

Russian nuclear weapons capability

【Overview】

Compared with the U.S. French, and UK nuclear capabilities, Russian capabilities are quite vague. As for the data pertaining to the U.S.-Russia New START Treaty, Russia, unlike the U.S., has not disclosed any breakdown of the number of (deployed/non-deployed) launchers. On March 1, 2021, Russia announced that it possessed a total 517 strategic delivery vehicles and 1,456 deployed strategic nuclear warheads (**U.S. Department of State 2021**). This chart and the New START Treaty data can be reconciled by replacing the 180 warheads counted under “Strategic bomber payloads” with the estimated number of operational strategic bombers (50) to reduce the number of strategic delivery vehicles and deployed warheads to 512 and 1,470, respectively. Given the general lack of transparency in Russia plus day-to-day changes in deployments, this is thought to be an appropriate estimate.

Also, Russia has approximately 160 ballistic missiles on high alert (capable of launch in 15 minutes), and most of them are estimated to be ICBMs (**Kristensen, Hans M. 2017**). After 2008, 96% of deployed ICBMs are said to be on high alert (**Podvig, Pavel 2014**).

Russia is attempting to renovate its aging nuclear weapons system, which dates back to the days of the former Soviet Union, and is currently in the mid-term stage of this overall effort. With regard to ICBMs, submarine-launched ballistic missiles (SLBMs) and strategic bombers, the Russian government has stated that the rate of modernization was 86% as of the end of 2020 (**Russian Federation 2020-2**), and will be over 88% by the end of 2021 (**TASS 2021**). Russia is in the process of systematically replacing Soviet-era SS-18,-19, and-25 systems with the latest SS-27M2 systems with complete replacement by 2024 (**TASS 2020-1**). SS-18s are likewise being replaced by the SS-X-29 Sarmats under development. Strategic nuclear submarines and SLBMs will also be replaced by the latest Borei-class submarines and new SLBM Bulava. Elsewhere, Russia’s bombers, cruise missiles and non-strategic nuclear weapons and their launchers are all being modernized.

As a matter of fact, maritime patrols by Russia’s nuclear submarines have gained in frequency in the recent years. However, this Russian fleet comprises about a total 20 submarines per year. Given constraints on submarine patrols, they are believed to be attack nuclear submarines (**Kristensen, Hans M. & Norris, Robert S. 2017**). Last year Russia conducted the following ballistic tests: one ICBMs and five SLBMs (**Space Launch Report 2020**). Russia has conducted large-scale military maneuvers involving one ICBM and one SLBM launches. These exercises involve strategic bombers launching long-range cruise missiles (**Podvig, Pavel 2020**).

In March 2018, President Putin, in a State of Federation address, disclosed the development of a series of new nuclear weapons (**Kremlin 2018**). Of these, two units with the hypersonic glide vehicle Avangard, delivered on an ICBM and able to penetrate missile defense, were deployed in late 2019 (**TASS 2019-3**). In addition, the Kinzhal, a hypersonic aeroballistic missile for the Mikoyan MiG-31 interceptor, is believed to be in deployment (**TASS 2018-2**). The Zircon (also spelt “Tsirkon”) hypersonic cruise missiles launchable from vertical launchers on missile cruisers currently carry conventional warheads, but it is surmised that they could be used to carry nuclear warheads in the future. In addition, Russia is conducting the development of the Poseidon, a large-scale nuclear-armed underwater vehicle with nuclear propulsion, and the Burevestnik, a subsonic nuclear-powered cruise missile capable of carrying one or several nuclear warheads (**Hruby, Jill 2019**). All this escalation is enough to raise concerns reminiscent of the Cold War nuclear buildup.

Furthermore, in June 2020, Russia announced a document entitled “Basic Principles of State Policy of the Russian Federation on Nuclear Deterrence,” in which it set out its fundamental policy on the use of nuclear weapons (**Russian Federation 2020-1**). Russia had previously adopted a stance of using nuclear weapons only in the events that it were attacked by nuclear or other weapons of mass destruction, or its existence as a nation was threatened by conventional

weapon attacks. The new policy also cites first of all the case of it obtaining “reliable data on a launch of ballistic missiles attacking the territory of the Russian Federation and/or its allies.” This makes no differentiation about whether such attacks involve nuclear warheads or not, and is a clear lowering of the threshold for the use of nuclear weapons on Russia’s part.

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The numbers that have changed since last year are highlighted in red

Updated: June 1, 2021

NATO designation	Missile/ bomb	No. of warheads per weapon	No. of warheads	Yield (kt)	Year first deployed	Remarks
Deployed		642	1,600			
Intercontinental ballistic missile (ICBM)		302	796			1)
SS-18 M6 Satan a)	46	6	276	500 or 800	1988	
SS-19 M4 b)	4	1	2	150?	2019	Avangard
SS-25 Sickle c)	19	1	19	800	1988	
SS-27 M1 (silos) d)	60	1	60	800	1997	
SS-27 M1 (mobile) e)	18	1	18	800?	2006	
SS-27 M2 (mobile) f)	135	3	405	100?	2010	
SS-27 M2 (silos) g)	20	3	60	100?	2014	
SS-X-29 (silos) h)	-	10	-	500?	(2022)	
Submarine-launched ballistic missile (SLBM)		160	624			2)
SS-N-18 Stingray i)	16	3	48	50	1978	Carried by the Delta III-class nuclear submarine l)
SS-N-23 Sineva j)	80	4	320	100	2007	Carried by the Delta IV-class nuclear submarine m)
SS-N-32 Bulava k)	64	4	256	100	2014	Carried by the Borey-class nuclear submarine n)
Strategic bomber payloads		180	180			3)
AS-15A Kent A o)		1		200	1984	Carried by the Bear H r)
AS-15B Kent B p)	180	1	180	200	1987	Carried by the Blackjack s)
AS-23B q)		1		?	2019?	Carried by the Blackjack
Nuclear bomb		1				
Reserve / Nondeployed			2,895			4)
Ground-based (ICBM, etc.)			868			
ICBM			393			1)
Ground-based non-strategic nuclear weapons t)			475			5)
Sea-based (SLBM, etc.)			1,127			
SS-N-23			64	100		2)
SS-N-32			128	100		2)
Sea-based non-strategic nuclear weapons u)			935			6)
Air-launched systems (Bombers, etc.)			900			
Missile, nuclear bomb			400			3)
Non-strategic air-launched nuclear weapons v)			500			7)
Retired warheads awaiting dismantlement, etc.			1,760			8)
Total inventory			6,260			

a)

Intercontinental ballistic missile (ICBM) SS-18 M6 Satan	
Russian designation	: P-36 M2 "Воевода" (R-36M2 Voevoda)
Alternate name	RS-20V
NATO designation	: SS-18 Mod.6 Satan
Propulsion	: Two-stage liquid propellant
Launch platform	: Silo
No. of warheads	: Maximum 10 warheads
Yield	: 500kt/800kt per 1 warhead
Specifications	: Length 34.3m, Diameter 3.0m, Weight 211tons
Range	: 11,000km
Circular error probability	: 220m
Where deployed :	: Dombarovsky Air Base : 18 missiles Uzhur Air Base : 28 missiles
Remarks	Voevoda means commander. It appears that Russia has reduced the payload of warheads on this missile to five in order to fulfill the New START Treaty. It is thought that the last test took place on October 30, 2013 during a major exercise of the Russian Strategic Missile Forces, when a missile was launched from the Dombarovsky Air Base and impacted on the Kura Test Range on the Kamchatka Peninsula. They are expected to be retired by 2027. The development plans for the liquid propellant Sarmat missiles that will replace them are behind schedule, and they are planned to be deployed in 2022.

【Source】

Bukharin, Oleg et al. 2004: "Russian strategic nuclear forces" edited by Pavel Podvig, 2004, MIT Press. p.218

IHS Jane's 2020: "RS-20/R-36M/15A14/15A18", IHS Jane's Weapons: Strategic 2020–2021, pp.107–111.

Kristensen, Hans M. & Korda, Matt 2021: "Russian nuclear forces, 2021," Bulletin of the Atomic Scientists, 77:2, 90-108, DOI: 10.1080/00963402.2021.1885869 (accessed May 1, 2021)

Norris, Robert S. & Kristensen, Hans M. 2009: "U.S. and Soviet/Russian intercontinental ballistic missiles, 1959–2008," Bulletin of the Atomic Scientists, VOL. 65, NO. 1, pp.62–69, <https://doi.org/10.2968/065001008> (accessed May 27, 2019)

Podvig, Pavel 2013: "Russia conducts large-scale exercise of its strategic forces," October 30, 2013.

http://russianforces.org/blog/2013/10/russia_conducts_large-scale_ex.shtml (accessed May 27, 2019)

Podvig, Pavel 2020: "Strategic Rocket Forces," January 4, 2020. <http://russianforces.org/missiles/> (accessed January 24, 2020)

b)

Intercontinental ballistic missile (ICBM) SS-19 M4	
Russian designation	: Y P-100H YTTX (UR-100NUTTH)
Alternate name	RS-18
NATO designation	: SS-19 Mod.4
Propulsion	: Two-stage liquid propellant
Launch platform	: Silo
No. of warheads	: 1 warhead
Yield	: ?
Specifications	: Length 24.3m, Diameter 2.5m, Weight 106tons
Range	: 10,000km
Circular error probability	: 350-430m
Where deployed	: Dombarovsky Air Base: 4 missiles

Remarks	<p>The missile is a version of the retired SS-19 Mod.3 Stiletto modified to launch the hypersonic glide vehicle Avangard (Авангард). They are deployed in SS18 silos at the Dombarovsky Air Base. Deployment started on December 27, 2019 and as of the end of 2021 there were six, with plans for a total of 12 by the end of 2027.</p> <p>The most recent flight test was conducted on December 26, 2018, successfully hitting a target at the Kura Test Range.</p> <p>: After reaching a sufficient altitude the Avangard reenters the atmosphere and uses aerodynamic force to glide. It completely evades missile defense systems using satellites and sequential data links and communications, and can destroy strategically important facilities. It appears that composite materials able to withstand the high temperatures of hypersonic flight have been developed, but the communications system and precision of the Avangard remain unclear. It can carry a payload of over 150 kilotons of conventional and nuclear warheads, and fly at speeds of up to Mach 20.</p>
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【Source】

Bukharin, Oleg et al. 2004: "Russian strategic nuclear forces" edited by Pavel Podvig, 2004, MIT Press. p.222.

