24
			OKB KP JSC (TIN 5029150262)	77517,6		26 678 218,33
			IRZ JSC (TIN 3811016215)	43776		15 353 962,86
			JSC "ENGSTREM" (TIN 7735010706)	2461,2		13 887 966
			JSC "KUZOTSM" (TIN 6666003414)	761028		3 257 527,20
			JSC "DKZ" (TIN 5010054903)	2917900,8		1 846 976,55
			LLC "MERKURY" (CIN 7604191664)	58622,4		156,852



			ChMZ JSC (CIN 1829008035)	7735,2	GOSNIIMASH (TIN: 5249093130)	164 259 920,60
			Khimreaktiv JSC (TIN 5257000040)	11434,8		5 138 286,99
			Million Instruments LLC (TIN 7602115918)	11281,2		554 214,04
			JSC "OKB KP"	77 517,60	JSC "Votkinsk Plant" (TIN: 1828020110)	69 887 972,16
			CJSC "KIRZHACH INSTRUMENT "	193 200,00		36 311 349,60
			JSC "CHMZ"	7 735,20		27 455 182,40
			LLC "VIRIAL"	10 555,20		14 570 520,00
			JSC "KUZOCM"	761 028,00		12 518 590,20
			LLC "RYBINSKAB LE"	634 156,80		9 637 612,41
			JSC "BMK"	3 329 284,76		5 675 703,11
			LLC "KAMSKY CABLE"	396 451,20		704 248,59
			LLC "LOGO TRADE"	725 294,40		352 792,51
			LLC "ZPP"	53 343,24		109 589,76
			JSC "IRZ"	43 776,00		59 382,48
			JSC "EKZ"	564 796,73		14 340,00
			TOTAL	10 742 239,57		450 562 135,88
LLC NCC (7727770372)	Carbon fibres	through clients	JSC "PERM MACHINE- BUILDING PLANT"	39 118 186,80	JSC "Votkinsk Plant" (TIN: 1828020110)	132320912,2
Obltranstermin al LLC (5053042571)	Carbon fibres	through clients	LLC TC "SOTA LOGISTICS"	9 290 000,00	JSC "Votkinsk Plant" (TIN: 1828020110)	60 000,00
Prokem LLC (9728033826)	Carbon fibres	through clients	LLC "NOVOMOSK OVSK POLYESTERS"	240 000,00	JSC "Votkinsk Plant" (TIN: 1828020110)	98 400,00
Kamensky Plant Polymer LLC (6147037307)	Carbon fibres	through clients	PJSC "CMK"	1 310 400,00	JSC "Votkinsk Plant" (TIN: 1828020110)	10 413 825,60
Granit-M LLC (6830003136)	Carbon fibres	through clients	JSC "GKNPC NAMED	499 228,80		2 574 166 965,00



			AFTER M.V. KHRUNICHEV "		JSC "Votkinsk Plant" (TIN: 1828020110)	
			JSC "MPZ"	497 097,00		52 591 659,98
			JSC "KARACHEV PLANT "ELECTRODET AL"	33 900,00		49 089 672,12
			PJSC "MEGAFON"	65 255,00		4 764 960,00
			PJSC "MTS"	65 254,23		769 116,22
			LLC "GAZKHIMKO MPLEKT"	42 120,00		765 000,00
			JSC "ORBITA"	8 864 724,60		245 995,20
			LLC "PLANT KONTAKT"	175 200,00		59 760,00
			PJSC "SBERBANK"	15 000,00		31 050,00
			PJSC "VYMPELCOM"	65 255,00		907,2
			TOTAL	10 323 034,63		2 682 485 085,72
AL5-Yug LLC (6142026478)	Carbon fibres	through clients	LLC "PO "ALPHA-METAL"	6 999 760,00	JSC "Votkinsk Plant" (TIN: 1828020110)	133 729,92
			LLC "FILTRATION TECHNOLOGIES"	8 865 615,56		44 482,80
TOTAL				15 865 375,56		178 212,72