STOP MISSILE TERROR

I. Russian missiles manufacturers

The countries of sanctions coalition have introduced sanction to the most of Russian missiles manufacturers and other defense companies:

Countries	Introduced sanctions
Ukraine	✔
US	✔
EU	✔
UK	✔
Canada	✔
New Zealand	✔
Australia	✔
Japan	✔
Switzerland	✔

However, Russia continues to systematically strike the territory of Ukraine with missiles of various types and modifications. Missiles that Russia uses the most out of its arsenal:

- Kh-47M2 Kinzhal;
- 3M14 Kalibr;
- 9M727 Iskander-K;
- Kh-101;
- 9M720 Iskander-M.

Some of the missile **manufacturers** are not included in the sanctions lists in certain jurisdictions of the sanctions coalition:

- JSC EXPERIMENTAL MACHINE DESIGN BUREAU NOVATOR
- JSC VOTKINSK MACHINE BUILDING PLANT

- RADUGA STATE ENGINEERING DESIGN BUREAU JSC NAMED AFTER A.Y. BEREZNYAK
- SCIENTIFIC RESEARCH INSTITUTE FOR MECHANICAL ENGINEERING JSC IN THE NAME OF V.V. BAKHIREV
- JSC SMOLENSK AVIATION PLANT
- SVERDLOV STATE-OWNED ENTERPRISE
- JSC DUBENSKY MACHINE-BUILDING PLANT NAMED AFTER M. P. FEDOROV
- JSC OMSK MOTOR MANUFACTURING DESIGN BUREAU
- JSC STATE SCIENTIFIC-RESEARCH INSTITUTE OF INSTRUMENT ENGINEERING
- JSC RESEARCH AND PRODUCTION ENTERPRISE RADAR MMS
- JSC SCIENTIFIC AND RESEARCH INSTITUTE NAMED AFTER M.F. STELMAKH POLYUS
- JSC SCIENTIFIC AND RESEARCH CENTRE OF ELECTRONIC COMPUTER TECHNOLOGY
- JSC CENTRAL RESEARCH INSTITUTE OF AUTOMATION AND HYDRAULICS
- STATE-OWNED ENTERPRISE PERM POWDER PLANT
- JSC SCIENTIFIC AND PRODUCTION CORPORATION MACHINE BUILDING DESIGN BUREAU
- PJSC UEC-SATURN
- JSC AGAT MOSCOW RESEARCH AND SCIENTIFIC INSTITUTE
- JSC ZVEZDA-STRELA
- JSC DESIGN BUREAU FOR SPECIAL MACHINE BUILDING
- JSC VERKHNYAYA SALDA CHEMICAL CONTAINER PLANT.

II. Foreign components in Russian missiles

Russian missiles and UAVs include foreign-made microchips that support GLONASS, Russian satellite navigation system, which directs them into the specified targets. Several foreign companies, including Linx Technologies (US), Qualcomm (US) and STMicroelectronics (Switzerland), continue to produce GLONASS-enabled microchips and sell them to Russia through numerous intermediaries. Removing the GLONASS function could reduce Russia's military potential. In addition, since GPS is still used in Russian military equipment, it is suggested to restrict usage of GPS for the Russian military in the border regions of Belarus and Russia, as well as in Ukrainian territory.

Russian missiles, as shown in the tables below, have a significant number of foreign-made electronic components.

There are at least **53 types** of foreign-made electronic components (chips, PCBs etc.) in **Kh-101** air-launched cruise missiles. Most of it is made by STMicroelectronics, Vicor, XILINX, Intel Corporation, Texas Instruments, ZILOG, Maxim Integrated, Cypress Semiconductor companies.

At least **45 types** of foreign-made components are used to produce **3M-14 Kalibr** sea-launched cruise missiles. Most of it is made by STMicroelectronics, ALTERA, Texas Instruments, Cypress Semiconductor, Analog Devices companies.

9M723 **ballistic** missiles and 9M728/9M729 Iskander **cruise** missiles are equipped with at least **15** and **32** foreign-made components accordingly. They are made by SPANSION, STMicroelectronics, Integrated Device Technology, XILINX, Maxim Integrated, Nexperia, Cypress Semiconductor, Analog Devices, HOLT Integrated Circuits, Onsemi, HALO Electronics, Marvell Semiconductor, AMD, Micron, M-TRON, HARTING, Fujitsu Component Ltd., Mini-Circuits, Traco Power, Advanced Micro Devices, Microchip Technology, Renesas Electronics Corporation, Vishay, Toshiba America Electronic Components, Nippon Instruments Corporation, RIFA, Integrated Rectifer, NetSol, Rohm semiconductor, Macronix.

Kh-47M2 Kinzhal hypersonic air-launched ballistic missiles include at least **48 types** of foreign-made electronic components. Most of them are made by Texas Instruments, Analog Devices, Traco Power, Integrated Rectife companies.

Most of foreign-made electronic components used by Russia in missile manufacturing are made in the US - 81%, **Switzerland** - 8%, **Germany** and **Japan** - 3.5%.

List of manufacturers of electronic components used in the missile weapons

Manufacturer	Number of electronic components types					
	Kh-101 air-launched cruise missiles	3M-14 Kalibr sea-launched cruise missiles	9M728/9M729 Iskander ground-launched cruise missiles	9M723 Iskander ballistic missiles	Kh-47M2 Kinzhal hypersonic air-launched ballistic missiles	Total
SPANSION	1	1	1			3
Linear Technology	1	1			1	3
STMicroelectronics	3	5		2		10
Integrated Device Technology	3	2	3		1	9
ALTERA	1	8	2	1	1	13
VBSEMI	1	1				2
Motorola	1	1				2
Vicor	3					3
XILINX	8		1		2	11

Manufacturer	Number of electronic components types					
	Kh-101 air-launched cruise missiles	3M-14 Kalibr sea-launched cruise missiles	9M728/9M729 Iskander ground-launched cruise missiles	9M723 Iskander ballistic missiles	Kh-47M2 Kinzhal hypersonic air-launched ballistic missiles	Total
Intel Corporation	3					3
ATMEL	1					1
Texas Instruments	9	9	7	2	6	33
Anderson Electronics	2					2
ZILOG	2					2
Maxim Integrated	3	4	1	1	1	10
Nexperia	1		1			2
Cypress Semiconductor	6	7	2		1	16
Philips Semiconductors	1					1
Numonyx	1					1
Analog Devices	1	9			13	23

Manufacturer	Number of electronic components types					
	Kh-101 air-launched cruise missiles	3M-14 Kalibr sea-launched cruise missiles	9M728/9M729 Iskander ground-launched cruise missiles	9M723 Iskander ballistic missiles	Kh-47M2 Kinzhal hypersonic air-launched ballistic missiles	Total
Flip Electronics	1					1
Rochester Electronics	1					1
HOLT Integrated Circuits	2	1			1	4
Infineon Technologies	2					2
Onsemi	1	1				2
HALO Electronics		1				1
Marvell Semiconductor		1				1
Micron		2			1	3
M-TRON			1			1
HARTING			3			3
Fujitsu Component Ltd.			1			1