Hruby, Jill 2019: "RUSSIA'S NEW NUCLEAR WEAPON DELIVERY SYSTEMS," November 2019. https://media.nti.org/documents/NTI-Hruby_FINAL.PDF (accessed November 18, 2019)

IHS Jane's 2020: "RS-18A/B/UR-100N/15A30/15A35", IHS Jane's Weapons: Strategic 2020–2021, pp.107–108.

Kristensen, Hans M. & Korda, Matt 2021: "Russian nuclear forces, 2021," Bulletin of the Atomic Scientists, 77:2, 90-108, DOI: 10.1080/00963402.2021.1885869

Maxim Starchak 2009: 'Complexities and Challenges of Russia's Avangard Hypersonic Glide Reentry Vehicle,' Eurasia Daily Monitor, March 5, 2019. <https://jamestown.org/program/complexities-and-challenges-of-russias-avangard-hypersonic-glide-reentry-vehicle/> (accessed May 27, 2019)

Podvig, Pavel 2016: "UR-100NUTTH launch from Dombarovskiy, most likely with Project 4202 payload," October 25, 2016. http://russianforces.org/blog/2016/10/ur-100nutth_launch_from_dombar.shtml (accessed May 27, 2019)

Podvig, Pavel 2018-1: "Avangard hypersonic boost-glide system deployment plans," October 29, 2018. http://russianforces.org/blog/2018/10/avangard_hypersonic_boost-glid.shtml (accessed May 27, 2019)

Podvig, Pavel 2018-2: "Avangard system is tested, said to be fully ready for deployment," December 26, 2018. http://russianforces.org/blog/2018/12/avangard_system_is_tested_said.shtml (accessed May 27, 2019)

Podvig, Pavel 2020: "Life extension for UR-100NUTTH," January 31, 2020. http://russianforces.org/blog/2020/01/life_extension_for_ur-100nutth.shtml (accessed March 17, 2020)

Tass 2018: "Russia to use SS-19 ICBMs as carriers for Avangard hypersonic glide vehicles — source," March 30, 2018. <http://tass.com/defense/995167> (accessed May 27, 2019)

Tass 2019: "First regiment of Avangard hypersonic missile systems goes on combat duty in Russia," December 27, 2019, <https://tass.com/defense/1104297> (accessed May 1, 2021)

Tass 2020: "Russia's 1st Regiment of Avangard Hypersonic Missiles to Assume Full Strength in 2021." December 23, 2020. <https://tass.com/defense/1238801> (accessed May 1, 2021)

c)

Intercontinental ballistic missile (ICBM) SS-25 Sickle	
Russian designation	: P Т -2ПМ "Тополь" (RT-2PM Topol)
Alternate name	: RS-12M
NATO designation	: SS-25 Sickle
Propulsion	: Three-stage solid-propellant
Launch platform	: Transporter erector launcher
No. of warheads	: 1 warhead
Yield	: 800 kt
Specifications	: Length 21.5m, Diameter 1.8m, Weight 45.1tons
Range	: 10,500km
Circular error probability	: 350-430m
Where deployed	: Barnaul Air base: 18 missiles : Vypolzovo Air base: 9 missiles

Remarks	<p>Topol means “poplar”. On October 26, 2017, Russian Strategic Missile Troops carried out a major exercise in which a missile was launched from the northwestern Plesetsk test range, which landed in the Kura test range on Kamchatka. This was thought to be for obtaining data for extending the service life of the missiles. Previously, the test was conducted on October 2, 2016. Currently, replacement by the mobile-launched Yars(SS-27 Mod2) is underway, and the Topol is expected to be retired by 2021.</p> <p>Using RT-2PM Topol, Russia is believed to be developing payload for the 4K51 Rubezh ICBM system. The latest test launch was conducted on December 26, 2017, with a missile launched from Kapustin Yar in southern Russia landing in Sary-Shagan in Kazakhstan. The most recent test was on December 10, 2018, but it ended in failure. The previous test to that on December 26, 2017 was successful.</p>
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【Source】

Bukharin, Oleg et al. 2004: "Russian strategic nuclear forces" edited by Pavel Podvig, 2004, MIT Press. p.232.

IHS Jane's 2020: "RS-12M Topol", IHS Jane's Weapons: Strategic 2020–2021, pp.103–105.

Kristensen, Hans M. & Korda, Matt 2021: "Russian nuclear forces, 2021," Bulletin of the Atomic Scientists, 77:2, 90-108, DOI: 10.1080/00963402.2021.1885869 (accessed May 1, 2021)

Norris, Robert S. & Kristensen, Hans M. 2009: "U.S. and Soviet/Russian intercontinental ballistic missiles, 1959–2008," Bulletin of the Atomic Scientists, 65:1, 62–69, <https://doi.org/10.2968/065001008>. (accessed May 29, 2019)

Podvig, Pavel 2013: "Topol launch from Kapustin Yar tests new combat payload," October 10, 2013. http://russianforces.org/blog/2013/10/topol_launch_from_kapustin_yar_1.shtml (accessed May 29, 2019)

Podvig, Pavel 2014: "Topol-E launched from Kapustin Yar," May 20, 2014. http://russianforces.org/blog/2014/05/topol-e_launched_from_kapustin.shtml (accessed May 29, 2019)

Podvig, Pavel 2016: "Launch of Topol from Plesetsk," September 9, 2016. http://russianforces.org/blog/2016/09/launch_of_topol_from_plesetsk.shtml (accessed May 29, 2019)

Podvig, Pavel 2017-1: "Strategic Rocket Forces," June 20, 2017. <http://russianforces.org/missiles/> (accessed May 27, 2019)

Podvig, Pavel 2017-2: "Annual exercise of strategic forces," October 26, 2017. http://russianforces.org/blog/2017/10/annual_exercise_of_strategic_f.shtml (accessed May 28, 2019)

Podvig, Pavel 2017-3: "Launch of Topol from Kapustin Yar," December 26, 2017. http://russianforces.org/blog/2017/12/launch_of_topol_from_kapustin_1.shtml (accessed May 29, 2019)

Podvig, Pavel 2018-1: "Yars missiles continue to replace Topol," March 29, 2018. http://russianforces.org/blog/2018/03/yars_missiles_continue_to_repl.shtml (accessed May 28, 2019)

Podvig, Pavel 2018-2: "By cancelling RS-26 Russia keeps its options open," April 2, 2018. http://russianforces.org/blog/2018/04/by_cancelling_rs-26_russia_kee.shtml (accessed May 28, 2019)

Podvig, Pavel 2018-3: "Looks like a Topol-E failure in a launch from Kapustin Yar," December 12, 2018. http://russianforces.org/blog/2018/12/looks_like_a_topol-e_failure_i.shtml (accessed May 28, 2019)

Podvig, Pavel 2020: "Strategic Rocket Forces," January 4, 2020. <http://russianforces.org/missiles/> (accessed January 24, 2021)

d)

Intercontinental ballistic missile (ICBM) SS-27 M1 (silo)	
Russian designation	: P T -2PM2 “Тополь-М” (RT-2PM2 Topol M)
Alternate name	: RS-12M1
NATO designation	: SS-27 Mod.1 (Silo)
Propulsion	: Three-stage solid-propellant
Launch platform	: Silo
No. of warheads	: 1 warhead
Yield	: 800 kt
Specifications	: Length 21.5m, Diameter 1.8m, Weight 45.1tons
Range	: 10,500km
Circular error probability	: 350-430m
Where deployed	: Tatishchevo Air Base : 60 missiles
Remarks	<p>Deployment of 60 silo-based Topol M missiles seemed to be completed at Tatishchevo Air Base.</p> <p>The latest test launch was conducted on January 16, 2017. A missile launched from the Plesetsk test range landed at the Kura test range on Kamchatka. It is assumed the objective was to validate ballistic stability and other technical characteristics.</p>

【Source】

Bukharin, Oleg et al. 2004: "Russian strategic nuclear forces" edited by Pavel Podvig, 2004, MIT Press. p.233.

IHS Jane's 2020: "RS-12M1/2 Topol-M (RT-2PM2)", IHS Jane's Weapons: Strategic 2020–2021, pp.105–107.

Kristensen, Hans M. & Korda, Matt 2021: "Russian nuclear forces, 2021," Bulletin of the Atomic Scientists, 77:2, 90-108, DOI: 10.1080/00963402.2021.1885869 (accessed May 1, 2021)

Norris, Robert S. & Kristensen, Hans M. 2009: "U.S. and Soviet/Russian intercontinental ballistic missiles, 1959–2008," Bulletin of the Atomic Scientists, 65:1, 62–69, <https://doi.org/10.2968/065001008>. (accessed May 29, 2019)

Podvig, Pavel 2015: "Topol-M deployment in Tatishchevo continues," February 13, 2015. http://russianforces.org/blog/2015/02/topol-m_deployment_in_tatishch.shtml (accessed May 29, 2019)

Podvig, Pavel 2017: "Test launch of silo-based Topol-M from Plesetsk," January 16, 2017. http://russianforces.org/blog/2017/01/test_launch_of_silo-based_topo_1.shtml (accessed May 29, 2019)

Podvig, Pavel 2020: "Strategic Rocket Forces," January 4, 2020. <http://russianforces.org/missiles/> (accessed January 24, 2020)

e)

Intercontinental ballistic missile (ICBM) SS-27 M1 (mobile)	
Russian designation	: Р Т -2ПМ2 “Тополь-М” (RT-2PM2 Topol M)
Alternate name	: RS-12M2
NATO designation	: SS-27 Mod.1 (mobile)
Propulsion	: Three-stage solid-propellant
Launch platform	: Transporter erector launcher
No. of warheads	: 1 warhead
Yield	: 800 kt
Specifications	: Length 21.5m, Diameter 1.8m, Weight 45.1tons
Range	: 10,500km
Circular error probability	: 350-430m
Where deployed	: Teykovo Air base: 18 missiles
Remarks	: Deployment of 18 mobile-launched Topol M missiles has been completed at Teykovo Air Base. The latest test launch was conducted on November 1, 2014. A missile launched from the Plesetsk test range landed at the Kura test range on Kamchatka. It is assumed the objective was to gather relevant data for potential lifetime extensions.

【Source】

Bukharin, Oleg et al. 2004: "Russian strategic nuclear forces" edited by Pavel Podvig, 2004, MIT Press. p.233.

IHS Jane's 2020: "RS-12M1/2 Topol-M (RT-2PM2)", IHS Jane's Weapons: Strategic 2020–2021, pp.105–107.

