## SPEC CPU®2017 Integer Speed Result

**Dell Inc.**

PowerEdge T640 (Intel Xeon Gold 6248R, 3.00 GHz)

**SPECspeed®2017_int_base = 11.3**

**SPECspeed®2017_int_peak = 11.6**

<table>
<thead>
<tr>
<th>Test Sponsor: Dell Inc.</th>
<th>Hardware Availability: Feb-2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tested by: Dell Inc.</td>
<td>Software Availability: Apr-2020</td>
</tr>
<tr>
<td>CPU2017 License: 55</td>
<td></td>
</tr>
<tr>
<td>Test Date: May-2020</td>
<td></td>
</tr>
</tbody>
</table>

### Hardware

- **CPU Name:** Intel Xeon Gold 6248R
- **Max MHz:** 4000
- **Nominal:** 3000
- **Enabled:** 48 cores, 2 chips
- **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:** 35.75 MB I+D on chip per chip
- **Other:** None
- **Memory:** 384 GB (24 x 16 GB 2Rx8 PC4-2933V-R, running at 2933)
- **Storage:** 1 x 1.92 TB SATA SSD
- **Other:** None

### Software

- **OS:** Red Hat Enterprise Linux 8.1
  - kernel 4.18.0-147.8.1.el8_1.x86_64
- **Compiler:** C/C++: Version 19.1.1.217 of Intel C/C++ Compiler for Linux;
  - Fortran: Version 19.1.1.217 of Intel Fortran Compiler for Linux
- **Parallel:** Yes
- **Firmware:** Version 2.7.7 released May-2020
- **File System:** xfs
- **System State:** Run level 3 (multi-user)
- **Base Pointers:** 64-bit
- **Peak Pointers:** 64-bit
- **Other:** None
- **jemalloc memory allocator V5.0.1**
- **Power Management:** BIOS set to prefer performance at the cost of additional power usage.

### Performance Results

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>threads</th>
<th>SPEC2017_int_base</th>
<th>SPEC2017_int_peak</th>
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<tr>
<td>perlbench</td>
<td>48</td>
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<tr>
<td>gcc</td>
<td>48</td>
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<tr>
<td>mcf</td>
<td>48</td>
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<td>omnetpp</td>
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<td>xalancbmk</td>
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<tr>
<td>leela</td>
<td>48</td>
<td>4.90</td>
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<tr>
<td>exchange2</td>
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<tr>
<td>xz</td>
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Dell Inc.

PowerEdge T640 (Intel Xeon Gold 6248R, 3.00 GHz)

**SPECspeed®2017_int_base = 11.3**

**SPECspeed®2017_int_peak = 11.6**

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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<th>Seconds</th>
<th>Ratio</th>
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<tbody>
<tr>
<td>600.perlbench_s</td>
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<td>6.88</td>
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<td>6.85</td>
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<td>7.88</td>
<td>48</td>
<td>226</td>
<td>7.84</td>
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<tr>
<td>602.gcc_s</td>
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<td>9.83</td>
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<td>18.3</td>
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<td>18.3</td>
<td>48</td>
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<td>631.deepsjeng_s</td>
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<td>242</td>
<td>5.92</td>
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<td>5.93</td>
<td>48</td>
<td>242</td>
<td>5.92</td>
</tr>
<tr>
<td>641.leela_s</td>
<td>48</td>
<td>348</td>
<td>4.90</td>
<td>348</td>
<td>4.90</td>
<td>48</td>
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<td>657.xz_s</td>
<td>48</td>
<td>257</td>
<td>24.1</td>
<td>257</td>
<td>24.1</td>
<td>48</td>
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<td>256</td>
<td>24.1</td>
<td>48</td>
<td>257</td>
<td>24.1</td>
</tr>
</tbody>
</table>

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

**Compiler Notes**

The inconsistent Compiler version information under Compiler Version section is due to a discrepancy in Intel Compiler. The correct version of C/C++ compiler is: Version 19.1.1.217 Build 20200306 Compiler for Linux

The correct version of Fortran compiler is: Version 19.1.1.217 Build 20200306 Compiler for Linux

**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:

- KMP_AFFINITY = "granularity=fine,scatter"
- LD_LIBRARY_PATH = "/home/cpu2017/lib/intel64:/home/cpu2017/je5.0.1-64"
- MALLOC_CONF = "retain:true"
- OMP_STACKSIZE = "192M"
### Dell Inc.