Manufacturer	Number of electronic components types					
	Kh-101 air-launched cruise missiles	3M-14 Kalibr sea-launched cruise missiles	9M728/9M729 Iskander ground-launched cruise missiles	9M723 Iskander ballistic missiles	Kh-47M2 Kinzhal hypersonic air-launched ballistic missiles	Total
Mini-Circuits			1			1
Traco Power			1		2	3
Advanced Micro Devices		3	4			7
Microchip Technology			1			1
Renesas Electronics Corporation			1			1
Vishay Intertechnology / Vishay General			1	2	1	4
Toshiba America Electronic Components				1		1
Toshiba					1	1
Nippon Instruments Corporation				1		1

Manufacturer	Number of electronic components types					
	Kh-101 air-launched cruise missiles	3M-14 Kalibr sea-launched cruise missiles	9M728/9M729 Iskander ground-launched cruise missiles	9M723 Iskander ballistic missiles	Kh-47M2 Kinzhal hypersonic air-launched ballistic missiles	Total
RIFA				1		1
Integrated Rectifer				1	2	3
NetSol				1		1
Rohm semiconductor				1	1	2
Macronix				1	1	2
SICSSA					1	1
Nelson					1	1
CADDOCK					1	1
DM&P Electronics					1	1
Winbond					1	1
Burr Brown					1	1
Murata					1	1

Manufacturer	Number of electronic components types					
	Kh-101 air-launched cruise missiles	3M-14 Kalibr sea-launched cruise missiles	9M728/9M729 Iskander ground-launched cruise missiles	9M723 Iskander ballistic missiles	Kh-47M2 Kinzhal hypersonic air-launched ballistic missiles	Total
Apex Microtechnology					1	1
Actel					1	1
Fairchild Semiconductor					1	1
Matsushita Panasonic					1	1
STM					1	1
Загалом	59	57	32	15	48	211

List of foreign-made electronic components in **Kh-101** air-launched cruise missile

	Component	Manufacturer	Country	HS Code
1.	32 MB Flash Memory S29AL032D70TFI00	SPANSION	US	8542
2.	8-channel 12-bit analog-to-digital converter LTC1594LIS	Linear Technology	US	8542
3.	Microcontroller M5-1-4 in TQFP44 case	STMicroelectronics	Switzerland	8542
4.	Microntroller M5-2-4 in TQFP44 case	STMicroelectronics	Switzerland	8542
5.	Built-in 64-bit CPU RC64475 RIS Controller	Integrated Device Technology	US	8542
6.	Processor 35M240BD01	ALTERA	US	8542

	Component	Manufacturer	Country	HS Code
7.	P-channel 60B (D-S) MOSFET FR5305	VBSEMI	China	8541
8.	Voltage regulator 8L05A PLUAB	Motorola	US	8542
9.	Microntroller W47G	STMicroelectronics	Switzerland	8542
10.	Isolated DC/DC converters VI-JW1-MZ 111511040187	Vicor	US	8542
11.	Isolated DC/DC converters VI-2W0-MW 35M240BD01	Vicor	US	8542
12.	Isolated DC/DC converters VI-JW1-MZ 11511040177	Vicor	US	8542
13.	Programmable gate matrix XCV150 PQ240AFPO437 D1149990A 41	XILINX	US	8542
14.	Programmable gate matrix XCV150 PO240AMS0917 D2151571A 51	XILINX	US	8542
15.	Inverter Schmitt Trigger 6-Element CMOS 14-Pin TSSOP	Integrated Device Technology	US	8542
16.	Processor Intel i386EX FA80386EX25L151MA07E	Intel Corporation	US	8542
17.	Programmable gate matrix XC2V1000 FGG256A 4C	XILINX	US	8542
18.	32 MB Flash Memory AT49BV322DT 70TU 1116	ATMEL	US	8542
19.	Microchip ALVTH16245	Texas Instrument	US	8542
20.	Oscillators of AE 803 32.0000MHz 1604 series	Anderson Electronics	США	8542
21.	Advanced IC controller Zilog Z8523016VEG ESCC 1412 LM	ZILOG	US	8542
22.	Advanced IC controller Zilog Z8523016VEC ESCC 0329 CV	ZILOG	US	8542
23.	2-CMOS linear receiver with low power consumption JM12AHIS DS26C32ATM	Texas Instrument	US	8542
24.	MAX211FFAT 5V RS-232 Transceivers with 0.1uF External Capacitors	Maxim Integrated	US	8542
25.	Oscillators MA02391	Anderson Electronics	US	8542
26.	16-bit microchip LVCH1622444	Nexperia	Netherlands	8542
27.	Microchip JS28F128	Intel Corporation	US	8542
28.	Microchip CY7C1069DV33	Cypress	US	8542

	Component	Manufacturer	Country	HS Code
		Semiconductor		
29.	Microchip CY7C104DV33	Cypress Semiconductor	US	8542
30.	20-bit bus switch CBTD16210	Philips Semiconductors	US	8542
31.	Transceiver ABTE16246	Texas Instrument	US	8542
32.	Microchip Xilinx Spartan XC2S200 FGG456AMS1503 F2121272A 51	XILINX	US	8542
33.	Microchip CY62157CV30	Cypress Semiconductor	US	8542
34.	Microchip CY7C1069DV33-10ZSXI	Cypress Semiconductor	US	8542
35.	Microchip JS28F128J3F75	Intel Corporation	US	8542
		Numonyx	Switzerland	8542
36.	Multi-channel transceiver device RS-232 MAX211EEAI	Maxim Integrated, Analog Devices	US	8542
37.	SRAM 16Mb cache memory chip CY7C1069DV33-10ZSXI	Cypress Semiconductor	US	8542
38.	Microchip BB ADS 7828E 760CK	Texas Instruments	US	8542
39.	Microchip CY7B991V-5JXI	Flip Electronics, Rochester Electronics	US	8542
40.	Microchip CY7C1041G30-10ZSXI	Cypress Semiconductor	US	8542
41.	Microchip DS26C31TM	Texas Instruments	US	8542
42.	Microchip DS1721	Maxim Integrated	US	8542
43.	Microchip HI-8445 PST	HOLT Integrated Circuits	US	8542
44.	Microchip HI-8585 PST	HOLT Integrated Circuits	US	8542
45.	Microchip XCF02S	XILINX	US	8542
46.	Microchip CY7C1069G30-10ZSXI	Infineon Technologies	Germany	8542
47.	Microchip DS26C31TN	Texas Instruments	US	8542
48.	Microchip XCF02S	XILINX	US	8542
49.	Microchip LCX 125	Onsemi	US	8542
50.	Microchip ABTE16245	Texas Instruments	US	8542

	Component	Manufacturer	Country	HS Code
51.	Microchip ALVTH162244	Texas Instruments	US	8542
52.	Microchip CBTD16210	Texas Instruments	US	8542
53.	Microchip CY7B991V-5JXI	Infineon Technologies	Germany	8542
54.	79R3081E-40DL X4C0537P SCD7171 (D1)	Integrated Device Technology	US	8542
55.	XC4036XLA HQ208AKP1009 A2254432A 091 (D32)	XILINX	US	8542
56.	XC6SLX16 TM FTG256DIV2025 D6130415A 3I TAIWAN (D6)	XILINX	US	8542