Kristensen, Hans M. & Korda, Matt 2021: "Russian nuclear forces, 2021," Bulletin of the Atomic Scientists, 77:2, 90-108, DOI: 10.1080/00963402.2021.1885869 (accessed May 1, 2021)

Norris, Robert S. & Kristensen, Hans M. 2009: "U.S. and Soviet/Russian intercontinental ballistic missiles, 1959–2008," Bulletin of the Atomic Scientists, 65:1, 62–69, <https://doi.org/10.2968/065001008>. (accessed May 29, 2019)

Podvig, Pavel 2012: "Topol-M and RS-24 Yars deployment plans," December 14, 2012. http://russianforces.org/blog/2012/12/topol-m_and_rs-24_yars_deploym.shtml (accessed May 29, 2019)

Podvig, Pavel 2020: "Strategic Rocket Forces," January 4, 2020. <http://russianforces.org/missiles/> (accessed January 24, 2020)

f)

Intercontinental ballistic missile (ICBM) SS-27 M2 (mobile)	
Russian designation	: Я р с (Yars)
Alternate name	: RS-24
NATO designation	: SS-27 Mod.2 (mobile)
Propulsion	: Three-stage solid-propellant
Launch platform	: Transporter erector launcher
No. of warheads	: Maximum 4 warheads
Yield	: 100 kt per 1 warhead?
Specifications	: Length 20.9m, Diameter 2.0m, Weight 49.0tons
Range	: 10,500km
Circular error probability	: 250m
Where deployed	: Barnaul Air base: 9 missiles Irkutsk Air base: 27 missiles Nizhniy Tagil Air base ; 27 missiles Novosibirsk Air base ; 27 missiles Teykovo Air base ; 18 missiles Yoshkar-Ola Air base ; 27 missiles

Remarks	<p>The mobile-launched Yars is consecutively replacing the SS-25.</p> <p>The latest launch test took place on December 9, 2020. The missile was launched from the Plesetsk Test Range during annual exercises and impacted on the Kura Test Range. The test before was conducted in June 2018.</p> <p>Elsewhere the rail-mobile Yars (Barguzin) ICBM system that had been under development appears to have been either cancelled or suspended.</p>
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【Source】

IHS Jane's 2020: "RS-24 Yars", IHS Jane's Weapons: Strategic 2020–2021, pp.111–112.

Kristensen, Hans M. 2012: "Trimming Nuclear Excess–Options for Further Reductions of U.S. and Russian Nuclear Forces," Federation of American Scientists, Special Report No. 5, December, 2012. <https://fas.org/programs/ssp/nukes/publications1/TrimmingNuclearExcess.pdf> (accessed May 29, 2019)

Kristensen, Hans M. & Korda, Matt 2021: "Russian nuclear forces, 2021," Bulletin of the Atomic Scientists, 77:2, 90-108, DOI: 10.1080/00963402.2021.1885869 (accessed May 1, 2021)

Podvig, Pavel 2013: "Two RS-24 Yars regiments begin combat duty," December 30, 2013. http://russianforces.org/blog/2013/12/two_rs-24_yars_regiments_begin.shtml (accessed May 29, 2019)

Podvig, Pavel 2016-1: "Barguzin project refuses to die," May 18, 2016. http://russianforces.org/blog/2016/05/barguzin_project_refuses_to_di.shtml (accessed May 29, 2019)

Podvig, Pavel 2016-2: "RS-24 Yars is replacing Topol in Vypolzovo and elsewhere," September 21, 2016. http://russianforces.org/blog/2016/09/rs-24_yars_is_replacing_topol.shtml (accessed May 29, 2019)

Podvig, Pavel 2017-1: "Flight tests of Barguzin rail-mobile ICBM are said to begin in 2019," January 19, 2017. http://russianforces.org/blog/2017/01/flight_tests_of_barguzin_rail-.shtml (accessed May 29, 2019)

Podvig, Pavel 2017-2: "Training launch of Yars ICBM from Plesetsk," September 20, 2017. http://russianforces.org/blog/2017/09/training_launch_of_yars_icbm_f.shtml (accessed May 29, 2019)

Podvig, Pavel 2017-3: "Barguzin rail-mobile ICBM is cancelled (again)," December 4, 2017. http://russianforces.org/blog/2017/12/barguzin_rail-mobile_icbm_is_c.shtml (accessed May 29, 2019)

Podvig, Pavel 2019: "Yars launch from Plesetsk," February 6, 2019. http://russianforces.org/blog/2019/02/yars_launch_from_plesetsk.shtml (accessed May 28, 2019)

Podvig, Pavel 2020-1: "Strategic Rocket Forces," January 4, 2020. <http://russianforces.org/missiles/> (accessed January 24, 2020)

Podvig, Pavel 2020-2: "Annual exercise of the strategic forces held later this year," December 9, 2020. http://russianforces.org/blog/2020/12/annual_exercise_of_the_strateg_1.shtml (accessed May 1, 2021)

TASS 2018: "Avangard Hypersonic Missiles Replace Rubezh ICBMs in Russia's Armament Plan through 2027," March 22, 2018. <http://tass.com/defense/995628> (accessed May 18, 2019)

g)

Intercontinental ballistic missile (ICBM) SS-27 M2 (silo)	
Russian designation	: Я п с (Yars)
Alternate name	: RS-24
NATO designation	: SS-27 Mod.2 (Silo)
Propulsion	: Three-stage solid-propellant
Launch platform	: Silo
No. of warheads	: Maximum 4 warheads
Yield	: 100 kt per 1 warhead?
Specifications	: Length 20.9m, Diameter 2.0m, Weight 49.0tons
Range	: 10,500km
Circular error probability	: 250m
Where deployed	: Kozelsk Air base: 20 missiles
Remarks	<p>Fixed silo types have been deployed by replacing the SS-19s at Kozelsk Air Base from 2014.</p> <p>The latest test launch was conducted on September 12, 2017. A missile launched from the Plesetsk test range landed at the Kura test range on Kamchatka. While the objective was likely to validate ballistic stability and other technical characteristics, some reports claim that the test was also about "minibus" warheads targeting the U.S. missile defense.</p>

【Source】

IHS Jane's 2020: "RS-24 Yars", IHS Jane's Weapons: Strategic 2020–2021, pp.111–112.

Kristensen, Hans M. 2012: "Trimming Nuclear Excess–Options for Further Reductions of U.S. and Russian Nuclear Forces," Federation of American Scientists, Special Report No. 5, December, 2012. <https://fas.org/programs/ssp/nukes/publications1/TrimmingNuclearExcess.pdf> (accessed May 26, 2018)

Kristensen, Hans M. & Korda, Matt 2021: "Russian nuclear forces, 2021," Bulletin of the Atomic Scientists, 77:2, 90-108, DOI:

10.1080/00963402.2021.1885869 (accessed May 1, 2021)

Podvig, Pavel 2012-2: "Topol-M and RS-24 Yars deployment plans," December 14, 2012. http://russianforces.org/blog/2012/12/topol-m_and_rs-24_yars_deploym.shtml (accessed May 29, 2019)

Podvig, Pavel 2014: "First two RS-24 Yars installed in silos in Kozelsk," August 20, 2014. http://russianforces.org/blog/2014/08/first_two_rs-24_yars_installed.shtml (accessed May 29, 2019)

Podvig, Pavel 2015: "Test of silo-based RS-24 Yars from Plesetsk," October 28, 2015. http://russianforces.org/blog/2015/10/test_of_silo-based_rs-24_yars.shtml (accessed May 27, 2019)

Podvig, Pavel 2017-1: "Test launch of Yars missile with "experimental warheads"," September 12, 2017. http://russianforces.org/blog/2017/09/test_launch_of_yars_missile_wi.shtml (accessed May 29, 2019)

Podvig, Pavel 2017-2: "Yars launch in September tested parallel deployment of warheads," October 4, 2017. http://russianforces.org/blog/2017/10/yars_launch_in_september_teste.shtml (accessed May 27, 2019)

Podvig, Pavel 2018: "First silo-based Yars regiment in Kozelsk is fully operational," December 15, 2018. http://russianforces.org/blog/2018/12/first_silo-based_yars_regiment.shtml (accessed May 28, 2019)

Podvig, Pavel 2020: "Strategic Rocket Forces," January 4, 2020. <http://russianforces.org/missiles/> (accessed January 24, 2020)

h)

Intercontinental ballistic missile (ICBM) SS-X-29	
Russian designation	: С а р м а т (Sarmat)
Alternate name	: RS-28
NATO designation	: SS-X-29 Satan 2
Propulsion	: Two-stage liquid propellant
Launch platform	: Silo
No. of warheads	: Maximum 10 warheads or more?
Yield	: 500kt per 1 warhead?
Specifications	: Length 36.3m, Diameter 3.0m, Weight 200tons
Range	: 11,000km
Circular error probability	: ?
Where deployed	: Dombarovsky Air base Uzhur Air base
Remarks	<p>The missile is under development as a replacement for the S-18. Development is far behind schedule due to ejection test problems. It is currently thought that flight tests will start in 2021 and deployment in 2022. A total of 46 missiles will be deployed between the Dombarovsky Air Base and the Uzhur Air Base.</p> <p>In October 2016, the Russian developer of Sarmat released the photographs. Sarmat's test launches commenced on December 27, 2017, and a second test, conducted either on March 28 or 29, 2018, had some public disclosure.</p> <p>The name Sarmat derives from the Sarmatians, a group of nomadic tribes, who flourished from around the fifth century BC to the fourth century AD.</p> <p>The Sarmat, which has been made lighter due to the development of new materials, can carry 10 to 16 nuclear warheads, and its aim appears to be reducing the interception rate of missile defense systems by firing large quantities of nuclear weapons into target nations. In addition, while simultaneously making detection and interception difficult by shortening its boost phases, its range has been greatly increased, enabling it to attack via the North or South poles. In particular, if the Sarmat flew over the South Pole it could attack from the direction of the Bay of Mexico where the missile defense system is weak.</p> <p>Moreover, there are plans to load multiple Avangard vehicles on the Sarmat.</p>

【Source】

Gady, Franz-Stefan 2018: "Russia's Strategic Rocket Force Tests Ejection of Deadly Sarmat Intercontinental Ballistic Missile," The Diplomat, March 30, 2018, <https://thediplomat.com/2018/03/russias-strategic-rocket-force-tests-ejection-of-deadly-sarmat-intercontinental-ballistic-missile/> (accessed May 27, 2019)

Hruby, Jill 2019: "RUSSIA'S NEW NUCLEAR WEAPON DELIVERY SYSTEMS," November, 2019. https://media.nti.org/documents/NTI-Hruby_FINAL.PDF (accessed March 16, 2020)

IHS Jane's 2020: "RS-28 Sarmat", IHS Jane's Weapons: Strategic 2020–2021, pp.112–114.

