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fio-performance

HUAWEI Kunpeng 920 testing with a THTF BC82AMDGE (KL4.41.017.TF.201225.R BIOS) and llvmpipe on Kylin Linux Advanced Server V10 via the Phoronix Test Suite.

Automated Executive Summary

kyv10 had the most wins, coming in first place for 30% of the tests.

Based on the geometric mean of all complete results, the fastest (kyv10) was 1.037x the speed of the slowest (linx100-buildinkyv10). linx100-kyv10 was 0.986x the speed of kyv10, linx100-anolis was 0.991x the speed of linx100-kyv10, linx100 was 0.996x the speed of linx100-anolis, linx100-buildinkyv10 was 0.991x the speed of linx100.

The results with the greatest spread from best to worst included:

Flexible IO Tester (Type: Sequential Read - Engine: Linux AIO - Buffered: No - Direct: Yes - Block Size: 4KB - Disk Target: Default Test Directory) at 1.285x
Flexible IO Tester (Type: Sequential Read - Engine: Linux AIO - Buffered: No - Direct: Yes - Block Size: 4KB - Disk Target: Default Test Directory) at 1.285x
Flexible IO Tester (Type: Sequential Read - Engine: POSIX AIO - Buffered: No - Direct: Yes - Block Size: 64KB - Disk Target: Default Test Directory) at 1.176x
Flexible IO Tester (Type: Sequential Read - Engine: POSIX AIO - Buffered: No - Direct: Yes - Block Size: 64KB - Disk Target: Default Test Directory) at 1.175x

Flexible IO Tester (Type: Sequential Read - Engine: POSIX AIO - Buffered: No - Direct: Yes - Block Size: 32KB - Disk Target: Default Test Directory) at 1.148x
Flexible IO Tester (Type: Sequential Read - Engine: POSIX AIO - Buffered: No - Direct: Yes - Block Size: 32KB - Disk Target: Default Test Directory) at 1.147x
Flexible IO Tester (Type: Sequential Read - Engine: POSIX AIO - Buffered: No - Direct: Yes - Block Size: 16KB - Disk Target: Default Test Directory) at 1.101x
Flexible IO Tester (Type: Sequential Read - Engine: POSIX AIO - Buffered: No - Direct: Yes - Block Size: 16KB - Disk Target: Default Test Directory) at 1.101x
Flexible IO Tester (Type: Random Write - Engine: Linux AIO - Buffered: No - Direct: Yes - Block Size: 64KB - Disk Target: Default Test Directory) at 1.07x
Flexible IO Tester (Type: Random Write - Engine: Linux AIO - Buffered: No - Direct: Yes - Block Size: 64KB - Disk Target: Default Test Directory) at 1.069x.

Test Systems:

linx100-buildinkyv10

Processor: Unknown (64 Cores), Motherboard: THTF BC82AMDGE (KL4.41.017.TF.201225.R BIOS), Chipset: Huawei HiSilicon, Memory: 4 x 16384 MB DDR4-2933MT/s Hynix HMA82GR7CJR8N-WM, Disk: 1999GB HW-SAS3508, Graphics: llvmpipe, Monitor: S24D300, Network: 4 x Huawei HNS GE/10GE/25GE

OS: Linx 10, Kernel: 4.19.90+ (aarch64), Display Server: X Server 1.20.4, OpenGL: 3.3 Mesa 18.3.6 (LLVM 7.0 128 bits), Compiler: GCC 8.3.0, File-System: ext4, Screen Resolution: 1920x1080

Kernel Notes: Transparent Huge Pages: always
Compiler Notes: --build=aarch64-linux-gnu --disable-libphobos --disable-libquadmath --disable-libquadmath-support --disable-werror --enable-bootstrap --enable-checking=release --enable-clocale=gnu --enable-fix-cortex-a53-843419 --enable-gnu-unique-object --enable-languages=c,ada,c++,go,d,fortran,objc,obj-c++ --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-nls --enable-plugin --enable-shared --enable-threads=posix --host=aarch64-linux-gnu --program-prefix=aarch64-linux-gnu- --target=aarch64-linux-gnu --with-default-libstdcxx-abi=new --with-gcc-major-version-only -v
Disk Notes: MQ-DEADLINE / errors=remount-ro,relatime,rw,stripe=64 / Block Size: 4096
Security Notes: itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Not affected + spectre_v1: Mitigation of __user pointer sanitization + spectre_v2: Not affected + srbds: Not affected + tsx_async_abort: Not affected

linx100-kyv10

Processor: HUAWEI Kunpeng 920 (64 Cores), Motherboard: THTF BC82AMDGE (KL4.41.017.TF.201225.R BIOS), Chipset: Huawei HiSilicon, Memory: 4 x 16384 MB DDR4-2933MT/s Hynix HMA82GR7CJR8N-WM, Disk: 1999GB HW-SAS3508, Graphics: llvmpipe, Network: 4 x Huawei HNS GE/10GE/25GE

OS: Linx 10, Kernel: 4.19.90-25.14.v2101.ky10.aarch64 (aarch64) 20220415, Display Server: X Server 1.20.4, OpenGL: 3.3 Mesa 18.3.6 (LLVM 7.0 128 bits), Compiler: GCC 8.3.0, File-System: ext4, Screen Resolution: 1024x768

Kernel Notes: Transparent Huge Pages: madvise
Compiler Notes: --build=aarch64-linux-gnu --disable-libphobos --disable-libquadmath --disable-libquadmath-support --disable-werror --enable-bootstrap --enable-checking=release --enable-clocale=gnu --enable-fix-cortex-a53-843419 --enable-gnu-unique-object --enable-languages=c,ada,c++,go,d,fortran,objc,obj-c++ --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-nls --enable-plugin --enable-shared --enable-threads=posix --host=aarch64-linux-gnu --program-prefix=aarch64-linux-gnu- --target=aarch64-linux-gnu --with-default-libstdcxx-abi=new --with-gcc-major-version-only -v
Disk Notes: MQ-DEADLINE / errors=remount-ro,relatime,rw,stripe=64 / Block Size: 4096
Security Notes: itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Not affected + spectre_v1: Mitigation of __user pointer sanitization + spectre_v2: Not affected + srbds: Not affected + tsx_async_abort: Not affected

linx100

Processor: Unknown (64 Cores), Motherboard: THTF BC82AMDGE (KL4.41.017.TF.201225.R BIOS), Chipset: Huawei HiSilicon, Memory: 4 x 16384 MB DDR4-2933MT/s Hynix HMA82GR7CJR8N-WM, Disk: 1999GB HW-SAS3508, Graphics: llvmpipe, Monitor: S24D300, Network: 4 x Huawei HNS GE/10GE/25GE

OS: Linx 10, Kernel: 4.19.0-11-linx-security-arm64 (aarch64), Display Server: X Server 1.20.4, OpenGL: 3.3 Mesa 18.3.6 (LLVM 7.0 128 bits), Compiler: GCC 8.3.0, File-System: ext4, Screen Resolution: 1920x1080

Kernel Notes: Transparent Huge Pages: always
Compiler Notes: --build=aarch64-linux-gnu --disable-libphobos --disable-libquadmath --disable-libquadmath-support --disable-werror --enable-bootstrap --enable-checking=release --enable-clocale=gnu --enable-fix-cortex-a53-843419 --enable-gnu-unique-object --enable-languages=c,ada,c++,go,d,fortran,objc,obj-c++ --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-nls --enable-plugin --enable-shared --enable-threads=posix --host=aarch64-linux-gnu --program-prefix=aarch64-linux-gnu- --target=aarch64-linux-gnu --with-default-libstdcxx-abi=new --with-gcc-major-version-only -v
Disk Notes: MQ-DEADLINE / errors=remount-ro,relatime,rw,stripe=64 / Block Size: 4096
Security Notes: itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Not affected + spectre_v1: Mitigation of __user pointer sanitization + spectre_v2: Not affected + srbds: Not affected + tsx_async_abort: Not affected

linx100-anolis

Processor: Unknown (64 Cores), Motherboard: THTF BC82AMDGE (KL4.41.017.TF.201225.R BIOS), Chipset: Huawei HiSilicon, Memory: 4 x 16384 MB DDR4-2933MT/s Hynix HMA82GR7CJR8N-WM, Disk: 1999GB HW-SAS3508, Graphics: llvmpipe, Network: 4 x Huawei HNS GE/10GE/25GE

OS: Linx 10, Kernel: 4.19.91 (aarch64), Display Server: X Server 1.20.4, OpenGL: 3.3 Mesa 18.3.6 (LLVM 7.0 128 bits), Compiler: GCC 8.3.0, File-System: ext4, Screen Resolution: 1024x768

Kernel Notes: Transparent Huge Pages: always
Compiler Notes: --build=aarch64-linux-gnu --disable-libphobos --disable-libquadmath --disable-libquadmath-support --disable-werror --enable-bootstrap --enable-checking=release --enable-clocale=gnu --enable-fix-cortex-a53-843419 --enable-gnu-unique-object --enable-languages=c,ada,c++,go,d,fortran,objc,obj-c++ --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-nls --enable-plugin --enable-shared --enable-threads=posix --host=aarch64-linux-gnu --program-prefix=aarch64-linux-gnu- --target=aarch64-linux-gnu --with-default-libstdcxx-abi=new --with-gcc-major-version-only -v
Disk Notes: MQ-DEADLINE / errors=remount-ro,relatime,rw,stripe=64 / Block Size: 4096
Security Notes: itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Not affected + spectre_v1: Mitigation of __user pointer sanitization + spectre_v2: Not affected + srbds: Not affected + tsx_async_abort: Not affected

kyv10

Processor: HUAWEI Kunpeng 920 (64 Cores), Motherboard: THTF BC82AMDGE (KL4.41.017.TF.201225.R BIOS), Chipset: Huawei HiSilicon, Memory: 4 x 16384 MB DDR4-2933MT/s Hynix HMA82GR7CJR8N-WM, Disk: 1999GB HW-SAS3508, Graphics: llvmpipe, Network: 4 x Huawei HNS GE/10GE/25GE

OS: Kylin Linux Advanced Server V10, Kernel: 4.19.90-24.4.v2101.ky10.aarch64 (aarch64) 20210524, Desktop: MATE, Display Server: X Server 1.20.8, OpenGL: 3.3 Mesa 20.1.4 (LLVM 10.0.1 128 bits), Compiler: GCC 7.3.0, File-System: ext4, Screen Resolution: 1024x768

Kernel Notes: Transparent Huge Pages: madvise
Disk Notes: MQ-DEADLINE / relatime,rw,stripe=64 / Block Size: 4096
Security Notes: itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Not affected + spectre_v1: Mitigation of __user pointer sanitization + spectre_v2: Not affected + srbds: Not affected + tsx_async_abort: Not affected

	linx100-buildink	linx100-kyv10	linx100	linx100-anolis	kyv10
	yv10				

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Flexible IO Tester - Seq Read - Linux AIO - No - Yes - 4KB	**133333**	168333	134333	146333	**171333**
Normalized	77.82%	98.25%	78.4%	85.41%	100%
Standard Deviation	0.9%	0.3%	0.9%	1.7%	0.3%
Flexible IO Tester - Seq Read - Linux AIO - No - Yes - 4KB	**520**	656	526	572	**668**
Normalized	77.84%	98.2%	78.74%	85.63%	100%
Standard Deviation	0.8%	0.4%	0.8%	1.7%	0.2%
Flexible IO Tester - Seq Read - POSIX AIO - No - Yes - 64KB (MB/s)	1572	**1834**	**1560**	1562	1823
Normalized	85.71%	100%	85.06%	85.17%	99.4%
Standard Deviation	0.3%	1.3%	1%	0.9%	0.8%
Flexible IO Tester - Seq Read - POSIX AIO - No - Yes - 64KB (IOPS)	25167	**29333**	**24967**	25000	29167
Normalized	85.8%	100%	85.12%	85.23%	99.43%
Standard Deviation	0.2%	1.2%	1%	0.8%	0.9%
Flexible IO Tester - Seq Read - POSIX AIO - No - Yes - 32KB (IOPS)	**30400**	**34900**	30825	30900	34500
Normalized	87.11%	100%	88.32%	88.54%	98.85%
Standard Deviation	1.7%	0.6%	2.5%	1%	
Flexible IO Tester - Seq Read - POSIX AIO - No - Yes - 32KB (MB/s)	**950**	**1090**	963	966	1078
Normalized	87.16%	100%	88.35%	88.62%	98.9%
Standard Deviation	1.7%	0.6%	2.4%	1.1%	
Flexible IO Tester - Seq Read - POSIX AIO - No - Yes - 16KB (MB/s)	552	**598**	**543**	559	597
Normalized	92.31%	100%	90.8%	93.48%	99.83%
Standard Deviation	1.2%	0.5%	0.5%	1.4%	0.7%
Flexible IO Tester - Seq Read - POSIX AIO - No - Yes - 16KB (IOPS)	35300	**38300**	**34800**	35767	38167
Normalized	92.17%	100%	90.86%	93.39%	99.65%
Standard Deviation	1.2%	0.5%	0.5%	1.4%	0.8%
Flexible IO Tester - Rand Write - Linux AIO - No - Yes - 64KB	**32.9**	33.0	34.7	34.3	**35.2**
Normalized	93.47%	93.75%	98.58%	97.44%	100%
Standard Deviation	0.8%	2.5%	1.2%	0.8%	1.1%
Flexible IO Tester - Rand Write - Linux AIO - No - Yes - 64KB (IOPS)	**523**	525	551	545	**559**
Normalized	93.56%	93.92%	98.57%	97.5%	100%
Standard Deviation	0.7%	2.5%		0.8%	1.1%
Flexible IO Tester - Rand Write - IO_uring - No - Yes - 64KB	**521**		545	**556**	
Normalized	93.71%		98.02%	100%	
Standard Deviation			0.6%	1.2%	

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Flexible IO Tester - Rand Write - IO_uring - No - Yes - 64KB	**32.8**		34.3	**35.0**	
Normalized	93.71%		98%	100%	
Standard Deviation	1.8%		0.6%	1.1%	
Flexible IO Tester - Seq Read - POSIX AIO - No - Yes - 4KB (MB/s)	158	**165**	**155**	159	164
Normalized	95.76%	100%	93.94%	96.36%	99.39%
Standard Deviation			0.7%		
Flexible IO Tester - Seq Read - POSIX AIO - No - Yes - 4KB (IOPS)	40433	**42200**	**39700**	40833	41867
Normalized	95.81%	100%	94.08%	96.76%	99.21%
Standard Deviation	0.3%	0.4%	0.4%	0.1%	0.1%
Flexible IO Tester - Rand Write - Linux AIO - No - Yes - 32KB	18.2	**17.9**	18.8	18.6	**18.9**
Normalized	96.3%	94.71%	99.47%	98.41%	100%
Standard Deviation	1.1%	1.4%	0.8%	0.5%	1.1%
Flexible IO Tester - Seq Write - POSIX AIO - No - Yes - 4KB (IOPS)	**27533**	29033	27633	28633	**29067**
Normalized	94.72%	99.88%	95.07%	98.51%	100%
Standard Deviation	0.9%	0.2%	0.4%	0.2%	0.2%
Flexible IO Tester - Seq Write - POSIX AIO - No - Yes - 4KB (MB/s)	**108**	113	**108**	112	**114**
Normalized	94.74%	99.12%	94.74%	98.25%	100%
Standard Deviation	0.9%	0.5%			
Flexible IO Tester - Rand Write - IO_uring - No - Yes - 4KB (IOPS)	**604**		618	**636**	
Normalized	94.97%		97.17%	100%	
Standard Deviation	1.9%		2.4%	3%	
Flexible IO Tester - Rand Write - Linux AIO - No - Yes - 32KB (IOPS)	578	**570**	596	592	**600**
Normalized	96.33%	95%	99.33%	98.67%	100%
Standard Deviation	1.1%	1.5%	1%	0.7%	1.3%
Flexible IO Tester - Rand Write - Linux AIO - No - Yes - 4KB	**612**	620	**644**	643	641
Normalized	95.03%	96.27%	100%	99.84%	99.53%
Standard Deviation	2.9%	2.5%	0.9%	2.5%	2.5%
Flexible IO Tester - Rand Read - IO_uring - No - Yes - 16KB	**605**		**575**	594	
Normalized	100%		95.04%	98.18%	
Standard Deviation	2.3%		5.7%	2.1%	
Flexible IO Tester - Rand Write - Linux AIO - No - Yes - 4KB	**2.464**	2.495	**2.592**	2.585	2.580
Normalized	95.06%	96.26%	100%	99.73%	99.54%
Standard Deviation	2.9%	2.4%	0.9%	2.5%	2.4%
Flexible IO Tester - Rand Write - IO_uring - No - Yes - 4KB (MB/s)	**2.432**		2.486	**2.557**	
Normalized	95.11%		97.22%	100%	
Standard Deviation	1.8%		2.4%	3%	

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Flexible IO Tester - Rand Read - IO_uring - No - Yes - 32KB	577		576	549	
Normalized	100%		99.83%	95.15%	
Standard Deviation	2.5%			5.6%	
Flexible IO Tester - Rand Read - IO_uring - No - Yes - 16KB	9.731		9.259	9.563	
Normalized	100%		95.15%	98.27%	
Standard Deviation	2.3%		5.6%	2.1%	
Flexible IO Tester - Rand Write - Linux AIO - No - Yes - 16KB (IOPS)	605	597	627	625	627
Normalized	96.49%	95.22%	100%	99.68%	100%
Standard Deviation	0.5%	1.1%	2.5%	2.3%	2.5%
Flexible IO Tester - Rand Write - POSIX AIO - No - Yes - 16KB (IOPS)	588	598	610	617	614
Normalized	95.3%	96.92%	98.87%	100%	99.51%
Standard Deviation	0.8%	0.5%	1.9%	1.4%	2.1%
Flexible IO Tester - Rand Read - IO_uring - No - Yes - 32KB	18.1		18.1	17.3	
Normalized	100%		100%	95.58%	
Standard Deviation	2.4%		0.6%	5.5%	
Flexible IO Tester - Rand Write - POSIX AIO - No - Yes - 64KB (IOPS)	523	531	547	536	545
Normalized	95.61%	97.07%	100%	97.99%	99.63%
Standard Deviation	3%	1.6%	0.8%	2%	1.7%
Flexible IO Tester - Rand Write - POSIX AIO - No - Yes - 64KB (MB/s)	32.9	33.4	34.4	33.7	34.3
Normalized	95.64%	97.09%	100%	97.97%	99.71%
Standard Deviation	3%	1.5%	0.9%	2%	1.7%
Flexible IO Tester - Rand Write - IO_uring - No - Yes - 16KB	596		598	623	
Normalized	95.67%		95.99%	100%	
Standard Deviation	0.9%		3.7%		
Flexible IO Tester - Seq Read - Linux AIO - No - Yes - 16KB (IOPS)	12067	11767	12067	11936	12280
Normalized	98.27%	95.82%	98.27%	97.2%	100%
Standard Deviation	0.5%	2.1%	0.5%	3.5%	2.7%
Flexible IO Tester - Seq Read - Linux AIO - No - Yes - 16KB	189	184	189	187	192
Normalized	98.44%	95.83%	98.44%	97.4%	100%
Standard Deviation	0.3%	2%	0.3%	3.6%	2.7%
Flexible IO Tester - Rand Write - POSIX AIO - No - Yes - 16KB (MB/s)	9.458	9.622	9.743	9.845	9.807
Normalized	96.07%	97.73%	98.96%	100%	99.61%
Standard Deviation	0.8%	0.5%	0.6%	1%	1.3%

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Flexible IO Tester - Rand Write - POSIX AIO - No - Yes - 32KB (IOPS)	572	572	592	594	595
Normalized	96.13%	96.13%	99.5%	99.83%	100%
Standard Deviation	1.3%	0.9%	0.8%	0.5%	0.9%
Flexible IO Tester - Rand Write - POSIX AIO - No - Yes - 32KB (MB/s)	18.0	18.0	18.6	18.7	18.7
Normalized	96.26%	96.26%	99.47%	100%	100%
Standard Deviation	1.3%	0.9%	0.9%	0.5%	1.1%
Flexible IO Tester - Rand Write - Linux AIO - No - Yes - 16KB	9.730	9.604	9.920	9.92	9.952
Normalized	97.77%	96.5%	99.68%	99.68%	100%
Standard Deviation	0.5%	1.1%	1.1%	1.7%	1.4%
Flexible IO Tester - Rand Read - Linux AIO - No - Yes - 32KB	17.7	18.2	18.1	17.8	17.6
Normalized	97.25%	100%	99.45%	97.8%	96.7%
Standard Deviation	1.6%	1.9%	1.4%	2.3%	4.7%
Flexible IO Tester - Rand Write - POSIX AIO - No - Yes - 4KB (MB/s)	2.505	2.511	2.562	2.590	2.559
Normalized	96.72%	96.95%	98.92%	100%	98.8%
Standard Deviation	1.6%	0.9%	2.5%	2.4%	0.3%
Flexible IO Tester - Seq Read - Linux AIO - No - Yes - 64KB (IOPS)	2955	2991	3008	3022	3055
Normalized	96.73%	97.91%	98.46%	98.92%	100%
Standard Deviation	0.3%	0.8%	0.6%	0.1%	0.9%
Flexible IO Tester - Rand Write - POSIX AIO - No - Yes - 4KB (IOPS)	623	624	637	644	636
Normalized	96.74%	96.89%	98.91%	100%	98.76%
Standard Deviation	1.6%	0.9%	2.5%	2.4%	
Flexible IO Tester - Seq Read - IO_uring - No - Yes - 64KB	188		182	187	
Normalized	100%		96.81%	99.47%	
Standard Deviation	0.5%		0.3%		
Flexible IO Tester - Seq Read - Linux AIO - No - Yes - 64KB	185	187	188	189	191
Normalized	96.86%	97.91%	98.43%	98.95%	100%
Standard Deviation		0.8%	0.5%		
Flexible IO Tester - Seq Write - POSIX AIO - No - Yes - 32KB (IOPS)	6034	5986	5952	6006	6144
Normalized	98.21%	97.43%	96.88%	97.75%	100%
Standard Deviation	0.5%	1.6%	1.8%	0.3%	0.4%
Flexible IO Tester - Seq Write - POSIX AIO - No - Yes - 32KB (MB/s)	189	187	186	188	192
Normalized	98.44%	97.4%	96.88%	97.92%	100%
Standard Deviation		1.5%	1.9%		

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Flexible IO Tester - Seq Read - Linux AIO - No - Yes - 32KB	**186**	187	189	188	**192**
Normalized	96.88%	97.4%	98.44%	97.92%	100%
Standard Deviation	1.4%	2.4%		0.6%	
Flexible IO Tester - Seq Read - Linux AIO - No - Yes - 32KB (IOPS)	**5955**	5979	6041	6024	**6146**
Normalized	96.89%	97.28%	98.29%	98.01%	100%
Standard Deviation	1.4%	2.4%	0.3%	0.7%	0.1%
Flexible IO Tester - Seq Read - IO_uring - No - Yes - 64KB	**3006**		**2914**	2993	
Normalized	100%		96.94%	99.57%	
Standard Deviation	0.6%		0.2%	0.3%	
Flexible IO Tester - Rand Read - Linux AIO - No - Yes - 32KB (IOPS)	563	**578**	576	566	**561**
Normalized	97.4%	100%	99.65%	97.92%	97.06%
Standard Deviation	1.6%	2.1%	1.3%	2.2%	4.7%
Flexible IO Tester - Rand Write - IO_uring - No - Yes - 32KB	**570**		**586**	585	
Normalized	97.27%		100%	99.83%	
Standard Deviation	1.3%		2.8%	0.6%	
Flexible IO Tester - Rand Write - IO_uring - No - Yes - 32KB	**17.9**		**18.4**	**18.4**	
Normalized	97.28%		100%	100%	
Standard Deviation	1.4%		2.7%	0.5%	
Flexible IO Tester - Seq Write - POSIX AIO - No - Yes - 64KB (IOPS)	3022	3020	**2983**	2990	**3065**
Normalized	98.6%	98.53%	97.32%	97.55%	100%
Standard Deviation	0.3%	0.3%	1.7%	0.6%	
Flexible IO Tester - Seq Write - Linux AIO - No - Yes - 32KB (IOPS)	**5973**	6074	6087	6081	**6137**
Normalized	97.33%	98.97%	99.19%	99.09%	100%
Standard Deviation	1%	0.4%	0.1%	0.7%	0.3%
Flexible IO Tester - Seq Write - POSIX AIO - No - Yes - 64KB (MB/s)	189	189	**187**	**187**	**192**
Normalized	98.44%	98.44%	97.4%	97.4%	100%
Standard Deviation		0.3%	1.7%	0.5%	
Flexible IO Tester - Seq Write - Linux AIO - No - Yes - 32KB	**187**	190	190	190	**192**
Normalized	97.4%	98.96%	98.96%	98.96%	100%
Standard Deviation	0.9%	0.5%		0.5%	0.3%
Flexible IO Tester - Seq Write - Linux AIO - No - Yes - 64KB	**188**	189	190	190	**193**
Normalized	97.41%	97.93%	98.45%	98.45%	100%
Standard Deviation	0.6%				1.4%

fio-performance

Flexible IO Tester - Rand Read - Linux AIO - No - Yes - 64KB (IOPS)	**514**	505	502	**501**	504
Normalized	100%	98.25%	97.67%	97.47%	98.05%
Standard Deviation	1.3%	1.8%	2%	1.2%	2.1%
Flexible IO Tester - Seq Write - Linux AIO - No - Yes - 64KB (IOPS)	**3006**	3012	3034	3032	**3083**
Normalized	97.5%	97.7%	98.41%	98.35%	100%
Standard Deviation	0.7%	0.3%	0.3%	0.2%	1.3%
Flexible IO Tester - Rand Read - Linux AIO - No - Yes - 64KB	**32.3**	31.8	31.6	**31.5**	31.7
Normalized	100%	98.45%	97.83%	97.52%	98.14%
Standard Deviation	1.2%	1.6%	1.9%	1.1%	2%
Flexible IO Tester - Seq Write - Linux AIO - No - Yes - 16KB (IOPS)	**12033**	12100	12167	12133	**12300**
Normalized	97.83%	98.37%	98.92%	98.64%	100%
Standard Deviation	0.5%		0.5%	0.5%	
Flexible IO Tester - Seq Read - IO_uring - No - Yes - 16KB	190		**192**	**188**	
Normalized	98.96%		100%	97.92%	
Standard Deviation	0.9%		1.7%	1.7%	
Flexible IO Tester - Rand Read - POSIX AIO - No - Yes - 64KB (MB/s)	**10.4**	10.3	**10.2**	10.3	10.3
Normalized	100%	99.04%	98.08%	99.04%	99.04%
Standard Deviation	0.6%	1%	0.6%	2%	0.6%
Flexible IO Tester - Seq Read - IO_uring - No - Yes - 16KB	12167		**12267**	**12033**	
Normalized	99.18%		100%	98.09%	
Standard Deviation	0.9%		1.7%	1.7%	
Flexible IO Tester - Rand Write - IO_uring - No - Yes - 16KB	**9.604**		9.612	**9.79**	
Normalized	98.1%		98.18%	100%	
Standard Deviation	0.9%		3.5%	0.1%	
Flexible IO Tester - Rand Read - POSIX AIO - No - Yes - 64KB (IOPS)	**163**	161	**160**	161	**160**
Normalized	100%	98.77%	98.16%	98.77%	98.16%
Standard Deviation		0.6%	0.6%	2.2%	0.7%
Flexible IO Tester - Rand Read - POSIX AIO - No - Yes - 16KB (IOPS)	169	**167**	169	**170**	168
Normalized	99.41%	98.24%	99.41%	100%	98.82%
Standard Deviation	2.6%	0.9%	2.4%	2.4%	1.7%
Flexible IO Tester - Seq Write - Linux AIO - No - Yes - 4KB	**190**	188	**187**	**190**	**190**
Normalized	100%	98.95%	98.42%	100%	100%
Standard Deviation			0.6%	0.6%	1.6%

fio-performance

Flexible IO Tester - Seq Write - IO_uring - No - Yes - 4KB (MB/s)	189		**190**	**187**	
Normalized	99.47%		100%	98.42%	
Standard Deviation			0.6%		
Flexible IO Tester - Seq Write - Linux AIO - No - Yes - 16KB	**189**	**189**	190	190	**192**
Normalized	98.44%	98.44%	98.96%	98.96%	100%
Standard Deviation	0.6%	0.6%	0.6%	0.5%	
Flexible IO Tester - Rand Read - Linux AIO - No - Yes - 16KB	**9.643**	9.532	9.553	9.584	**9.496**
Normalized	100%	98.85%	99.07%	99.39%	98.48%
Standard Deviation	2.3%	1.1%	2.1%	2.4%	1.9%
Flexible IO Tester - Rand Read - Linux AIO - No - Yes - 16KB (IOPS)	**599**	592	594	595	**590**
Normalized	100%	98.83%	99.17%	99.33%	98.5%
Standard Deviation	2.2%	1%	2.1%	2.5%	1.9%
Flexible IO Tester - Seq Write - IO_uring - No - Yes - 4KB (IOPS)	48333		**48600**	**47900**	
Normalized	99.45%		100%	98.56%	
Standard Deviation	0.1%		0.5%		
Flexible IO Tester - Rand Read - POSIX AIO - No - Yes - 16KB (MB/s)	2.764	**2.738**	2.768	**2.778**	2.755
Normalized	99.5%	98.56%	99.64%	100%	99.17%
Standard Deviation	2.4%	1%	2.2%	2.4%	1.7%
Flexible IO Tester - Seq Write - Linux AIO - No - Yes - 4KB	48667	48200	**48033**	48533	**48700**
Normalized	99.93%	98.97%	98.63%	99.66%	100%
Standard Deviation	0.3%		0.6%	0.5%	1.6%
Flexible IO Tester - Seq Write - IO_uring - No - Yes - 32KB	**6043**		5978	**5968**	
Normalized	100%		98.92%	98.76%	
Standard Deviation	1.5%		0.3%	0.6%	
Flexible IO Tester - Seq Write - POSIX AIO - No - Yes - 16KB (IOPS)	**12100**	**11967**	12067	12033	12000
Normalized	100%	98.9%	99.73%	99.45%	99.17%
Standard Deviation		0.5%	0.5%	0.5%	2.2%
Flexible IO Tester - Seq Write - IO_uring - No - Yes - 16KB	**12100**		**11967**	**11967**	
Normalized	100%		98.9%	98.9%	
Standard Deviation			0.5%	1.3%	
Flexible IO Tester - Seq Write - POSIX AIO - No - Yes - 16KB (MB/s)	**189**	**187**	**189**	188	**187**
Normalized	100%	98.94%	100%	99.47%	98.94%
Standard Deviation				0.5%	2.5%
Flexible IO Tester - Seq Write - IO_uring - No - Yes - 32KB	**189**		**187**	**187**	
Normalized	100%		98.94%	98.94%	
Standard Deviation	1.4%		0.3%	0.6%	