List of foreign-made electronic components in **3M-14** Kalibr sea-launched cruise missile

No.	Component	Manufacturer	Country	HS Code
1.	32 MB Flash Memory S29AL032D70TAI00	SPANSION	US	8542
2.	Microchip CY62157EV30L L-45ZSXI	Cypress Semiconductor	US	8542
3.	8-channel 12-bit analog-to-digital converter LTC1594LIS	Linear Technology	US	8542
4.	Microcontroller M5-1-4 in TQFP44 case	STMicroelectronics	Switzerland	8542
5.	Microcontroller M5-2-4 in TQFP44 case	STMicroelectronics	Switzerland	8542
6.	Built-in 64-bit CPU RC64475	Integrated Device Technology	US	8542
7.	Processor 35M240BD01	ALTERA	US	8542
8.	P-channel 60V (D-S) MOSFET FR5305	VBSEMI	China	8541
9.	Voltage regulator 8L05A PLUAB	Motorola	US	8542
10.	Microcontroller W47G	STMicroelectronics	Switzerland	8542
11.	Digital signal processor TMS 320C25GBA	Texas Instruments	US	8542
12.	Microchip CY7C10490	Cypress Semiconductor	US	8542
13.	Digital signal processor DSP TMS 320C30GEL JG-22S2LG8	Texas Instruments	US	8542
14.	Integrated IC CY7C1011DV33	Cypress Semiconductor	US	8542

No.	Component	Manufacturer	Country	HS Code
15.	Integrated IC CY7C1381KV33	Cypress Semiconductor	US	8542
16.	Microchip 8BCQ97K ABT534A G4	Texas Instruments	US	8542
17.	Transformer HALO TG1G-E001NY	HALO Electronics	US	8542
18.	Integrated transceiver 88E1111-BAB GBV5251 1JW	Marvell Semiconductor	US	8542
19.	Flash Memory M29W320DB	STMicroelectronics	Switzerland	8542
20.	Processor EP4CGX110DF3117N G CAAA F1901E	ALTERA	US	8542
21.	Microchip ALXD800EEXJ2VF	AMD	US	8542
22.	Microchip CY7C1381D-133AXI	Cypress	US	8542
23.	Microchip MT46H32LFB5-5 D9LRB	Micron	US	8542
24.	Microchip 29F32C08AFABA	Micron	US	8542
25.	Microchip 74ABT16245A	Texas Instruments	US	8542
26.	Microchip AD9218BSTZ-105	Analog Devices	US	8542
27.	Microchip HI-8382J-15-10-4959	Holt Integrated	US	8542
28.	Microchip 8138A	Analog Devices	US	8542
29.	Microchip LD1086	STMicroelectronics	Switzerland	8542
30.	Microchip MAX 1623EA	Maxim Integrated	US	8542
31.	Microchip EPCS64N 9911E V5	ALTERA	US	8542
32.	Microchip LX245B	Texas Instruments	US	8542
33.	Microchip EP1K500I208-2NQ HDAAL1713A	ALTERA	US	8542
34.	Microchip AD8016ARP	Analog Devices	US	8542
35.	Microchip AD7450	Analog Devices	US	8542
36.	Microchip AD7243	Analog Devices	US	8542
37.	Microchip REF195	Analog Devices	US	8542
38.	Microchip LT1185IT	Analog Devices	US	8542
39.	Microchip EPC2LI20N	ALTERA	US	8542
40.	Microchip MAX1658	Maxim Integrated	US	8542
41.	Microchip MC33269DT-3.3G	Onsemi	US	8542
42.	Microchip EPF10K30EQI208-2N	ALTERA	US	8542
43.	Microchip TPS51100	Texas Instruments	US	8542
44.	Microchip AD780	Analog Devices	US	8542

No.	Component	Manufacturer	Country	HS Code
45.	Microchip OP276	Analog Devices	US	8542
46.	Мікросхема MAX1480BEPI	Maxim Integrated	US	8542
47.	Мікросхема TL16C552AIFN	Texas Instruments	US	8542
48.	Мікросхема IDTTM 7005	Integrated Device Technology	US	8542
49.	Мікросхема DSP TMS320C25GBA	Texas Instruments	US	8542
50.	Мікросхема DSP TMS320C30GEL	Texas Instruments	US	8542
51.	Мікросхема MAX233EPP	Maxim Integrated Products	US	8542
52.	Мікросхема CY7C10490-10VXI	Cypress Semiconductor	US	8542
53.	Мікросхема AM29F800BB-55EF	Advanced Micro Devices	US	8542
54.	Мікросхема ALTERA FLEX EPF10K50VQI240-2 S DDA210410A	Altera Corporation	US	8542
55.	Мікросхема ALTERA FLEX EPF10K30AQI240-3 S CCA510433A VCA51500B7 301SA3ROP	Altera Corporation	US	8542
56.	Мікросхема AM29LV400BT-90EI 0032CBA M 1997 AMD	Advanced Micro Devices	US	8542
57.	Мікросхема CY7C1021V33 12VI 0112 C 04 704993	Cypress Semiconductor	US	8542

List of foreign-made electronic components in **9M728/9M729 Iskander missiles**

No.	Component	Manufacturer	Country	HS Code
1.	Microchip XC4036XLA	XILINX	US	8542
2.	Microchip CY7C1069DV33-10ZSXI	SPANSION	US	8542
3.	Microchip S29GL236P117F102	Cypress Semiconductor	US	8542
4.	Processor 79R3031E-40DL, XC0124P	IDT	US	8542
5.	Quartz element 00601-236-R 16.000000MHz MHO+23FAD-R	M-TRON	US	8541
6.	Connector 940	HARTING	Germany	8536
7.	Connector 234	HARTING	Germany	8536
8.	Microchip FLEX HCA511213A	**Altera**	US	8542

No.	Component	Manufacturer	Country	HS Code
9.	Microchip MB87J2140 0243 Y02	Fujitsu Component Ltd.	Japan	8542
10.	Microchip ADTL1-12	Mini-Circuits	US	8542
11.	Microchip TSM0505S	Traco Power	Switzerland	8542
12.	Microchip AMD L6AODU9ON 11401	Advanced Micro Devices	US	8542
13.	Microchip A6E3 DSP TMS320C6414GLZ C-20 24A10CW	Texas Instrument	US	8542
14.	Microchip MIC 49300WR 1004PHIL	Microchip Technology	US	8542
15.	Microchip ALVC 164215 A3X3-04 11270	Integrated Device Technology, Texas Instruments	US	8542
16.	Microchip ALVC 164215 A3X3-04 11270	Renesas Electronics Corporation	Japan	8542
17.	Microchip ALVC 164215 A3X3-04 11270	Nexperia, NXP Semiconductors	Netherlands	8542
18.	Microchip 99 AMD 1640DU90NI 943BBC32	Advanced Micro Devices	US	8542
19.	Microchip 01CZD2K LV273	Texas Instrument	US	8542
20.	Microchip EP1C3T14417N L HCE951049A	ALTERA	US	8542
21.	Microchip 10-35L X5	Vishay Intertechnology	US	8542
22.	Microchip DSP TMS 320C30GEL JG-22S2LGB	Texas Instrument	US	8542
23.	Microchip CY7C10490-10VXI 1137 04 645988	Cypress Semiconductor	US	8542
24.	Microchip Y29390033-3373 833-32 1996 AMD DDM2	Advanced Micro Devices	US	8542
25.	Microchip M29F800BB 35EF 218BB762-JJ 1990AMD DDM1	Advanced Micro Devices	US	8542
26.	Microchip 7005 S55JI VO92IP	Integrated Device Technology	US	8542