Kristensen, Hans M. & Korda, Matt 2021: "Russian nuclear forces, 2021," Bulletin of the Atomic Scientists, 77:2, 90-108, DOI: 10.1080/00963402.2021.1885869 (accessed May 1, 2021)

The Missile Threat 2017: "SS-X-30 "Satan II" (RS-28 Sarmat)," 17 May 2017. <https://missilethreat.csis.org/missile/rs-28-sarmat/> (accessed May 27, 2019)

Podvig, Pavel 2013: "Some new missile system to be deployed in Dombarovskiy," December 18, 2013.

http://russianforces.org/blog/2013/12/some_new_missile_system_to_be.shtml (accessed May 27, 2019)

Podvig, Pavel 2016: "Sarmat to be deployed in Uzhur and Dombrovskiy," May 9, 2016.

http://russianforces.org/blog/2016/05/sarmat_to_be_deployed_in_uzhur.shtml (accessed May 27, 2019)

Podvig, Pavel 2017: "Sarmat ejection test, at last," December 29, 2017.

http://russianforces.org/blog/2017/12/sarmat_ejection_test_at_last.shtml (accessed May 27, 2019)

Podvig, Pavel 2018-1: "Second ejection test of Sarmat," March 30, 2018.

http://russianforces.org/blog/2018/03/second_ejection_test_of_sarmat.shtml (accessed May 27, 2019)

Podvig, Pavel 2018-2: "Sarmat to begin flight tests in 2019," October 3, 2018.

http://russianforces.org/blog/2018/10/sarmat_to_begin_flight_tests_i.shtml (accessed May 27, 2019)

Podvig, Pavel 2018-3: "Sarmat deployment is said to begin in 2021," October 31, 2018.

http://russianforces.org/blog/2018/10/sarmat_deployment_is_said_to_b.shtml (accessed May 27, 2019)

Russian Federation 2020: "Expanded meeting of the Defence Ministry Board," December 21, 2020.

<http://en.kremlin.ru/events/president/news/64684> (accessed May 1, 2021)

TASS 2018-1: "Key facts about Russia's advanced Sarmat ICBM system," March 1, 2018. <http://tass.com/defense/992360> (accessed May 27, 2019)

TASS 2018-2: "Russia completes building infrastructure for Sarmat ICBMs," December 17, 2018. <http://tass.com/defense/1036386> (accessed May 27, 2019)

i)

Submarine-launched ballistic missile (SLBM) SS-N-18 Stingray

Russian designation	:	P -29P (R-29R)
Alternate name	:	RSM-50
NATO designation	:	SS-N-18 Mod.1 Stingray
Propulsion	:	Two-stage liquid propellant
Launch platform	:	Project 667BDR Strategic Nuclear Submarine (NATO designation: Delta III)
No. of warheads	:	Maximum 3 warheads
Yield	:	50kt per 1 warhead
Specifications	:	Length 14.1m, Diameter 1.8m, Weight 35.3tons
Range	:	6,500km
Circular error probability	:	900m
Remarks	:	The latest test launch was conducted on October 17, 2019. Russian Strategic Missile Troops carried out a major exercise in which a Delta III nuclear submarine launched a Stingray missile from the Sea of Okhotsk, which landed in the Chizha test range on the Kanin Peninsula.

【Source】

Bukharin, Oleg et al. 2004: "Russian strategic nuclear forces" edited by Pavel Podvig, 2004, MIT Press. p.331.

IHS Jane's 2020: "R-29R Volna (RSM-50/3M40)", IHS Jane's Weapons: Strategic 2020–2021, pp.102–103.

Kristensen, Hans M. & Korda, Matt 2021: "Russian nuclear forces, 2021," Bulletin of the Atomic Scientists, 77:2, 90-108, DOI: 10.1080/00963402.2021.1885869 (accessed May 1, 2021)

Podvig, Pavel 2019: "Annual exercise of the strategic forces, this time without ICBMs," October 17, 2019.

http://russianforces.org/blog/2019/10/annual_exercise_of_strategic_f_1.shtml (accessed May 1, 2021)

Podvig, Pavel 2020: Strategic fleet," January 4, 2020. <http://russianforces.org/navy/> (accessed May 1, 2021)

j)

Submarine-launched ballistic missile (SLBM) SS-N-23 Sineva

Russian designation	:	P -29РМУ Синева (R-29RMU Sineva)
Alternate name	:	RSM-54
NATO designation	:	SS-N-23 Mod.1
Propulsion	:	Three-stage liquid propellant
Launch platform	:	Project 667BDRM Strategic Nuclear Submarine (NATO designation: Delta IV)
No. of warheads	:	Maximum 10 warheads
Yield	:	50kt per 1 warhead
Specifications	:	Length 14.8m, Diameter 1.9m, Weight 40.3tons
Range	:	8,500km
Circular error probability	:	500m

Remarks	Sineva means “blue”. In the latest test during an annual exercise on December 6, 2020, the K-18 Karelia Delta IV class nuclear submarine launched a Sineva missile from the Barents Sea and impacted on the Kura Test Range on the Kamchatka Peninsula.
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【Source】

Bukharin, Oleg et al. 2004: "Russian strategic nuclear forces" edited by Pavel Podvig, 2004, MIT Press. p.336.
IHS Jane's 2020: "R-29RM Shetal/Sineva (RSM-54/3M27)", IHS Jane's Weapons: Strategic 2020–2021, pp.101–102.
Kristensen, Hans M. & Korda, Matt 2021: "Russian nuclear forces, 2021," Bulletin of the Atomic Scientists, 77:2, 90-108, DOI: 10.1080/00963402.2021.1885869 (accessed May 1, 2021)
Podvig, Pavel 2014: "Sineva missile launched from Tula submarine," November 5, 2014. http://russianforces.org/blog/2014/11/sineva_missile_launched_from_t.shtml (accessed May 29, 2019)
Podvig, Pavel 2020-1: "Strategic fleet," January 4, 2020. <http://russianforces.org/navy/> (accessed May 1, 2021)
Podvig, Pavel 2020-2: "Annual exercise of the strategic forces held later this year," December 9, 2020. http://russianforces.org/blog/2020/12/annual_exercise_of_the_strateg_1.shtml (accessed May 1, 2021)

k)

Submarine-launched ballistic missile (SLBM) SS-N-32 Bulava	
Russian designation	: P -30 Булава (R-30 Bulava)
Alternate name	: RSM-56
NATO designation	: SS-N-32
Propulsion	: Three-stage solid-propellant
Launch platform	: 955 class submarine (Borey/Borey A)
No. of warheads	: Maximum 10 warheads (6 warheads appeared to be deployed)
Specifications	: Length 12.1m, Diameter 2.0m, Weight 36.8tons
Range	: 8,300km
Circular error probability	: 300m
Remarks	Bulava means “cudgel”. The latest test was on December 12, 2020, when four of the missiles were launched from the Vladimir Monomakh, the third Borei Class submarine, targeting the Chizha Test Range on the Kanin Peninsula. The missiles used in test were the 35th to 38th. The previous test took place on September 29, 2019. It is believed that the missile can carry up to six nuclear warheads, but this number has been reduced to four in order to comply with the new START Treaty.

【Source】

IHS Jane's 2020: "Bulava (RSM-56)", IHS Jane's Weapons: Strategic 2020–2021, pp.93–94.
Kristensen, Hans M. & Korda, Matt 2021: "Russian nuclear forces, 2021," Bulletin of the Atomic Scientists, 77:2, 90-108, DOI: 10.1080/00963402.2021.1885869 (accessed May 1, 2021)
Podvig, Pavel 2014: "Missile deliveries in 2014 and plans for 2015," December 19, 2014. http://russianforces.org/blog/2014/12/missile_deliveries_in_2014.shtml (accessed May 29, 2019)
Podvig, Pavel 2015: "Alexander Nevskiy with missiles on board," April 13, 2015. http://russianforces.org/blog/2015/04/alexander_nevskiy_with_missile.shtml (accessed May 29, 2019)
Podvig, Pavel 2016: "Success reported in salvo Bulava launch from Yuri Dolgorukiy," September 27, 2016. http://russianforces.org/blog/2016/09/success_reported_in_salvo_bula.shtml (accessed May 29, 2019)
Podvig, Pavel 2018: "Bulava is finally accepted for service," June 29, 2018. http://russianforces.org/blog/2018/06/bulava_is_finally_accepted_for.shtml (accessed May 29, 2019)
Podvig, Pavel 2020-1: "Strategic fleet," January 4, 2020. <http://russianforces.org/navy/> (accessed January 24, 2020)
Podvig, Pavel 2020-2: "First Bulava launches from the Pacific," December 12, 2020. http://russianforces.org/blog/2020/12/first_bulava_launches_from_the.shtml (accessed May 1, 2021)

l)

Strategic nuclear submarine Delta III	
Russian designation	: 667БДР "Кальмар" (667BDR Kalmar)
NATO designation	: Delta III class
No. of tubes	: 16
SLBM	: Stingray (RSM-50)
Specifications	: Length 155m, Width 12m, Displacement underwater 13,000tons

Submerged speed	:	25knot (km/h 46km)
Where deployed	:	Pacific Fleet base (Vilyuchinsk)
Submarines in service	:	K-44 Ryazan
Remarks	:	Deployment began in 1976, and 14 submarines were commissioned. Over the past few years three of the Delta III class submarines have been in commission, whilst it is planned that they will be replaced by Borei class submarines. Today the K-44 Ryazan, returned to service from long-term overhaul in February 2017, remains the only active submarine of this class.

【Source】

Bukharin, Oleg et al. 2004: "Russian strategic nuclear forces" edited by Pavel Podvig, 2004, MIT Press. p.233.