**PowerEdge T640 (Intel Xeon Gold 6248R, 3.00 GHz)**

<table>
<thead>
<tr>
<th>SPEC Speed Value</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECspeed\textsuperscript{©}2017\textunderscore int\textunderscore peak</td>
<td>11.6</td>
</tr>
<tr>
<td>SPECspeed\textsuperscript{©}2017\textunderscore int\textunderscore base</td>
<td>11.3</td>
</tr>
</tbody>
</table>

**CPU2017 License:** 55  
**Test Date:** May-2020  
**Hardware Availability:** Feb-2020  
**Test Sponsor:** Dell Inc.  
**Software Availability:** Apr-2020  
**Tested by:** Dell Inc.

### General Notes

- Binaries compiled on a system with 1x Intel Core i9-9900K 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
  ```
- runcpu command invoked through numactl i.e.:
  ```
  numactl --interleave=all runcpu <etc>
  ```
- jemalloc, a general purpose malloc implementation
- built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5

### Platform Notes

- BIOS settings:
  - Sub NUMA Cluster enabled
  - Virtualization Technology disabled
  - System Profile set to Custom
  - CPU Performance set to Maximum Performance
  - C States set to Autonomous
  - C1E disabled
  - Uncore Frequency set to Dynamic
  - Energy Efficiency Policy set to Performance
  - Memory Patrol Scrub disabled
  - Logical Processor disabled
  - CPU Interconnect Bus Link Power Management disabled
  - PCI ASPM L1 Link Power Management disabled
  - UPI Prefetch enabled
  - LLC Prefetch disabled
  - Dead Line LLC Alloc enabled
  - Directory AtoS disabled

- Sysinfo program: /home/cpu2017/bin/sysinfo
- Rev: r6365 of 2019-08-21 295195f888a3d7ed1e6e46a485a0011
- running on poweredge-sut-rhel8-1 Tue May 26 06:03:15 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

(Continued on next page)
Platform Notes (Continued)

From /proc/cpuinfo

```plaintext
model name : Intel(R) Xeon(R) Gold 6248R CPU @ 3.00GHz
  2 "physical id"s (chips)
  48 "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 : 24
siblings : 24
physical 0: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 16 17 18 19 20 21 25 26 27 28 29
physical 1: cores 0 1 2 3 4 5 6 9 10 11 12 13 16 17 18 19 20 21 24 25 26 27 28 29
```

From lscpu:

```plaintext
Architecture:        x86_64
CPU op-mode(s):      32-bit, 64-bit
Byte Order:          Little Endian
CPU(s):              48
On-line CPU(s) list: 0-47
Thread(s) per core:  1
Core(s) per socket:  24
Socket(s):           2
NUMA node(s):        2
Vendor ID:           GenuineIntel
CPU family:          6
Model:               85
Model name:          Intel(R) Xeon(R) Gold 6248R CPU @ 3.00GHz
Stepping:            7
CPU MHz:             3700.003
CPU max MHz:         4000.0000
CPU min MHz:         1200.0000
BogoMIPS:            6000.00
Virtualization:      VT-x
L1d cache:           32K
L1i cache:           32K
L2 cache:            1024K
L3 cache:            36608K
NUMA node0 CPU(s):  0,2,4,6,8,10,12,14,16,18,20,22,24,26,28,30,32,34,36,38,40,42,44,46
NUMA node1 CPU(s):  1,3,5,7,9,11,13,15,17,19,21,23,25,27,29,31,33,35,37,39,41,43,45,47
Flags:               fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov
```

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<table>
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PowerEdge T640 (Intel Xeon Gold 6248R, 3.00 GHz)

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**CPU2017 License:** 55  
**Test Date:** May-2020  
**Test Sponsor:** Dell Inc.  
**Hardware Availability:** Feb-2020  
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**Software Availability:** Apr-2020

**Platform Notes (Continued)**

cqm mpx rdt_a avx512f avx512dq rdseed adx smap cflushopt clwb intel_pt avx512cd avx512bw avx512vl xsaveopt xsaves xgetbv1 xsavec 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