No.	Component	Manufacturer	Country	HS Code
27.	Microchip DSP TMS 320C30GBA FE-94AB04T 1990 TI	Texas Instrument	US	8542
28.	Connector 492 A US 1218 09031966921	HARTING	Germany	8536
29.	Microchip DSP TMS320C25GBA FE-2BS8QCB	Texas Instrument	US	8542
30.	Microchip MAX1480BEPI 1112	Maxim Integrated	US	8542
31.	Microchip IDTTM 7005 S55JI VO921P	Integrated Device Technology	US	8542
32.	Microchip TL16C552AFN 21A IDRW C4	Texas Instrument	US	8542

List of foreign-made electronic components in **9M723 Iskander ballistic missile**

No.	Component	Manufacturer	Country	HS Code
1.	Microchip MAX EPM7160STI100-10N W HDC241281A VDC24842215 3N2WAQOL	ALTERA	US	8542
2.	Microchip 1242: TLP627-4	Toshiba America Electronic Components	US	8542
3.	Electrolytic capacitor	Nippon Instruments Corporation	Japan	8532
4.	Film capacitors PHE 426 400~	RIFA	Sweden	8532
5.	16-bit buffer and linear driver LVT162244A	Texas Instrument	US	8542
6.	8-channel transceiver bus with 3 outputs LS245	Texas Instrument	US	8542
7.	Transceiver MAX211EEAT	Maxim Integrated	US	8542
8.	Dual-function protective resistor F5210S	Integrated Rectifer	US	8533
9.	Schottky barrier diode B20100CT	Vishay Intertechnologies	US	8541
10.	Pulse generator diode 841e3, 805e3	Vishay Intertechnologies	US	8541
11.	Asynchronous SRAM SGM1608WIM	NetSol	South Korea	8542

No.	Component	Manufacturer	Country	HS Code
12.	Transistor BA996A1	Rohm semiconductor	Japan	8541
13.	Non-volatile memory 93C46WP	STMicroelectronics	Switzerland	8542
14.	Transistor BCP53-16	STMicroelectronics	Switzerland	8541
15.	Memory chip 256 Mb (32 Mb x 8)	Macronix	Taiwan	8542

List of foreign-made electronic components in Kh-47M2 **Kinzhal** hypersonic air-launched ballistic missiles

No.	Component	Manufacturer	Country	HS Code
1.	Transistor BA996A1	ROHM	Japan	8541
2.	Temperature sensor MS03951	SICSSA	Spain	9025
3.	Microchip SGM1608WIM	Nelson	US	8542
4.	16 -bit buffer and linear driver with 3 outputs LVT162244A	Texas Instrument	US	8542
5.	Memory 256 Mb (32 Mbx 8) MX29GL256FHT21-90Q	Macronix	Taiwan	8542
6.	8-channel transceiver bus with 3 outputs LS245	Texas Instrument	US	8542
7.	Pulse generator diode 841e3, 805e3	Vishay General	US	8541
8.	Transceiver MAX211EEAT	Maxim Integrated	US	8542
9.	Diode pair B20100CT	Integrated Rectifer	US	8541
10.	Dual-function fuse resistor F5210S	Integrated Rectifer	US	8533
11.	Transistor BCP53	STM	US	8541
12.	12-bit serial DACPORT AD7243BR	Analog Devices	US	8542
13.	12-bit analog-to-digital converter AD7450BRZ	Analog Devices	US	8542
14.	Integrated IC 8138A	Analog Devices	US	8542
15.	3-channel digital isolator ADUM1301 CRWZ	Analog Devices	US	8542
16.	16-bit transceiver ABT16245A	Texas Instrument	US	8542
17.	Rhino-film resistors MP915-10.0-1% 1829	CADDOCK	US	8533
18.	Component 1BAYSKK G4 65C23243	Texas Instrument	US	8542

No.	Component	Manufacturer	Country	HS Code
19.	64 MB Flash memory 2RC22 D9MHP	Micron	US	8542
20.	System on a crystal, build on x86-compatible Vortex86DX core	DM&P Electronics	Taiwan	8542
21.	Low-noise linear regulator 1,5 A 337e3 963A33	Linear Technology	US	8542
22.	64 MB Flash memory 25Q64FVSIG	Winbond	Taiwan	8542
23.	Programmable highly-specific ASIC chip XC2S50-TQG144AMS	Xilinx	US	8542
24.	High-speed instrumental amplifier with programmable gain PGA206UA 39A1R1T	Burr Brown	US	8542
25.	Broadband interference suppression filter BNX022	Murata	Japan	8542
26.	Component HT573 38K G4 D2XK	Texas Instruments	US	8542
27.	Component 78336 596.VS	Xilinx	US	8542
28.	3-channel digital isolator ADUM1300 BRWZ #1333 2677991.1*	Analog Devices	US	8542
29.	3-channel digital isolator ADUM1300 C #1344 2736425.1*	Analog Devices	US	8542
30.	Component ADG 1409Y #326	Analog Devices	US	8542
31.	Component HT14 2AK G4 CQVP	Texas Instruments	US	8534 or 8542
32.	High-precision voltage source VRE3025J	Apex Microtechnology	US	8535 or 8542
33.	Programmable gate matrix APA150 FG144	Actel	US	8542
34.	4Mb SRAM – parallel IC of asynchronous memory CY7C1041DV33-10BVI	Cypress Semiconductor	US	8542
35.	High-speed CVOS 20-bit bus switch with flow separation QS32X861Q1G	Integrated Device Technology (IDT)	US	8542
36.	Hex inverter with Schmitt-trigger input PCUAB 74AC14	Fairchild Semiconductor	US	8542
37.	IC with built-in complex programmable device EPM7256SRI208-10N	Altera	US	8542
38.	Dual low power transceiver HI-1567CDI	Holt Integrated Circuits	US	8542

No.	Component	Manufacturer	Country	HS Code
39.	Relay 4A 1/20HP125	Matsushita Panasonic	Japan, made in Germany	8536
40.	Converter DC/DC TSM0505S	Traco Power	Switzerland	8504
41.	Converter DC/DC TEN 20-2411	Traco Power	Switzerland	8504
42.	Component 149 P126	Toshiba	Japan	8504 or 8542
43.	4/8-channel high performance analog multiplexer ADG409BR #1346	Analog Devices	US	8542
44.	Component ADR43I B#233 3826	Analog Devices	US	8542
45.	Component ADR01B #599 5958	Analog Devices	US	8542
46.	Component AMPO3G #1345 P44242	Analog Devices	US	8542
47.	24-bit high-precision ADC with high bandwidth AD7734 B#1347 2749122.1	Analog Devices	US	8542
48.	Component ADT 7310 TRZ	Analog Devices	US	8542

III. Circumvention of sanctions and export controls by Russia

Electronic components and materials for missile weapons, made in the countries of the sanctions coalition, reach Russia mostly **through third countries** that are not in the sanctions coalition.

