# SPEC CPU®2017 Floating Point Speed Result

## New H3C Technologies Co., Ltd.

### H3C UniServer R4900 G3 (Intel Xeon Platinum 8280)

**SPECspeed®2017_fp_base = 145**  
**SPECspeed®2017_fp_peak = 146**

<table>
<thead>
<tr>
<th>Software</th>
<th>Hardware</th>
</tr>
</thead>
<tbody>
<tr>
<td>OS: Red Hat Enterprise Linux release 8.2 (Ootpa) 4.18.0-193.el8.x86_64</td>
<td>CPU Name: Intel Xeon Platinum 8280</td>
</tr>
<tr>
<td>Compiler: C/C++: Version 19.1.1.217 of Intel C/C++ Compiler Build 20200306 for Linux; Fortran: Version 19.1.1.217 of Intel Fortran Compiler Build 20200306 for Linux</td>
<td>Max MHz: 4000</td>
</tr>
<tr>
<td>Firmware: Version 2.00.39 released Mar-2020 BIOS</td>
<td>Nominal: 2700</td>
</tr>
<tr>
<td>File System: xfs</td>
<td>Enabled: 56 cores, 2 chips</td>
</tr>
<tr>
<td>System State: Run level 3 (multi-user)</td>
<td>Orderable: 1.2 chips</td>
</tr>
<tr>
<td>Base Pointers: 64-bit</td>
<td>Cache L1: 32 KB I + 32 KB D on chip per core</td>
</tr>
<tr>
<td>Peak Pointers: 64-bit</td>
<td>L2: 1 MB I+D on chip per core</td>
</tr>
<tr>
<td>Other: jemalloc memory allocator V5.0.1</td>
<td>L3: 38.5 MB I+D on chip per chip</td>
</tr>
<tr>
<td>Power Management: BIOS set to prefer performance at the cost of additional power usage</td>
<td>Other: None</td>
</tr>
</tbody>
</table>

### Threads

<table>
<thead>
<tr>
<th>Thread</th>
<th>SPECspeed®2017_fp_base</th>
<th>SPECspeed®2017_fp_peak</th>
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<tbody>
<tr>
<td>603.bwaves_s</td>
<td>607.cactuBSSN_s</td>
<td>619.lbm_s</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>627.cam4_s</td>
<td>628.pop2_s</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>644.nab_s</td>
<td>649.fotonik3d_s</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>SPECspeed®2017_fp_base (145)</td>
<td>SPECspeed®2017_fp_peak (146)</td>
</tr>
</tbody>
</table>

**CPU2017 License:** 9066  
**Test Sponsor:** New H3C Technologies Co., Ltd.  
**Tested by:** New H3C Technologies Co., Ltd.  
**Test Date:** Sep-2020  
**Hardware Availability:** Jun-2019  
**Software Availability:** Apr-2020
New H3C Technologies Co., Ltd.