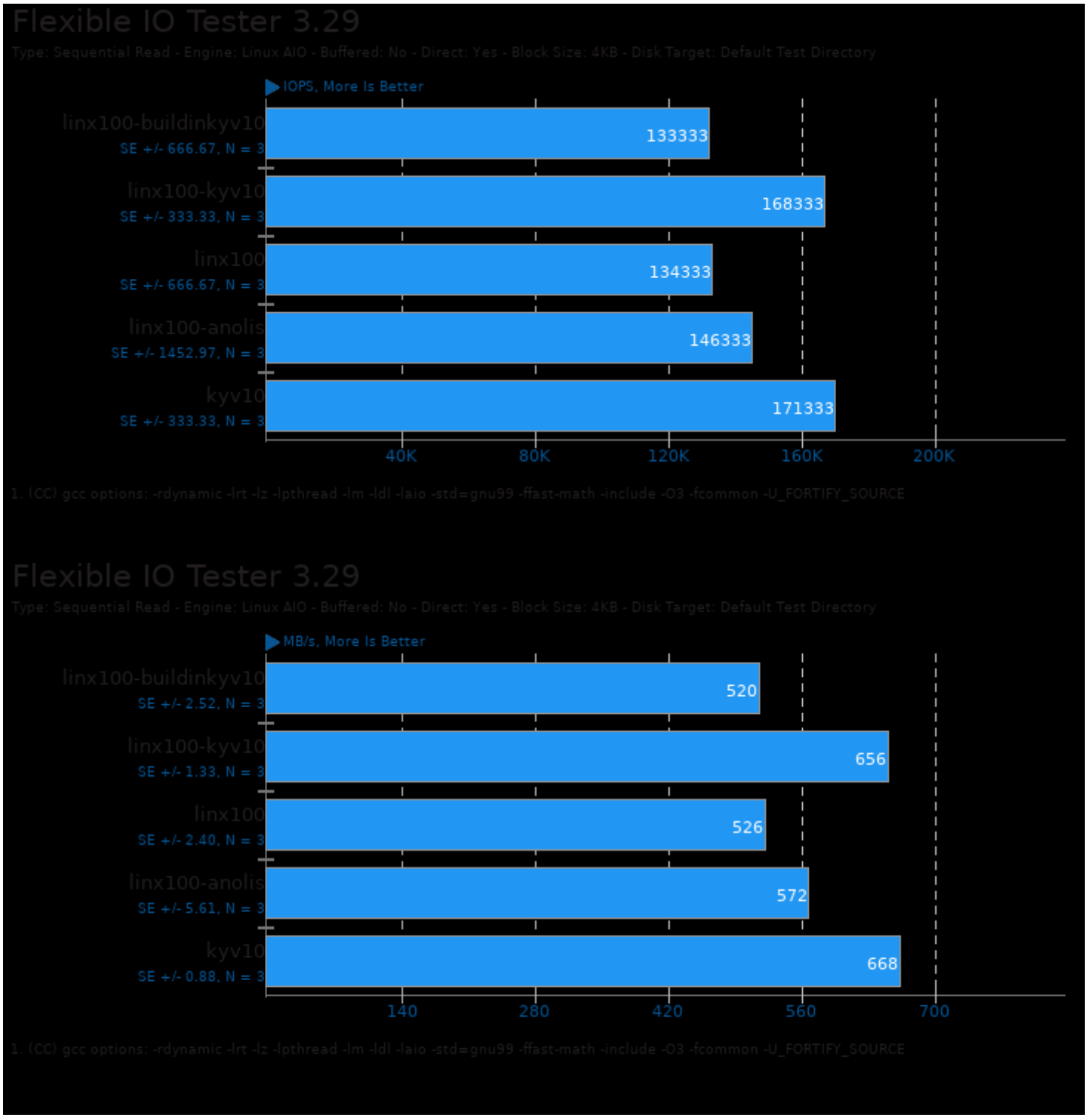
fio-performance

Flexible IO Tester - Seq Write - IO_uring - No - Yes - 16KB	189		187	187	
Normalized	100%		98.94%	98.94%	
Standard Deviation				1.1%	
Flexible IO Tester - Seq Read - IO_uring - No - Yes - 32KB	188		188	190	
Normalized	98.95%		98.95%	100%	
Standard Deviation	0.6%		2.9%		
Flexible IO Tester - Rand Read - POSIX AIO - No - Yes - 4KB (MB/s)	0.697	0.702	0.702	0.699	0.696
Normalized	99.29%	100%	100%	99.57%	99.15%
Standard Deviation	1.6%	0.4%	1.5%	2.2%	0.6%
Flexible IO Tester - Seq Read - IO_uring - No - Yes - 32KB	6030		6019	6059	
Normalized	99.52%		99.34%	100%	
Standard Deviation	0.5%		2.9%	0.9%	
Flexible IO Tester - Rand Read - POSIX AIO - No - Yes - 4KB (IOPS)	171	172	172	171	171
Normalized	99.42%	100%	100%	99.42%	99.42%
Standard Deviation	1.5%	0.6%	1.7%	2.3%	0.7%
Flexible IO Tester - Seq Write - IO_uring - No - Yes - 64KB	3030		3013	3027	
Normalized	100%		99.44%	99.9%	
Standard Deviation	0.4%		1.2%	0.8%	
Flexible IO Tester - Rand Read - IO_uring - No - Yes - 64KB	515		514	514	
Normalized	100%		99.81%	99.81%	
Standard Deviation	0.8%		0.2%	1.4%	
Flexible IO Tester - Seq Write - IO_uring - No - Yes - 64KB	189		189	189	
Standard Deviation			1.3%		
Flexible IO Tester - Rand Read - IO_uring - No - Yes - 64KB	32.4		32.4	32.4	
Standard Deviation	0.8%		0.2%	1.3%	
Flexible IO Tester - Seq Read - IO_uring - No - Yes - 4KB (IOPS)	132417		112200	149917	
Normalized	88.33%		74.84%	100%	
Standard Deviation	11.1%		3.7%	10.2%	
Flexible IO Tester - Seq Read - IO_uring - No - Yes - 4KB (MB/s)	517		439	586	
Normalized	88.23%		74.91%	100%	
Standard Deviation	11.1%		3.6%	10.3%	
Flexible IO Tester - Rand Read - POSIX AIO - No - Yes - 32KB (IOPS)	165	168	165	164	169
Normalized	97.63%	99.41%	97.63%	97.04%	100%
Standard Deviation	8.1%	1.6%	1.9%	3.5%	0.9%

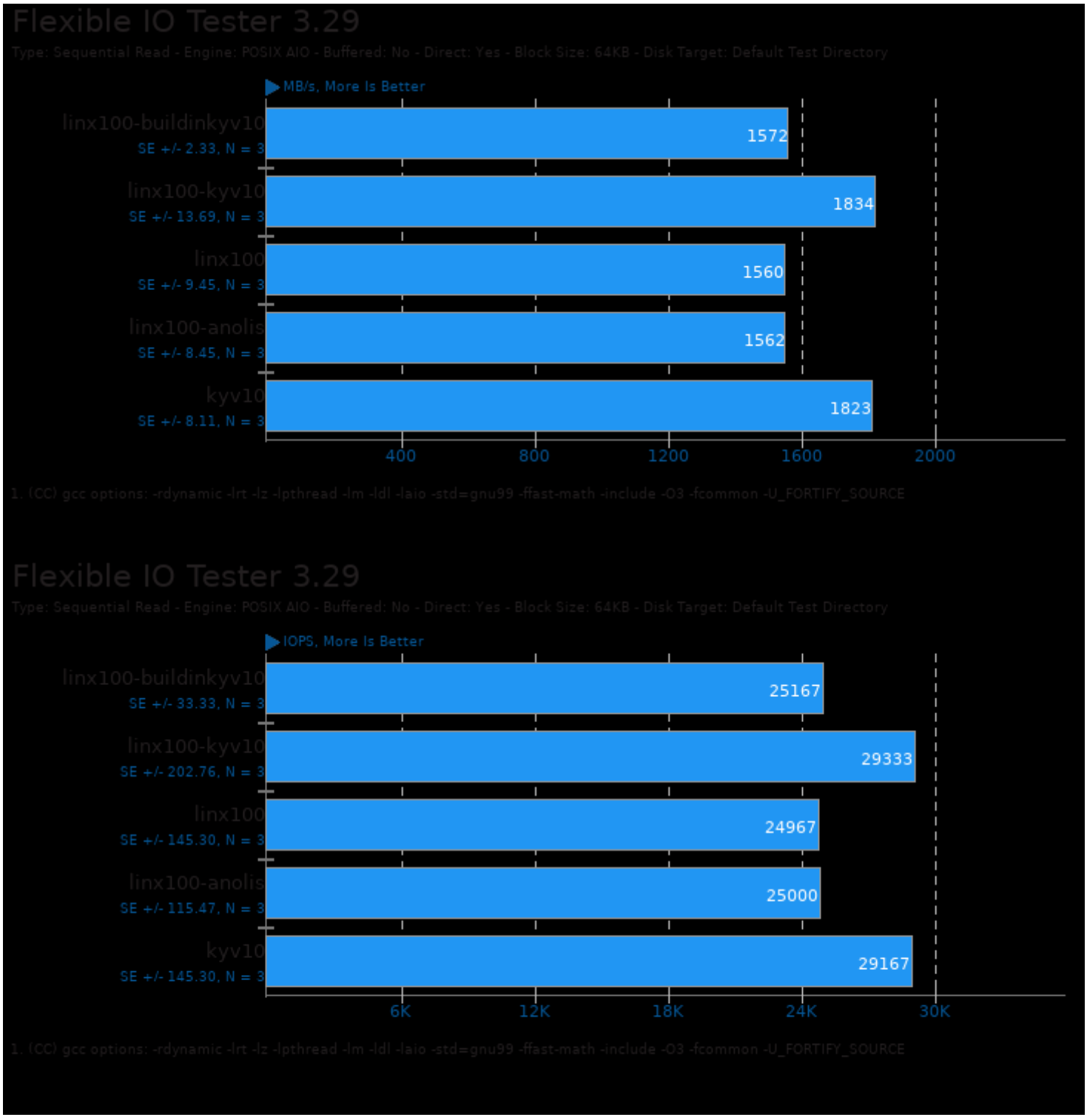
fio-performance

Flexible IO Tester - Rand Read - POSIX AIO - No - Yes - 32KB (MB/s)	5.409	5.498	5.407	**5.358**	**5.525**
Normalized	97.9%	99.51%	97.86%	96.98%	100%
Standard Deviation	7.9%	1.4%	2%	3.4%	0.8%
Flexible IO Tester - Rand Read - Linux AIO - No - Yes - 4KB	621	**632**	630	**617**	623
Normalized	98.26%	100%	99.68%	97.63%	98.58%
Standard Deviation	6.8%	1.6%	1.4%	0.2%	1%
Flexible IO Tester - Rand Read - Linux AIO - No - Yes - 4KB	2.497	**2.540**	2.533	**2.483**	2.507
Normalized	98.31%	100%	99.72%	97.76%	98.7%
Standard Deviation	6.7%	1.6%	1.3%	0.3%	1%
Flexible IO Tester - Rand Read - IO_uring - No - Yes - 4KB (IOPS)	**588**		605	**614**	
Normalized	95.77%		98.53%	100%	
Standard Deviation	10.4%		2.4%	2.4%	
Flexible IO Tester - Rand Read - IO_uring - No - Yes - 4KB (MB/s)	**2.365**		2.434	**2.470**	
Normalized	95.75%		98.54%	100%	
Standard Deviation	10.4%		2.4%	2.4%	

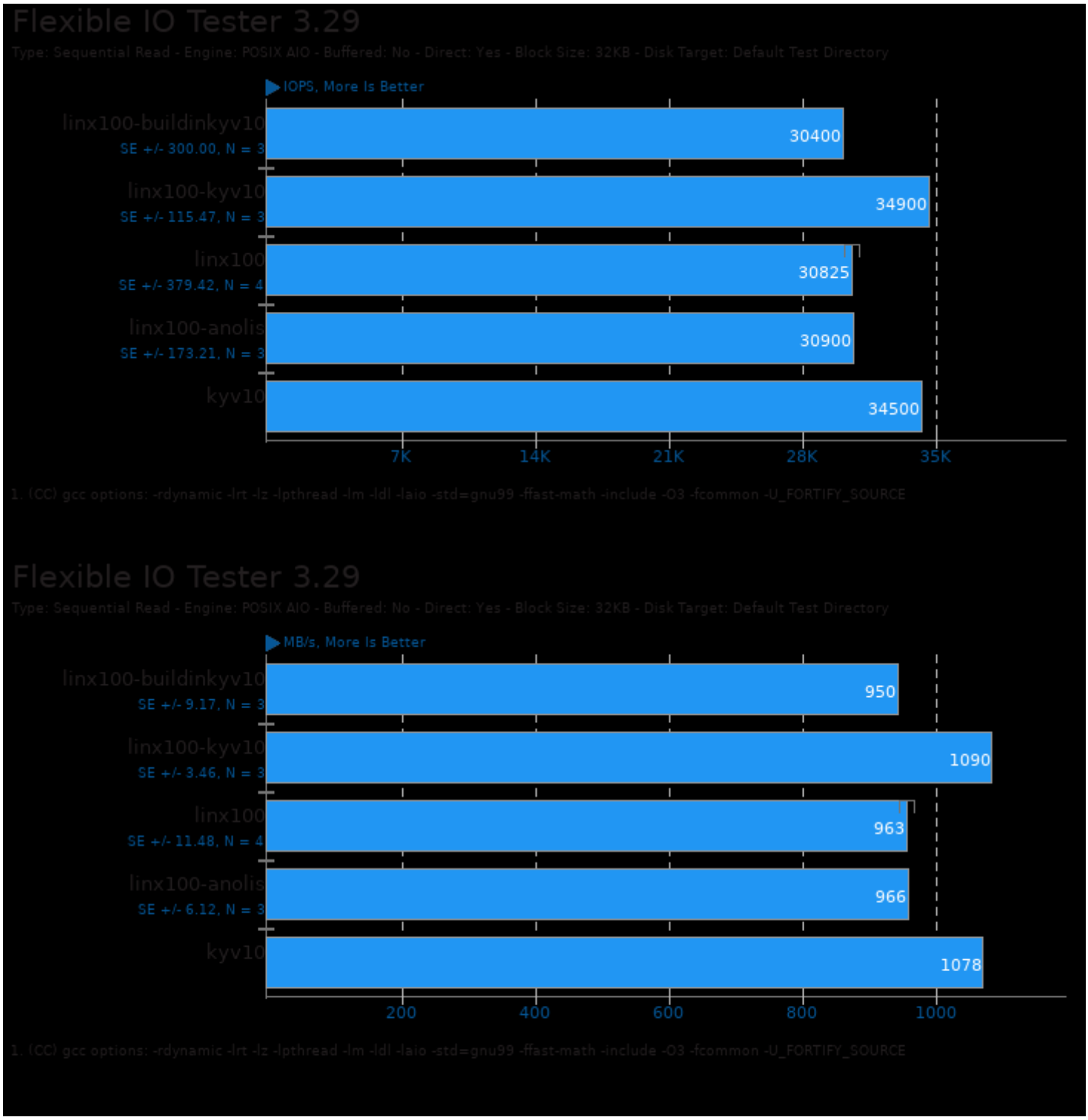
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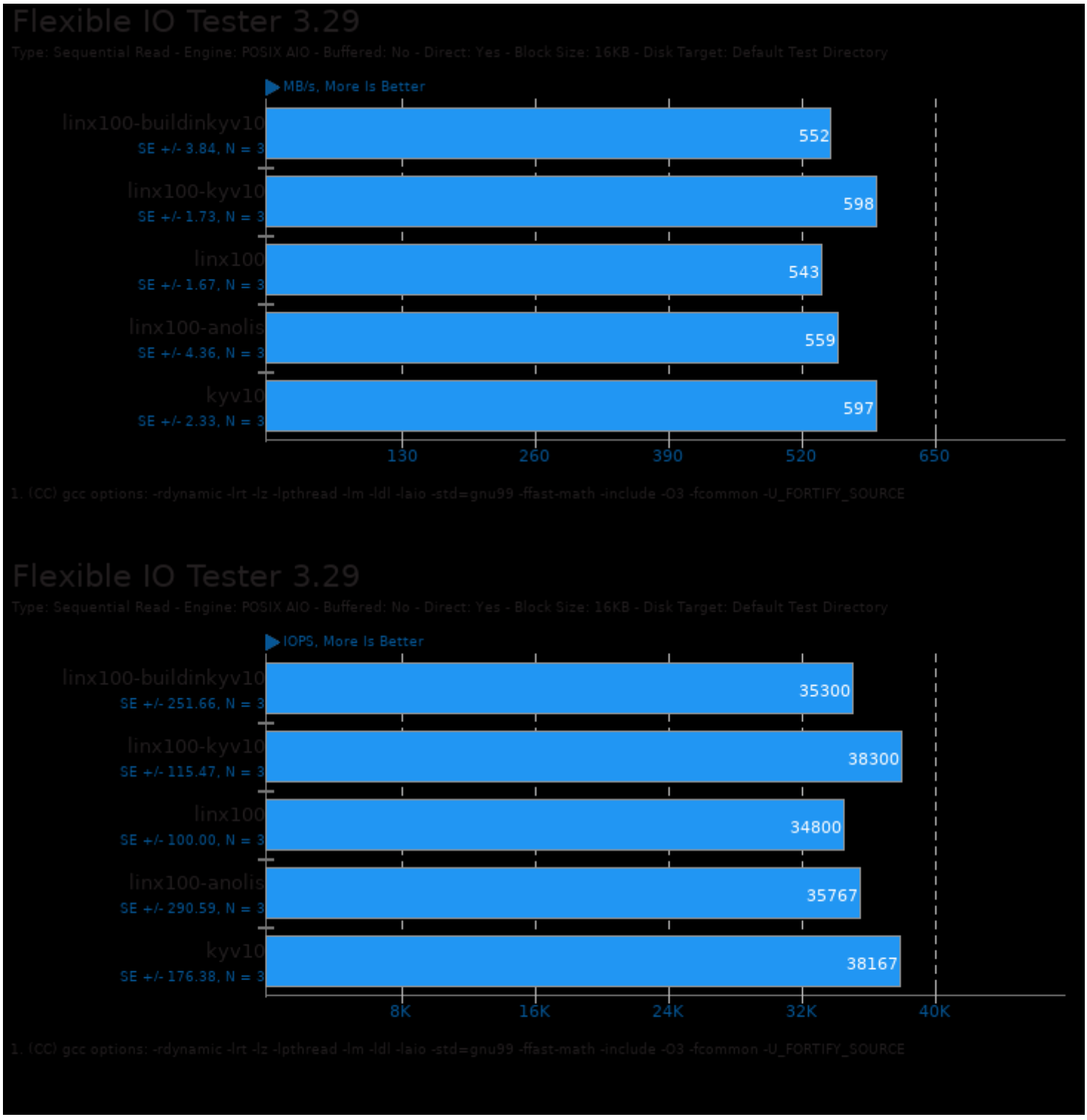
fio-performance