In addition, in response to increased sanctions pressure and countering of sanctions circumvention schemes, **Russia is working to disguise the supplies even better:**

- **illegal networks** are used, supervised by employees of special security services;
- **customs data do not include name of the goods**, or very general description is provided, or inaccurate information is added, or the products are imported without documenting the fact of border crossing;
- **one-day shell companies**, that are massively created and changed, are used for purchases;
- the number of **intermediary companies** between manufacturer and the Russians increases and in some cases may amount to dozens.

This makes it significantly more challenging for control bodies to identify and prove the facts of shipments. Resources and time needed to prove one shipment event are disproportionate to the time and ease the shell companies are replaced with new shell companies by Russians.

The largest share of the electronic components comes from China. In addition to the classic shipments, Russia is an active client of Chinese companies, engaged in so-called «**reverse engineering**». ELINC China Co., Ltd., that manufactures electronic components **analogous** to the

ones made in the US and Japan, is one of such companies. Microchip HWD7734MAI found in the available product catalogs of ELINC China Co., Ltd. is a complete analog of AD7734 (made by Analog Devices, US company), used in 9M723 Iskander-M, 9-S-7760 Kinzhal missiles.

Given the peculiarities of Chinese diplomacy, indisputable documentary evidence of the whole supply chain is required to prove one shipment event. Chinese companies perform shipments to non-sanctioned Russian companies that purchase various, including household goods - which, in turn, makes it challenging to prove that the seller was aware of the military purpose of such shipments.

Factors, contributing to the Russia's ability to adapt to the sanctions restrictions:

- components that are sent to Russia through third countries **mostly have a civil purpose**; therefore, can be freely used (for example, in small household appliances);
- full stop of supplies by partner countries is possible only in case of full stop of exports of the specified goods to the world market, which is impossible;
- authoritative bodies / agencies of the partner countries do not have the necessary influence on consequent reselling / transfer of goods that are out of export controls and restrictions; and for positions where such restrictions are applied - in some jurisdictions, e.g. in China, check control authority of partner countries is restricted on a state level;
- sanctions infrastructure of partner countries - as well as in Ukraine - was designed before the full-scale Russia's invasion in 2022 and is not adapted to such an intensity; in result, a number of sanctions restrictions that need to be administered on an ongoing basis, has significantly increased while resources allocated for its administering remain the same;
- to completely exclude intermediary countries that contribute to high-tech component supplies to Russia, direct economic sanctions against these countries should be introduced, which may eventually lead to the sanctioning of half of the world's GDP and collapse of the sanctions system.

Payment approach for electronic components that are sent through foreign intermediary companies:

- **payment methods**: cash or non-cash (through intermediaries), netting (India, PRC and other countries in exchange to payments for oil and/or other goods sent by Russia), gold and cryptocurrency;

- in case of non-cash option, funds from accounts of Russian intermediary companies in a Russian bank (in rubles) are transferred to the accounts of foreign intermediary companies in one of the foreign state banks, which accepts rubles;

- received funds are converted into foreign currency (US dollar) by transferring them between accounts of intermediary companies in various currencies;

- funds converted into US dollars are transferred to the account of electronic components supplier.

Given all the context, it is suggested to focus on specific measures that may decrease a number of sanctions evasion facts:

- implement systematic and permanent monitoring of compliance with introduced sanctions and export restrictions;

- strengthen control on exports of certain goods (components):

- exports to be made with permission only;

- export of components to be accompanied by end-user certificate;
- obtaining other (additional) guarantees from the importer that the goods will not enter Russia.

IV. Foreign-made materials in Russian missiles

Missile weapons production include both radio and electronic components and foreign-made critical components, in particular insulating materials, polymers, glues, paints, connectors etc., supplied from **the US, China, Canada, Germany, Italy, United Kingdom, South Korea, Japan, and Taiwan**.

Imported products *(critical elements are highlighted with a color)*	**HS code**	**Manufacturer**	**Country of supplier**
Ribbon cable connectors (plugs) IDC-10MS	8544 or 8536	**AMP**	US
Self-resetting fuses MF-MSMF110-1,1A	8536	**Bourns**	
Thermally and electrically conductive adhesives Diemet DM6030Hk	3506	**Diemat, Inc.**	
Photosensitive dry film solder masks Vacrel-8130	3702	**DuPont**	
Ferrite core B65525J0000R*, R*=0,87;0,92;0,97	8503 or 7326	**Epcos AG**	Germany
Pass through connectors 40-pin PC/104 962-60206-12, 64-pin PC/104 962-60326-12	8536	**ept GmbH & Co. KG**	
Connectors FCN-365P008-AU	8536	**Fujitsu, Microelectronics America Inc.**	US
Sockets on the wire FCN-361J008-AU	8536		
Pass through connectors 40-pin PC/104 M206152005 (PC/104-40F), 64-pin PC/104 M20-6153205 (PC/104-64F)	8536	**Harwin**	United Kingdom

Multicore solder pastes SN62 WS200	3810	**Henkel electronics**	Germany
Electrically insulating foil materials for PCBs DURAVER-E-Cu QUAL/117ML	3921	**Isola Group**	US, PRC, Germany, Italy
Foil glass textolite DURAVER-E-Cu-104MLFR-4	3921		
DURAVER-E- QUAL Prepreg 1080HT01	7019		
One-part epoxy adhesives Chipbonder 3621	3506	**Loctite (Henkel brand)**	Germany
40-pin and 64-pin connectors, pass-through connectors PC/104	8536	**Microcomputer System, Tri-M Engineering, Diamond System**	US, Canada
Connectors C-Grid 10-pin 01089-4102 50-pin 01097-7506	8536	**Molex**	US
Connectors Milli-Grid 4-pin 87758-0416, 10-pin 87760-1016, 14-pin 87833-1420, 44-pin 87758-4416	8536, 8538		
Prepreg R04450F	3921	**Rogers Group**	US, PRC, Japan, South Korea, Taiwan
Foiled glass ceramics R04350B	3921		
Protective solder masks Imagecure XV 501 TSM	3810 or 3215 or 3707	**SunChamical**	US
Protective solder masks PSR-4000	3810 or 3215 or 3707		NATO member countries, Japan
Plastik varnish	3208 or 3209 or 3210		
marking paints PLM-6000	3208 or 3209		

V. Machines used in manufacturing process of Russian missiles

In missiles production, Russia uses automated robotic machines which can perform operations by programmed instructions without direct human involvement (computer numerical control machines - CNC machines). High precision, versatility and compatibility with a wide range of materials make CNC machines ideal for missile production. Long before the full-scale invasion, numerous foreign producers of CNC machines made a big number of shipments to the Russian

defense enterprises, which, in turn, contributed to rearmament of the Russian army and a full-scale aggression against Ukraine in 2022.