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Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
</tr>
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<tbody>
<tr>
<td>603.bwaves_s</td>
<td>56</td>
<td>120</td>
<td>490</td>
<td>121</td>
<td>486</td>
<td>121</td>
<td>488</td>
<td>56</td>
<td>121</td>
<td>487</td>
<td>121</td>
<td>485</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>56</td>
<td>88.4</td>
<td>189</td>
<td>91.3</td>
<td>183</td>
<td>90.3</td>
<td>185</td>
<td>56</td>
<td>88.4</td>
<td>189</td>
<td>91.3</td>
<td>183</td>
</tr>
<tr>
<td>619.ibm_s</td>
<td>56</td>
<td>55.0</td>
<td>95.2</td>
<td>51.9</td>
<td>101</td>
<td>55.9</td>
<td>93.7</td>
<td>56</td>
<td>55.0</td>
<td>95.2</td>
<td>51.9</td>
<td>101</td>
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<tr>
<td>621.wrf_s</td>
<td>56</td>
<td>103</td>
<td>128</td>
<td>103</td>
<td>128</td>
<td>103</td>
<td>129</td>
<td>56</td>
<td>98.8</td>
<td>134</td>
<td>98.5</td>
<td>134</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>56</td>
<td>74.3</td>
<td>119</td>
<td>73.6</td>
<td>120</td>
<td>73.3</td>
<td>121</td>
<td>56</td>
<td>74.3</td>
<td>119</td>
<td>73.6</td>
<td>120</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>56</td>
<td>191</td>
<td>62.2</td>
<td>188</td>
<td>63.1</td>
<td>194</td>
<td>61.2</td>
<td>56</td>
<td>191</td>
<td>62.2</td>
<td>188</td>
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<td>638.imagick_s</td>
<td>56</td>
<td>116</td>
<td>124</td>
<td>116</td>
<td>124</td>
<td>116</td>
<td>124</td>
<td>56</td>
<td>116</td>
<td>124</td>
<td>116</td>
<td>124</td>
</tr>
<tr>
<td>644.nab_s</td>
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<td>56.0</td>
<td>312</td>
<td>56.3</td>
<td>310</td>
<td>56.1</td>
<td>312</td>
<td>56</td>
<td>54.1</td>
<td>323</td>
<td>54.3</td>
<td>322</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>56</td>
<td>113</td>
<td>80.8</td>
<td>107</td>
<td>85.3</td>
<td>105</td>
<td>86.6</td>
<td>56</td>
<td>105</td>
<td>86.5</td>
<td>104</td>
<td>87.7</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>56</td>
<td>105</td>
<td>151</td>
<td>105</td>
<td>151</td>
<td>103</td>
<td>154</td>
<td>56</td>
<td>105</td>
<td>151</td>
<td>105</td>
<td>151</td>
</tr>
</tbody>
</table>

SPECspeed®2017_fp_base = 145
SPECspeed®2017_fp_peak = 146

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:
KMP_AFFINITY = "granularity=fine,compact"
LD_LIBRARY_PATH = "/home/speccpu/lib/intel64:/home/speccpu/je5.0.1-64"
MALLOC_CONF = "retain:true"
OMP_STACKSIZE = "192M"

General Notes

Binaries compiled on a system with 1x Intel Core i9-7980XE CPU + 64GB RAM
memory using Redhat Enterprise Linux 8.0
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.
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
jemalloc, a general purpose malloc implementation
built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5

(Continued on next page)
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Test Date: Sep-2020
Test Sponsor: New H3C Technologies Co., Ltd.
Hardware Availability: Jun-2019
Tested by: New H3C Technologies Co., Ltd.
Software Availability: Apr-2020

General Notes (Continued)

Platform Notes

BIOS Settings:
Set Hyper Threading to Disabled
Set IMC Interleaving to 2-way Interleave

Sysinfo program /home/speccpu/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7edeb1e6e46a485a0011
running on localhost.localdomain Thu Sep 24 23:52:03 2020

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) Platinum 8280 CPU @ 2.70GHz
  2 "physical id"s (chips)
  56 "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 : 28
siblings : 28
physical 0: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27 28 29 30
physical 1: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27 28 29 30

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-Bit, 64-bit
Byte Order: Little Endian
CPU(s): 56
On-line CPU(s) list: 0-55
Thread(s) per core: 1
Core(s) per socket: 28
Socket(s): 2
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Platinum 8280 CPU @ 2.70GHz
Stepping: 7
CPU MHz: 1000.197
CPU max MHz: 4000.0000

(Continued on next page)
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**Platform Notes (Continued)**

CPU min MHz: 1000.0000
BogoMIPS: 5400.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 39424K
NUMA node0 CPU(s): 0-27
NUMA node1 CPU(s): 28-55
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 pdpesgb rdtscp lm constant_tsc art arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid aperfmperf 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 pdat timer tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault epb cat13 cdp13 invpcid_single intel_pmm ssbd mba ibrs ibpib stibp ibrs_enhanced tpr_shadow vnmi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 2 erms invpcid rtm cqm mpx rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl xsaveopt xsaves xetbvl xsavevc xsavec qm_llc qm_occup_vllc qm_mbm_total qm_mbm_local dtherm ida arat pln pts hwp hwp_act_window hwp_epp hwp_pkg_req pku ospke avx512_vnni md_clear flush_lld arch_capabilities