Kristensen, Hans M. & Korda, Matt 2021: "Russian nuclear forces, 2021," Bulletin of the Atomic Scientists, 77:2, 90-108, DOI: 10.1080/00963402.2021.1885869 (accessed May 1, 2021)

Podvig, Pavel 2017: "Ryazan Project 667BDR submarine is back in service," February 15, 2017, http://russianforces.org/blog/2017/02/ryazan_project_667bdr_submarin.shtml (accessed May 29, 2019)

Podvig, Pavel 2018: "Two Project 667BDR submarines withdrawn from service," March 14, 2018, http://russianforces.org/blog/2018/03/two_project_667bdr_submarines.shtml (accessed May 29, 2019)

Podvig, Pavel 2020: "Strategic fleet," January 4, 2020, <http://russianforces.org/navy/> (accessed May 1, 2021)

m)

Strategic nuclear submarine Delta IV		
Russian designation	:	667БДРМ "Дельфин" (667BDRM Delfin)
NATO designation	:	Delta IV
Propulsion	:	Three-stage solid-propellant
No. of tubes	:	16
SLBM	:	Sineva (RSM-54)
Specifications	:	Length 167m, Width 12m, Displacement underwater 13,600tons
Submerged speed	:	22-23knot (km/h 41-43km)
Where deployed	:	Northern Fleet base (Gadzhiiyev)
Submarines in service	:	K-51 Verkhoturie K-84 Ekaterinburg K-114 Tula K-117 Bryansk K-18 Karelia
Remarks	:	K-407 Novomoskovsk Deployments began in 1985, with seven constructed to date but the six listed above in service today. Four and five are regularly kept in operational deployment, with the remainder in overhaul. As of June 1, 2019, only K-117 Bryansk is believed to be in overhaul. Since 2013, the 667BDRM Kal'mar has participated in each annual maneuver and test-fired missiles. Seven Borei-A submarines will be constructed as the successors to the 667BDRM submarines. It is planned that the first submarine to be replaced will be the K-84 Ekaterinburg, which is scheduled to be retired in 2022.

【Source】

Bukharin, Oleg et al. 2004: "Russian strategic nuclear forces" edited by Pavel Podvig, 2004, MIT Press. p.233

Larson, Caleb 2021: "Why Russia Is Retiring One Of Its Mighty Delta IV-class Submarines," The National Interest, April 30, 2021, <https://nationalinterest.org/blog/buzz/why-russia-retiring-one-its-mighty-delta-iv-class-submarines-184043> (accessed May 1, 2021)

Kristensen, Hans M. & Korda, Matt 2021: "Russian nuclear forces, 2021," Bulletin of the Atomic Scientists, 77:2, 90-108, DOI: 10.1080/00963402.2021.1885869 (accessed May 1, 2021)

Podvig, Pavel 2017-1: "Tula submarine completed overhaul," December 28, 2017, http://russianforces.org/blog/2017/12/tula_submarine_completed_overh.shtml (accessed May 27, 2019)

Podvig, Pavel 2017-2: "Bryansk begins overhaul," December 29, 2017. http://russianforces.org/blog/2017/12/bryansk_begins_overhaul.shtml (accessed May 29, 2019)

Podvig, Pavel 2019: "Project 667BDRM submarines will stay in service until 2029," March 18, 2019, http://russianforces.org/blog/2019/03/project_667bdrm_submarines_wil.shtml (accessed May 27, 2019)

Podvig, Pavel 2020-1: "Strategic fleet," January 4, 2020. <http://russianforces.org/navy/> (accessed May 1, 2021)

Podvig, Pavel 2020-2: "Annual exercise of the strategic forces held later this year," December 9, 2020. Annual exercise of the strategic forces held later this year (accessed May 1, 2021)

n)

Strategic nuclear submarine Borey	
Russian designation	: Б о р е й (Borey)
NATO designation	Borey
No. of tubes	16
SLBM	: Bulava (RSM-56)
Specifications	Length 170m, Width 13.5m, Displacement underwater 19,400tons
Submerged speed	: 25knot (km/h 46km)
Where deployed	: Northern Fleet base (Gadzhiiyev) (1st and 3rd vessels) Pacific Fleet base (Vilyuchinsk) (2nd vessel)
Submarines in service	: K-535 Yuriy Dolgorukiy K-550 Aleksandr Nevskiy K-551 Vladimir Monomakh K-549 Knyaz Vladimir
Remarks	Three 955 vessels (Borey 1) are being built as the successor to the 667BDR type (Delta III). The first vessel, the Yuri Dolgorukiy was commissioned in January 2013, and the second, the Alexander Nevsky in December 2013. The third vessel, the Vladimir Monomakh was also commissioned in December 2014. In order to replace the 667BDRM (Delta IV class) submarines, seven 955A class (Borei-A/II) submarines with a new design including a horizontal rudder and sonar will or are being built. The first, the Knyaz Vladimir, went into commission on June 12, 2020; the second, the Knyaz Oleg, was launched in June 2020 and is currently on test voyages. The third, the Generalissimus Suvorov, the fourth, the Emperor Aleksandr III, and the fifth, the Knyaz Pozharsky are all under construction.

【Source】

Gady, Franz-Stefan 2019: "Will Russia Build Borei B-Class Ballistic Missile Subs?," The Diplomat, April 18, 2019, <https://thediplomat.com/2019/04/will-russia-build-borei-b-class-ballistic-missile-subs/> (accessed May 29, 2019)

Kristensen, Hans M. & Korda, Matt 2021: "Russian nuclear forces, 2021," Bulletin of the Atomic Scientists, 77:2, 90-108, DOI: 10.1080/00963402.2021.1885869 (accessed May 1, 2021)

Podvig, Pavel 2013-1: "Yuri Dolgorukiy submarine officially accepted for service," January 10, 2013. http://russianforces.org/blog/2013/01/yuri_dolgorukiy_submarine_offi.shtml (accessed May 27, 2019)

Podvig, Pavel 2013-2: "Aleksandr Nevskiy submarine joined the Pacific Fleet," December 23, 2013. http://russianforces.org/blog/2013/12/aleksandr_nevskiy_submarine_jo.shtml (accessed May 29, 2019)

Podvig, Pavel 2014-1: "Ekaterinburg and Vladimir Monomakh join the fleet," December 19, 2014. http://russianforces.org/blog/2014/12/ekaterinburg_and_vladimir_mono.shtml (accessed May 27, 2019)

Podvig, Pavel 2014-2: "Sixth Project 955 Borey submarine laid down," December 26, 2014. http://russianforces.org/blog/2014/12/sixth_project_955_borey_submar.shtml (accessed May 29, 2019)

Podvig, Pavel 2015: "Seventh Project 955 Borey submarine laid down," December 18, 2015. http://russianforces.org/blog/2015/12/seventh_project_955_borey_subm.shtml (accessed May 29, 2019)

Podvig, Pavel 2016: "The eighth Project 955 Borey submarine laid down at Sevmash," December 23, 2016. http://russianforces.org/blog/2016/12/the_eighth_project_955_sub.shtml (accessed May 29, 2019)

Podvig, Pavel 2018: "Two more Borey-A submarines to be built by 2028t," December 4, 2018. http://russianforces.org/blog/2018/12/two_more_borey-a_submarines_to.shtml (accessed May 29, 2019)

Podvig, Pavel 2020-1: "Strategic fleet," January 4, 2020. <http://russianforces.org/navy/> (accessed May 1, 2021)

Podvig, Pavel 2020-2: "Knyaz Vladimir officially joined the navy," June 12, 2020. http://russianforces.org/blog/2020/06/knyaz_vladimir_officially_join.shtml (accessed May 1, 2021)

Podvig, Pavel 2020-3: "Launch of the Knyaz Oleg Project 955A submarine," July 16, 2020. http://russianforces.org/blog/2020/07/launch_of_the_knyaz_oleg_proje.shtml (accessed May 1, 2021)

TASS 2014: "Russia's Sevmash shipyard lays down 5th Borei-class nuclear sub- Knyaz Oleg," July 27, 2014. <http://tass.com/russia/742472> (accessed June 11, 2018)

TASS 2017: "Russian Navy to receive improved Borei-class strategic submarine in 2026 — source," December 25, 2017. <http://tass.com/defense/982864> (accessed May 29, 2019)

TASS 2018: "Russian Navy to get improved Borei-class nuclear submarine in 2019," April 25, 2018. <http://tass.com/defense/1001781> (accessed May 29, 2019)

TASS 2020: "Two Borei-A strategic nuclear subs to be laid down in 2021 — Defense Ministry," December 30, 2020. <https://tass.com/defense/1241183> (accessed May 1, 2021)

o)

Cruise missile AS-15A Kent A deployed on Strategic Bomber

Russian designation	:	X-55 (Kh-55)
NATO designation	:	AS-15A Kent A
Carried by	:	Tupolev Tu-95MS (NATO designation: Bear H)
Yield	:	200 kt
Specifications	:	Length 6.04m, Diameter 0.51m, Weight 1.2tons
Range	:	2,500km
Remarks	:	The Tu-95MS6 carries six missiles internally, and the 95MS16 can carry a further 10 missiles underneath the wings. The sea-launched variant of these missiles is the non-strategic nuclear RK-55 (SS-N-21).

【Source】

Bukharin, Oleg et al. 2004: "Russian strategic nuclear forces" edited by Pavel Podvig, 2004, MIT Press. p.365.

FAS 2013: "AS-15 KENT- Russian and Soviet Nuclear Forces," <http://www.fas.org/nuke/guide/russia/bomber/as-15.htm> (accessed June 11, 2018)

IHS Jane's 2020: "Kh-55/Kh-55SM/Kh-555 (A S -15 'Kent')", IHS Jane's Weapons: Air Launch 2020–2021, pp.392–394.

Kristensen, Hans M. & Korda, Matt 2021: "Russian nuclear forces, 2021," Bulletin of the Atomic Scientists, 77:2, 90-108, DOI: 10.1080/00963402.2021.1885869 (accessed May 1, 2021)

Podvig, Pavel 2020: "Strategic aviation," January 4, 2020. <http://russianforces.org/aviation/> (accessed January 24, 2020)

p)

Cruise missile AS-15B Kent B deployed on Strategic Bomber

Russian designation	:	X-55CM (Kh-55SM)
NATO designation	:	AS-15B Kent B
Carried by	:	Tupolev Tu-160 (NATO designation: Blackjack)
Yield	:	200 kt
Specifications	:	Length 6.04m, Diameter 0.77m, Weight 1.5tons
Range	:	3,000km
Remarks	:	This is a missile that extends the range of the AS-15A Kent A (Kh-55). The Tu-160 carries 12 missiles.

【Source】

Bukharin, Oleg et al. 2004: "Russian strategic nuclear forces" edited by Pavel Podvig, 2004, MIT Press. p.365.

FAS 2013: "AS-15 KENT- Russian and Soviet Nuclear Forces," <http://www.fas.org/nuke/guide/russia/bomber/as-15.htm> (accessed June 11, 2018)

IHS Jane's 2020: "Kh-55/Kh-55SM/Kh-555 (A S -15 'Kent')", IHS Jane's Weapons: Air Launch 2020–2021, pp.392–394.