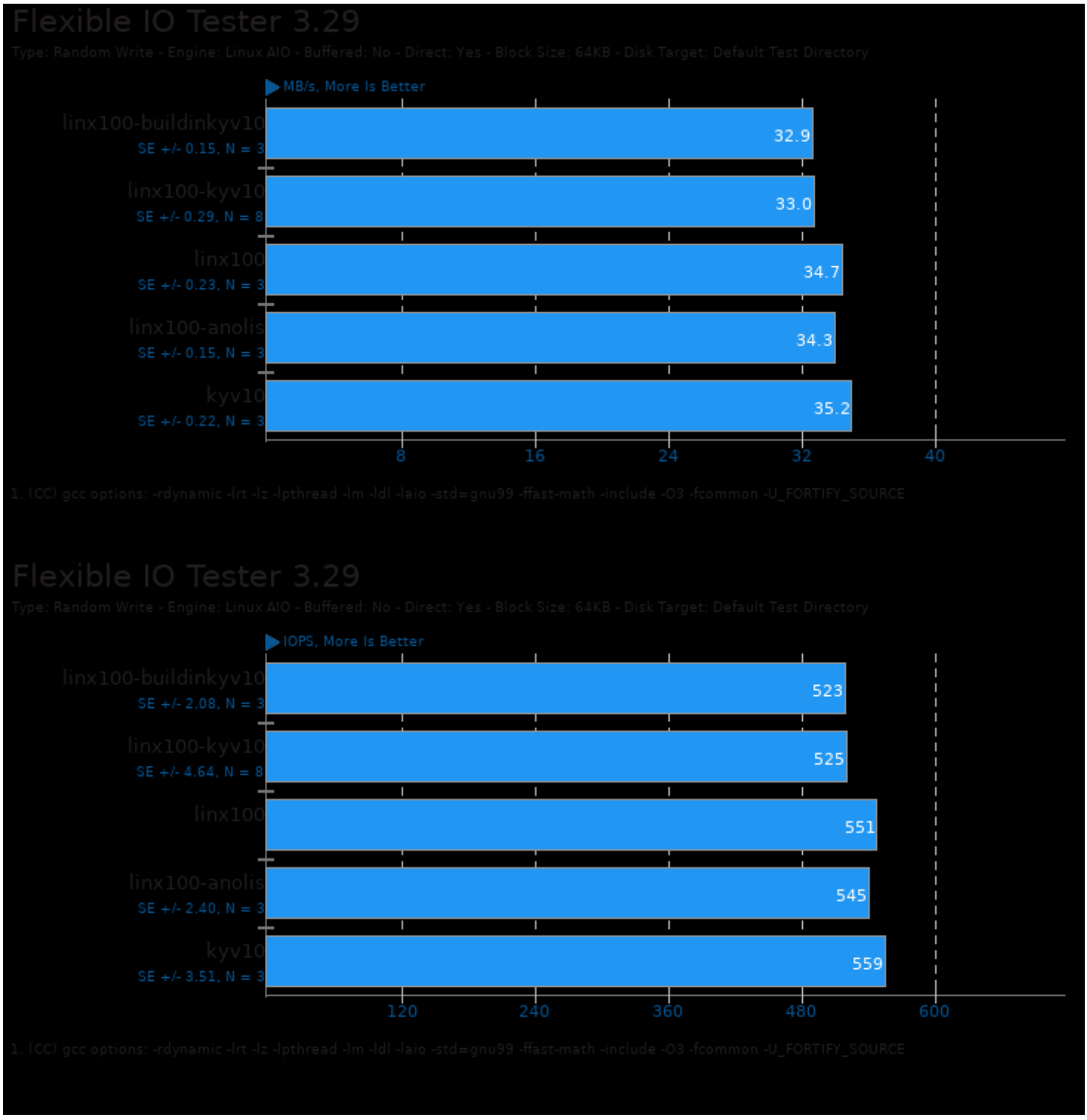
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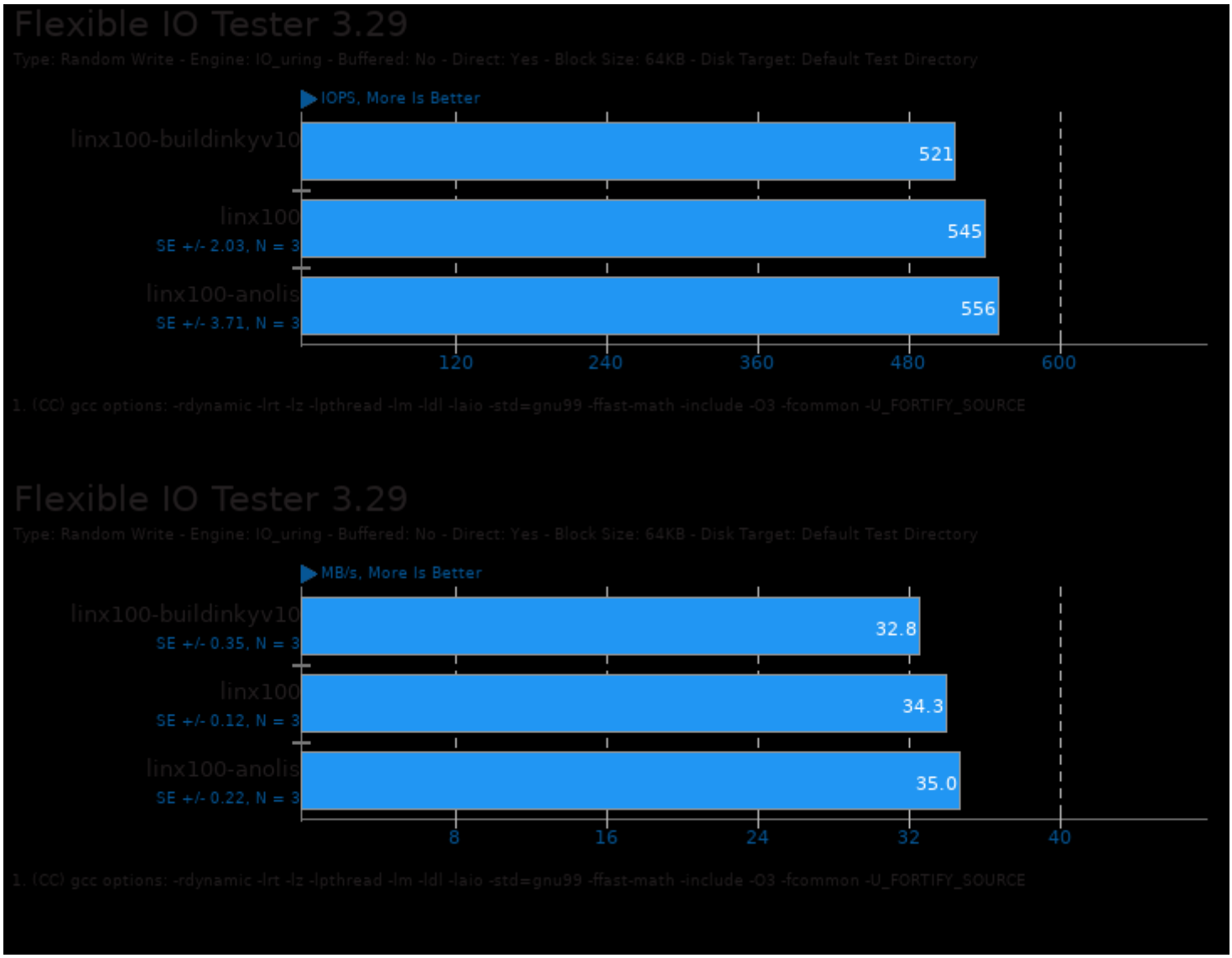
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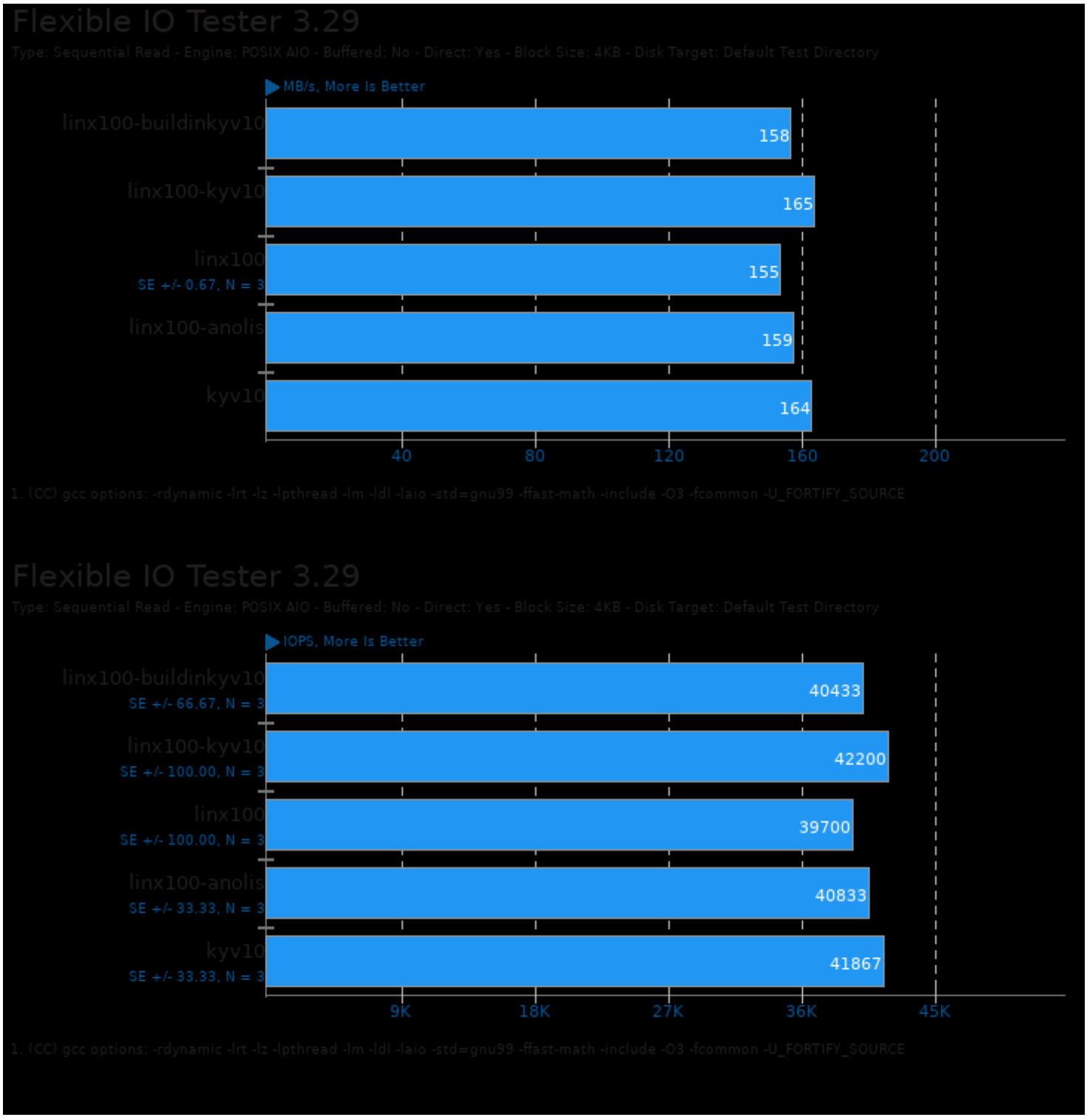
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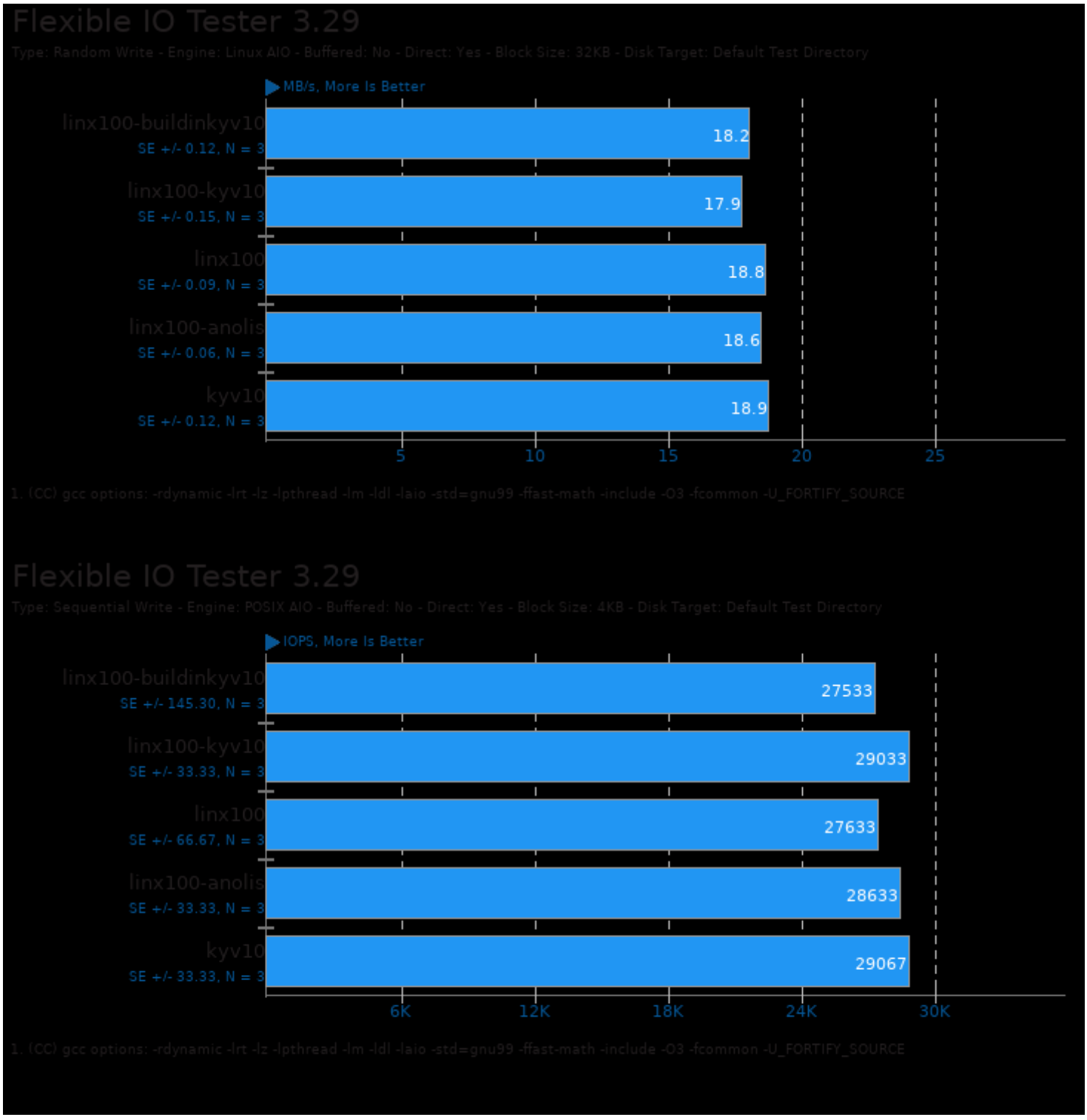
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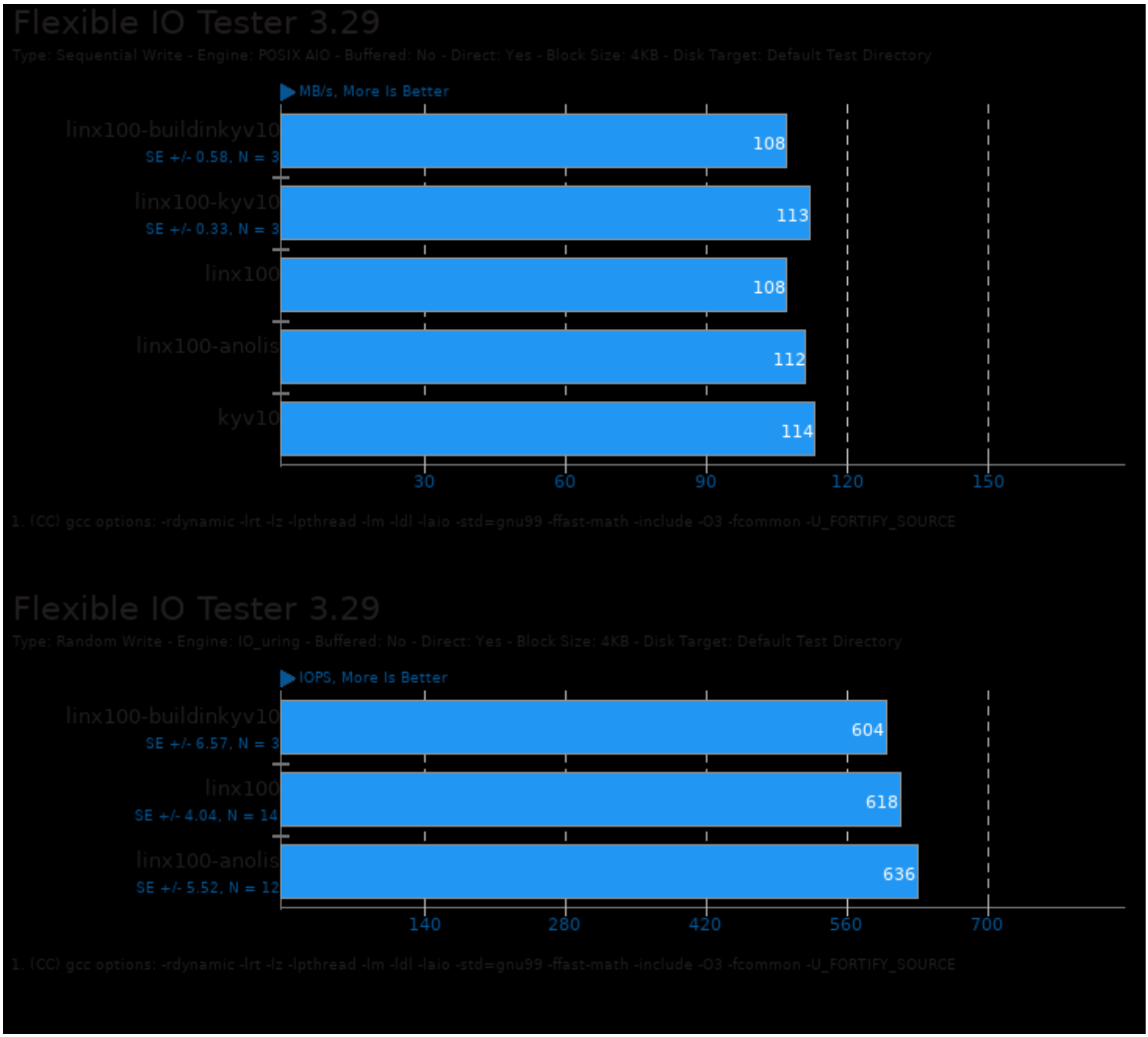
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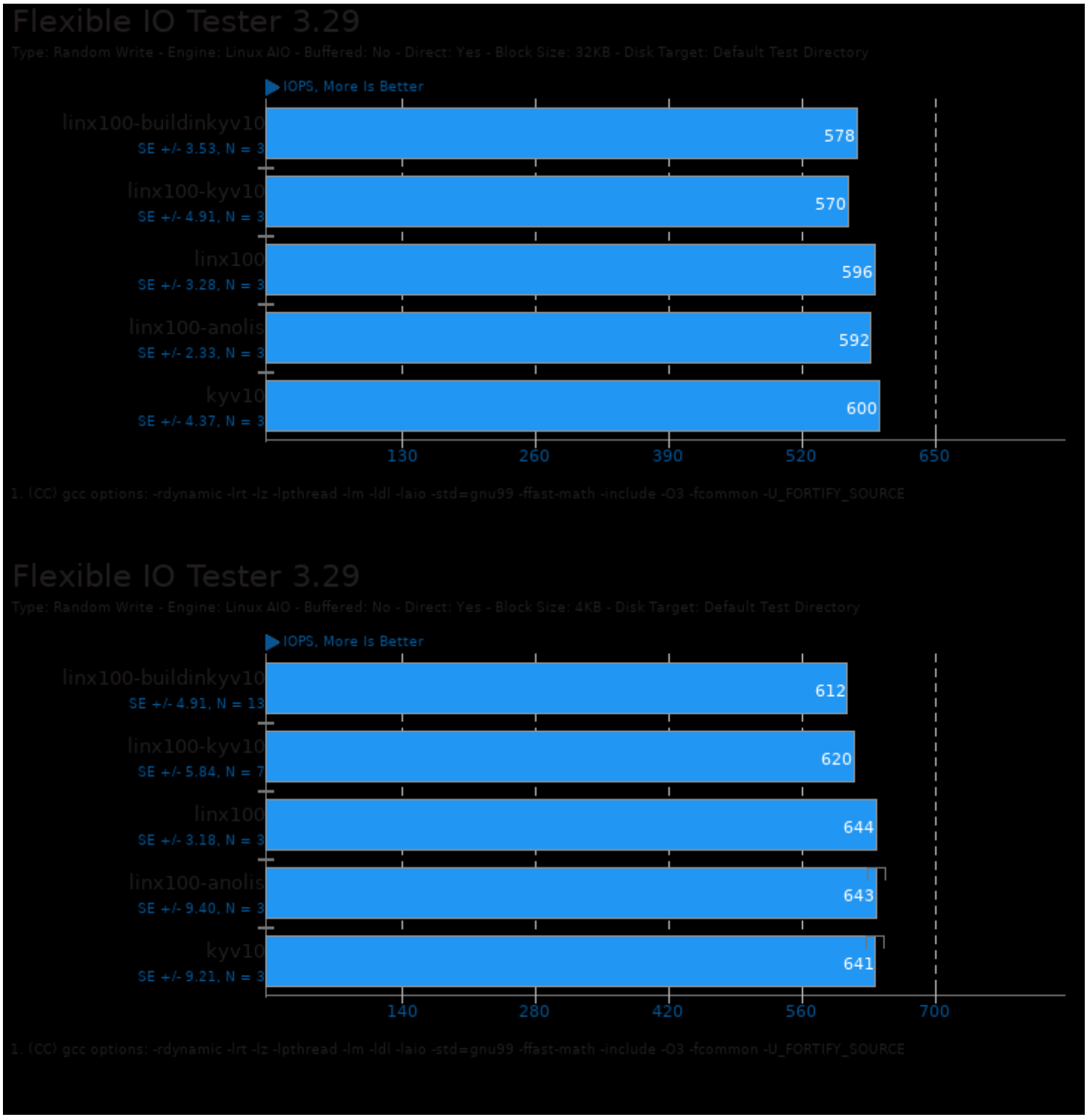
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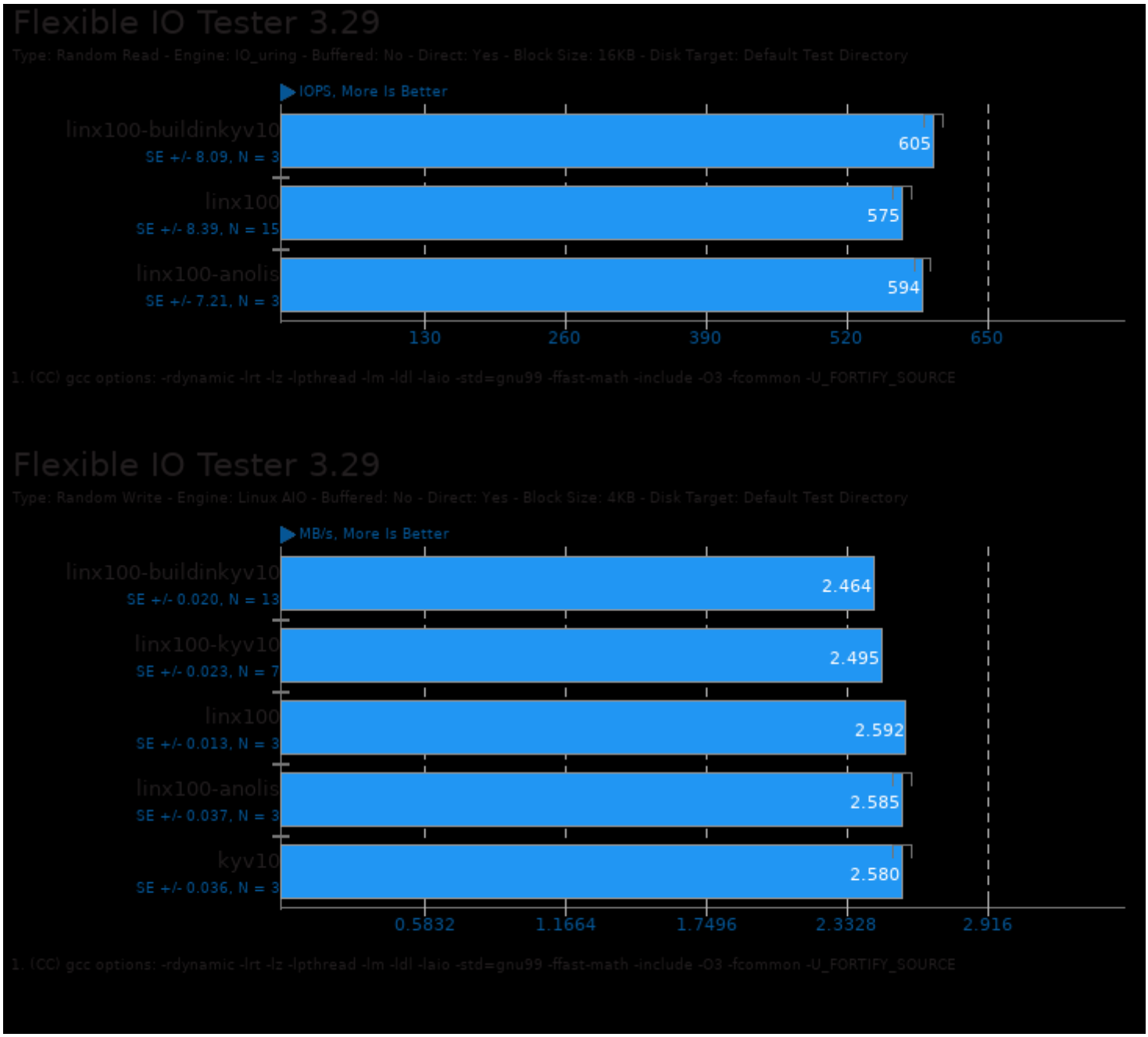
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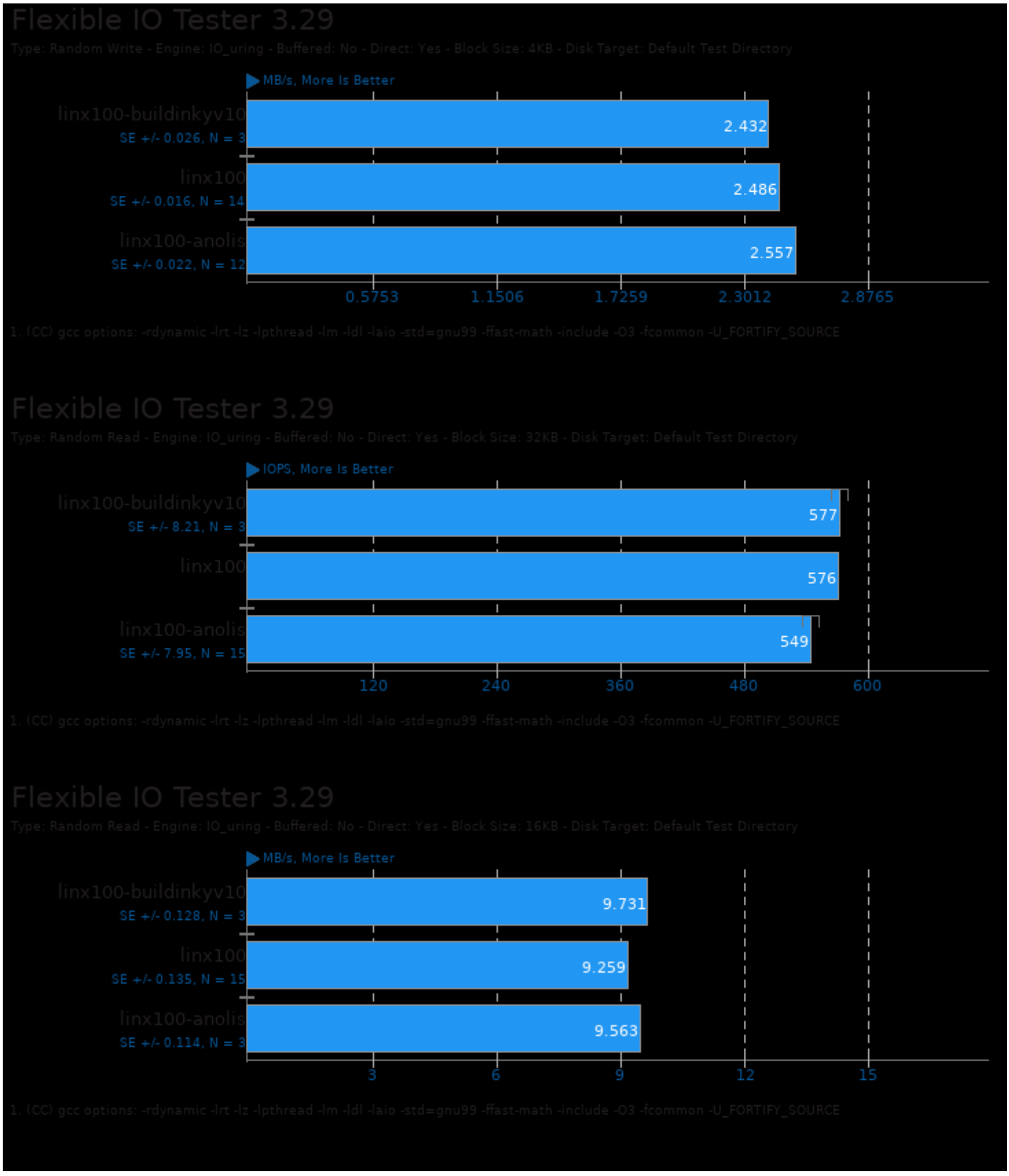
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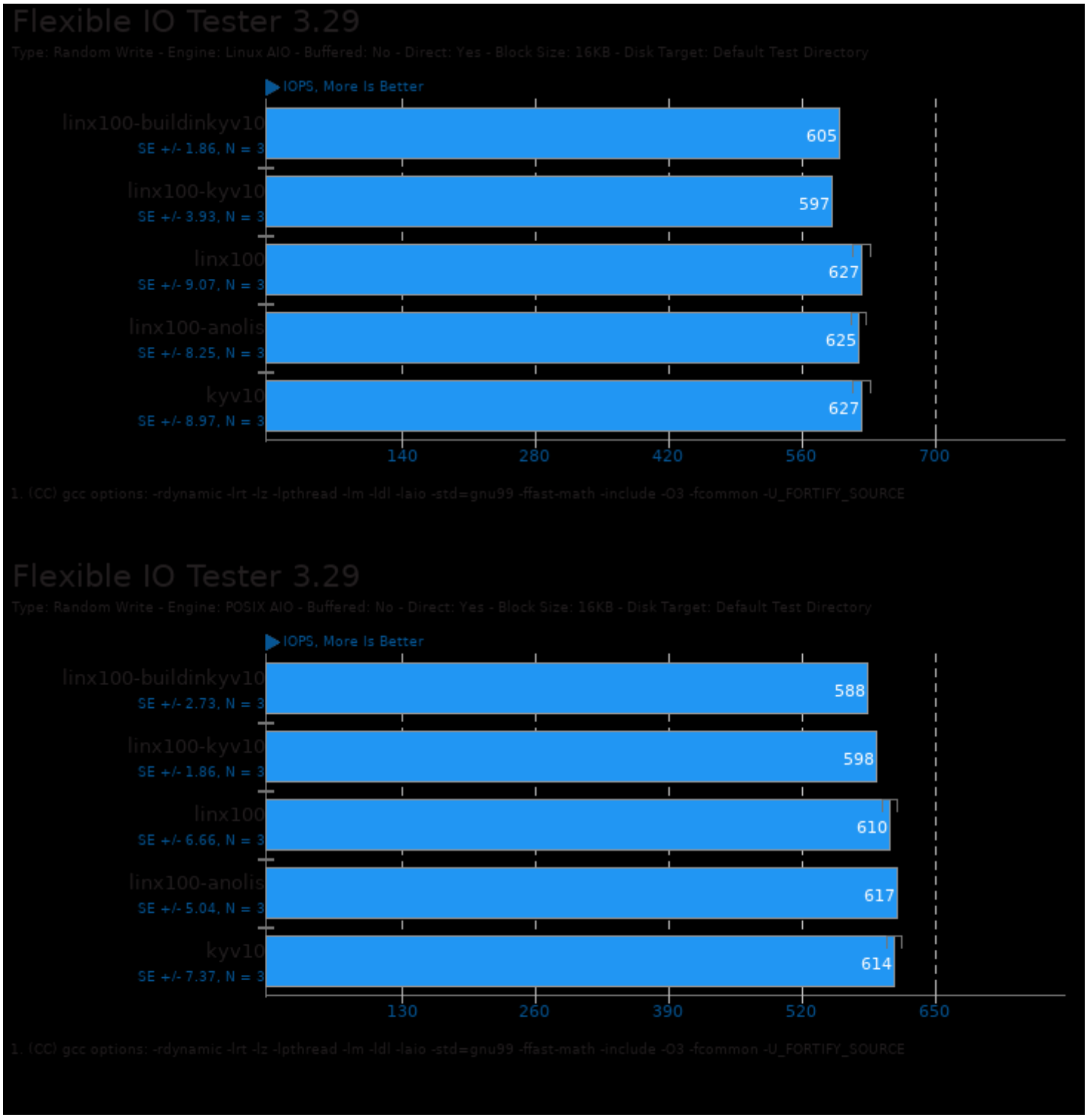
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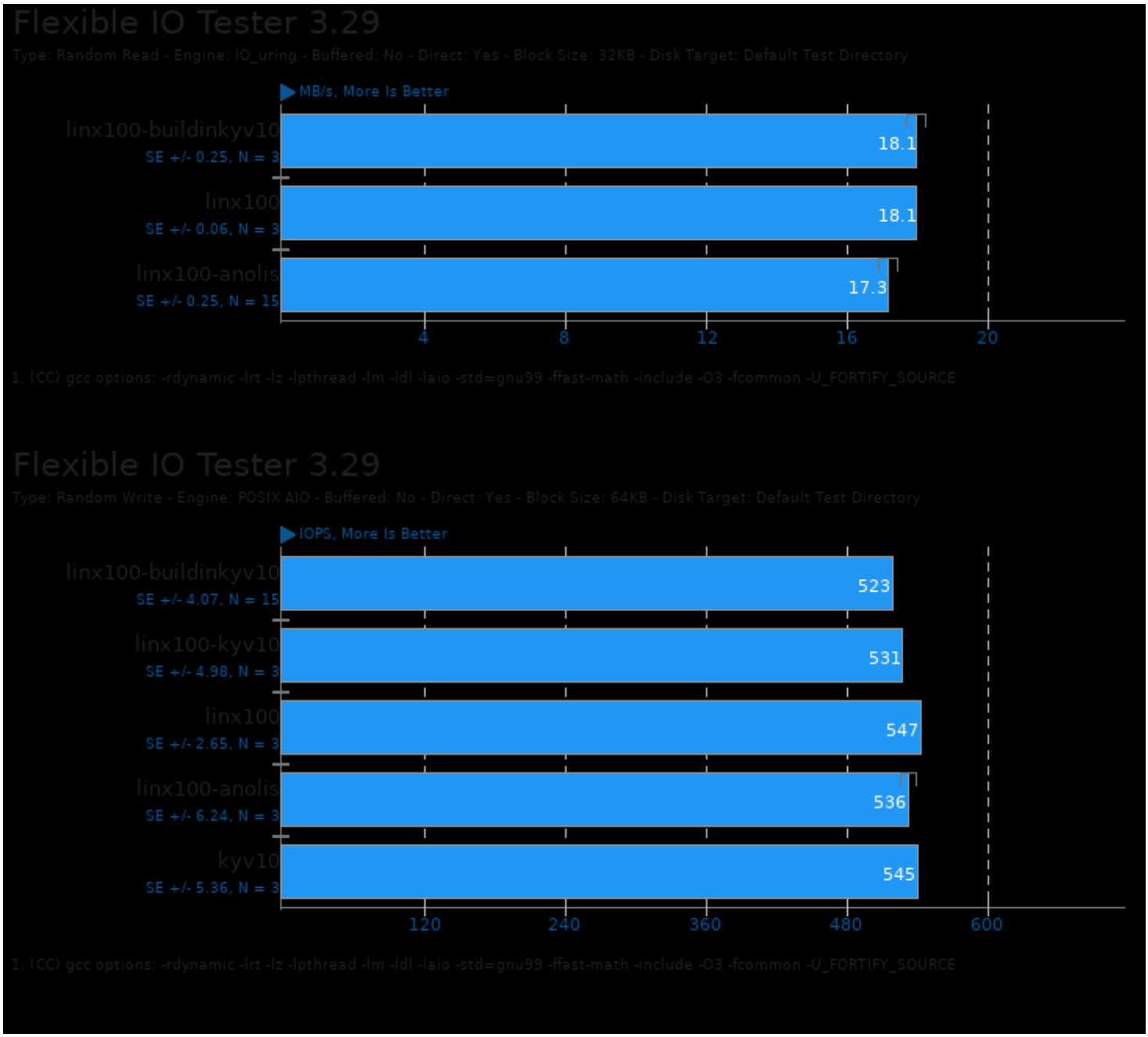
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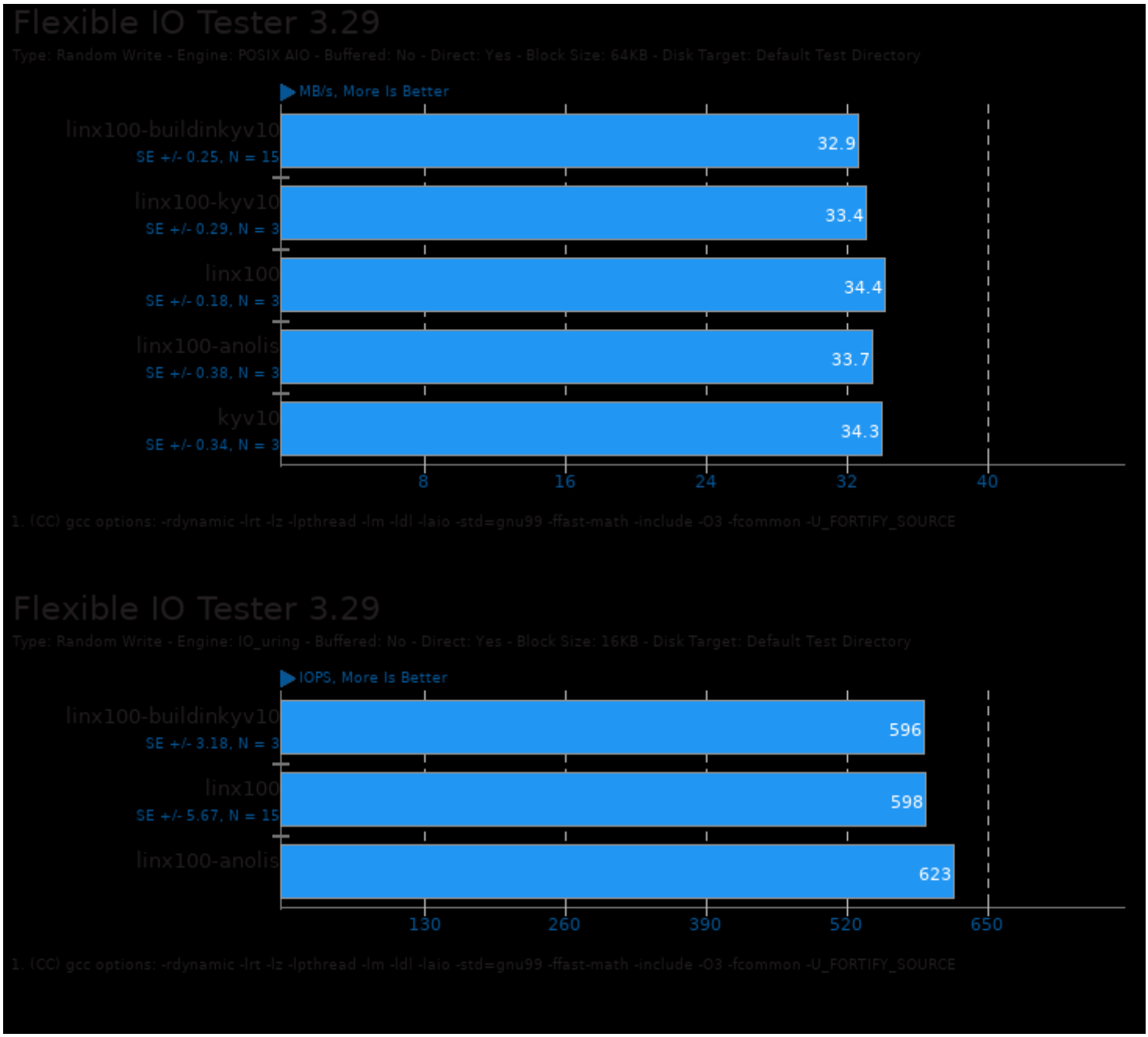
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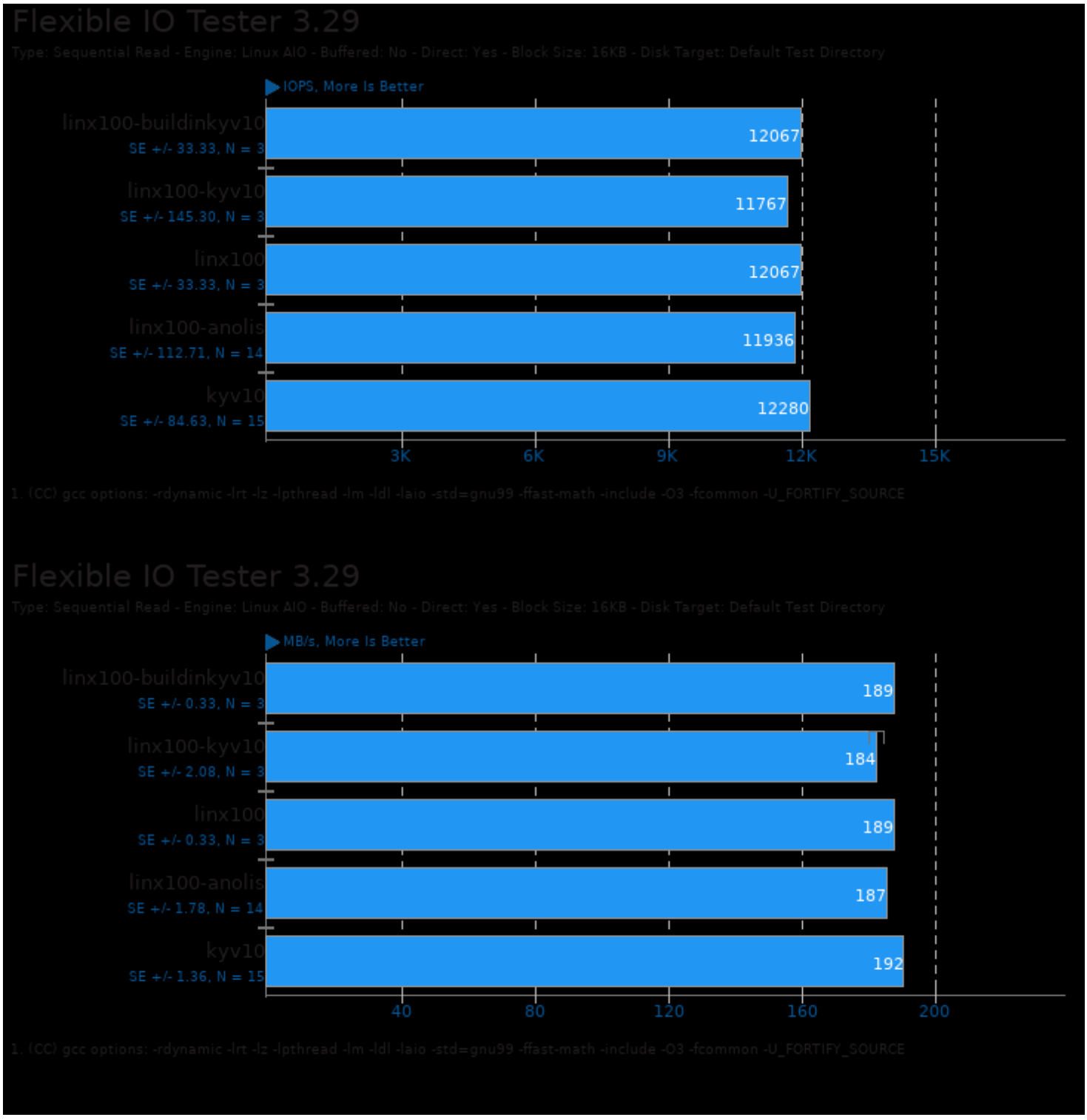
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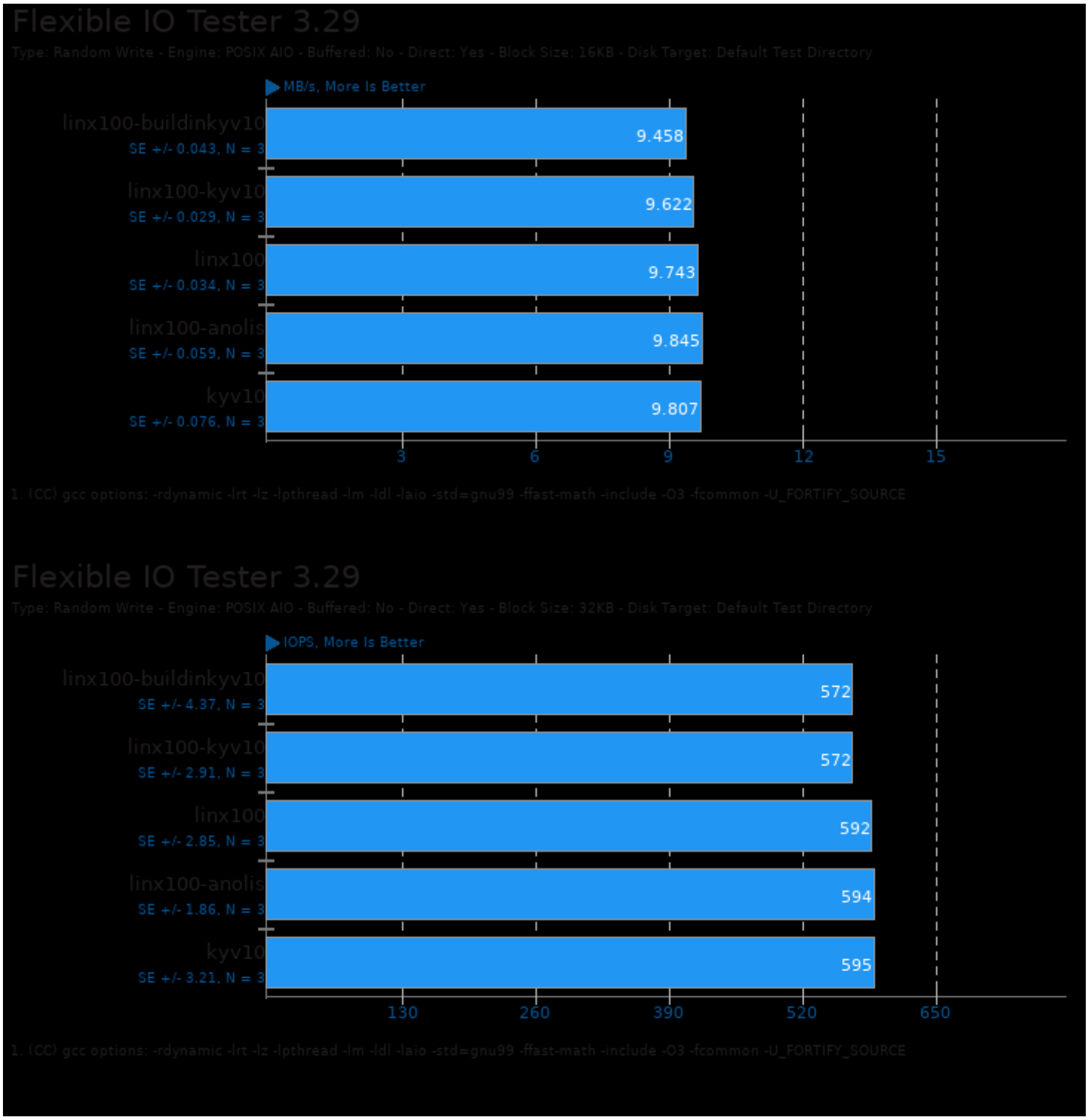