/proc/cpuinfo cache data

| cache size : 39424 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 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 |
| node 0 size: 191810 MB |
| node 0 free: 186100 MB |
| node 1 cpus: 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 |
| node 1 size: 193529 MB |
| node 1 free: 190520 MB |
| node distances: |
| node 0 1 |
| 0: 10 21 |
| 1: 21 10 |

From /proc/meminfo

| MemTotal: 394588392 KB |
| HugePages_Total: 0 |
| Hugepagesize: 2048 KB |

From /etc/*release* /etc/*version* os-release:

(Continued on next page)
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**Platform Notes (Continued)**

```
NAME="Red Hat Enterprise Linux"
VERSION="8.2 (Ootpa)"
ID="rhel"
ID_LIKE="fedora"
VERSION_ID="8.2"
PLATFORM_ID="platform:el8"
PRETTY_NAME="Red Hat Enterprise Linux 8.2 (Ootpa)"
ANSI_COLOR="0;31"
redhat-release: Red Hat Enterprise Linux release 8.2 (Ootpa)
system-release: Red Hat Enterprise Linux release 8.2 (Ootpa)
system-release-cpe: cpe:/o:redhat:enterprise_linux:8.2:ga
```

```
uname -a:
Linux localhost.localdomain 4.18.0-193.el8.x86_64 #1 SMP Fri Mar 27 14:35:58 UTC 2020
x86_64 x86_64 x86_64 GNU/Linux
```

**Kernel self-reported vulnerability status:**

- **itlb_multihit:** KVM: Mitigation: Split huge pages
- **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
- **tsx_async_abort:** Mitigation: Clear CPU buffers; SMT disabled

```
run-level 3 Sep 24 19:46
SPEC is set to: /home/speccpu
```

```
Filesystem       Type  Size  Used Avail Use% Mounted on
/dev/mapper/rhel-home xfs   503G   87G  416G  18% /home
```

```
From /sys/devices/virtual/dmi/id
BIOS: American Megatrends Inc. 2.00.39 03/24/2020
Vendor: Unis Huashan Technologies Co., Ltd.
Product: UniServer R4900 G3
Product Family: Rack
Serial: 210200A00QH177000025
```

Additional information from dmi_decode follows. WARNING: Use caution when you interpret this section. The 'dmi_decode' 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.

(Continued on next page)
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Platform Notes (Continued)

Memory:
12x NO DIMM NO DIMM  
1x Samsung M393A4K40CB2-CVF 32 GB 2 rank 2933  
11x Samsung M393A4K40DB2-CVF 32 GB 2 rank 2933

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
| C               | 619.lbm_s(base, peak) 638.imagick_s(base, peak)  
| 644.nab_s(base, peak) |
------------------------------------------------------------------------------
| Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,  
Version 19.1.1.217 Build 20200306  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved. |
------------------------------------------------------------------------------

C++, C, Fortran | 607.cactuBSSN_s(base, peak) |
------------------------------------------------------------------------------
| Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,  
Version 19.1.1.217 Build 20200306  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.  
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,  
Version 19.1.1.217 Build 20200306  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.  
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)  
64, Version 19.1.1.217 Build 20200306  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved. |
------------------------------------------------------------------------------

Fortran         | 603.bwaves_s(base, peak) 649.fotonik3d_s(base, peak)  
| 654.roms_s(base, peak) |
------------------------------------------------------------------------------
| Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)  
64, Version 19.1.1.217 Build 20200306  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved. |
------------------------------------------------------------------------------

Fortran, C      | 621.wrf_s(base, peak) 627.cam4_s(base, peak)  
| 628.pop2_s(base, peak) |
------------------------------------------------------------------------------
| Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)  
(Continued on next page)
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**SPEC Benchmark Results**

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<tr>
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**Compiler Version Notes (Continued)**

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Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
Intel (R) C Intel (R) 64 Compiler for applications running on Intel(R) 64,
Version 19.1.1.217 Build 20200306
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