Now, Russia is well aware of its drastic dependence on imported CNC machines. Despite numerous measures and import substitution programs for production and maintenance of CNC machines, the share of imports of key components in Russian CNC machines still ranges from 80% to 95%. Current phase of the Russian army's rearmament creates even greater demand for these technologies.

Russia's dependence on the imports of foreign-made CNC machines is caused by the lack of own developed precise and technological machine tool industry. Russia imports both - components to machines (bearing, spindles, software, ball screw gears) and means to produce machines themselves.

Key manufacturers of CNC machines: DMG Mori (Japan and Germany); Okuma (Japan); Fair Friend Group (Taiwan); Sodick (Japan); Dr.Johannes Heidenhain GmbH (Germany); GF Machining Solutions (Germany); Hermle (Germany); Willemin-Macodel (Germany); HURCO (France); Haas (US).

Information about Russian missile weapons (its components) production using foreign-made CNC machines

No.	Manufacturer	Country of manufacture	Model	Used in missiles weapons production
1	Bochi	PRC	CK7525, Fanuc (Japan)	Kh-31, Kh-35, Kh-59M, 3M-14 Kalibr
2	Siemens	Germany	CNC Siemens Sinumerik	Kh-31, Kh-35, Kh-59M, 3M-14 Kalibr
3	Dr.Johannes Heidenhain GmbH	Germany	Heidenhain iTNC530 (module CNC)	Kh-31, Kh-35, Kh-59M, 3M-14 Kalibr
4	Siemens	Germany	Sinumerik 840D sl Sinumerik 828 (module CNC)	Kh-31, Kh-35, Kh-59M, 3M-14 Kalibr
5	Hermle	Germany	C30U (2 pieces), CNC Heidenhain (Germany)	Kh-31, Kh-35, Kh-59M, 3M-14 Kalibr
6	Siemens	Germany	CNC Siemens Sinumerik 828	Iskander-M
7	DMG Mori	Germany Japan		Kh-101
8	DMG Mori	Germany Japan		Kh-47 Kinzhal; Iskander, Iskander-M, Iskander-K, Iskander-E

No.	Manufacturer	Country of manufacture	Model	Used in missiles weapons production
9	CNC-Interservice Zlín	Czech Republic	Soustruh SPR 63, CNC Sinumerik 828 (Siemens, Germany)	Kh-31, Kh-35, Kh-59M, 3M-14 Kalibr
10	TOS Varnsdorf	Czech Republic		Iskander-M
11	GF	Switzerland	Liechti go-Mill 350	Kh-31, Kh-35, Kh-59M, 3M-14 Kalibr
12	MÄGERLE	Switzerland	MFP 50	Kh-31, Kh-35, Kh-59M, 3M-14 Kalibr
13	Fanuc	Japan	Fanuc 31i (processing)	Kh-59, Kh-32, Kh-101
14	Fanuc	Japan	Fanuc 16 (processing)	Kh-59, Kh-32, Kh-101
15	DMG Mori	Germany, Japan	DMU 125P duoBlock	Kh-31, Kh-35, Kh-59M, 3M-14 Kalibr

Withdrawal of Western companies from the Russian market of CNC machines:

- will slow down the Russian machine building industry;
- will cause massive breakdowns and failures of existing precision machines;
- will reduce or completely stop the imports (defense companies will be forced to utilize the existing equipment in a most intensive way, which, in turn, will shorten the life of the machinery);
- will force to switch to Russian and Chinese machines. Russian machine building industry is not able to fully or substantially satisfy the domestic demand, and lack of foreign-made components will lead to failing government defense contracts, which will lead to ever-increasing conflict between defense industry and the monopolists of machine-building industry. Lack of machines itself may be partially solved through machine sharing (the possibility to source machine park or service from a friendly Russian company within industrial cooperation framework), but increasing the intensity of operations will shorten the life of the machinery. Switching to Chinese machines is not a magic bullet for the Russian defense industry, since China can only provide Russia with machines of a low or medium precision. In addition, quality and efficiency of Chinese machines are lower compared to Western models;
- will lead Russia to a general technological degradation and loss of technological progress;
- will slow down the production and reduce the quality of products made by Russian defense companies.

The importance of Western CNC machines for the Russian military production is proven and, thus, is a critical direction of work for the sanctioning authorities and other agencies in order to weaken Russia and prevent the recurrence of the full-scale war. Further measures to counter the use of CNC machines in missile weapons production should focus on the most sensitive areas for Russia: software; spare tools; spare parts; lubricants, coolants and other liquids; and suppliers of these products and services.

Software for CNC machines

a. Termination of product support and maintenance in Russia by the key CNC machines manufacturers and software providers (including software updates and providing activation codes).

   Key **software providers for CNC machines**:

- ➔ Siemens (Germany);
- ➔ Fanuc (Japan);
- ➔ Mitsubishi (Japan);
- ➔ HEIDENHAIN (Germany);
- ➔ MAZAK (Japan); and
- ➔ Bosch Rexroth (Germany).

   AutoCAD, Esprit and Solidworks are among the most used programs for CNC machines.

b. Contract terminations by CNC machines manufacturers with their authorized agents, which provide technical support to the local (Russian) clients. In particular, termination of cooperation agreements, spare parts supplies, personnel training and certification.
c. Implementing the function of remote switch off via installed GPS trackers, which is to be used in Russia by machines manufacturers. It can be done if each new machine is equipped with so-called "kill-switch" (emergency button): if the user does not enter the activation code within a defined period of time, the machine is automatically switched off forever.
d. Ensuring thorough due diligence of end clients by software providers and CNC machines manufacturers to prevent product supplies to Russia or countries which assist Russia in sanctions circumvention.These requirements may become a part of existing compliance practice and be implemented as a part of due diligence and know-your-customer (KYC) policies. Standards for these procedures may be developed and implemented at international and national levels and adopted by international and national authorities. Responsibility of companies for standards violation and for the fact that goods enter Russia may be established at the legislative level in the countries of registration of manufacturers.

Spare parts and tools, lubricants, coolants and other liquids for CNC machines:

a) Supplies of spare parts, lubricants, coolants and other liquids for CNC machines to Russia and countries that assist with sanctions circumvention may be stopped by compiling an accurate and comprehensive list of prohibited goods.

   In particular, spare parts and tools include: tool holders; carbide cutting plates with carbide tips; simple punching machines; retractable gears; cutters; board cutters; drills; fullers; slits; spindles; spindle motors; servomotors; servo converters; servo amplifiers; linear roller guides; ball screws, belt drives, gear drives; linear ball bearings; stepper motors and their drivers; feedback transmitters; angular and linear position sensors; high-torque linear motors; switch and opto isolator PCBs; measuring probes; laser generators; CPUs; optical scales; magnetic codes; micrometers.