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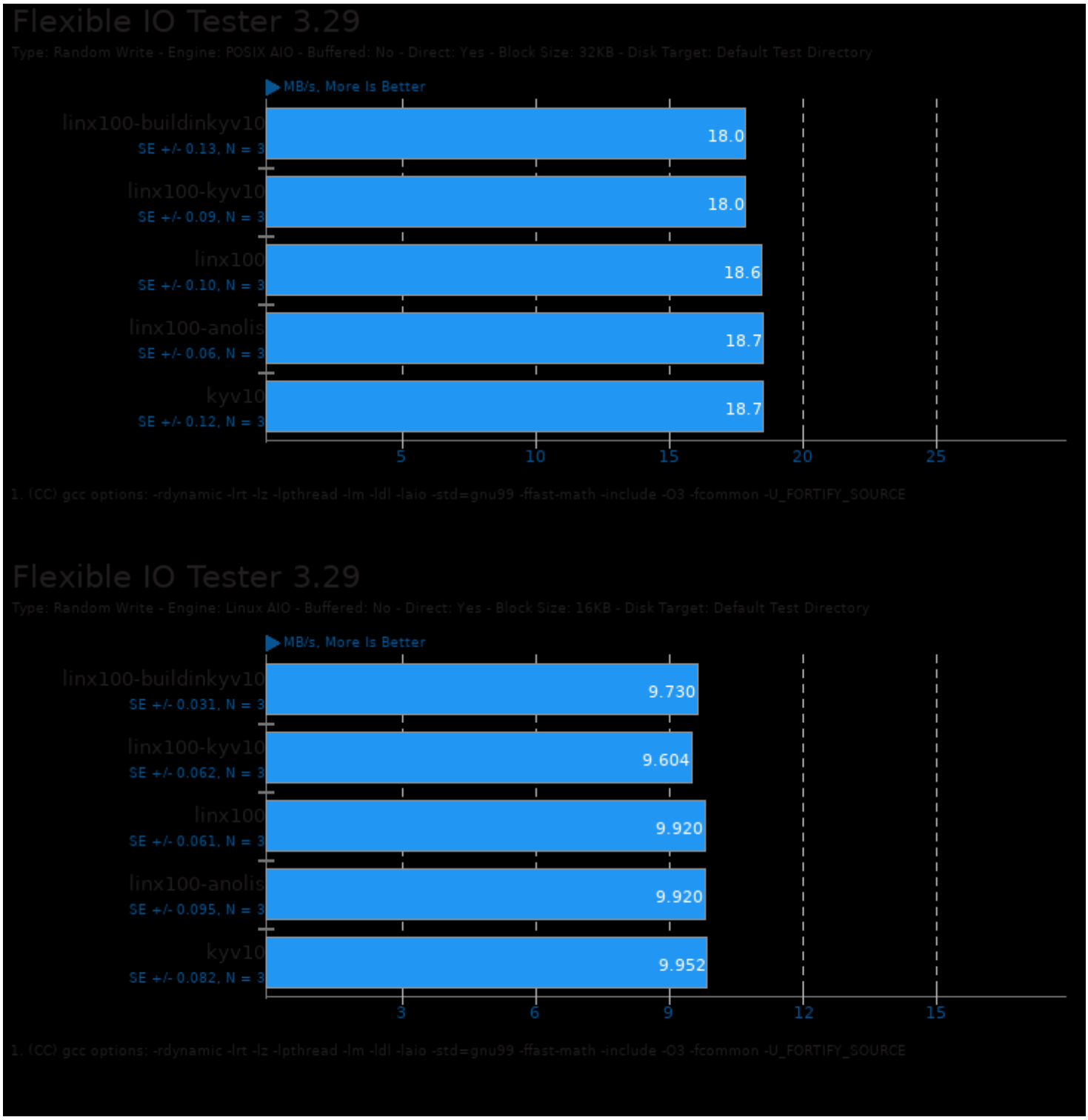


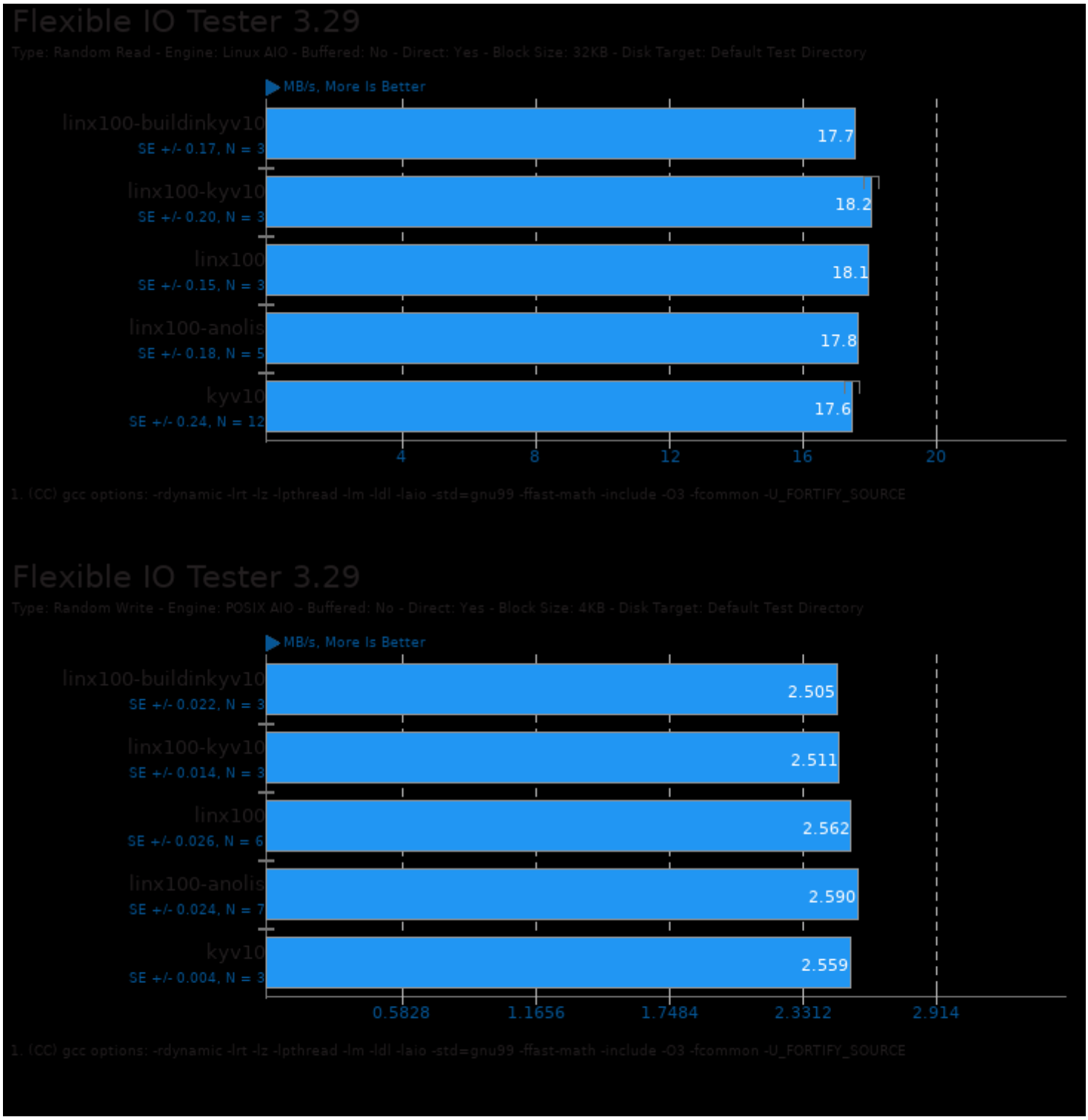
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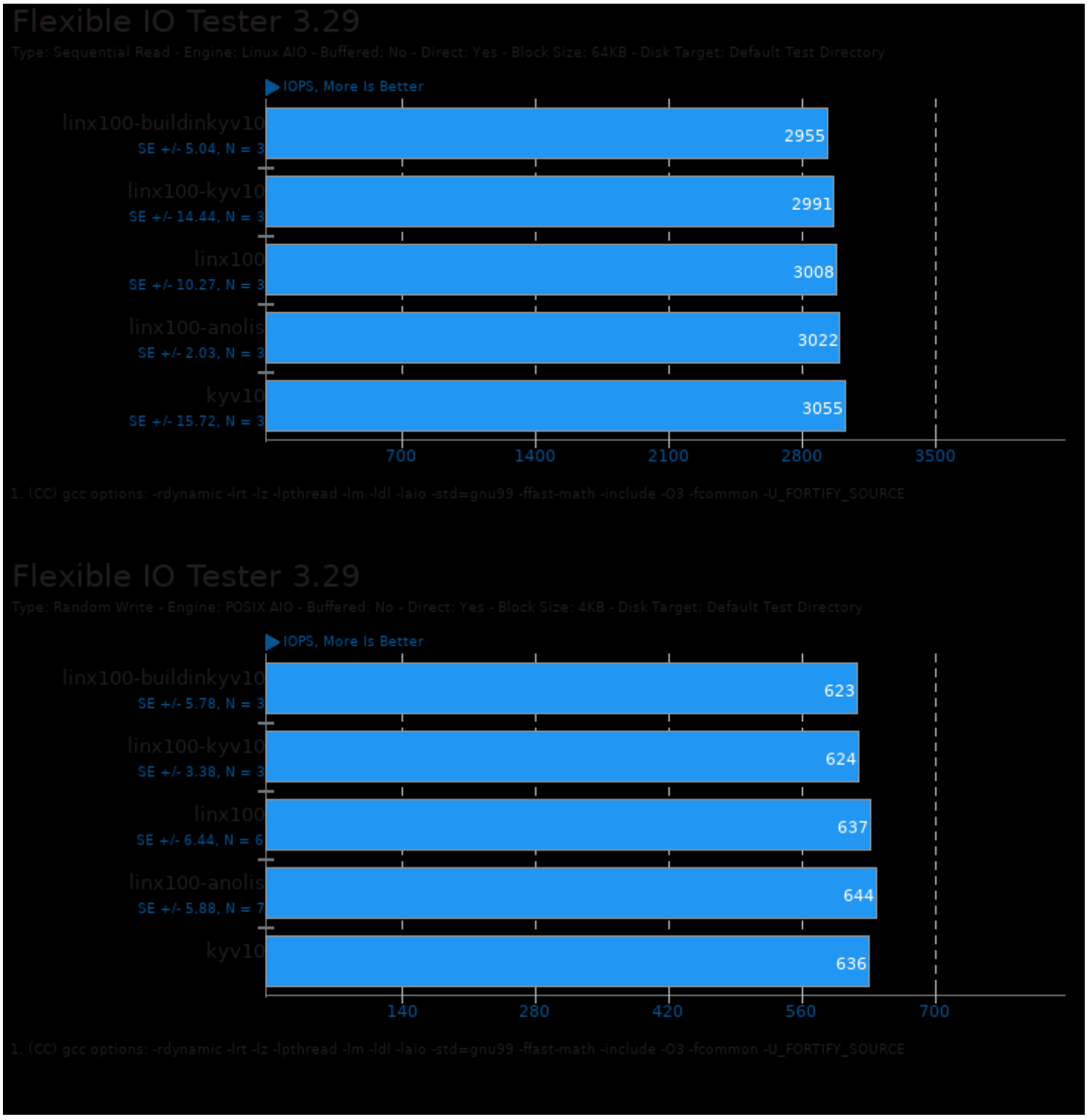

