



SPEC CPU®2017 Integer Rate Result

Copyright 2017-2021 Standard Performance Evaluation Corporation

Altos Computing Inc.

SPECrate®2017_int_base = 89.4

BrainSphere T350 F4 (Intel Xeon Silver 4208)

SPECrate®2017_int_peak = 91.9

CPU2017 License: 97

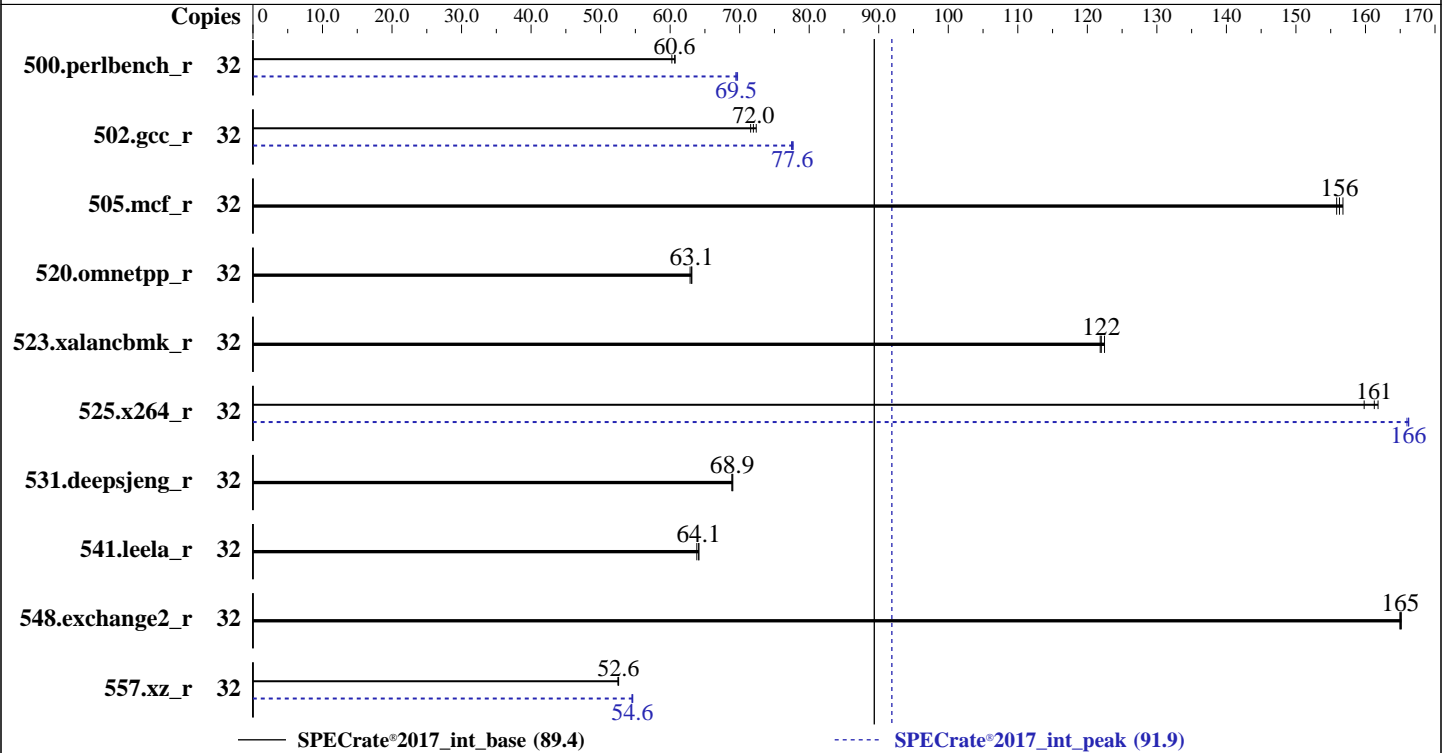
Test Date: Oct-2021

Test Sponsor: Altos Computing Inc.

Hardware Availability: Feb-2020

Tested by: Altos Computing Inc.