   Key spare tools manufacturers: TaeguTec (South Korea); Tungaloy (Japan); Mitsubishi (Japan); Korloy (South Korea); Kennametal (US); Sandvik (Sweden); Kemmler (Germany); Schunk (Germany); Zoller (Germany).

b) All brokers, importers, distributors and shell companies involved in supply of spare parts, components, lubricants, coolants and other liquids for CNC machines, as well as those who provide maintenance and software upgrades for CNC machines in Russia and countries that assist Russia in sanctions circumvention may be subject to sanctions introduction.

Those measures will limit Russian military industry, which, in turn, may result in curtailment of military operations.

VI. Suggestions of response actions

To stop missile terror, we demand immediate steps:

1. Impose sanctions on the key Russian manufacturers of missiles and their components in all jurisdictions of the sanctions coalition countries.
2. Completely stop supplies of identified components to Russia and all risky jurisdictions, as well as materials and machines (including halt production of GLONASS enabled chips and restrict GPS usage for Russian military in the border regions of Belarus, Russia and occupied territories of Ukraine).
3. Hold all manufacturers of such components accountable in case their products continue to be supplied to the Russian missile manufacturers.
4. Impose sanctions on all identified companies that assist Russia in sanctions circumvention.
5. Ensure constant monitoring of compliance with imposed sanctions and export restrictions.
6. Impose or strengthen export control measures for defined goods (components):
    - exports to be made with permissions only;
    - export of components to be accompanied by end-user certificate;
    - obtaining other guarantees that the goods, machines and materials will not enter Russia.
7. Create a single database of components used in Russian missile weapons; and regularly publish data about subjects/countries that make direct shipments, including logistics companies and financial institutions.

Russia's circumvention of international sanctions

Faced with international economic isolation and in order to the kremlin has been taking a number of actions to circumvent existing economic sanctions and negate their detrimental impact. These actions are:

moscow has been creating new schemes how to source sanctioned goods to the russian market as the supply of certain Western products and technologies has been banned. This is also done to ensure the stable functioning of russian defense industrial complex. Numerous cases have been reported when russia received sanctioned goods of foreign production for the production of weapons and military hardware through China, the United Arab Emirates, Turkey, the Eurasian Economic Union and Central Asia countries;

ensuring supplies of defense-related products, certain examples of armament and military hardware from countries that have not imposed sanctions on russia, primarily from Iran, DPRK, China, Turkey, Serbia, Armenia and Belarus;

increasing cooperation with private, non-commercial companies and shell companies to run illegal supply chains of western-made high-tech products. This allows russia to cover deficit of these products on russian market at least partially. Engagement of companies of russia's small and medium-size business makes it difficult to track and block illegal supply schemes of sanctioned goods;

russia has been using other countries to transport sanctioned goods form EU to russia. In particular, after russian companies were banned from carrying out transportation of cargoes from/ to the EU countries, russian logistic companies moved their businesses to Central Asia countries. On top of that russian has stepped up its electronic marketplace activities. russian logistic companies once they receive the formal status of "joint ventures with local companies" are allowed to transport sanctioned goods from the EU to the russian federation and also transport russian products to Central Asia countries.

russia has been engaging leading companies of belarusian defense industry to produce military hardware and repair armament and equipment for russian armed forces and security agencies. In particular, russia has reached an agreement with belarus that it will produce 122-mm and 152-mm shell cases and also ensure their assembly with warheads. Apart from that, since russia has had limited access to procurement of high-tech production machineries, russian defense companies have switched to belarusian-made digitally-programmed metal working machineries;

russia has been creating a number of special organizational structures in the countries of Eurasian Economic Union that coordinate supply of deficit (sanctioned) goods to russia. On top of that, russia has been creating companies in the Eurasian Economic Union countries that produce equipment and components russian industry critically needs, including its defense industry;

russia has been ramping up procurement of rare-earth minerals used in the production of armament and military hardware through the countries that have not imposed sanctioned on the russian federation, primarily Kazakhstan, Vietnam, Mozambique, Bolivia, China, Brazil, Armenia, the Democratic Republic of Congo, Republic of Congo, Indonesia, Mexico, Mongolia, South African Republic, Turkey and Chile;

russia has been using "parallel import" schemes to obtain high-tech electronic products. This allows russia to at least partially compensate deficit in microelectronics, household appliances and their component on russian domestic market. Significant part of these products is used by russian defense industrial complex to produce armament and military hardware.

> *"Parallel import" – import of original goods without the consent of their manufacturer. Sanctions that were imposed on russia and withdrawal of foreign companies resulted in a sharp decline in the import of certain goods to russia. In response to this, russia has made "parallel import" of 50 groups of goods legal. These goods include: general use items, equipment and electronic devices. "Parallel import" has been operational since 6 May 2022 in response to the decree of the russian government;*

Among the products supplied through "parallel import" scheme are the following ones: electronic components made by the U.S., German, Dutch, Taiwanese and Japanese companies. Their delivery to russia is ensured through the russian-friendly countries such as Kazakhstan, Armenia, Belarus, Iran, Vietnam etc.

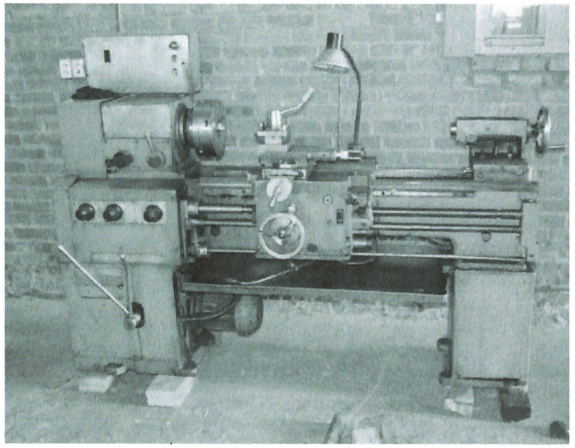
Electronic components produced by companies from the U.S., Germany, the Netherlands, Taiwan, Japan, etc. are among products that are supplied via "parallel import". The supplies are carried out through russia-friendly countries, in particular Kazakhstan, Armenia, belarus, Iran, Vietnam, etc.

acceleration of the process of switching foreign trade operations with the Eurasian Economic Union member-states into payments in national currencies and expansion of cooperation with "friendly" countries in financial, bank and taxation spheres;

**non-disclosure of russia`s oil transportation into external markets** through concealing end destinations of cargos (via turning off on-board AIS satellite tracking system), mixing russia`s raw materials with other brands` oil (similar practice was followed by Iran and Venezuela), as well as off shore transshipment of oil from one tanker to another. Herewith, russia is seeking for intermediary companies in friendly countries to establish "grey" schemes for exporting russian hydrocarbons into external markets.

It should be mentioned that in order to bypass sanctions russia has been actively involving countries it has had close ties within the framework of the Eurasian Economic Union and CSTO. The main lines of efforts of russia in this regard are, as follows: (1) re-export of key technologies/components, produced by the Western countries, etc., from third countries to russia; (2) export of russia`s goods subject to sanctions; (3) establishment of an alternative to SWIFT international payment system and switching to the use of national currencies for bilateral trade operations.