---

**Base Compiler Invocation**

C benchmarks:

```
icc
```

Fortran benchmarks:

```
ifort
```

Benchmarks using both Fortran and C:

```
ifort icc
```

Benchmarks using Fortran, C, and C++:

```
icpc icc ifort
```

---

**Base Portability Flags**

603.bwaves_s: -DSPEC_LP64
607.cactuBSSN_s: -DSPEC_LP64
619.lbm_s: -DSPEC_LP64
621.wrf_s: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert_big_endian
627.cam4_s: -DSPEC_LP64 -DSPEC_CASE_FLAG
628.pop2_s: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert_big_endian
-assume byterecl
638.imagick_s: -DSPEC_LP64
644.nab_s: -DSPEC_LP64
649.fotonik3d_s: -DSPEC_LP64
654.roms_s: -DSPEC_LP64

---

**Base Optimization Flags**

C benchmarks:

```
-m64 -std=c11 -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP -mbranches-within-32B-boundaries
```

(Continued on next page)
Base Optimization Flags (Continued)

Fortran benchmarks:
-m64 -Wl,-z,muldefs -DSPEC_OPENMP -xCORE-AVX512 -ipo -O3
-no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4 -qopenmp -nostandard-realloc-lhs
-mbranches-within-32B-boundaries -L/usr/local/jemalloc64-5.0.1/lib
-ljemalloc

Benchmarks using both Fortran and C:
-m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp
-DSPEC_OPENMP -mbranches-within-32B-boundaries -nostandard-realloc-lhs
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

Benchmarks using Fortran, C, and C++:
-m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp
-DSPEC_OPENMP -mbranches-within-32B-boundaries -nostandard-realloc-lhs
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

Peak Compiler Invocation

C benchmarks:
icc

Fortran benchmarks:
ifort

Benchmarks using both Fortran and C:
ifort icc

Benchmarks using Fortran, C, and C++:
icpc icc ifort

Peak Portability Flags

Same as Base Portability Flags
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Peak Optimization Flags

C benchmarks:

619.lbm_s: basepeak = yes
638.imagick_s: basepeak = yes
644.nab_s: -m64 -std=c11 -Wl,-z,muldefs -xcORE-AVX512 -ipo -O3
-no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP
-mbranches-within-32B-boundaries
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

Fortran benchmarks:

603.bwaves_s: -m64 -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2)
-DSPEC_SUPPRESS_OPENMP -DSPEC_OPENMP -ipo -xcORE-AVX512
-O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4 -qopenmp -nostandard-realloc-lhs
-mbranches-within-32B-boundaries
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
649.fotonik3d_s: Same as 603.bwaves_s
654.roms_s: basepeak = yes

Benchmarks using both Fortran and C:

621.wrf_s: -m64 -std=c11 -Wl,-z,muldefs -prof-gen(pass 1)
-prof-use(pass 2) -ipo -xcORE-AVX512 -O3 -no-prec-div
-qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4
-DSPEC_SUPPRESS_OPENMP -qopenmp -DSPEC_OPENMP
-mbranches-within-32B-boundaries -nostandard-realloc-lhs
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
627.cam4_s: basepeak = yes
628.pop2_s: basepeak = yes

Benchmarks using Fortran, C, and C++:

607.cactuBSSN_s: basepeak = yes

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

http://www.spec.org/cpu2017/flags/New_H3C-Platform-Settings-V1.4-CLX-RevB.html
<table>
<thead>
<tr>
<th>SPEC CPU®2017 Floating Point Speed Result</th>
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</thead>
<tbody>
<tr>
<td>New H3C Technologies Co., Ltd.</td>
</tr>
<tr>
<td>H3C UniServer R4900 G3 (Intel Xeon Platinum 8280)</td>
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<tr>
<td>SPECspeed®2017_fp_base = 145</td>
</tr>
<tr>
<td>SPECspeed®2017_fp_peak = 146</td>
</tr>
</tbody>
</table>

| CPU2017 License: 9066                  |
| Test Sponsor: New H3C Technologies Co., Ltd. |
| Tested by: New H3C Technologies Co., Ltd.   |
| Test Date: Sep-2020                    |
| Hardware Availability: Jun-2019         |
| Software Availability: Apr-2020         |

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

- http://www.spec.org/cpu2017/flags/New_H3C-Platform-Settings-V1.4-CLX-RevB.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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