```
/cache data
cache size : 36608 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 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46
node 0 size: 192073 MB
node 0 free: 190790 MB
node 1 cpus: 1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41 43 45 47
node 1 size: 193505 MB
node 1 free: 193109 MB
node distances:
  node 0  1
  0:  10  21
  1:  21  10
```

From `/proc/meminfo`

```
MemTotal:       394832380 kB
HugePages_Total:       0
Hugepagesize:       2048 kB
```

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 poweredge-sut-rhel8-1 4.18.0-147.8.1.el8_1.x86_64 #1 SMP Wed Feb 26 03:08:15 UTC 2020 x86_64 x86_64 x86_64 GNU/Linux
```

Kernel self-reported vulnerability status:

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

- **itlb_multihit:** Processor vulnerable
- **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 May 26 06:02 last=5**

**SPEC is set to:** /home/cpu2017

From /sys/devices/virtual/dmi/id
- **BIOS:** Dell Inc. 2.7.7 05/05/2020
- **Vendor:** Dell Inc.
- **Product:** PowerEdge T640
- **Product Family:** PowerEdge
- **Serial:** 1234567

Additional information from dmidecode 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:**
- 14x 002C069D002C 18ASF2G72PDZ-2G9E1 16 GB 2 rank 2933
- 2x 00AD00B300AD HMA82GR7CJR8N-WM 16 GB 2 rank 2933
- 4x 00AD069D00AD HMA82GR7CJR8N-XN 16 GB 2 rank 3200
- 4x 00AD069D00AD HMA82GR7CJR8N-WM 16 GB 2 rank 2933

(End of data from sysinfo program)

### Compiler Version Notes

==============================================================================
<table>
<thead>
<tr>
<th>C</th>
<th>600.perlbench_s(base) 602.gcc_s(base, peak) 605.mcf_s(base, peak) 625.x264_s(base, peak) 657.xz_s(base, peak)</th>
</tr>
</thead>
</table>

Intel(R) C Compiler for applications running on Intel(R) 64, Version 2021.1
NextGen Build 20200304
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

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# SPEC CPU® 2017 Integer Speed Result

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**PowerEdge T640 (Intel Xeon Gold 6248R, 3.00 GHz)**

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## Compiler Version Notes (Continued)

<table>
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<tr>
<th>Platform</th>
<th>Application(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>600.perlbench_s(peak)</td>
</tr>
</tbody>
</table>
|          | 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        | 600.perlbench_s(base) 602.gcc_s(base, peak) 605.mcf_s(base, peak) 625.x264_s(base, peak) 657.xz_s(base, peak) |
|          | Intel(R) C Compiler for applications running on Intel(R) 64, Version 2021.1 NextGen Build 20200304  
|          | Copyright (C) 1985-2020 Intel Corporation. All rights reserved. |
| C++      | 620.omnetpp_s(base, peak) 623.xalancbmk_s(base, peak) 631.deepsjeng_s(base, peak) 641.leela_s(base, peak) |
|          | Intel(R) C++ Compiler for applications running on Intel(R) 64, Version 2021.1 NextGen Build 20200304  
|          | Copyright (C) 1985-2020 Intel Corporation. All rights reserved. |
| Fortran  | 648.exchange2_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. |
Dell Inc.

PowerEdge T640 (Intel Xeon Gold 6248R, 3.00 GHz)

SPEC CPU® 2017 Integer Speed Result

Copyright 2017-2020 Standard Performance Evaluation Corporation

Dell Inc. SPECspeed® 2017_int_base = 11.3
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CPU2017 License: 55
Test Sponsor: Dell Inc.
Test Date: May-2020
Tested by: Dell Inc.
Hardware Availability: Feb-2020
Software Availability: Apr-2020