Software Availability: Aug-2020



Hardware

CPU Name: Intel Xeon Silver 4208
 Max MHz: 3200
 Nominal: 2100
 Enabled: 16 cores, 2 chips, 2 threads/core
 Orderable: 1,2 chips
 Cache L1: 32 KB I + 32 KB D on chip per core
 L2: 1 MB I+D on chip per core
 L3: 11 MB I+D on chip per chip
 Other: None
 Memory: 384 GB (12 x 32 GB 2Rx4 PC4-2933V-R, running at 2400)
 Storage: 1 x 240 GB SATA SSD
 Other: None

Software

OS: Red Hat Enterprise Linux release 8.1 (Ootpa) 4.18.0-147.el8.x86_64
 Compiler: C/C++: Version 19.1.2.275 of Intel C/C++ Compiler Build 20200623 for Linux; Fortran: Version 19.1.2.275 of Intel Fortran Compiler Build 20200623 for Linux
 Parallel: No
 Firmware: Version 3.3 released Jul-2020
 File System: xfs
 System State: Run level 3 (multi-user)
 Base Pointers: 64-bit
 Peak Pointers: 32/64-bit
 Other: jemalloc memory allocator V5.0.1
 Power Management: BIOS and OS set to prefer performance at the cost of additional power usage



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Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
500.perlbench_r	32	840	60.6	839	60.7	846	60.2	32	733	69.5	733	69.5	731	69.7
502.gcc_r	32	630	72.0	633	71.6	626	72.4	32	584	77.6	583	77.7	585	77.5
505.mcf_r	32	332	156	330	157	331	156	32	332	156	330	157	331	156
520.omnetpp_r	32	665	63.1	668	62.9	665	63.1	32	665	63.1	668	62.9	665	63.1
523.xalancbmk_r	32	276	122	277	122	277	122	32	276	122	277	122	277	122
525.x264_r	32	347	161	346	162	351	160	32	337	166	338	166	337	166
531.deepsjeng_r	32	532	68.9	531	69.0	532	68.9	32	532	68.9	531	69.0	532	68.9
541.leela_r	32	826	64.1	827	64.1	830	63.8	32	826	64.1	827	64.1	830	63.8
548.exchange2_r	32	508	165	508	165	508	165	32	508	165	508	165	508	165
557.xz_r	32	658	52.6	657	52.6	658	52.5	32	633	54.6	634	54.5	633	54.6

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Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

Submit Notes

The numactl mechanism was used to bind copies to processors. The config file option 'submit' was used to generate numactl commands to bind each copy to a specific processor. For details, please see the config file.

Operating System Notes

Stack size set to unlimited using "ulimit -s unlimited"

Environment Variables Notes

Environment variables set by runcpu before the start of the run:

LD_LIBRARY_PATH =

"/home/spec2017/lib/intel64:/home/spec2017/lib/ia32:/home/spec2017/je5.0
.1-32"

MALLOC_CONF = "retain:true"

General Notes

Binaries compiled on a system with 1x Intel Core i9-7980XE CPU + 64GB RAM memory using Redhat Enterprise Linux 8.0
Transparent Huge Pages enabled by default
Prior to runcpu invocation
Filesystem page cache synced and cleared with:
sync; echo 3> /proc/sys/vm/drop_caches
runcpu command invoked through numactl i.e.:

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General Notes (Continued)

numactl --interleave=all runcpu <etc>

NA: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown) is mitigated in the system as tested and documented.

Yes: The test sponsor attests, as of date of publication, that CVE-2017-5753 (Spectre variant 1) is mitigated in the system as tested and documented.

Yes: The test sponsor attests, as of date of publication, that CVE-2017-5715 (Spectre variant 2) is mitigated in the system as tested and documented.

jemalloc, a general purpose malloc implementation

built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5

sources available from jemalloc.net or <https://github.com/jemalloc/jemalloc/releases>

Platform Notes

BIOS Configuration:

Power Policy Quick Settings set to Performance

IMC Interleaving set to 1-way Interleave

SNC (Sub_NUMA Cluster) set to Enabled

Sysinfo program /home/spec2017/bin/sysinfo

Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acafc64d

running on linuxRH Sat Oct 9 17:42:19 2021

SUT (System Under Test) info as seen by some common utilities.