Kristensen, Hans M. & Korda, Matt 2021: "Russian nuclear forces, 2021," Bulletin of the Atomic Scientists, 77:2, 90-108, DOI: 10.1080/00963402.2021.1885869 (accessed May 1, 2021)

Podvig, Pavel 2020: "Strategic aviation," January 4, 2020. <http://russianforces.org/aviation/> (accessed January 24, 2020)

q)

Cruise missile AS-23B deployed on Strategic bomber

Russian designation	:	X-102 (Kh-102)
NATO designation	:	AS-23B
Carried by	:	Tupolev Tu-95MSM (NATO designation: Bear H)
Yield	:	250kt
Specifications	:	Length 7.45m, Diameter 0.51m, Weight 2.4tons
Range	:	4,5000km
Remarks	:	An extremely stealthy long-range cruise missile developed as the successor to the AS-15A Kent A (Kh-55). The conventional warhead AS-23A (Kh-101) was first fired on November 17, 2015 from the Blackjack (Tu-160) bomber and from the Bear-H (Tu-95MSM) bomber when Russia participated in the bombing of Syria. Furthermore, in the major annual exercises conducted by the Russian Strategic Missile Forces, they were fired from a Tu-160 (Blackjack) bomber and Tu-95MSM (Bear-H) bomber.

【Source】

IHS Jane's 2020: "Kh-101/-102 ", IHS Jane's Weapons: Air Launch 2020–2021, pp.401–403.

IHS Jane's 360 2015: "Russia launches long-range air sorties into Syria," 18 November 2015. <http://www.janes.com/article/56062/russia-launches-long-range-air-sorties-into-syria> (accessed June 10, 2016)

Kristensen, Hans M. & Korda, Matt 2021: "Russian nuclear forces, 2021," Bulletin of the Atomic Scientists, 77:2, 90-108, DOI: 10.15080/00963402.2021.1885869 (accessed May 1, 2021)

Missile Defense Project 2018: "Kh-101 / Kh-102," Missile Threat, Center for Strategic and International Studies, October 26, 2017, last modified June 15, 2018. <https://missilethreat.csis.org/missile/kh-101-kh-102/> (accessed May 29, 2019)

Podvig, Pavel 2015: "Tu-95MS and Tu-160 strategic bombers used in Syria strikes," November 17, 2015. http://russianforces.org/blog/2015/11/tu-95ms_and_tu-160_strategic_b.shtml (accessed May 29, 2019)

Podvig, Pavel 2020: "Annual exercise of the strategic forces held later this year," December 9, 2020. http://russianforces.org/blog/2020/12/annual_exercise_of_the_strateg_1.shtml (accessed May 1, 2021)

r)

Strategic bomber Bear H (Bear H6/H16/H Mod)	
Russian designation	: Т у п о л е в Ту-95MC6/MC16/MCM (Tupolev) Tu-95 MS6/MS16/MSM)
NATO designation	: Bear H6/H16/H Mod
Nuclear weapon	: The Bear H6/H16 bombers are mounted with AS-15A Kent A (Kh-55) missiles; the Bear H Mod bombers with AS-23B (Kh-102) missiles, and the Bear H6 (Tu-95MS6) bombers with six internally mounted AS-15A Kent A (Kh-55) missiles. Furthermore, the Bear H16 (95MA16) bombers are mounted with a further 10 underwing missiles, amounting to 16 in all (though this load decreases flying range). The Bear H Mod (Tu-95MSM) has six internally mounted AS-23B (Kh-102) missiles, and eight underwing missiles, 14 in total.
Specifications	: Length 49.5m, Span 51.1m (Propeller aircraft)
Max. speed	: 830km/h
Range	: 10,500km
Where deployed	: Ukrainka Air base and Engels Air base
Remarks	: The Russian Strategic Missile Forces fire cruise missiles from Bear H (Tupolev Tu-95MS) bombers during their major annual exercises. Russia is currently developing new models to replace its strategic bombers. In the meanwhile it is also attempting to modernize the Bear H16 (Tupolev Tu-95MA16) bomber. November 2015 saw the start of the delivery to the Russian Air Force of the Bear H Mod (Tu-95MSM), which has improved radar functions and incorporates a satellite-based target-acquisition system/navigation system. On August 22, 2020, pilot flights began of an enhanced Bear H Mod (Tu-95MSM) with the latest electronic equipment, an improved engine and new model propellers. Flight precision and reliability have been vastly improved, service life extended, and they are expected to be in service until at least 2040.

【Source】

Bukharin, Oleg et al. 2004: "Russian strategic nuclear forces" edited by Pavel Podvig, 2004, MIT Press. p.382.

Cenciotti, David 2020: "Modernised Tu-95MSM "Bear" Bomber Performing Its Maiden Flight," August 23, 2020.

<https://theaviationist.com/2020/08/23/heres-the-first-footage-of-the-modernised-tu-95msm-bear-bomber-performing-its-maiden-flight/> (accessed May 1, 2021)

Gady, Franz-Stefan 2018: "Russia Conducts Large-Scale Exercise With its Nuclear Forces," The Diplomat, October 12, 2018.

<https://thediplomat.com/2018/10/russia-conducts-large-scale-exercise-with-its-nuclear-forces/> (accessed May 31, 2019)

Kristensen, Hans M. & Korda, Matt 2021: "Russian nuclear forces, 2021," Bulletin of the Atomic Scientists, 77:2, 90-108, DOI: 10.1080/00963402.2021.1885869 (accessed May 1, 2021)

Podvig, Pavel 2012: "Modernization of Tu-95MS bombers," September 20, 2012. http://russianforces.org/blog/2012/09/modernization_of_tu-95ms_bombe.shtml (accessed May 31, 2019)

Podvig, Pavel 2014: "Tupolev design bureau to work on new strategic bomber," February 18, 2014. http://russianforces.org/blog/2014/02/tupolev_design_bureau_to_work.shtml (accessed June 11, 2018)

Podvig, Pavel 2020-1: "Strategic aviation," January 4, 2020. <http://russianforces.org/aviation/> (accessed January 24, 2020)

Podvig, Pavel 2020-2: "Annual exercise of the strategic forces held later this year," December 9, 2020. http://russianforces.org/blog/2020/12/annual_exercise_of_the_strateg_1.shtml (accessed May 1, 2021)

Sputnik News 2014: "Russian Tu-95 Bear Bomber Launches Cruise Missiles During Drills," May 8, 2014. <http://sputniknews.com/military/20140508/189674387.html> (accessed June 11, 2018)

TASS 2016: "Russia's Tupolev-95MSM bomber delivers first-ever strike on mission to Syria," November 17, 2016. <http://tass.com/defense/913163> (accessed June 1, 2018)

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Strategic bomber Blackjack	
Russian designation	: Т у п о л е в Ту-160 'Белый лебедь' (Tupolev Tu-160/M/M2)
NATO designation	: Blackjack
Nuclear weapons	12 air-launched AS-15B Kent B (Kh-55SM) cruise missiles : 12 air launched AS-23B (Kh-102) cruise missiles gravity bombs.
Specifications	Length 54.1m, Span 55.7-35.6m
Max. speed	: 2,200km/h (supersonic bomber)
Range	: 14,000km
Where deployed	: Ukrainka Air base
Remarks	The Russian nickname is the White Swan (Belyy Lebed). In the mid-2000s, Russia began to modernize about a dozen Tu-160s in its bomber fleet. Phase one modifications upgraded the bomber's fire power by enabling it to carry two new long-range cruise missiles, the Kh-101 (conventional warhead) and the Kh-102 (nuclear warhead). Currently, phase two modifications are under way, swapping most of its electronics and improving its radionavigation system, and due for completion by 2019. The modified Tu-160M had its first test flight in November 2014. : From 2023, Russia is set to produce the Tu-160M2, a variant equivalent to the Tu-160M modification. This series is reported to number 50 planes at a minimum. This first flight of Tu-160M2 is projected for late 2021. PSC Tupolev is set to manufacture Russia's proposed next-generation stealth strategic bomber: Perspektivnyi Aviatsionnyi Kompleks Dal'ney Aviatsii (PAK DA) or "prospective aviation complex for long-range aviation." This first flight is projected for 2021. PAK DAs are scheduled to undergo fully-fledged production in 2028. This new product is expected to replace Tu-160s, Tu-95MSs and Tu-22M3s (intermediate range bomber).

【Source】

Bukharin, Oleg et al. 2004: "Russian strategic nuclear forces" edited by Pavel Podvig, 2004, MIT Press. p.397.

Gady, Franz-Stefan 2018-1: "Russia Orders First 10 Upgraded Supersonic Nuclear-Capable Bombers," The Diplomat, January 31, 2018. <https://thediplomat.com/2018/01/russia-orders-first-10-upgraded-supersonic-nuclear-capable-bombers/> (accessed May 31, 2019)

Gady, Franz-Stefan 2018-2: "Russia Conducts Large-Scale Exercise With its Nuclear Forces," The Diplomat, October 12, 2018. <https://thediplomat.com/2018/10/russia-conducts-large-scale-exercise-with-its-nuclear-forces/> (accessed May 31, 2019)

Kristensen, Hans M. & Korda, Matt 2021: "Russian nuclear forces, 2021," Bulletin of the Atomic Scientists, 77:2, 90-108, DOI: 10.1080/00963402.2021.1885869 (accessed May 1, 2021)

Podvig, Pavel 2014-1: "Tupolev design bureau to work on new strategic bomber," February 18, 2014. http://russianforces.org/blog/2014/02/tupolev_design_bureau_to_work.shtml (accessed May 31, 2019)

Podvig, Pavel 2014-2: "Plans for the new strategic bomber," May 22, 2014. http://russianforces.org/blog/2014/05/plans_for_the_new_strategic_bo.shtml (accessed May 31, 2019)

Podvig, Pavel 2015: "Russia wants to build 50 new Tu-160 bombers," May 28, 2015. http://russianforces.org/blog/2015/05/russia_wants_to_build_50_new_t.shtml (accessed May 31, 2019)

Podvig, Pavel 2020-1: "Strategic aviation," January 4, 2020. <http://russianforces.org/aviation/> (accessed January 24, 2020)

Podvig, Pavel 2020-2: "Annual exercise of the strategic forces held later this year," December 9, 2020. http://russianforces.org/blog/2020/12/annual_exercise_of_the_strateg_1.shtml (accessed May 1, 2021)

RUSSIAN AVIATION 2014: "The upgraded Tu-160 performed its first flight," November 27, 2014. <http://www.ruaviation.com/news/2014/11/27/2767/> (accessed May 27, 2019)