Flexible IO Tester 3.29
Type: Random Write - Engine: POSIX AIO - Buffered: No - Direct: Yes - Block Size: 16KB - Disk Target: Default Test Directory
MB/s, More Is Better
linx100-buildinkyv10
SE +/- 0.043, N = 3
9.458
linx100-kyv10
SE +/- 0.029, N = 3
9.622
linx100
SE +/- 0.034, N = 3
9.743
linx100-anolis
SE +/- 0.059, N = 3
9.845
kyv10
SE +/- 0.076, N = 3
9.807
3
6
9
12
15
1. (CC) gcc options: -rdynamic -lrt -lz -lpthread -lm -ldl -laio -std=gnu99 -ffast-math -include -O3 -fcommon -U_FORTIFY_SOURCE
Flexible IO Tester 3.29
Type: Random Write - Engine: POSIX AIO - Buffered: No - Direct: Yes - Block Size: 32KB - Disk Target: Default Test Directory
IOPS, More Is Better
linx100-buildinkyv10
SE +/- 4.37, N = 3
572
linx100-kyv10
SE +/- 2.91, N = 3
572
linx100
SE +/- 2.85, N = 3
592
linx100-anolis
SE +/- 1.86, N = 3
594
kyv10
SE +/- 3.21, N = 3
595
130
260
390
520
650
1. (CC) gcc options: -rdynamic -lrt -lz -lpthread -lm -ldl -laio -std=gnu99 -ffast-math -include -O3 -fcommon -U_FORTIFY_SOURCE

fio-performance

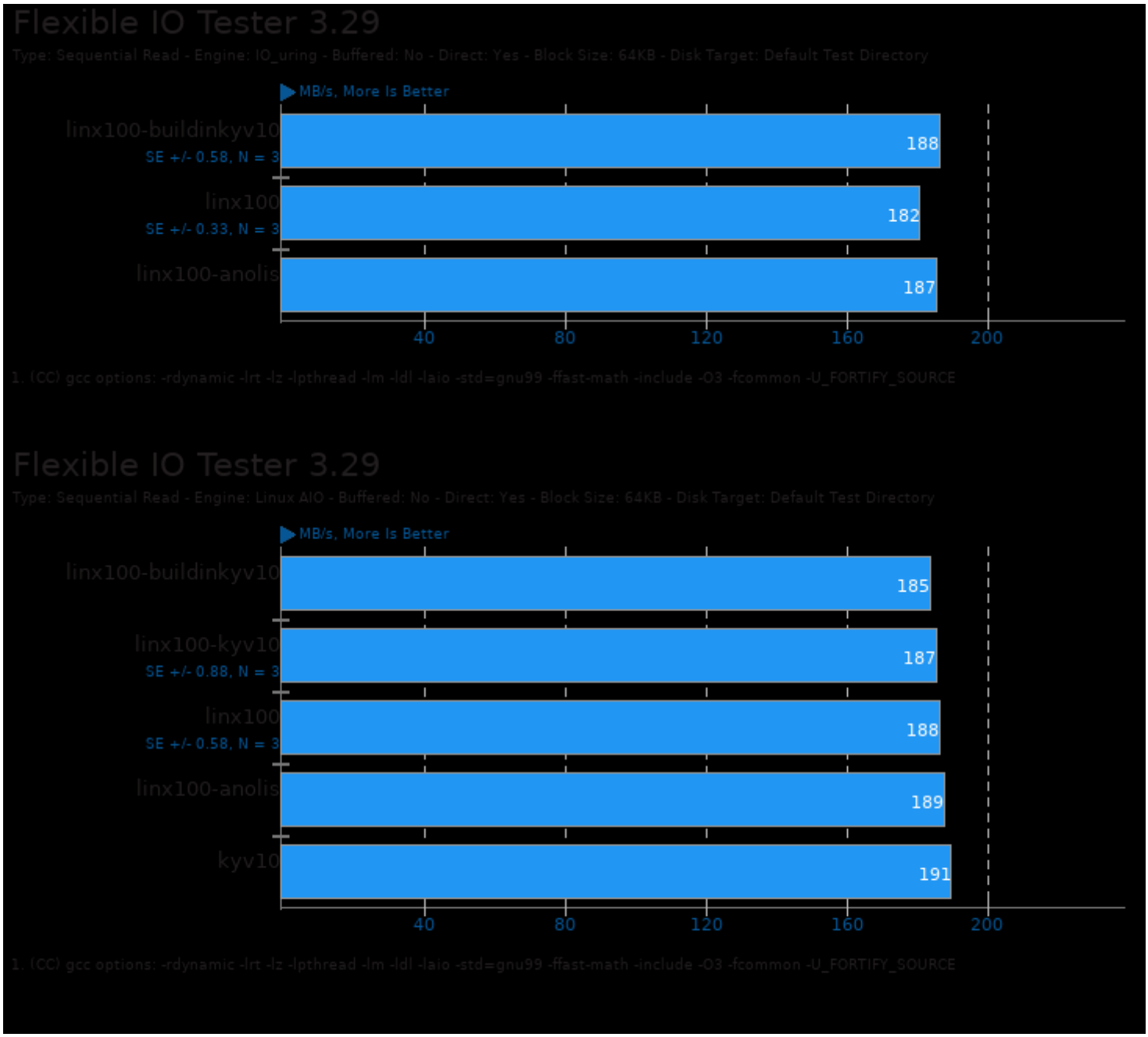



Flexible IO Tester 3.29
Type: Random Read - Engine: Linux AIO - Buffered: No - Direct: Yes - Block Size: 32KB - Disk Target: Default Test Directory
MB/s, More Is Better
linx100-buildinkyv10
SE +/- 0.17, N = 3
17.7
linx100-kyv10
SE +/- 0.20, N = 3
18.2
linx100
SE +/- 0.15, N = 3
18.1
linx100-anolis
SE +/- 0.18, N = 5
17.8
kyv10
SE +/- 0.24, N = 12
17.6
4
8
12
16
20
1. (CC) gcc options: -rdynamic -lrt -lz -lpthread -lm -ldl -laio -std=gnu99 -ffast-math -include -O3 -fcommon -U_FORTIFY_SOURCE
Flexible IO Tester 3.29
Type: Random Write - Engine: POSIX AIO - Buffered: No - Direct: Yes - Block Size: 4KB - Disk Target: Default Test Directory
MB/s, More Is Better
linx100-buildinkyv10
SE +/- 0.022, N = 3
2.505
linx100-kyv10
SE +/- 0.014, N = 3
2.511
linx100
SE +/- 0.026, N = 6
2.562
linx100-anolis
SE +/- 0.024, N = 7
2.590
kyv10
SE +/- 0.004, N = 3
2.559
0.5828
1.1656
1.7484
2.3312
2.914
1. (CC) gcc options: -rdynamic -lrt -lz -lpthread -lm -ldl -laio -std=gnu99 -ffast-math -include -O3 -fcommon -U_FORTIFY_SOURCE