Base Compiler Invocation

C benchmarks:
   icc

C++ benchmarks:
   icpc

Fortran benchmarks:
   ifort

Base Portability Flags

600.perlbench_s: -DSPEC_LP64 -DSPEC_LINUX_X64
602.gcc_s: -DSPEC_LP64
605.mcf_s: -DSPEC_LP64
620.omnetpp_s: -DSPEC_LP64
623.xalancbmk_s: -DSPEC_LP64 -DSPEC_LINUX
625.x264_s: -DSPEC_LP64
631.deepsjeng_s: -DSPEC_LP64
641.leela_s: -DSPEC_LP64
648.exchange2_s: -DSPEC_LP64
657.xz_s: -DSPEC_LP64

Base Optimization Flags

C benchmarks:
   -m64 -qnextgen -std=c11
   -W1,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs
   -xCORE-AVX512 -O3 -ffast-math -flto -mfpmath=sse -funroll-loops
   -fuse-ld=gold -qopt-mem-layout-trans=4 -fopenmp -DSPEC_OPENMP
   -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

C++ benchmarks:
   -m64 -qnextgen -Wl,-plugin-opt=-x86-branches-within-32B-boundaries
   -Wl,-z,muldefs -xCORE-AVX512 -O3 -ffast-math -flto -mfpmath=sse
   -funroll-loops -fuse-ld=gold -qopt-mem-layout-trans=4
   -L/usr/local/IntelCompiler19/compilers_and_libraries_2020.1.217/linux/compiler/lib/intel64_lin
   -llqkmalloc

Fortran benchmarks:
   -m64 -Wl,-plugin-opt=-x86-branches-within-32B-boundaries -xCORE-AVX512
   -O3 -ipo -no-prec-div -qopt-mem-layout-trans=4
   -nostandard-realloc-lhs -align array32byte

(Continued on next page)
Dell Inc.

PowerEdge T640 (Intel Xeon Gold 6248R, 3.00 GHz)

| SPECspeed®2017_int_base = 11.3 |
| SPECspeed®2017_int_peak = 11.6 |

Base Optimization Flags (Continued)

Fortran benchmarks (continued):
-mbranches-within-32B-boundaries

Peak Compiler Invocation

C benchmarks:
icc

C++ benchmarks:
icpc

Fortran benchmarks:
ifort

Peak Portability Flags

600.perlbench_s: -DSPEC_LP64 -DSPEC_LINUX_X64
602.gcc_s: -DSPEC_LP64(*) -DSPEC_LP64
605.mcf_s: -DSPEC_LP64
620.omnetpp_s: -DSPEC_LP64
623.xalancbmk_s: -DSPEC_LP64 -DSPEC_LINUX
625.x264_s: -DSPEC_LP64
631.deepsjeng_s: -DSPEC_LP64
641.leela_s: -DSPEC_LP64
648.exchange2_s: -DSPEC_LP64
657.xz_s: -DSPEC_LP64

(*) Indicates a portability flag that was found in a non-portability variable.

Peak Optimization Flags

C benchmarks:
600.perlbench_s: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2)
-xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=4 -fno-strict-overflow
-mbranches-within-32B-boundaries
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

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</table>

### CPU2017 License: 55

**Test Sponsor:** Dell Inc.  
**Tested by:** Dell Inc.

### Test Date: May-2020

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**Software Availability:** Apr-2020

## Peak Optimization Flags (Continued)

```bash
602.gcc_s: -m64 -qnextgen -std=c11 -fuse-ld=gold
-\W1, -plugin-opt=-x86-branches-within-32B-boundaries
-\W1, -z, multiefs -fprofile-generate(pass 1)
-\fprofile-use=default.profdata(pass 2) -xCORE-AVX512 -flto
-\fart(pass 1) -O3 -ffast-math -gopt-mem-layout-trans=4
-\L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

605.mcf_s\[basepeak = yes\]:

625.x264_s: -m64 -qnextgen -std=c11
-\W1, -plugin-opt=-x86-branches-within-32B-boundaries
-\W1, -z, multiefs -xCORE-AVX512 -flto -O3 -ffast-math
-\fuse-ld=gold -gopt-mem-layout-trans=4 -fno-alias
-\L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

657.xz_s: basepeak = yes

C++ benchmarks:

620.omnetpp_s: basepeak = yes

623.xalancbmk_s: basepeak = yes

631.deepsjeng_s: basepeak = yes

641.leela_s: basepeak = yes

Fortran benchmarks:

648.exchange2_s: basepeak = yes

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


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


```

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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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