Sputnik News 2015: "Russia to Produce Successor of Tu-160 Strategic Bomber After 2023," June 4, 2015. <https://sputniknews.com/military/201506041022954769/> (accessed May 31, 2019)

TASS 2019: "Russia to test next-generation stealth strategic bomber," August 2, 2019. <https://tass.com/defense/1071613> (accessed May 1, 2021)

TASS 2020-1: "Russia begins construction of the first PAK DA strategic bomber - sources," May 26, 2020. <https://tass.com/defense/1160253> (accessed May 1, 2021)

TASS 2020-2: "First newly-built Tu-160M to make maiden flight in 4th quarter of 2021," December 30, 2020. <https://tass.com/defense/1241341> (accessed May 1, 2021)

t)

Ground-based non-strategic nuclear weapons

Russian designation(NATO designation)	Yield(kt)	Range(km)	Launch platform
Anti-ballistic missile			

53T6 (Gazelle)	10	80	Silo
Air defense missile			
S-300 (SA-20)	?	~150	Transporter erector launcher
S-400 (SA-21)	?	~400	Transporter erector launcher
Coastal defense missile			
Redut (SSC-1B)	350	500	Transporter erector launcher
Bastion-P (SSC-5)	10	350	Transporter erector launcher
Short-range ballistic missile			
Tochka (SS-21)	10-100	120	Transporter erector launcher
Iskander-M (SS-26)	10-100	350	Transporter erector launcher
Cruise missile			
9M729 (SSC-8)	10-100	~2,500	Transporter erector launcher

【Source】

IHS Jane's 2020-1: "9K715 Iskander/9M720 Iskander-M/9M720E Iskander-E," IHS Jane's Weapons: Strategic 2015–2016, pp.87–92.

IHS Jane's 2020-2: "9K79 Tochka/97M79-1) Tochka-U," IHS Jane's Weapons: Strategic 2020–2021, pp.82–87.

Kristensen, Hans M. 2012: "Non-Strategic Nuclear Weapons,"; Federation of American Scientists, Special Report No. 3, May, 2012.

https://fas.org/docs/Non_Strategic_Nuclear_Weapons.pdf (accessed May 31, 2019)

Kristensen, Hans M. & Korda, Matt 2021: "Russian nuclear forces, 2021," Bulletin of the Atomic Scientists, 77:2, 90-108, DOI: 10.1080/00963402.2021.1885869 (accessed May 1, 2021)

Missile Defense Project 2018: "S-400 Triumph," Missile Threat, Center for Strategic and International Studies, June 15, 2018.

<https://missilethreat.csis.org/defsys/s-400-triumf/> (accessed May 31, 2019)

Missile Defense Project 2019: "SSC-8 (Novator 9M729)," Missile Threat, Center for Strategic and International Studies, January 23, 2019, <https://missilethreat.csis.org/missile/ssc-8-novator-9m729/> (accessed May 31, 2019.5.31)

u)

Sea-based non-strategic nuclear weapons

Russian designation(NATO designation)	Yield(kt)	Range(km)	Launch platform
Anti-ship cruise missile			
P-120 Malakhit (SS-N-9)	200	110	Corvette
P-500 Bazalt (SS-N-12)	350	550	Cruiser
P-700 Granit (SS-N-19)	500	625	Nuclear submarine、 Aircraft carrier、 Cruiser
Kh-41 Moskit (SS-N-22)	200	250	Destroyer、 Corvette
Land-attack cruise missile			
RK-55 Granat (SS-N-21)	200	2,400	Nuclear submarine
Kalibr (SS-N-30A)	?	1,500-2,500	Nuclear submarine
Anti-submarine rocket			
RPK-2 Vyuga (SS-N-15)	200	35	Nuclear submarine、 Cruiser、 Destroyer, etc.
RPK-6 Vodopad (SS-N-16)	200	50	Nuclear submarine、 Cruiser、 Destroyer, etc.
Torpedo			Nuclear submarine
Depth charge			Aircraft carrier、 Cruiser、 Destroyer, etc.

【Source】

IHS Jane's 2020-1: "SS-N-9 'Siren' (P-120 Malakhit)," IHS Jane's Weapons: Naval 2020–2021, pp.113-115.

IHS Jane's 2020-2: "SS-N-22 'Sunburn'/Moskit?moskit-M/Moskit-MV," IHS Jane's Weapons: Naval 2020–2021, pp.115–119.

IHS Jane's 2020-3: "P-500 Bazalt (SS-N-12 'Sandbox')/P-700 Granit (SSN-19 'Shopwreck')," IHS Jane's Weapons: Naval 2020–2021, pp.22–25.

IHS Jane's 2020-4: "RK-55 Granat (3M10)," IHS Jane's Weapons: Strategic 2020–2021, pp.135–136.

IHS Jane's 2020-5: "3M-14 'Kalibr' (SS-N-30A)," IHS Jane's Weapons: Naval 2020–2021, pp.18–20.

IHS Jane's 2020-6: "SS-N-15 Starfish (RPK-2 Vyuga/Tsakra)," IHS Jane's Weapons: Naval 2020–2021, p.282.

IHS Jane's 2020-7: "SS-N-16 'Stallion' (RPK-6/Vyuga PRK-7/Veter)," IHS Jane's Weapons: Naval 2020–2021, pp.282–283.

Kristensen, Hans M. 2012: "Non-Strategic Nuclear Weapons,"; Federation of American Scientists, Special Report No. 3, May, 2012.

https://fas.org/docs/Non_Strategic_Nuclear_Weapons.pdf (accessed May 31, 2019)

Kristensen, Hans M. & Korda, Matt 2021: "Russian nuclear forces, 2021," Bulletin of the Atomic Scientists, 77:2, 90-108, DOI: 10.1080/00963402.2021.1885869 (accessed May 1, 2021)

Missile Defense Project 2018: "SS-N-30A (3M-14 Kalibr)," Missile Threat, Center for Strategic and International Studies, June 15, 2018, <https://missilethreat.csis.org/missile/ss-n-30a/> (accessed June 1, 2019)

Sutyagin, Igor 2012: "Atomic Accounting: A New Estimate of Russia's Non-Strategic Nuclear Forces," Royal United Services Institute, November 2012. https://rusi.org/sites/default/files/201211_op_atomic_accounting.pdf (accessed June 1, 2019)

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Air-carried non-strategic nuclear weapons

Russian designation(NATO designation)	Yield(kt)	Range(km)	Launch platform
Cruise missile			
Kh-22N (AS-4)	200	310	Tu-22M
Kh-32	100-500	600-1,000	Tu-22M
Ballistic missile			
Kh-15 (AS-16)	350	150	Medium-range bomber
Kh-47M2 (Kinzhal)	?	1,500-2,000	MiG-31K
Gravity bomb			Medium-range bomber, Fighter-bomber

【Source】

IHS Jane's 2020-1: "Kh-15/RKV-15 (AS-16 'Kickback')," IHS Jane's Weapons: Air-Launched 2020–2021, pp.391–392.

IHS Jane's 2020-2: "Kinzhal (Kh-47M2)," IHS Jane's Weapons: Air-Launched 2020–2021, pp.403–404.

IHS Jane's 2020-3: "Kh-22 (AS-4 'Kitchen'/Burya), Kh-32," IHS Jane's Weapons: Air-Launched 2020–2021, pp.327–329.

Kristensen, Hans M. 2012: "Non-Strategic Nuclear Weapons,"; Federation of American Scientists, Special Report No. 3, May, 2012.

https://fas.org/docs/Non_Strategic_Nuclear_Weapons.pdf (accessed May 31, 2019)

Kristensen, Hans M. & Korda, Matt 2021: "Russian nuclear forces, 2021," Bulletin of the Atomic Scientists, 77:2, 90-108, DOI:

10.1080/00963402.2021.1885869 (accessed May 1, 2021)

Missile Defense Project 2018: "Kinzhal," Missile Threat, Center for Strategic and International Studies, July 18, 2018,

<https://missilethreat.csis.org/missile/kinzhal/> (accessed June 1, 2019)

Navy Recognition 2018: "New Kh-32 Antiship Missile Becomes Operational in Russia," March 26, 2018,

<https://www.navyrecognition.com/index.php/focus-analysis/naval-technology/6088-new-kh-32-antiship-missile-becomes-operational-in-russia-part-1.html> (accessed June 1, 2019)

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【Notes】

1) This is in line with the latest estimates (**Kristensen, Hans M. & Korda, Matt 2021-2**). Changes from last year include the exchange at the Barnaul Air Base of nine SS-25 missiles with nine (mobile) SS-27M missiles. The replacement of other SS-25 missiles is underway at Barnaul, with four missiles put in reserve stockpile. Six SS-27M missiles (silos) have also been additionally deployed at the Kozelsk Base (**Kristensen, Hans M. & Korda, Matt 2021-1**). Elsewhere, the Dombarovsky Air Base has been boosted with the addition of four of the Avangard hypersonic glide vehicle systems (**TASS 2020-2**). An attempt is being made to extend the lifetime of the SS-19 ICBMs that carry the Avangard (**Podvig, Pavel 2020-4**).

With a view to complying with the New START Treaty, SS-18s' warheads are believed to have been reduced from ten to five and SS-27 Mod 2s' from four to three. These reductions are now in reserve.

One estimate of the total ICBM stockpile puts it at 1,181 (**Podvig, Pavel 2020-1**) but this is mainly due to differences in the methodology used to account for the SS-25's upgrading to the road-mobile SS27M2, so there is no material discrepancy.

The SS-X-29, set to replace SS-18s, commenced flight tests in 2021 and will likely begin deployment in 2022 (**Russian Federation 2020-2**).

2) Russian strategic nuclear submarines currently consist of 10 submarines in operational deployment and one in maintenance. The Delta III class, with K-44 Ryazan's sole exception (**Navaltoday 2017**), is all thought to have been retired. Of the Delta IV class, K-117 Bryansk is believed to be in overhaul (**Podvig, Pavel 2020-2**), with five others in operational deployment. SLBM Blavars on four Borei-class submarines have been reduced to four warheads from the standard six, in order to adhere to the New START. The total Russian count, as a result, is 624 deployed warheads (3 warheads/missile x 16 missiles/submarine x 1 submarine + 4 warheads/missile x 16 missiles/submarine x 5 submarines + 4 warheads/missile x 16 missiles/submarine x 4 submarines), leaving 192 in reserve (64 per Delta IV in overhaul, and 128

not deployed on Blavars.)