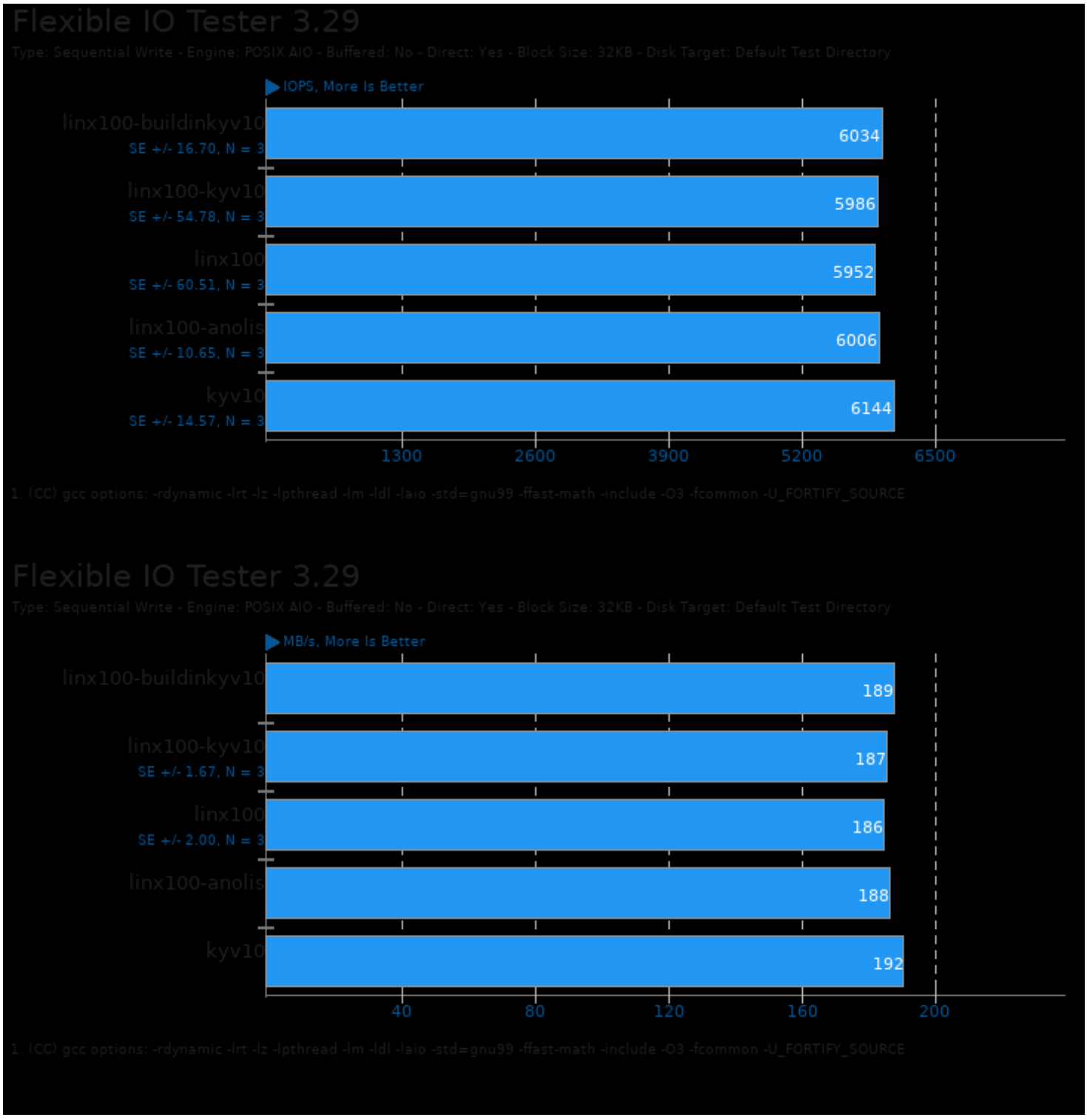
fio-performance



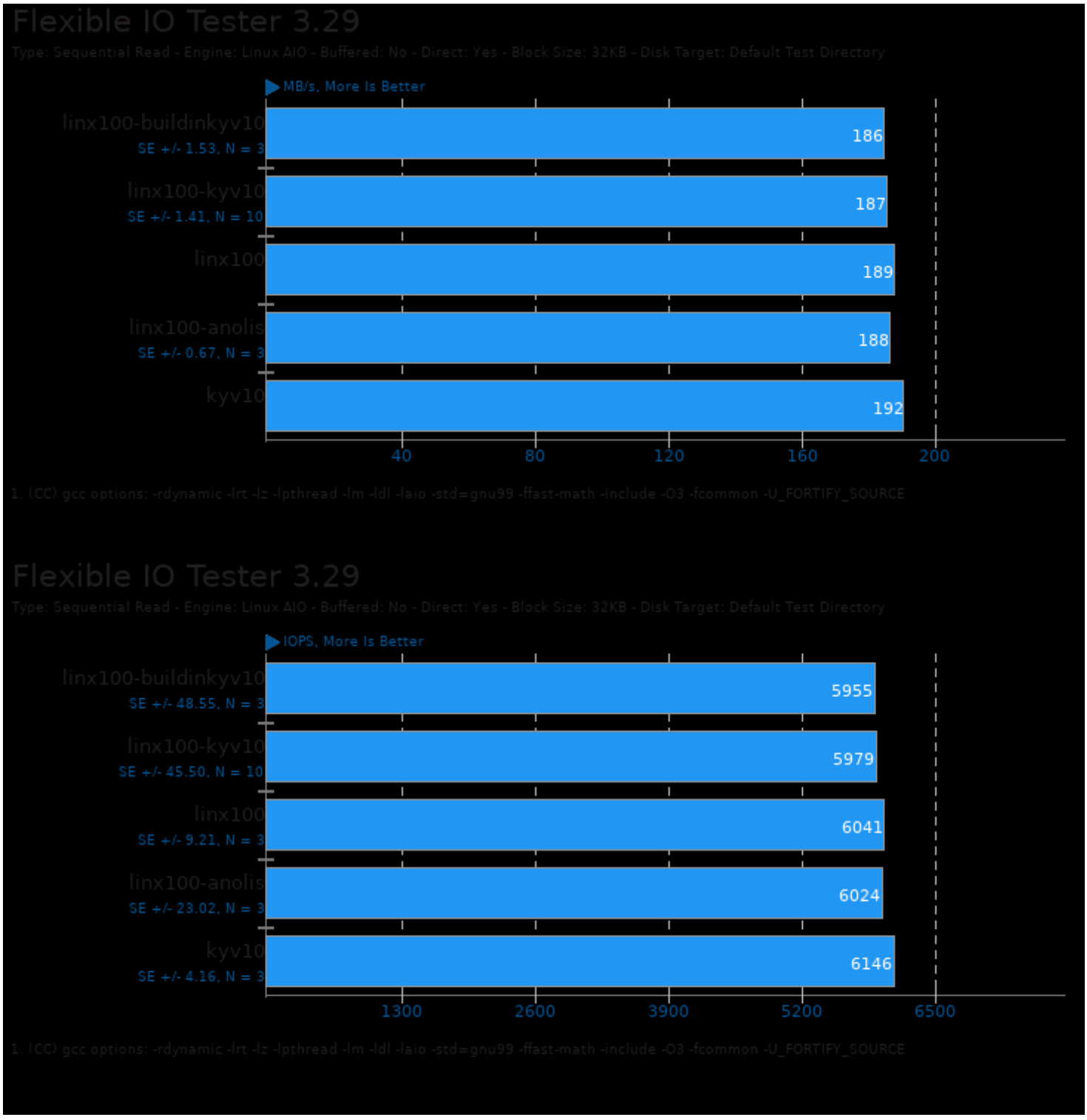
fio-performance



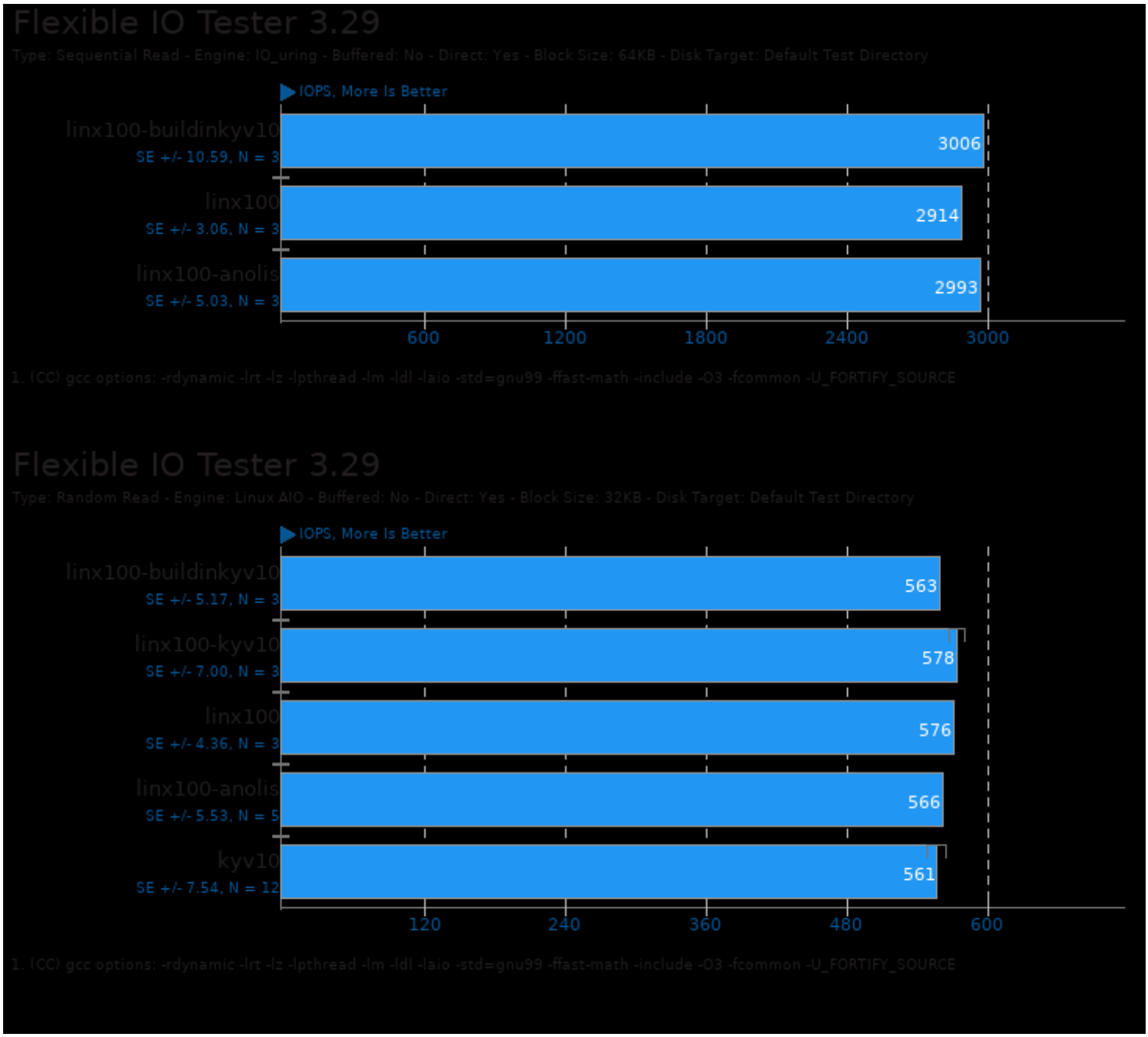
fio-performance



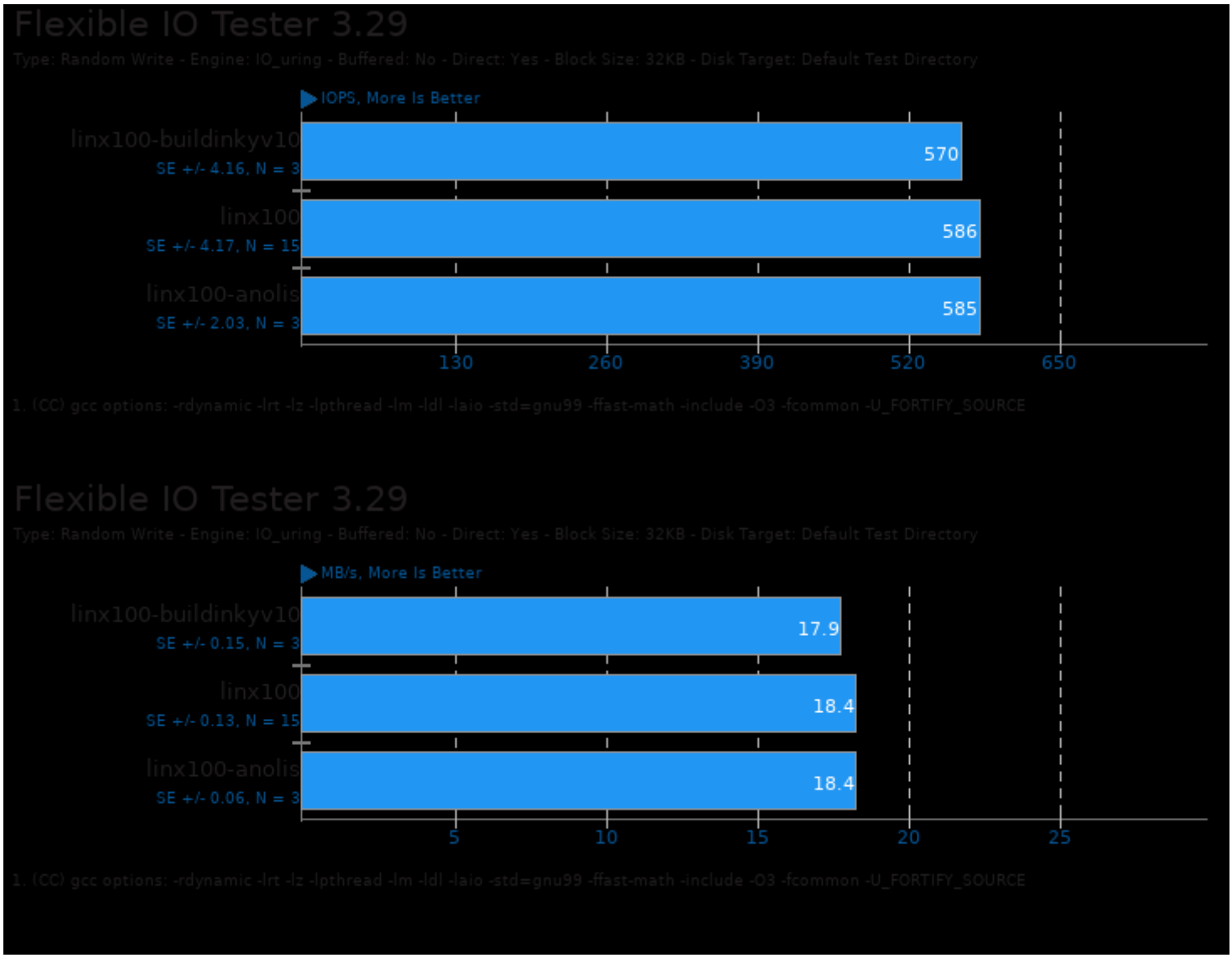
fio-performance



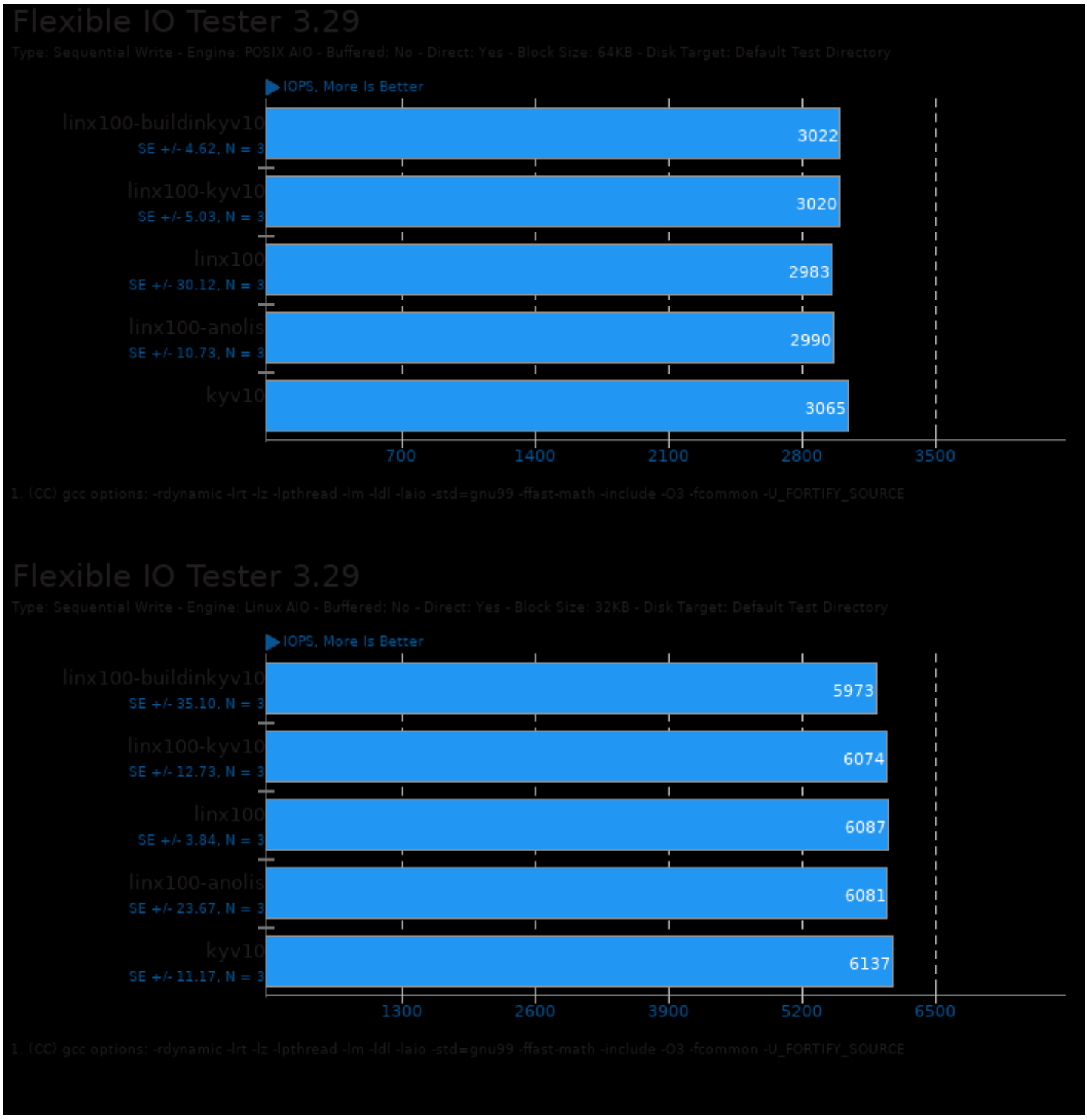
fio-performance



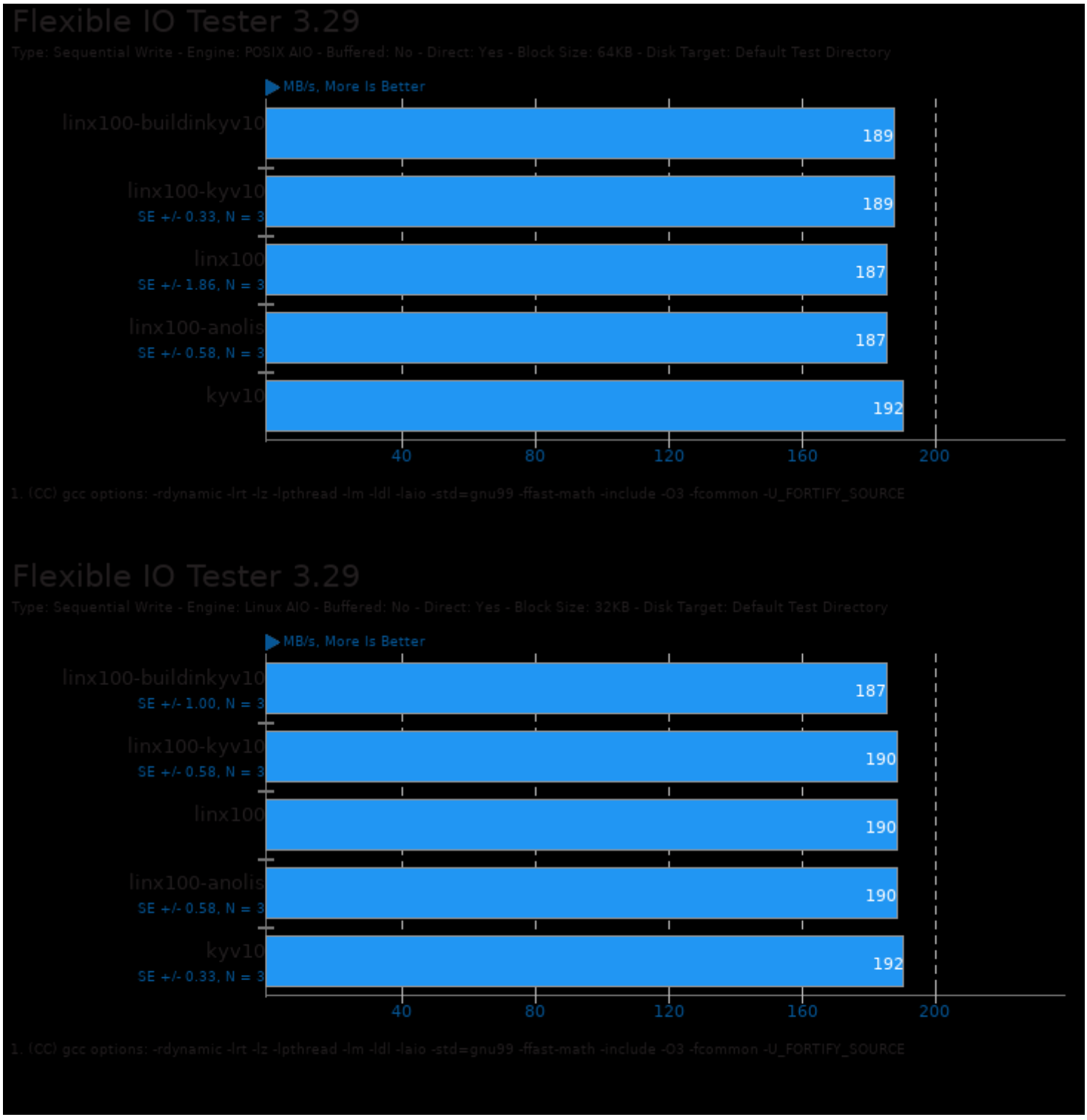
fio-performance



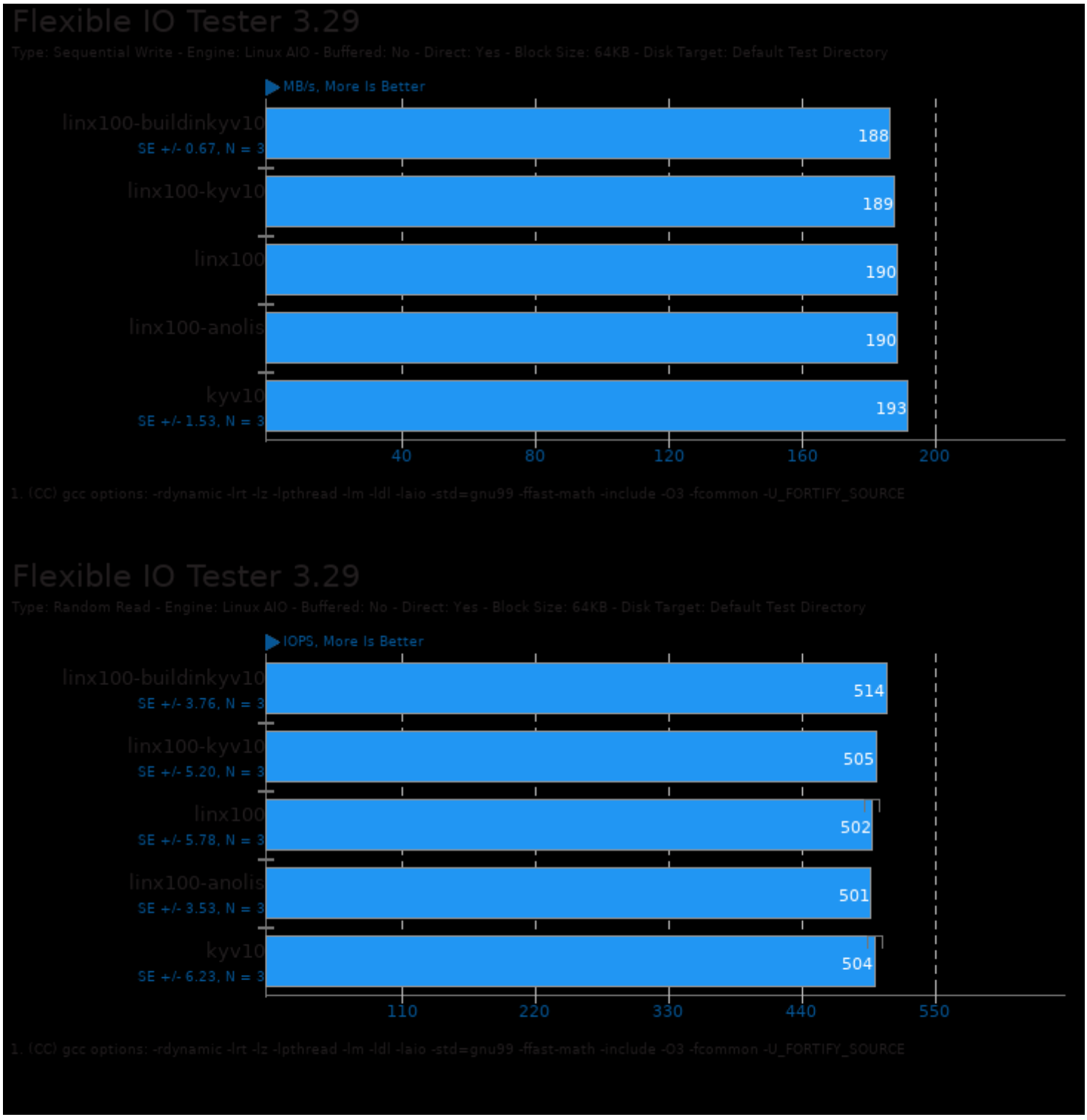
fio-performance



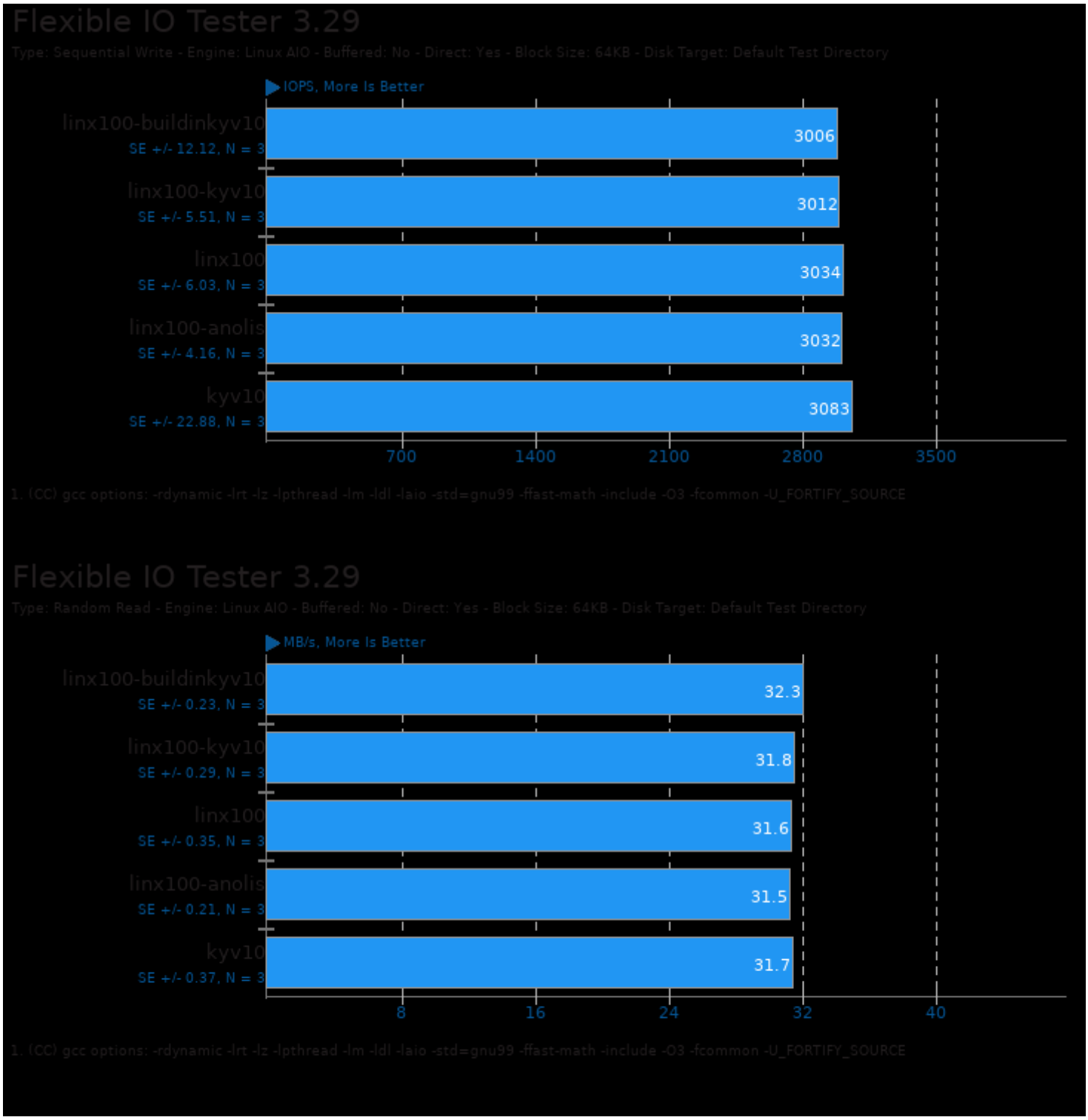
fio-performance



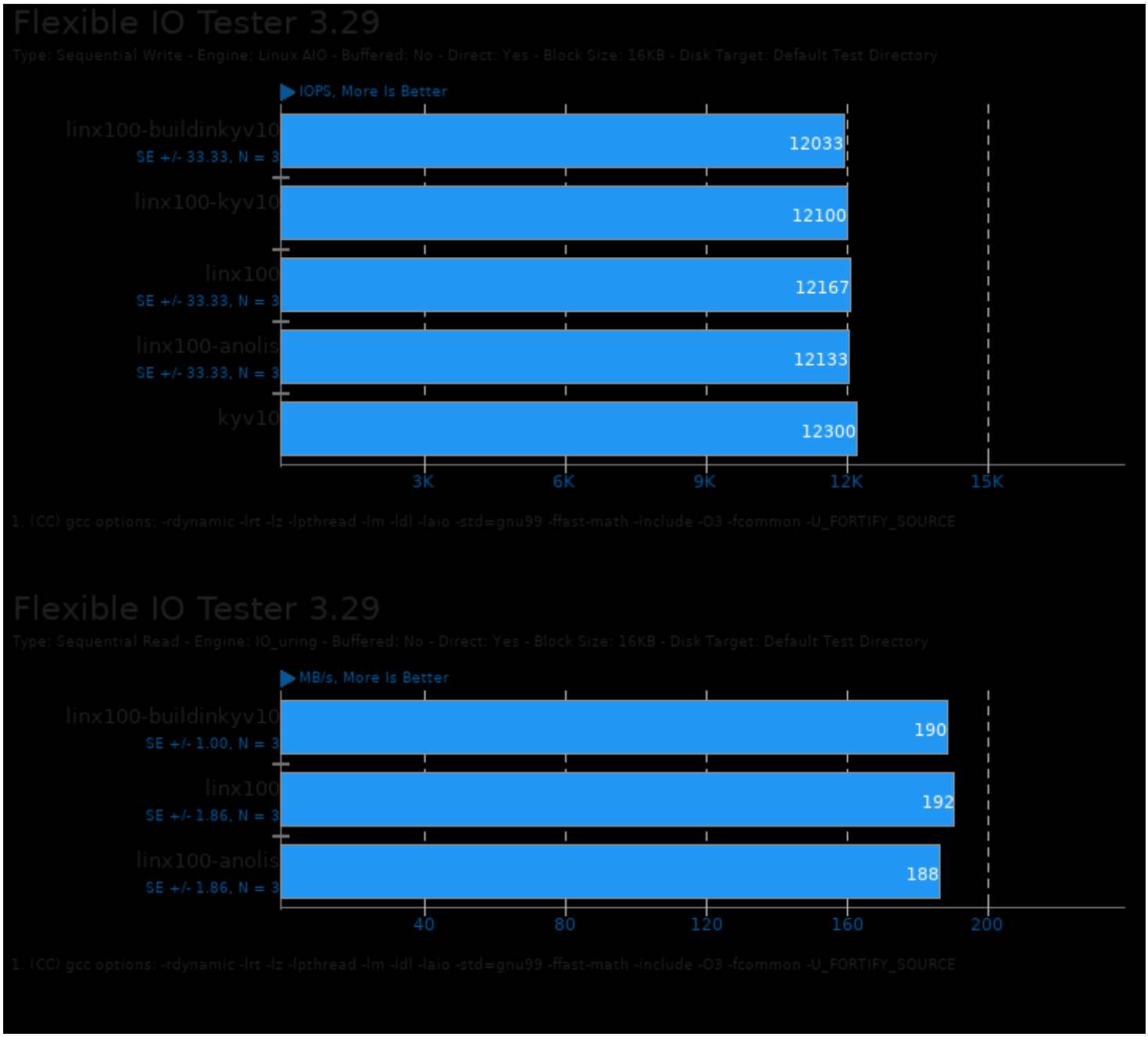
fio-performance



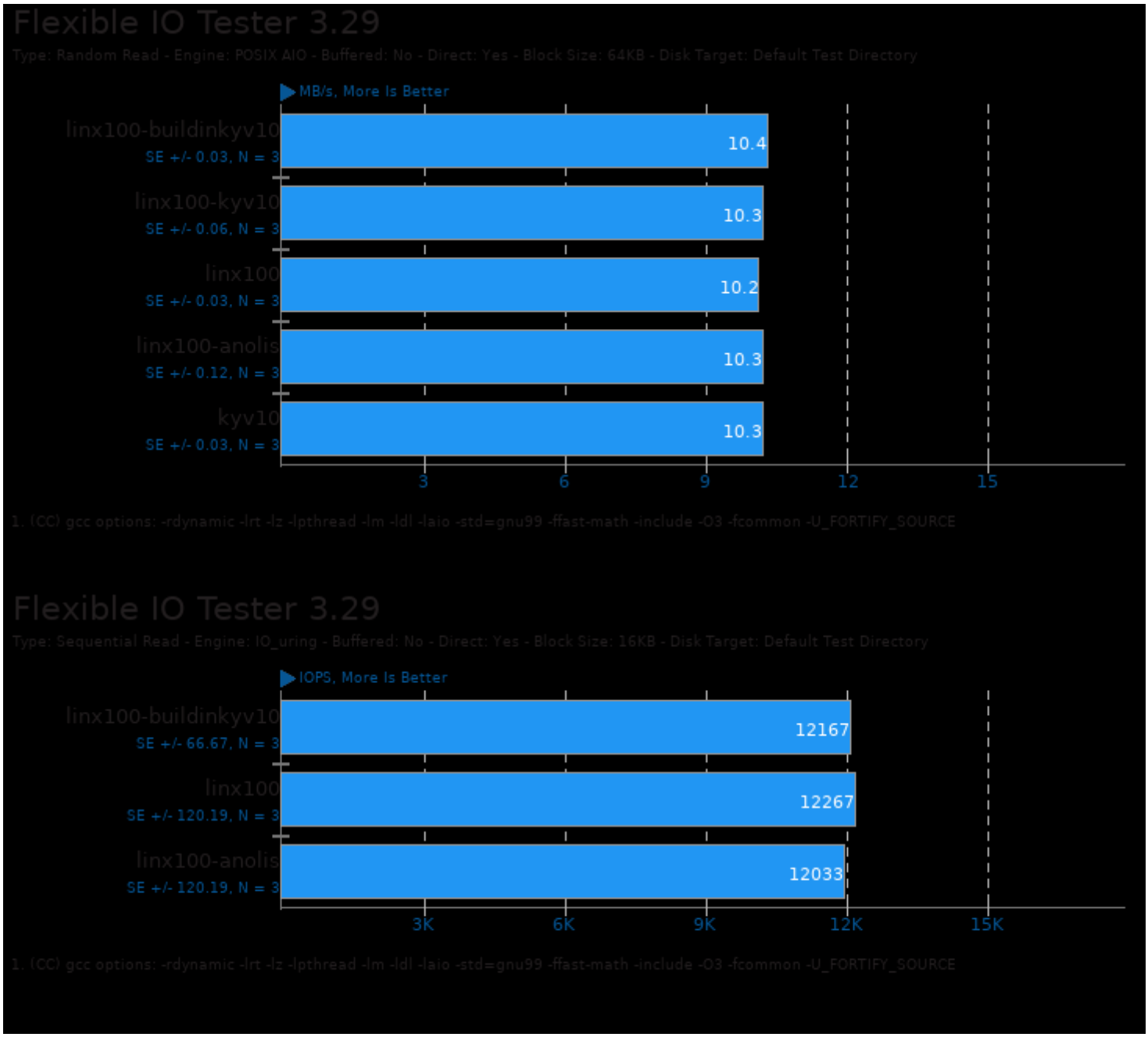
fio-performance



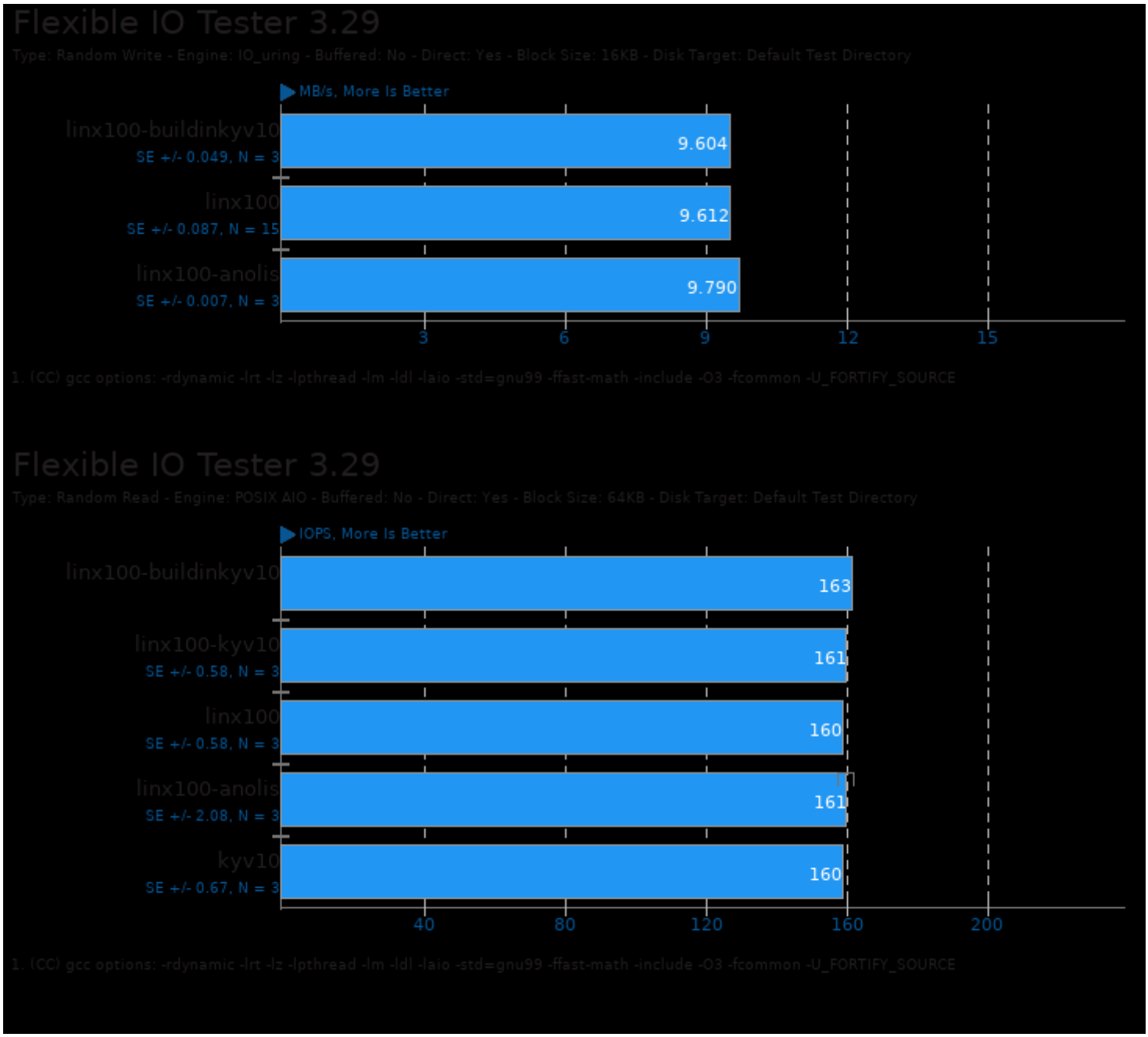
fio-performance



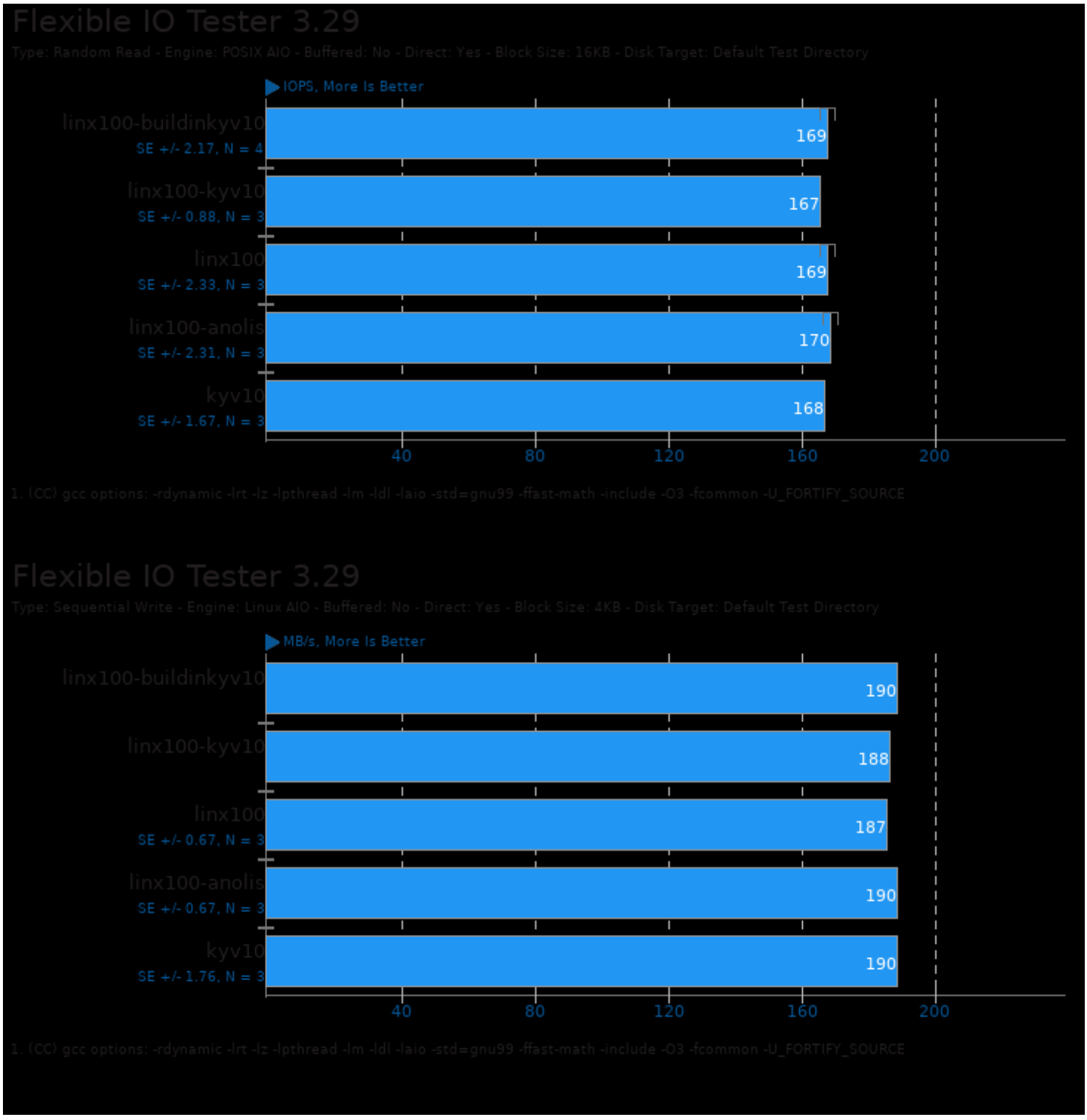
fio-performance

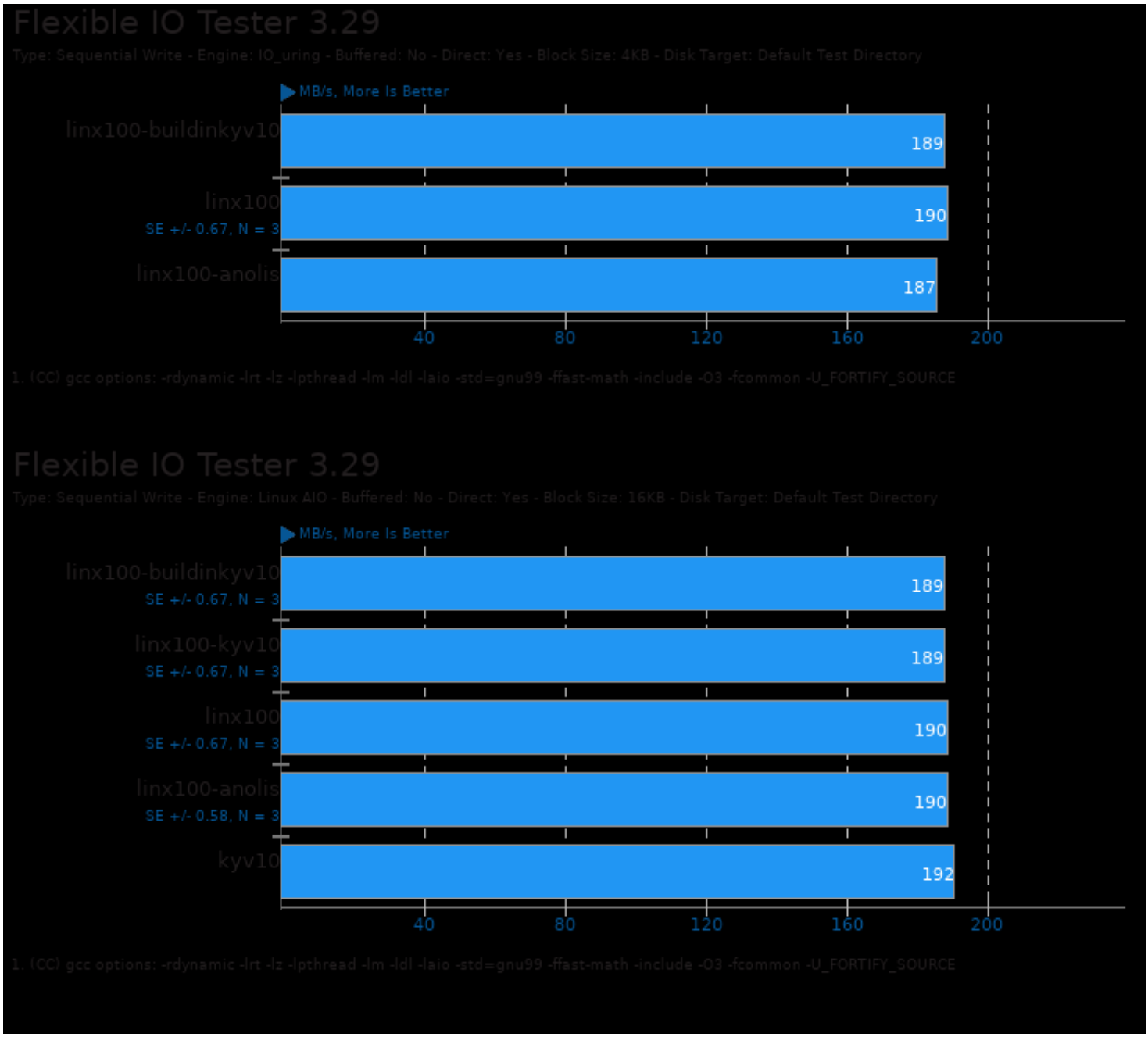


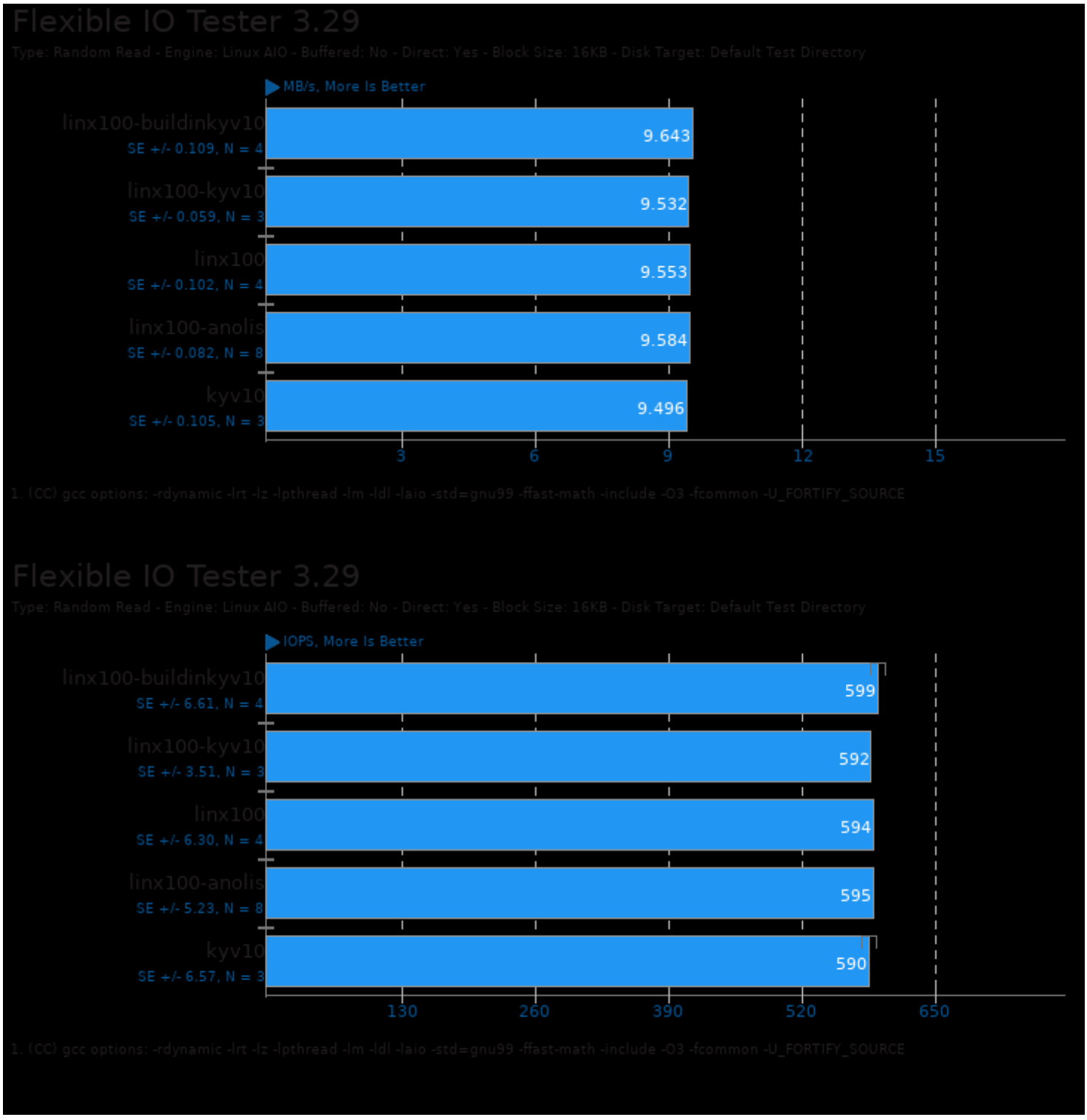
fio-performance



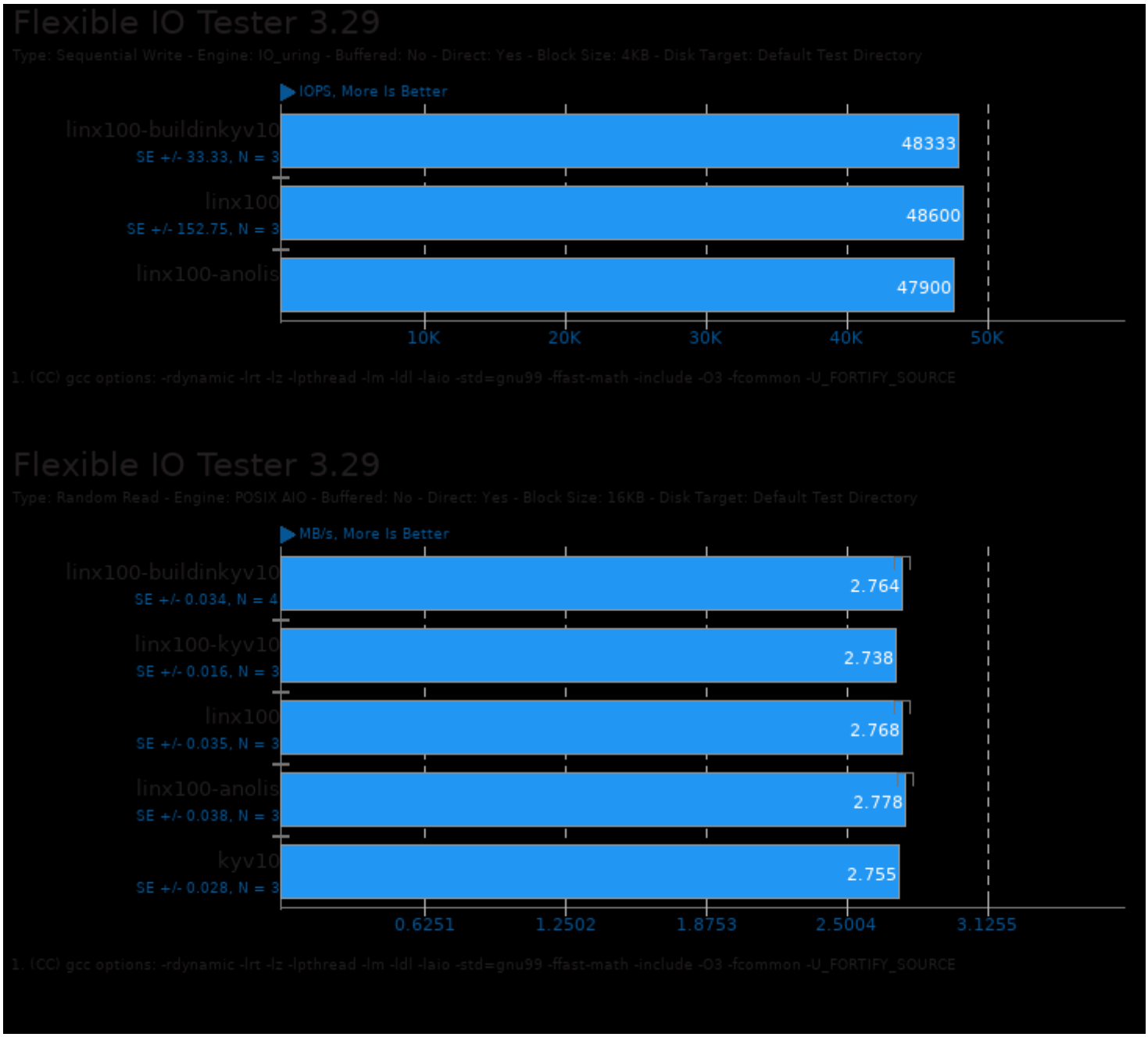
fio-performance

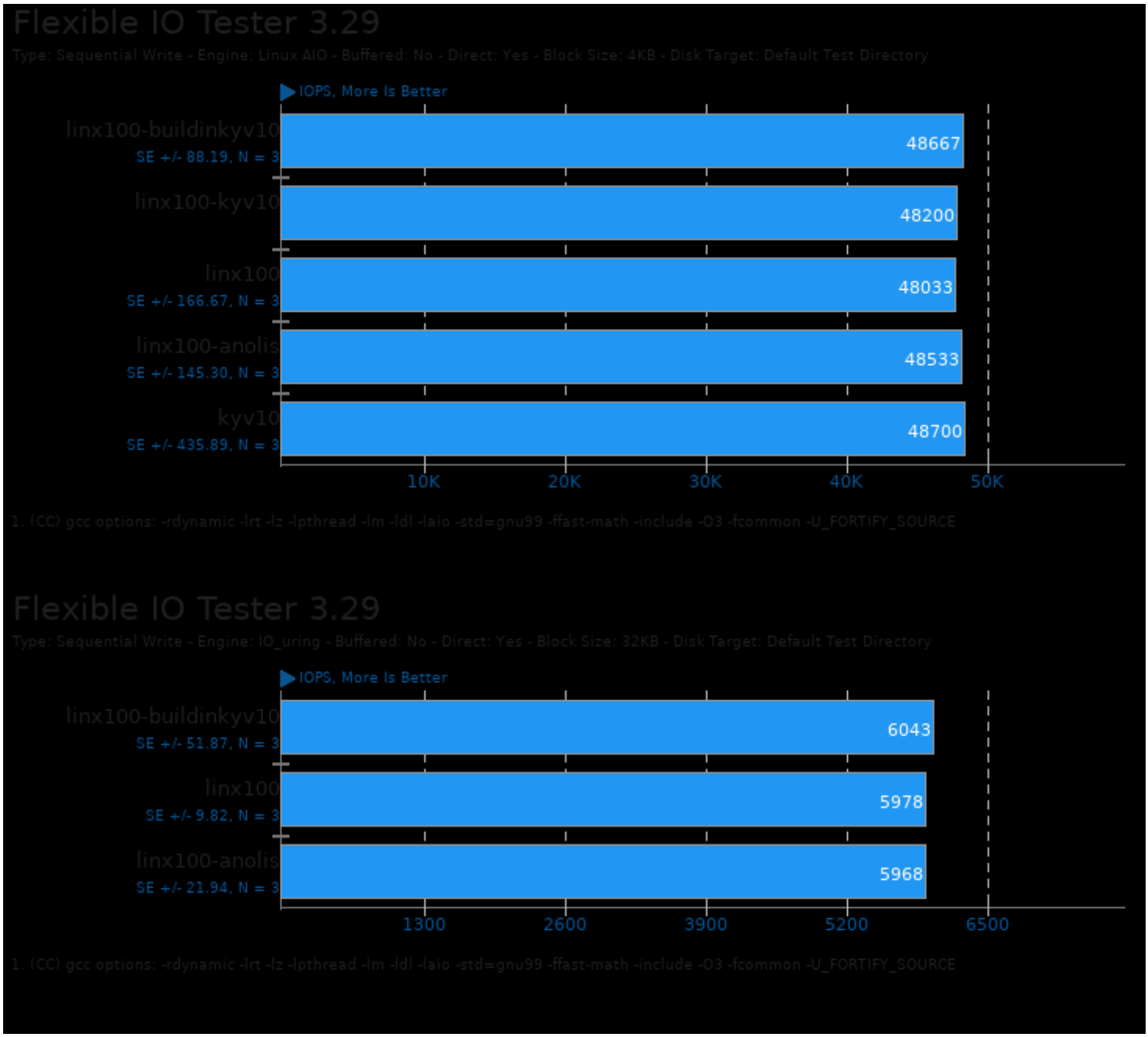


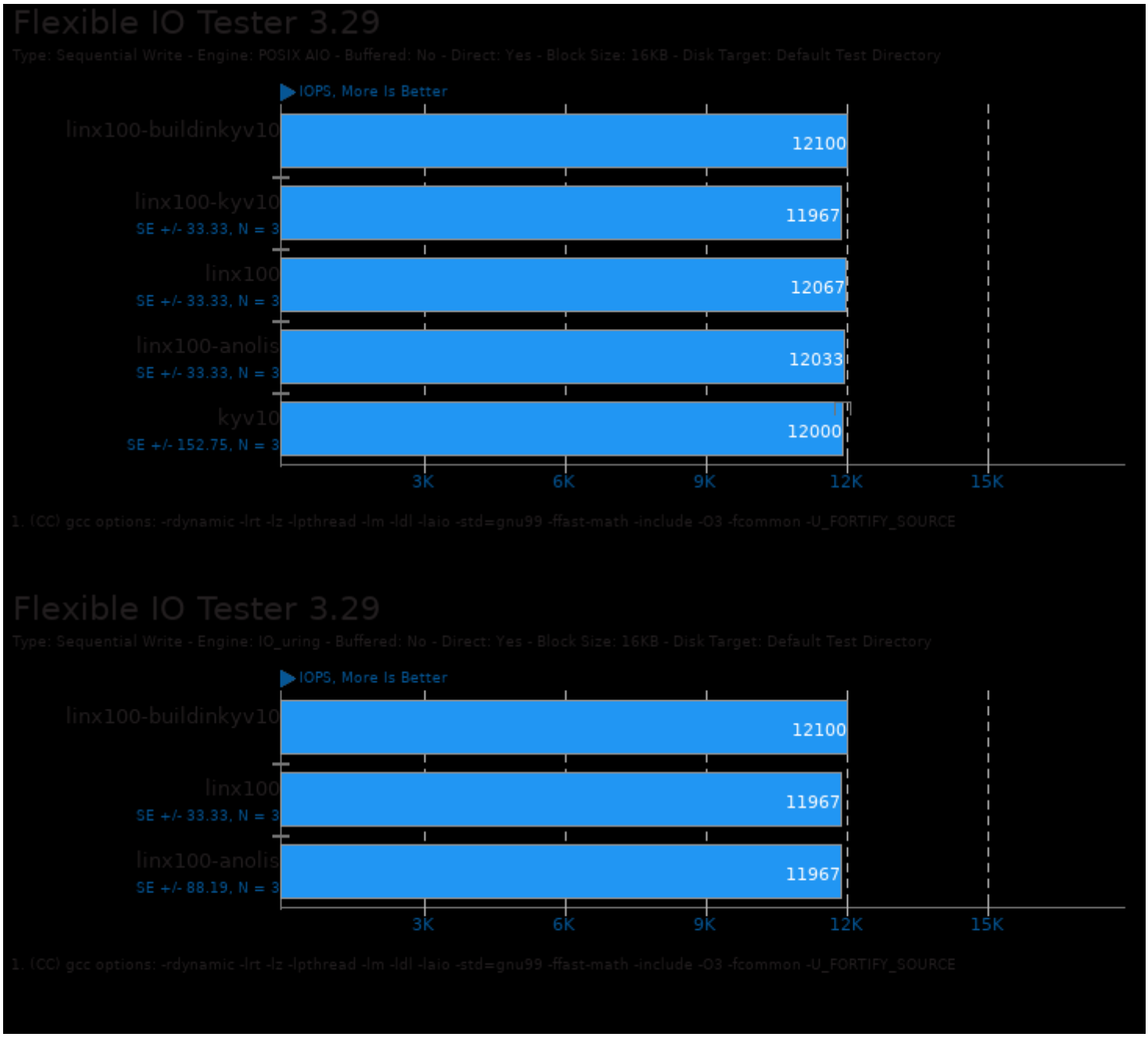

Flexible IO Tester 3.29
Type: Sequential Write - Engine: IO_uring - Buffered: No - Direct: Yes - Block Size: 4KB - Disk Target: Default Test Directory
MB/s, More Is Better
linx100-buildinkyv10
189
linx100
SE +/- 0.67, N = 3
190
linx100-anolis
187
40
80
120
160
200
1. (CC) gcc options: -rdynamic -lrt -lz -lpthread -lm -ldl -laio -std=gnu99 -ffast-math -include -O3 -fcommon -U_FORTIFY_SOURCE
Flexible IO Tester 3.29
Type: Sequential Write - Engine: Linux AIO - Buffered: No - Direct: Yes - Block Size: 16KB - Disk Target: Default Test Directory
MB/s, More Is Better
linx100-buildinkyv10
SE +/- 0.67, N = 3
189
linx100-kyv10
SE +/- 0.67, N = 3
189
linx100
SE +/- 0.67, N = 3
190
linx100-anolis
SE +/- 0.58, N = 3
190
kyv10
192
40
80
120
160
200
1. (CC) gcc options: -rdynamic -lrt -lz -lpthread -lm -ldl -laio -std=gnu99 -ffast-math -include -O3 -fcommon -U_FORTIFY_SOURCE


Flexible IO Tester 3.29
Type: Random Read - Engine: Linux AIO - Buffered: No - Direct: Yes - Block Size: 16KB - Disk Target: Default Test Directory