DEPENDENCE ON IMPORTED SPARE PARTS TO KEEP THE INDUSTRI BASE IN WORKING CONDITION



Up to **85%** of high-precision machines with numerical control which are used by russian defense industry are foreign-made.
Japan ("DMG Mori", "Okuma", "Sodick"), **Germany** ("Dr.Johannes Heidenhain GmbH", "GF Machining Solutions", "Hermle", "Willemin-Macodel"), **France** ("HURCO"), **Taiwan** ("Fair Friend Group") and **USA** ("Haas").

Software for CNC machines is mainly developed by **German** ("Siemens", "HEIDENHAIN" i "Bosch Rexroth") and **Japanese** ("Fanuc", "Mitsubishi" i "MAZAK") companies.

In high-precision machines of russian production up to **80%** of imported components are used.

Restoration of production facilities in 2023
JSC "Svetlana-Rost" – state funding of **1 billion RUB** to procure 15 pieces of foreign equipment
JSC "Ural design-construction bureau "Detal" – 900 million RUB/355 pieces of equipment
JSC "Perm plant "Mashinostroitel" – 780 million RUB/30 pieces of equipment
JSC "State machine-building construction bureau "Vympel" – 176 million RUB/11 pieces of equipment

Supply of armaments and materiel by third countries to RF

IRAN. Supply of armaments and ammunitions from Iran to RF is carried out by sea and air ways.

Cargo shipments are conducted by aircraft of transport aviation of Aerospace Forces of RF AF and transport aircraft of different Iranian airlines.

At least 15 ships are used to ship military-use cargos and other cargos from Iran to RF (11 – russian, 4 – Iranian). Shipments are carried out via the Caspian Sea from Iranian seaports Amirabad, Nowshahr, Anzali, Caspian to russian seaports Olya, Astrakhan and Makhachkala. The most common routes of transportation by air: Teheran-Mozdok and Teheran-moscow (Vnukovo airport).

Iran supplied to RF about 2400 UAVs ("kamikaze" type UAVs: "Shahed-136" – 1700 pieces, "Shahed-131" – 700 pieces; multipurpose UAVs: "Mohajer-6").

In the end of 2022 the sides considered possibility to conclude a contract on supply of artillery ammunitions for a total amount of more than 87 million USD (70 thousand 122/125/152-mm ammunitions of different type, artillery/tank barrels). Additionally, russian planned to obtain 130 thousand 122-mm ammunitions for "Gvozdika" self-propelled artillery systems and 50 thousand 152-mm ammunitions for "Akatsia" and "Msta" self-propelled artillery systems).

Construction of plant on production of "kamikaze" type UAVs "Shahed-136" in RF on the territory of the Republic of Tatarstan (exclusive economic zone "Alabuga") has been completed. Iran continues to supply RF with components to produce the mentioned UAVs, in particular 1000 pieces of engines were delivered to RF in September 2023.

DEMOCRATIC PEOPLE'S REPUBLIC OF KOREA. Supply of ammunitions from the DPRK to RF is carried out by sea.

During **June-October 2023** the North Korea supplied to RF about **950 thousand** of 122-mm and 152-mm ammunitions for rocket and barrel artillery.

During this period sea vessels **"Angara"** (IMO: 9179842), **"Lady R"** (IMO: 9161003), **"Maria"** (IMO: 8517839) and **"Maia-1"** (IMO: 9358010) shipped from seaport **Rajin** (DPRK) to seaport **Danube** (Primorskiy Krai, RF) at least **38,2 thousand tons of cargo** (3,9 thousand twenty-foot containers).

Then, North Korean ammunitions are delivered by railways from the Primorskiy Krai, RF (from railway station Danube to Nakhodka-Vostochnaya) to arsenals of **1061st** material-technical support centre of the Southern MD and **1060th** material-technical support centre of the Western MD of RF.

PRC. According to available information, in the end of February 2023, Panama company **ALTIMEX** (under control of OJSC ROSAT[1]) concluded contracts with Chinese company "North Industries Corporation" (NORINCO) on production and supply of ammunitions for rocket and barrel artillery ammunitions to RF.

Initially, RF ordered in the PRC more than **750 thousand 122-mm/220-mm projectiles for MLRSs "Grad"/ "Uragan", 1,5 million 152-mm/122-mm artillery shells, 1,5 million 120-mm mortar mines** for a total amount of more than 8 billion USD. Supply of the abovementioned goods, almost certainly, is carried out via Iran. Currently, there is

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[1] OJSC "Repair, maintenance, support of aviation equipment (rus: "Ремонт, обслуживание, сопровождение авиационной техники"; (ROSAT, moscow) is authorized company by RF MoD on organization of import of artillery ammunitions from the PRC to RF .

no information on the beginning of supply of artillery ammunitions by Beijing to moscow.

Besides, **Chinese company "Xi'an Bingguo Innovation Aviation Technology Co. Ltd"** (it specializes on the production of long-range UAVs, Xi'an) **participates in creation and testing of "Garpiya" "kamikaze" type UAVs on the territory of RF.**

According to available data, RF ordered in Chinese company **"Yakeda"** (April 2023) 200 pieces of **"Mugin-5 Pro"** aircraft type UAVs. Most likely, the mentioned UAVs will be equipped with devices for ammunitions dropping.

SERBIA. In the beginning of February 2023, JSC "Rosoboronexport" achieved agreement with **Serbian company "Krupnik d.o.o. Beograd"** (Belgrade) on supply of 130 thousand 60 mm, 81 mm, 82 mm and 120 mm mortar mines, as well as 9500 projectiles for "Grad" MLRSs for a total amount of more than 80 million USD. An issue of obtaining consent of the Serbian leadership to export ammunitions to RF is worked out.

In order to hide the facts of the supply of military products to RF, management of Serbian companies insisted on the provision by moscow of end-user certificates of third country. Also, russian side had to ensure covert transportation to RF.

BELARUS.

Project **"Development and production of artillery ammunitions and projectiles"** anticipates creation in Belarus of industrial facilities with closed cycle of manufacturing of 152-mm artillery rounds and 122-mm projectiles, first of all in the interests of RF AF. Main executor – OJSC "VOLATAVTO".

RF involves Belarus into production of optical devices, which are critically important to equip new/modernised tanks and combat armoured vehicles. First of all, it is related to "Sosna-U" multichannel thermal sights[2] (for T-90M, T-80BVM, T-72B3 tanks), combined gunner sights (for BTR-82A), commander panoramic sights (armoured materiel) and optical-electronic weapons aiming systems (combat vehicles of 2S38 anti-aircraft artillery systems).

Attention should be paid to the fact that OJSC "Peleng" and holding "BelOMO" also involve **Chinese companies** into production of components of optical devices for russian materiel. Order in the PRC for the production of components is carried out via Chinese intermediary-company **"Shenzhen 5G Hi-Tech Innovation Co., Ltd."**.

[2] In 2023 it is foreseen a supply of 600 pieces of "Sosna-U" devices to RF (in 2022 192 pieces were supplied).