- 3) The estimate (actual number of aircraft tasked for nuclear missions is around 50 aircrafts) for strategic bombers capable of carrying nuclear weapons is placed at 50 (**Kristensen, Hans M. & Korda, Matt 2021-1**), comprising 14 Bear H6, 7 Bear H16, 18 upgraded Bear H16 and 11 Blackjack aircraft. Since they are capable of carrying six, 16, 14 and 12 cruise missiles, respectively, we calculate a combined 580 warheads available for these strategic bombers to be in operational deployment/reserve. It is thought that in peacetime around 200 missiles are allocated for bombers, but here we put the figure at 180. These are not deployed on bombers, but stored on air bases at Ukrainka (Amur Oblast) and Engels (Saratov Oblast). These are counted as being deployed. The remainder are stored at a central depository and are counted as reserve stockpiles. An estimate for strategic bombers tasked for nuclear assignments is 55 Bear H and 11 Blackjacks for an operational missile total of approximately 200 missiles (**Podvig, Pavel 2020-3**).
- 4) Russia's reserve stockpile consists of warheads not loaded on ICBMs, those stored temporarily out of submarines during overhaul or not allocated to bombers, and non-strategic weapons. These are said to be stored in 48 locations across the Federation (**Kristensen, Hans M. & Norris, Robert. 2017**). Since the end of the Cold War, Russia's tactical warheads have been significantly reduced, with current estimates pegging them at some 1,910 (see 475 + 935 + 500 on table). Each warhead, while tagged to a specific launch pad, is not deployed operationally and centrally stored (**Kristensen, Hans M. 2021-1**). The Russian Foreign Ministry, during the 2014 NPT Preparatory Committee, affirmed that all non-strategic warheads are categorized as nondeployed and assembled at multiple central storage sites (**Uliyanov, M. I. 2014**). According to a new noteworthy research finding about Russian tactical weapons (**Sutyagin, Igor 2012**), such concepts as operational deployments, central storages and surpluses need to be redefined, in accordance with the Russian military's unique operational practices. Sutyagin's analysis says that, of about 2,000 tactical nuclear weapons, some 1,000 are "operationally allocated" to launch pads and, though not loaded onto delivery means, kept in alert readiness for immediate use. Some of these may be found aboard ships or with ordnance units under the direct command of strike forces. Although this table adheres to Kristensen's reserve category, large amounts, conceptually, resemble more closely with Kristensen's operational deployments.
- 5) There are estimated to be 475 ground-launched tactical nuclear weapons. Of these, defensive missiles account for approximately 360 warheads, anti-air missiles 290 warheads, anti-ballistic missiles 68 warheads, and anti-ship missiles for coastal defense four. On the other hand, Russia has deployed with four units the ground-launched cruise missile SSC-8 (capable of delivering both nuclear or conventional warheads), which the US has alleged to be an INF violation (**Army Recognition 2019**).
- 6) There are estimated to be approximately 935 sea-launched tactical nuclear weapons, allocated to warships, submarines, ship-based aircraft, and helicopters. They are made up of anti-ship cruise missiles, anti-submarine rockets, land-attack cruise missiles, torpedoes, and depth charges. Most of the missiles are for dual nuclear and non-nuclear use (**Kristensen, Hans M. 2012**). Following the US notification to leave the INF, Russia responded by announcing a conversion of the sea-launched Kalibr cruise missiles to a ground-launched variant (**TASS 2019-1**).
- 7) Approximately 500 warheads are estimated to be allocated to aircraft in cruise missiles, short-range attack missiles, and gravity bombs. They are carried by the Tu-22M3 (NATO reporting name: Backfire C) intermediate-range bomber and the Su-24 (NATO reporting name: Fencer D) and Su-34 (NATO reporting name: Fullback) strategic bombers.
- 8) With dismantling continuing, warheads retired and to-be-dismantled are now fewer in stock. In the coming years, Russia is expected to continue dismantling at a rate of 200-300 warheads per annum. (**Kristensen, Hans M. & Korda, Matt 2021-2**).

【Source】

Army Recognition 2019: "Russia has more SSC-8 cruise missiles than expected, with conflictual range," February 11, 2019. https://www.armyrecognition.com/february_2019_global_defense_security_army_news_industry/russia_has_more_ssc-8_cruise_missiles_than_expected_with_conflictual_range.html (accessed April 30, 2021)

Hruby, Jill 2019: "RUSSIA'S NEW NUCLEAR WEAPON DELIVERY SYSTEMS," November 2019. https://media.nti.org/documents/NTI-Hruby_FINAL.PDF (accessed November 18, 2019)

Kremlin 2018: "Presidential Address to the Federal Assembly," March 1, 2018. <http://en.kremlin.ru/events/president/news/56957> (accessed May

27, 2019)

Kristensen, Hans M. 2012: “Non-Strategic Nuclear Weapons,” Federation of American Scientists, Special Report No. 3, May, 2012. https://fas.org/docs/Non_Strategic_Nuclear_Weapons.pdf (accessed May 4, 2021)

Kristensen, Hans M. 2017: “Alert Status of Nuclear Weapons,” briefing to George Washington University Elliott School’s Short Course on Nuclear Weapons and Related Security Issues, April 21, 2017. https://fas.org/wp-content/uploads/2014/05/Brief2017_GWU_2s.pdf (accessed May 27, 2019)

Kristensen, Hans M. & Korda, Matt 2021-1: “Russian nuclear forces, 2021,” Bulletin of the Atomic Scientists, 77:2, 90-108, DOI: 10.1080/00963402.2021.1885869

Kristensen, Hans M. & Korda, Matt 2021-2: “Status of World Nuclear Forces (March 2021),” Federation of American Scientists, 2021. <http://fas.org/issues/nuclear-weapons/status-world-nuclear-forces/> (accessed May 1, 2021)

Kristensen, Hans M. & Norris, Robert S. 2017: “Worldwide deployments of nuclear weapons, 2017,” Bulletin of the Atomic Scientists, 73:5, 289-297, DOI: 10.1080/00963402.2017.1363995

Navaltoday 2017: “Russian nuclear-powered ballistic missile submarine Ryazan returns to service,” February 16, 2017. <http://navaltoday.com/2017/02/16/russian-nuclear-powered-ballistic-missile-submarine-ryazan-returns-to-service/> (accessed May 27, 2019)

Podvig, Pavel 2014: “Russian missile force readiness rate,” http://russianforces.org/blog/2014/12/russian_missile_force_readines.shtml (accessed May 27, 2019)

Podvig, Pavel 2019: “Annual exercise of strategic forces Grom-2019,” October 17, 2019. http://russianforces.org/blog/2019/10/annual_exercise_of_strategic_f_1.shtml (accessed November 11, 2019)

Podvig, Pavel 2020-1: “Strategic Rocket Forces,” January 4, 2020. <http://russianforces.org/missiles/> (accessed January 24, 2020)

Podvig, Pavel 2020-2: “Strategic Fleet,” January 4, 2020. <http://russianforces.org/missiles/> (accessed January 24, 2020)

Podvig, Pavel 2020-3: “Strategic aviation,” January 4, 2020. <http://russianforces.org/aviation/> (accessed January 24, 2020)

Podvig, Pavel 2020-4: “Life extension for UR-100NUTTH,” January 31, 2020. <http://russianforces.org/aviation/> (accessed May 4, 2021)

Podvig, Pavel 2020-5: “Annual exercise of the strategic forces held later this year,” December 9, 2020. http://russianforces.org/blog/2020/12/annual_exercise_of_the_strateg_1.shtml (accessed May 1, 2021)

RT 2018: “‘Best New Year’s gift to Russia’: Putin boasts successful test of Avangard hypersonic glider,” December 26, 2018. <https://on.rt.com/9l8x> (accessed May 18, 2019)

Russian Federation 2020-1: “Basic Principles of State Policy of the Russian Federation on Nuclear Deterrence,” June 8, 2020. https://www.mid.ru/en/web/guest/foreign_policy/international_safety/disarmament/-/asset_publisher/rpOfiUBmANaH/content/id/4152094 (accessed June 30, 2020)

Russian Federation 2020-2: “Expanded meeting of the Defence Ministry Board,” December 21, 2020. <http://en.kremlin.ru/events/president/news/64684> (accessed May 1, 2021)

Space Launch Report 2020: “2020 Major Suborbital Log,” <http://www.spacelaunchreport.com/log2020.html#log2> (accessed May 1, 2021)

Sutyagin, Igor 2012: “Atomic Accounting: A New Estimate of Russia’s Non-Strategic Nuclear Forces,” Royal United Services Institute, November 2012. https://rusi.org/sites/default/files/201211_op_atomic_accounting.pdf (accessed May 4, 2021)

TASS 2018: “Russian fighters armed with Kinzhal hypersonic missiles hold drills with strategic bombers,” July 19, 2018. <http://tass.com/defense/1014048> (accessed May 18, 2019)

TASS 2019-1: “Russia may develop land-based Kalibr cruise missile by end of year – source,” February 7, 2019. <http://tass.com/defense/1043620> (accessed May 4, 2020)

TASS 2019-2: “Russian Strategic Missile Forces to be fully equipped with modern systems by 2024,” December 16, 2019. <https://tass.com/defense/1099597> (accessed April 8, 2021)

TASS 2019-3: “First regiment of Avangard hypersonic missile systems goes on combat duty in Russia,” December 27, 2019. <https://tass.com/defense/1104297> (accessed January 8, 2020)

TASS 2020-1: “Russia to complete rearming Strategic Missile Force with advanced Yars ICBMs by 2024,” November 2, 2020. <https://tass.com/defense/1219001> (accessed May 1, 2021)

TASS 2020-2: “Russia’s 1st Regiment of Avangard Hypersonic Missiles to Assume Full Strength in 2021.” December 23, 2020. <https://tass.com/defense/1238801> (accessed May 1, 2021)

TASS 2021: “Putin says advanced weaponry in Russia’s nuclear triad to exceed 88% in 2021,” April 21, 2021, <https://tass.com/defense/1280975> (accessed May 13, 2021)

Uliyanov, M. I. 2014: NPT/CONF.2015/PC.III/17, 25 April 2014. <http://undocs.org/NPT/CONF.2015/PC.III/17> (accessed April 27, 2021)

U.S. Department of State 2021: “New START Treaty Aggregate Numbers of Strategic Offensive Arms, Fact Sheet,” March 1, 2021. <https://www.state.gov/new-start-treaty-aggregate-numbers-of-strategic-offensive-arms/> (accessed May 1, 2021)

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