MB/s, More Is Better
linx100-buildinkyv10
SE +/- 0.109, N = 4
9.643
linx100-kyv10
SE +/- 0.059, N = 3
9.532
linx100
SE +/- 0.102, N = 4
9.553
linx100-anolis
SE +/- 0.082, N = 8
9.584
kyv10
SE +/- 0.105, N = 3
9.496
3
6
9
12
15
1. (CC) gcc options: -rdynamic -lrt -lz -lpthread -lm -ldl -laio -std=gnu99 -ffast-math -include -O3 -fcommon -U_FORTIFY_SOURCE
Flexible IO Tester 3.29
Type: Random Read - Engine: Linux AIO - Buffered: No - Direct: Yes - Block Size: 16KB - Disk Target: Default Test Directory
IOPS, More Is Better
linx100-buildinkyv10
SE +/- 6.61, N = 4
599
linx100-kyv10
SE +/- 3.51, N = 3
592
linx100
SE +/- 6.30, N = 4
594
linx100-anolis
SE +/- 5.23, N = 8
595
kyv10
SE +/- 6.57, N = 3
590
130
260
390
520
650
1. (CC) gcc options: -rdynamic -lrt -lz -lpthread -lm -ldl -laio -std=gnu99 -ffast-math -include -O3 -fcommon -U_FORTIFY_SOURCE

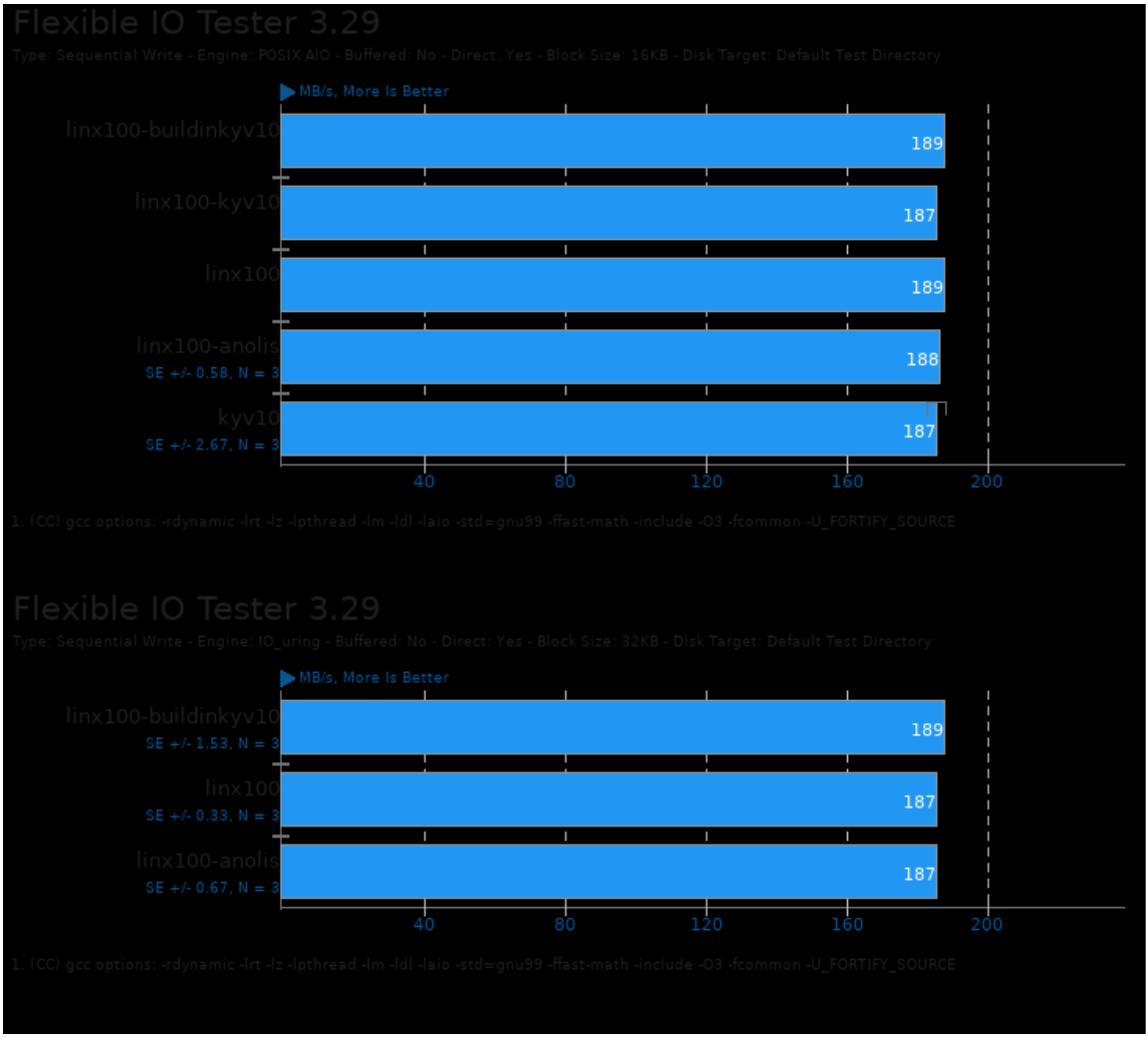
fio-performance



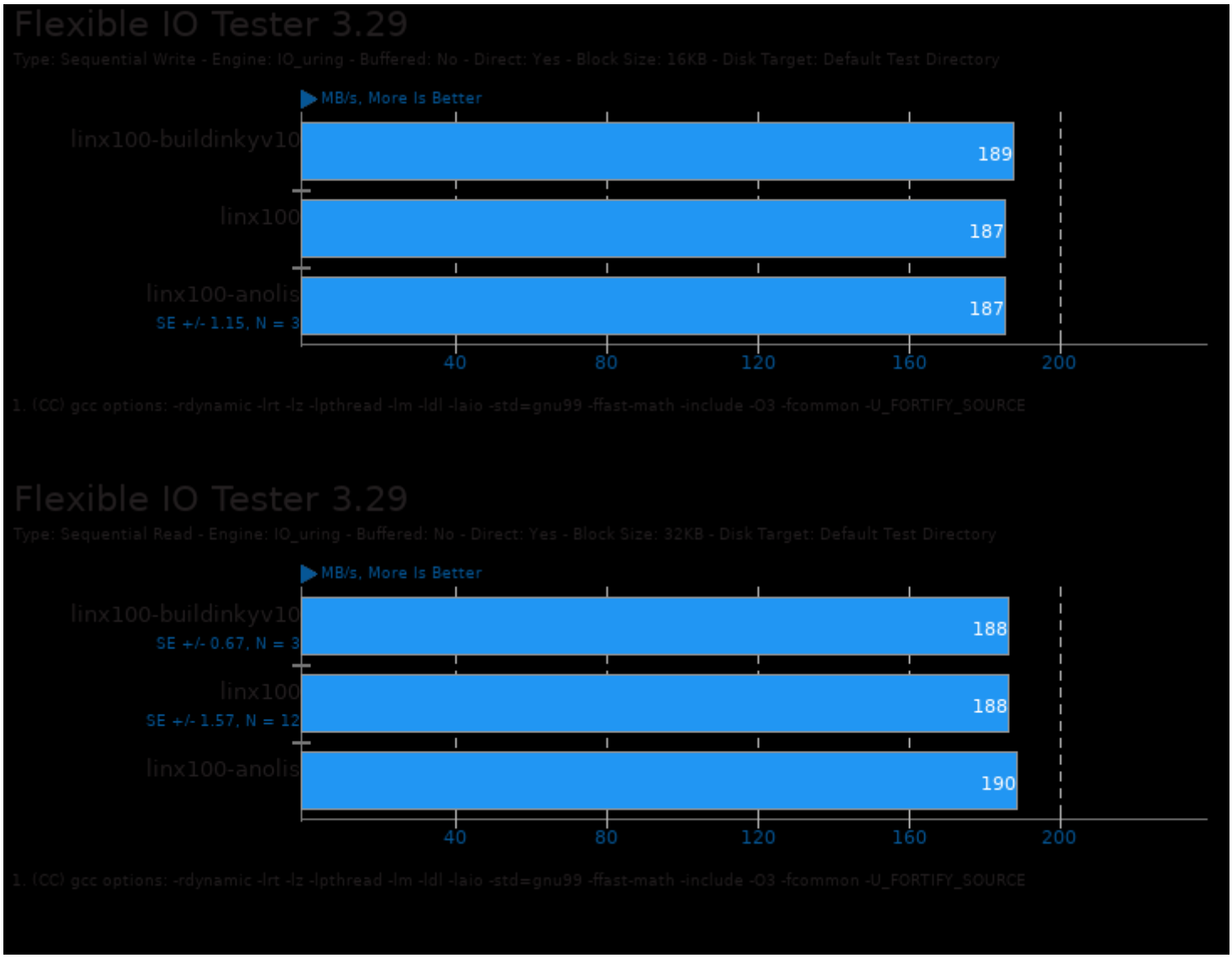

Flexible IO Tester 3.29
Type: Sequential Write - Engine: Linux AIO - Buffered: No - Direct: Yes - Block Size: 4KB - Disk Target: Default Test Directory
IOPS, More Is Better
linx100-buildinkyv10
SE +/- 88.19, N = 3
48667
linx100-kyv10
48200
linx100
SE +/- 166.67, N = 3
48033
linx100-anolis
SE +/- 145.30, N = 3
48533
kyv10
SE +/- 435.89, N = 3
48700
10K
20K
30K
40K
50K
1. (CC) gcc options: -rdynamic -lrt -lz -lpthread -lm -ldl -laio -std=gnu99 -ffast-math -include -O3 -fcommon -U_FORTIFY_SOURCE
Flexible IO Tester 3.29
Type: Sequential Write - Engine: IO_uring - Buffered: No - Direct: Yes - Block Size: 32KB - Disk Target: Default Test Directory
IOPS, More Is Better
linx100-buildinkyv10
SE +/- 51.87, N = 3
6043
linx100
SE +/- 9.82, N = 3
5978
linx100-anolis
SE +/- 21.94, N = 3
5968
1300
2600
3900
5200
6500
1. (CC) gcc options: -rdynamic -lrt -lz -lpthread -lm -ldl -laio -std=gnu99 -ffast-math -include -O3 -fcommon -U_FORTIFY_SOURCE