For more information on this section, see

<https://www.spec.org/cpu2017/Docs/config.html#sysinfo>

From /proc/cpuinfo

model name : Intel(R) Xeon(R) Silver 4208 CPU @ 2.10GHz

2 "physical id"s (chips)

32 "processors"

cores, siblings (Caution: counting these is hw and system dependent. The following excerpts from /proc/cpuinfo might not be reliable. Use with caution.)

cpu cores : 8

siblings : 16

physical 0: cores 0 1 2 3 4 5 6 7

physical 1: cores 0 1 2 3 4 5 6 7

From lscpu from util-linux 2.32.1:

Architecture: x86_64

CPU op-mode(s): 32-bit, 64-bit

Byte Order: Little Endian

CPU(s): 32

On-line CPU(s) list: 0-31

Thread(s) per core: 2

Core(s) per socket: 8

Socket(s): 2

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Platform Notes (Continued)

```

NUMA node(s):      2
Vendor ID:         GenuineIntel
CPU family:        6
Model:             85
Model name:        Intel(R) Xeon(R) Silver 4208 CPU @ 2.10GHz
Stepping:          7
CPU MHz:           2495.343
CPU max MHz:       3200.0000
CPU min MHz:       800.0000
BogoMIPS:          4200.00
Virtualization:    VT-x
L1d cache:         32K
L1i cache:         32K
L2 cache:          1024K
L3 cache:          11264K
NUMA node0 CPU(s): 0-7,16-23
NUMA node1 CPU(s): 8-15,24-31

```

```

Flags:              fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov
pat pse36 clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdtscp
lm constant_tsc art arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid
aperfperf pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16
xtpr pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave
avx f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault epb cat_l3 cdp_l3
invpcid_single intel_ppin ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vnmi
flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm
cqm mpx rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd
avx512bw avx512vl xsaveopt xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total
cqm_mbm_local dtherm ida arat pln pts pku ospke avx512_vnni md_clear flush_l1d
arch_capabilities

```

```

/proc/cpuinfo cache data
cache size : 11264 KB

```

From numactl --hardware

WARNING: a numactl 'node' might or might not correspond to a physical chip.

```

available: 2 nodes (0-1)
node 0 cpus: 0 1 2 3 4 5 6 7 16 17 18 19 20 21 22 23
node 0 size: 192619 MB
node 0 free: 190958 MB
node 1 cpus: 8 9 10 11 12 13 14 15 24 25 26 27 28 29 30 31
node 1 size: 193532 MB
node 1 free: 187135 MB
node distances:
node  0  1
  0:  10  21
  1:  21  10

```

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Platform Notes (Continued)

From /proc/meminfo

MemTotal: 395419660 kB

HugePages_Total: 0

Hugepagesize: 2048 kB

/sbin/tuned-adm active

Current active profile: throughput-performance

/sys/devices/system/cpu/cpu*/cpufreq/scaling_governor has performance

From /etc/*release* /etc/*version*

os-release:

NAME="Red Hat Enterprise Linux"

VERSION="8.1 (Ootpa)"

ID="rhel"

ID_LIKE="fedora"

VERSION_ID="8.1"

PLATFORM_ID="platform:el8"

PRETTY_NAME="Red Hat Enterprise Linux 8.1 (Ootpa)"

ANSI_COLOR="0;31"

redhat-release: Red Hat Enterprise Linux release 8.1 (Ootpa)

system-release: Red Hat Enterprise Linux release 8.1 (Ootpa)

system-release-cpe: cpe:/o:redhat:enterprise_linux:8.1:ga

uname -a:

Linux linuxRH 4.18.0-147.el8.x86_64 #1 SMP Thu Sep 26 15:52:44 UTC 2019 x86_64 x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:

CVE-2018-12207 (iTLB Multihit):

No status reported

CVE-2018-3620 (L1 Terminal Fault):

Not affected

Microarchitectural Data Sampling:

Not affected

CVE-2017-5754 (Meltdown):

Not affected

CVE-2018-3639 (Speculative Store Bypass):

Mitigation: Speculative Store Bypass disabled via prctl and seccomp

CVE-2017-5753 (Spectre variant 1):

Mitigation: usercopy/swapgs barriers and __user pointer sanitization

CVE-2017-5715 (Spectre variant 2):

Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling

CVE-2020-0543 (Special Register Buffer Data Sampling): No status reported

CVE-2019-11135 (TSX Asynchronous Abort):

No status reported

run-level 3 Oct 8 06:14

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Platform Notes (Continued)

SPEC is set to: /home/spec2017

Filesystem	Type	Size	Used	Avail	Use%	Mounted on
/dev/mapper/rhel-home	xfs	151G	23G	128G	15%	/home

From /sys/devices/virtual/dmi/id

Vendor: Altos
 Product: BrainSphere T350 F4
 Product Family: Altos Server
 Serial: 123456789

Additional information from dmidecode 3.2 follows. WARNING: Use caution when you interpret this section. The 'dmidecode' program reads system data which is "intended to allow hardware to be accurately determined", but the intent may not be met, as there are frequent changes to hardware, firmware, and the "DMTF SMBIOS" standard.

Memory:

4x NO DIMM NO DIMM
 12x Samsung M393A4K40CB2-CVF 32 GB 2 rank 2933, configured at 2400

BIOS:

BIOS Vendor: American Megatrends Inc.
 BIOS Version: 3.3
 BIOS Date: 07/31/2020
 BIOS Revision: 5.14

(End of data from sysinfo program)

Compiler Version Notes

```
=====
C      | 502.gcc_r(peak)
```

```
-----
Intel(R) C Compiler for applications running on IA-32, Version 19.1.2.275
Build 20200604
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
```

```
=====
C      | 500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base, peak)
      | 525.x264_r(base, peak) 557.xz_r(base)
```

```
-----
Intel(R) C Compiler for applications running on Intel(R) 64, Version
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```

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Compiler Version Notes (Continued)

=====
C | 500.perlbench_r(peak) 557.xz_r(peak)

Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.1.2.275 Build 20200623
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

=====
C | 502.gcc_r(peak)

Intel(R) C Compiler for applications running on IA-32, Version 19.1.2.275
Build 20200604
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

=====
C | 500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base, peak)
525.x264_r(base, peak) 557.xz_r(base)

Intel(R) C Compiler for applications running on Intel(R) 64, Version
19.1.2.275 Build 20200604
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

=====
C | 500.perlbench_r(peak) 557.xz_r(peak)

Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.1.2.275 Build 20200623
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

=====
C | 502.gcc_r(peak)

Intel(R) C Compiler for applications running on IA-32, Version 19.1.2.275
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=====
C | 500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base, peak)
525.x264_r(base, peak) 557.xz_r(base)

Intel(R) C Compiler for applications running on Intel(R) 64, Version
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Compiler Version Notes (Continued)

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C | 500.perlbench_r(peak) 557.xz_r(peak)

Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.1.2.275 Build 20200623

Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

C++ | 520.omnetpp_r(base, peak) 523.xalancbmk_r(base, peak) 531.deepsjeng_r(base, peak) 541.leela_r(base, peak)

Intel(R) C++ Compiler for applications running on Intel(R) 64, Version 19.1.2.275 Build 20200604

Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

Fortran | 548.exchange2_r(base, peak)

Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.1.2.275 Build 20200623

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Base Compiler Invocation

C benchmarks:

icc

C++ benchmarks:

icpc

Fortran benchmarks:

ifort

Base Portability Flags

500.perlbench_r: -DSPEC_LP64 -DSPEC_LINUX_X64

502.gcc_r: -DSPEC_LP64

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Base Portability Flags (Continued)

```

505.mcf_r: -DSPEC_LP64
520.omnetpp_r: -DSPEC_LP64
523.xalancbmk_r: -DSPEC_LP64 -DSPEC_LINUX
525.x264_r: -DSPEC_LP64
531.deepsjeng_r: -DSPEC_LP64
541.leela_r: -DSPEC_LP64
548.exchange2_r: -DSPEC_LP64
557.xz_r: -DSPEC_LP64

```

Base Optimization Flags

C benchmarks:

```

-m64 -qnextgen -std=c11
-Wl,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs
-xCORE-AVX2 -O3 -ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4
-L/usr/local/IntelCompiler19/compilers_and_libraries_2020.3.275/linux/compiler/lib/intel64_lin
-lqkmalloc

```

C++ benchmarks:

```

-m64 -qnextgen -Wl,-plugin-opt=-x86-branches-within-32B-boundaries
-Wl,-z,muldefs -xCORE-AVX2 -O3 -ffast-math -flto -mfpmath=sse
-funroll-loops -qopt-mem-layout-trans=4
-L/usr/local/IntelCompiler19/compilers_and_libraries_2020.3.275/linux/compiler/lib/intel64_lin
-lqkmalloc

```

Fortran benchmarks:

```

-m64 -Wl,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs
-xCORE-AVX2 -O3 -ipo -no-prec-div -qopt-mem-layout-trans=4
-nostandard-realloc-lhs -align array32byte -auto
-mbranches-within-32B-boundaries
-L/usr/local/IntelCompiler19/compilers_and_libraries_2020.3.275/linux/compiler/lib/intel64_lin
-lqkmalloc

```

Peak Compiler Invocation

C benchmarks:

icc

C++ benchmarks:

icpc

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Peak Compiler Invocation (Continued)

Fortran benchmarks:

ifort

Peak Portability Flags

```
500.perlbench_r: -DSPEC_LP64 -DSPEC_LINUX_X64
502.gcc_r: -D_FILE_OFFSET_BITS=64
505.mcf_r: -DSPEC_LP64
520.omnetpp_r: -DSPEC_LP64
523.xalancbmk_r: -DSPEC_LP64 -DSPEC_LINUX
525.x264_r: -DSPEC_LP64
531.deepsjeng_r: -DSPEC_LP64
541.leela_r: -DSPEC_LP64
548.exchange2_r: -DSPEC_LP64
557.xz_r: -DSPEC_LP64
```

Peak Optimization Flags

C benchmarks:

```
500.perlbench_r: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2)
-xCORE-AVX2 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=4 -fno-strict-overflow
-mbranches-within-32B-boundaries
-L/usr/local/IntelCompiler19/compilers_and_libraries_2020.3.275/linux/compiler/lib/intel64_lin
-lqkmalloc

502.gcc_r: -m32
-L/usr/local/IntelCompiler19/compilers_and_libraries_2020.3.275/linux/compiler/lib/ia32_lin
-std=gnu89
-Wl,-plugin-opt=-x86-branches-within-32B-boundaries
-Wl,-z,muldefs -fprofile-generate(pass 1)
-fprofile-use=default.profdata(pass 2) -xCORE-AVX2 -flto
-Ofast(pass 1) -O3 -ffast-math -qnextgen
-qopt-mem-layout-trans=4 -L/usr/local/jemalloc32-5.0.1/lib
-ljemalloc

505.mcf_r: basepeak = yes

525.x264_r: -m64 -qnextgen -std=c11
-Wl,-plugin-opt=-x86-branches-within-32B-boundaries
-Wl,-z,muldefs -xCORE-AVX2 -flto -O3 -ffast-math
```

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Peak Optimization Flags (Continued)

525.x264_r (continued):

```
-qopt-mem-layout-trans=4 -fno-alias  
-L/usr/local/IntelCompiler19/compilers_and_libraries_2020.3.275/linux/compiler/lib/intel64_lin  
-lqkmallo
```

557.xz_r: -Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div

```
-qopt-mem-layout-trans=4 -mbranches-within-32B-boundaries  
-L/usr/local/IntelCompiler19/compilers_and_libraries_2020.3.275/linux/compiler/lib/intel64_lin  
-lqkmallo
```

C++ benchmarks:

520.omnetpp_r: basepeak = yes

523.xalancbmk_r: basepeak = yes

531.deepsjeng_r: basepeak = yes

541.leela_r: basepeak = yes

Fortran benchmarks:

548.exchange2_r: basepeak = yes

The flags files that were used to format this result can be browsed at

http://www.spec.org/cpu2017/flags/Intel-ic19.1u1-official-linux64_revA.html

<http://www.spec.org/cpu2017/flags/Altos-Platform-Settings-V1.0-revD.html>

You can also download the XML flags sources by saving the following links:

http://www.spec.org/cpu2017/flags/Intel-ic19.1u1-official-linux64_revA.xml

<http://www.spec.org/cpu2017/flags/Altos-Platform-Settings-V1.0-revD.xml>

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For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

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