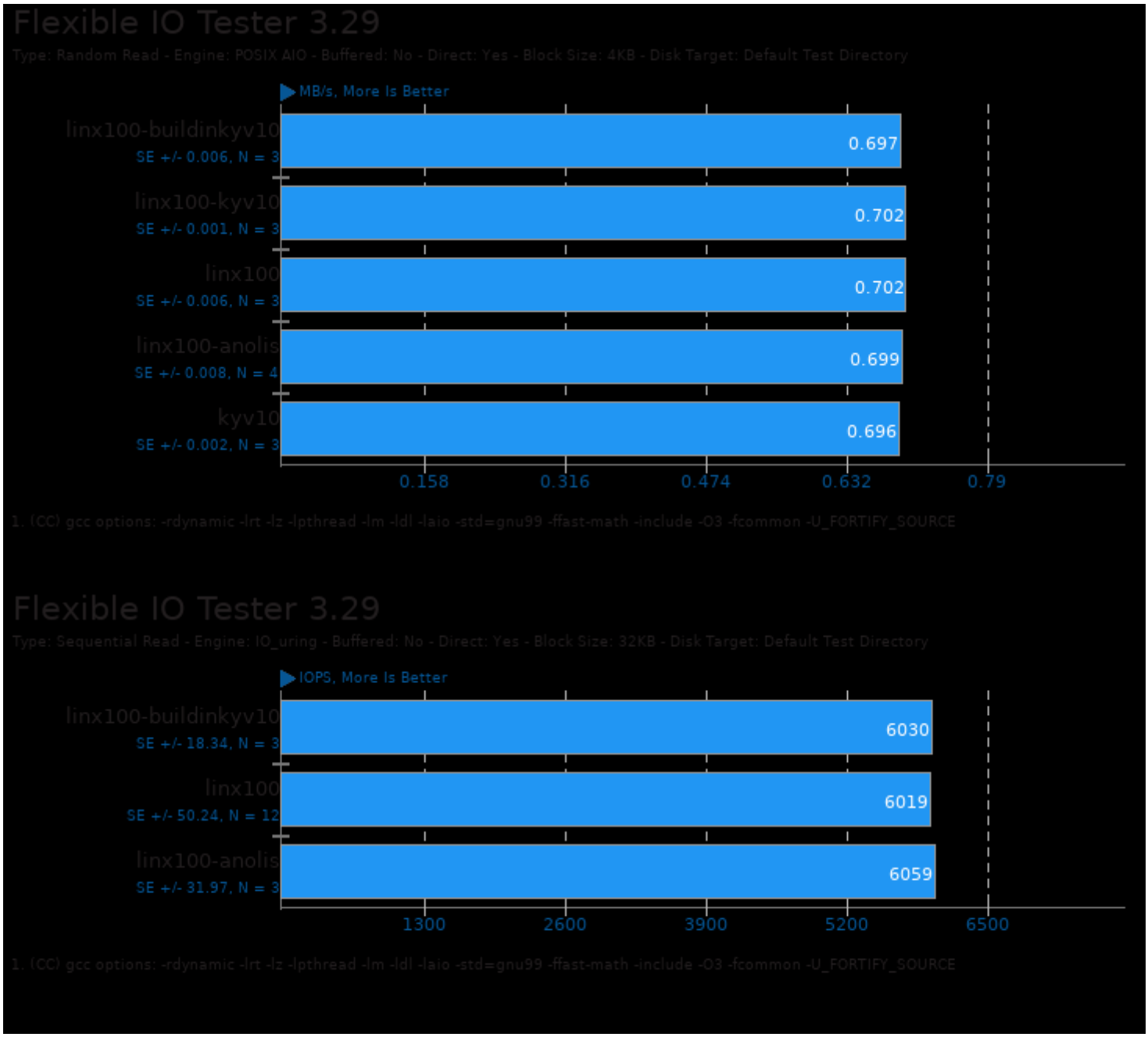

Flexible IO Tester 3.29
Type: Sequential Write - Engine: POSIX AIO - Buffered: No - Direct: Yes - Block Size: 16KB - Disk Target: Default Test Directory
IOPS, More Is Better
linx100-buildinkyv10
12100
linx100-kyv10
SE +/- 33.33, N = 3
11967
linx100
SE +/- 33.33, N = 3
12067
linx100-anolis
SE +/- 33.33, N = 3
12033
kyv10
SE +/- 152.75, N = 3
12000
3K
6K
9K
12K
15K
1. (CC) gcc options: -rdynamic -lrt -lz -lpthread -lm -ldl -laio -std=gnu99 -ffast-math -include -O3 -fcommon -U_FORTIFY_SOURCE
Flexible IO Tester 3.29
Type: Sequential Write - Engine: IO_uring - Buffered: No - Direct: Yes - Block Size: 16KB - Disk Target: Default Test Directory
IOPS, More Is Better
linx100-buildinkyv10
12100
linx100
SE +/- 33.33, N = 3
11967
linx100-anolis
SE +/- 88.19, N = 3
11967
3K
6K
9K
12K
15K
1. (CC) gcc options: -rdynamic -lrt -lz -lpthread -lm -ldl -laio -std=gnu99 -ffast-math -include -O3 -fcommon -U_FORTIFY_SOURCE

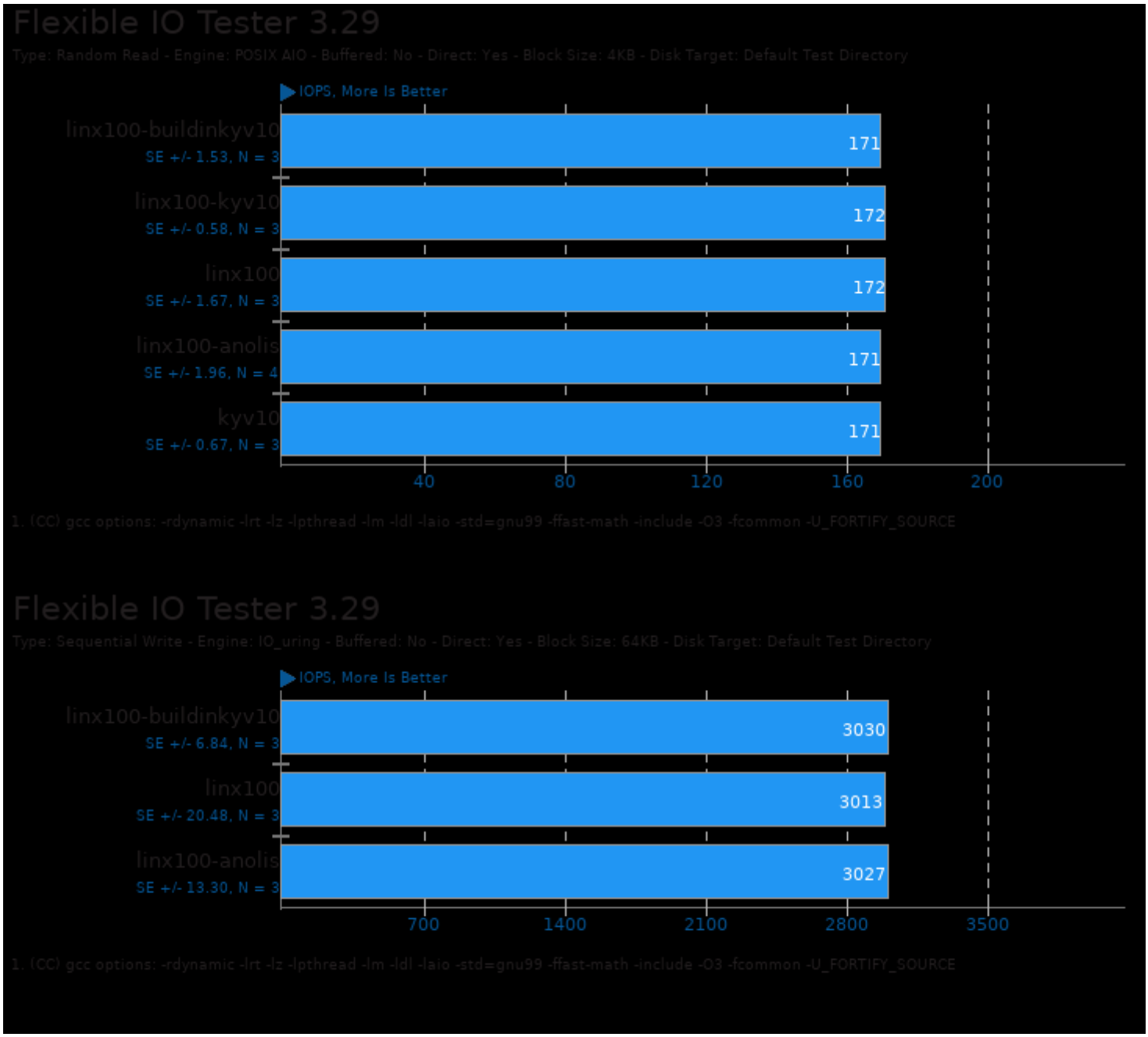
fio-performance



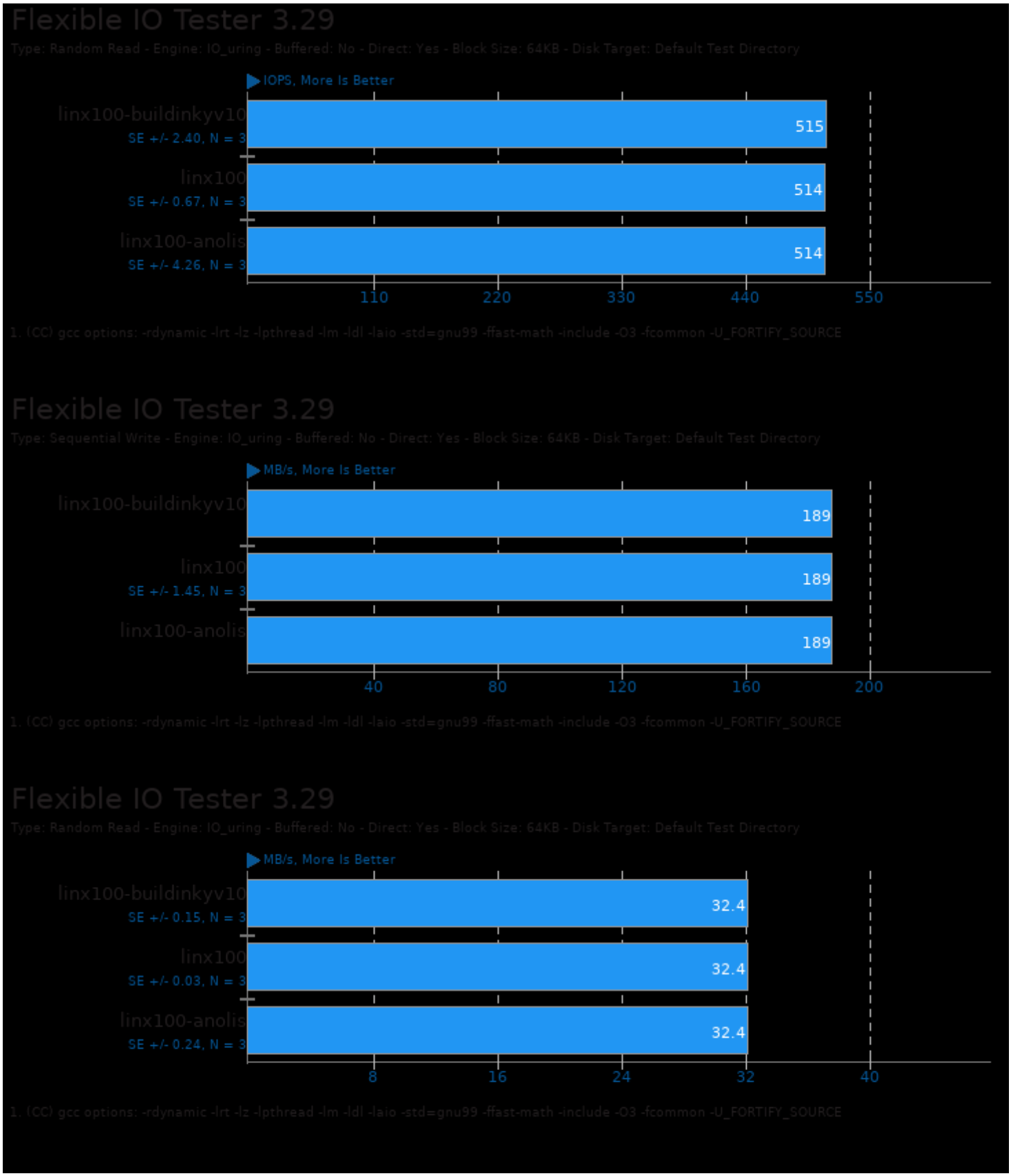
fio-performance



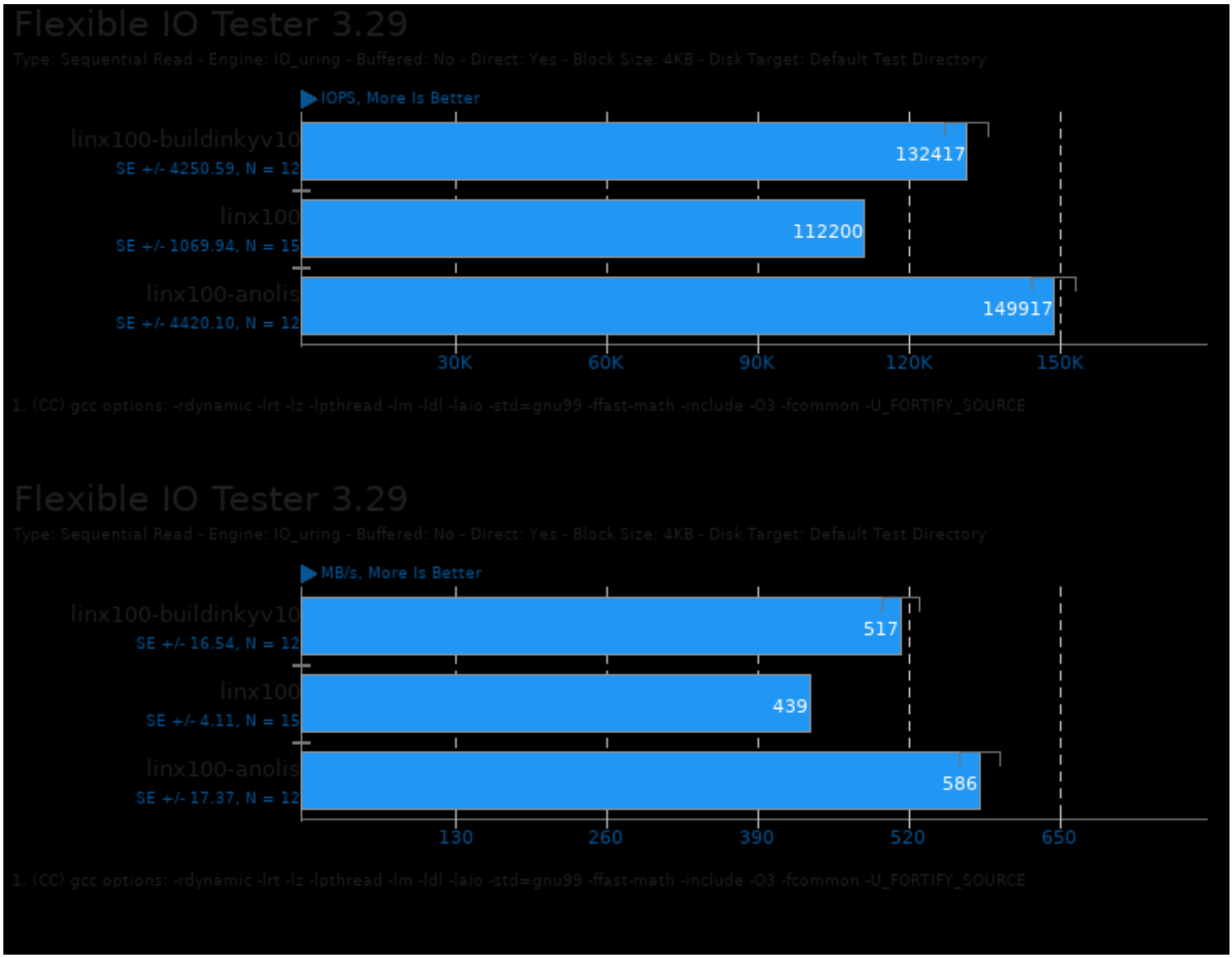

Flexible IO Tester 3.29
Type: Random Read - Engine: POSIX AIO - Buffered: No - Direct: Yes - Block Size: 4KB - Disk Target: Default Test Directory
MB/s, More Is Better
linx100-buildinkyv10
SE +/- 0.006, N = 3
0.697
linx100-kyv10
SE +/- 0.001, N = 3
0.702
linx100
SE +/- 0.006, N = 3
0.702
linx100-anolis
SE +/- 0.008, N = 4
0.699
kyv10
SE +/- 0.002, N = 3
0.696
0.158
0.316
0.474
0.632
0.79
1. (CC) gcc options: -rdynamic -lrt -lz -lpthread -lm -ldl -laio -std=gnu99 -ffast-math -include -O3 -fcommon -U_FORTIFY_SOURCE
Flexible IO Tester 3.29
Type: Sequential Read - Engine: IO_uring - Buffered: No - Direct: Yes - Block Size: 32KB - Disk Target: Default Test Directory
IOPS, More Is Better
linx100-buildinkyv10
SE +/- 18.34, N = 3
6030
linx100
SE +/- 50.24, N = 12
6019
linx100-anolis
SE +/- 31.97, N = 3
6059
1300
2600
3900
5200
6500
1. (CC) gcc options: -rdynamic -lrt -lz -lpthread -lm -ldl -laio -std=gnu99 -ffast-math -include -O3 -fcommon -U_FORTIFY_SOURCE


Flexible IO Tester 3.29
Type: Random Read - Engine: POSIX AIO - Buffered: No - Direct: Yes - Block Size: 4KB - Disk Target: Default Test Directory
IOPS, More Is Better
linx100-buildinkyv10
SE +/- 1.53, N = 3
171
linx100-kyv10
SE +/- 0.58, N = 3
172
linx100
SE +/- 1.67, N = 3
172
linx100-anolis
SE +/- 1.96, N = 4
171
kyv10
SE +/- 0.67, N = 3
171
40
80
120
160
200
1. (CC) gcc options: -rdynamic -lrt -lz -lpthread -lm -ldl -laio -std=gnu99 -ffast-math -include -O3 -fcommon -U_FORTIFY_SOURCE
Flexible IO Tester 3.29
Type: Sequential Write - Engine: IO_uring - Buffered: No - Direct: Yes - Block Size: 64KB - Disk Target: Default Test Directory
IOPS, More Is Better
linx100-buildinkyv10
SE +/- 6.84, N = 3
3030
linx100
SE +/- 20.48, N = 3
3013
linx100-anolis
SE +/- 13.30, N = 3
3027
700
1400
2100
2800
3500
1. (CC) gcc options: -rdynamic -lrt -lz -lpthread -lm -ldl -laio -std=gnu99 -ffast-math -include -O3 -fcommon -U_FORTIFY_SOURCE

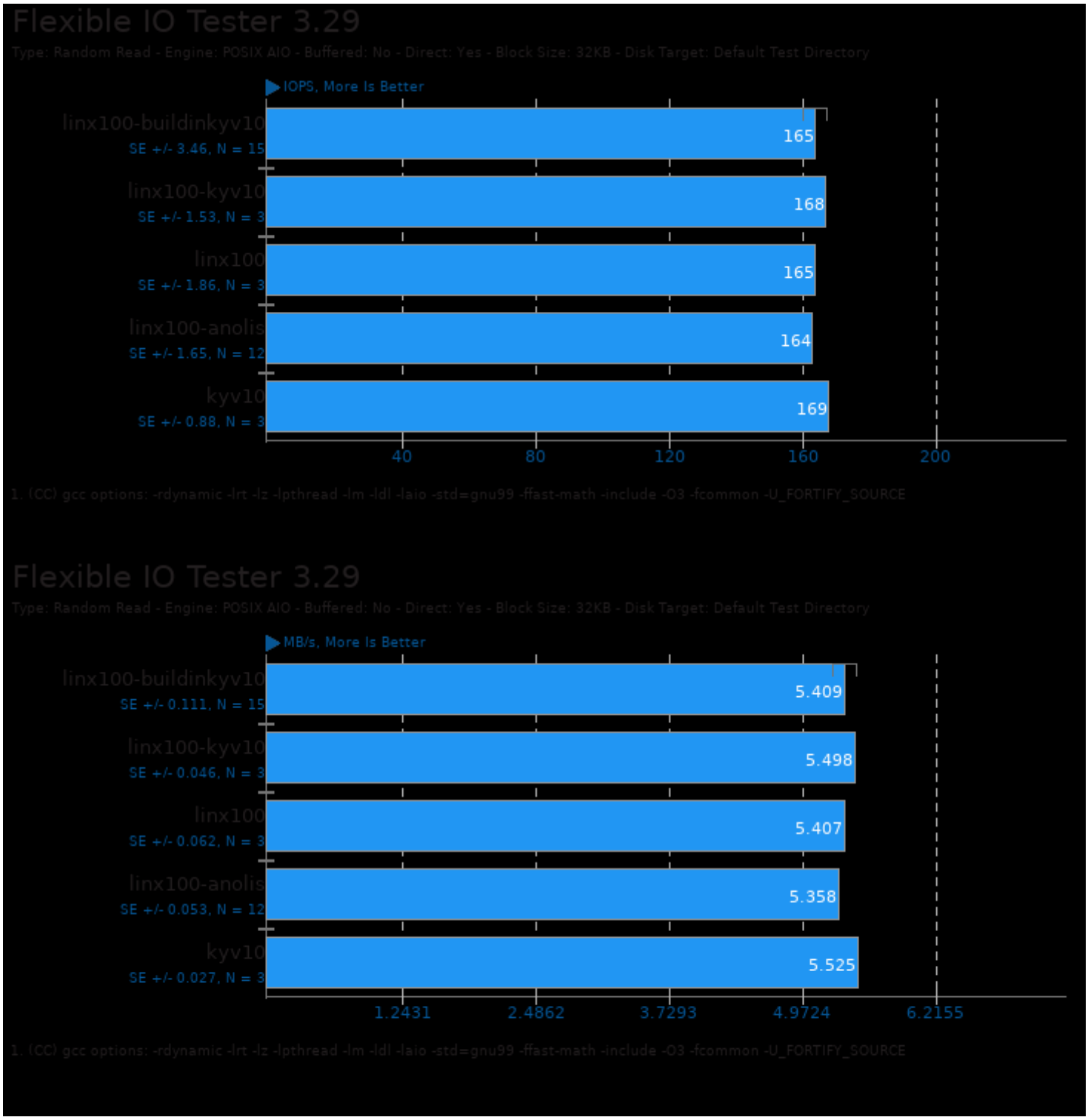
fio-performance



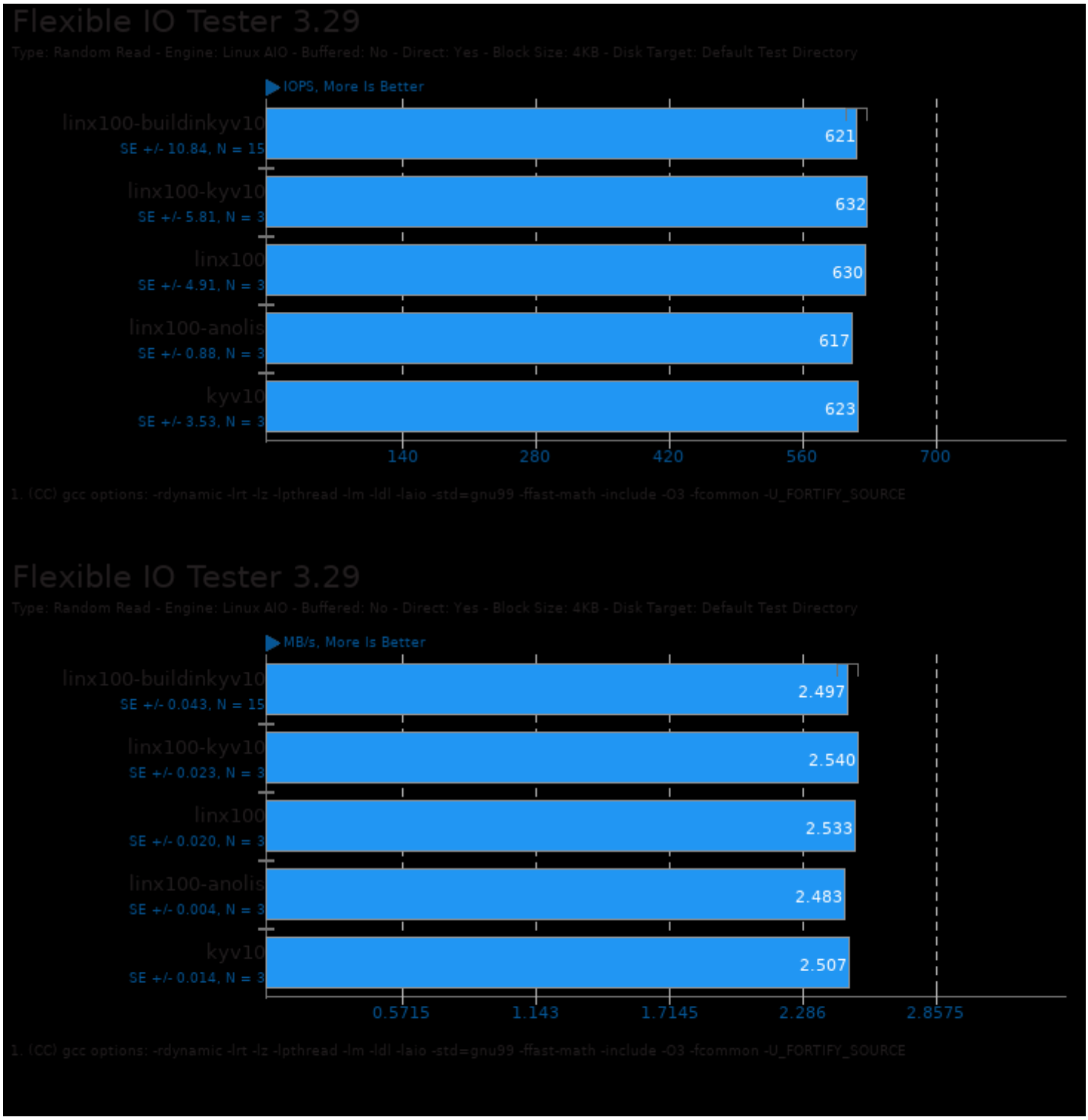
fio-performance

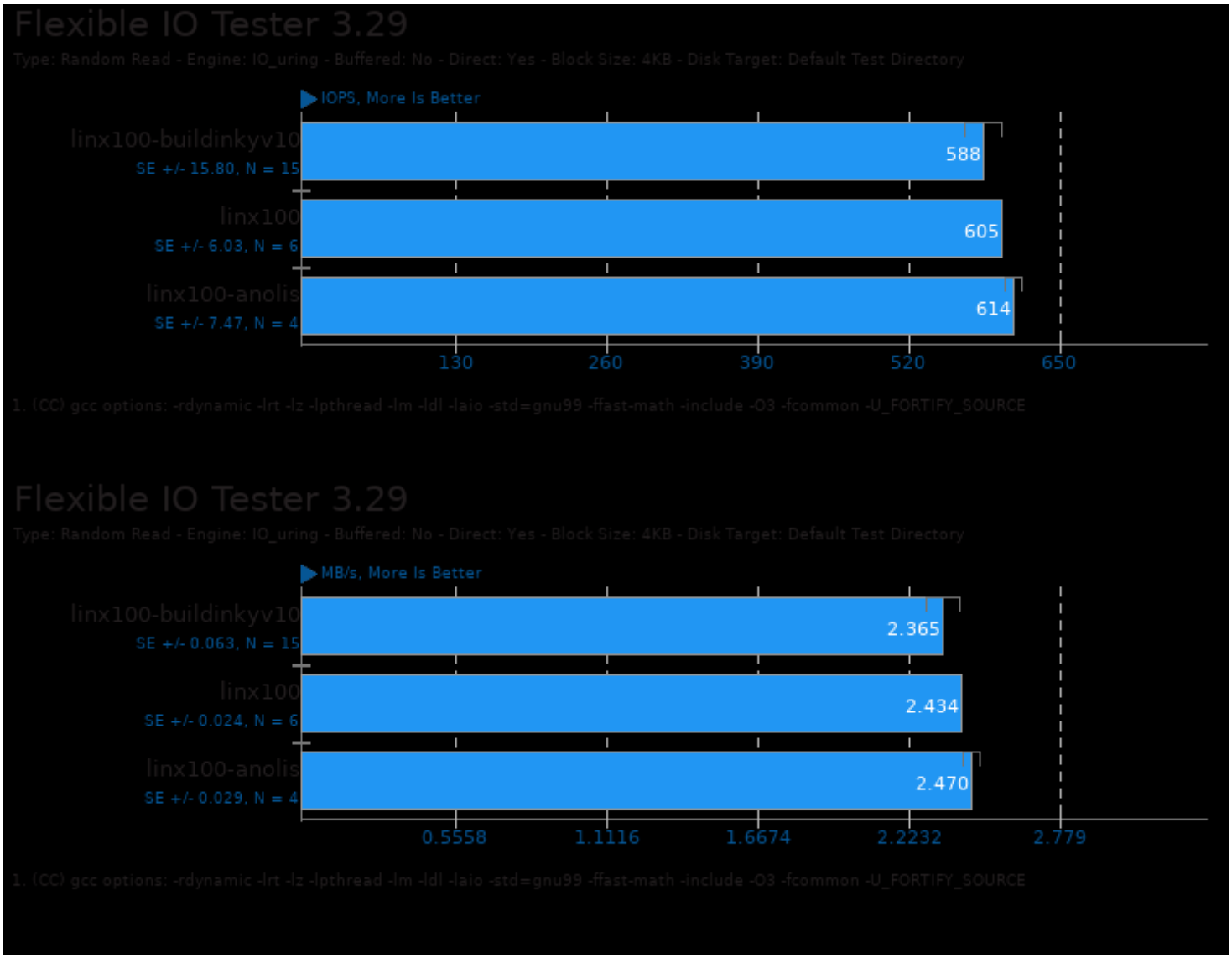


fio-performance



fio-performance





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